

# **APPENDIX B • WATER MANAGEMENT SCHEMATIC FLOW SHEETS**

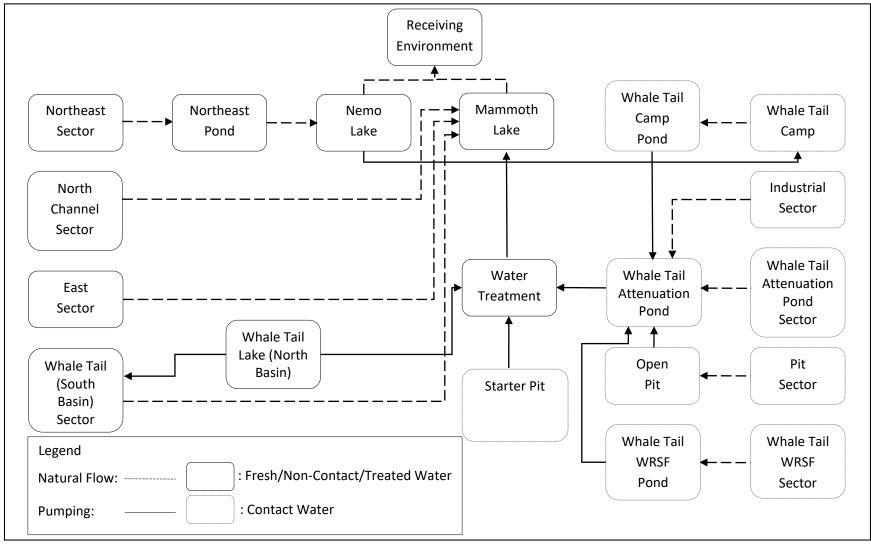


Figure B.1 Water Management Flowsheet during Construction and Operations

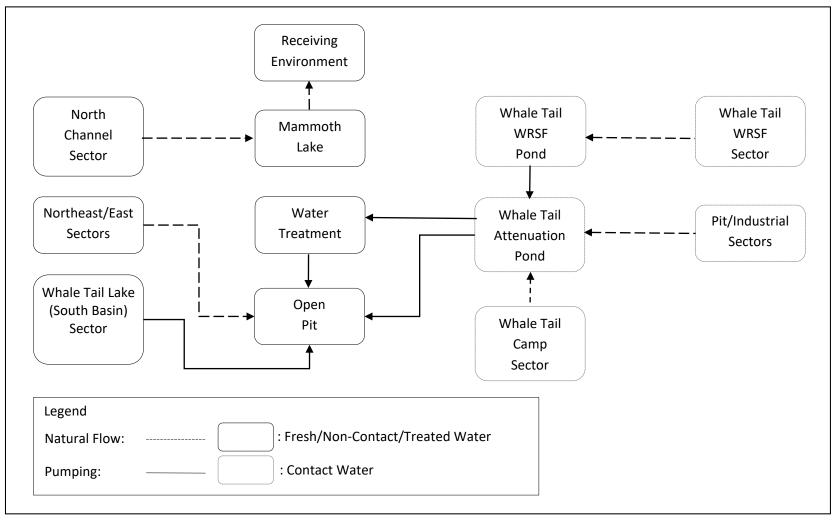


Figure B.2 Water Management Flowsheet during Closure (Year 4 [2022] to Year 7 [2025])

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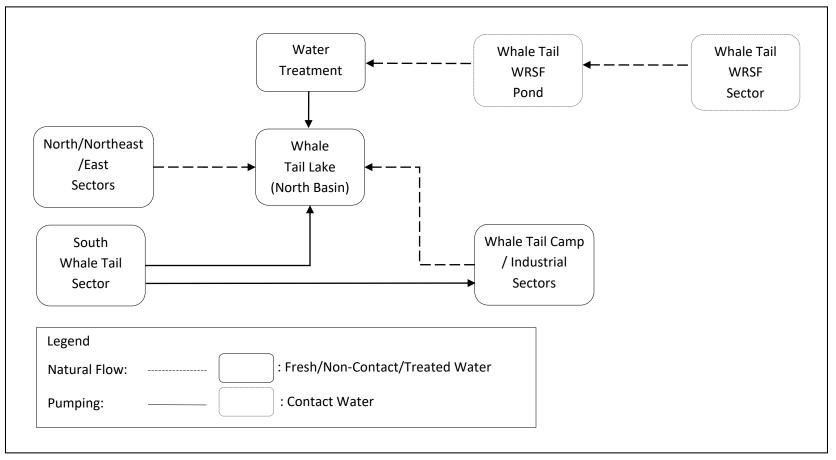


Figure B.3 Water Management Flowsheet during Closure (Year 8 [2026] to Year 11 [2029])

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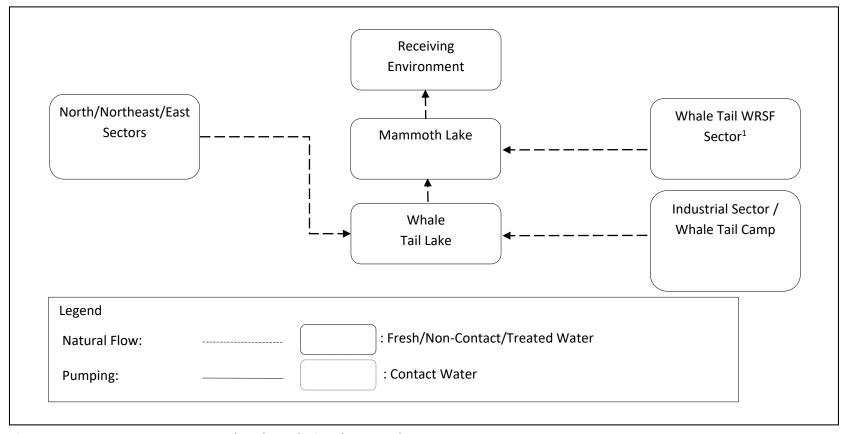


Figure B.4 Water Management Flowsheet during the Post-Closure

<sup>&</sup>lt;sup>1</sup> Breaching of Whale Tail WRSF Dike may be delayed if water treatment is required

# **APPENDIX C ● SELECTED YEARLY WATER BALANCE DATA**

Water balances for each storage facilities were extracted from the permitting level engineering report (SNC 2015) under mean annual climate conditions for the operational phase. Design criteria and considerations can be found in the permitting level engineering report (SNC 2015), and in the FEIS, Volume 2, Appendix 2-J.

 Table C.1
 Whale Tail Waste Rock Storage Facility Pond Water Balance

Month	Temperature	Snowfall	Max Snow Sublimation	Net Inflow from Snow	Rainfall	Total Runoff	Other Qin	Total Inflow	Lake Evaporation	Maximum Evapotrans- piration	Total Inflow Net from Evaporation	Pumping out	Total Outflow
	[°C]	[m³]	[m³]	[m³]	[m³]	[m³]	[m³]	[m³]	[m³]	[m³]	[m³]	[m³]	[m³]
Jan	-31.3	7,536	9,864	0	19	0	0	0	0	0	0	0	0
Feb	-31.1	6,840	9,864	0	35	0	0	0	0	0	0	0	0
Mar	-26.3	9,981	9,864	117	31	0	0	0	0	0	0	0	0
Apr	-17.0	14,561	9,864	4,697	460	0	0	0	0	0	0	0	0
May	-6.4	8,871	9,864	0	5,663	0	0	0	0	0	0	0	0
Jun	4.9	3,285	0	3,285	19,847	65,478	0	65,478	3	3,110	62,365	62,365	62,365
Jul	11.6	6	0	6	42,199	42,205	0	42,205	30	35,062	7,112	7,112	7,112
Aug	9.8	671	0	671	46,176	46,847	0	46,847	31	35,486	11,330	11,330	11,330
Sep	3.1	7,465	0	7,465	37,987	45,452	0	45,452	12	13,961	31,478	31,478	31,478
Oct	-6.5	24,601	9,864	14,737	6,987	0	0	0	0	35	0	0	0
Nov	-19.3	18,180	9,864	8,316	213	0	0	0	0	0	0	0	0
Dec	-26.8	10,907	9,864	1,043	27	0	0	0	0	0	0	0	0
Year	-11.3	112,903	78,912	40,337	159,644	199,982	0	199,982	76	84,655	112,285	112,285	112,285

<sup>°</sup>C = degrees Celsius; m³ = cubic metres.

Table C.2 Whale Tail Camp Pond Water Balance

Month	Temperature	Snowfall	Max Snow Sublimation	Net Inflow from Snow	Rainfall	Total Runoff	Other Qin	Total Inflow	Lake Evaporation	Maximum Evapotrans- piration	Total Inflow Net from Evaporation	Pumping out	Total Outflow
	[°C]	[m³]	[m³]	[m³]	[m³]	[m³]	[m³]	[m³]	[m³]	[m³]	[m³]	[m³]	[m³]
Jan	-31.3	1,623	2,124	0	4	0	0	0	0	0	0	0	0
Feb	-31.1	1,473	2,124	0	7	0	0	0	0	0	0	0	0
Mar	-26.3	2,149	2,124	25	7	0	0	0	0	0	0	0	0
Apr	-17.0	3,135	2,124	1,011	99	0	0	0	0	0	0	0	0
May	-6.4	1,910	2,124	0	1,219	0	0	0	0	0	0	0	0
Jun	4.9	707	0	707	4,274	14,099	0	14,099	12	666	13,421	13,421	13,421
Jul	11.6	1	0	1	9,087	9,088	0	9,088	139	7,507	1,442	1,442	1,442
Aug	9.8	145	0	145	9,943	10,088	0	10,088	141	7,598	2,349	2,349	2,349
Sep	3.1	1,607	0	1,607	8,180	9,787	0	9,787	55	2,989	6,742	6,742	6,742
Oct	-6.5	5,297	2,124	3,173	1,504	0	0	0	0	8	0	0	0
Nov	-19.3	3,915	2,124	1,791	46	0	0	0	0	0	0	0	0
Dec	-26.8	2,349	2,124	225	6	0	0	0	0	0	0	0	0
Year	-11.3	24,311	16,992	8,686	34,376	43,062	0	43,062	347	18,768	23,954	23,954	23,954

<sup>°</sup>C = degrees Celsius; m³ = cubic metres.

Table C.3 Whale Tail Pit Water Balance (Groundwater not considered)

Month	Temperature	Snowfall	Max Snow Sublimation	Net Inflow from Snow	Rainfall	Total Runoff	Other Qin	Total Inflow	Lake Evaporation	Maximum Evapotrans- piration	Total Inflow Net from Evaporation	Pumping out	Total Outflow
	[°C]	[m³]	[m³]	[m³]	[m³]	[m³]	[m³]	[m³]	[m³]	[m³]	[m³]	[m³]	[m³]
Jan	-31.3	7,639	9,999	0	20	0	0	0	0	0	0	0	0
Feb	-31.1	6,933	9,999	0	35	0	0	0	0	0	0	0	0
Mar	-26.3	10,118	9,999	119	32	0	0	0	0	0	0	0	0
Apr	-17.0	14,760	9,999	4,761	466	0	0	0	0	0	0	0	0
May	-6.4	8,992	9,999	0	5,741	0	0	0	0	0	0	0	0
Jun	4.9	3,330	0	3,330	20,118	66,374	0	66,374	176	3,097	63,101	63,101	63,101
Jul	11.6	6	0	6	42,776	42,783	0	42,783	1,984	34,912	5,887	5,887	5,887
Aug	9.8	680	0	680	46,808	47,488	0	47,488	2,008	35,334	10,146	10,146	10,146
Sep	3.1	7,567	0	7,567	38,507	46,074	0	46,074	790	13,901	31,382	31,382	31,382
Oct	-6.5	24,938	9,999	14,939	7,082	0	0	0	2	35	0	0	0
Nov	-19.3	18,429	9,999	8,430	216	0	0	0	0	0	0	0	0
Dec	-26.8	11,056	9,999	1,057	27	0	0	0	0	0	0	0	0
Year	-11.3	114,449	79,992	40,889	161,829	202,719	0	202,719	4,960	87,280	110,516	110,516	110,516

<sup>°</sup>C = degrees Celsius; m³ = cubic metres.

Table C.4 Whale Tail Attenuation Pond Water Balance

Month	Temperature	Snowfall	Max Snow Sublimation	Net Inflow from Snow	Rainfall	Total Runoff	Pumping In from Dump, Pit and Exploration Camp	Total Inflow	Lake Evaporation	Maximum Evapotrans- piration	Total Inflow Net from Evaporation	Pumping out	Total Outflow
	[°C]	[m³]	[m³]	[m³]	[m³]	[m³]	[m³]	[m³]	[m³]	[m³]	[m³]	[m³]	[m³]
Jan	-31.3	6,319	8,271	0	16	0	0	0	0	0	0	0	0
Feb	-31.1	5,735	8,271	0	29	0	0	0	0	0	0	0	0
Mar	-26.3	8,369	8,271	98	26	0	0	0	0	0	0	0	0
Apr	-17.0	12,209	8,271	3,938	385	0	0	0	0	0	0	0	0
May	-6.4	7,438	8,271	0	4,749	0	0	0	0	0	0	0	0
Jun	4.9	2,754	0	2,754	16,641	54,903	138,886	193,789	251	2,528	191,011	191,011	191,011
Jul	11.6	5	0	5	35,384	35,389	14,441	49,830	2,826	28,496	18,508	18,508	18,508
Aug	9.8	563	0	563	38,719	39,282	23,825	63,107	2,860	28,841	31,406	31,406	31,406
Sep	3.1	6,259	0	6,259	31,852	38,111	69,603	107,714	1,125	11,347	95,242	95,242	95,242
Oct	-6.5	20,628	8,271	12,357	5,858	0	0	0	3	29	0	0	0
Nov	-19.3	15,244	8,271	6,973	179	0	0	0	0	0	0	0	0
Dec	-26.8	9,146	8,271	875	23	0	0	0	0	0	0	0	0
Year	-11.3	94,670	66,168	33,823	133,862	167,685	246,755	414,441	7,065	71,241	336,166	336,166	336,166

<sup>°</sup>C = degrees Celsius; m³ = cubic metres.



Table C.5 Northeast Pond Water Balance

Month	Temperature	Snowfall	Max Snow Sublimation	Net Inflow from Snow	Rainfall	Total Runoff	Other Qin	Total Inflow	Lake Evaporation	Maximum Evapotrans- piration	Total Inflow Net from Evaporation	Pumping out	Total Outflow
	[°C]	[m³]	[m³]	[m³]	[m³]	[m³]	[m³]	[m³]	[m³]	[m³]	[m³]	[m³]	[m³]
Jan	-31.3	13,917	18,216	0	36	0	0	0	0	0	0	0	0
Feb	-31.1	12,631	18,216	0	64	0	0	0	0	0	0	0	0
Mar	-26.3	18,432	18,216	216	58	0	0	0	0	0	0	0	0
Apr	-17.0	26,889	18,216	8,673	849	0	0	0	0	0	0	0	0
May	-6.4	16,382	18,216	0	10,459	0	0	0	0	0	0	0	0
Jun	4.9	6,066	0	6,066	36,651	120,918	0	120,918	0	5,746	115,173	0	115,173
Jul	11.6	12	0	12	77,929	77,941	0	77,941	0	64,768	13,173	0	13,173
Aug	9.8	1,239	0	1,239	85,274	86,514	0	86,514	0	65,551	20,962	0	20,962
Sep	3.1	13,785	0	13,785	70,151	83,936	0	83,936	0	25,790	58,147	0	58,147
Oct	-6.5	45,432	18,216	27,216	12,902	0	0	0	0	65	0	0	0
Nov	-19.3	33,574	18,216	15,358	394	0	0	0	0	0	0	0	0
Dec	-26.8	20,142	18,216	1,926	50	0	0	0	0	0	0	0	0
Year	-11.3	208,500	145,728	74,492	294,817	369,309	0	369,309	0	161,920	207,454	0	207,454

<sup>°</sup>C = degrees Celsius; m³ = cubic metres.



Table C.6 Whale Tail Lake (South Basin) Water Balance

Month	Temperature	Snowfall	Max Snow Sublimation	Net Inflow from Snow	Rainfall	Total Runoff	Other Qin	Total Inflow	Lake Evaporation	Maximum Evapotrans- piration	Total Inflow Net from Evaporation	Pumping out	Total Outflow
	[°C]	[m³]	[m³]	[m³]	[m³]	[m³]	[m³]	[m³]	[m³]	[m³]	[m³]	[m³]	[m³]
Jan	-31.3	166,428	217,845	0	429	0	0	0	0	0	0	0	0
Feb	-31.1	151,050	217,845	0	768	0	0	0	0	0	0	0	0
Mar	-26.3	220,430	217,845	2,585	692	0	0	0	0	0	0	0	0
Apr	-17.0	321,568	217,845	103,723	10,150	0	0	0	0	0	0	0	0
May	-6.4	195,907	217,845	0	125,075	0	0	0	0	0	0	0	0
Jun	4.9	72,542	0	72,542	438,310	1,446,063	0	1,446,063	33,893	57,778	1,354,392	0	1,354,392
Jul	11.6	139	0	139	931,955	932,094	0	932,094	382,064	651,314	0	0	0
Aug	9.8	14,822	0	14,822	1,019,793	1,034,614	0	1,034,614	386,686	659,192	0	0	0
Sep	3.1	164,858	0	164,858	838,935	1,003,792	0	1,003,792	152,132	259,344	592,317	0	592,317
Oct	-6.5	543,320	217,845	325,475	154,300	0	0	0	385	657	0	0	0
Nov	-19.3	401,510	217,845	183,665	4,714	0	0	0	0	0	0	0	0
Dec	-26.8	240,882	217,845	23,037	598	0	0	0	0	0	0	0	0
Year	-11.3	2,493,455	1,742,760	890,846	3,525,717	4,416,563	0	4,416,563	955,160	1,628,284	1,946,709	0	1,946,709

<sup>°</sup>C = degrees Celsius; m³ = cubic metres.

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Table C.7 Lake A16 (Mammoth Lake) Water Balance

Month	Temperature	Snowfall	Max Snow Sublimation	Net Inflow from Snow	Rainfall	Total Runoff	Qin from Whale Tail South and Whale Tail Attenuation Pond	Total Inflow	Lake Evaporation	Maximum Evapotrans- piration	Total Inflow Net from Evaporation	Pumping out	Total Outflow
	[°C]	[m³]	[m³]	[m³]	[m³]	[m³]	[m³]	[m³]	[m³]	[m³]	[m³]	[m³]	[m³]
Jan	-31.3	65,196	85,338	0	168	0	0	0	0	0	0	0	0
Feb	-31.1	59,172	85,338	0	301	0	0	0	0	0	0	0	0
Mar	-26.3	86,351	85,338	1,013	271	0	0	0	0	0	0	0	0
Apr	-17.0	125,970	85,338	40,632	3,976	0	0	0	0	0	0	0	0
May	-6.4	76,744	85,338	0	48,997	0	0	0	0	0	0	0	0
Jun	4.9	28,417	0	28,417	171,702	566,477	1,545,145	2,111,622	12,246	22,966	2,076,410	0	2,076,410
Jul	11.6	54	0	54	365,081	365,136	15,602	380,738	138,042	258,894	0	0	0
Aug	9.8	5,806	0	5,806	399,491	405,297	28,465	433,762	139,711	262,026	32,024	0	32,024
Sep	3.1	64,581	0	64,581	328,642	393,223	686,402	1,079,625	54,966	103,088	921,570	0	921,570
Oct	-6.5	212,839	85,338	127,501	60,445	0	0	0	139	261	0	0	0
Nov	-19.3	157,286	85,338	71,948	1,847	0	0	0	0	0	0	0	0
Dec	-26.8	94,362	85,338	9,024	234	0	0	0	0	0	0	0	0
Year	-11.3	976,779	682,704	348,977	1,381,155	1,730,132	2,275,614	4,005,746	345,104	647,236	3,030,004	0	3,030,004

<sup>°</sup>C = degrees Celsius; m³ = cubic metres.



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#### **TECHNICAL MEMORANDUM**

To: Department of Fisheries and Ocean (DFO)

Cc: Amaruq Permitting team

From: Pier-Eric McDonald, Patrice Gagnon

Date: Friday, June 15, 2018

Subject: Blasting Activities - Whale Tail Dike construction

# 1. Introduction

After the reception of Licence A, Agnico Eagle (AEM) plans to build the Whale Tail Dike that will allow for the mining of the Whale Tail pit. One of the construction activities consists of drill & blasting (D&B) the East and West abutments of the Whale Tail dike. Those abutments are located on the shoreline of Whale Tail Lake and this activity is critical for assuring the performance of the dike. Since this activity is close to a water body, AEM aims to comply with the DFO's Guidelines for Use of Explosives in or Near Canadian Fisheries Waters. This memo presents the proposed monitoring and mitigation measures in order to respect the above guidelines that are summarized in section 3.

#### 2. Description of Blasting Activities

Drill and Blast of the Whale Tail Dike abutment is required as per the Design to minimize the risk of deformation of cut-off wall of the structure due to thaw settlement. Following the dike construction, thawing of the abutment is expected due the rise of the Whale Tail lake level which will change the thermal regime of the foundation. Removing the ice-rich till material and unsuitable foundation material under the cut-off wall on the abutments will remove this risk by ensuring that the cut-off of the dike is on a foundation not prone to thaw settlement. Due to the expected thickness of frozen material to remove, blasting is required for this activity. Drill and blast will be undertaken on each abutment and near the lake shore while respecting the distance allowed per the DFO's guideline. The blasting activities are planned to occur in the months of July to August 2018. The extent of the blasting area for both abutments are presented in Appendix A. These extents might change due to field observations and design adjustments.

#### 3. Review of existing DFO guidelines

AEM intends to comply with the nine (9) guidelines of the document "Guidelines for Use of Explosives in or Near Canadian Fisheries Waters" summarize below:

- 1. Proponents considering the use of explosives are encouraged to consult the appropriate DFO Regional/Area authorities (Appendix I) as early as possible in their planning process to identify possible alternatives to the use of explosives, the biological resources and their habitats at risk, and/or effective mitigation measures.
- 2. Where provincial or territorial resource management agencies, or aboriginal resource management boards undertake the administration of fisheries, the proponent is encouraged to consult with the relevant authorities.

- 3. The use of confined or, in particular, unconfined explosives in or near Canadian fisheries waters is discouraged, and proponents are encouraged to utilize other potentially less destructive methods wherever possible.
- 4. No use of ammonium nitrate-fuel oil mixtures occurs in or near water due to the production of toxic by-products (ammonia).
- 5. After loading a charge in a hole, the hole is to be back-filled (stemmed) with angular gravel to the level of the substrate/water interface or the hole collapsed to confine the force of the explosion to the formation being fractured. The angular gravel is to have a particle size of approximately 1/12th the diameter of the borehole.
- 6. All "shock-tubes" and detonation wires are to be recovered and removed after each blast.
- 7. No explosive is to be knowingly detonated within 500 m of any marine mammal (or no visual contact from an observer using 7x35-power binocular).
- 8. No explosive is to be detonated in or near fish habitat that produces, or is likely to produce, an instantaneous pressure change (i.e., overpressure) greater than 100 kPa (14.5 psi) in the swimbladder of a fish.
- 9. No explosive is to be detonated that produces, or is likely to produce, a peak particle velocity greater than 13 mm\*s-1 in a spawning bed during the period of egg incubation.

# 4. Proposed Monitoring Plan

AEM is committed to monitor blast vibrations with Instantel seismograph monitoring devices to be installed as indicated by the manufacturer at the same location every blast. Note that 2 stations per abutment are suggested depending on which side of the centerline the blast are occurring. Those locations are to be in a representative area on the shoreline and outside the footprint of dike construction . Refer to appendix A for proposed locations of STA-W1, STA-W2, STA-E1 and STA-E2. Such practices are consistent with the current application of the license at Meadowbank.

After each blast, the recorded values shall be analyzed and documented by competent personal and adjustments on the next blasting sequences shall be brought forward should the vibration limits exceed the guidelines presented in section 3.

# 5. Potential mitigation measures

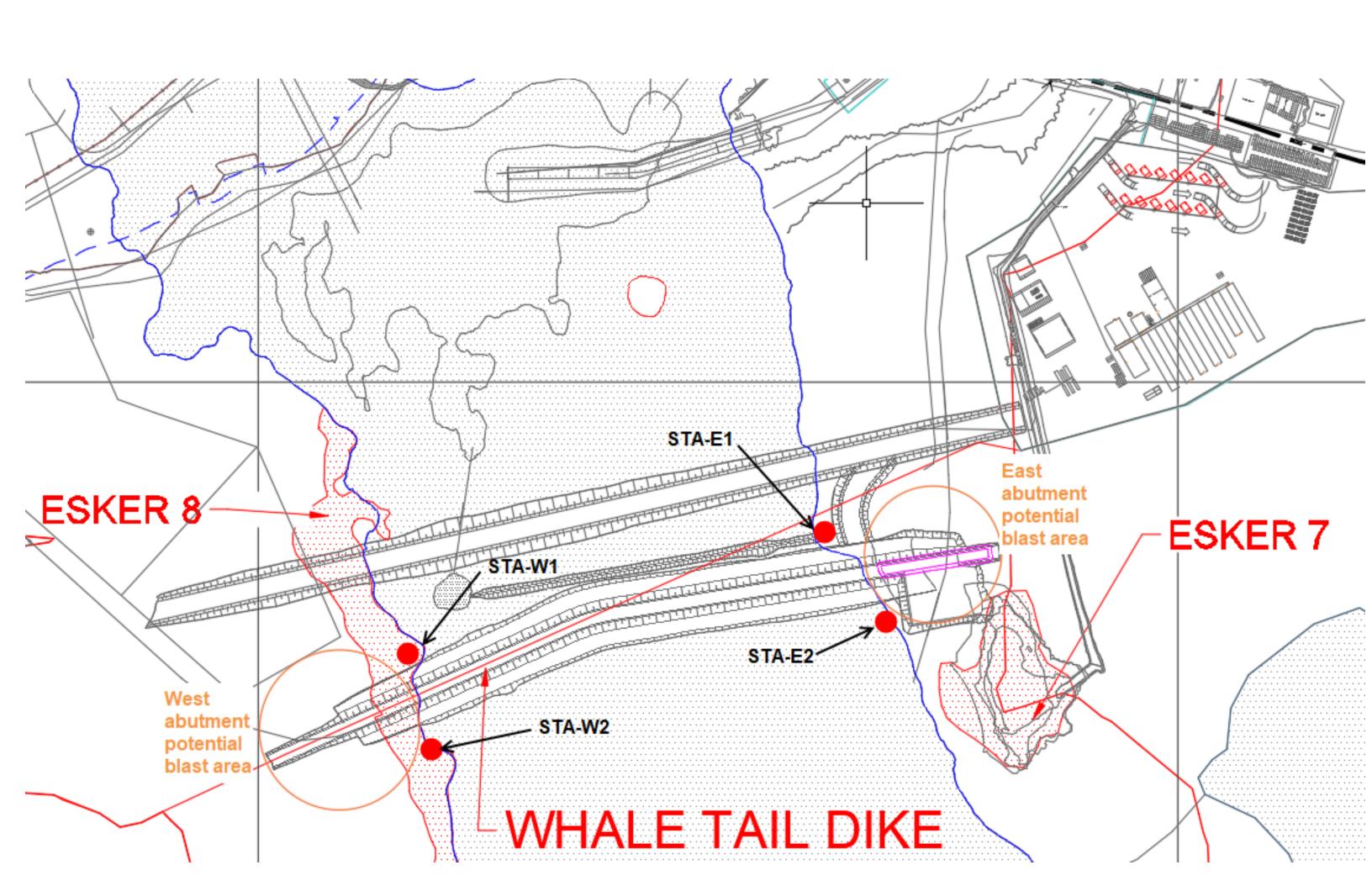
AEM has identified a handful of potential mitigation measures that could be applied in Drill & Blast practices in order to comply with the above mentioned DFO guidelines. Those are developed from a combination of literature and past experiences at Meadowbank that have proven to be successful, namely:

- This document will be reviewed by all parties involved in the D&B activities;
- Drill on small diameters hole as low as 3" to limit vibrations;
- The explosive charge in each hole (powder factor) shall be reduced to the minimum judged practical in the design phase of the blast;

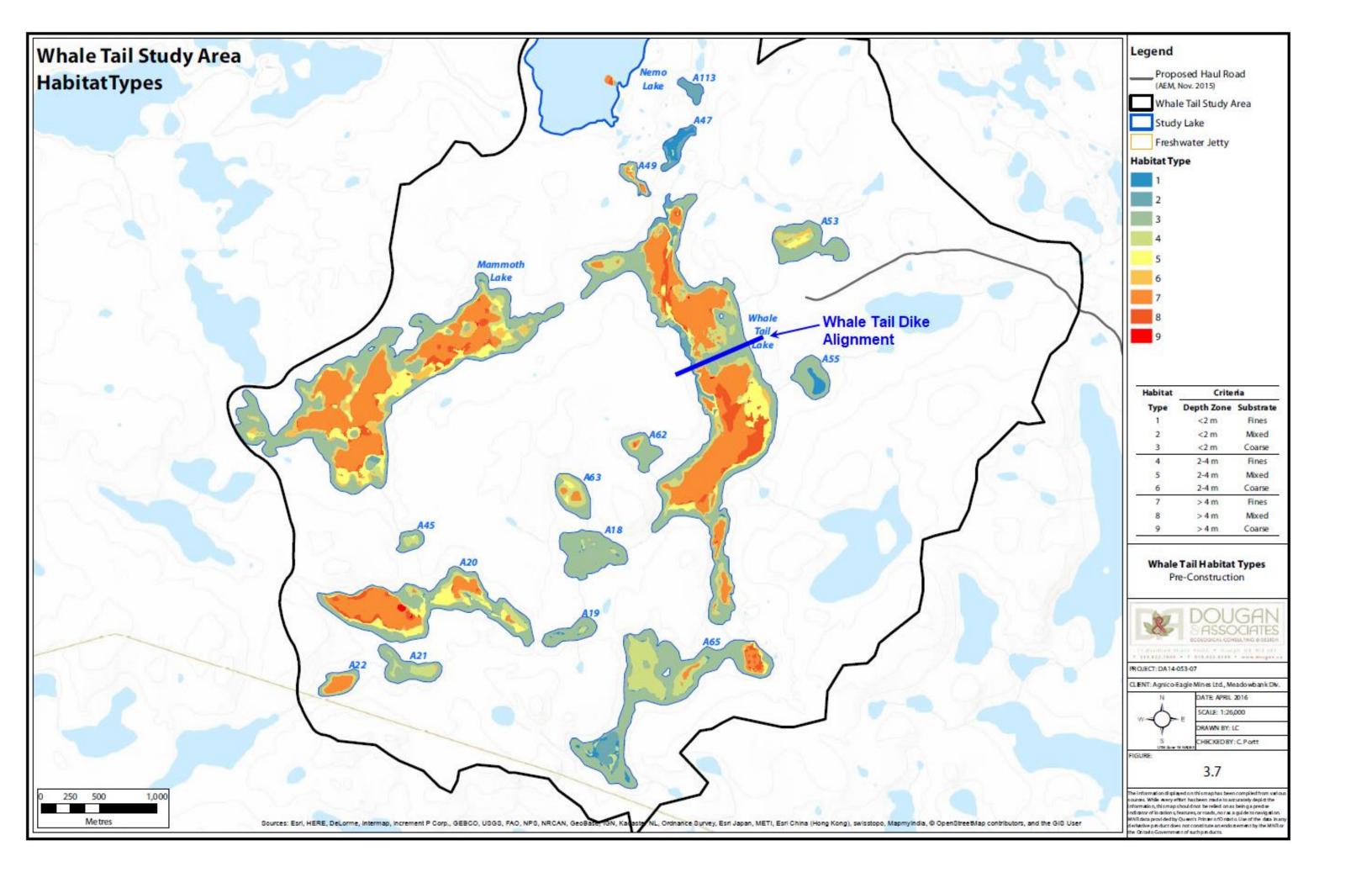
- Number of holes blasting per delay shall be reduced to a minimum as much as practical in the tying plan produced by the D&B engineer to limit vibrations;
- The blasting area will be broken down to small blast patterns to be blasted in a sequential manner.
- The blaster will perform a visual inspection of the area around the blast after each blast and remove any shock tubes or detonators close to the shoreline. If visual inspection reseals blasting accessories in the water, the blaster will advice the Geotechnical engineer so that the material is removed by boat via appropriate procedures;
- Every hole will be backfilled with angular gravel as per current AEM practices;
- The explosive used will be emulsion which is not water soluble.
- In the event where projections are judged problematic, blasting mats or geotextile could be applied over the whole blasting sequence with an appropriate amount of aggregates over it in such a way that the energy is kept in the rock mass as opposed to sending projections and deleterious blasting material in the air.

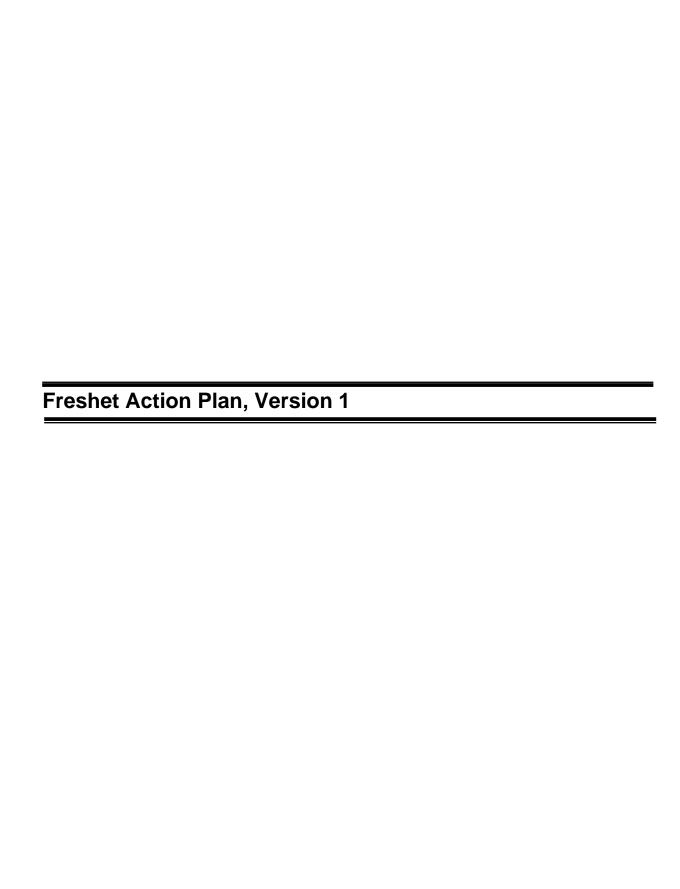
Additionally, AEM's D&B engineers have performed calculations as presented in Appendix II & III of the DFO's guidelines document to find the maximum setback distance from the shoreline to avoid a pressure on fish bladders exceeding 100kpa as per criteria number 8 and to have vibrations limit not exceeding 13 mm\*s<sup>-1</sup> in spawning beds for criteria number 9. Furthermore, appendix B below presents the fish habitats type and it can be seen that the Whale Tail Dike's alignment and proposed blasting areas on the East and West abutments are in a low risk zone and more than 100m away from the critical areas. Nevertheless, AEM is committed to respect the criteria directed by DFO's Guidelines for Use of Explosives in or Near Canadian Fisheries Waters.

# APPENDIX A – Proposed Blast Monitoring Stations



APPENDIX B – Fish Habitats Types







# MEADOWBANK GOLD MINE

# FRESHET ACTION AND INCIDENT RESPONSE PLAN WHALE TAIL PROJECT

**March 2019** 

VERSION 1





#### **EXECUTIVE SUMMARY**

The purpose of this Action and Response Plan is to identify areas of concern around the Whale Tail Pit mine site and the associated Hauling road that need to be managed in an organized and timely manner during the annual freshet period to prevent adverse environmental and operational impacts. The Incident Response section of the Plan outlines any future incidents that have the potential to affect off site water or land will be added and would include any specific mitigation and monitoring actions.

The freshet period typically occurs during the annual snow and ice melt sometime around mid-May and extends until the end of July. During this period excess water is created and must be managed through additional pumping and management practices at vulnerable areas around the site. Mitigation techniques, timeframes and specified roles and responsibilities are outlined in this document for each area of concern.

The main areas of concern are the mining pit and pit wall.

It is important that all dewatering and associated infrastructure be in good working order and adequate to manage the expected water flows associated with the freshet period; this includes but is not limited to pumps, ditch, culvert and sump maintenance, critical piping system installation and inspection, adequate resource allocation for preparative work and establishing a viable monitoring program for the areas of concern and incident response locations. A summary of the 2019 preparation works and roles and responsibilities is presented in the attached Appendix 1 (2019 Freshet Action Plan Procedures). Appendix 1 will be updated yearly to reflect changes in conditions at the Whale Tail site.



# **DOCUMENT CONTROL**

		Revision		Pages	Remarks		
#	Prep.	Rev.	Date	Revised			
01	Agnico	Internal	March 2019	All	Initial Version		

Prepared By: Meadowbank Environment

Approved by:

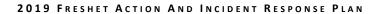
Robin Allard, General Supervisor Environment





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# **List of Appendix**

Appendix 1 - 2019 Freshet Action Plan Procedure



#### 1 INTRODUCTION

The purpose of this Whale Tail (WT) Freshet Action and Incident Response Plan is to ensure that Agnico can address and manage excess water associated with the freshet season at the Whale Tail site and to ensure Agnico has implemented specific management and mitigation measures in response to environmental incidents with potential for off site impacts to water or land.

The freshet season is loosely defined as being a period of time from approximately May 15 – July 30; in some cases this period of time can extend up to early fall when freezing re-occurs (October 15). There are many areas around the site that are vulnerable to this excess water; the goal is to identify these areas and develop a clear plan with defined roles and responsibilities (among Agnico Departments), and to manage the freshet flows.

In addition, several guiding principles are applicable to the formation of this plan. The highest priority principles are:

- 1) to ensure that mine contact water from runoff or seepage is managed to prevent adverse environmental impacts:
- 2) to ensure that the health and safety of Agnico employees is protected, especially with respect to mining operations when excess water is present; and
- 3) to make sure the site is in compliance with the Nunavut Water Board (NWB) License, Part D, Item 21 and Part E, Item 11.

The plan will identify the areas of concern and discuss the potential risks as well as mitigation measures necessary to address the identified issues. An adaptive strategy had been designed at the Whale Tail site to ensure sufficient mitigation measured are in place to prevent potential issues. The overall site footprint has increased and experience needs to be gained in indenfying key location; lessons learned from the Meadowbank site will provide the necessary guidance. Appendix 1 contains the defined 2019 procedures, the roles and responsibilities and associated timelines. Agnico's intent is to update the Procedural Appendix on a yearly basis. For example, there may be additional mitigation measures for a defined problem area or in some cases a previously defined issue may be permanently rectified.

The main areas of concern are:

- · Mining pits and pit walls;
- WRF pond;
- A53 pond;
- East channel;;
- North-East dike:
- Attenuation pond;
- WT Tank farm;
- Haul road culverts and bridges.

Each area identified above will be discussed in detail below. All areas of concern are considered priorities based on the guiding principles.



#### 2 AREAS OF CONCERN

#### 2.1 SITE MAPS

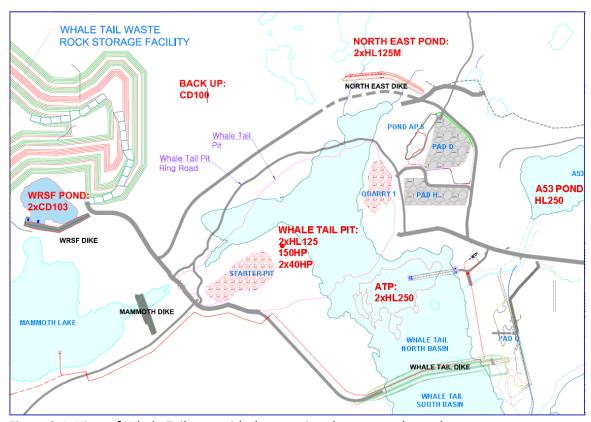


Figure 2-1: View of Whale Tail area with the associated pumps and trenches

# 2.2 MINING PITS AND PIT WALLS

All permanent ramps, jump ramps, ditches and sumps must be cleaned of all ice and snow before May in order to contain any water resulting from the snow melt. All pumps must be checked and serviced before the month of May. In addition, a check must be completed confirming that all piping systems starting from the different pits leading to the Whale Tail attenuation pond are free of ice by validating pumping values (if pumping systems are active) and/or performing an air test in the pipe with a compressor.

Water management in the Whale Tail pit has been simplified since the mining is it's early sequences of operation.

 A pond and ditch system is planned in the pit. Runoff water accumulated in this pond will be pumped into the attenuation pond. Infrastructures might be modified or added within the actual trench and sumps footprint in such a way to prevent water from ponding against the pit crest;



#### 2.3 WHALE TAIL ROCK STORAGE FACILITY

The Whale Tail Rock Storage Facility (RSF) will require weekly inspections around the perimeter beginning as soon as the freshet starts (May) until freeze up to identify any seepage. In the event that seepage is observed from the RSF, it must be reported to the Engineering and Environment Departments and samples must be taken to determine the water quality and source. A mitigation plan will be prepared and implemented if necessary. A sump is located at the toe of the RSF and water will be pumped to the WT Attenuation pond when required.

#### 2.4 A53 LAKE

Water management around A53 will required regular inspection to ensure impacts are limited, to maintain integrity of structure and to prevent any adverse environmental impacts. Inlfows of water will be monitored for the lake immediate watershed to ensure, erosion and sediments are not impacting the waterbody.

#### 2.5 EAST CHANNEL

The east channel structure is planned to be built subsequently to the 2019 freshet season and therefore water will be management by maintaining a pumping strategy from it's planned source (lake A53), ensuring that water from upstream won't impact surrounding water bodies by erosion and TSS.

#### 2.6 NORTH-EAST DIKE

Water collecting at North-East Dike will be managed according by letting water raise behind the dike thus redirecting the non-contact water naturally towards Nemo lake. A pumping strategy could also be used to ensure no impacts are directed towards Nemo Lake if erosion and dike stability are affected depending on water quality and quantities observed around the area.

#### 2.7 ATTENUATION POND

Water from the WT Attenuation pond will be management as contact water and treated, if necessary, through the AsWTP and the water discharged towards Mammoth Lake. Representing the main water collection structure in 2019, the attenuation water levels will be managed closely and be inspected regularly at freshet.

Discharge from the WT attenuation pond to Mammoth Lake may require treatment at the AsWTP if the water quality did not meet discharge criteria, Water License and MDMER criteria, for the Attenuation Pond discharge. The Actiflo treatment plant was designed to remove TSS and arsenic. All piping and the discharge diffuser must be inspected in April in order to have all installations in place to proceed with pumping and/or treatment activities during freshet.



#### 2.8 WHALE TAIL FUEL TANK FARMS

The main fuel fuel farm constainment is in the process of being built and will be monitored at freshet. Snow and ice accumulation within the fuel tank farm must be adequately managed to prevent overflow to the environment and/or damage to the fuel handling systems. The Energy and Infrastructure Department will advise the Environmental Department of their intent to pump the containment area once ice/snow begins to melt. Water samples will be taken in accordance with the Water License to ensure compliance prior to its release. A notice must be provided to the Inspector 10 days prior to this pumping activity. Once sample results have been obtained, the Environmental Department will advise the Energy and Infrastructure Department if pumping can begin. If sample results permit, the pumping may begin; to direct water to the tundra/ground in a way to prevent erosion. In the event that the water sample results do not meet discharge criteria the water could be trucked in a tanker and transported to the Meadowbank site to be disposed of in the TSF or placed in containers for shipment south as hazmat.

#### 2.9 HAUL ROAD CULVERTS AND BRIDGES

Daily and Weekly inspections will be undertaken starting in May at all culverts along the Haul road to ensure that water during freshet is flowing freely and no erosion is occurring. If elevated TSS/Turbidity levels are observed sampling will occur and the results assessed. Turbidity barrier will be installed if required. The Energy and Infrastructure department will also be advised if severe erosion/scouring is observed. In addition snow and ice removal may be required to allow the water to flow as per design specifications. Daily inspections will be performed during the freshet period by the Environment department.





# **3 INCIDENT RESPONSE**

No incidents require a specific response plan to be impleted for the Whale Tail site at this moment.

#### 4 SNOW MANAGEMENT

Similarly to the Meadowbank site, a snow management procedure has been developed internally in 2018 and will be updated annually. Temporary snow storage dumps and snow accumulation areas of concern were identified on a map. Removal will be managed accordingly.



# **APPENDIX 1**

2019 Freshet Action Plan Procedure



Section	Area of Concern	Role/Action	Responsbilities	Dates
2.1	Mining Pits and Pit Walls			
		Clean all ice, mud and snow on all permanent ramps, jump ramps, etc.	Mine Operations	Before May
2.1	Mining Pit and Pit walls -	2) Check and service all pumps.	E&I (Energy and Infrastructure) and Maintenance	Before May
2.1	General	3) Check that all piping systems starting from the pit leading to the Attenuation pond are free of ice by validating pumping values (if pumping systems is active) and/or performing an air test in the pipe with a compressor.	E&I	Before May
2.2	WASTE ROCK STORAGE	E FACILITY		
		Weekly inspection around the RSF perimeter to identify any seepage.	Env. Department	May - as soon as freshet starts until freeze up
2.2.	WT RSF Inspection	If seepage observed notify Eng and Env     Department AND sample for Water License     Parameters.	Env. Department	May - as soon as freshet starts until freeze up



2.3	A53			
	A53	Daily inspection - keep record	Env. Department	May - until Freshet complete and after rain events
2.3		Install turbidity barriers, if needed (elevated TSS observed), and maintain	Env. Department	May - until freshet complete and after rain events
		Sample monitoring for TSS, if excess turbidity observed - use external lab.	Env. Department	May - until freshet complete and after rain events
		4) Report any discharge of TSS to ECCC/NWB (if grab > 30 mg/L).	Env. Department	May - until freshet complete and after rain events
2.4	East Channel			
2.4	A53 to East channel	Daily inspection - keep record	Env. Department	May - until Freshet complete and after rain events
		Install turbidity barriers, if needed (elevated TSS observed), and maintain	Env. Department	May - until freshet complete and after rain events





		<ol> <li>Sample monitoring for TSS, if excess turbidity observed - use external lab.</li> </ol>	Env. Department	May - until freshet complete and after rain events
		<ol> <li>Report any discharge of TSS to A56 to ECCC/NWB (if grab &gt; 30 mg/L).</li> </ol>	Env. Department	May - until freshet complete and after rain events
2.5	North-East dike			
	North-East dike flow to Nemo	Daily inspection - keep record	Env. Department	May - until Freshet complete and after rain events
2.5		<ol> <li>Install turbidity barriers, if needed (elevated TSS observed), and maintain</li> </ol>	Env. Department	May - until freshet complete and after rain events
		<ol> <li>Sample monitoring for TSS, if excess turbidity observed - use external lab.</li> </ol>	Env. Department	May - until freshet complete and after rain events
		4) Report any discharge of TSS to Nemo Tail to ECCC/NWB (if grab > 30 mg/L).	Env. Department	May - until freshet complete and after rain events



2.6 WT Attenuation pond			
	During the freshet period water management consists of making sure all sumps are pumped to the Attenuation Pond.	Mine Operations	May to Sept
2.6 WT Attenuation Pond	Set-up pumping Attenuation Pond to prevent water from flowing into the pit area.	Mine Operations	May
	<ol> <li>Notify Environmental Department before discharging any water to Mammoth Lake. NOTE: Any discharge of contact water must be through the Diffuser.</li> </ol>	Engineering	Freshet/Summer 2019
	4) Inspect all piping and discharge diffuser	E&I	May
2.7 FUEL TANK FARMS			
	E&I Dept to advise Env Dept in advance of intent to pump once ice melts in containment area.	E&I and Env. Department	Probably mid- June and September
2.7 WT Tank Farm	Sample water in accordance with Water License to ensure compliance with limits prior to release.	Env. Department	Probably mid- June and September
	3) Provide notice to Inspector 10 days prior to pumping.	Env. Department	Probably mid- June and September





		Advise Energy and Infrastructure Dept if pumping can begin based on sample results.	Env. Department	Probably mid- June and September
		5) Pump to tundra/ground or Meadowbank TSF.  NOTE: The water cannot be pumped out to the tundra if it does not meet the Water License criteria.	E&I	Probably mid- June and September
2.8	HAUL ROAD CULVERT	S AND BRIDGES		
		Weekly inspection of culverts along the haul road.	Env. Department	May
		Sample for TSS and Turbidity if elevated TSS observed.	Env. Department	May - until freeze up
2.8	Culverts and bridges	Notify E&I Dept if severe erosion/scouring observed -     for repair action.	Env. Department	May - until freeze up
		4) Install turbidity barriers if required.	Env. Department	May - until freeze up
2.9	INCIDENT RESPONSE			
	To be determined			







## MEADOWBANK OPERATIONS (Meadowbank Gold Project & Whale Tail Pit Project)

#### **Air Quality and Dustfall Monitoring Plan**

In Accordance with:
NIRB Project Certificate Terms and Conditions No.004 and No. 008

Prepared by:
Agnico Eagle Mines Limited – Meadowbank Division

Version 4 March 2019

#### **EXECUTIVE SUMMARY**

#### **General Information**

The Air Quality and Dustfall Monitoring Plan (AQDMP) describes the design features and operational procedures for the monitoring of air quality and dustfall at the Meadowbank Gold Project and Whale Tail Pit Project sites.

#### **Annual Review**

The AQDMP will be reviewed and updated regularly if necessary. Completion of the review of the AQDMP will be documented through signatures of the personnel responsible for reviewing, updating and approving the AQDMP.

#### **Record of Changes**

A record will document all significant changes that have been incorporated in the AQDMP subsequent to the latest review. The record will include the names of the persons who made and approved the change, as well as the date of the approval.

#### **Distribution List**

Agnico Eagle Mines Limited (Agnico Eagle) will maintain a distribution list for the AQDMP providing information about all parties that receive the plan.

#### **IMPLEMENTATION SCHEDULE**

The proposed implementation schedule for this Plan is effective immediately (March 2019) subject to any modifications proposed by the NIRB as a result of the review and approval process.

#### **DISTRIBUTION LIST**

Agnico Eagle - Environmental Superintendent

Agnico Eagle – Environmental General Supervisor

Agnico Eagle – Environmental Coordinator (s)

#### **DOCUMENT CONTROL**

Version	Date (YMD)	Section	Page	Revision
1	10/2005			
Tech. Memo Addendum	16/05/2008	3.4		Update to air quality monitoring section of Version 1
2	10/2013	All		Revision
WT	06/2016	1.2		Update to include Whale Tail Pit
3	05/2018	All		Updated to include Terms and Conditions of NIRB Project Certificate #008 – Whale Tail Pit Project
4	03/2019	All		Included recommendation from ECCC

**Prepared by:**Agnico Eagle Mines Limited - Meadowbank Division - Environmental Department

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#### 1 INTRODUCTION

#### 1.1 OBJECTIVES

In accordance with Nunavut Impact Review Board Project Certificates No.004 and No.008, the objective of this program is to monitor ambient air quality and dustfall at the Meadowbank and Whale Tail Pit mine site perimeters and roads, with the goals of verifying compliance with applicable standards, and mitigating potential environmental effects. The parameters to be measured are suspended particulates (TSP, PM<sub>10</sub>, PM<sub>2.5</sub>), NO<sub>2</sub> and dustfall (settleable particulate matter).

#### 1.2 MONITORING LOCATIONS

The initial monitoring locations were determined in consultation with Environment Canada in 2011. One station (DF-4) was moved in 2012 due to changes in the location of the Vault Road (see Section 1.2.4).

In 2012, dustfall transects were added at kilometer's 18 and 78 along the All-Weather Access Road (AWAR) between Baker Lake and the Meadowbank Mine.

Station DF-5 was installed in 2018 but the monitoring at this station will begin only in 2019. Dustfall transects at approximately kilometers 18, 36, and 54 along the WTHR was added in 2018. The new monitoring locations were selected in consultation with Environment and Climate Change Canada, and in accordance with terms and conditions associated with the development of the Whale Tail Pit Project.

UTM coordinates are provided in Table 1, and locations are shown in relation to Baker Lake, the Meadowbank Mine, and the Whale Tail Pit in Figure 1.

#### 1.2.1 DF-1

Station DF-1 is located next to the explosive storage area (emulsion plant), and approximately 500 m north of the all-weather access road. TSP, PM<sub>10</sub>, PM<sub>2.5</sub>, NO<sub>2</sub> and dustfall are monitored at this location.

#### 1.2.2 DF-2

Station DF-2 is located at the northern corner of South Camp Island, near the TCG contractor area. TSP,  $PM_{10}$ ,  $PM_{2.5}$ ,  $NO_2$  and dustfall are monitored at this location.

#### 1.2.3 DF-3

Station DF-3 is approximately 1,800 m east of the East Dike. Second Portage Lake is to the west and east. Dustfall only is monitored at this location.

#### 1.2.4 DF-4

Station DF-4 was approximately 1,500 m southwest of the future location of Vault Pit. This monitoring station was installed before the construction of the Vault Road. Realignment of the road during

construction placed the station within 10 feet of the road. Therefore, Agnico Eagle re-positioned Station DF-4 approximately 480 m to the north-west on February 29, 2012 to be representative of the originally intended location relative to the road. Dustfall only is monitored at this location.

#### 1.2.5 AWAR: KM-18 and KM-78

Dustfall transects were established in 2012 at kilometers 18 and 78 along the Baker Lake to Meadowbank Mine AWAR. Dustfall samples are collected annually from mid-August to mid-September. Transects include stations at 25 m, 100 m, 300 m and 1000 m from the road on both sides (east/downwind and west/upwind). The purpose of these temporary monitoring stations were to evaluate dust mitigation measures (AEM 2017) and to validate recent model predictions of fugitive dust in support of the Whale Tail Pit and Haul Road (AEM 2016).

In 2019, Agnico will conduct a study to put in application the recommendation from ECCC saying that the installation of canisters at ground level and not on 1.5-2m poles is not a common practice. The study will first consist of the review of the following documents of reference cited by ECCC:

- Standard test method for collection and measurement of dustfall (settleable particulate matter) - ASTM 2017
- Ontario's manual for air quality monitoring: <a href="https://dr6j45jk9xcmk.cloudfront.net/documents/1466/3-7-32-manual-for-air-quality-monitoring-en.pdf">https://dr6j45jk9xcmk.cloudfront.net/documents/1466/3-7-32-manual-for-air-quality-monitoring-en.pdf</a>
- US EPA Quality Assurance Handbook for Air Pollution Measurement Systems Volume II: Ambient Air Quality Monitoring Program: https://nepis.epa.gov/Exe/ZyPDF.cqi/P100FUYK.PDF?Dockey=P100FUYK.PDF

Agnico will then determine the best method to comply with these reference documents to confirm confirm that dustfall rates measured at ground level continue to align with those measured on stands. The study will probably consist of the installation of canisters on elevated poles in one of the established transect along the AWAR. Canisters will also be installed on the ground at the same location, as in previous years, and a comparison on both methods will be assessed. Result of the study will be provided in subsequent annual report along with sampling method and mitigation measure that will be adopted.

#### 1.2.6 DF-5

Station DF-5 (Figure 1) will be sited with the communications tower on the eastern boundary of the Whale Tail Pit in an area predicted to receive elevated concentrations of particulate matter (TSP, PM<sub>10</sub> and PM<sub>2.5</sub>) and NO<sub>2</sub> relative to concentrations predicted further from the project footprint. Monitoring at DF-5 will include TSP, PM<sub>10</sub>, PM<sub>2.5</sub>, passive NO<sub>2</sub>, and dustfall.

#### 1.2.7 WTHR: KM-18, KM-36 and KM-54

Dustfall transects will be established between kilometers 18 & 19, 36 & 37, and 54 & 55 along the Whale Tail Haul Road (WTHR). Dustfall samples will be collected annually from mid-August to mid-September. The transects will include stations at 25 m (upwind east/north), 100 m, 300 m and 1000 m (downwind west/south) of the haul road.

Table 1: UTM Coordinates for the Meadowbank and Whale Tail Air Quality and Dustfall Monitoring Locations

Monitoring Ecoations				
Monitoring Locations	Measured Preferences	Easting	Northing	
DF-1	TSP, PM <sub>10</sub> , PM <sub>2.5</sub> , NO <sub>2</sub> , dustfall	636850	7217663	
DF-2	TSP, PM <sub>10</sub> , PM <sub>2.5</sub> , NO <sub>2</sub> , dustfall	637895	7213049	
DF-3	Dustfall	639599	7213198	
DF-4	Dustfall	639233	7217074	
AWAR KM-18	Dustfall	640208	7152082	
AWAR KM-78	Dustfall	626155	7199739	
DF-5	TSP, PM <sub>10</sub> , PM <sub>2.5</sub> , passive NO <sub>2</sub> , dustfall	608301	7255973	
WTHR KM-18	Dustfall	630941	7234375	
WTHR KM-36	Dustfall	618132	7238621	
WTHR KM-54	Dustfall	613782	7249508	

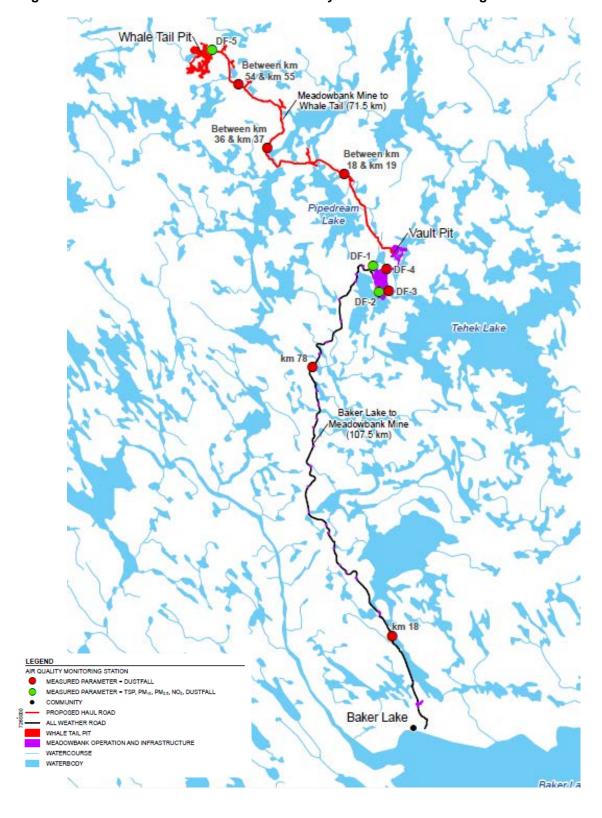


Figure 1: Meadowbank and Whale Tail Air Quality and Dustfall Monitoring Locations

#### 2 METHODS

#### 2.1 TSP, PM<sub>10</sub>, PM<sub>2.5</sub>

Suspended particulate matter will be generated by wind erosion of local landscapes, movement of vehicles/equipment, airstrip activities, construction activities, the combustion of diesel fuel, and solid waste incineration.

The monitoring program for suspended particulates will utilize Partisol Model 2025 sequential air samplers (single and dichotomous units) installed at two locations to measure:

- Total suspended particulates (TSP) particulate matter less than 100 μm;
- PM<sub>10</sub> particulate matter less than 10 μm; and
- PM<sub>2.5</sub> particulate matter less than 2.5 μm.

Partisol samplers operate on the principle that a stream of ambient air at a controlled flow rate is drawn through a size-selective inlet and then through a pre-weighed filter for a pre-determined time period. The exposed filter is shipped to a laboratory where it is re-weighed. The concentrations can be determined using the measured volume of air and the weight difference between the pre-weighed and exposed filter. The U.S. EPA has described standard methods for collection of PM air samples in section 40 CFR part 53 and 58 of the U.S. Code of federal Regulations (U.S. CFR, 1997a, 1997b, 1997c,).

The monitoring of TSP, PM<sub>10</sub>, and PM<sub>2.5</sub> concentrations will be carried out according to the National Air Pollution Surveillance (NAPS) schedule. This schedule follows a monitoring cycle where a single 24-hour sample is collected every sixth day. Sampling in accordance with the NAPS schedule will provide consistency between the Meadowbank particulate monitoring stations and stations at the other facilities across the country. In addition, by operating stations on a six-day cycle, different days are sampled each week, which allows for the monitoring of differing production intensities or other variations. Monitoring of TSP and fine particulate matter will continue throughout the operations and closure phases of the Project.

Particulate sampling will be conducted year-round using the Partisol instruments' automated sampling function. However, sampling during extreme winter conditions (-20 degrees Celsius [°C] and colder with the potential for blowing snow) which frequently occur during winter months, allows the possibility for snow to be drawn through the inlet, resulting in a void sample and possible damage to the electronic components of the sampler. A small amount of data loss is expected during the winter as ambient conditions exceed the normal operating range expected for the equipment being used. Climate-controlled shelters are used to minimize those issues.

The collection of TSP provides a measure of airborne dust or dirt, which may present environmental issues such as reduced visibility, while  $PM_{2.5}$  and  $PM_{10}$  (fine and coarse particulates) are regulated based on health-related concerns. TSP and  $PM_{2.5}$  are subject to GN ambient air quality standards (GN, 2011). No standard is provided for  $PM_{10}$  in Nunavut, so these results will be compared to the BC air quality objective (BC, 2013) – see Section 3.

For comparison to Government of Nunavut Ambient Air Quality Standards (GN, 2011), concentrations of particulates must be calculated as:

C = M/VSTD

Where:

C = mass concentration of particulates (µg/m³)

M = final mass of filter - initial mass of filter (µg)

V<sub>STD</sub> = volume of air drawn in during the sampling period, normalized to 25°C and 101.3kPA (standard temperature and pressure; STP)

The Partisol instrument will be set to calculate and store the V<sub>STD</sub> value for each filter.

#### 2.2 DUSTFALL

Dustfall collection is a passive program that provides a measure of particulate deposition in the vicinity of the Project. The main dust generation processes at Meadowbank and Whale Tail are wind erosion of site structures (e.g. the Rock Storage Facility), and fugitive sources from open pit mining, rock crushing and movement of vehicles/equipment/air traffic on site.

Dustfall is collected over monthly periods in open vessels containing a purified liquid matrix, supplied by an external accredited laboratory. Particles are deposited and retained in the liquid, which is then analyzed by the accredited laboratory for total and fixed (non-combustible) dustfall. Calculated dustfall rates are normalized to 30 days (mg/cm²/30 days). Sampling is conducted over this period to allow for a sufficient sample size for analysis, and as a result it provides an indication of longer-term air quality trends.

The analysis of the fixed dustfall sampling results will include comparison with Alberta Environment's objectives since neither Nunavut nor the NWT have dustfall standards or guidelines (see Section 3).

#### 2.3 NO<sub>2</sub>

Concentrations of NO<sub>2</sub> by volume (ppb) are analyzed at two locations over monthly periods using a passive sampling device provided by an external accredited laboratory. No continuous monitoring is proposed for other gaseous pollutants because of low concentrations predicted by air quality dispersion modeling for Meadowbank (Cumberland, 2005) and the Whale Tail Pit (Agnico Eagle 2016).

The passive  $NO_2$  monitoring stations are co-located with dustfall stations to allow for the efficient collection of samples and the calculation of ambient secondary particulate (nitrate) concentrations (should this information be required at a later date).

The annual average NO<sub>2</sub> concentration by volume is calculated from the monthly data for comparison against the relevant standard.

#### 2.4 WEATHER DATA

Weather data for the dustfall and air quality monitoring plan is collected using the Meadowbank and Whale Tail Pit permanent climate station. Daily averages for wind speed, wind direction and temperature are available from this station (see Meteorological Monitoring Plan).

#### 2.5 GREENHOUSE GAS EMISSIONS

Agnico Eagle is required by the Greenhouse Gas Emissions Reporting Program (GHGRP) to track greenhouse gas emissions based on annual fuel consumption, composition and the US EPA's AP-42 emission factors. Please see the Meadowbank and Whale Tail Greenhouse Gas Reduction Plan.

#### 2.6 QUALITY ASSURANCE/QUALITY CONTROL PROCEDURES

Agnico Eagle will ensure that monitoring is conducted in accordance with the sampling reference methodology. In addition to standardized quality assurance/quality control requirements, such as instrument calibration, leak checks, review of data, and proper labeling of all sampling containers, field audits of Partisol samplers will be performed in accordance, where possible, with the Partisol Sampler Operating Manual, "Section 6 – Operations". See Section 4 for a detailed description of instrument management. Filters and dustfall samplers will be supplied and analyzed by a CALA-accredited external laboratory.

#### 3 DATA ANALYSIS

#### 3.1 REGULATORY STANDARDS

Data collected from the air quality and dustfall monitoring program at Meadowbank and Whale Tail are compared to the applicable Government of Nunavut Environmental Standards for Ambient Air Quality (October, 2011). Standards for the measured parameters are provided in Table 2.

Table 2: Government of Nunavut Environmental Standards for Ambient Air Quality (October, 2011) for the parameters of concern at Meadowbank and Whale Tail

		Standard		
Parameter	Time Frame	μg/m <sup>3</sup>	ppb	
Fine Particulate Matter (PM <sub>2.5</sub> )	24-h average	30		
Total Cuspended Doutiondets (TCD)	24-h average	120		
Total Suspended Particulate (TSP)	Annual geometric mean	60		
	1-h average	400	213	
Nitrogen Dioxide (NO <sub>2</sub> )	24-h average	200	106	
	Annual arithmetic mean	60	32	

Note: All values are for data normalized to standard conditions of 25°C and 101.3 kPa.

No PM<sub>10</sub> standard is yet available for coarse particulate matter (PM<sub>10</sub>), so results will be compared to the BC Air Quality Objective (August, 2013) of 50  $\mu$ g/m<sup>3</sup>.

Comparison to Canadian Ambient Air Quality Standards (CAAQS) for Fine Particulate Matter (PM2.5) is also done (28  $\mu$ g/m³ for the 24-h)

Likewise, no standards for dustfall are available for Nunavut. Results of the dustfall analysis will be compared to the Alberta Environment Department recreational area guideline of 0.53mg/cm²/30d, to provide context.

#### 3.2 ANNUAL TRENDS

In addition, annual and year-over-year trends will be assessed, and results will be discussed in the context of mine site activity.

#### 3.3 REPORTING

Agnico Eagle will provide an annual air quality and dustfall monitoring report that summarizes the collected data. In addition, Agnico Eagle will report annual emission estimates to the NPRI and GHG emissions to the appropriate federal program.

Annual monitoring reports will include the following:

• Description of the monitoring programs;

- Description of mitigation efforts undertaken in the previous year;
- Monitoring locations;
- Instrumentation;
- Weather conditions during sample collection;
- Time and duration of monitoring, including dates;
- Partisol sampler inspection reports;
- Relevant standards/guidelines;
- Results of monitoring (raw and averaged as appropriate for comparison to standards); Comparison of results to FEIS;
- Emission tracking data for greenhouse gases based on annual fuel consumption, composition, and AP-42 emission factors;
- Comparison of results to relevant standards, analysis of annual and year-over-year trends, and comparison to estimates in EIA dispersion modeling;
- Discussion of results, including possible reasons for non-compliance with standards; and
- Mitigation measures for reducing non-compliance incidents in the future.

#### 4 OPERATION AND MAINTENANCE

#### 4.1 MANAGEMENT RESPONSIBILITY

Agnico Eagle will be responsible for managing and operating the stations. Operation and monitoring of the stations will come under the responsibility of the Environment Superintendent. Designation of training requirements is the responsibility of Meadowbank Environment Department.

#### 4.2 OPERATION

The Environment Department will be responsible to ensure that the Partisol samplers are operated in accordance with the equipment operating manual and that samples will be collected by appropriately trained personnel consistent with detailed written operating instructions from qualified personnel (i.e. air quality specialist familiar with the equipment). An SOP will be kept up to date and communicated to personnel. It will also ensure that proper QAQC practices are followed.

#### 4.3 MAINTENANCE

As recommended by the manufacturer and to ensure results are in compliance with good practices, the following items will be part of the regular maintenance and care of the Partisol sequential air samplers. This will allow flow values and temperature compensation to be constant with time.

Maintenance Procedures	Interval
Exchanging particle trap filter	6 months
Testing batteries—exchange if necessary	6 months
Exchanging fuses	As needed
Cleaning Air Intake Filters	6 months
Inspect "V" Seals and O-rings	3 months
Rebuilding piston pump(s)	18 months

Audit Procedures	Interval
Ambient Air Temperature audit	4 weeks
Filter Temperature(s) audit	4 weeks
Ambient Pressure audit	4 weeks
External Leak Check	4 weeks
Flow controller audit	4 weeks

Calibration Procedures	Interval
Analog I/O calibration	Automatic
Ambient Air Temperature calibration	1 year
Filter Compartment Temperature calibration	1 year
Filter Temperature(s) calibration	1 year
Ambient Pressure calibration	1 year
Ambient Relative humidity calibration	1 year
External Leak Check	1 year
Flow controller calibration	1 year

#### 5 DUST MANAGEMENT

Daily road watering and, if necessary, the application of chemical dust suppressants will be employed at the Meadowbank Project and the Whale Tail Pit Project to mitigate emissions of fugitive road dust during the frost-free summer season. Dust suppression along the Meadowbank AWAR will consist of the application of Tetraflake (CaCl<sub>2</sub>) twice a year during summer time on five sections of the AWAR, as well as two locations in the hamlet of Baker Lake, and one area onsite. Locations are described in Table 3. Effectiveness of dust suppression will continue to be reported annually to NIRB. Dust suppression on mine site will consist of water and Tetraflake.

As well, Agnico will also continue to investigate alternatives dust mitigation measures in its Nunavut sites.

Table 3: AWAR dust suppression location

Location Type	Dust Suppression Location	Rationale
Hamlet	Agnico Eagle spud barge area	High traffic area near hamlet
Hamlet	Agnico Eagle tank farm to Arctic Fuel site	High traffic area near hamlet
AWAR	km 10 - 12	High traffic area near hamlet & area of concern to HTO – proximity to lake
AWAR	km 24 - 26	Area of concern to HTO – proximity to lake
AWAR	km 48 - 50	Area of concern to HTO – water crossing
AWAR	km 68 - 70	Location identified by Agnico Eagle – water crossing
AWAR	km 80 - 84	Location identified by Agnico Eagle – proximity to water & crossing
Onsite	Emulsion plant turn off to Meadowbank site (km 103 – 110)	High traffic area onsite

Based on the modelling of the dust emissions on the road, and the experience and monitoring data of the Meadowbank AWAR from Baker Lake to the mine site, use of chemical dust suppressants is not expected for the Whale Tail Pit Haul Road. Chemical dust suppressants may be only used as a last resort and only in accordance with the Environmental Guidance for Dust Suppression published by the Government of Nunavut Department of Environment (GN 2014).

The Whale Tail Haul Road (WTHR) Management Plan discusses mitigation measures that will be employed by Agnico Eagle to suppress the production of fugitive dust along the Whale Tail Pit Haul Road (see Section 8.3; WTHR Management Plan; Agnico Eagle 2019). These strategies include:

- enforcing speed limits;
- grading of road surfaces;
- placement of new coarser material onto the road surface; and
- if necessary, road watering or application of dust suppressants.

The Agnico Eagle road supervisor may employ dust mitigation measures where road visibility is impaired, or in areas where dust deposition is potentially impacting traditional land use, fish habitat and/or water quality (WTHR Management Plant; Agnico Eagle; 2019).

Thresholds (Table 3) will be used to determine when mitigation measures need to be initiated. Dustfall measurements will be regularly collected (along the roads and other parts of the Meadowbank and Whale Tail Mine site) using passive sampling methods to record the quantity of dust collected over time and to quantify the success of mitigation measures. The monitoring data will be used to adjust mitigation measures and improve dust management strategies.

In Q2 2019, Agnico Eagle will hold a discussion with ECCC during the technical meeting of the Whale Tail Expansion Project and will determine in collaboration, the threshold that will trigger adaptive management responses and actions. The Air Quality and Dustfall Monitoring Plan will then be updated.

**Table 4: Thresholds and Mitigation Measures** 

Location	Frequency	Indicator	Threshold	Mitigation Measure
Haul road and site access roads	Regular weekly or more frequency inspection by road supervisor during the late spring and summer periods	Measured dustfall     Deterioration of visibility along road	<ul> <li>Deterioration of visibility</li> <li>Safety concern</li> <li>High dust levels evident near significant waterbodies</li> </ul>	<ul> <li>Use of water and/or dust suppressant in areas requiring attention</li> <li>Grade the road surface</li> <li>Add new granular material to the road surface</li> <li>Temporarily lower the speed limit on the road</li> </ul>
Mine site, including travel areas	Regular weekly or more frequent inspection by the site supervisor during the late spring and summer periods.	Measured dustfall	<ul> <li>Deterioration of visibility</li> <li>Safety concern</li> <li>Dust reaching Whale Tail Lake or Mammoth Lake</li> </ul>	<ul> <li>Use of water and/or dust suppressant on exposed surfaces such as parking areas, pads, haul, access and service roads</li> <li>Review mitigation measures in place</li> <li>Add new granular material to surface</li> <li>If applicable, grade the surface</li> <li>Temporarily lower the speed limit on site</li> </ul>
Ramps in the open pits	Regular inspection by pit supervisor during summer period	Deterioration of visibility	<ul><li>Deterioration of visibility</li><li>Safety concern</li></ul>	Use water as a dust suppressant

#### **6 PLAN REVIEW**

The Air Quality and Dustfall Monitoring Plan will be reviewed regularly by the Meadowbank Environmental Superintendent and be updated if any changes to the equipment or the program occur.

#### 7 REFERENCE

Agnico Eagle (Agnico-Eagle Mines Limited). 2008. Technical Memo- Air Traffic Management-Meadowbank Gold Project (June 10, 2008)

Agnico Eagle. 2016. Environmental Assessment for the Whale Tail Pit and Haul Road.

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BC 2013. British Columbia Ambient Air Quality Objectives. Provincial Air Quality Objective Information Sheet. August 12, 2013.

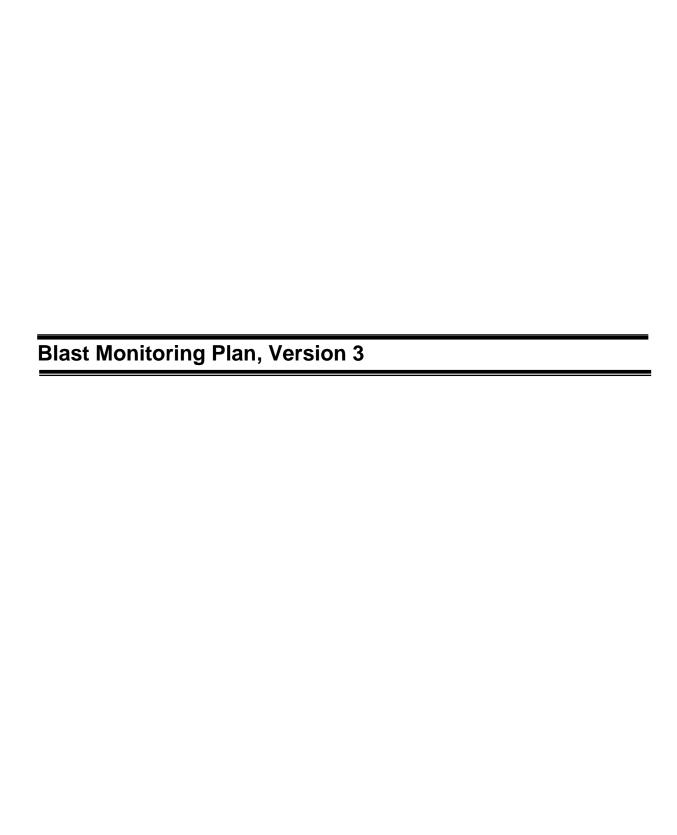
Cumberland Resources Ltd. 2005. Meadowbank Gold Project Air Quality Impact Assessment Report.

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GN, Department of Environment. 2014. Guideline: Dust Suppression on Unpaved Roads.

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Golder 2008. Technical Memorandum. Addendum Report: Air Quality Monitoring Meadowbank Gold Project. Prepared for Agnico-Eagle Mines Ltd. May 16, 2008.





# Meadowbank & Whale Tail Project Blast Monitoring Program

Prepared by:
Agnico-Eagle Mines Limited – Meadowbank Division

Version 3

March 2019

#### 1. EXECUTIVE SUMMARY

The Guidelines for the Use of Explosives In or Near Canadian Waters (Wright and Hopky, 1998) as modified by the DFO for use in the North mention the following requirements that are applicable to the Meadowbank Mine:

- No explosive is to be detonated in or near fish habitat that produces, or is likely to produce, an instantaneous pressure change (i.e. overpressure) greater than 100 kPa in the swim bladder of a fish.
- No explosive is to be detonated that produces, or is likely to produce, a peak particle velocity greater than 13 mm/sec in a spawning bed during the period of egg incubation.

As a result of testing and monitoring in the NWT that indicates the limit of 100 kPa was not protective to fish, DFO has recommended to Agnico to use 50 kPa as the threshold for instantaneous pressure change.

Every blast is monitored with an Instantel Minimate Blaster to ensure that vibrations generated by blasting are less than 13 mm/sec and the overpressure is under 50 KPa. The blasts are monitored from three locations at the Meadowbank site; one station is located near the northern end of Portage Pit, the second near the south end of Portage Pit and the other one at the north of Vault Pit. For Whale Tail, the blasts are monitored from two locations; one on Whale Tail Lake before the fish out is completed and another one on Mammoth Lake for the open pit operations. Independent blast monitoring plans will be established for blasts that are outside of the Whale Tail Pit area; for example: the Whale Tail Dike and the Mammoth Dike Construction MEMO that was submitted to the DFO. The results of blast monitoring are systematically analyzed by the Engineering department within the 24 hours following the blasting operation. The blast monitoring results are interpreted and a blast mitigation plan is implemented immediately if the vibrations or the overpressure exceed the guidelines. A retro analysis is conducted to determine what caused the higher than expected results.

The following factors are considered in controlling vibration intensity:

- The confinement of the charges
- The coupling of the explosives charges to the rock affects how much energy is transferred to the rock

- The spatial (geometric) distribution of the explosives affects the character and intensity of the ground vibrations
- The charge weight per delay (8ms intervals)
- The blast direction

The following factors are considered in controlling overpressure:

- Depth of burial
- Insufficient burden on the first row of holes, this can cause air blast and generate fly rocks
- Charges placed in open seams, clay filled seams, and highly fractured zones where gases could be vented
- The charge weight per delay (8ms intervals), especially for pre-shear blasting

The blast monitoring reports are systematically archived and relevant information entered into a database. The blast monitoring data will be submitted for regulatory review annually in the Meadowbank Annual Report.

#### **IMPLEMENTATION SCHEDULE**

This Plan is implemented immediately (March 2019)

#### **DISTRIBUTION LIST**

Agnico Eagle – Environment Superintendents Agnico Eagle – Environmental Coordinators Agnico Eagle – Engineering Superintendents Agnico Eagle – Engineering Coordinators

Version	Date (YMD)	Section	Page	Revision
1	May 2010	All Section		Comprehensive plan for Meadowbank Project
2	March 2017	All Section		Update of the original plan
3	March 2019	All Section		Implementation of Whale Tail project monitoring

Produced by Engineering Department

Approved by:

Miles Legault

Assistant Engineering Superintendent

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# 1. Introduction

Agnico-Eagle Mines Limited – Meadowbank Division has developed this Blasting Monitoring Program for the control of blasting vibrations at the Portage, Goose and Vault Pit in accordance with Condition 85 of Project Certificate No.004 issued by the Nunavut Impact Review Board (NIRB). This monitoring program was also updated to include blasting activities at Whale Tail Project in accordance with Condition 22 of NIRB Project Certificate No.008.

Agnico had developed a detailed blasting program to minimize the effects of blasting on fish and fish habitat, water quality, and wildlife and terrestrial VECs. The Blasting Program has been developed in consultation with the Department Of Fisheries and Oceans (DFO) and the Government of Nunavut (GN), and shall:

- a) Comply with the Guidelines for the Use of Explosives In or Near Canadian Fisheries Waters (Wright and Hopky, 1998) as modified by the DFO for use in the north;
- b) adhere to the guidance provided in the Monitoring Explosive-Based Winter Seismic Exploration in Waterbodies, NWT 2000-2002 (Cott and Hanna, 2005);
- c) Include a monitoring and mitigation plan to be developed in consultation with the DFO, and obtain DFO approval of the blasting program prior to the commencement of blasting;
- d) Restrict blasting when migrating caribou, or sensitive local carnivores or birds may be negatively affected; and
- e) Minimize the use of ammonium nitrate to reduce the effects of blasting on receiving water quality

The Blasting Monitoring Program will continue to be implemented during the operation phases of the Meadowbank and Whale Tail Projects.

# 2. Blasting standard and criteria

The effects of blasting are typically assessed in terms of Peak Particle Velocity (PPV). The US Bureau of Mines has established that the peak particle velocity is related to the scaled distance by the following relationship:

$$PPV = k * (R/W^{0.5})^{-b}$$

Where:

PPV = Peak Particle Velocity, mm/s

R = Distance from blast to point of concern, m

W = Charge weight per delay, kg

k = confinement factor – specific to site

b = site factor

This formula can be used to estimate PPV and determine if the PPV will surpass the given limits before the blast occurs.

The Guidelines for the Use of Explosives In or Near Canadian Waters (Wright and Hopky, 1998) as modified by the DFO for use in the North mention the following requirements that are applicable to the Meadowbank Project:

- "8. No explosive is to be detonated in or near fish habitat that produces, or is likely to produce, an instantaneous pressure change (i.e. overpressure) greater than 100 kPa (14.5 psi) in the swim bladder of a fish.
- 9. No explosive is to be detonated that produces, or is likely to produce, a peak particle velocity greater than 13 mm/sec in a spawning bed during the period of egg incubation."

As a result of testing and monitoring in the NWT that indicates the limit of 100kpa was not protective to fish, DFO has recommended to Agnico to use 50 kPA as the threshold for instantaneous pressure change.

To keep PPV under the 13 mm/sec guideline Wright and Hopky (1998) suggests the setback distances shown in table 1.

Table 1 : Set back distance (m) from center of detonation of a confined explosive to spawning habitat to achieve 13mm/sec guideline criteria for all types of substrate (Wright and Hopkins, 1998)

	Weight of Explosive Charges (kg)						
	0.5	1	5	10	25	50	100
Setback							
distance							
(m)	10.7	15.1	33.7	47.8	75.5	106.7	150.9

Concerning the instantaneous pressure change (i.e. overpressure), Wright and Hopky (1998) suggest the following setback distances to keep it under the 100 kPa guideline.

Table 2 : Set back distance (m) from center of detonation of a confined explosive to fish habitat to achieve 100 KPa guideline criteria for various substrate.

	Weight of Explosive Charges (kg)							
Substrate Type	0.5	1	2	5	10	25	50	100
Rock	3.6	5.0	7.1	11.0	15.9	25.0	35.6	50.3
Sfrozen Soil	3.3	4.7	6.5	10.4	14.7	23.2	32.9	46.5
Ice	3.0	4.2	5.9	9.3	13.2	20.9	29.5	41.8
Saturated Soil	3.0	4.2	5.9	9.3	13.2	20.9	29.5	41.8
Rock	2.0	2.9	4.1	6.5	9.2	14.5	20.5	29.0

The Meadowbank Engineering team is also referring to the vibration and overpressure historical data to assess certain blast pattern closer to lakes. Nine (9) years of historical data are archived in the Meadowbank database and they are often used as case study for delicate blasting operations.

# 3. Blast monitoring plan

# 3.1. Blast monitoring equipment

Every blast is monitored to ensure that vibrations generated by blasting are less than 13 mm/sec and the overpressure is under 50 KPa. The instrument used for blast monitoring is an Instantel Minimate Blaster which is fully compliant with the international Society of Explosives and Engineers performance specification for blasting seismographs (Instantel, 2005).

The Minimate Blaster has three main parts: a monitor, a standard transducer (geophone) and a microphone (figure 1). The monitor contains the battery and electronic components of the instrument. It also checks the two sensors to be sure that they work properly. The transducer measures ground vibration with a mechanism called a geophone.



Figure 1: Instantel Minimate Blaster Unit

The transducer has three geophones that measure the ground vibrations in terms of particle velocity. They measure transverse, vertical and longitudinal ground vibrations (figure 2). Transverse ground vibrations agitate particles in a side to side motion. Vertical ground vibrations agitate particles in an up and down motion. Longitudinal ground vibrations agitate particles in a back and forth motion progressing outward from the event site (Instantel, 2016).

The microphone measures the PSP (Peak Sound Pressure) also referred as to the PAO (Peak Air Overpressure). The instrument checks the entire event waveform and displays the largest sound pressure in Pa unit.

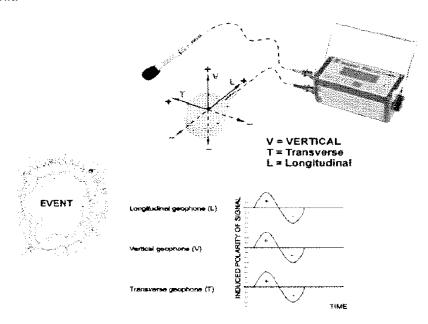


Figure 2: Sensor Orientation (Instantel, 2016)

The Minimate Blaster (Instantel) calculates the PPV for each geophone and calculates the vector sum of the three axes.

The final result is the PVS (Peak Vector Sum) and it is the resultant particle velocity magnitude of the event:

$$PVS = \sqrt{(T^2 + V^2 + L^2)}$$

Where:

T = particle velocity along the transverse plane

V = particle velocity along the vertical plane

L = particle velocity along the longitudinal plane

# 3.2. Equipment installation

The transducer is installed on a hard surface, which in this case is rock. A 3/8 inch bolt is anchored in the rock (figure 3) and the transducer is tightened with a nut (figure 4). The arrow on the top of the standard transducer must be pointed in the direction of the event to ensure the geophone sensors, located inside the standard transducer, remains in their natural axis (Instantel, 2016). The trigger level of the instrument is set to 1 mm/s and the transducer will start recording an event automatically when the ground vibrations are greater than or equal to 1 mm/s. The recording time is 4 seconds, which is sufficient considering that the blast timing is rarely more than 2 seconds at Meadowbank. The instrument is protected with a box and the microphone is oriented in the direction of the blast.

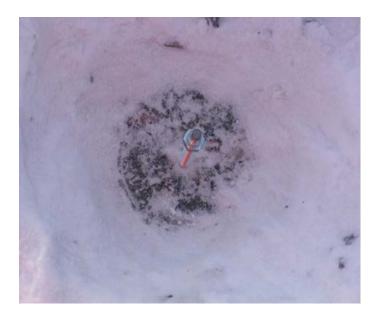


Figure 3: 3/8 inch bolt anchored in the rock



Figure 4: Transducer tightened with a nut



Figure 5: Final Set-up with the Microphone in the direction of the blast



Figure 6: General view of the Portage South monitoring station

# 3.3. Blast monitoring stations at Meadowbank

The blasts are monitored from three different locations. The locations were chosen to have the optimal distance between the blasts and the water (fish habitat). One station is located near the northern end of Portage pit and the other near the south end of Portage pit (figure 7). The third station is located at the complete northern of the Vault Pit (Figure 8).

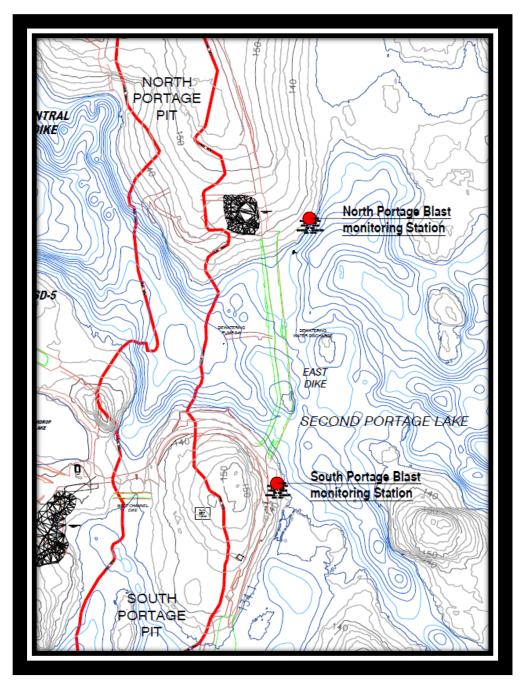


Figure 7: Localizations of the two blast monitoring stations at Portage Pit

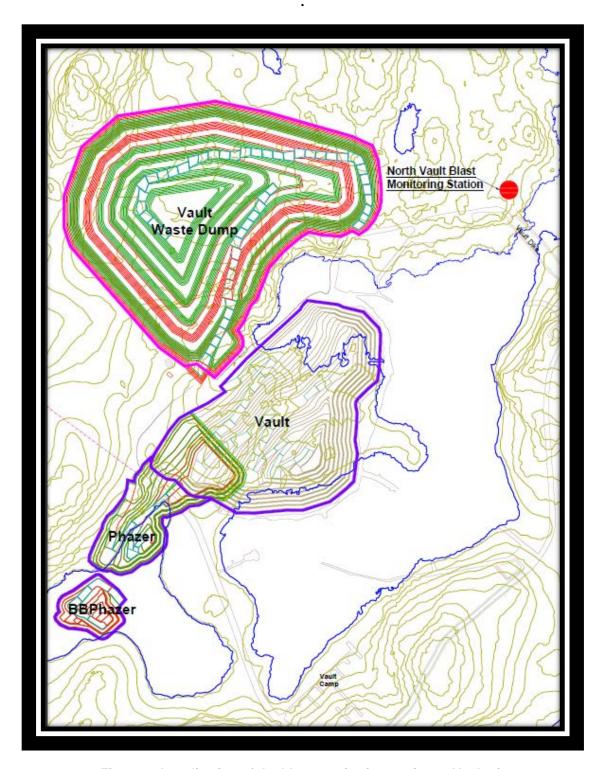


Figure 8: Localization of the blast monitoring station at Vault pit

# 3.4 Whale Tail monitoring stations

The blasts were monitored from Whale Tail Station 1 when mining in Quarry 1 and Ap-5. For Quarry 2 and Phase 1 of Whale Tail Pit; monitoring is done from Mammoth Station 1 only since the fish out of Whale Tail Lake has been completed. Depending on the location of the blast inside Whale Tail Pit, Whale Tail Station 2 will be used as well. Additionally, monitoring will be done on both Mammoth Dike and Whale Tail Dike which will provide redundancy and mitigation if ever the Instatel monitoring devices were to not record.

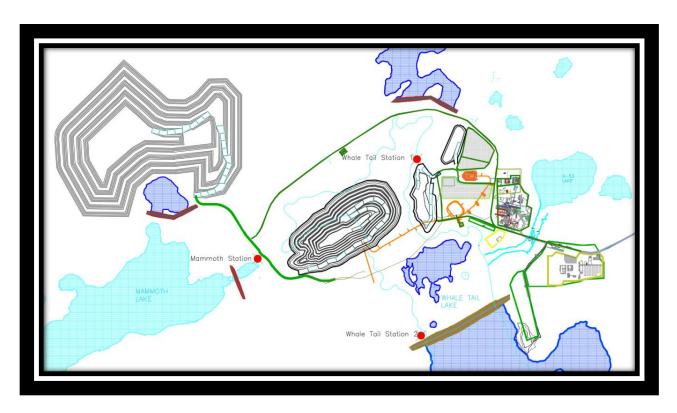


Figure 9: Localization of the blast monitoring stations at Amaruq

As demonstrated on Figure 10, the possible fish spawning areas are located West of Mammoth Dike while Mammoth Station is located East of the Dike. Therefore, it is safe to say, according to the formula for calculating PPV in Section 2, that if we record PPVs under the 13mm/s threshold, that the PPVs will be lower at the fish spawning areas.

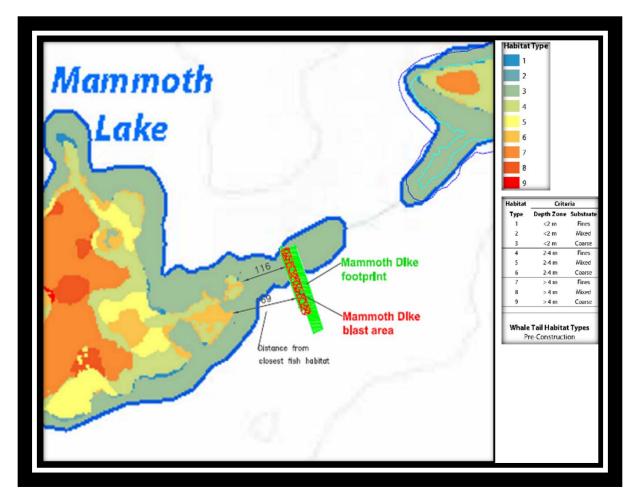
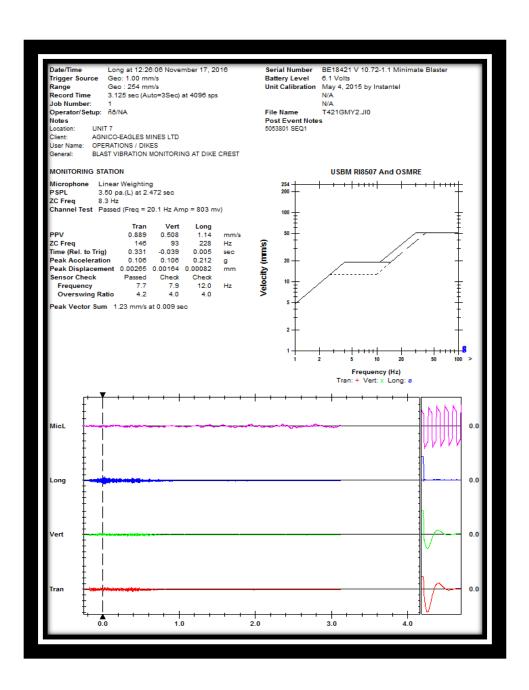


Figure 10: Fish Habitat Types for Mammoth Lake

# 3.5 Blast monitoring report

After each blast, the results are stored in a database and the report saved in the library for future reference. The blast monitoring results are interpreted and a blast mitigation plan is implemented immediately if the vibrations or the overpressure exceed the permitted limit (see section 4). The data will be submitted to DFO, GN, NIRB, Environment and Climate Change Canada, and the Nunavut Water Board annually in the Meadowbank Annual Report.



# 4. Blast mitigation plan

This mitigation plan is specific to blasts in the open pits (Portage Pit, Vault Pit, BB Phaser Pit, Phaser Pit and Whale Tail Pit. A Memo has been sent to the Fisheries and Oceans with its own specific mitigation plan relative to blasts for Whale Tail Dike and Mammoth Dike excavation.

If the vibrations or the overpressure approach or exceed the permitted limit, it is possible to conduct a retro analysis and find the factors that may have caused higher than desired results. It is important to consider the main factors influencing blast vibration intensity (table 3) or overpressure (table 4) in order to prevent such results (ISEE, 1998).

Table 3: Main Factors Influencing Blast Vibration Intensity (ISEE, 1998)

Main Factors Influencing Blast Vibration Intensity
Maximum charge weight detonating at one time
True distance (distance the waves must travel)
Geological conditions
Confinement
Physical properties of the rock
Coupling
Spatial distribution
Detonator timing scatter
Time of energy release
Type of Explosive

**Table 4: Main Factors Influencing Overpressure (ISEE, 1998)** 

Main Factors Influencing Overpressure
Maximum charge weight per delay
Depth of burial of charges
Exposed surface detonation material
Atmospheric conditions
Wind
Temperature gradients
Topography

Volume of displaced rock
Delay interval and orientation
Type of Explosive

Geological conditions and rock properties are site specific and cannot be changed but there are several controllable factors that may reduce blast vibration intensity. Agnico takes the following factors into consideration at Meadowbank to reduce vibration intensity:

- I. The confinement of the charges affects the vibration intensity. If a charge is deeply buried with no free face nearby, the rock is not displaced and more of the energy goes into seismic waves (ISEE, 1998). The engineering department carefully plans pre-shear blasting that may have excessive burden in the first row of holes.
- II. The coupling of the explosives charges to the rock affects how much energy is transferred to the rock and hence the intensity of the vibrations. If smaller-diameter charges are placed in large-diameter holes, the charges are decoupled and less energy is transferred (ISEE, 1998). Using bulk products increases the coupling. In specific cases, like pre-splitting blast, it is a better idea to use packaged products that have a small diameter.
- III. The spatial (geometric) distribution of the explosives affects the character and intensity of the ground vibrations. A reduction in vibration is often found when there are many small charges per delay, widely distributed. There is a practical limit to the number of small charges that can reinforce each other, and the more there are, the less effective their reinforcement. A charge per delay composed of 100 charges of 1lb each will not generate the same intensity of vibration as a single charge of 100 lbs. (ISEE, 1998).
- IV. The main factor that is used to prevent high intensity vibration is the charge weight per delay. The 8-ms criterion is applied to prevent short delay times from overlapping or causing constructive reinforcement (addition) of two or more pulses (ISEE, 1998), which could cause higher vibrations. In every blast connection plan designed by the engineering department, this fact is taken into consideration. Timing is designed to minimize the number of holes that overlap in an 8 ms delay.
- V. The blasting direction of a blast pattern is another key element to minimize vibration once blasting besides areas close to lakes.

Mitigation techniques used to reduce overpressures are as follows:

- I. Depth of burial affects the overpressure. Improperly stemmed or insufficient collar will allow blast holes energy to be vented upwards. The quality of the stemming is also important: angular, coarse stemming material (3/4") is necessary to be efficient.
- II. Avoid having insufficient burden on the first row of holes. This can cause air blast and generate fly rocks. Leaving muck piles from the previous blast in front of the free face (choke blasting) can reduce the amount of air blast generated and minimize the chance fly rocks.
- III. Avoid placing charges in open seams, clay filled seams, and highly fractured zones where gases could be vented.
- IV. Controlling the charge weight per delay especially for the pre-shear drilling. A limited number of kg per delay is in effect at Portage pit to avoid overpressure.

# 5. Conclusion

Blast monitoring process will continue to ensure that blast vibrations do not cause harm to aquatic life at Meadowbank and Whale Tail. The results are used to find a more accurate confinement factor of the site. The data collected helps to correlate different factors that could influenced vibration intensity and will be taken into consideration in the future to guarantee a constant improvement in controlling blast vibrations.

We have overall successfully managed to keep our vibrations below the limit authorized. Agnico is committed to monitoring all blasts in order to fully comply with the regulation.

# 6. References

INSTANTEL INC. 2005, MINIMATE BLASTER OPERATOR MANUAL

INTERNATIONAL SOCIETY OF EXPLOSIVE ENGINEERS (ISEE) (1998). BLASTERS' HANDBOOK (17TH ED.). CLEVELAND: INTERNATIONAL SOCIETY OF EXPLOSIVE ENGINEERS..

WRIGHT, D.G., AND G.E. HOPKY. (1998) GUIDELINES FOR THE USE OF EXPLOSIVES IN OR NEAR CANADIAN

FISHERIES WATERS. CAN. TECH. REP. FISH. AQUAT. SCI. 2107: IV + 34P.

GAGNON, P. AND MACDONALD, P-E, MEADOWBANK AND AMARUQ GEOTECHNICAL ENGINEERS,

Memo: Blasting Activities - Mammoth Dike construction, Agnico Eagle

Bulk Fuel Storage Facility: Environmental Performance Monitoring Plan, Version 4



Meadowbank and Whale Tail Bulk Fuel Storage Facility:

Environmental Performance Monitoring Plan

**MARCH 2019** 

**VERSION 4** 

### **EXECUTIVE SUMMARY**

Agnico Eagle Mines Limited – Meadowbank Division (Agnico Eagle) is currently operating the Meadowbank Gold Project approximately 70 km north of the Hamlet of Baker Lake. As part of the project, one - 5.6 million litres bulk fuel storage tank was constructed to store diesel fuel for routine operations at the mine site, and one - 1.5 million liters bulk fuel storage tank will be built at the Whale Tail Pit site. The former bulk fuel tank facility was commissioned in January 2009 while the one at Whale Tail is to be commissioned in 2019. This document provides the details for the Meadowbank and Whale Tail Pit Bulk Fuel Storage Facility Environmental Performance Monitoring Plan required by Water License 2AM-MEA1526 Part B, Item 13(I) and 2AM-WTP1826 Part B, Item 14 (b).

To adequately assess the environmental performance of the bulk fuel storage tank at Meadowbank and Whale Tail Pit, this report provides: a summary of the design, installation, operation and maintenance that follows the CCME (2003) Environmental Code of Practice for Aboveground Storage Tank Systems Containing Petroleum and Allied Petroleum Products; a summary of the location and environmental setting; a summary of the NWB Type A water license requirements; and an environmental assessment to support the recommended environmental monitoring for the ongoing evaluation of the secondary containment.

# **IMPLEMENTATION SCHEDULE**

As required by Water Licence 2AM-MEA1526 and 2AM-WTP1826, , the proposed implementation schedule for this Plan is effective upon approval and subject to any modifications proposed by the NIRB and NWB as a result of the review and approval process.

# **DISTRIBUTION LIST**

Agnico Eagle – General Mine Manager

Agnico Eagle – Environment Superintendent

Agnico Eagle – General Supervisor

Agnico Eagle – Environmental Coordinator

Agnico Eagle – Environmental Technician

Agnico Eagle – Energy and Infrastructures Superintendent

Agnico Eagle – Field Services Supervisor

Agnico Eagle – Warehouse Supervisor

Agnico Eagle – Whale Tail Open Pit Manager

# **DOCUMENT CONTROL**

Version	Date (YMD)	Section	Page	Revision
1	09/12/22			Comprehensive plan for Meadowbank Bulk Fuel Storage Facility
2	14/06/30			Comprehensive review of the plan
3	16/06/02			Addition of the Whale Tail Pit site and Whale Tail Pit haul road to the Plan
4	19/03/31	All	All	Update to reflect current Whale Tail Operations and storage capacity

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Appendix A: Meadowbank Fuel Storage Installations - Final Report

Appendix B: Whale Tail Storage Installations – Final Report (to be added once completed)

# Section 1 INTRODUCTION

Agnico Eagle Mines Limited – Meadowbank Division (Agnico Eagle) is operating the Meadowbank Gold Project and Whale Tail Pit (a Meadowbank satellite deposit located on the Amaruq property). The Meadowbank Project includes the Baker Lake Marshalling Area, the All-weather Access Road (AWAR), the Meadowbank Mine site, the Whale Tail pit, and the Whale Tail Haul Road.

One 5.6 million liter bulk fuel storage tank was constructed to provide diesel fuel for routine operations at the Meadowbank mine site, and one 1.5 ML tank will be built at the Whale Tail Pit Project.

To adequately assess the environmental performance of the bulk fuel storage tanks at Meadowbank and Whale Tail this report provides:

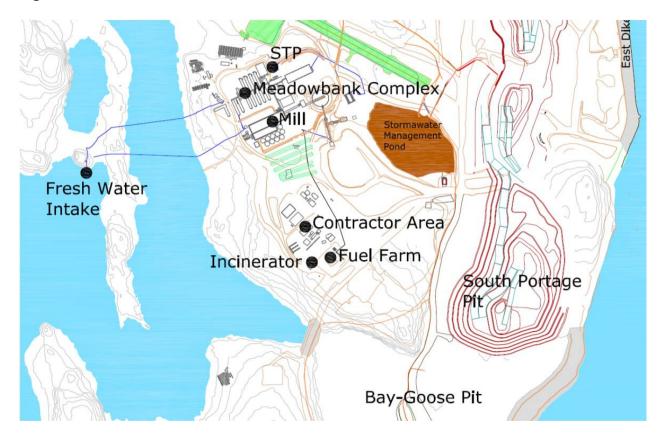
- a summary of the design, installation, operation and maintenance that follows the CCME (2003) Environmental Code of Practice for Aboveground Storage Tank Systems Containing Petroleum and Allied Petroleum Products:
- a summary of the location and environmental setting;
- a summary of the NWB Type A water license 2AM-MEA1526 and 2AM-WTP1826 requirements;
   and
- an environmental assessment to support the recommended environmental monitoring for the ongoing evaluation of the secondary containment.

# Section 2 SITE LOCATION, CONSTRUCTION AND OPERATION

### 2.1 SITE LOCATION

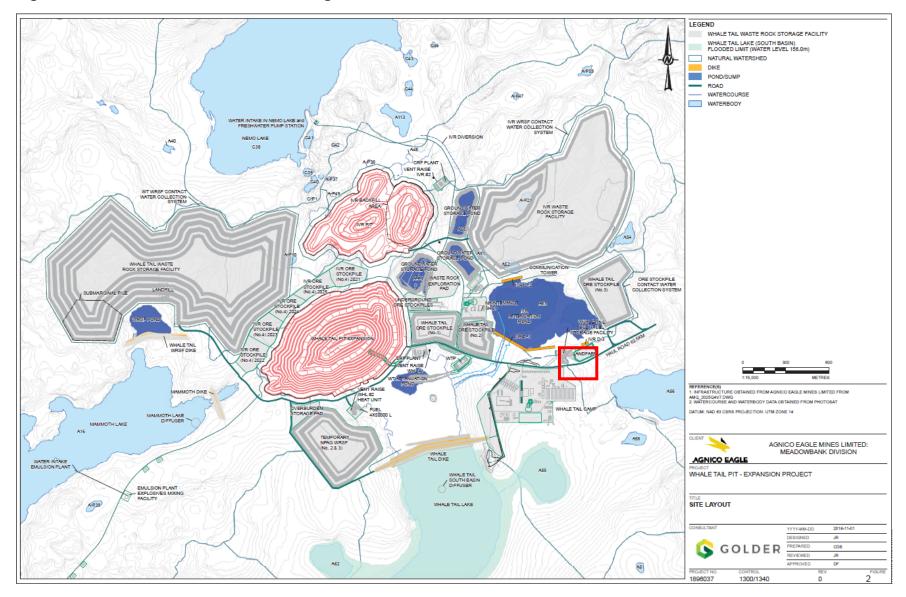
The Meadowbank Bulk Fuel Storage Facility is located at Meadowbank, east of the main camp facilities adjacent to the mine operations haul road. There is one (1) above ground storage tank with approximately 5.6 million liters capacity. The GPS coordinates of the facility is NAD83 14W E 0638083 N 7214288. The general location of the tank farm is provided in Figure 2-1 below.

Figure 2-1. Location Meadowbank Tank Farm



The Whale Tail Fuel Storage Facility is located at the Whale Tail satellite open pit, approximately 50 km west of the Meadowbank site. One 1.5 ML tank will be built. The tank will be in a berm and lined area and its location is shown in Figure 2-2.

Figure 2-2. Location of Whale Tail Fuel Storage



#### 2.2 DESIGN AND INSTALLATION SUMMARY

Following regulatory approval, during the summer of 2008 Agnico Eagle built the bulk fuel tank and respective secondary containment with a capacity of 5.6 million liters (AEM, 2009). The secondary containment enclosure and HDPE liner was installed in accordance with CCME (2003) specifications. The aboveground storage tanks were field erected. Construction activity was supervised by Hatch Engineering and Stavibel Engineering and included qualified steel fabricators and membrane installers. The diesel fuel tank is single-walled and constructed of welded steel. In addition, aviation fuel is stored in two 50,000 L double-walled steel tanks adjacent to the airstrip. Additionally, in the summer of 2015, an aboveground pipe was installed in accordance with CEPA (2008) specifications to supply fuel from the bulk fuel tank to the main Meadowbank power plant.

Similarly, for the Whale Tail Pit site, diesel fuel originating from the Baker Lake Tank Farm is stored in one 1,500,000 L tank with secondary containment. The Whale Tail Bulk Fuel Storage Facility is shown in Figure 2-2.

#### 2.3 OPERATION AND MAINTENANCE SUMMARY

Inventory control of transfer and monthly volume inspections using manual or electronic dip reconciliation are conducted at Meadowbank and at the Whale Tail Pit by operations staff at the respective sites. Weekly inspections are logged and reported by Agnico Eagle. Weekly visual inspections and inventory reconciliation are used to evaluate and determine bulk fuel tank leakage at Meadowbank and Whale Tail.

The bulk fuel storage facilities are maintained in accordance with best management practices. The bulk fuel tanks at Meadowbank and Whale Tail Pit are re-filled by a fuel truck on a regular basis throughout the year. During the period of re-filling, there is the greatest risk of over-filling. Through regular visual inspections, inventory control and monitoring fuel transfer, the risk of over-filling is significantly reduced. In the case of a spill, the Spill Contingency Plan will be implemented.

### Section 3 ENVIRONMENTAL SETTING

#### 3.1 TOPOGRAPHY

The surrounding area of the Meadowbank site and Whale Tail site consists of low, rolling hills with many small lakes; Third Portage Lake is located to the south and Second Portage Lake to the north. The bulk fuel storage tank at Meadowbank is bound to the north by the mine site, a haul road to the east, and the incinerator and waste management area to the south. The surface water drainage at the bulk fuel storage facility is towards the storm water management pond to the north.

The topography of the Whale Tail area differs a little from that of Meadowbank. The tank farm is located northeast of the camp as shown in Figure 2-2. The water drainage at the Whale Tail Pit bulk fuel storage facility is towards pond A53, which during operations drains through the east channel and into Whale Tail Lake (South Basin).

#### 3.2 GEOLOGY

The two fuel storage sites have a thin, discontinuous cover of top soil with minimal organic material. Soil thickness is typically between 1 and 5 m below which bedrock is encountered. In the area near the Meadowbank and Whale Tail Pit bulk fuel farm, bedrock is encountered within 2m of existing ground surface or is exposed with weathered fractures extending 1 to 2 m into the rock.

#### 3.3 FLORA AND FAUNA

There are no trees and few shrubs in the area surrounding the Meadowbank and Whale Tail sites. The sites are covered by low-lying vegetation; predominated by grassy hummocks, dwarf willow, sedge, green moss, and lichen.

Arctic ground squirrels, ptarmigan and songbirds are inhabitants in the area surrounding the fuel storage areas. Lake trout, arctic char, lake whitefish, round whitefish, slimy sculpin and stickleback are predominant fish species found in local lakes.

# 3.4 SUBSURFACE CONDITIONS

At the two sites, soil is characterized by lateral deposits of glacial till. Bedrock is exposed at shallow depths throughout the sites. There is high site drainage due to limited soil depth, high presence of fractured bedrock and glacial till.

#### 3.5 WATER QUALITY

Water quality closely resembles distilled water as many conventional water chemistry parameters are at or below detection limits. The water column is generally well mixed and the water chemistry homogenous. During the open water season there is limited vertical stratification in temperature and dissolved oxygen.

# Section 4 NWB TYPE A WATER LICENSE CONDITIONS

Agnico Eagle will continue to adhere and will apply the conditions of the Nunavut Water Board (NWB) Type A water license 2AM-MEA1526 and 2AM-WTP1826 requirements, related to the Meadowbank mine site bulk fuel storage facility and the Whale Tail Pit Bulk Fuel Storage Facility. Agnico Eagle is committed to achieving all of these requirements at Meadowbank, and at Whale Tail.

### Section 5 ENVIRONMENTAL PERFORMANCE ASSESSMENT

To adequately assess the environmental performance of the Meadowbank bulk fuel storage tanks and facilities, a desktop review of the Meadowbank Fuel Storage Installations: Final Report (Agnico Eagle, 2009) was completed. In addition, on October 26, 2009 Agnico Eagle environmental personnel completed a site inspection to visually evaluate the site drainage, tank construction, and secondary containment and performed an environmental assessment of the bulk fuel storage facility. A geotechnical inspection is also conducted annually by an external qualified engineer. The report included observations, photos and recommendations.

A similar level of assessment was carried out at Whale Tail Pit once the fuel storage facilities are in place.

#### 5.1 DESK-TOP REPORT REVIEW OF THE MEADOWBANK BULK FUEL STORAGE FACILITY

The Meadowbank bulk fuel storage facility was commissioned in January 2009. The installation report (Agnico Eagle, 2009; attached in Appendix A) indicated the use of best management practices during the installation of the aboveground fuel storage tank. Following the tank construction, X- Ray testing of horizontal and vertical welds was completed. All of the welds met the specifications outlined in the API Standard 650 (Agnico Eagle, 2009). A similar approach was used at the Whale Tail tank farm.

Under the supervision of Hatch Engineering and Stavibel Engineering, the construction of the secondary containment berm was completed for the tank. Enviroline Services Inc. was hired in October 2008 to install the HDPE membrane liner in accordance with CCME (2003) specifications; this liner was subsequently covered with a surface layer of crushed stone.

A secondary containment volume calculation using AutoCAD Civil 3D was completed to provide verification on the liquid storage capacity of the storage tank system. The CCME Environmental Code of Practice for Aboveground Storage Tanks (2003) states:

a storage tank system that consists of more than one storage tank which should have a volumetric capacity of not less than the sum of the capacity of the largest storage tank located in the contained space and 10% of the capacity of the largest tank or the aggregate capacity of all other storage tanks located in the contained space.

In accordance with the CCME (2003) code of practice, the Meadowbank bulk fuel storage tank meets the volumetric requirements for a storage tank system (Agnico Eagle, 2009). The Whale Tail bulk fuel storage tanks will also be constructed to meet CCME (2003) code of practice.

In the summer of 2009, a 4-inch below-ground pipe was installed to supply fuel from the Bulk Fuel storage tank to the Meadowbank main power plant. The pipe was installed according to the CEPA (2008) regulations.

# 5.2 SECONDARY CONTAINMENT VISUAL INSPECTIONS

A consultant performs a geotechnical inspection annually and inspects the bulk fuel secondary containment structures at the Meadowbank Bulk Fuel Storage Facility, the report is sent to NWB annually. The same inspections and reporting are carried out at Whale Tail Pit.

#### 5.3 ENVIRONMENTAL ASSESSMENT

The management at the site drainage, surface water collection, and water/fuel removal within the secondary containment area is an important measure in the protection of the terrestrial environment, surface water, and ground water from potential sources of contamination. The environmental protection objectives, strategy, and an evaluation of the potential of leaks or seepage that could contaminate the terrestrial environment, surface water and ground water are provided in the following sections. Much of the environmental protection strategies focus on the control of contact water. In this report contact water is defined as any water that may be physically or chemically affected by the nearby operational activities.

At Meadowbank and Whale Tail Pit, the bermed and lined tank farm provides secondary containment. If fuel escapes from the tanks holding the fuel, the bermed and lined area will not allow the fuel to escape to the receiving terrestrial and aquatic environment. As there is expected to be a high volume of fuel transfer and activity around the modular fuel dispenser and refueling station, inadvertent fuel spills during refueling are expected but will be retained on the impermeable, lined pad. The liner is sloped such that any fuel spilled on the pad would flow to a sump where it collects and can be recovered.

#### 5.3.1 Terrestrial Environment

The primary objective of the terrestrial management plan is to minimize any adverse impacts to the terrestrial (soil, flora and fauna) environment. To meet this objective, the Meadowbank and Whale Tail Pit bulk fuel storage facility structures have been constructed, to minimize the operational footprint and control contact run-off water within the secondary containment area. Due to the site grading, all water that comes into contact with the bulk fuel storage facility (including the modular fuel dispenser) is intercepted and directed into the impermeable HDPE lined secondary containment area.

The ground beneath the secondary containment area has been graded to ensure berm stability.

#### 5.3.2 Surface Water

The objective of water management around the Meadowbank and Whale Tail bulk fuel storage facilities is to minimize impacts on the quantity and quality of surface water and groundwater. To meet this objective, the bulk fuel storage facility structures have been constructed to intercept and direct contact run-off water to the impermeable HDPE lined secondary containment area. As there is a high volume of fuel transfer and activity around the modular fuel dispenser, the pad below the modular fuel dispenser and refueling station is lined and sloped toward the secondary containment berm.

Due to the high compaction of the surrounding mine site pad, natural topography of the site, shallow top soil and predominate bedrock, should contact water reach the natural environment at Meadowbank, the ultimate fate of the contaminants is to the stormwater management pond.

#### 5.3.3 Groundwater

It is not expected that groundwater would be impacted as there is no direct pathway for contaminated water to seep from the Meadowbank and Whale Tail bulk fuel storage facilities. Due to the site grading, all contact water from the bulk fuel storage facility is directed inside the HDPE lined secondary containment area. Should the integrity of the liner become compromised, there could be leakage into the below grade soil, which is within a zone of continuous permafrost.

# Section 6 PERFORMANCE MONITORING PLAN

The environmental performance monitoring plan is a tiered approach with an emphasis on visual and operational inspections; routine surface water sampling to control and monitor the quality of the contact water; and event monitoring (in the case of a spill emergency or occurrence). Management of the Meadowbank and Whale Tail fuel storage facilities will be guided by the monitoring results.

### 6.1 VISUAL AND OPERATIONAL INSPECTIONS

Visual and operational inspections are a central component of the environmental performance monitoring plan. Visual inspections of the Meadowbank and Whale Tail secondary containment structures are important because if the integrity of the berm walls or liner is compromised, this presents the greatest potential for leaks or seepage.

Visual inspections are conducted by the environmental department once per week and monthly manual or electronic dip tests are conducted for inventory reconciliation by Procurement Department. Staff will inspect the bulk fuel storage facilities pad for: tank and piping condition, secondary containment berm structure and integrity, indicators of liner damage, precipitation/ run-off accumulation, evidence of tampering or misuse, any structural abnormalities and visible sheens on contact water pools and crush material inside the secondary containment.

The Environment staff will follow-up with the Energy and Infrastructures (E&I) Department if any non-compliances are observed. A weekly written inspection sheet will continue to be completed and signed by the E&I supervisor and available upon request.

# 6.2 ROUTINE CONTACT WATER MONITORING

Due to snow accumulation, melting and precipitation, contact water is unavoidably collected inside the secondary containment area. Contact water from inside the secondary containment area is sampled as described below before being discharged. The water accumulated in the Meadowbank and Whale Tail secondary containment will be released in accordance with the Type A Water License 2AM-MEA1526 and 2AM-WTP1826, Part F Item 7 to 11 conditions.

During visual inspections the quantity of contact water collected inside the secondary containment area and sump will be evaluated. If there is a visible sheen on the contact water or if water withdrawal to the environment is deemed necessary, water samples will be collected and analyzed as per Water License 2AM-MEA1526 Part F Item 8 and 2AM-WTP1826 Part F Item 7. If the contact water exceeds the licensed limits, a portable oil-water separator can be used to treat the water. Prior to withdrawal, samples will be analyzed at a certified laboratory and the 10-day notice will be sent to the inspector (as per 2AM-MEA1526 Part F Item 12 and 2AM-WTP1826 Part F, Item 13).

In addition, water samples from lakes near the Meadowbank and Whale Tail Pit site are collected as part of the Core Receiving Environmental Monitoring Plan (CREMP) and Aquatic Environmental Management Plan. The results of these analyzes will continue to be included in the annual report.

These samples are used to evaluate the performance of the overall water management plan for the Meadowbank and Whale Tail sites.

### 6.3 EVENT MONITORING

In the event of a spill occurrence at fuel storage facilities, the Spill Contingency Plan will be followed. As a follow-up to the spill response, the environmental staff will conduct an environmental assessment to determine the extent of impacts of the spill occurrence on the nearby environment. This will include the identification of the potential environmental pathways of concern that may result in impacts to surface water (i.e. Third Portage Lake near-shore surface water or east channel that drains into Whale Tail Lake (South Basin)), soil or groundwater.

# 6.3.1 Soil Sampling

Following the unlikely event where a spill is not contained within the secondary containment area or on the lined pad, soil sampling may be required to locate and prevent further impact to the terrestrial and aquatic receiving environment. Depending on the quantity of the spill, the organic surface soils and shallow till are a likely sink for hydrocarbons, thus soil samples will be taken at selected locations to horizontally and vertically delineate the impacted areas. Furthermore, the soil samples will provide valuable information used to determine the necessity of installing groundwater wells (see Section 6.3.3 below).

## 6.3.2 Water Sampling

Following a spill event escaping secondary containment, an environmental assessment will be conducted. Similar to routine contact water sampling (inside the secondary containment area or on the lined pad), water samples will be collected and analyzed as per Water License 2AM-MEA1526 Part F Item 8 and 2AM-WTP1826 Part F Item 7. If the contact water exceeds the licensed limits, a portable oil-water separator can be used to treat the water before it was disposed to the stormwater management ponds. Prior to withdrawal, samples will be analyzed at a certified laboratory. As part of the CREMP, receiving environment surface and at-depth water samples will be taken from Third Portage Lake or Whale Tail Lake, and analyzed for the same parameters as listed above.

#### 6.3.3 Assessment of the Need for Groundwater Well Installation

Following a spill event escaping secondary containment, if soil sample results identify elevated concentrations of contaminants (i.e. exceeding the CCME Canada-Wide Standard (CWS) for Petroleum Hydrocarbons (PHC) in Soil) and/or if water samples identify elevated receiving environment water samples (i.e. exceeding licensed limits caused as a result of the spill event), an assessment of the need for groundwater wells will be conducted. The assessment, and if required, design for installation, monitoring and maintenance of vertical ground water monitoring wells will be in accordance with CCME (2003) procedures.

### Section 7 REFERENCES

Agnico Eagle (2009). Meadowbank Fuel Storage Installations: Final Report Following Construction. April 2009.

Agnico Eagle (2016). Meadowbank Gold Project: Spill Contingency Plan. June 2016

Azimuth (2016). Core Receiving Environmental Monitoring Program: Whale Tail Pit Addendum. May 2016

BAER (2005). Meadowbank Gold Project Baseline Aquatic Ecosystem Report. October 2005. CCME (2008). Canadian Council of Ministers of the Environment: Canada Wide Standards for Petroleum Hydrocarbons in Soil. PN 1398. January 2008.

CCME (2003). Canadian Council of Ministers of the Environment: Environmental Code of Practice for Aboveground and Underground Storage Tank Systems Containing Petroleum and Allied Petroleum Products. ISBN 1-896997-33-3.

CEPA (2008). Canadian Environmental Protection Act. Storage Tank Systems for Petroleum Products and Allied Petroleum Products Regulations. June 12, 2008.

Golder Associates Ltd. (2004). Geotechnical Input to Infrastructure Design. Meadowbank Gold Project. Nunavut. Report submitted to Cumberland Resources Ltd, March 2004.

Golder Associates Ltd (2014). 2014 Annual Geotechnical Inspection Meadowbank Gold Mine, Nunavut.

Meadowbank and Whale Tail Bulk Fuel Storage Facilities: Environmental Performance Monitoring Plan Version 4, March 2019

# Appendix A

**Meadowbank Fuel Storage Installations – Final Report** 



# AGNICO-EAGLE MINES LTD MEADOWBANK DIVISION

#### **MEADOWBANK FUEL STORAGE INSTALLATIONS**

# FINAL REPORT FOLLOWING THE CONSTRUCTION



# AGNICO-EAGLE MINES LTD MEADOWBANK DIVISION

#### **MEADOWBANK FUEL STORAGE INSTALLATIONS**

## FINAL REPORT FOLLOWING THE CONSTRUCTION

#### PREPARED BY:



**Patrick Giard**, P.Eng., CCE Supervisor, Construction Department AGNICO-EAGLE MINES LTD, *Meadowbank Division* 



## AGNICO-EAGLE MINES LTD MEADOWBANK DIVISION

#### MEADOWBANK FUEL STORAGE INSTALLATIONS

## FINAL REPORT FOLLOWING THE CONSTRUCTION

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- C REVISION OF CONSTRUCTION DRAWINGS
- D VERIFICATIONS TO STORAGE CAPACITY WITHIN BERMS

**APPENDIX 1: DRAWINGS** 

**AS-BUILT**: VD2259-MBD-001, VD2259-MBD-002, VD2259-MBD-003

REVISION 1 OF 17202-2000-46D6-2001 IFC DRAWING from SNC-LAVALIN

VENDOR DRAWING FROM CHAMCO INDUSTRIES LTD: CUP1014938-21

#### APPENDIX 2

SAFE FILL LEVEL FOR FUEL TANK 680-TK-042

#### **DESCRIPTION OF THE MANDATE**

Agnico-Eagle Mines has given a mandate to the undersigned in order to verify the compliance with applicable regulations of its fuel storage installations at the Meadowbank gold mining site, in Nunavut.

According to the terms of reference, the mandate consists summarily in the following activities.

- A. Review and compilation of the available documentation;
- B. Collection of any information that may be missing;
- C. Preparation of an AS BUILT version of the construction drawings;
- D. Verifications to the storage capacity within the containment berms in regards to the applicable regulations.

#### A. DOCUMENTATION READILY AVAILABLE

#### **HATCH** - Vancouver Office

Only one (1) layout drawing showing the berm enclosure was issued from Hatch. No detailed design or cross-sections of containment berms was available prior to the construction phase. The original design of the fuel containment area is shown on revision 0B of drawing 325174-600-C-0135, which was issued **for information**.

#### NISHI-KHON / SNC-LAVALIN LTD - Vancouver Office

This firm was responsible for issuing the piping layout drawings and P&ID's for the Baker Lake fuel storage installations, which is a similar project located 100 km further South. During the construction and installation of piping for the Meadowbank bulk fuel storage tank, the *Process and Instrumentation Diagram* issued for construction was not readily available to the pipefitters.

#### **GEM STEEL EDMONTON LTD**

This vendor has submitted a set of drawings issued **for review**, consisting in three (3) structural drawings showing the details of a fuel tank of 5.6 million liters nominal capacity. The original design of this fuel tank is shown on revision A0 of drawings BL-2008-80-1, BL-2008-80-2, and BL-2008-80-3.

#### **CHAMCO INDUSTRIES LTD**

This vendor has submitted a set of preliminary drawings issued **for approval**, consisting in twenty-five (25) documents showing details of a fuel dispensing module. These documents have been reviewed by HATCH, and bear the following identification, which has been assigned by HATCH Document Control.

DRAWING NUMBER	H325174-M268-VD-0040	H325174-M268-VD-0041	H325174-M268-VD-0010
H325174-M268-VD-0011	H325174-M268-VD-0012	H325174-M268-VD-0013	H325174-M268-VD-0014
H325174-M268-VD-0015	H325174-M268-VD-0016	H325174-M268-VD-0017	H325174-M268-VD-0019
H325174-M268-VD-0020	H325174-M268-VD-0021	H325174-M268-VD-0029	H325174-M268-VD-0030
H325174-M268-VD-0031	H325174-M268-VD-0032	H325174-M268-VD-0033	H325174-M268-VD-0034
H325174-M268-VD-0035	H325174-M268-VD-0036	H325174-M268-VD-0037	H325174-M268-VD-0039

#### B. ADDITIONAL COLLECTION OF INFORMATION

#### **HATCH** - Vancouver Office

Role during construction phase: Design & Field Supervision during construction of berms.

Mr. Marlon Coakley and Jim Bonia, both of which were HATCH employees at the time, have supervised the construction of the fuel containment area. They have also hired a specialized crew from Saskatoon (Enviroline Service inc.) in October 2008 to install the HDPE membrane covering the berms. This HDPE membrane has since been covered with a layer of about 100 mm thickness of crushed stone.

#### NISHI-KHON / SNC-LAVALIN LTD - Vancouver Office

Role during construction phase: So far, I have never communicated with these people.

A research of all files provided by HATCH Document Control has permitted to find **Revision 0** of drawing 017202-2000-46D6-2001 from SNC-LAVALIN.

This document was not readily available to the construction team at the time when the crew from Mosher Engineering Ltd were installing the piping and commissioning the fuel dispensing module.

#### AGNICO-EAGLE MINES LTD, Meadowbank Surveying Team

Role during construction phase: Surveying of quantities & grades for berms, HDPE liner.

A surveying crew from AEM has monitored the quantities of granular materials and required berm elevations, as well as the installation of the HDPE membrane and grounding wire around the fuel tank. All of this work was done with the same specifications which were observed during the construction of the berms around the AEM bulk fuel storage tanks, which are located in Baker Lake.

#### **GEM STEEL EDMONTON LTD**

Role during construction phase: Fabrication and field assembly of the 5.6 M liters tank

A crew of ten (10) workers has started the construction of fuel tank 680-TK-042 on August 25, 2008 and the field erection was completed over a period of 16 days. Following this field work, a crew from ACUREN has proceeded to X-RAY testing of horizontal and vertical welds according to specifications described in the latest edition of API Standard 650. According to the report made by ACUREN, no repairs of defective welds were required, either on the tank shell or nozzles.

#### MOSHER ENGINEERING LTD

Role during construction phase: Welding of pipelines and support brackets between the 5.6 M liters tank and the fuel dispensing module.

In early November 2008, a crew of two (2) workers has welded the pipelines and installed the flanged connections and gate valves between fuel tank 680-TK-042 and the fuel dispensing module manufactured by CHAMCO INDUSTRIES LTD.

They have also installed check valves on the 100 mm diameter inlet and outlet nozzles on this tank, as well as a pressure relief valve set at 75 psi to bypass the check valve on the pipeline between the tank outlet and the fuel dispensing module. The grade of material that was used for this pipeline was A333 cold temperature rated steel.

#### **CHAMCO INDUSTRIES LTD**

<u>Role during construction phase</u>: Manufacturing of the fuel dispensing module.

This fuel dispensing module was manufactured in the summer of 2007 and sent to the Meadowbank site. No representatives of CHAMCO were present during the commissioning. Possibly due to vibrations during transport, there were many flanged connections that needed tightening, and it was found that this was not a turn-key installation. The air eliminator unit on the fuel tanker unloading area leaked fuel extensively during operation, as it was often locked in open position.

#### C. REVISION OF CONSTRUCTION DRAWINGS

AEM has hired STAVIBEL Engineering Services, a firm based in Val-d'Or, in order to complete the drawings that were used in producing this report.

Those four (4) drawings are enclosed in **Appendix 1** of this report.

Drawing VD2259-MDB-001 shows the general layout of the fuel tank 680-TK-042 and containment area. It has been compiled using surveying data collected by a crew from AEM. It also shows the location of pipelines, fuel dispensing module, and some three (3) additional fuel tanks.

Drawing VD2259-MDB-002 shows the cross-sections on both sides of the containment area. These cross-sections are derived from surfaces that were generated using the *Autocad Civil 3D* software, and are also based on information collected from AEM Construction Supervisors. This drawing file was also used to verify containment volumes, as it is described further in section D.

Drawing VD2259-MDB-003 is an as-built version of Vendor drawing BL-2008-80-1 which has been updated to reflect nozzle orientations that were noted during a site visit. No changes were noted except those made to the nozzle schedule.

The enclosed **Revision 1** of drawing 017202-2000-46D6-2001 from SNC-LAVALIN is also an as-built drawing. It shows a few items from the proposed piping layout for the Meadowbank bulk fuel storage that have not yet been put in place. These missing items consists in three (3) pressure relief loops around gate valves, and a 300 US gallon floor sump, which was to be located inside the fuel dispensing module. This floor sump has not been supplied by CHAMCO INDUSTRIES LTD.

Also enclosed is a vendor drawing from CHAMCO INDUSTRIES LTD, which shows the piping details inside the fuel dispensing module.

#### D. VERIFICATIONS TO STORAGE CAPACITY WITHIN BERMS

STAVIBEL Engineering Services has completed verifications on the liquid storage capacity inside the containment berms, which create an impermeable enclosure around tank 680-TK-042.

The method used was a volume calculation using *Autocad CIVIL 3D* software.

The maximum storage capacity of fuel tank 680-TK-042 is 5 675 700 litres of diesel fuel at a standard temperature of fifteen degrees Celcius (15 °C).

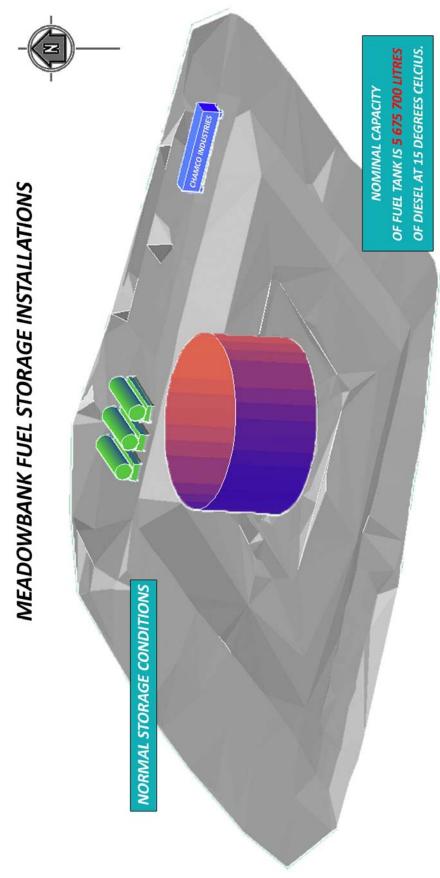
It has been verified using the above software that the impermeable enclosure around this fuel tank will effectively hold one hundred and ten percent (110%) of its maximum storage capacity. This theoretical calculation does not include the volume inside the tank itself, as if the fuel was pumped outside the tank.

Thus, the lowest point of the HDPE membrane that sits atop the containment area is sufficiently high (at elevation 150.94 m) to meet the above criteria.

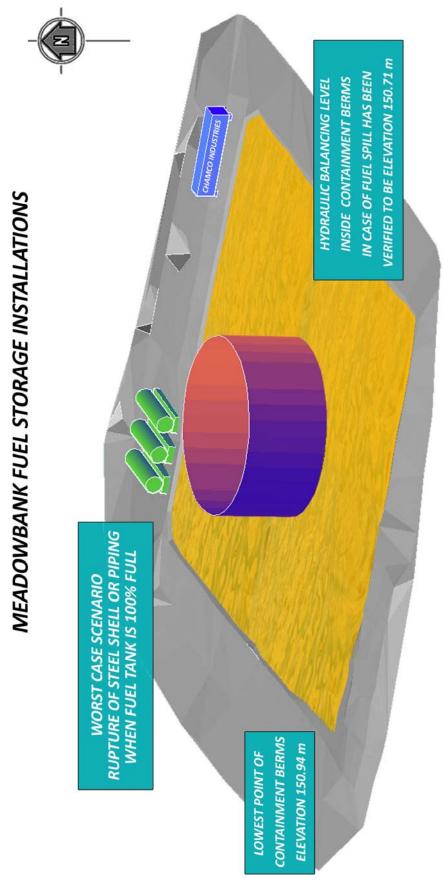
On the following pages are the results of a software simulation, which are showing a 3D view of the containment area in normal storage conditions, as well as another view showing the worst case scenario.

This worst case scenario would consist in either a rupture of the first course of side plates in the tank shell, or a failure in the outlet piping, when the tank is 100% full.

This simulation shows that, in such a worst case scenario, the hydraulic balancing level inside the containment area would not exceed the point with the lowest elevation on the surrounding berms. There is a safety margin of about 200 mm.



Our Reference : V. PAGE 7



Our Reference : V. PAGE 8

## **APPENDIX 1**

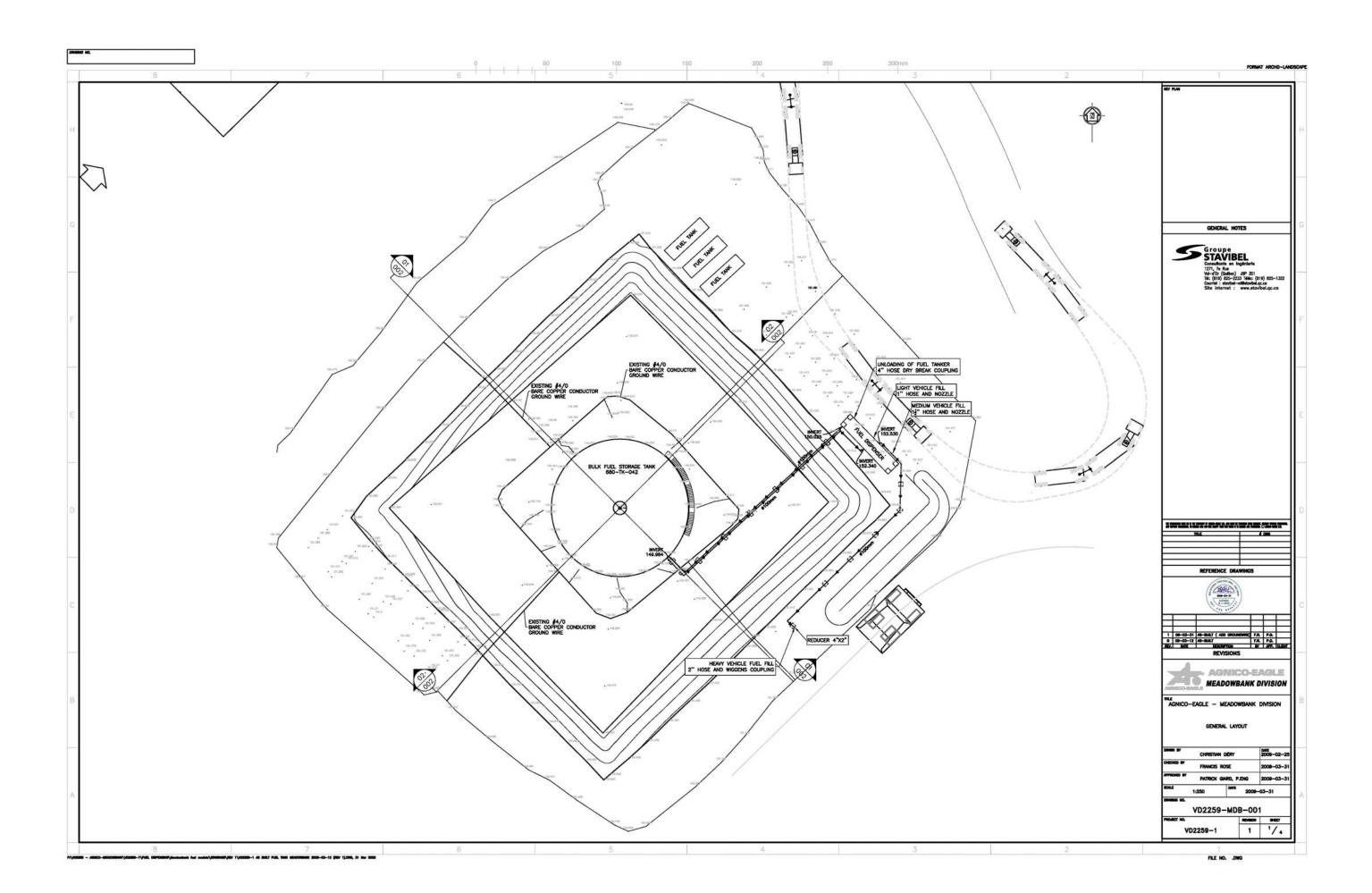
## **AS BUILT DRAWINGS**

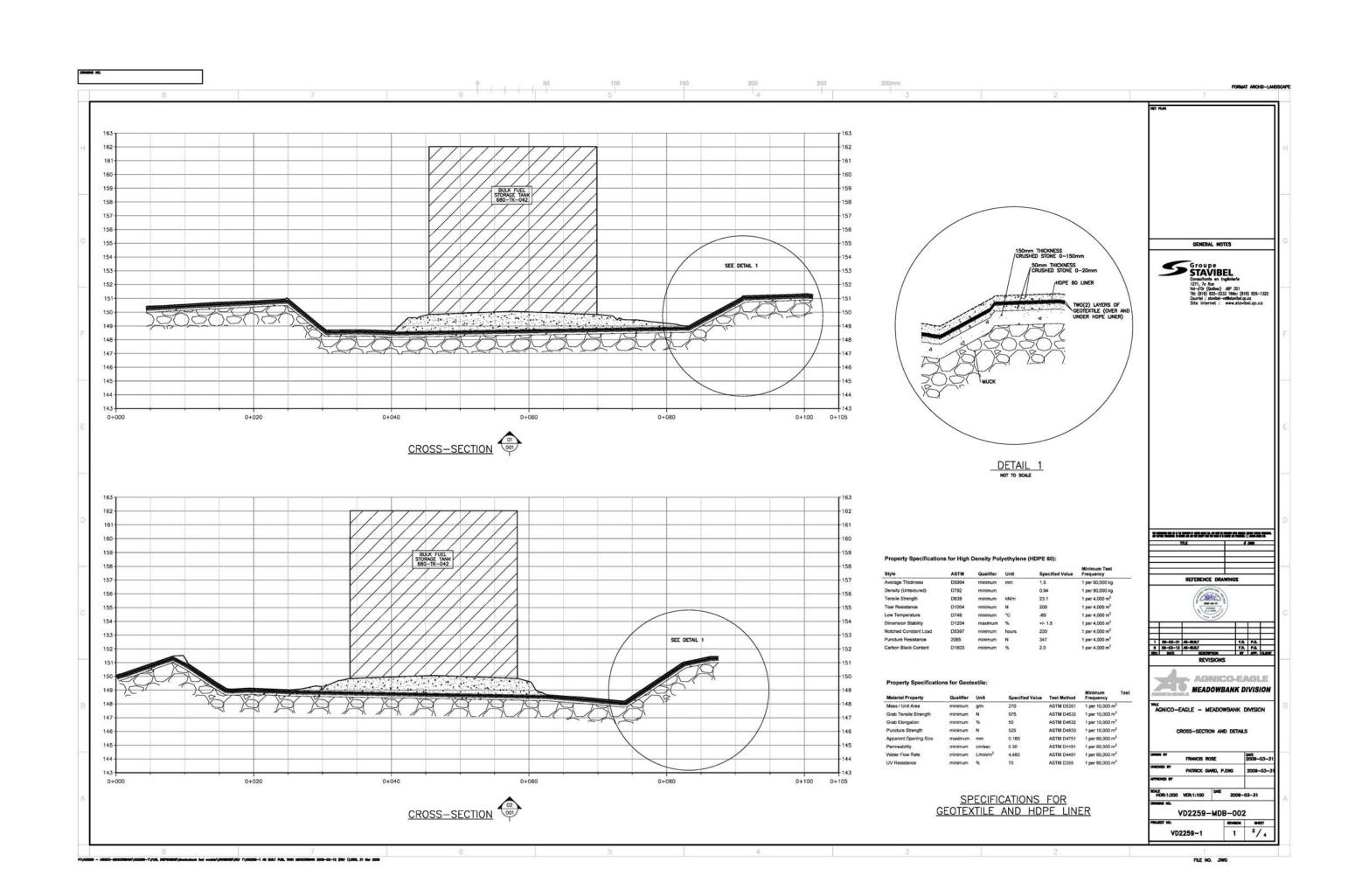
VD2259-MDB-001 VD2259-MDB-002 VD2259-MDB-003

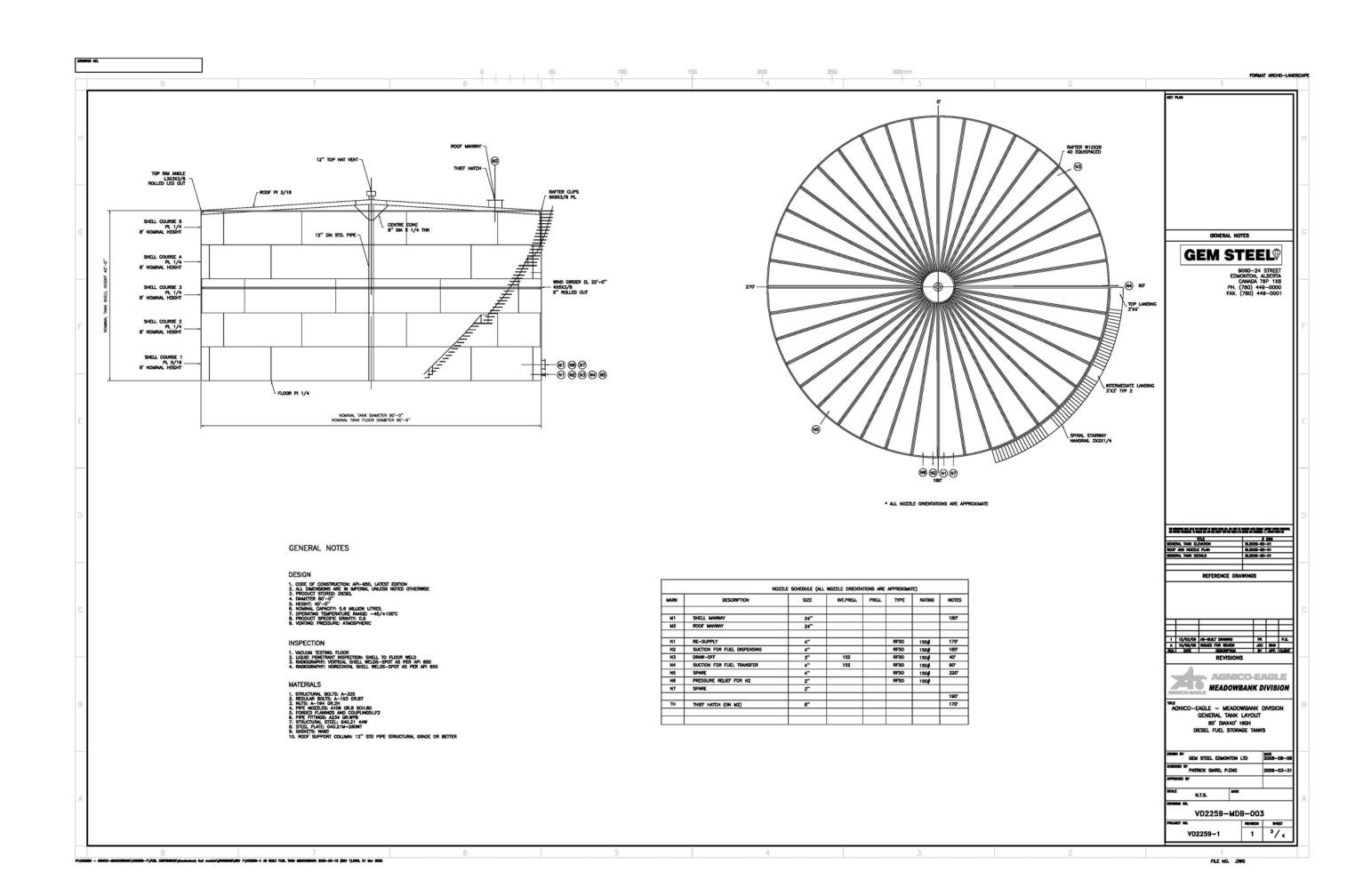
017202-2000-46D6-2001 IFC DRAWING from SNC-LAVALIN

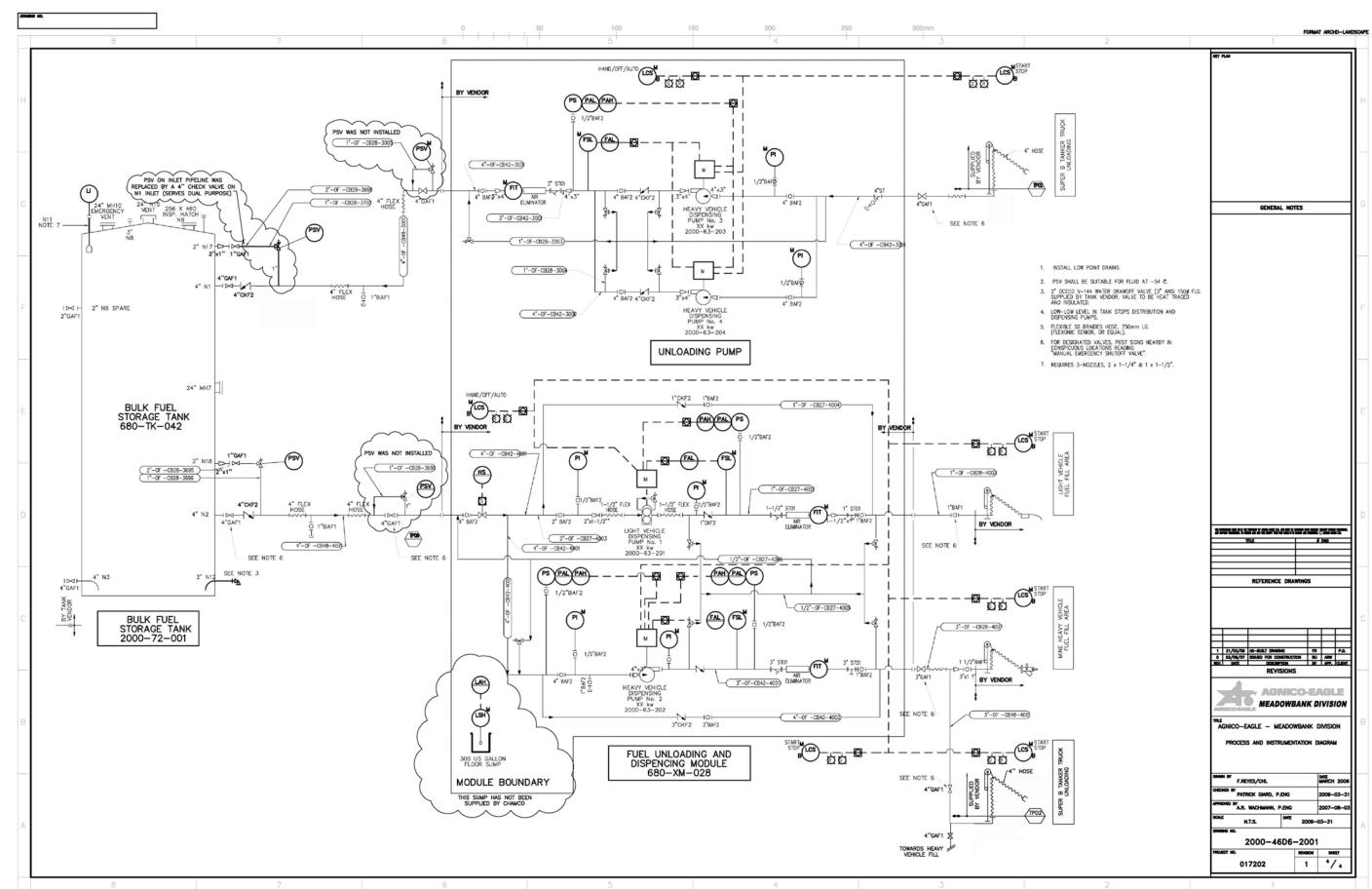
# Plus one (1) drawing from CHAMCO INDUSTRIES LTD

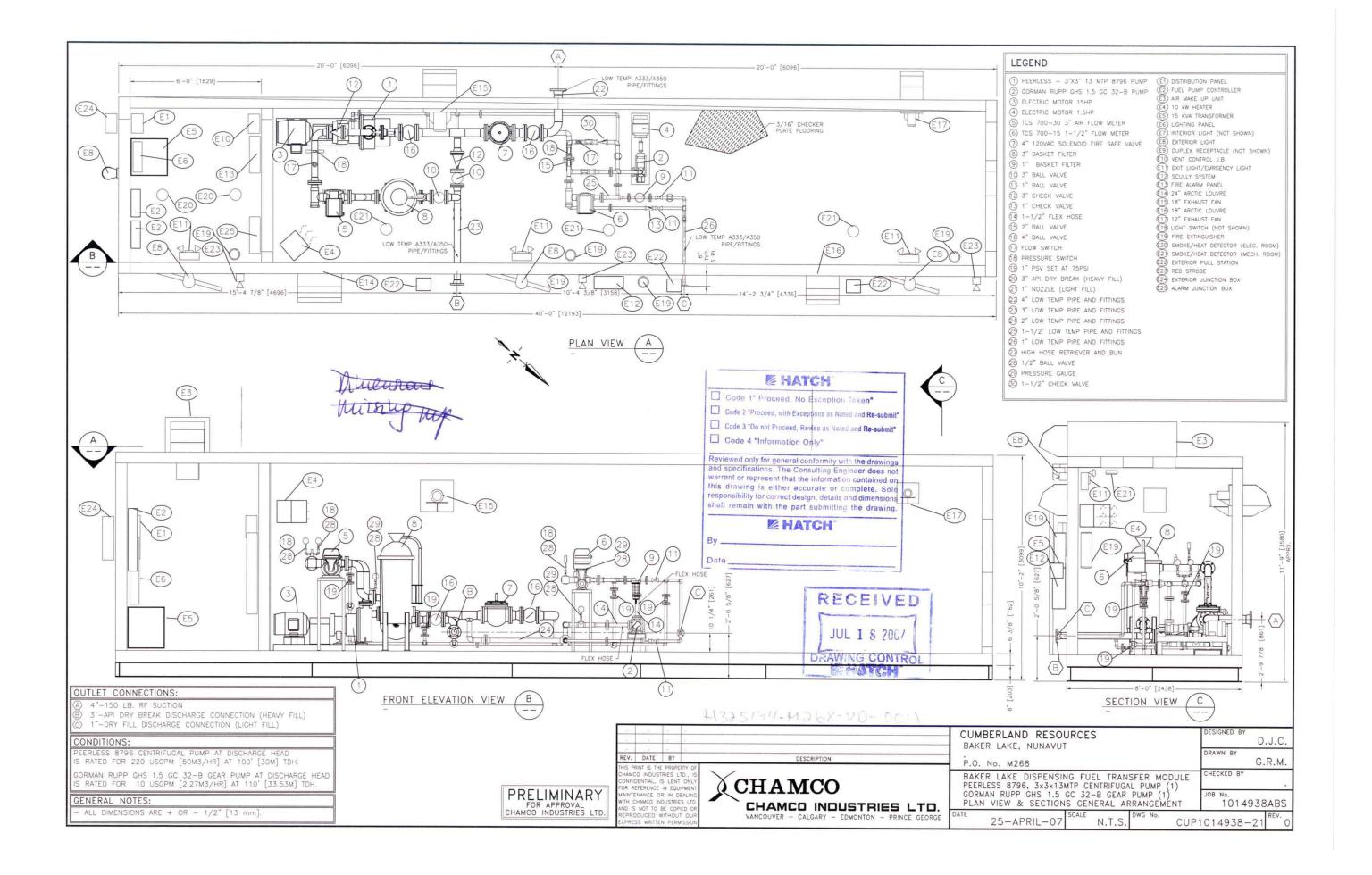
Vendor ref. # CUP1014938-21









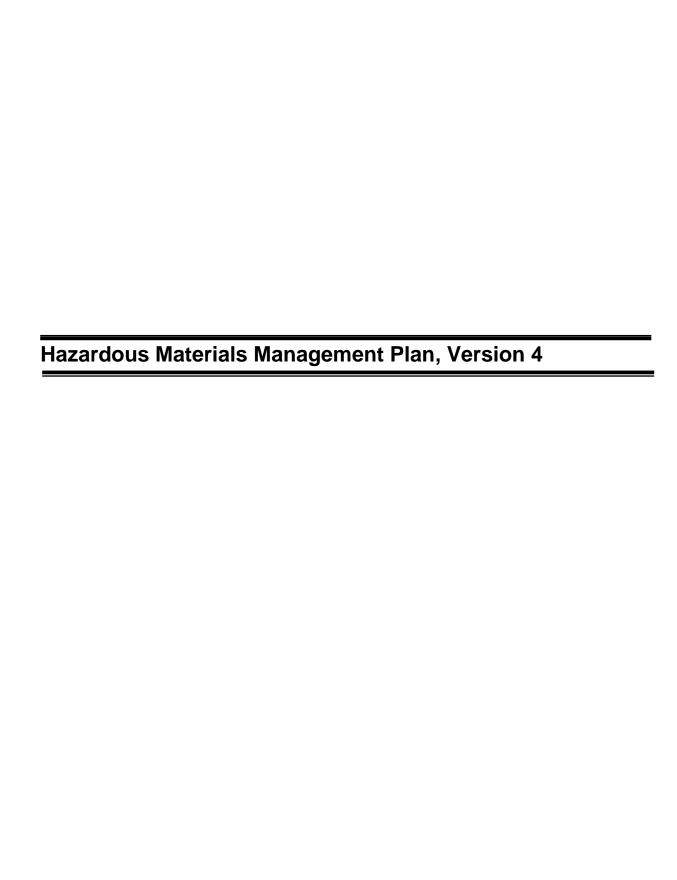


## **APPENDIX 2**

### SAFE FILL LEVEL FOR FUEL TANK 680-TK-042

The safe fill level of fuel tank 680-TK-042 depends on the temperature of the fuel inside the tanker, as well as outside temperature. In order to allow room for thermal expansion of diesel fuel, some care must be taken not to exceed the safe fill levels stated hereunder. The VAREC float gives imperial readings.

safe fill for fuel tank 680-TK-042			
TEMPERATURE	MAXIMUM FUEL LEVEL		
of fuel unloaded	feet	inches	fraction
- 40°C	38	1	9/16
- 35°C	38	3	3/8
- 30°C	38	5	3/16
- 25°C	38	7	1/16
- 20°C	38	8	7/8
- 15°C	38	10	3/4
- 10°C	39	0	5/8
- 5°C	39	2	9/16
0°C	39	4	9/16
+ 5°C	39	6	1/2
+10°C	39	8	1/2
+15°C	39	10	1/2





#### MEADOWBANK Division

# <u>Meadowbank Mine Site</u> <u>Whale Tail Pit Site</u>

**Baker Lake Facilities** 

In Accordance with Water License 2AM-MEA1526 & 2AM-WTP1826

Prepared by:

Agnico Eagle Mines Limited – Meadowbank Division

Version 4 March 2019

#### **EXECUTIVE SUMMARY**

#### **General Information**

The Hazardous Materials Management Plan (HMMP) will be executed within the scope of normal operations. The Meadowbank Mine and Whale Tail Project requires that the transportation, storage, handling and use of hydrocarbon products, ammonium nitrate and associated explosive materials, and all other chemicals be conducted in a safe and efficient manner. Ore and material (including various hazmat products and waste) will be shipped along the Whale Tail Pit Haul Road (WTHR) an All-Weather access road (AWAR).

#### **Annual Review**

The HMMP will be reviewed annually and updated as required. Completion of the annual review of the HMMP will be documented through signatures of the personnel responsible for reviewing, updating and approving the HMMP.

#### **IMPLEMENTATION SCHEDULE**

As required by Water License 2AM-MEA1526 and 2AM-WTP1826, the proposed implementation schedule for this plan is effective immediately and subject to any modification proposed by the Nunavut Water Board as a result of the review and approval process.

#### **DISTRIBUTION LIST**

Agnico Eagle - Environmental Superintendent

Agnico Eagle – Environmental General Supervisor

Agnico Eagle – Environmental Coordinator

Agnico Eagle – General Mine Manager

Agnico Eagle – Health and Safety Superintendent

Agnico Eagle – Mill Superintendent

Agnico Eagle – Maintenance Superintendent

Agnico Eagle – Mine Superintendent

Agnico Eagle – Energy and Infrastructures Superintendent

Agnico Eagle – General Services Superintendent

Agnico Eagle – Procurement and Logistics Coordinator

#### DOCUMENT CONTROL

Version	Date (YMD)	Section	Page	Revision
1	2007/08			Comprehensive plan for Meadowbank Mine Site and Baker Lake Facilities
2	2012/3/12			Comprehensive review and update.
3	2013/10			Add Baker Lake Jet-A Information and comprehensive review and update
WT	2016/06/15	All	All	Added the Whale Tail pit development to the Plan. Numerous changes were made throughout the document.
4	2019/03/31	All	All	Updated plan to reflect active operating licenses

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APPENDIX E: Procedure Poster Hazardous Material Storage

#### 1 INTRODUCTION

#### 1.1 PURPOSE & SCOPE OF THE PLAN

The purpose of this plan is to provide a consolidated source of information on the safe and environmentally sound transportation, storage, and handling of the major hazardous products that are used at the Meadowbank Mine and Whale Tail Pit. A hazardous material is one that, as a result of its physical, chemical, or other properties, poses a hazard to human health or the environment when it is improperly handled, used, stored, disposed of, or otherwise managed. In combination with Agnico Eagle's Emergency Response Plan (ERP) and Spill Contingency Plan (SCP), this Hazardous Materials Management Plan (HMMP) provides instruction on the prevention, detection, containment, response, and mitigation of accidents that could result from handling hazardous materials.

The plan is based on the following principles of best practice management for hazardous materials:

- Identify and prepare materials and waste inventories;
- Characterize potential environmental hazards posed by those materials;
- Allocate clear responsibility for managing hazardous materials;
- Describe methods for transport, storage, handling, and use;
- Identify means of long-term storage and disposal;
- Prepare contingency and emergency response plans;
- Ensure training for management, workers, and contractors whose responsibilities include handling hazardous materials; and
- Maintain and review records of hazardous material consumption and incidents in order to anticipate and avoid impacts on personal health and the environment.

All hazardous materials to be used at the Meadowbank and Whale Tail Projects operations will be manufactured, delivered, stored, and handled in compliance with all applicable federal and territorial laws and regulations. Agnico Eagle is committed to preventing, to the greatest extent possible, both inadvertent release of these substances to the environment and accidents resulting from mishandling or mishap. Agnico Eagle has instituted programs for employee training, facility inspection, periodic drills to test systems, and procedural review to address deficiencies, accountability, and continuous improvement objectives.

Agnico Eagle actively works towards minimizing the generation of hazardous wastes by investigating alternatives to the use of hazardous materials, by recycling products and containers wherever feasible, and by treating wastes using state-of-the-art technologies before any release to the environment.

As with all other aspects of health and safety policy at the Meadowbank mine, all employees will be expected to comply with all applicable precautions and handling procedures with regard to hazardous materials. Employees are also expected to report any concerns to their supervisors, the Occupational Health & Safety Committee (OH&SC), or senior site management. All staff are encouraged to bring forward suggestions for improvements that can be incorporated into procedure revisions as appropriate.

#### 1.2 APPLICABLE LEGISLATION

Both federal and territorial legislation regulate the management of hazardous materials in Nunavut. Copies of relevant legal documents are kept on file at the mine site. Agnico Eagle will regularly update the HMMP with respect to applicable legislation, and ensure that current legislation documents are available at the mine site.

Management and safety personnel provide an overview of the applicable regulations to all employees as part of their initiation and ongoing training. The acts, regulations, and guidelines pertinent to the hazardous products that are used at the Meadowbank Gold Project<sup>1</sup> are listed in Appendix A.

The *Transportation of Dangerous Goods Act* classifies hazardous materials into nine (9) main classes according to an internationally recognized system, as follows:

- Class 1 Explosives;
- Class 2 Gases;
- Class 3 Flammable liquids;
- Class 4 Flammable solids;
- Class 5 Oxidizing substances and organic products;
- Class 6 Poisonous (toxic) and infectious substances;
- Class 7 Nuclear substances, within the meaning of the Nuclear Safety and Control Act, which are radioactive:
- Class 8 Corrosives; and
- Class 9 Miscellaneous products or substances.

Fuel products hazard classes and potential impacts are presented in Table 1.

<sup>&</sup>lt;sup>1</sup> The Meadowbank Gold Project includes the Meadowbank mine site, the Baker Lake facilities All-weather Private Access Road, the Whale Tail open pit and the haul road between Meadowbank and Whale Tail Pit.

#### 2 OVERVIEW OF HAZARDOUS MATERIALS

#### 2.1 HAZARDOUS MATERIALS AND FUEL STORAGE LOCATIONS

The primary storage locations for hazardous materials, hazardous wastes and fuel are shown on Figures 1 to 6. Figure 1 and 2 are respectively a general layout of the Meadowbank mine site and Vault open pit. Figure 3 identifies hazardous material storage areas at Meadowbank mine site. Figure 4 shows the Diesel Fuel Tank Farm and Figure 5 show the Jet-A Fuel Tank Farm at the Baker Lake Marshalling Area. Figure 6 provides a general layout of camp infrastructure at the Whale Tail Project, including a Hazardous Material Storage Area. Hazardous materials are to be located in all work areas such as the warehouse, mine maintenance shop and bulk fuel storage facility. Comprehensive lists of all hazardous materials and the estimated quantities that are and will be stored at the mine site and the satellite open pit are provided in Appendix B. Hazardous materials used in the process plant will only be located at the Meadowbank site.

Petroleum products, explosives, sodium cyanide and miscellaneous hazardous materials are stored in facilities that contain no open drains, utilize concrete berms, and incorporate lined areas or secure sea-cans. Storage tanks on site are regularly inspected and maintained.

Meadowbank's permanent storage facilities are clearly identified as storage facilities for hazardous materials with proper labelling. These are ventilated in order to prevent the build-up of toxic fumes or dust, which could harm both the personnel present and the environment. The facilities are secured and only authorized personnel have access to the area. The same will hold true for the Whale Tail storage facilities. Additionally, the Whale Tail site includes a hazardous material storage area next to the tank farm where products and wastes will be held until they are either consumed or transported to Meadowbank for treatment or sent south to a certified waste management company for disposal or recycling.

#### 2.2 TYPES OF HAZARDOUS MATERIALS

The Meadowbank Gold Project requires the use of the following types of classified hazardous materials:

- Petroleum products and lubricants diesel fuel, Jet-A, oils, greases, anti-freeze, and solvents used for equipment operation and maintenance;
- Meadowbank Process plant consumables sodium cyanide, caustic soda (sodium hydroxide), sulphur prills, carbon sodium metabisulphite, nitric acid, calcine lime, flocculants, calcium chloride, borax, silica, lead nitrate, and anti-scalants used in mineral extraction;
- Water treatment chemicals silica sand and flocculants polymers;

Explosives – emulsion, caps, and high explosives used for blasting in the mine; and

 Meadowbank Laboratory chemicals and wastes – various by-products classified as hazardous waste and chemicals such as nitric acid used in the assay laboratory.

Sections 5 and 7 contain general information and safe handling procedures for the first four categories above. Laboratory wastes are generally very limited in quantity and will be handled only by specialist laboratory technicians. These wastes will be pumped to the grinding circuit in the process plant for recycling and eventually become part of the tailings disposal stream. As such, they are not addressed separately in this document.

#### 2.3 GENERAL HAZARDOUS MATERIAL STORAGE GUIDELINES

Agnico Eagle is committed to the safe and appropriate storage of fuels, hazardous materials and hazardous wastes. The following sections outline Agnico Eagle's general guidelines for storing fuels, hazardous materials and hazardous wastes.

#### 2.3.1 General Guidelines for Storage Drums/Containers

Hazardous materials/waste shall be stored in super sacs/drums/sea containers according to the following guidelines:

- In the original containers, where possible, or in containers compatible with the material being stored to prevent corrosion or chemical interaction that could lead to leaks or fires;
- Storage containers shall be in good condition, sealable and not damaged or leaking;
- Drums containing hazardous materials/wastes expected to be in storage for more than six months shall be placed on pallets or on a well-drained storage area to prevent rusting;
- Each container shall be clearly labelled to identify the substance being stored according to the requirements of the Workplace Hazardous Materials Information System (WHMIS) and as specified in the MSDS;
- · Containers shall be kept closed except when adding or removing product;
- Containers with product shall be kept in the upright position, empty drums can be placed horizontally;
- Containers shall be arranged to prevent damage from falling or dislodging; and
- Containers shall be arranged to allow for easy access and inspections.

#### 2.3.2 General Guidelines for Storage Areas

To assist in the safe and secure storage of fuels, hazardous materials and hazardous wastes, the following general guidelines for storage areas/facilities are followed:

- Design of storage areas are in compliance with the National Fire Code, where appropriate;
- Compliance with the Canadian Council of Ministers of the Environment (CCME) publication,
   "Environmental Code of Good Practice for Above Ground Storage Tank Systems Containing
   Petroleum Products". This CCME code deals with inventory control, inspections, corrosion
   protection, records and monitoring. Environment Canada's Storage Tank Systems for
   Petroleum Products and Allied Petroleum Products Regulations outline registration and
   documentation requirements for storage tanks;
- Storage areas are adequately signed indicating that hazardous materials/wastes are stored therein;
- Storage locations are clearly defined and marked to prevent damage of storage drums and containers in the event they are covered by snow;
- Incompatible materials are segregated by chemical compatibility within the storage area to prevent contact between materials in the event of a release;
- Storage areas are located at least 30 metres from surface water and on a low-permeability area;
- Storage areas are readily accessible for firefighting and other emergency procedures;
- Storage areas are adequately ventilated to prevent the build-up of noxious or toxic vapours;
- Where necessary secondary containment is installed to allow for the containment of at least 110% of the largest container or tank volume within the contained area;
- Storage areas are constructed, or provided with barriers, to protect containers from physical damage;
- Adequate spill and emergency response equipment has been installed at large volume storage areas i.e.; bulk fuel tank facilities (i.e. spill control, fire protection, etc.). A list of spill control equipment is provided in the Spill Contingency Plan.

#### 3 HAZARDOUS MATERIALS LIFE CYCLE MANAGEMENT

#### 3.1 LIFE CYCLE MANAGEMENT

"Life cycle management" implies the assessment of a particular product over its entire life — from the time where a material need is identified to the time the product is fully consumed or disposed of as waste. It covers product supply, transportation, storage, handling, recycling, and waste disposal. Agnico Eagle is committed to ensuring proper life cycle management of all products used at the Meadowbank and Whale Tail sites, including hazardous materials. Agnico Eagle and its contractors will deal only with reputable, certified suppliers, transporters, and expediters.

#### 3.1.1 Delivery

All hazardous materials are delivered to site by commercial carriers in accordance with the requirements of the *Canadian Transportation of Dangerous Goods Act* (TDGA). Carriers are licensed and inspected as required by the Department of Transportation. All required permits, licences, and certificates of compliance are the responsibility of the carrier. All shipments are properly identified and labelled. Shipping papers must be accessible and include information describing the substance, immediate health hazards, fire and explosion risks, immediate precautions, firefighting information, procedures for handling leaks or spills, first aid measures, and emergency response telephone numbers.

Each transportation company is required to develop a spill prevention, control, and countermeasures plan to address the materials they are importing. In the event of a release during transport, the commercial transportation company is responsible for first response and cleanup. Agnico Eagle intends to periodically verify the qualifications of transport companies, their personnel and the existence of their spill prevention, control and countermeasures plan.

#### 3.1.2 On-Site Handling

Once dangerous goods are received at the workplace, additional regulations apply. The federal *Workplace Hazardous Materials Information System* (WHMIS) calls for the proper labelling of products, the availability of product information in the form of MSDS, and employee education on how to identify and handle hazardous products. Agnico Eagle has established procedures for obtaining MSDS with new product deliveries; maintaining MSDS current (i.e. no older than three years), and maintaining a system of hardcopy or electronic MSDS that are readily accessible by all employees. A chemical tracking system is also established and all news hazardous material used on site are reviewed by Health and Safety and Environmental Department before the first use.

All hazardous materials are stored in secured areas to prevent access by unauthorized personnel or any tampering. All tanks used for the storage of diesel and aviation fuel have been installed in secondary containment areas sized to hold at least 110% of the volume of the largest tank or in double walled storage tanks. Tanks and vessels in the process plant are installed on concrete surfaces sloping

to interior sumps that will route spilled solutions to lined collection areas. Additional guidelines for the storage of hazardous materials are provided in Section 2.3.2.

In support of pollution prevention, Agnico Eagle has established procedures for the regular inspection of storage containers and facilities. If deficient conditions are identified, appropriate corrective actions are taken and documented. Additional details for inspection of storage areas are provided in Section 9.

Emergency response procedures for spilled chemical substances are provided in the Spill Contingency Plan (SCP) (see also the Emergency Response Plan (ERP). These procedures outline the response to accidental spills or releases of hazardous materials to minimize health risks and environmental effects. Included are procedures for evacuating personnel, maintaining safety, cleanup and neutralization activities, emergency contacts, internal and external notifications to regulatory authorities, and incident documentation.

#### 3.1.3 Wastes

On becoming wastes, materials are stored and/or disposed of in accordance with specific government regulations and guidelines. Agnico Eagle stores most waste materials on the Meadowbank site in secure facilities until they can be transported to a provincial jurisdiction for recycling or disposal. Wastes materials originating from the Whale Tail site are to be sorted at Whale Tail sites, packaged at the source and delivered to Meadowbank for management, shipment to Baker Lake and ultimately sent on the barge. The waste will be stored in a seacan on a lined pad. The length of time the wastes will be stored at Whale Tail Pit will depend on the product and the time it takes to fill a seacan for safe shipment along the Haul Road.

Process plant tailings pass through a treatment plant for cyanide destruction using the standard Inco SO<sub>2</sub>/air process or through chemical destruction with Sodium Metabisulphite before being disposed of in the tailings pond. The cyanide content of the tailings material is reduced to 15 ppm (parts per million). Cyanide further degrades naturally with exposure to air and sunlight (UV) in the Tailings Storage Facility. The current regulatory requirement for cyanide content in liquids released to the environment is 1 mg/L for a single grab sample or no greater than 0.5 mg/L average for the month (Nunavut Water Board Water License).

The Nunavut Department of Environment and Environment Protection Service (EPS) monitor the movement of hazardous waste from the generator to final disposal, through use of a tracking document known as a Waste Manifest. Accordingly, a Waste Manifest accompanies movements of hazardous wastes for the Meadowbank Project. Agnico Eagle is registered with the EPS as a waste generator, and employs only registered waste carriers to transport waste to registered/approved waste receivers. A copy of the completed manifest will be maintained for a period of two years after the hazardous waste is received by the authorized waste disposal facility.

#### 3.1.4 Empty Product Containers

Many empty chemical containers are not safe to dispose of directly and require handling precautions identical to those for full containers. Chemical users must be familiar with safe waste handling and storage procedures supplied by manufacturers in MSDS. The containers are backhauled to the Baker Lake Marshalling Area for disposal at an approved facility. These containers are stored and hauled south via sealift.

#### 4 SODIUM CYANIDE

#### 4.1 INTRODUCTION

Large quantities of sodium cyanide are used at the Meadowbank Gold Project to optimize gold recovery from the ore. Due to transportation restrictions, normally a full year's supply of sodium cyanide will be transported and stored on site. This product will be transported, stored, handled, transferred and used in compliance with appropriate legislation and applicable Best Management Practices. Agnico Eagle became a signatory to the International Cyanide Management Code in 2011.

#### 4.1.1 Physical Properties

Cyanide is one of only a few chemical reagents that will dissolve in water. Gold mining operations use very dilute solutions of sodium cyanide, typically in the range of 0.01% to 0.05% cyanide (100 to 500 ppm). Unlike many synthetic chemicals, cyanide oxidizes and decomposes when exposed to air or other oxidants (UV sunlight rays), and does not persist in the environment. As such, it does not give rise to chronic health or environmental problems when present in low concentrations.

#### 4.1.2 Cyanide Production

Cyanide production and handling are highly regulated. Both the manufacturer and Agnico Eagle employ stringent risk management systems to prevent injury or damage from the use of cyanide.

Sodium cyanide for the Meadowbank project is in briquette form, and packaged in water-resistant super sac and 4mm bags inside an intermediate bulk container (IBC). The IBC holds 1,000 kg of cyanide, and have the following approximate dimensions: 44" x 44" x 44". For shipment, there are normally 20 IBCs in a sea can container.

#### 4.1.3 Cyanide Transport

Cyanide producers audit purchasers and transportation systems. They design special packaging for the transport of cyanide and inventory all shipments against delivery records to ensure proper surveillance at all times. All shipments are accompanied by MSDS that provide the chemistry and toxicity of sodium cyanide, instructions in case of accidents, and emergency telephone numbers for assistance.

Truck, rail, and barge transporters screen their employees, carefully inventory shipments and, establish and maintain systems for loading and unloading cyanide products. Product handling and transportation are in accordance with protocols set by the industries and in compliance with national and international regulations.

For the Meadowbank Project, the IBCs are properly stacked in sea containers and transported by ship from Becancour, QC to Baker Lake, NU. At Baker Lake, the containers are transferred from barge to truck for transport to the Meadowbank mine site. At no point during transport the sea container or IBCs will be opened. From the point of cyanide packaging and onwards, the bags will only be opened on site, when and at the location (mill) where the use of cyanide is required.

This method of cyanide transport provides three levels of containment. The cyanide is contained within plastic bags. In the event one of the bags ruptures, the cyanide is contained within the IBC. In the event the IBC container breaks, the cyanide is contained within the sea container, which provides a tertiary precautionary measure for minimizing the impact of the spilled material.

#### 4.1.4 On-Site Storage & Handling

The cyanide is stored on site in a dark, cool, dry, location. Cyanide is stored in sealed sea cans until the time it is needed for processing. Only as much as needed is removed from storage at any one time. The cyanide storage area is located close to the processing plant. Only authorized personnel have access to the cyanide storage.

When cyanide is required, only the quantity required for immediate use will be removed from storage. The cyanide bag will be lifted by its straps (the straps are provided by the manufacturer as part of packaging; see Appendix C for an illustration) using a forklift, and then using an overhead crane to lower onto a specially designed knife slitter that cuts the bag. The contents of the bag will drop into a mixing tank. At no time does the cyanide need to be physically handled by Meadowbank personnel.

The IBC materials are properly decontaminated and disposed of according to all applicable regulations to prevent environmental impact. Before disposal, the bags are visually inspected to ensure they are empty, and triple rinsed and drained to dissolve any residual cyanide left in the bag. Rinse water from the flushing process is recovered and reused in the cyanide mix tank and used in the gold recovery plant.

All personnel potentially exposed to cyanide, including contractors and visitors, receive appropriate training (see Section 10).

#### 4.1.5 Spills

In the event a spill occurs, the cyanide will be promptly cleaned up to minimize its exposure to humans and the environment. A dry spill will be swept up and disposed of in a drum or other suitable container. In the event of a wet spill, the spill procedures will be carried out to prevent environmental contamination and the appropriate authorities will be contacted. For more information on spills handling and containment, see the SCP and ERP.

After cleaning up as much cyanide as possible, the area will be decontaminated using a small amount of caustic solution (i.e., 1 oz. /5 gal hypochlorite solution). This will help keep the pH in the 10 to 11 range and suppress the formation of lethal HCN gas.

#### 4.1.6 International Cyanide Management Code

Agnico Eagle is a signatory to the International Cyanide Management Code (the Code) for the manufacture, transport and use of cyanide in the production of gold. The Code is administered by a non-profit institute consisting of participants from the gold mining industry, governments, nongovernmental organizations, labour, cyanide producers, and other interested parties.

The Code represents a voluntary commitment on the part of all signatories to identify and follow basic principles and guidelines for safe cyanide use at gold mining operations. This is the first such generic international code in the history of the mining industry. Under the Code, gold mines are required to manage their cyanide from source to site, thus assuming "cradle to grave" responsibility for all cyanide used at their operation.

## **5 PETROLEUM PRODUCTS**

## 5.1 PRODUCT DESCRIPTION

The Meadowbank and Whale Tail Project operations use large amounts of fuel and lubricants (petroleum products). These products are transported, stored, handled, transferred and used in compliance with the appropriate legislation and Best Management Practices.

## 5.2 DELIVERY TO SITE

With the exception of diesel and aviation fuel, most petroleum fuel and lubricant products are delivered to the two sites and stored in the original packing container from the manufacturer. These types of containers include a variety of sealed drums, pails, 1 tonne super sac, bulk cubes, cans, and tubes.

Due to transportation restrictions, i.e. climate, a full year's supply of fuel and lubricants is transported and stored on-site, in order to meet the demand of the upcoming year. During the summer months, diesel and aviation fuel are shipped from Becancour, QC to Baker Lake, NU where it is transferred into storage tanks. From the Baker Lake storage tanks, fuel is transported daily on the AWAR to Meadowbank and in the near future on the Whale Tail haul road to Whale Tail Pit bulk fuel storage sites via contracted tanker trucks.

Diesel fuel coming from the Baker Lake Tank Farm is stored onsite at the Meadowbank site in a single 5.6 million litre tank within secondary containment, and the aviation fuel into two (2) – 50,000L double walled tanks at the airstrip. Similarly for the Whale Tail site, diesel fuel originating from the Baker Lake Tank Farm will be stored in one 1,500,000 L tank within secondary containment. From there, the diesel at both sites is delivered directly to the power plants by above ground pipes or redistributed into different storage tanks by an on-site tanker. Table 2 provides the varieties and volumes of petroleum products stored on site and their storage locations at Meadowbank.

Exploration will have up to 37 envirotanks of diesel for use in their underground and regional exploration programs.

The Baker Lake fuel farm consists of six (6), ten (10) million litre (L) tanks for diesel fuel and eighteen (18), 100,000L double walled tanks, within secondary containment, for aviation fuel. Agnico Eagle is currently working to permit the addition of two (2) ten (10) million L tanks for diesel fuel to the Baker Lake fuel farm. The diesel fuel tanks are single-walled and constructed of welded steel. The aviation fuel tanks are double-walled and constructed of steel. Both Baker Lake Fuel Farm and storage locations have been designed and constructed to meet the CCME guidelines for *Aboveground Storage Tank Systems Containing Petroleum and Allied Petroleum Products*. The fuel unloading facility in each area includes a sloped lined pad to prevent contamination of the receiving environment. A continuous 60 mm high-density, polyethylene liner sheet is installed under the tanks and the internal sides of the berm. The containment area is sized to hold 110% of the volume of the largest tank.

All fuel transfer and storage facilities have been designed in accordance with the Canadian Council of Ministers for the Environment (CCME, 1994) *Environmental Code of Practice for Above Ground Storage Tank Systems Containing Petroleum Products*, and the *National Fire Code*.

Appropriate measures are in place to minimize impacts to surface water, groundwater and soils from potential vehicle accidents when transporting petroleum products to the site. Details of petroleum product safe handling procedures and proper PPE can be found in Tables 3 and 4. Details of spill response measures are presented in the SCP. The following general precautions will be taken:

- A maximum speed on the All-Weather Private Access Road and the Whale Tail haul road for loaded and empty vehicles has been established based on the road design which considers safety and the protection of wildlife. This speed limit is 50 km/hr;
- All trucks will carry a spill kit;
- Trucks are equipped with a reliable radio and/or satellite phone; and
- Agnico Eagle commits to being prepared to respond to spills resulting from vehicle accidents
  on both roads in a timely and efficient manner. Refer to the Spill Contingency Plan.

### 5.3 FUEL TRUCK TRANSFER PROCEDURES

A contract supplier fills the storage tanks in the main tank farms at both sites. General procedures to be followed are listed below. Similar procedures would be followed for fuelling remote station tanks.

Before fuel transfer, verify that:

- All fuel transfer hoses are connected properly and couplings are tight;
- Transfer hoses are not obviously damaged;
- Fuel transfer personnel are familiar with procedures;
- Personnel are located at both the fuel delivery truck and fuel transfer tank(s) and can manually shut off the flow of fuel;
- If a high liquid level shutoff device is installed at the delivery tank, verify that the shutoff is operating correctly each time it is used; and
- Fuel transfer will then proceed per the established procedures of the contract supplier.

Any accidents or spills must be reported immediately to the Environmental Department representatives at the Meadowbank or Whale Tail sites. Notification and response procedures are detailed in the Spill Contingency Plan.

#### 5.4 CONTAMINATED SOILS AND SPILLS

All contaminated spill pads, and booms resulting from the storage and handling of fuels and lubricants will be salvaged at the time such impacts are identified, and put into Quatrex bags, labelled and shipped off-site to an approved disposal facility or incinerated (small quantities) on site. All the petroleum hydrocarbon contaminated soil from the Meadowbank and Whale Tail sites is placed into the Meadowbank landfarm for treatment. At this time, a landfarm will not be established at the Whale Tail Pit site. Refer to the *Landfarm Design and Management Plan* for more details regarding the Meadowbank landfarm.

### 5.5 USED PETROLEUM PRODUCTS

Used oil that is no longer suitable for its intended use is classified as a liquid waste. The discharge of used oil into the environment, including but not limited to landfills, sewers and water bodies, is prohibited.

Used oil is used as auxiliary fuel at the secondary chamber at the Meadowbank incinerator or in designated on site waste oil heaters. This used oil burner at the incinerator has the capacity to handle approximately 200,000 litres of used oil per year. Refer to the *Incinerator Waste Management Plan* for more information. Similarly, at the Whale Tail site, waste oil will be used in the incinerator or waste oil heaters. Failing this, the waste oil will be sent to Meadowbank where it will be consumed or shipped to an accredited recycling facility.

All used oil products that are not burned in the incinerators or waste oil heaters are collected in tanks or drums marked "Waste Oil" and disposed of at an approved facility in the south. Empty petroleum containers are stored on site in a designated area and returned to the supplier on backhauls or disposed at approved facilities in the south. Oil filters are punctured and/or crushed and drained of their contents for 24 hours prior to disposal.

A random sample of used oil incinerated at both sites will continue to be analysed twice a year to ensure that it does not contain unacceptable levels of impurities, including cadmium, chromium, lead, total organic halogens (such as chlorine compounds), polychlorinated biphenyls (PCB) and ash content. Samples will be sent to an accredited laboratory (H2Lab) for analysis. Concentrations of parameters listed above will be compared to the criteria set out in Schedule A of the *Used Oil and Waste Fuel Management Regulations*. Alternate arrangements will be made for the off-site disposal, treatment or recycling of used oil that does not meet this criteria.

The following information is recorded in association with the incineration of used oil:

- Volume of used oil generated at each site;
- Volume of used oil incinerated at each site;
- Name and address of the person in charge, management or control of the used oil, and the place where the used oil was produced;

- Analysis of any representative sample of used oil;
- Summary of maintenance performed on the incinerators or processing equipment;
- Volume and nature of the products produced from the used oil; and
- Destination of the used oil products shipped from the Meadowbank Mine (including Whale Tail Pit facilities).

Table 1 - Fuel Products – Hazardous Classes & Potential Impacts

Material	TDGA Class <sup>a</sup>	Potential Environmental Impact
Diesel	3	Water & soil contamination
Motor oil	Not regulated	Water & soil contamination
Aviation fuel	3	Water & soil contamination
Hydraulic fluid	Not regulated	Low risk to water & soil with proper handling
Varsol	3	Water & Soil contamination
Automotive grease	Not regulated	Low risk to water & soil with proper handling
Ethylene glycol	Not regulated	Toxic by ingestion, could potentially be consumed by wildlife.

Table 2 - Fuel Products - Meadowbank and Whale Tail Site Storage Locations

Product	Total Quantity On- Site	Storage Location	Container	Presently used
	6.1 ML (potentially 66.1 ML including Baker Lake) and 1.5 ML at Whale Tail Site	Meadowbank Fuel farm	1 x 5.6 ML tank in berm area	Yes
		Whale Tail Fuel Farm	1 x 1.5 ML tank in berm area	Yes
			2 x 25,000 L tank	Yes
Diesel			1 x 10,000 L tank	Not in use but contains diesel
			1 x 75,000 L tank	Not in use but contains diesel
		Meadowbank Emulsion Plan	1 x 25,000 L tank	Yes

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		Meadowbank Camp Emergency Genset	2 x 55,000 L tank	Yes
		Meadowbank Incinerator	1 x 2,200 L tank	Yes
		Meadowbank Fueling station	1 x 50,000 L tank	No
			4 x 50,000 L tank	Yes
		Vault	1 x 25,000 L tank	Yes
			1 x 10,000 L tank	Yes
		Baker Lake	6 x 10 ML tank in bermed area	Yes
Gasoline	60,000 L	Fueling Station	1 x 50,000 L tank	Yes
Gusonne	00,000 E	ruening Station	1 x 10,000 L tank	Yes
Waste oil	50,000 L	Incinerator	1 x 50,000 L tank	Yes
		Mechanical shop	Cubes or Barrels	Yes
Motor oils	*refer to Appendix B	Powerhouse	Cubes or Barrels	Yes
		Exploration camp	Cubes or Barrels	No
		Airstrip	2 x 50,000 L tank	Yes
Aviation fuel	100,000 L (potentially 2.1ML including Baker Lake)	Exploration Camp	1 x 75,000 L tank	Not in use but contain aviation fuel
		Baker Lake	20 x 100,000 L tank in berm area	Yes
		Mechanical shop	Cubes or Barrels	Yes
Hydraulic fluid	*refer to Appendix B	Powerhouse	Cubes or Barrels	Yes
		Plant	Cubes or Barrels	Yes

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Ethylene glycol	*refer to Appendix B	Mechanical shop	Cubes	Yes

Note: L = litre; ML = Mega-litre (1X10<sup>6</sup> litres).

Table 3 - Fuel Products – Safe Handling Procedures

Product	Handling Procedures
Diesel	Do not get in eyes, on skin, or on clothing. Avoid breathing vapours, mist, fume, or dust. Do not swallow. May be aspirated into lungs. Wear PPE and/or garments if exposure conditions warrant. Wash thoroughly after handling. Launder contaminated clothing before reuse. Use with adequate ventilation. Keep away from heat, sparks, and flames. Store in a well-ventilated area. Store in a closed container. Bond and ground during transfer.
Motor oil	Wear protective clothing and impervious gloves when working with used motor oils. To be handled generally consistent with other petroleum hydrocarbons.
Aviation fuel	See diesel procedures above.
Hydraulic fluid	Keep container closed until ready for use.
Ethylene glycol	Ensure adequate ventilation. Wear protective gloves and chemical safety goggles. Keep in tightly closed container, stored in a cool, dry, ventilated area. Separate from acids and oxidizing materials. Empty containers of this product retain product residues and may be hazardous.

Table 4 - Fuel Products – Personal Protective Equipment

Product	Personal Protective Equipment				
	Eyes	Skin	Respiration		
Diesel	Chemical goggles	Neoprene or nitrile gloves; protective garments	None usually required		
Motor oil	Chemical goggles	Neoprene or nitrile gloves; protective garments	None usually required		
Aviation fuel	Chemical goggles	Neoprene or nitrile gloves; protective garments	None usually required; ensure adequate ventilation		
Hydraulic fluid	Chemical goggles	None usually required	None usually required		
Ethylene glycol	Chemical goggles	Neoprene or nitrile gloves; protective garments	None usually required; ensure adequate ventilation		

#### 6 EXPLOSIVES

#### 6.1 PRODUCT DESCRIPTION

Explosives are required for blasting waste rock and ore in the mine. Transportation, storage, use, and handling of blasting materials are strictly regulated by the Federal *Explosives Act* and *Transportation of Dangerous Goods Act* (Class 1 – Explosives), as well as the following territorial Acts:

- Explosives Use Act and Regulations; and
- Mine Health and Safety Act and Regulations.

## 6.2 EXPLOSIVES STORAGE

Manufacturing, handling, and storage of explosives are carried out by QAAQTUQ – Dyno Nobel Canada Inc. However, a small amount of explosive materials are shipped to Meadowbank in the form of blasting caps and Agnico handles them. The bulk of the explosives used at site are Emulsion (XL-1000), which is a mixture of nitrites and emulsifier. Emulsion is mixed by Dyno Nobel in an on-site plant (Emulsion Plant shown on Figure 1), located near the Meadowbank Mine site.

The estimated annual explosives requirement for the Whale Tail satellite open pit is expected to vary from 6,000 to 11,000 tonnes per year, this being the same as presently used at Meadowbank. The use of explosives at Portage Pit, Goose Pit, Vault Pit, Phaser Pit and BB Phaser Pit, located on or near the Meadowbank Mine site, will cease upon completion of mining.

The existing emulsion plant at Meadowbank Mine will continue to operate with deliveries on an as needed basis to Whale Tail. The haul road will be used to truck explosives between Meadowbank and the Whale Tail sites, with a minimum amount of explosives to be stored at the Whale Tail Pit site in the remote emulsion storage located adjacent to the Whale Tail Pit operations. Explosives truck(s) will be based at the Emulsion Plant at the Meadowbank Mine.

The Whale Tail site will primarily use emulsion based explosives during construction and operations. Presplit explosives will also be used to control the final pit walls, where required.

Sea cans of emulsion and nitrite prills are stored on the Meadowbank Emulsion Plant site. They are stored within sea cans in quantities of approximately 20,000 kg's per sea can. These items are stored in separate locations so as to prevent the mixing of the two products. These products are also stored away from any other products, >40m away from the emulsion plant, and >25m from the fuel tanks.

The high explosive detonators and blasting caps are stored in an enclosed magazines located near the Meadowbank emulsion plant and will be stored at a safe location and distance from the Whale Tail Pit operations. It is estimated that approximately twelve magazines will be required on site, each being approximately 4 m x 14 m (i.e., not much bigger than a sea can).

The explosive mixing plant, product storage, and magazines are safely located away from vulnerable facilities, as stipulated by the federal and territorial *Explosives Use Act* and Regulations. The mixing plant is also used for the washing and minor repair of trucks and equipment used to handle the explosives.

## 6.3 USE OF EXPLOSIVES

The primary blasthole drills are diesel-powered rigs capable of drilling 152.4 mm diameter holes. Drilling requirements were calculated for ore and waste. A pre-shear and buffer blasting followed by mechanical wall cleanup is used for the final wall. Blasting operations are affected by several factors, including wall control and weather. A number of modified operating procedures will be implemented during the winter season. These may include minimizing the sleep time for loaded holes; ensuring that cuttings are mounded around the hole collars after loading to prevent snow drifting into the holes, and utilizing blasthole covers.

The responsibility for blasting is split between appropriately trained mine personnel and the explosives supplier, Dyno Nobel. Dyno Nobel is responsible for supplying and delivering blasting agents to the site, manufacturing the blasting product on site, delivering blasting agents to the blastholes and filling the holes. Agnico Eagle Blasters are responsible for charging the holes, placing the detonators and boosters, and tying-in the patterns. The AN and emulsion components are loaded on barges and transported to the Baker Lake Marshalling Area for temporary storage, if necessary, prior to transport to site. Dyno Nobel provide mixing and delivery trucks. Agnico Eagle provides diesel fuel and accommodations.

Blasting will be approximately daily and will average, in size, the daily production requirement of 50-90,000 tonnes per blast. Blasting will likely be by electric initiation and will feature current technology with down-the-hole delays to minimize the energy per delay to single hole loads. This will minimize backbreak, fly rock, vibration levels and will optimize fragmentation and minimize digging problems.

Blasting is carried out by certified blasters following blasting regulations and safe practices. All pit activities are under the supervision of certified mine supervisors, knowledgeable in mine operating regulations and best practices.

The manufacture and distribution of explosives is carried out by suppliers under Federal license to conduct such work. They provide and operate the explosives manufacturing plant under such license and authority.

Details on explosives inventory and inspections are provided in Section 9.2. Information on Explosives Handlers is available in Section 10.3.

### 6.4 DISPOSAL

Disposal of regular waste will follow the Agnico Eagle Meadowbank Mine Waste Management Plan.

Wash water that is created at the Emulsion plant is sucked out via vacuum truck and taken to the tailings storage facility for disposal.

Any unusable Emulsion waste is taken to the mines blast pattern for disposal down the bore holes.

## 7 PROCESS PLANT & WATER TREATMENT REAGENTS & CONSUMABLES

#### 7.1 PRODUCT DESCRIPTION

The Process Plant (mill) uses a number of chemicals and reagents to treat the ore, recover entrained gold and to destroy cyanide. The Water Treatment Plant also uses a number of chemicals and reagents to treat water for TSS removal. Water Treatment chemicals would be used over a 3 to 4 month period during frost-free months only for dewatering and the discharge of the attenuation pond water to Mammoth Lake. The range in annual quantities used would reflect the different dosages that may be used during different mining stages (early operations, late operations, closure treatment of tailings water and polishing of pit lake water quality on a contingency basis). Material categories, site handling and storage requirements, and PPE recommended by manufacturers are summarized in Tables 5 to 8.

Table 5 - Process Plant & Water Treatment Reagents – Use, Consumption & Storage

		Approx	imate		Normal Delivery	
Reagent	Use	Consur	Consumption		Format	On-Site Storage
		Daily	Annual			
Acetylene	Welding	1-2	600	gas	gas cylinders	secured upright
Activated carbon (granular)	Gold recovery	340 kg	140 t	solid	500 kg bags	Pallet
Anti-scalant	Water treatment	25 kg	10 t	liquid	650 kg tote tank	Pallet drums
Borax	Refinery	60 kg	22 t	solid	40 kg bags	Pallet
Silica	Refinery	30 kg	11 t	solid	22.7 kg bags	Pallet
Calcium oxide (Quicklime) (CaO)	pH control	7,814 kg	3150 t	solid	1 t supersacs	Pallet
Calcium peroxide (alternative to	Potential use:	minimal*	minimal*	solid	45 kg drum	Pallet drums
hydrogen peroxide)	Water treatment	Immina	Imminai	30114	45 kg urum	i anct urums
Copper sulphate (CuSO₄)	Cyanide destruction	1450 kg	585 t	solid	1 t supersacs	Pallet

Flocculant	Settling aid	300 kg	120 t	solid	25 kg bags	Pallet
(Magnafloc 338 or Magnafloc 10)	Settling alu	300 kg .	120 (	Soliu	23 kg bags	i anct
Hydrochloric acid (HCI)	Refining/stripping	200 kg	75 t	liquid	20 gal drums	Pallet drums
Hydrofluoric acid	Laboratory	5 gallons	1 825 gallons	liquid	20 gal drums	Pallet drums
Hydrogen peroxide (alternative to	Potential use:	minimal*	minimal*	liquid	1 m³ HDPE tote	Pallet
calcium hydroxide)	Water treatment	IIIIIIII	IIIIIIII	iiquiu	Till Tibre tote	railet
Lead acid batteries	Vehicles	-	24	liquid	-	Pallet
Nitric acid	Stripping	50 kg	18 t	liquid	34 kg bottle	Pallet
Paints	Maintenance	-	100 gallons	liquid	gallon	Pallet
Sodium cyanide (NaCN)	Leaching	3825 kg	1 540 t	solid	1 t box bags	Pallet
Sodium hydroxide	Refining/stripping	20 kg	8 t	solid	25 kg bags	Pallet
(caustic soda) (NaOH)	Refining/stripping	786 kg	320 t	solid	1000 kg	Pallet
Sodium metabisulphite (Na₂S₂O₅)	Cyanide destruction	7710 kg	3100 t	solid	1 t supersacs	Pallet
Sodium nitrate	Refinery	40 kg	15 t	solid	50 kg bags	Pallet
Sulphur	Cyanide destruction	745 kg	300 t	solid	1 t bags	Pallet

Note: kg = kilogram; t = ton; gal = gallon;  $m^3 = cubic metre$ .

Table 6 - Process Plant & Water Treatment Reagents – Hazard Classes & Potential Environmental Impacts

Material	Class	Potential Impact
Acetylene	2.1	Generally not hazardous for water.
Activated carbon	4.2	No information available.
Anti-scalant	Not regulated	Negligible with proper handling
Borax	Not regulated	Presents no health hazards.
Calcium oxide	Not regulated	No information available.
Calcium peroxide	5.1	Releases oxygen into environment when dissolved in water.
Copper sulphate	9	Harmful to aquatic life.
Flocculant	Not regulated	Acute fish, invertebrate, algae and bacteria toxicity.
Hydrochloric acid	8	Extremely toxic to aquatic life by lowering the pH below 5.5. When released into the soil, this material may leach into groundwater.
Hydrofluoric acid	8.6.1	No information available.
Hydrogen peroxide	5.1	Aquatic Toxicity 96-hour LC50.
Lead acid batteries	8	No information available.
Nitric acid	8	No information available.
Paints	Not regulated	No information available.
Silica	Not regulated	Generally not hazardous for water.
Sodium cyanide	6.1	Expected to be very toxic to aquatic life and to terrestrial life.

Sodium hydroxide	8	No information available.
Sodium metabisulphite	Not regulated	No information available.
Sodium nitrate	5.1	Possibly hazardous short-term degradation products are not likely. However, long term degradation products may arise. The products of degradation are less toxic than the product itself.
Sulphur	9	No info available (insoluble in water).

Table 7 - Process Plant & Water Treatment Reagents – Safe Handling Procedures

Product	Handling Procedure
Acetylene	Do not mix with air or oxygen above atmospheric pressure. Store away from oxidizing agents. Open and handle cylinder with care. Keep ignition sources away - Do not smoke. Protect from heat. Protect against electrostatic charges. Pressurized container: protect from sunlight, store in a cool location and do not expose to temperatures exceeding 50°C. Do not pierce or burn, even after use. Prevent impact and friction. Store in accordance with local fire code and/or building code or any pertaining regulations.
Activated carbon	Wash thoroughly after handling. Use with adequate ventilation. Minimize dust generation and accumulation. Avoid contact with eyes, skin, and clothing. Avoid ingestion and inhalation. Activated Carbon, especially when wet, can deplete oxygen from air in enclosed spaces, and dangerously low levels of oxygen may result.  Store in a tightly closed container. Keep from contact with oxidizing materials. Store in a cool, dry, well-ventilated area away from incompatible substances.
Anti-scalant	Used in extremely small quantities. Can cause mild to moderate irritation of eyes, skin, and upper respiratory tract. Wash thoroughly after handling. Use sensible industrial hygiene and housekeeping products. Not flammable. Keep containers tightly closed
Borax	No special steps required.

Calcium oxide	Store in closed containers in a controlled drainage area under cover. Use in a well ventilated area. Empty containers retain product residues and may be hazardous.
Calcium peroxide	Wash thoroughly after handling. Avoid all situations that could lead to harmful exposure.  Store in a cool, dry, well-ventilated place. Keep container tightly closed and away from incompatible materials and sources of heat.
Copper sulphate	Avoid contact with skin and eyes. DO NOT breathe dust. Always wash hands thoroughly after contact. Store and use only in dry, well-ventilated areas. Keep container tightly closed.
Flocculant	Dust generated in handling of this product can be explosive if sufficient quantities are mixed in air, in which case ignition sources should be avoided. Employ grounding, venting and explosion relief provisions in accord with accepted engineering practices in process operations capable of generating dust/or static electricity. Handle in accordance with good industrial practice, handle with care and avoid unnecessary personal contact. Avoid contact with eyes and prolonged or repeated skin contact. Avoid continuous or repetitive breathing of dust. Use only with adequate ventilation. Remove contaminated clothing; launder or dry-clean before reuse. Wash thoroughly with soap and water after using. For industrial use only. Slip hazard when wet.  Material is slippery when wet. Store in the original container, securely closed, in a cool and dry
Hydrochloric acid	location. Avoid extremes of temperature and ignition sources.  Do not get in eyes, on skin, or on clothing. Wear protective clothing. Avoid breathing vapours or fumes. Store in cool, dry, ventilated area with acid-resistant floors. Keep container closed, out of direct sunlight, and away from heat, water, and incompatible materials. When diluting, add acid slowly to water and in small amounts. Never use hot water and never add water to acid. When opening metal drum, use non-sparking tools because hydrogen gas may be present. Do not wash out container and use for other purposes. Empty containers retain product residues and may be hazardous.

Hydrofluoric acid	Wash thoroughly after handling. Remove contaminated clothing and wash before reuse. Use with adequate ventilation. Do not get on skin, in eyes or on clothing. Do not ingest or inhale.  Store in a cool, dry, well-ventilated area away from incompatible substances. Do not store in metal or glass containers. Do not store in direct sunlight. Keep tightly closed. Empty container may contain hazardous residue. Do not add any other material to the container. Do not wash down the drain. Do not allow smoking or food consumption while handling. Store in approved containers only. Do not add water to acids.
Hydrogen peroxide	Use extreme care when attempting any reactions because of fire and explosion potential (immediate or delayed). Conduct all initial experiments on a small scale and protect personnel with adequate shielding as the reactions are unpredictable, and may be delayed, and may be affected by impurities, contaminants, temperature, etc. Do not get in eyes. Avoid contact with skin and clothing. Wash thoroughly after handling. Avoid contact with flammable or combustible materials. Avoid contamination from any source including metals, dust, and organic materials. In the event of an accident where large volumes of hydrogen peroxide might come into contact with external fires or with incompatible chemicals, a one-half mile area from the incident should be evacuated.  Store in a properly vented container or in approved bulk storage facilities. Do not block vent. Do not store on wooden pallets. Do not store where contact with incompatible materials could occur, even with a spill (see "Hazardous Reactivity" on MSDS). Have water source available for diluting. Do not add any other product to container. Never return used or unused peroxide to container, instead dilute with plenty of water and discard. Rinse empty containers thoroughly with clean water before discarding. (See "Waste Disposal" on MSDS).
Lead Acid Batteries	Store batteries in a well-ventilated cool area. Handle carefully to avoid damaging or turning batteries over.
Nitric acid	Class 8 products are not to be loaded with class 1, 4.3, 5, 6, 7 or foodstuffs or foodstuff empties. Store in a well-ventilated area and out of direct sunlight. Keep containers closed at all times. Store away from oxidisable, caustic and combustible materials.  Vapours heavier than air; prevent concentration in sumps and hollows. DO NOT enter confined spaces where vapour may have collected. Strong oxidising agent; can lead to fire or explosion with organic and/or combustible materials.
Paints	No special steps required.

Silica	Prevent formation of dust. This product is not flammable. When pouring into a container of flammable liquid, ground both containers electrically to prevent static electric spark. Keep containers tightly sealed.	
Sodium cyanide	Highly toxic, corrosive to eyes, skin, and respiratory tract. Can be fatal if swallowed, inhaled, or absorbed through skin. Keep cyanide antidote kit available in any cyanide work area. Wear personal protective clothing at all times. Keep in tightly closed container in cool, dry, ventilated area. Protect against physical damage to containers. Do not store under sprinkler systems. Do not wash out container and use for other purposes. Empty containers retain product residues and may be hazardous.	
Sodium hydroxide (caustic soda)	Can cause severe injury to eyes, skin, and respiratory tract. Use PPE at all times and DO NOT contact product directly. Wash thoroughly after handling. Store in dry, well ventilated area. Keep in original container, tightly closed. Empty containers retain product residues and may be hazardous.	
Sodium	May cause irritation to eyes, skin, and respiratory tract with prolonged exposure.	
metabisulphite	Sulphite-sensitive individuals may experience severe allergic reaction to dust. Releases sulphur dioxide gas when mixed with water. Wear PPE and wash thoroughly after handling. Store in dry, well-ventilated area away from heat, acids, and oxidizers.  Keep container tightly closed. Use vacuum to clean up dust.	
Sodium nitrate	Keep away from heat. Keep away from sources of ignition. Keep away from combustible materials. Empty containers pose a fire risk; evaporate the residue under a fume hood. Ground all equipment containing material. Do not ingest. Do not breathe dust. In case of insufficient ventilation, wear suitable respiratory equipment. If ingested, seek medical advice immediately and show the container or the label. Avoid contact with skin and eyes. Keep away from incompatibles such as reducing agents, combustible materials, acids.  Keep container dry. Keep in a cool place. Keep container tightly closed. Keep in a cool and well-ventilated area. Highly toxic or infectious materials should be stored in a separate locked safety storage cabinet or room.	

Sulphur	Wash thoroughly after handling. Remove contaminated clothing and wash before reuse. Minimize dust generation and accumulation. May form flammable dust-air mixtures. Avoid contact with skin, eyes and clothing. Empty containers contain product residue, (liquid and/or vapour), and can be dangerous. Keep containers tightly closed. Avoid contact with heat, sparks, and flame. Use with adequate ventilation. Do not pressurize, cut, weld, braze, solder, drill, grind, or expose empty containers to heat spark, or open flames.  Store away from heat, sparks, and flame. Keep away from sources of ignition. Store in a tightly closed container. Store in a cool, dry, well-ventilated area away from incompatible substances (oxidizing agents).
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Table 8 - Process Plant & Water Treatment Reagents – Personal Protective Equipment

Product	Personal Eyes	Protective Skin	Equipment Respiration
Acetylene	Tightly sealed goggles	Protective gloves	Use atmosphere supplying respirators (e.g. supplied-air: demand, pressure demand, or continuous flow or self-contained breathing apparatus: demand or pressure demand or combination supplied-air with auxiliary self-contained air supply atmosphere supplying respirator in case of insufficient ventilation).
Activated carbon	None required	None required	None required
Anti-scalant	For splash protection use chemical goggles or full face shield	Rubber or neoprene gloves; impervious apron or coveralls and boots	Not normally needed

Borax	Avoid eye contact	None required	None required
Calcium oxide	For splash protection use chemical goggles or full face shield.	Rubber, neoprene, or nitrile gloves; impervious apron or coveralls and boots.	NIOSH/MSHA approved respirator, if required.
Calcium peroxide	Chemical goggles, full-face shield, or a full-face respirator is to be worn at all times when product is handled. Contact lenses should not be worn; they may contribute to severe eye injury.	Impervious gloves of chemically resistant material (rubber or neoprene) should be worn at all times. Wash contaminated gloves and dry thoroughly before reuse. Body suits, aprons, and/or coveralls of chemical resistant material should be worn at all times. Wash contaminated clothing and dry thoroughly before reuse. Impervious boots of chemically resistant material should be worn.	NIOSH-approved respirator for dust should be worn if needed.
Copper sulphate	Chemical goggles or full face shield.	Rubber or neoprene gloves; impervious apron or coveralls and boots.	Dust mask;  NIOSH/MSHA approved respirator, if required.
Flocculant	For splash protection use chemical goggles or full face shield	Rubber or neoprene gloves; impervious apron or coveralls and boots	Dust mask
Hydrochloric acid	For splash protection use chemical goggles or full face shield	Rubber or neoprene gloves; impervious apron or coveralls and boots	NIOSH/MSHA approved respirator

Hydrofluoric acid	Wear appropriate protective eyeglasses or chemical safety goggles as described by OSHA's eye and face protection regulations in 29 CFR 1910.133. Wear face shield.	Wear appropriate protective neoprene gloves to prevent skin exposure. Wear acid resistant jacket, trousers and boots sufficient to protect skin.	Wear appropriate OSHA/MSHA approved chemical cartridge respirator regulations found in 29CFR 1910.134. If more than TLV, do not breathe vapour. Wear self contained breathing apparatus. Always use an NIOSH-approved respirator when necessary.
Hydrogen peroxide	Wear coverall chemical splash goggles. In addition, where the possibility exists for eye or faces contact due to splashing or spraying of material, wear chemical splash goggles/full-length face shield combination.	Where there is potential for skin contact, have available and wear as appropriate: impervious gloves, apron, pants, jacket, hood, and boots; or totally encapsulating chemical suit with breathing air supply. Permeation data supplied by vendors indicate that impervious materials such as natural rubber, natural rubber plus neoprene, nitrile, or polyvinylchloride afford adequate protection.  Do not wear leather gloves or leather shoes (uppers or soles) because they can ignite following contact with peroxide. Cotton clothing can also ignite. This effect may be within minutes, or delayed. Clothing fires and skin damage occur less quickly with 50% or lower hydrogen peroxide than with 70% material, but adequate personal protection is essential for all industrial concentrations. Protective skin creams offer no	Where there is potential for airborne exposure in excess of applicable limits, wear NIOSH approved respiratory protection.

		protection from hydrogen peroxide and should not be used.	
Lead Acid Batteries	Safety glasses must be worn when moving, connecting, disconnecting, or maintaining batteries, or cleaning up acid spills; as well as, when brushing battery posts or handling solids from inside a battery.	When moving, connecting, disconnecting or maintaining batteries, or cleaning up acid spills acid resistant gloves and full coverage acid resistant clothing must be worn. When brushing battery posts or handling solids from inside a battery gloves and apron must be worn.	When brushing battery posts or handling solids from inside a battery, dust masks must be worn.
Nitric acid	Chemical safety goggles. A face shield may also be necessary.	Impervious gloves, coveralls, boots, and/or other resistant protective clothing. An impervious full-body encapsulating suit and respiratory protection may be required in some operations.	NIOSH/MSHA approved respirator, if required
Paints	None required.	None required.	None required.

Silica	Safety goggles	Wear impervious gloves,	NIOSH/MSHA approved
		shoes and protective clothing to prevent skin contact.	respirator, if required
Sodium cyanide	For dust and splash protection use chemical goggles or full face shield	Rubber or neoprene gloves; impervious lab coat, apron, or coveralls and boots	NIOSH/MSHA approved respirator, if required
Sodium hydroxide (caustic soda)	Tight-fitting goggles if dust is generated. For splash protection use chemical goggles or full face shield	Gauntlet type rubber or neoprene gloves; impervious apron or coveralls and boots	NIOSH/MSHA approved respirator
Sodium metabisulphite	Chemical safety goggles	Cotton gloves adequate for handling dry product. For solutions, use rubber or neoprene gloves; impervious apron or overalls and boots	NIOSH/MSHA approved respirator
Sodium nitrate	Contact lenses should not be worn; they may contribute to severe eye injury.	Impervious gloves of chemically resistant material (rubber or PVC), body suits, aprons, and/or coveralls of chemical resistant material and impervious boots of chemically resistant material should be worn at all times	For dusty or misty conditions, wear NIOSH-approved dust or mist respirator. In case of spill or leak resulting in unknown concentration, use NIOSH approved supplied air respirator.
Sulphur	Chemical safety goggles	Wear impervious gloves, shoes and protective clothing to prevent skin contact.	NIOSH/MSHA approved respirator, if required

## 8 MISCELLANEOUS HAZARDOUS/TOXIC MATERIALS

#### 8.1 PRODUCT DESCRIPTION

Acids such as nitric acid, as well as emulsifiers and ammonium nitrate are used at the mine site. Gases such as propane, oxygen, acetylene; solvents; water/effluent treatment chemicals and various additives are also utilized.

The release or spillage of any of these substances would possibly result in environmental impacts and pose a potentially hazardous situation for those personnel exposed to some of these materials. It is essential that materials deemed to be potentially hazardous be dealt with in a cautious manner, in strict adherence to laws and regulations outlined in the legislation, whether the substance is provided in large or smaller quantities as this will prevent serious repercussions should an accidental release of material happen.

## 8.2 STORAGE FACILITIES OF HAZARDOUS/TOXIC CHEMICALS

All explosive related chemicals will be stored as discussed in Section 6 of this Plan.

All other chemicals and gases will be stored in appropriate locations.

These storage facilities ensure that chemicals that could interact and cause a serious incident will be kept segregated.

## 9 INVENTORY, INSPECTION & RECORDS

A contract expediting company, Arctic Fuels, arranges all deliveries from the Baker Lake Marshalling Area to the Meadowbank and Whale Tail sites. This includes the hazardous materials discussed in this plan. The General Mine Manager has ultimate responsibility for supervising the receipt, inspection, and recording of all material inventories at site. The division managers reconcile total amounts received against amounts ordered.

#### 9.1 PETROLEUM PRODUCTS

## 9.1.1 Inventory Management

Diesel fuel use is metered automatically when it is pumped from the Meadowbank and Whale Tail bulk tanks. The metered volumes are summarized weekly and reconciled against tank levels determined manually with a dipstick from the top of the tanks. Diesel fuel consumption for the power generators is recorded weekly at Meadowbank and will be recorded weekly at Whale Tail.

Aviation fuel is dispensed as required under the supervision of aircraft personnel and site services. Helicopters may be stationed at the Whale Tail site for Amaruq exploration activities with periodic use of a fixed wing aircraft at the Amaruq Exploration site. Fixed wing aircrafts and helicopters will continue to use the Meadowbank airstrip. Consumption and on-site volumes are reconciled monthly at both locations. Lubricants and other petroleum products are inventoried monthly.

#### 9.1.2 Inspection

The Environmental Department performs regularly scheduled inspections of all fuel and lubricant storage areas at both sites. The inspection schedule and procedures to be followed are summarized in Table 9. All inspections are logged with the date and time of inspection, facility inspected, and name of the person making the inspection. See Appendix D for the inspection report of any hazardous material storage area.

The condition of hazardous materials storage areas, containers, tanks, connectors and associated plumbing will be checked on a regular basis. Observations on their condition will be logged, dated and kept near the corresponding storage area. Drums/containers will be inspected for the presence and legibility of symbols, words or other marks identifying the contents, signs of deterioration or damage such as corrosion, rust, leaks at seams or signs that the drum/container is under pressure such as bulging and swelling, spillage or discoloration on the top or sides of the drum/container. If leaks or deterioration is encountered it will be noted and addressed in a timely manner.

The hazardous materials area's secondary containment will be inspected and the condition of the secondary containment will be noted. Arrangements will be made for repairs if necessary.

**Table 9 - Inspection of Petroleum Storage Sites** 

-	
Fuel Tanks	Schedule – Daily by Site Services Supervisor, Weekly by Environmental Technician, Quarterly by Environmental Coordinator.
	Procedure – Repair leaks and report promptly. Inspections will be reported annually and filed with the General Mine Manager or Site Services Superintendent and Environmental
	Superintendent.
Electrical Generating Plant (diesel)	Schedule – Daily by powerhouse operator, weekly by Environmental Technician as part of internal environmental inspections.
	Procedure – Inspections will be reported annually and filed as above.
Other Fuelling Stations	Schedule – Daily by Site Services Supervisor, Weekly by
	Environmental Technician as part of regular inspections. <i>Procedure</i> – Inspections will be reported annually and filed as above.
Spill Kits	Schedule – Monthly by Environmental Technician, Quarterly by Environmental Coordinator.
	Procedure – Inspections will be reported annually and filed as above.
Other Hazardous Material Storage	Schedule – Daily by Site Services Supervisor, Mill Supervisor, Weekly by Environmental Technician when materials are on site.
	Procedure – Inspections will be reported annually and filed as above.

Any accidental damage to containment structures will be inspected immediately and appropriate repairs undertaken. The extent of damage will be reported in writing to the General Mine Manager and Environmental Superintendent. The report will note any remedial repairs that may be made, the date of any repairs, and the need for any follow-up inspection.

#### 9.1.3 Records

Records pertaining to storage, use, and loss of fuels and lubricants are required by CCME and the Fire Marshal (under the *National Fire Code*). The following records are prepared by the Procurement and Logistics and Site Services departments:

- Reconciliation of bulk inventory from resupply logs;
- Weekly use summaries;
- Weekly reconciliation for each storage tank;

- Overfill alarm tests;
- Pressure tests (if applicable);
- Inspections and maintenance checks of the storage tank, piping, and delivery systems;
- Any alteration to the systems;
- Reports of leaks or losses;
- Reports of spill responses; and
- Records of training.

#### 9.2 EXPLOSIVES

## 9.2.1 Inventory Management

See Figure 1 for location of the Meadowbank Explosives Mixing Plant or Emulsion Plant. Once mining ends at Meadowbank, the emulsion manufactured on-site will continue to be stored in a tank located at the Emulsion Plant and delivered via the haul road to the Whale Tail site on an as needed basis. Refer to the Ammonia Management Plan for more details on emulsion storage. Agnico Eagle's explosive contractor, Dyno Nobel Inc., performs daily and weekly inspections on the Emulsion Plant to ensure that inventory used is documented. Agnico Eagle conducts daily inspections of the sea can's storing the boosters, delays and detonator cords and provides an inventory to the Mine Manager.

#### 9.2.2 Inspection

Access to and use of explosives will be under the exclusive control of Agnico Eagle. Agnico Eagle will be responsible for inspection of all explosives equipment and facilities, including the ammonium nitrate storage areas and the magazines for high explosive detonators and blasting caps. The explosives manufacturing plant is inspected by Dyno Nobel Inc. and reports this to Agnico Eagle Management.

### 9.2.3 Records

The *Federal Explosives Act* requires that the following records be kept with regard to explosives products:

- Quantity and strength of each explosive manufactured; and
- Quantity of each explosive issued to the mine site from the factory, including the dates of shipments and quantity of each explosive on site.

Agnico Eagle staff will provide weekly reports to the General Mine Manager that will include:

- Staffing;
- Safety concerns or incidents;

- Total explosives consumption;
- Amount of ammonium nitrate remaining on site; and
- Inventory of other explosives and accessories to be audited for fiscal month-end balances.

## 9.3 MISCELLANEOUS HAZARDOUS/TOXIC MATERIALS

## 9.3.1 Inventory Management

Adequate quantities of all hazardous chemicals are reconciled against orders on receipt. The appropriate department responsible for the miscellaneous chemicals at each site is responsible for reconciling the resupply inventory.

## 9.3.2 Inspection

During operations, the appropriate department responsible for storage and handling of the miscellaneous chemicals are to regularly inspect all areas where such hazardous materials are used and stored. Any problems will be noted and reported to the Department Manager. The Department Manager is responsible for weekly or monthly inspections of miscellaneous hazardous materials and storage areas.

#### 9.3.3 Records

The quantity of hazardous materials received, used, and in possession of personnel are recorded by appropriate Departments. The departments are to comply with the environmental regulations.

#### 10 TRAINING

#### **10.1 GENERAL**

All staff and contractors at the Meadowbank and Whale Tail sites will receive the following training:

- WHMIS;
- Emergency and spill response (see also the SCP and ERP);
- Operations overview; and
- Mine Standard Operating Procedures.

Mine employees will receive additional training in mine safety as specified by the *Mine Health and Safety Act* and regulations. Agnico Eagle will ensure compliance with the training requirements specified in the Act and regulations.

Process plant employees will receive additional training specific to their area of work and duties, including safe operating practices, safe handling and storage of chemicals, and use of PPE. Other training includes cyanide and chemical awareness, specific chemical training for specific tasks, and a mill induction training. This training will be the responsibility of Agnico Eagle.

A record of training received will be maintained for each employee and also from contractors.

In Appendix E you will find a procedure poster that is placed at the applicable hazardous material storage location. This poster will also be used during toolbox meetings with all departments to ensure that hazardous material is being segregated and placed in the appropriate containers for storage.

#### 10.2 PETROLEUM PRODUCTS HANDLERS

Personnel who handle petroleum products will be expected to be conversant with relevant MSDS information. As well, these personnel will be given training in the following:

- Transportation of dangerous goods (TDG);
- Agnico Eagle's fuel handling procedures (outlined in Section 5);
- Spill response and cleanup procedures for petroleum (see the SCP); and
- Emergency response, especially firefighting procedures (see the ERP).

## **10.3 EXPLOSIVES HANDLERS**

Only trained and certified persons will work with explosives. The explosives personnel will undertake formal training and on-the-job training to ensure compliance with legislation. The Mine Inspector will check the adequacy of training. Training requirements will include (but not necessarily be limited to):

Specific fire procedures as per the Federal Explosives Act;

- First aid;
- Transportation of dangerous goods (TDG); and
- WCB Blasting Certificate.

## **10.4 PLANT EMPLOYEES**

Process plant operators may receive TDG training, if appropriate. All plant employees will be trained in spill and emergency response procedures. Emergency response procedures for spilled chemical substances are provided in the SCP.

## **10.5 THIRD PARTY CONTRACTORS**

It is expected that third party contractors receive adequate and comprehensive training to conduct their work tasks from their employer. Agnico Eagle intends to review the general qualifications of third party contractors prior to having them work at the site. In addition, the contractor companies may also be requested to confirm the qualifications of specific individuals that they may have working at the site.

Third party contractors working on the site are required to participate in, and complete a site specific health and safety training session. The training session is envisioned to be valid for a period of 3 years, after which time the contractor may be required to complete the training again, or attend a refresher. The training session will outline site specific hazardous and response procedures that they should be aware of in the course of conducting their work on site. The training session will cover hazardous materials management.

# 11 PLAN EVALUATION, AUDIT & IMPROVEMENT

As part of Agnico Eagle's commitment under the International Cyanide Management Code, it will sponsor regular (every three years) audits by Institute-approved, third-party professionals to verify its compliance with the Code's principles and standards of practice with regard to cyanide handling

# 12 FIGURES

- Figure 1: Meadowbank Mine Site General Layout
- Figure 2: Vault General Layout
- Figure 3: Meadowbank Mine Site: Hazardous Material Storage Locations
- Figure 4: Baker Lake Marshalling Area Layout: Diesel Fuel Storage Facility
- Figure 5: Baker Lake Marshalling Area Layout: Jet-A Fuel Storage Facility
- Figure 6: Whale Tail Camp Layout

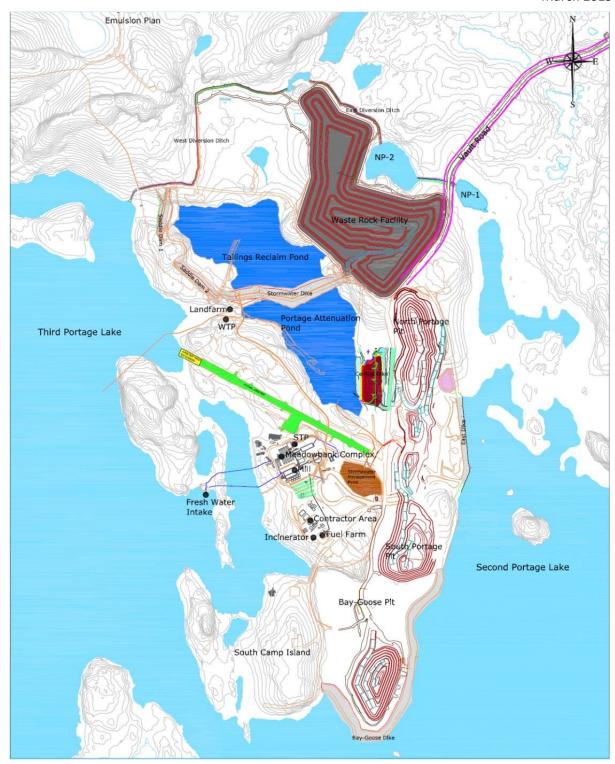


Figure 1 Meadowbank Site Layout

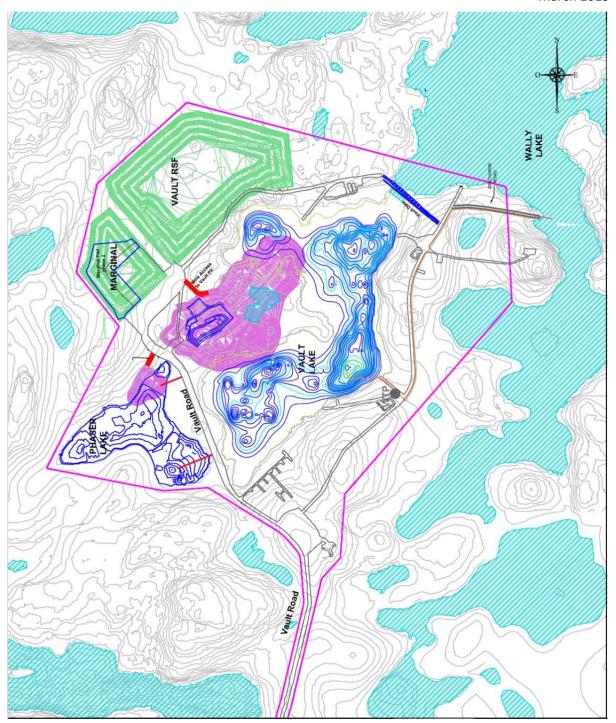


Figure 2 - Vault General Layout

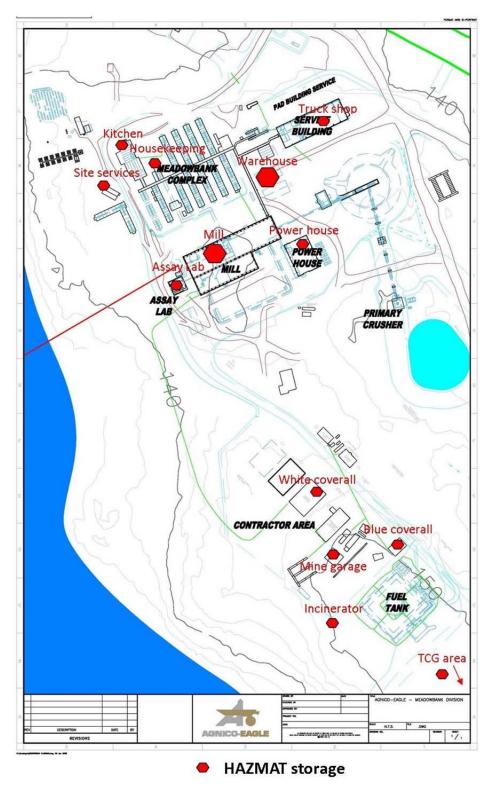


Figure 3 - Meadowbank Mine Site: Hazardous Material Storage Locations



Figure 4 - Baker Lake Marshalling Area Layout: Diesel Fuel Storage Facility

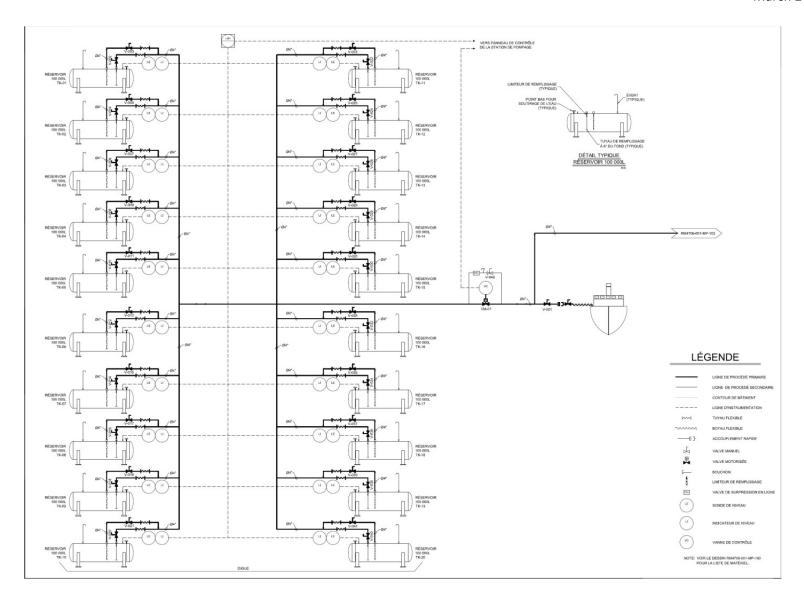


Figure 5 – Baker Lake Marshalling Area Layout: Jet-A Fuel Storage Facility

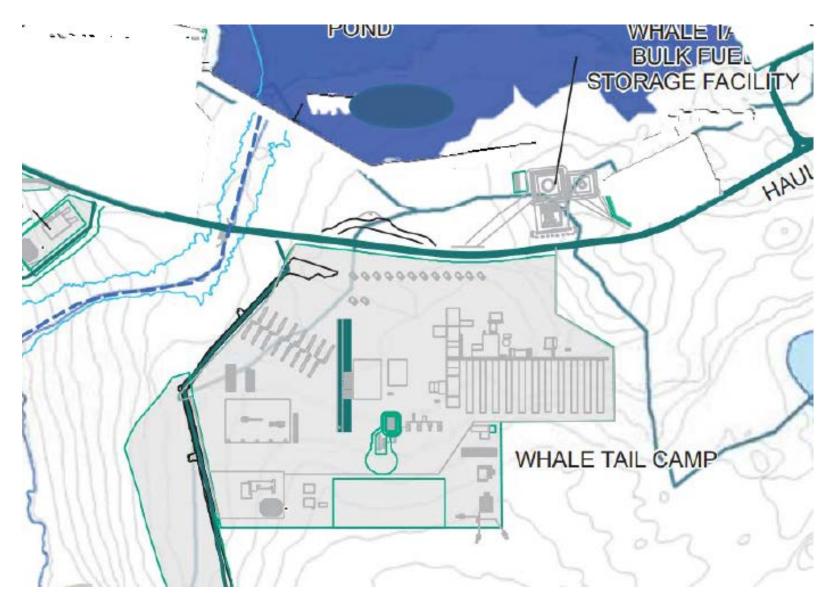


Figure 6 Whale Tail Camp

#### 13 LIST OF ACRONYMS

Agnico Eagle Agnico Eagle Mines Ltd.

AN Ammonium Nitrate

ANSI American National Standards Institute

ANFO Ammonium Nitrate Fuel Oil

CCME Canadian Council of Ministers of the Environment

EPS Environmental Protection Service

ERD Explosives Regulatory Division, Natural Resources Canada

ERP Emergency Response Plan

ERT Emergency Response Team

FS Fuel Storage Area

**HAZCOM** Hazard Communication

HCN Hydrogen Cyanide

HM Hazardous Materials Storage Area

HMMP Hazardous Materials Management Plan

HR Human Resources

HSC Occupational Health & Safety Committee

HW Hazardous Waste Storage Area

IBC Intermediate Bulk Container

ISO International Organization for Standardization

MSDS Materials Safety Data Sheets

MSHA Mine Safety and Health Administration

#### Hazardous Materials Management Plan March 2019

NIOSH National Institute for Occupational Safety and

Health

OHSA Occupational Health and Safety Administration

OHSP Occupational Health & Safety Plan

PCB Polychlorinated Biphenyls

PPE Personal Protective Equipment

SCP Spill Contingency Plan

TDG Transportation of Dangerous Goods

TDGA Transportation of Dangerous Goods Act

WCB Workers' Compensation Board

WHMIS Workplace Hazardous Materials Information System

Hazardous Materials Management Plan
March 2019

# Appendix A

List of Applicable Legislation

The following is a list of federal and territorial legislation and guidelines that regulate the management of hazardous materials in Nunavut, and which are considered potentially applicable to the Meadowbank Gold Mine. As part of Meadowbank Mining Corp's overall environmental management system for the mine site, this list is updated at least annually to ensure it represents current and relevant information.

#### **Federal Legislation**

#### ☐ CANADIAN ENVIRONMENTAL PROTECTION ACT, 1999 S.C. 1999, c. 33

Code of Practice for the Reduction of Chlorofluorocarbon Emissions from Refrigeration and Air Conditioning Systems.

Environmental Code of Practice for Elimination of Fluorocarbon Emissions from Refrigeration and Air Conditioning Systems.

Environmental Code of Practice on Halons Code of Practice EPS 1/RA/3E.

Environmental Emergency Regulations SOR/2003-307.

Environmental Guidelines for Controlling Emissions of Volatile Organic Compounds from Aboveground Storage Tanks, CCME-EPC-87-E, as amended.

Export and Import of Hazardous Waste and Hazardous Recyclable Material Regulations SOR/2005-149.

Federal Halocarbon Regulations, 2003 SOR/2003-289.

Interprovincial Movement of Hazardous Waste Regulations SOR/2002-301.

Ozone-Depleting Substances Regulations, 1998 SOR/99-7.

#### ☐ EXPLOSIVES ACT R.S.C 1985, c. E-17

Ammonium Nitrate and Fuel Oil Order C.R.C. 1978, c. 598.

Explosives Regulations C.R.C. 1978, c. 599.

☐ TRANSPORTATION OF DANGEROUS GOODS ACT, 1992 S.C. 1992, c. 34

Transportation of Dangerous Goods Regulations SOR/2001-286.

Transportation of Dangerous Goods Regulations - Schedules SOR/2001-286.

#### **Federal Codes and Other Guidance Documents**

- National Fire Code.
- Indian and Northern Affairs Canada. 2005. DEW Line Cleanup Barrel Protocol.
- Canadian Council of Ministers for the Environment (CCME) Environmental Code of Practice for Above-Ground and Underground Storage Tanks Systems containing Petroleum Products and Allied Petroleum Products (2003).
- CCME Canadian Wide Standards for Petroleum Hydrocarbons in Soil.
- CCME Canadian Environmental Quality Guidelines.
- Environment Canada (Tilden & Westerman). 1990. Guidelines for the Preparation of Hazardous Material Spill Contingency Plans.
- Department of Fisheries and Oceans. 1998. Guidelines for the Use of Explosives in or Near Canadian Fisheries Water.

#### **Territorial Legislation**

#### ☐ ENVIRONMENTAL PROTECTION ACT R.S.N.W.T. 1988, c. E-7

A Guide to the Spill Contingency Planning and Reporting Regulations January 2002.

Environmental Guideline for Contaminated Site Remediation November 2003.

Environmental Guideline for Waste Lead and Lead Paint.

Guideline for Ozone Depleting Substances.

Guideline for the General Management of Hazardous Waste in the NWT.

Guideline for the Management of Waste Antifreeze.

Guideline for the Management of Waste Batteries.

Guideline for the Management of Waste Paint.

Guideline for the Management of Waste Solvents.

Guideline for Dust Suppression, February 1998.

Spill Contingency Planning and Reporting Regulations R-068-93.

Used Oil and Waste Fuel Management Regulations R-064-2003.

Plain Language Guide to the Used Oil and Waste Fuel Management Regulations.

- TRANSPORTATION OF DANGEROUS GOODS ACT, 1990 S.N.W.T. 1990, c. 36

  Transportation of Dangerous Goods Regulations R-049-2002.
- EXPLOSIVES USE ACT R.S.N.W.T. 1988, c. E-10
- Explosives Regulations R.R.N.W.T. 1990, c. E-27.

	March 2019
Appendix B	
Hazardous Materials Stored on the Meadowbank Site	

Hazardous Materials Management Plan

Name	Description	Quantity
2,6 DIMETHYL 4 HEPTANONE 80 %	4LT	60
ABS GLUE CAN WITH BRUSH	500ML	3
ABS TO PVC TRANSITION GLUE	W/ BRUSH 500ML	11
ACETONE	4LT	4
ACETONE CLEANER		22
ACETYLENE	SIZE A390 CYLINDERS	506
ACETYLENE CGA510	SIZE MC CYLINDERS	20
ACETYLENE LABORATORY GRADE	SIZE K	42
ACTISAND 7E-3003	SILICE SAND 22.68KG	144
ACTIVATED CARBON	8 X 16 - 60% ACTIVE IN 500KG	504
ACTIVATED CARBON (GAC) FILTER	2 1/2" X 10" PHOSPHATE	12
ADDITIVE		16
ADHESIVE SILICONE	WITH RTV SUPERFLEX	40
ADHESIVE SILICONE	HIGH-TEMP RTV RED	93
ADHESIVE/SEALANT 277	BOT/250ML F/ LARGE BOLTS	41
ALIQUAT 336 AVERAGE MW 442	1LT	4
ALIQUOT 336	250ML	4
ALL SEASON SELECT OIL.	1L	16
ALL STEEL WELDING ELECTRODE	M4 5/32" 2.5KG/BX	2
ANHYDRE BORAX 12 MESH	25KG DEHYBOR	167
ANHYDRONE		7
ANIONIC FLOCCULANT 920 MC	750KG/BAG	181
ANIONIC FLOCCULANT 934 SH	750KG/BAG	151
ANTI SEIZE LOCTITE SILVER GR	CONTENANT 1LB	26
ANTI-STATIC/FOG BOTTLE CLEANER	MAGIC 225ML	36
ARC AIR TORCH	EXTREME K4000	4
ARC AIR TORCH 1000A	W/10' CABLE CSK4000W	9
ARCAIR SLICE ROD	1/4" X 22" LONG 100/PACK	2
ARCAIR SLICE ROD	3/8" X 18" LONG 50/PACK	2
ARCTIC GREEN LOW TEMP WET CHEM	FOR HVY EQUIP FIRE SUPPRESSION	15
ARDEE 100 ROCK DRILL OIL	20LT	201
ARDEE 32 ROCK DRILL OIL	20LT	1301
ARDEE 32 ROCK DRILL OIL	205LT DRUM	7
ARENA SILICA	MALLA 2030 INDUSTRIAL 25KG/BAG	0
ARGON	SIZE T CYLINDERS	118
ARSENIC EDL		2
ARSENIC STANDARD	1000PPM 500ML	4
ASSIST 1AL1 LIQUID ALKALI	18.9LT	107
ATF D3M	1040LT	1
AU LUMINA HCL		1
BACKING COMPOUND	MAGANESE	50
BATTERY	12V CM785	4
BATTERY	12 VOLTS	0
BATTERY	KAWASAKI MULE	12
BATTERY	12V 8DW ELECTROL F/ DM45 DRILL	2
BATTERY	CR2	6
BATTERY 12V	FOR HVY EQUIP FIRE SUPPRES	6
BATTERY ACID NEUTRALIZER		22
BATTERY ENERGIZER	6V	3
BATTERY ENERGIZER INDUSTRIAL	ALKALINE AAA 4/PK	2185
BATTERY ENERGIZER INDUSTRIAL	AA 4/PK	2554
BATTERY ENERGIZER INDUSTRIAL	С	39
BATTERY ENERGIZER INDUSTRIAL	ALKALINE D	572
BATTERY ENERGIZER INDUSTRIAL	9V	453

BATTERY INTERNATIONAL	LUBE AND SERVICE TRK	12
BATTERY LI-ION CP200	2250MA CAPACITY	13
BATTERY MOTORCRAFT	12V 850A	31
BLUESHIELD WIRE LA-S6.35	20KG ROLL	10
BODY PRIMER	F/ URATHANE WINDOW&WINDSHIELD	10
BONE ASH	20 MESH	27
BRAKE CLEANER		
BRAKE CLEANER BRAKE CLEANER	KLEEN-FLO 20LT	82
	12/CS 1LT	766
BRAKE FLUID DOT-3		32
BRP MINERAL OIL	946ML 2 STROKE	265
BUFFER SOLUTION PH 10	4L	3
BUFFER SOLUTION PH 4	4L	3
BUFFER SOLUTION PH12	R1300 (4 LITRES)	0
BUFFER SOLUTION PH7	4/CASE	2
BUG SPRAY DEEP WOOD OFF	100ML PUMP BTL	278
BURNING RODS LENCO	10' 6" 5/8ID 11/16OD	100
BUTANE FUEL	70ML	14
C25 ARGOSHIELD	SIZE T CYLINDERS	99
CALCIUM CHLORIDE LIQUID	29.6% 1000L/DM	1587
CALCIUM CHLORIDE LIQUID	29.6% 1200L/DM	303
CARBON DIOXIDE	SIZE T CYLINDERS	0
CAT DEO MONOGRADE 40 OIL	1200 LITERS/TOTE	93
CAT DEO MONOGRADE 40 OIL	205 LITERS DRUM	6
CATIONIC POLYMER	25KG HYDREX 3613	25
CAUSTIC SODA ANHYDRE	1000KG MICROPEARL	321
CAUSTIC SODA MICROPEARL	25KG/BG	1137
CAUSTIC ULTRATAK GREASE	CARTRIDGES	4
CELLULOSE		30
CHASSIS LUBRIFIANT	2KG CASTROL	2
CHIP CMS HYDROCYANIC ACID	2 - 50 PPM	10
CHOKE AND CARB CLEANER	KLEEN-FLO	37
CLEANER BATTERY MAINTENANCE	AERO 312GM	78
CLEANER CARBURATOR/CHOKE		9
COAGULANT ALUMINIUM HYDROXYDE	1000KG HYDREX 352 PASS-10S	123
COLORED FLEECE RAGS	20LB	314
COMPRESSOR OIL SYNTHETIC	COMPRO XL-S 32 205LT	23
COMPRO SYNTHETIC	205LT/DM	14
COOLANT CVC-7-A	1040LT TOTE YELLOW	1
COOLANT SAMPLE KIT		114
COOLANT TREATMENT		2
COPPER OXIDE		16
COPPER SULPHATE	PENTAHYDRATE MINE GRADE	447
COUPLER QUICK	PERMITTER OF THE PROPERTY OF T	34
CPVC GLUE	W/ BRUSH 500ML	7
CULTURE TUBE DISPOSABLE	BOROSILICATE16MMX150MM 1000/BX	196
CVC-7-A YELLOW COOLANT	3.78LT	50
DEB DEBBA PROTECTIVE CREAM	# 233 8 X 800ML	31
DEB NATURELL HAIR/BODY	# 266 4 X 4LT	166
DEB NATURELL SUNFLOWER	# 256	145
DEFLECT PRO SUN SCREEN	140ML	1174
DE-ICER LOCK POCKET SIZE	35ML	47
DIELECTRIC GREASE	JOIVIL	7
DIESEL ADDITIVE	9.8L	
DIESEL ADDITIVE DIESEL MELT	ANTI-GELLING TREATMENT	145
DIESEL MELT DIFERENCIEL LOCK ADDITIVE SEAL	ANTI-GELLING TREATMENT	34
DIFERENCIEL LOCK ADDITIVE SEAL		6

DISSOLVED ON TOEN SERVICE NIT   FIRACH PORTIABLE DATOER METER   0   DIXON LUBRICATOR   3/4"   3   DOW CORNING GREASE # 111 TUBE   HVY EQUIP FIRE SUPPRES   7   DDP FREE CHLORINE HACH   10ML SAMPLE REAGENT 100/PK   7   DRILL CARE MOTOR OIL   QT FOR DM45 DRILL   7   DRILL STELL GREASE   KOPPER KOTE 10LT   76   DURADRIVE MY SYNTHETIC ATF   20LT PAIL   10   DURADRIVE MY SYNTHETIC   205 LITERS DRUM   5   DURON E 15W40   1040LT IBC   27   DURON E 15W40   1040LT IBC   27   DURON E SYN 10W40   205LT   1   DURON E SYN SYNTHETIC 5W-40   4L   32   DURON SYNTHETIC 5W-40   4L   32   DURON SYNTHETIC 15W40   205LT   1   DURON SYNTHETIC 15W40   205LT   2   DUST BAN	DICCOLVED OVVCEN CEDVICE KIT	LIACII DODTADI E OVVCENI METED	_
DOW CORNING GREASE # 111 TUBE	DISSOLVED OXYGEN SERVICE KIT	HACH PORTABLE OXYGEN METER	6
DPD FREE CHLORINE HACH		7.7	
DRILL CARE MOTOR OIL			
DRILL STEEL GREASE         KOPPER KOTE 10LT         76           DURADRIVE MV SYNTHETIC ATF         20LT PAIL         10           DURATRAN SYNTHETIC         205 LITERS DRUM         5           DURON E 15W40         1040LT IBC         80           DURON E SYN 0W40         1040LT IBC         27           DURON SYNTHETIC 15W40         205LT         1           DURON XL 0W30         1040LT IBC         88           DUST CONTROL NALCO         8882.61 1183KG TOTE         95           DUST CONTROL NALCO         8882.61 1183KG TOTE         92           DYNALENE EG 60 A-RED         ETHYLENE GLYCOL (1078KG/TOTE)         15           ECOTRACTION         1 TON BULK TOTE IBC         15           ELECTRODE         600-800-900         60           ELECTRODE CLEANING SOLUTION         HANNA INSTR.TESTER 230ML BTL         12           ENDURATEX EP220         205L/DM         30           ENDURATEX EP220         205L/DM         36           ENDURATEX EP220         205L/DM         30           ENDURATEX EP240         205L/DM         4           ENDURATEX EP240         205L/TOM         4           ENDURATEX SYN EP150         205L/TOM         7           ENDURATEX SYN EP150			
DURADRIVE MY SYNTHETIC         205 LITERS DRUM         5           DURON E 15W40         1040LT IBC         80           DURON E SYN W40         1040LT IBC         27           DURON E SYNTHETIC 5W-40         4L         32           DURON SYNTHETIC 5W-40         4L         32           DURON SYNTHETIC 5W-40         4L         32           DURON SYNTHETIC 5W-40         205LT         1           DURON SYNTHETIC 5W-40         4L         32           DUST BAN         20KG         95           DUST BAN         20KG         95           DUST BAN         20KG         95           DUST BAN         20KG         95           DUST CONTROL NALCO         8882.61 1183KG TOTE         92           DYNALENE EG 80 A-RED         ETHYLENE GLYCOL (1078KG/TOTE)         15           ECOTRACTON         1 TON BULK TOTE IBC         15           EDGE DETERGENT         18.9LT         108           ELECTRODE         600-800-900         60           ELECTRODE         600-800-900         60           ELECTRODE         206L/DM         86           ENDURATEX EP150         205L/DM         86           ENDURATEX EP220         205L/DM			
DURATRAN SYNTHETIC         205 LITERS DRUM         5           DURON E 15W40         1040LT IBC         80           DURON E SYN OW40         1040LT IBC         27           DURON SYNTHETIC 5W-40         4L         32           DURON SYNTHETIC 15W40         205LT         1           DURON XLOW30         1040LT IBC         88           DUST CONTROL NALCO         8882 61 1183KG TOTE         95           DUST CONTROL NALCO         8882 61 1183KG TOTE         92           DYNALENE EG 60 A-RED         ETHYLENE GLYCOL (1078KG/TOTE)         15           ECOTRACTION         1 TON BULK TOTE IBC         15           EOGE DETERGENT         18,9LT         108           ELECTRODE         600-800-900         60           ELECTRODE CLEANING SOLUTION         HANNA INSTR.TESTER 230ML BTL         12           ENDURATEX EP150         205LT/DM         36           ENDURATEX EP20         205LT/DMM         30           ENDURATEX EP20         205LT/DMM         30           ENDURATEX EP320         205LT/DM         4           ENDURATEX EP68         205LT/DM         7           ENDURATEX SP68         205LT/DM         3           ENDURATEX SYN EP220         205LT/DM         3<			
DURON E 15W40         1040LT IBC         27           DURON E SYN 0W40         1040LT IBC         27           DURON E SYNTHETIC 5W-40         4L         32           DURON SYNTHETIC 15W40         205LT         1           DURON XL 0W30         1040LT IBC         88           DUST BAN         20KG         95           DUST CONTROL NALCO         8882.61 1183KG TOTE         92           DYNALENE EG 60 A-RED         ETHYLENE GLYCOL (1078KG/TOTE)         15           ECOTRACTION         1 TON BULK TOTE IBC         15           EDGE DETERGENT         18.9LT         108           ELECTRODE CLEANING SOLUTION         HANNA INSTR.TESTER 230ML BTL         12           ENDURATEX EP150         206L/DM         86           ENDURATEX EP220         205LT/DMUM         30           ENDURATEX EP220         205LT/DMUM         30           ENDURATEX EP220         205LT/DM         4           ENDURATEX EP320         205LT/DM         7           ENDURATEX SYN EP220         205LT/DM         3           ENDURATEX SYN EP220         205LT/DM         3           ENDURATEX SYN EP320         205LT/DM         34           ENDURATEX SYN EP320         205LT/DM         3 <td></td> <td></td> <td></td>			
DURON E SYNTHETIC 5W-40         4L         32           DURON SYNTHETIC 15W40         205.T         1           DURON SYNTHETIC 15W40         205.T         95           DUST CONTROL NALCO         8882.61 1183KG TOTE         92           DYNALENE EG 60 A-RED         ETHYLENE GLYCOL (1078KG/TOTE)         15           ECOTRACTION         1 TON BULK TOTE IBC         15           EDGE DETERGENT         18.9LT         108           ELECTRODE         600-800-900         60           ELECTRODE CLEANING SOLUTION         HANNA INSTR.TESTER 230ML BTL         12           ENDURATEX EP150         205.L/DM         86           ENDURATEX EP220         1040LB IBC         10           ENDURATEX EP220         1040LB IBC         10           ENDURATEX EP260         205.LT/DM         4           ENDURATEX EP460         205.LT/DM         7           ENDURATEX SYN EP150         205.LT/DM         3           ENDURATEX SYN EP220         205.LT/DM         34           ENDURATEX SYN EP250         205.LT/DM         <			
DURON E SYNTHETIC 15W40         4L         32           DURON SYNTHETIC 15W40         205LT         1           DURON XL 0W30         1040LT IBC         88           DUST BAN         20KG         95           DUST CONTROL NALCO         8882.61 1183KG TOTE         92           DYNALENE E G 60 A-RED         ETHYLENE GLYCOL (1078KG/TOTE)         15           ECOTRACTION         1 TON BULK TOTE IBC         15           EDGE DETERGENT         18.9LT         108           ELECTRODE         600-800-900         60           ELECTRODE CLEANING SOLUTION         HANNA INSTR.TESTER 230ML BTL         12           ENDURATEX EP150         205L/DM         86           ENDURATEX EP20         205LT/DRUM         30           ENDURATEX EP220         205LT/DM         86           ENDURATEX EP220         205LT/DM         4           ENDURATEX EP320         205LT/DM         4           ENDURATEX EP460         205LT/DM         7           ENDURATEX SYN EP150         205LT/DM         29           ENDURATEX SYN EP320         205LT/DM         3           ENDURATEX SYN EP320         205LT/DM         3           ENDURATEX SYN EP320         205L/DM         10 <t< td=""><td></td><td></td><td></td></t<>			
DURON SYNTHETIC 15W40			
DURTON XL 0W30         1040LT IBC         88           DUST BAN         20KG         95           DUST CONTROL NALCO         8882.61 1183KG TOTE         92           DYNALENE EG 60 A-RED         ETHYLENE GLYCOL (1078KG/TOTE)         15           EOGR DETERGENT         18.9LT         108           ELECTRODE         600-800-900         60           ELECTRODE CLEANING SOLUTION         HANNAI INSTR.TESTER 230ML BTL         12           ENDURATEX EP150         205L/DM         86           ENDURATEX EP220         205L/DM         86           ENDURATEX EP220         1040LB IBC         10           ENDURATEX EP220         105LT/DRUM         30           ENDURATEX EP220         205LT/DRUM         30           ENDURATEX EP220         105LT/DM         4           ENDURATEX EP460         205LT/DM         7           ENDURATEX SYN EP150         205LT/DM         29           ENDURATEX SYN EP150         205LT/DM         3           ENDURATEX SYN EP220         205LT/DM         34           ENDURATEX XL SYN BLEND 68/220         205LT         7           ESAB WELDING WIRE         0.045 (15 Kg/ROLL)         50           ESAB WELDING WIRE         0.045 (15 Kg/ROLL)         <	DURON E SYNTHETIC 5W-40	4L	
DUST BAN         20KG         95           DUST CONTROL NALCO         8882.61 1183KG TOTE         92           DYNALENE EG 60 A-RED         ETHYLENE GLYCOL (1078KG/TOTE)         15           ECOTRACTION         1 TON BULK TOTE IBC         15           EDGE DETERGENT         18.9LT         108           ELECTRODE         600-800-900         60           ELECTRODE CLEANING SOLUTION         HANNA INSTR.TESTER 230ML BTL         12           ENDURATEX EP150         205L/DM         86           ENDURATEX EP150         205L/DM         30           ENDURATEX EP220         1040LB IBC         10           ENDURATEX EP320         205LT/DM         3           ENDURATEX EP320         205LT/DM         4           ENDURATEX EP68         205LT/DM         7           ENDURATEX SYN EP150         205LT/DM         3           ENDURATEX SYN EP320         205LT/DM         34           ENDURATEX XYN EP320         205LT/DM         34           ENDURATEX XL SYN BLEND 68/220         205LT         7           ESAB WELDING WIRE         0.062 (15 Kg/ROLL)         50           ESAB WELDING WIRE         0.062 (15 Kg/ROLL)         82           ESSO XOO 60         1100L/TOTE	DURON SYNTHETIC 15W40	205LT	1
DUST CONTROL NALCO         8882.61 1183KG TOTE         92           DYNALENE EG 60 A-RED         ETHYLENE GLYCOL (1078KG/TOTE)         15           ECOTRACTION         1 TON BULK TOTE IBC         15           EDGE DETERGENT         18.9LT         108           ELECTRODE         600-800-900         60           ELECTRODE CLEANING SOLUTION         HANNA INSTR.TESTER 230ML BTL         12           ENDURATEX EP150         205L/DM         86           ENDURATEX EP220         206LT/DRUM         30           ENDURATEX EP220         1040LB IBC         10           ENDURATEX EP220         1040LB IBC         10           ENDURATEX EP220         1040LB IBC         10           ENDURATEX EP230         205LT/DM         4           ENDURATEX EP460         205LT/DM         7           ENDURATEX SYN EP150         205LT/DM         29           ENDURATEX SYN EP150         205LT/DM         3           ENDURATEX SYN EP320         205L/DM         10           ENDURATEX SYN BEDEND 68/220         205LT         7           ESAB WELDING WIRE         0.045 (15 Kg/ROLL)         50           ESAB WELDING WIRE         0.062 (15 Kg/ROLL)         82           ESSO XDO 60         1100L/TOTE<	DURON XL 0W30	1040LT IBC	88
DYNALENE EG 60 A-RED         ETHYLENE GLYCOL (1078KG/TOTE)         15           ECOTRACTION         1 TON BULK TOTE IBC         15           EDGE DETERGENT         18.9LT         108           ELECTRODE         600-800-900         60           ELECTRODE CLEANING SOLUTION         HANNAI INSTR.TESTER 230ML BTL         12           ENDURATEX EP150         205L/DM         86           ENDURATEX EP220         205LT/DRUM         30           ENDURATEX EP220         1040LB IBC         10           ENDURATEX EP320         205LT/DM         4           ENDURATEX EP320         205LT/DM         7           ENDURATEX EP68         205LT/DM         7           ENDURATEX SYN EP150         205LT/DM         34           ENDURATEX SYN EP120         205LT/DM         34           ENDURATEX SYN EP220         205LT/DM         34           ENDURATEX SYN EP320         205LT/DM         10           ENDURATEX XL SYN BLEND 68/220         205LT         7           ESAB WELDING WIRE         0.045 (15 Kg/ROLL)         50           ESAB WELDING WIRE         0.062 (15 Kg/ROLL)         82           ESSO XDO 60         1100L/TOTE         0           EXTENDED LIFE COOLANT -52         1040LT	DUST BAN	20KG	95
ECOTRACTION         1 TON BULK TOTE IBC         15           EDGE DETERGENT         18.9LT         108           ELECTRODE         600-800-900         60           ELECTRODE CLEANING SOLUTION         600-800-900         60           ELECTRODE CLEANING SOLUTION         HANNA INSTR.TESTER 230ML BTL         12           ENDURATEX EP150         205L7/DM         86           ENDURATEX EP220         1040LB IBC         10           ENDURATEX EP320         205LT/DM         4           ENDURATEX EP460         205LT/DM         7           ENDURATEX EP68         205LT/DM         7           ENDURATEX SYN EP150         205LT/DM         3           ENDURATEX SYN EP220         205LT/DM         34           ENDURATEX SYN EP320         205LT/DM         34           ENDURATEX SYN EP320         205LT/DM         10           ENDURATEX SYN EP320         205LT/DM         10           ENDURATEX SYN EP320         205LT/DM         34           ENDURATEX SYN EP320         205LT/DM         34           ENDURATEX SYN EP320         205LT/DM         30           ENDURATEX SYN EP320         205LT/DM         3           ENDURATEX SYN EP320         205LT/DM         3	DUST CONTROL NALCO	8882.61 1183KG TOTE	92
EDGE DETERGENT	DYNALENE EG 60 A-RED	ETHYLENE GLYCOL (1078KG/TOTE)	15
ELECTRODE         600-800-900         60           ELECTRODE CLEANING SOLUTION         HANNA INSTR.TESTER 230ML BTL         12           ENDURATEX EP150         205L/DM         86           ENDURATEX EP220         205LT/DRUM         30           ENDURATEX EP220         1040LB IBC         10           ENDURATEX EP320         205LT/DM         4           ENDURATEX EP460         205LT/DM         7           ENDURATEX SYP80         205LT/DM         7           ENDURATEX SYN EP150         205LT/DM         3           ENDURATEX SYN EP220         205LT/DM         34           ENDURATEX SYN EP320         205LT/DM         10           ENDURATEX XYN BES00         205LT         7           ENDURATEX X. SYN BLEND 68/220         205LT         7           ENDURATEX X. SYN BLEND 68/220         205LT         7           ESAB WELDING WIRE         0.045 (15 Kg/ROLL)         50           ESAB WELDING WIRE         0.045 (15 Kg/ROLL)         82           ESSO XDO 60         1100L/TOTE         0           EXTERIOR SEALANT MULCO         300ML BLUE SCOTIA         47           EXTERIOR SEALANT MULCO         300ML CLEAR         48           FLOCULANT         25 KG/BG 85016	ECOTRACTION	1 TON BULK TOTE IBC	15
ELECTRODE CLEANING SOLUTION         HANNA INSTR.TESTER 230ML BTL         12           ENDURATEX EP150         205L/DM         86           ENDURATEX EP220         205LT/DRUM         30           ENDURATEX EP220         1040LB IBC         10           ENDURATEX EP320         205LT/DM         4           ENDURATEX EP460         205LT/DM         7           ENDURATEX EP68         205LT/DM         29           ENDURATEX SYN EP150         205LT/DM         3           ENDURATEX SYN EP320         205LT/DM         34           ENDURATEX XYN EP320         205LT/DM         10           ENDURATEX XYN BLEND 68/220         205LT         7           ESAB WELDING WIRE         0.045 (15 Kg/ROLL)         50           ESAB WELDING WIRE         0.062 (15 Kg/ROLL)         82           ESSO XDO 60         1100L/TOTE         0           EXTERIOR SEALANT MULCO         300ML BLUE SCOTIA         47           EXTERIOR SEALANT MULCO         300ML BLUE SCOTIA         47           EXTERIOR SEALANT MULCO         300ML SULE SCOTIA         47           EXTERIOR SEALANT IN TUBE         9         5           GASKET BLIMINATOR 515         50ML SMALL TUBE         16           GASKET MAKER HI-TEMP	EDGE DETERGENT	18.9LT	108
ENDURATEX EP150         205L/DM         86           ENDURATEX EP220         205LT/DRUM         30           ENDURATEX EP220         1040LB IBC         10           ENDURATEX EP320         205LT/DM         4           ENDURATEX EP460         205LT/DM         7           ENDURATEX EP68         205LT/DM         29           ENDURATEX SYN EP150         205LT/DM         3           ENDURATEX SYN EP150         205LT/DM         34           ENDURATEX SYN EP120         205LT/DM         34           ENDURATEX SYN EP320         205LT         7           ENDURATEX XL SYN BLEND 68/220         205LT         7           ESAB WELDING WIRE         0.045 (15 Kg/ROLL)         50           ESAB WELDING WIRE         0.062 (15 Kg/ROLL)         82           ESSO XDO 60         1100L/TOTE         0           EXTENDED LIFE COOLANT -52         1040LT         123           EXTERIOR SEALANT MULCO         300ML BLUE SCOTIA         47           EXTERIOR SEALANT MULCO         300ML CLEAR         48           FLOCULANT         25KG/BG 85016         1           FUNNEL         DYNALINE         9           GASKET BEALANT IN TUBE         6         6 <td< td=""><td>ELECTRODE</td><td>600-800-900</td><td>60</td></td<>	ELECTRODE	600-800-900	60
ENDURATEX EP150         205L/DM         86           ENDURATEX EP220         205LT/DRUM         30           ENDURATEX EP220         1040LB IBC         10           ENDURATEX EP320         205LT/DM         4           ENDURATEX EP460         205LT/DM         7           ENDURATEX EP68         205LT/DM         29           ENDURATEX SYN EP150         205LT/DM         3           ENDURATEX SYN EP150         205LT/DM         34           ENDURATEX SYN EP120         205LT/DM         34           ENDURATEX SYN EP320         205LT         7           ENDURATEX XL SYN BLEND 68/220         205LT         7           ESAB WELDING WIRE         0.045 (15 Kg/ROLL)         50           ESAB WELDING WIRE         0.062 (15 Kg/ROLL)         82           ESSO XDO 60         1100L/TOTE         0           EXTENDED LIFE COOLANT -52         1040LT         123           EXTERIOR SEALANT MULCO         300ML BLUE SCOTIA         47           EXTERIOR SEALANT MULCO         300ML CLEAR         48           FLOCULANT         25KG/BG 85016         1           FUNNEL         DYNALINE         9           GASKET BEALANT IN TUBE         6         6 <td< td=""><td>ELECTRODE CLEANING SOLUTION</td><td>HANNA INSTR.TESTER 230ML BTL</td><td>12</td></td<>	ELECTRODE CLEANING SOLUTION	HANNA INSTR.TESTER 230ML BTL	12
ENDURATEX EP220         205LT/DRUM         30           ENDURATEX EP220         1040LB IBC         10           ENDURATEX EP320         205LT/DM         4           ENDURATEX EP460         205LT/DM         7           ENDURATEX EP68         205LT/DM         29           ENDURATEX SYN EP150         205LT/DM         3           ENDURATEX SYN EP220         205LT/DM         34           ENDURATEX SYN EP320         205LT/DM         10           ENDURATEX SYN EP320         205LT/DM         10           ENDURATEX SYN EP320         205LT         7           ESAB WELDING WIRE         0.045 (15 Kg/ROLL)         50           ESAB WELDING WIRE         0.062 (15 Kg/ROLL)         82           ESSO XDO 60         1100L/TOTE         0           EXTERIOR SEALANT MULCO         300ML BLUE SCOTIA         47           EXTERIOR SEALANT MULCO         300ML CLEAR         48           FLOCULANT         25KG/BG 85016         1           FUNNEL         DYNALINE         9           GASKET BLIMINATOR 515         50ML SMALL TUBE         16           GASKET SEALANT IN TUBE         94           GEAR CHAIN & CABLE LUBRICANT         LOCTITE 12 OZ. AEROSOL         26			
ENDURATEX EP220         1040LB IBC         10           ENDURATEX EP320         205LT/DM         4           ENDURATEX EP680         205LT/DM         7           ENDURATEX EP68         206LT/DM         29           ENDURATEX SYN EP150         205LT/DM         3           ENDURATEX SYN EP220         205LT/DM         34           ENDURATEX XL SYN BE920         205LT         7           ESAB WELDING WIRE         0.045 (15 Kg/ROLL)         50           ESAB WELDING WIRE         0.062 (15 Kg/ROLL)         82           ESSO XDO 60         1100L/TOTE         0           EXTERIOR SEALANT MULCO         300ML BLUE SCOTIA         47           EXTERIOR SEALANT MULCO         300ML CLEAR         48           FLOCULANT         25KG/BG 85016         1           FUNNEL         DYNALINE         9           GASKET ELIMINATOR 515         50ML SMALL TUBE         16           GASKET SEALANT IN TUBE         9         5           GEAR CHAIN & CABLE LUBRICANT         LOCTITE 12 OZ. AEROSOL         26           GEAR CHAIN & CABLE LUBRICANT         LOCTITE 12 OZ. AEROSOL         26           GEARGUARD         180KG/DRUM         4           GENERAL PURPOSE THINNER         GALLON			
ENDURATEX EP320         205LT/DM         4           ENDURATEX EP460         205LT/DM         7           ENDURATEX EP68         205LT/DM         29           ENDURATEX SYN EP150         206LT/DM         3           ENDURATEX SYN EP220         205LT/DM         34           ENDURATEX SYN EP320         205LT         7           ENDURATEX XL SYN BLEND 68/220         205LT         7           ESAB WELDING WIRE         0.045 (15 Kg/ROLL)         50           ESAB WELDING WIRE         0.062 (15 Kg/ROLL)         82           ESSO XDO 60         1100L/TOTE         0           EXTERIOR SEALANT MULCO         300ML BLUE SCOTIA         47           EXTERIOR SEALANT MULCO         300ML BLUE SCOTIA         47           EXTERIOR SEALANT MULCO         300ML CLEAR         48           FLOCULANT         25KG/BG 85016         1           FUNNEL         DYNALINE         9           GASKET ELIMINATOR 515         50ML SMALL TUBE         16           GASKET SEALANT IN TUBE         94           GEAR CHAIN & CABLE LUBRICANT         LOCTITE 12 OZ. AEROSOL         26           GEARGUARD         180KG/DRUM         4           GENERAL PURPOSE THINNER         GALLON         59 <td></td> <td></td> <td></td>			
ENDURATEX EP460         205LT/DM         7           ENDURATEX EP68         205LT/DM         29           ENDURATEX SYN EP150         205LT/DM         3           ENDURATEX SYN EP220         205LT/DM         34           ENDURATEX SYN EP320         205LT/DM         10           ENDURATEX XL SYN BLEND 68/220         205LT         7           ESAB WELDING WIRE         0.045 (15 Kg/ROLL)         50           ESAB WELDING WIRE         0.062 (15 Kg/ROLL)         82           ESSO XDO 60         1100L/TOTE         0           EXTENDED LIFE COOLANT -52         1040LT         123           EXTERIOR SEALANT MULCO         300ML BLUE SCOTIA         47           EXTERIOR SEALANT MULCO         300ML CLEAR         48           FLOCULANT         25KG/BG 85016         1           FUNNEL         DYNALINE         9           GASKET ELIMINATOR 515         50ML SMALL TUBE         16           GASKET MAKER HI-TEMP         80ML RED         5           GASKET SEALANT IN TUBE         94           GEAR CHAIN & CABLE LUBRICANT         LOCTITE 12 OZ. AEROSOL         26           GEAR GUARD         180KG/DRUM         4           GENERAL PURPOSE THINNER         GALLON         59			
ENDURATEX EP68         205LT/DM         29           ENDURATEX SYN EP150         205LT/DM         3           ENDURATEX SYN EP220         205LT/DM         34           ENDURATEX SYN EP320         205L/DM         10           ENDURATEX XL SYN BLEND 68/220         205LT         7           ESAB WELDING WIRE         0.045 (15 Kg/ROLL)         50           ESAB WELDING WIRE         0.062 (15 Kg/ROLL)         82           ESSO XDO 60         1100L/TOTE         0           EXTERIOR SEALANT MULCO         300ML BLUE SCOTIA         47           EXTERIOR SEALANT MULCO         300ML BLUE SCOTIA         47           EXTERIOR SEALANT MULCO         300ML CLEAR         48           FLOCULANT         25KG/BG 85016         1           FUNNEL         DYNALINE         9           GASKET ELIMINATOR 515         50ML SMALL TUBE         16           GASKET MAKER HI-TEMP         80ML RED         5           GASKET SEALANT IN TUBE         94           GEAR CHAIN & CABLE LUBRICANT         LOCTITE 12 OZ. AEROSOL         26           GEARGUARD         180KG/DRUM         4           GENERAL PURPOSE THINNER         GALLON         59           GLUE STICK         20G         23 <td></td> <td></td> <td></td>			
ENDURATEX SYN EP150         205LT/DM         34           ENDURATEX SYN EP220         205LT/DM         34           ENDURATEX SYN EP320         205L/DM         10           ENDURATEX XL SYN BLEND 68/220         205LT         7           ESAB WELDING WIRE         0.045 (15 Kg/ROLL)         50           ESAB WELDING WIRE         0.062 (15 Kg/ROLL)         82           ESSO XDO 60         1100L/TOTE         0           EXTENDED LIFE COOLANT -52         1040LT         123           EXTERIOR SEALANT MULCO         300ML BLUE SCOTIA         47           EXTERIOR SEALANT MULCO         300ML CLEAR         48           FLOCULANT         25KG/BG 85016         1           FUNNEL         DYNALINE         9           GASKET ELIMINATOR 515         50ML SMALL TUBE         16           GASKET MAKER HI-TEMP         80ML RED         5           GASKET SEALANT IN TUBE         94         66AR CHAIN & CABLE LUBRICANT         LOCTITE 12 OZ. AEROSOL         26           GEAR GUARD         180KG/DRUM         4         4         6ENERAL PURPOSE THINNER         GALLON         59           GLUE STICK         20G         23         6LUE STICK ENIUM         40G         7           GLYCEROL (VERLUBE)			
ENDURATEX SYN EP220         205LT/DM         34           ENDURATEX SYN EP320         205L/DM         10           ENDURATEX XL SYN BLEND 68/220         205LT         7           ESAB WELDING WIRE         0.045 (15 Kg/ROLL)         50           ESAB WELDING WIRE         0.062 (15 Kg/ROLL)         82           ESSO XDO 60         1100L/TOTE         0           EXTENDED LIFE COOLANT -52         1040LT         123           EXTERIOR SEALANT MULCO         300ML BLUE SCOTIA         47           EXTERIOR SEALANT MULCO         300ML CLEAR         48           FLOCULANT         25KG/BG 85016         1           FUNNEL         DYNALINE         9           GASKET ELIMINATOR 515         50ML SMALL TUBE         16           GASKET HI-TEMP         80ML RED         5           GASKET SEALANT IN TUBE         94           GEAR CHAIN & CABLE LUBRICANT         LOCTITE 12 OZ. AEROSOL         26           GEARGUARD         180KG/DRUM         4           GENERAL PURPOSE THINNER         GALLON         59           GLUE STICK         20G         23           GUE STICK ENIUM         40G         7           GLYCEROL (VERLUBE)         4LT/CONTAINER         1			
ENDURATEX SYN EP320         205L/DM         10           ENDURATEX XL SYN BLEND 68/220         205LT         7           ESAB WELDING WIRE         0.045 (15 Kg/ROLL)         50           ESAB WELDING WIRE         0.062 (15 Kg/ROLL)         82           ESSO XDO 60         1100L/TOTE         0           EXTENDED LIFE COOLANT -52         1040LT         123           EXTERIOR SEALANT MULCO         300ML BLUE SCOTIA         47           EXTERIOR SEALANT MULCO         300ML CLEAR         48           FLOCULANT         25KG/BG 85016         1           FUNNEL         DYNALINE         9           GASKET ELIMINATOR 515         50ML SMALL TUBE         16           GASKET MAKER HI-TEMP         80ML RED         5           GASKET SEALANT IN TUBE         94           GEAR CHAIN & CABLE LUBRICANT         LOCTITE 12 OZ. AEROSOL         26           GEARGUARD         180KG/DRUM         4           GENERAL PURPOSE THINNER         GALLON         59           GLUE STICK         20G         23           GLUE STICK ENIUM         40G         7           GLYCEROL (VERLUBE)         4LT/CONTAINER         1           GOLD SOLUTION STD         1000PPM         5			
ENDURATEX XL SYN BLEND 68/220         205LT         7           ESAB WELDING WIRE         0.045 (15 Kg/ROLL)         50           ESAB WELDING WIRE         0.062 (15 Kg/ROLL)         82           ESSO XDO 60         1100L/TOTE         0           EXTENDED LIFE COOLANT -52         1040LT         123           EXTERIOR SEALANT MULCO         300ML BLUE SCOTIA         47           EXTERIOR SEALANT MULCO         300ML CLEAR         48           FLOCULANT         25KG/BG 85016         1           FUNNEL         DYNALINE         9           GASKET ELIMINATOR 515         50ML SMALL TUBE         16           GASKET MAKER HI-TEMP         80ML RED         5           GASKET SEALANT IN TUBE         94         94           GEAR CHAIN & CABLE LUBRICANT         LOCTITE 12 OZ. AEROSOL         26           GEARGUARD         180KG/DRUM         4           GENERAL PURPOSE THINNER         GALLON         59           GLUE STICK         20G         23           GLUE STICK ENIUM         40G         7           GLYCEROL (VERLUBE)         4LT/CONTAINER         1           GOLD SOLUTION STD         1000PPM         5           GREASE EP-1         IN TUBE ULTRA DUTY         58 </td <td></td> <td></td> <td></td>			
ESAB WELDING WIRE         0.045 (15 Kg/ROLL)         50           ESAB WELDING WIRE         0.062 (15 Kg/ROLL)         82           ESSO XDO 60         1100L/TOTE         0           EXTENDED LIFE COOLANT -52         1040LT         123           EXTERIOR SEALANT MULCO         300ML BLUE SCOTIA         47           EXTERIOR SEALANT MULCO         300ML CLEAR         48           FLOCULANT         25KG/BG 85016         1           FUNNEL         DYNALINE         9           GASKET ELIMINATOR 515         50ML SMALL TUBE         16           GASKET MAKER HI-TEMP         80ML RED         5           GASKET SEALANT IN TUBE         94           GEAR CHAIN & CABLE LUBRICANT         LOCTITE 12 OZ. AEROSOL         26           GEARGUARD         180KG/DRUM         4           GENERAL PURPOSE THINNER         GALLON         59           GLUE STICK         20G         23           GLUE STICK ENIUM         40G         7           GLYCEROL (VERLUBE)         4LT/CONTAINER         1           GOLD SOLUTION STD         1000PPM         5           GREASE EP.         NLGI CHEVRON 6134 300GR         12           GREASE EP.         IN TUBE ULTRA DUTY         58 <tr< td=""><td></td><td></td><td></td></tr<>			
ESAB WELDING WIRE         0.062 (15 Kg/ROLL)         82           ESSO XDO 60         1100L/TOTE         0           EXTENDED LIFE COOLANT -52         1040LT         123           EXTERIOR SEALANT MULCO         300ML BLUE SCOTIA         47           EXTERIOR SEALANT MULCO         300ML CLEAR         48           FLOCULANT         25KG/BG 85016         1           FUNNEL         DYNALINE         9           GASKET ELIMINATOR 515         50ML SMALL TUBE         16           GASKET MAKER HI-TEMP         80ML RED         5           GASKET SEALANT IN TUBE         94         94           GEAR CHAIN & CABLE LUBRICANT         LOCTITE 12 OZ. AEROSOL         26           GEARGUARD         180KG/DRUM         4           GENERAL PURPOSE THINNER         GALLON         59           GLUE STICK         20G         23           GLUE STICK ENIUM         40G         7           GLYCEROL (VERLUBE)         4LT/CONTAINER         1           GOLD SOLUTION STD         1000PPM         5           GREASE EP-1         IN TUBE ULTRA DUTY         58           GREASE FOR COUPLING         PEERLESS XCG FLEX GREASE         90           GREASE TUBE         TRAMAC         0     <			
ESSO XDO 60         1100L/TOTE         0           EXTENDED LIFE COOLANT -52         1040LT         123           EXTERIOR SEALANT MULCO         300ML BLUE SCOTIA         47           EXTERIOR SEALANT MULCO         300ML CLEAR         48           FLOCULANT         25KG/BG 85016         1           FUNNEL         DYNALINE         9           GASKET ELIMINATOR 515         50ML SMALL TUBE         16           GASKET MAKER HI-TEMP         80ML RED         5           GASKET SEALANT IN TUBE         94           GEAR CHAIN & CABLE LUBRICANT         LOCTITE 12 OZ. AEROSOL         26           GEARGUARD         180KG/DRUM         4           GENERAL PURPOSE THINNER         GALLON         59           GLUE STICK         20G         23           GLUE STICK ENIUM         40G         7           GLYCEROL (VERLUBE)         4LT/CONTAINER         1           GOLD SOLUTION STD         1000PPM         5           GREASE EP-         NLGI CHEVRON 6134 300GR         12           GREASE EP-1         IN TUBE ULTRA DUTY         58           GREASE FOR COUPLING         PEERLESS XCG FLEX GREASE         90           GREASE TUBE         TRAMAC         0			
EXTENDED LIFE COOLANT -52		` ' '	
EXTERIOR SEALANT MULCO       300ML BLUE SCOTIA       47         EXTERIOR SEALANT MULCO       300ML CLEAR       48         FLOCULANT       25KG/BG 85016       1         FUNNEL       DYNALINE       9         GASKET ELIMINATOR 515       50ML SMALL TUBE       16         GASKET MAKER HI-TEMP       80ML RED       5         GASKET SEALANT IN TUBE       94         GEAR CHAIN & CABLE LUBRICANT       LOCTITE 12 OZ. AEROSOL       26         GEARGUARD       180KG/DRUM       4         GENERAL PURPOSE THINNER       GALLON       59         GLUE STICK       20G       23         GLUE STICK ENIUM       40G       7         GLYCEROL (VERLUBE)       4LT/CONTAINER       1         GOLD SOLUTION STD       1000PPM       5         GREASE EP.       NLGI CHEVRON 6134 300GR       12         GREASE EP-1       IN TUBE ULTRA DUTY       58         GREASE FOR COUPLING       PEERLESS XCG FLEX GREASE       90         GREASE TUBE       TRAMAC       0         GREASE TUBE KIT       GRACO FIREBALL 425 50:1       8         HAND CLEANER GRIME EATER       3.5LT       7			
EXTERIOR SEALANT MULCO         300ML CLEAR         48           FLOCULANT         25KG/BG 85016         1           FUNNEL         DYNALINE         9           GASKET ELIMINATOR 515         50ML SMALL TUBE         16           GASKET MAKER HI-TEMP         80ML RED         5           GASKET SEALANT IN TUBE         94           GEAR CHAIN & CABLE LUBRICANT         LOCTITE 12 OZ. AEROSOL         26           GEARGUARD         180KG/DRUM         4           GENERAL PURPOSE THINNER         GALLON         59           GLUE STICK         20G         23           GLUE STICK ENIUM         40G         7           GLYCEROL (VERLUBE)         4LT/CONTAINER         1           GOLD SOLUTION STD         1000PPM         5           GREASE EP.         NLGI CHEVRON 6134 300GR         12           GREASE EP-1         IN TUBE ULTRA DUTY         58           GREASE FOR COUPLING         PEERLESS XCG FLEX GREASE         90           GREASE TUBE         TRAMAC         0           GREASE TUBE KIT         GRACO FIREBALL 425 50:1         8           HAND CLEANER GRIME EATER         3.5LT         7			
FLOCULANT         25KG/BG 85016         1           FUNNEL         DYNALINE         9           GASKET ELIMINATOR 515         50ML SMALL TUBE         16           GASKET MAKER HI-TEMP         80ML RED         5           GASKET SEALANT IN TUBE         94           GEAR CHAIN & CABLE LUBRICANT         LOCTITE 12 OZ. AEROSOL         26           GEARGUARD         180KG/DRUM         4           GENERAL PURPOSE THINNER         GALLON         59           GLUE STICK         20G         23           GLUE STICK ENIUM         40G         7           GLYCEROL (VERLUBE)         4LT/CONTAINER         1           GOLD SOLUTION STD         1000PPM         5           GREASE EP.         NLGI CHEVRON 6134 300GR         12           GREASE EP-1         IN TUBE ULTRA DUTY         58           GREASE FOR COUPLING         PEERLESS XCG FLEX GREASE         90           GREASE TUBE         TRAMAC         0           GREASE TUBE KIT         GRACO FIREBALL 425 50:1         8           HAND CLEANER GRIME EATER         3.5LT         7			
FUNNEL         DYNALINE         9           GASKET ELIMINATOR 515         50ML SMALL TUBE         16           GASKET MAKER HI-TEMP         80ML RED         5           GASKET SEALANT IN TUBE         94           GEAR CHAIN & CABLE LUBRICANT         LOCTITE 12 OZ. AEROSOL         26           GEARGUARD         180KG/DRUM         4           GENERAL PURPOSE THINNER         GALLON         59           GLUE STICK         20G         23           GLUE STICK ENIUM         40G         7           GLYCEROL (VERLUBE)         4LT/CONTAINER         1           GOLD SOLUTION STD         1000PPM         5           GREASE EP.         NLGI CHEVRON 6134 300GR         12           GREASE FOR COUPLING         PEERLESS XCG FLEX GREASE         90           GREASE TUBE         TRAMAC         0           GREASE TUBE KIT         GRACO FIREBALL 425 50:1         8           HAND CLEANER GRIME EATER         3.5LT         7			
GASKET ELIMINATOR 515         50ML SMALL TUBE         16           GASKET MAKER HI-TEMP         80ML RED         5           GASKET SEALANT IN TUBE         94           GEAR CHAIN & CABLE LUBRICANT         LOCTITE 12 OZ. AEROSOL         26           GEARGUARD         180KG/DRUM         4           GENERAL PURPOSE THINNER         GALLON         59           GLUE STICK         20G         23           GLUE STICK ENIUM         40G         7           GLYCEROL (VERLUBE)         4LT/CONTAINER         1           GOLD SOLUTION STD         1000PPM         5           GREASE EP.         NLGI CHEVRON 6134 300GR         12           GREASE EP.1         IN TUBE ULTRA DUTY         58           GREASE FOR COUPLING         PEERLESS XCG FLEX GREASE         90           GREASE TUBE         TRAMAC         0           GREASE TUBE KIT         GRACO FIREBALL 425 50:1         8           HAND CLEANER GRIME EATER         3.5LT         7			
GASKET MAKER HI-TEMP         80ML RED         5           GASKET SEALANT IN TUBE         94           GEAR CHAIN & CABLE LUBRICANT         LOCTITE 12 OZ. AEROSOL         26           GEARGUARD         180KG/DRUM         4           GENERAL PURPOSE THINNER         GALLON         59           GLUE STICK         20G         23           GLUE STICK ENIUM         40G         7           GLYCEROL (VERLUBE)         4LT/CONTAINER         1           GOLD SOLUTION STD         1000PPM         5           GREASE EP.         NLGI CHEVRON 6134 300GR         12           GREASE FOR COUPLING         PEERLESS XCG FLEX GREASE         90           GREASE TUBE         TRAMAC         0           GREASE TUBE KIT         GRACO FIREBALL 425 50:1         8           HAND CLEANER GRIME EATER         3.5LT         7			
GASKET SEALANT IN TUBE GEAR CHAIN & CABLE LUBRICANT GEARGUARD 180KG/DRUM 4 GENERAL PURPOSE THINNER GLUE STICK 20G 23 GLUE STICK ENIUM 40G 7 GLYCEROL (VERLUBE) 4LT/CONTAINER 1 GOLD SOLUTION STD 1000PPM 5 GREASE EP. NLGI CHEVRON 6134 300GR 12 GREASE EP-1 IN TUBE ULTRA DUTY 58 GREASE TUBE GREASE TUBE TRAMAC 0 GREASE TUBE KIT GRACO FIREBALL 425 50:1 8 HAND CLEANER GRIME EATER 26 10 10 10 10 10 10 10 10 10 10 10 10 10			
GEAR CHAIN & CABLE LUBRICANT         LOCTITE 12 OZ. AEROSOL         26           GEARGUARD         180KG/DRUM         4           GENERAL PURPOSE THINNER         GALLON         59           GLUE STICK         20G         23           GLUE STICK ENIUM         40G         7           GLYCEROL (VERLUBE)         4LT/CONTAINER         1           GOLD SOLUTION STD         1000PPM         5           GREASE EP.         NLGI CHEVRON 6134 300GR         12           GREASE EP-1         IN TUBE ULTRA DUTY         58           GREASE FOR COUPLING         PEERLESS XCG FLEX GREASE         90           GREASE TUBE         TRAMAC         0           GREASE TUBE KIT         GRACO FIREBALL 425 50:1         8           HAND CLEANER GRIME EATER         3.5LT         7		80ML RED	
GEARGUARD         180KG/DRUM         4           GENERAL PURPOSE THINNER         GALLON         59           GLUE STICK         20G         23           GLUE STICK ENIUM         40G         7           GLYCEROL (VERLUBE)         4LT/CONTAINER         1           GOLD SOLUTION STD         1000PPM         5           GREASE EP.         NLGI CHEVRON 6134 300GR         12           GREASE EP-1         IN TUBE ULTRA DUTY         58           GREASE FOR COUPLING         PEERLESS XCG FLEX GREASE         90           GREASE TUBE         TRAMAC         0           GREASE TUBE KIT         GRACO FIREBALL 425 50:1         8           HAND CLEANER GRIME EATER         3.5LT         7			
GENERAL PURPOSE THINNER         GALLON         59           GLUE STICK         20G         23           GLUE STICK ENIUM         40G         7           GLYCEROL (VERLUBE)         4LT/CONTAINER         1           GOLD SOLUTION STD         1000PPM         5           GREASE EP.         NLGI CHEVRON 6134 300GR         12           GREASE EP-1         IN TUBE ULTRA DUTY         58           GREASE FOR COUPLING         PEERLESS XCG FLEX GREASE         90           GREASE TUBE         TRAMAC         0           GREASE TUBE KIT         GRACO FIREBALL 425 50:1         8           HAND CLEANER GRIME EATER         3.5LT         7			
GLUE STICK         20G         23           GLUE STICK ENIUM         40G         7           GLYCEROL (VERLUBE)         4LT/CONTAINER         1           GOLD SOLUTION STD         1000PPM         5           GREASE EP.         NLGI CHEVRON 6134 300GR         12           GREASE EP-1         IN TUBE ULTRA DUTY         58           GREASE FOR COUPLING         PEERLESS XCG FLEX GREASE         90           GREASE TUBE         TRAMAC         0           GREASE TUBE KIT         GRACO FIREBALL 425 50:1         8           HAND CLEANER GRIME EATER         3.5LT         7			
GLUE STICK ENIUM         40G         7           GLYCEROL (VERLUBE)         4LT/CONTAINER         1           GOLD SOLUTION STD         1000PPM         5           GREASE EP.         NLGI CHEVRON 6134 300GR         12           GREASE EP-1         IN TUBE ULTRA DUTY         58           GREASE FOR COUPLING         PEERLESS XCG FLEX GREASE         90           GREASE TUBE         TRAMAC         0           GREASE TUBE KIT         GRACO FIREBALL 425 50:1         8           HAND CLEANER GRIME EATER         3.5LT         7			
GLYCEROL (VERLUBE)         4LT/CONTAINER         1           GOLD SOLUTION STD         1000PPM         5           GREASE EP.         NLGI CHEVRON 6134 300GR         12           GREASE EP-1         IN TUBE ULTRA DUTY         58           GREASE FOR COUPLING         PEERLESS XCG FLEX GREASE         90           GREASE TUBE         TRAMAC         0           GREASE TUBE KIT         GRACO FIREBALL 425 50:1         8           HAND CLEANER GRIME EATER         3.5LT         7			
GOLD SOLUTION STD         1000PPM         5           GREASE EP.         NLGI CHEVRON 6134 300GR         12           GREASE EP-1         IN TUBE ULTRA DUTY         58           GREASE FOR COUPLING         PEERLESS XCG FLEX GREASE         90           GREASE TUBE         TRAMAC         0           GREASE TUBE KIT         GRACO FIREBALL 425 50:1         8           HAND CLEANER GRIME EATER         3.5LT         7			
GREASE EP.  GREASE EP-1  GREASE FOR COUPLING  GREASE TUBE  GREASE TUBE KIT  HAND CLEANER GRIME EATER  NLGI CHEVRON 6134 300GR  PEERLESS XCG FLEX GREASE  90  TRAMAC  GRACO FIREBALL 425 50:1  8	, ,		
GREASE EP-1 IN TUBE ULTRA DUTY 58 GREASE FOR COUPLING PEERLESS XCG FLEX GREASE 90 GREASE TUBE TRAMAC 0 GREASE TUBE KIT GRACO FIREBALL 425 50:1 8 HAND CLEANER GRIME EATER 3.5LT 7			
GREASE FOR COUPLING PEERLESS XCG FLEX GREASE 90 GREASE TUBE TRAMAC 0 GREASE TUBE KIT GRACO FIREBALL 425 50:1 HAND CLEANER GRIME EATER 3.5LT 7			12
GREASE TUBE TRAMAC 0 GREASE TUBE KIT GRACO FIREBALL 425 50:1 8 HAND CLEANER GRIME EATER 3.5LT 7		IN TUBE ULTRA DUTY	58
GREASE TUBE KIT GRACO FIREBALL 425 50:1 8 HAND CLEANER GRIME EATER 3.5LT 7	GREASE FOR COUPLING	PEERLESS XCG FLEX GREASE	90
HAND CLEANER GRIME EATER 3.5LT 7	GREASE TUBE	TRAMAC	0
	GREASE TUBE KIT	GRACO FIREBALL 425 50:1	8
HARD FACING ELECTRODE 3/16" 20KG/CS 0	HAND CLEANER GRIME EATER	3.5LT	7
	HARD FACING ELECTRODE	3/16" 20KG/CS	0

HELISTAR CS GAS		30
HELIUM	SIZE T CYLINDERS	28
HIGH PRESSURE NITROGEN	SIZE T CYLINDERS	25
HIGH TEMPERATURE CONTROLLER	OIZE TOTEINDERO	1
HIGH VACUUM GREASE		4
HYD ARCTIC OIL	FOR DM45	2
HYDRAULIC COOLER	THERMAL TRANSFER	1
HYDREX AW 46	HYDRAULIC OIL 20LT/PAIL	6
HYDREX EXTREME HYDRAULIC OIL	205LT	10
HYDREX MV ARCTIC 15	205LT	24
HYDREX MV22	20LT/PAIL	40
HYDREX MV36	20LT/PAIL	40
HYDREX MV60	20LT/PAIL	32
HYDREX XV ALL SEASON	1040LT IBC	0
HYDROCHLORIC ACID	240KG 20BE 32%	396
HYDROCHLORIC ACID REAGENT GRAD	2.5LT 4/CS	52
ICE FREE AIR TOOL OIL	1LT WHEEL & ACCESSORIES	0
INO FOAM SOAP	6 X 1LT	160
INT/EXT BLUE PAINT	AGNICO DEVOE	17
IRON ACCELERATOR		89
J-512 FINAL STEP/SANITIZER	4 X 1.89LB BY CS	15
JAVELISANT DIBAC	20LT	12
JERRYCAN GAS	20LT	30
KEEN-FLO	BRAKE & PARTS CLEANER 4LT	20
KIDDY APC WET CHEMICAL AGENT	MODEL # WHDR-125	2
KIDDY APC WET CHEMICAL AGENT	MODEL #: WHDR-600	2
KVS	20G/PKG	2
LAUNCH 6GL2 LIQUID SOUR	18.9LT	28
LEAD BULLION MOLD	1000 OZ	20
LEAD NITRATE	25KG 99% MIN	2730
LEAD NITRATE	1000 KG	138
LEPAGE BLUE CONTACT CEMENT	3.8L	0
LITHARGE GOLD FREE	25KG	2
LOCTITE 290	50ML GREEN	4
LOCTITE 510 GASKET ELIMINATOR	50ML	12
LOCTITE SUPER GLUE	SUPER GLUE 495	69
LOCTITE THREADLOCKER 242 BLUE	REMOVABLE BOT 250ML	7
LOW COOLANT SEN	INCINIOVABLE BOT 250IVIL	2
LUBRICANT	5 GALLON	2
LUBRICANT OIL WD 40	AEROSOL	2
LUBRICANT OIL WD40	4LT	24
LUBRICANT SUPER PENETRATING	PL-100 350G 12/CS	20
LYSOL TOILET CLEANER		_
	710ML	1
MAGIC BOND EPOXY STICK		6
MAGLITE RECHARGEABLE BATTERY	4 LITED CONTENIANT	10
MERCON SP TRANSMISSION OIL	1 LITER CONTENANT	2070
METABISULFITE	97% W	1046
METABISULFITE	97% W 907.19KG	389
METABISULFITE	97% W 1200KG/BAG	51
METABISULFITE	97% W 1360KG/BAG	80
MILL PERSE 813	SCALE CONTROL 200LT	0
MILL PERSE 813	SCALE CONTROL 1000LT TOTE	34
MOBILE SHC 10/24	20LT COMPRESSOR OIL	4
MOBILITH	GREASE SHC100	10
MOBILTAC 325NC	205L/DM	1

NEW FLUX NICKEL ANTI-SEIZE NICKEL ANTI-SEIZE NICKEL ANTI-SEIZE NICKEL ANTI-SEIZE NITRIC ACID 67% 193LT/DM 467 NITRIC ACID REAGENT GRADE 2.5LT 4/CS NITRIC ACID REAGENT GRADE 2.5LT 4/CS NITRIC ACID REAGENT GRADE 2.5LT 4/CS NITRO CARTRIDGE FOR HVY EQUIP FIRE SUPPRESSION 4 NITROGEN PPLOT CYLINDER KIT FOR HVY EQUIP FIRE SUPPRESSION 4 NITROGEN PPL-8 SIZE T CYLINDERS 25 NU-BIO SCRUB NU-ACTION-3 4LT 20 NU-TRAP 20LT 14 OIL ADDITIVE 301-A 0IL ADDITIVE 301-A 0IL COOLER 0IL RALUBE 40 1040 LITTER TOTE IBC 40 OXYGEN SIZE K CYLINDERS 100 OXYGEN LABORATORY GRADE HYDROCARBON FREE SIZE K 67 PAINT 1GAL BRIENT YELLOW 25 PAINT AERVOE INVERTED 0RANGE GLO 12CN/BX 78 PAINT BRUSH ANGLE 2 1/2" 100 PAINT DEVOE 11GAL SAFETY BLUE H19 PAINT BRUSH ANGLE 2 1/2" 100 PAINT GEVE PAINT GEVE PAINT GEVE PAINT REVOE INVERTED 11GAL SAFETY BLUE H19 PAINT BUSH 12 1/2' 196 PAINT BRUSH ANGLE 2 1/2' PAINT TOEVOE 11GAL SAFETY BLUE H19 PAINT TOEVOE 11GAL SAFETY BLUE H19 PAINT TOEVOE 11GAL SAFETY BLUE 11D PAINT TOEVOE 11GAL SAFETY BLUE 11D PAINT RUST-OLEUM 140Z FLUO GREEN 64 PAINT RUST-OLEUM 140	MOBILTAC 375 NC	17.2KG PAILS	24
NICKEL ANTI-SEIZE			
NITRIC ACID 67%   193LT/DM   467		,	
NITRIC ACID REAGENT GRADE   2.5LT 4/CS   23     NITRO CARTRIDGE   FOR HVY EQUIP FIRE SUPPRESSION   14     NITROGEN PILOT CYLINDER KIT   FOR HVY EQUIP FIRE SUPPRESSION   14     NITROGEN PP4.8   SIZE T CYLINDERS   25     NU-ACTION-3   4LT   76     NU-BIO SCRUB   4LT   55     NU-KLEENSMELL   4LT   20     NU-TRAP   20LT   14     OIL ADDITIVE   301-A   20     OIL COOLER   0     OIL FOLAIN LIGHT   WINTER -40°C RESISTANT   20     OIL MOTOR DRILL CARE   20 LITER   2     OIL MOTOR DRILL CARE   20 LITER   2     OIL MOTOR DRILL CARE   20 LITER   2     OIL MOTOR DRILL CARE   312E D CYLINDERS   286     OXYGEN GAS40   SIZE D CYLINDERS   10     OXYGEN LABORATORY GRADE   HYDROCARBON FREE SIZE K   67     PAINT AERVOE INVERTED   ORANGE GLO 12CN/BX   158     PAINT AERVOE INVERTED   GREEN GLO 12 CAN/BX   158     PAINT BRUSH   2 1/2"   196     PAINT BRUSH ANGLE   2 1/2"   196     PAINT BRUSH ANGLE   2 1/2"   196     PAINT DEVOE   1GAL SAFETY BLUE H19   54     PAINT DEVOE RUST-OLEUM   1GAL SILVER GRAY   47     PAINT EXTERIOR LATEX   1GAL SAFETY BLUE   22     PAINT EXTERIOR LATEX   1GAL SAFETY BLUE   22     PAINT RUST-OLEUM   1GAL SILVER GRAY   47     PAINT PRUST-OLEUM   1GAL SILVER GRAY   47     PAINT PRUST-OLEUM   1GAL SATERY YELLOW EPOXY   13     PAINT PRUST-OLEUM   1GAL SATERY YELLOW EPOXY   13     PAINT PRUST-OLEUM   1402 FLUO GREEN   64     PAINT RUST-OLEUM   1402 FLUO GREEN   64     PAINT PRUST-OLEUM   1402 FLUO GRANGE   241     PAINT PRUST-OLEUM   1402 FLUO GREEN   64     PAINT PRUST-OLEUM   1402 FLUO GREEN   64     PAINT PRUST-OLEUM   1402 FLUO GREEN   64     PAINT PRUST-OLEUM   1402 FLUO GREEN   64			
NITRO CARTRIDGE			
NITROGEN PILOT CYLINDER KIT			
NITROGEN PP4.8   SIZE T CYLINDERS   25			
NU-ACTION-3  ALT  NU-ACTION-3  ALT  NU-ACTION-3  ALT  NU-KLEENSMELL  4LT  20  NU-TRAP  20LT  14  OIL ADDITIVE  301-A  20LC  OIL COOLER  COOLER  OIL COOLER  OIL COOLER  OIL COOLER  OIL F/ CHAIN LIGHT  OIL MOTOR DRILL CARE  20 LITER  21  OIL RALUBE 40  OXYGEN  SIZE K CYLINDERS  286  OXYGEN CGA540  SIZE K CYLINDERS  20  OXYGEN CGA540  SIZE K CYLINDERS  10  OXYGEN LABORATORY GRADE  HYDROCARBON FREE SIZE K  67  PAINT AERVOE INVERTED  ORANGE GLO 12CN/BX  158  PAINT AERVOE INVERTED  ORANGE GLO 12CN/BX  78  PAINT BRUSH ANGLE  21/2'  100  PAINT BRUSH ANGLE  21/2'  100  PAINT DEVOE  1GAL SAFETY BLUE H19  54  PAINT OEVOE  1GAL SAFETY BLUE H99  FAINT GREY  PAINT GREY  ATLAS-COPCO  15  PAINT RUST-OLEUM  140Z FLUO GREEN  64  PAINT RUST-OLEUM  140Z FLUO GRANGE  140  PERMATEX ORING&RUBBER ADHESIVE  PETROSOL 3139  PERCISION SYNTHETIC EMB  TUBE  90  PRECISION SYNTHETI			
NU-BIO SCRUB			
NU-KLEENSMELL         4LT         20           NU-TRAP         20LT         14           OIL ADDITIVE         301-A         20           OIL COOLER         COOLER         4           OIL COOLER         0         0           OIL COOLER         0         0           OIL COOLER         0         2           OIL FALUBE 40         1040 LITER         20           OIL RALUBE 40         1040 LITER TOTE IBC         40           OXYGEN         SIZE K CYLINDERS         286           OXYGEN CGA540         SIZE K CYLINDERS         286           OXYGEN LABORATORY GRADE         HYDROCARBON FREE SIZE K         67           PAINT         1GAL BRIGHT YELLOW         25           PAINT AERVOE INVERTED         ORANGE GLO 12CN/BX         158           PAINT AERVOE INVERTED         GREEN GLO 12 CAN/BX         158           PAINT BRUSH         2 1/2"         196           PAINT BRUSH ANGLE         2 1/2"         196           PAINT DEVOE         1GAL SAFETY BLUE H19         54           PAINT DEVOE         1GAL SAFETY YELLOW PEOXY         13           PAINT TORY         47         14           PAINT TORY         47         14			
NU-TRAP         20LT         14           OIL ADDITIVE         301-A         20           OIL COOLER         COOLER         4           OIL COOLER         0         0           OIL COOLER         0         0           OIL COOLER         0         0           OIL F/ CHAIN LIGHT         WINTER -40°C RESISTANT         20           OIL MOTOR DRILL CARE         20 LITER         2           OIL MOTOR DRILL CARE         20 LITER         2           OIL RALUBE 40         1040 LITER TOTE IBC         40           OXYGEN CGA540         SIZE C CYLINDERS         286           OXYGEN LABORATORY GRADE         HYDROCARBON FREE SIZE K         67           PAINT         1GAL BRIGHT YELLOW         25           PAINT AERVOE INVERTED         ORANGE GLO 12 CAN/BX         158           PAINT AERVOE INVERTED         GREEN GLO 12 CAN/BX         78           PAINT BRUSH         2 1/2"         196           PAINT BRUSH         2 1/2"         196           PAINT BRUSH ANGLE         2 1/2"         196           PAINT DEVOE         1GAL SAFETY BLUE H19         54           PAINT DEVOE         1GAL SAFETY YELLOW EPOXY         13           PAINT EXTERIOR LA			
OIL ADDITIVE         301-A         20           OIL COOLER         4           OIL COOLER         0           OIL COOLER         0           OIL COOLER         0           OIL COOLER         2           OIL COOLER         2           OIL COOLER         2           OIL COOLER         20           OIL FORD CASA         2           OIL COOLER         20           OIL FORD CASA         20           OIL ROTOR DRILL CARE         20           OIL RALUBE 40         1040 LITER TOTE IBC         40           OXYGEN CASA540         SIZE D CYLINDERS         286           OXYGEN LABORATORY GRADE         HYDROCARBON FREE SIZE K         67           PAINT         IGAL BRIGHT YELLOW         25           PAINT BRUSH         02 1/2"         10           OXYGEN LABORATORY GRADE         HYDROCARBON FREE SIZE K         67           PAINT BRUSH         02 1/2"         158           PAINT ALERVOE INVERTED         GREEN GLO 12 CAN/BX         78           PAINT BRUSH         2 1/2"         196           PAINT BRUSH ANGLE         2 1/2"         196           PAINT BRUSH ANGLE         2 1/2"         100			
OIL COOLER         COOLER         4           OIL COOLER         0         0           OIL COOLER         2         0           OIL F/ CHAIN LIGHT         WINTER -40°C RESISTANT         20           OIL MALUBE 40         1040 LITER TOTE IBC         40           OL RALUBE 40         1040 LITER TOTE IBC         40           OXYGEN GA540         SIZE K CYLINDERS         10           OXYGEN LABORATORY GRADE         HYDROCARBON FREE SIZE K         67           PAINT         1GAL BRIGHT YELLOW         25           PAINT AERVOE INVERTED         ORANGE GLO 12CN/BX         158           PAINT BRUSH INVERTED         GREEN GLO 12 CAN/BX         78           PAINT BRUSH ANGLE         2 1/2"         196           PAINT DEVOE         1GAL SAFETY BLUE H19         54           PAINT DEVOE         1GAL SAFETY BLUE H19         54           PAINT DEVOE RUST-OLEUM         1GAL SAFETY BLUE H19         47           PAINT DEVOE RUST-OLEUM         1GAL SAFETY BLUE         22           PAINT PIZZAZZ ENAMEL ALKYD         1GAL SAFETY BLUE         22           PAINT RUST-OLEUM         1402 SAFETY BLUE         22           PAINT RUST-OLEUM         1402 SAFETY BLUE         22           PAINT RUST-O			
OIL COOLER         0           OIL COOLER         2           OIL F/ CHAIN LIGHT         WINTER -40°C RESISTANT         2           OIL MOTOR DRILL CARE         20 LITER         2           OIL MOTOR DRILL CARE         20 LITER TOTE IBC         40           OXYGEN CBA540         SIZE K CYLINDERS         286           OXYGEN LABORATORY GRADE         HYDROCARBON FREE SIZE K         67           PAINT         1GAL BRIGHT YELLOW         25           PAINT AERVOE INVERTED         ORANGE GLO 12CN/BX         158           PAINT AERVOE INVERTED         GREEN GLO 12 CAN/BX         78           PAINT BRUSH         2 1/2°         196           PAINT BRUSH ANGLE         2 1/2°         196           PAINT BRUSH ANGLE         2 1/2°         196           PAINT DEVOE         1GAL SAFETY BLUE H19         54           PAINT DEVOE         1GAL SAFETY YELLOW EPOXY         13           PAINT DEVOE RUST-OLEUM         1GAL SAFETY BLUE         22           PAINT GREY         ATLAS-COPCO         15           PAINT RUST-OLEUM         140.2 SAFETY YELLOW         2           PAINT RUST-OLEUM         140.2 FLUO GREEN         64           PAINT RUST-OLEUM         140.2 FLUO GREEN         64			
OIL COOLER         2           OIL F/ CHAIN LIGHT         WINTER -40°C RESISTANT         20           OIL MOTOR DRILL CARE         20 LITER         2           OIL RALUBE 40         1040 LITER TOTE IBC         40           OXYGEN         SIZE K CYLINDERS         286           OXYGEN CGA540         SIZE C OYLINDERS         10           OXYGEN LABORATORY GRADE         HYDROCARBON FREE SIZE K         67           PAINT         1GAL BRIGHT YELLOW         25           PAINT AERVOE INVERTED         ORANGE GLO 12CN/BX         158           PAINT AERVOE INVERTED         GREEN GLO 12 CAN/BX         78           PAINT BRUSH         2 1/2"         196           PAINT BRUSH ANGLE         2 1/2"         100           PAINT BRUSH ANGLE         2 1/2"         100           PAINT DEVOE         1GAL SAFETY BLUE H19         54           PAINT DEVOE         1GAL SAFETY YELLOW EPOXY         13           PAINT DEVOE RUST-OLEUM         1GAL SAFETY YELLOW EPOXY         13           PAINT RUST-OLEUM         1GAL SAFETY BLUE         22           PAINT RUST-OLEUM         1402 FLUO GREEN         64           PAINT RUST-OLEUM         1402 FLUO GREEN         64           PAINT YELLOW         ATLAS		COOLER	
OIL F/ CHAIN LIGHT         WINTER -40°C RESISTANT         20           OIL MOTOR DRILL CARE         20 LITER         2           OIL RALUBE 40         1040 LITER TOTE IBC         40           OXYGEN         SIZE K CYLINDERS         286           OXYGEN CGA540         SIZE D CYLINDERS         10           OXYGEN LABORATORY GRADE         HYDROCARBON FREE SIZE K         67           PAINT         1GAL BRIGHT YELLOW         25           PAINT AERVOE INVERTED         ORANGE GLO 12 CAN/BX         158           PAINT BRUSH         2 1/2"         196           PAINT BRUSH ANGLE         2 1/2"         196           PAINT DEVOE         1GAL SAFETY BLUE H19         54           PAINT DEVOE         1GAL SAFETY YELLOW EPOXY         13           PAINT DEVOE RUST-OLEUM         1GAL SAFETY BUE         22           PAINT GREY         ATLAS-COPCO         15           PAINT PIZZAZZ ENAMEL ALKYD         1GAL SAFETY BUE         22           PAINT RUST-OLEUM         140Z FLUO GRANGE         241           PAINT RUST-OLEUM         140Z FLUO GRANGE         241           PAINT RUST-OLEUM         140Z FLUO GRANGE         241           PAINT RUST-OLEUM         140Z FLUO ORANGE         241           <			
OIL MOTOR DRILL CARE         20 LITER         2           OIL RALUBE 40         1040 LITER TOTE IBC         40           OXYGEN         SIZE K CYLINDERS         286           OXYGEN CGA540         SIZE D CYLINDERS         10           OXYGEN LABORATORY GRADE         HYDROCARBON FREE SIZE K         67           PAINT         1GAL BRIGHT YELLOW         25           PAINT AERVOE INVERTED         ORANGE GLO 12 CN/BX         158           PAINT BRUSH         2 1/2"         196           PAINT BRUSH ANGLE         2 1/2"         196           PAINT BRUSH ANGLE         2 1/2"         196           PAINT DEVOE         1GAL SAFETY BLUE H19         54           PAINT DEVOE         1GAL SAFETY YELLOW EPOXY         13           PAINT DEVOE RUST-OLEUM         1GAL SAFETY BUE         22           PAINT EXTERIOR LATEX         1GAL SAFETY BUE         22           PAINT PIZZAZZ ENAMEL ALKYD         1GAL SATURN YELLOW         2           PAINT RUST-OLEUM         140Z FLUO GREEN         64           PAINT YELLOW         ATLAS-COPCO         12           PC ATF D3M         205LT/DM         5           PEERLESS LLG GREASE         TUBE         140           PEFRESOL 3139         205L			_
OIL RALUBE 40         1040 LITER TOTE IBC         40           OXYGEN         SIZE K CYLINDERS         286           OXYGEN CGA540         SIZE D CYLINDERS         10           OXYGEN LABORATORY GRADE         HYDROCARBON FREE SIZE K         67           PAINT         1GAL BRIGHT YELLOW         25           PAINT AERVOE INVERTED         ORANGE GLO 12 CN/BX         158           PAINT BRUSH INVERTED         GREEN GLO 12 CAN/BX         78           PAINT BRUSH ANGLE         2 1/2"         196           PAINT DEVOE         1GAL SAFETY BLUE H19         54           PAINT DEVOE         1GAL SAFETY YELLOW EPOXY         13           PAINT DEVOE RUST-OLEUM         1GAL SILVER GRAY         47           PAINT EXTERIOR LATEX         1GAL SAFETY BLUE         22           PAINT EXTERIOR LATEX         1GAL SAFETY BLUE         22           PAINT PIZZAZZ ENAMEL ALKYD         1GAL SAFETY BLUE         22           PAINT RUST-OLEUM         140Z FLUO GREEN         64			
OXYGEN         SIZE K CYLINDERS         286           OXYGEN CGA540         SIZE D CYLINDERS         10           OXYGEN LABORATORY GRADE         HYDROCARBON FREE SIZE K         67           PAINT         1GAL BRIGHT YELLOW         25           PAINT AERVOE INVERTED         ORANGE GLO 12 CAN/BX         158           PAINT BRUSH         2 1/2"         196           PAINT BRUSH ANGLE         2 1/2"         100           PAINT DEVOE         1GAL SAFETY BLUE H19         54           PAINT DEVOE         1GAL SAFETY YELLOW EPOXY         13           PAINT DEVOE RUST-OLEUM         1GAL SAFETY YELLOW EPOXY         13           PAINT DEVOE RUST-OLEUM         1GAL SAFETY BLUE         22           PAINT GREY         ATLAS-COPCO         15           PAINT PIZZAZZ ENAMEL ALKYD         1GAL SATUR YELLOW         2           PAINT RUST-OLEUM         140Z FLUO GREEN         64           PAINT RUST-OLEUM         140Z FLUO GREEN         64           PAINT YELLOW         2         205LT/DM         5           PC ATF D3M         205LT/DM         5           PC ATF D3M         205LT/DM         5           PERMATEX ORING&RUBBER ADHESIVE         14           PERMATEX ORING&RUBBER ADHESIVE <td></td> <td></td> <td></td>			
OXYGEN CGA540         SIZE D CYLINDERS         10           OXYGEN LABORATORY GRADE         HYDROCARBON FREE SIZE K         67           PAINT         1 GAL BRIGHT YELLOW         25           PAINT AERVOE INVERTED         ORANGE GLO 12 CAN/BX         158           PAINT AERVOE INVERTED         GREEN GLO 12 CAN/BX         78           PAINT BRUSH         2 1/2"         196           PAINT BRUSH ANGLE         2 1/2"         100           PAINT DEVOE         1 GAL SAFETY BLUE H19         54           PAINT DEVOE         1 GAL SAFETY YELLOW EPOXY         13           PAINT DEVOE RUST-OLEUM         1 GAL SAFETY BLUE         22           PAINT EXTERIOR LATEX         1 GAL SAFETY BLUE         22           PAINT EXTERIOR LATEX         1 GAL SAFETY BLUE         22           PAINT GREY         ATLAS-COPCO         15           PAINT PIZZAZZ ENAMEL ALKYD         1 GAL SAFURY YELLOW         2           PAINT RUST-OLEUM         1 402 FLUO GREEN         64			
OXYGEN LABORATORY GRADE         HYDROCARBON FREE SIZE K         67           PAINT         1GAL BRIGHT YELLOW         25           PAINT AERVOE INVERTED         ORANGE GLO 12CN/BX         158           PAINT AERVOE INVERTED         GREEN GLO 12 CAN/BX         78           PAINT BRUSH         2 1/2"         196           PAINT BRUSH ANGLE         2 1/2"         100           PAINT DEVOE         1GAL SAFETY BLUE H19         54           PAINT DEVOE         1GAL SAFETY YELLOW EPOXY         13           PAINT DEVOE RUST-OLEUM         1GAL SAFETY BLUE         22           PAINT EXTERIOR LATEX         1GAL SAFETY BLUE         22           PAINT GREY         ATLAS-COPCO         15           PAINT GREY         ATLAS-COPCO         15           PAINT RUST-OLEUM         140Z FLUO GREEN         64           PAINT YELLOW         ATLAS-COPCO         12           PAINT YELLOW         ATLAS-COPCO         12           PEC ATF D3M         20SLT/DM         5           PEERLESS LLG GREASE         TUBE         140           PEKNATEX ORING&RUBBER ADHESIVE         11           PETROSOL 3139         20SLT         1           PH 4.01 SOLUTION         HANNA INSTRUMENT PH TESTER <td< td=""><td></td><td></td><td></td></td<>			
PAINT         1GAL BRIGHT YELLOW         25           PAINT AERVOE INVERTED         ORANGE GLO 12 CN/BX         158           PAINT AERVOE INVERTED         GREEN GLO 12 CAN/BX         78           PAINT BRUSH         2 1/2"         196           PAINT BRUSH ANGLE         2 1/2"         100           PAINT DEVOE         1GAL SAFETY BLUE H19         54           PAINT DEVOE         1GAL SAFETY YELLOW EPOXY         13           PAINT DEVOE RUST-OLEUM         1GAL SAFETY BLUE         22           PAINT DEVOE LATEX         1GAL SAFETY BLUE         22           PAINT GREY         ATLAS-COPCO         15           PAINT PIZZAZZ ENAMEL ALKYD         1GAL SATURN YELLOW         2           PAINT RUST-OLEUM         140Z FLUO GREEN         64           PAINT YELLOW         ATLAS-COPCO         12           PC ATF D3M         205LT/DM         5           PEERLESS LLG GREASE         TUBE         140           PEKOE THE VRAC         (1000/BX)         99           PERMATEX ORING&RUBBER ADHESIVE         11           PH 7.01 SOLUTION         HANNA INSTRUMENT PH TESTER         5           PH 7.01 SOLUTION         HANNA INSTRUMENT PH TESTER         6           PH 7.01 SOLUTION         HANNA			
PAINT AERVOE INVERTED         ORANGE GLO 12CN/BX         158           PAINT AERVOE INVERTED         GREEN GLO 12 CAN/BX         78           PAINT BRUSH         2 1/2"         196           PAINT BRUSH ANGLE         2 1/2"         100           PAINT DEVOE         1GAL SAFETY BLUE H19         54           PAINT DEVOE         1GAL SAFETY YELLOW EPOXY         13           PAINT DEVOE RUST-OLEUM         1GAL SILVER GRAY         47           PAINT DEVOE RUST-OLEUM         1GAL SAFETY BLUE         22           PAINT EXTERIOR LATEX         1GAL SAFETY BLUE         22           PAINT GREY         ATLAS-COPCO         15           PAINT RUST-OLEUM         140Z FLUO GREEN         64           PAINT RUST-OLEUM         140Z FLUO GREEN         64           PAINT YELLOW         ATLAS-COPCO         12           PC ATF D3M         205LT/DM         5           PEERLESS LLG GREASE         TUBE         140           PEKNE THE VRAC         (1000/BX)         99           PERMATEX ORING&RUBBER ADHESIVE         11           PETROSOL 3139         205LT         1           PH 4.01 SOLUTION         HANNA INSTRUMENT PH TESTER         5           PH 7.01 SOLUTION         HANNA INSTRUMENT PH TEST			
PAINT AERVOE INVERTED         GREEN GLO 12 CAN/BX         78           PAINT BRUSH         2 1/2"         196           PAINT BRUSH ANGLE         2 1/2"         100           PAINT DEVOE         1GAL SAFETY BLUE H19         54           PAINT DEVOE         1GAL SAFETY YELLOW EPOXY         13           PAINT DEVOE RUST-OLEUM         1GAL SAFETY YELLOW EPOXY         47           PAINT DEVOE RUST-OLEUM         1GAL SAFETY BLUE         22           PAINT GREY         ATLAS-COPCO         15           PAINT PIZZAZZ ENAMEL ALKYD         1GAL SATURN YELLOW         2           PAINT RUST-OLEUM         1402 FLUO GREEN         64           PAINT RUST-OLEUM         1402 FLUO ORANGE         241           PAINT YELLOW         ATLAS-COPCO         12           PC ATF D3M         205LT/DM         5           PEERLESS LLG GREASE         TUBE         140           PEKNE THE VRAC         (1000/BX)         99           PERMATEX ORING&RUBBER ADHESIVE         11           PETROSOL 3139         205LT         1           PH 4.01 SOLUTION         HANNA INSTRUMENT PH TESTER         5           H 7.01 SOLUTION         HANNA INSTRUMENT PH TESTER         6           PINE-SOL         443ML	PAINT	1GAL BRIGHT YELLOW	25
PAINT BRUSH         2 1/2"         196           PAINT BRUSH ANGLE         2 1/2"         100           PAINT DEVOE         1GAL SAFETY BLUE H19         54           PAINT DEVOE         1GAL SAFETY PBLUE H19         54           PAINT DEVOE RUST-OLEUM         1GAL SAFETY YELLOW EPOXY         13           PAINT DEVOE RUST-OLEUM         1GAL SAFETY BLUE         22           PAINT GREY         ATLAS-COPCO         15           PAINT PIZZAZZ ENAMEL ALKYD         1GAL SATURN YELLOW         2           PAINT RUST-OLEUM         140Z FLUO GREEN         64           PAINT RUST-OLEUM         140Z FLUO GREEN         64           PAINT RUST-OLEUM         140Z FLUO ORANGE         241           PAINT RUST-OLEUM         ATLAS-COPCO         12           PC ATF D3M         205LT/DM         5           PEERLESS LLG GREASE         TUBE         140           PEKNOE THE VRAC         (1000/BX)         99           PERMATEX ORING&RUBBER ADHESIVE         11           PETROSOL 3139         205LT         1           PH 4.01 SOLUTION         HANNA INSTRUMENT PH TESTER         5           PH 7.01 SOLUTION         HANNA INSTRUMENT PH TESTER         6           PINE-SOL         443ML <t< td=""><td>PAINT AERVOE INVERTED</td><td>ORANGE GLO 12CN/BX</td><td>158</td></t<>	PAINT AERVOE INVERTED	ORANGE GLO 12CN/BX	158
PAINT BRUSH ANGLE         2 1/2"         100           PAINT DEVOE         1GAL SAFETY BLUE H19         54           PAINT DEVOE         1GAL SAFETY YELLOW EPOXY         13           PAINT DEVOE RUST-OLEUM         1GAL SILVER GRAY         47           PAINT DEVOE RUST-OLEUM         1GAL SAFETY BLUE         22           PAINT GREY         ATLAS-COPCO         15           PAINT PIZZAZZ ENAMEL ALKYD         1GAL SATURN YELLOW         2           PAINT RUST-OLEUM         140Z FLUO GREEN         64           PAINT YELLOW         ATLAS-COPCO         12           PCATF D3M         205LT/DM         5           PEERLESS LLG GREASE         TUBE         140           PEKOE THE VRAC         (1000/BX)         99           PERMATEX ORING&RUBBER ADHESIVE         11           PETROSOL 3139         205LT         1           PH 4.01 SOLUTION         HANNA INSTRUMENT PH TESTER         5           PH 7.01 SOLUTION         HANNA INSTRUMENT PH TESTER         6           PINE-SOL         443ML         0           POTASSIUM NITRATE         FA209A         0           PRECISION SYNTHETIC EMB         TUBE         90           PRECISION XL EMB GREASE         TUBE         179 <td>PAINT AERVOE INVERTED</td> <td>GREEN GLO 12 CAN/BX</td> <td>78</td>	PAINT AERVOE INVERTED	GREEN GLO 12 CAN/BX	78
PAINT DEVOE         1GAL SAFETY BLUE H19         54           PAINT DEVOE         1GAL SAFETY YELLOW EPOXY         13           PAINT DEVOE RUST-OLEUM         1GAL SILVER GRAY         47           PAINT EXTERIOR LATEX         1GAL SAFETY BLUE         22           PAINT GREY         ATLAS-COPCO         15           PAINT PIZZAZZ ENAMEL ALKYD         1GAL SATURN YELLOW         2           PAINT RUST-OLEUM         14OZ FLUO GREEN         64           PAINT RUST-OLEUM         14OZ FLUO GREEN         64           PAINT YELLOW         ATLAS-COPCO         12           PC ATF D3M         205LT/DM         5           PEERLESS LLG GREASE         TUBE         140           PEKOE THE VRAC         (1000/BX)         99           PERMATEX ORING&RUBBER ADHESIVE         99           PERMATEX ORING&RUBBER ADHESIVE         11           PETROSOL 3139         205LT         1           PH 4.01 SOLUTION         HANNA INSTRUMENT PH TESTER         5           PH 7.01 SOLUTION         HANNA INSTRUMENT PH TESTER         6           PINE-SOL         443ML         0           POTASSIUM NITRATE         FA209A         0           PRECISION SYNTHETIC EMB         TUBE         90 <tr< td=""><td>PAINT BRUSH</td><td>2 1/2"</td><td>196</td></tr<>	PAINT BRUSH	2 1/2"	196
PAINT DEVOE         1GAL SAFETY YELLOW EPOXY         13           PAINT DEVOE RUST-OLEUM         1GAL SILVER GRAY         47           PAINT EXTERIOR LATEX         1GAL SAFETY BLUE         22           PAINT GREY         ATLAS-COPCO         15           PAINT PIZZAZZ ENAMEL ALKYD         1GAL SATURN YELLOW         2           PAINT RUST-OLEUM         140Z FLUO GREEN         64           PAINT RUST-OLEUM         140Z FLUO ORANGE         241           PAINT YELLOW         ATLAS-COPCO         12           PC ATF D3M         205LT/DM         5           PEERLESS LLG GREASE         TUBE         140           PEKOE THE VRAC         (1000/BX)         99           PERMATEX ORING&RUBBER ADHESIVE         11         1           PETROSOL 3139         205LT         1           PH 4.01 SOLUTION         HANNA INSTRUMENT PH TESTER         5           PH 7.01 SOLUTION         HANNA INSTRUMENT PH TESTER         6           PINE-SOL         443ML         0           POTASSIUM NITRATE         FA209A         0           PRECISION SYNTHETIC EMB         TUBE         90           PRECISION XL EMB GREASE         TUBE         179           PRECISION XL EP2 GREASE         TUBE	PAINT BRUSH ANGLE	2 1/2"	100
PAINT DEVOE RUST-OLEUM         1GAL SILVER GRAY         47           PAINT EXTERIOR LATEX         1GAL SAFETY BLUE         22           PAINT GREY         ATLAS-COPCO         15           PAINT PIZZAZZ ENAMEL ALKYD         1GAL SATURN YELLOW         2           PAINT RUST-OLEUM         140Z FLUO GREEN         64           PAINT RUST-OLEUM         140Z FLUO ORANGE         241           PAINT YELLOW         ATLAS-COPCO         12           PC ATF D3M         205LT/DM         5           PEERLESS LLG GREASE         TUBE         140           PEKOE THE VRAC         (1000/BX)         99           PERMATEX ORING&RUBBER ADHESIVE         11           PETROSOL 3139         205LT         1           PH 4.01 SOLUTION         HANNA INSTRUMENT PH TESTER         5           PH 7.01 SOLUTION         HANNA INSTRUMENT PH TESTER         6           PINE-SOL         443ML         0           POTASSIUM NITRATE         FA209A         0           PRECISION SYNTHETIC EMB         TUBE         90           PRECISION XL EMB GREASE         TUBE         179           PRECISION XL EP2 GREASE         TUBE         782           PRECISION XL EP2 GREASE DRUM         15	PAINT DEVOE	1GAL SAFETY BLUE H19	54
PAINT EXTERIOR LATEX         1GAL SAFETY BLUE         22           PAINT GREY         ATLAS-COPCO         15           PAINT PIZZAZZ ENAMEL ALKYD         1GAL SATURN YELLOW         2           PAINT RUST-OLEUM         14OZ FLUO GREEN         64           PAINT RUST-OLEUM         14OZ FLUO ORANGE         241           PAINT YELLOW         ATLAS-COPCO         12           PC ATF D3M         205LT/DM         5           PEERLESS LLG GREASE         TUBE         140           PEKOE THE VRAC         (1000/BX)         99           PERMATEX ORING&RUBBER ADHESIVE         11           PETROSOL 3139         205LT         1           PH 4.01 SOLUTION         HANNA INSTRUMENT PH TESTER         5           PH 7.01 SOLUTION         HANNA INSTRUMENT PH TESTER         6           PINE-SOL         443ML         0           POTASSIUM NITRATE         FA209A         0           PRECISION SYNTHETIC EMB         TUBE         90           PRECISION XL EMB GREASE         TUBE         179           PRECISION XL EP2 GREASE         TUBE         179           PRECISION XL EP2 GREASE DRUM         15           PREMIX FLUX 66PB026SODA4.5         ORANGE 19KG/PAIL         0	PAINT DEVOE	1GAL SAFETY YELLOW EPOXY	13
PAINT GREY         ATLAS-COPCO         15           PAINT PIZZAZZ ENAMEL ALKYD         1GAL SATURN YELLOW         2           PAINT RUST-OLEUM         140Z FLUO GREEN         64           PAINT RUST-OLEUM         140Z FLUO ORANGE         241           PAINT YELLOW         ATLAS-COPCO         12           PC ATF D3M         205LT/DM         5           PEERLESS LLG GREASE         TUBE         140           PEKOE THE VRAC         (1000/BX)         99           PERMATEX ORING&RUBBER ADHESIVE         11           PETROSOL 3139         205LT         1           PH 4.01 SOLUTION         HANNA INSTRUMENT PH TESTER         5           PH 7.01 SOLUTION         HANNA INSTRUMENT PH TESTER         6           PINE-SOL         443ML         0           POTASSIUM NITRATE         FA209A         0           PRECISION SYNTHETIC EMB         TUBE         90           PRECISION SYNTHETIC GREASE         TUBE         270           PRECISION XL EMB GREASE         TUBE         179           PRECISION XL EP2 GREASE         TUBE         782           PRECISION XL EP2 GREASE DRUM         15           PREMIX FLUX 66PB026SODA4.5         ORANGE 19KG/PAIL         0 <t< td=""><td>PAINT DEVOE RUST-OLEUM</td><td>1GAL SILVER GRAY</td><td>47</td></t<>	PAINT DEVOE RUST-OLEUM	1GAL SILVER GRAY	47
PAINT PIZZAZZ ENAMEL ALKYD         1GAL SATURN YELLOW         2           PAINT RUST-OLEUM         140Z FLUO GREEN         64           PAINT RUST-OLEUM         140Z FLUO ORANGE         241           PAINT YELLOW         ATLAS-COPCO         12           PC ATF D3M         205LT/DM         5           PEERLESS LLG GREASE         TUBE         140           PEKOE THE VRAC         (1000/BX)         99           PERMATEX ORING&RUBBER ADHESIVE         11           PETROSOL 3139         205LT         1           PH 4.01 SOLUTION         HANNA INSTRUMENT PH TESTER         5           PH 7.01 SOLUTION         HANNA INSTRUMENT PH TESTER         6           PINE-SOL         443ML         0           POTASSIUM NITRATE         FA209A         0           PRECISION SYNTHETIC EMB         TUBE         90           PRECISION SYNTHETIC GREASE         TUBE         270           PRECISION XL EMB GREASE         TUBE         179           PRECISION XL EP2 GREASE         TUBE         782           PRECISION XL EP2 GREASE DRUM         15           PREMIX FLUX 66PB026SODA4.5         ORANGE 19KG/PAIL         0           PRIMARY OIL BURNER         1           PRODURO OIL FD-1 60<	PAINT EXTERIOR LATEX	1GAL SAFETY BLUE	22
PAINT RUST-OLEUM         14OZ FLUO GREEN         64           PAINT RUST-OLEUM         14OZ FLUO ORANGE         241           PAINT YELLOW         ATLAS-COPCO         12           PC ATF D3M         205LT/DM         5           PEERLESS LLG GREASE         TUBE         140           PEKOE THE VRAC         (1000/BX)         99           PERMATEX ORING&RUBBER ADHESIVE         11           PETROSOL 3139         205LT         1           PH 4.01 SOLUTION         HANNA INSTRUMENT PH TESTER         5           PH 7.01 SOLUTION         HANNA INSTRUMENT PH TESTER         6           PINE-SOL         443ML         0           POTASSIUM NITRATE         FA209A         0           PRECISION SYNTHETIC EMB         TUBE         90           PRECISION SYNTHETIC GREASE         TUBE         270           PRECISION XL EMB GREASE         TUBE         179           PRECISION XL EP2 GREASE         TUBE         782           PRECISION XL EP2 GREASE DRUM         15           PREMIX FLUX 66PB026SODA4.5         ORANGE 19KG/PAIL         0           PRIMARY OIL BURNER         1           PRODURO OIL FD-1 60         1100/TOTES         8           PRODURO TO -4+ SYNTH         <	PAINT GREY	ATLAS-COPCO	15
PAINT RUST-OLEUM         14OZ FLUO ORANGE         241           PAINT YELLOW         ATLAS-COPCO         12           PC ATF D3M         205LT/DM         5           PEERLESS LLG GREASE         TUBE         140           PEKOE THE VRAC         (1000/BX)         99           PERMATEX ORING&RUBBER ADHESIVE         11           PETROSOL 3139         205LT         1           PH 4.01 SOLUTION         HANNA INSTRUMENT PH TESTER         5           PH 7.01 SOLUTION         HANNA INSTRUMENT PH TESTER         6           PINE-SOL         443ML         0           POTASSIUM NITRATE         FA209A         0           PRECISION SYNTHETIC EMB         TUBE         90           PRECISION SYNTHETIC GREASE         TUBE         270           PRECISION XL EMB GREASE         TUBE         179           PRECISION XL EP2 GREASE         TUBE         782           PRECISION XL EP2 GREASE DRUM         15           PREMIX FLUX 66PB026SODA4.5         ORANGE 19KG/PAIL         0           PRIMARY OIL BURNER         1           PRODURO OIL FD-1 60         1100/TOTES         8           PRODURO TO -4+ SYNTH         ALL SEASON 205L         25	PAINT PIZZAZZ ENAMEL ALKYD	1GAL SATURN YELLOW	2
PAINT YELLOW         ATLAS-COPCO         12           PC ATF D3M         205LT/DM         5           PEERLESS LLG GREASE         TUBE         140           PEKOE THE VRAC         (1000/BX)         99           PERMATEX ORING&RUBBER ADHESIVE         11           PETROSOL 3139         205LT         1           PH 4.01 SOLUTION         HANNA INSTRUMENT PH TESTER         5           PH 7.01 SOLUTION         HANNA INSTRUMENT PH TESTER         6           PINE-SOL         443ML         0           POTASSIUM NITRATE         FA209A         0           PRECISION SYNTHETIC EMB         TUBE         90           PRECISION SYNTHETIC GREASE         TUBE         270           PRECISION XL EMB GREASE         TUBE         179           PRECISION XL EP2 GREASE         TUBE         782           PRECISION XL EP2 GREASE DRUM         15           PREMIX FLUX 66PB026SODA4.5         ORANGE 19KG/PAIL         0           PRIMARY OIL BURNER         1           PRODURO OIL FD-1 60         1100/TOTES         8           PRODURO TO -4+ SYNTH         ALL SEASON 205L         25	PAINT RUST-OLEUM	140Z FLUO GREEN	64
PAINT YELLOW         ATLAS-COPCO         12           PC ATF D3M         205LT/DM         5           PEERLESS LLG GREASE         TUBE         140           PEKOE THE VRAC         (1000/BX)         99           PERMATEX ORING&RUBBER ADHESIVE         11           PETROSOL 3139         205LT         1           PH 4.01 SOLUTION         HANNA INSTRUMENT PH TESTER         5           PH 7.01 SOLUTION         HANNA INSTRUMENT PH TESTER         6           PINE-SOL         443ML         0           POTASSIUM NITRATE         FA209A         0           PRECISION SYNTHETIC EMB         TUBE         90           PRECISION SYNTHETIC GREASE         TUBE         270           PRECISION XL EMB GREASE         TUBE         179           PRECISION XL EP2 GREASE         TUBE         782           PRECISION XL EP2 GREASE DRUM         15           PREMIX FLUX 66PB026SODA4.5         ORANGE 19KG/PAIL         0           PRIMARY OIL BURNER         1           PRODURO OIL FD-1 60         1100/TOTES         8           PRODURO TO -4+ SYNTH         ALL SEASON 205L         25	PAINT RUST-OLEUM	14OZ FLUO ORANGE	241
PC ATF D3M         205LT/DM         5           PEERLESS LLG GREASE         TUBE         140           PEKOE THE VRAC         (1000/BX)         99           PERMATEX ORING&RUBBER ADHESIVE         11           PETROSOL 3139         205LT         1           PH 4.01 SOLUTION         HANNA INSTRUMENT PH TESTER         5           PH 7.01 SOLUTION         HANNA INSTRUMENT PH TESTER         6           PINE-SOL         443ML         0           POTASSIUM NITRATE         FA209A         0           PRECISION SYNTHETIC EMB         TUBE         90           PRECISION SYNTHETIC GREASE         TUBE         270           PRECISION XL EMB GREASE         TUBE         179           PRECISION XL EP2 GREASE         TUBE         782           PRECISION XL EP2 GREASE DRUM         15           PREMIX FLUX 66PB026SODA4.5         ORANGE 19KG/PAIL         0           PRIMARY OIL BURNER         1           PRODURO OIL FD-1 60         1100/TOTES         8           PRODURO TO -4+ SYNTH         ALL SEASON 205L         25	PAINT YELLOW		
PEERLESS LLG GREASE         TUBE         140           PEKOE THE VRAC         (1000/BX)         99           PERMATEX ORING&RUBBER ADHESIVE         11           PETROSOL 3139         205LT         1           PH 4.01 SOLUTION         HANNA INSTRUMENT PH TESTER         5           PH 7.01 SOLUTION         HANNA INSTRUMENT PH TESTER         6           PINE-SOL         443ML         0           POTASSIUM NITRATE         FA209A         0           PRECISION SYNTHETIC EMB         TUBE         90           PRECISION SYNTHETIC GREASE         TUBE         270           PRECISION XL EMB GREASE         TUBE         179           PRECISION XL EP2 GREASE         TUBE         782           PRECISION XL EP2 GREASE DRUM         15           PREMIX FLUX 66PB026SODA4.5         ORANGE 19KG/PAIL         0           PRIMARY OIL BURNER         1           PRODURO OIL FD-1 60         1100/TOTES         8           PRODURO TO -4+ SYNTH         ALL SEASON 205L         25			
PEKOE THE VRAC         (1000/BX)         99           PERMATEX ORING&RUBBER ADHESIVE         11           PETROSOL 3139         205LT         1           PH 4.01 SOLUTION         HANNA INSTRUMENT PH TESTER         5           PH 7.01 SOLUTION         HANNA INSTRUMENT PH TESTER         6           PINE-SOL         443ML         0           POTASSIUM NITRATE         FA209A         0           PRECISION SYNTHETIC EMB         TUBE         90           PRECISION SYNTHETIC GREASE         TUBE         270           PRECISION XL EMB GREASE         TUBE         179           PRECISION XL EP2 GREASE         TUBE         782           PRECISION XL EP2 GREASE DRUM         15           PREMIX FLUX 66PB026SODA4.5         ORANGE 19KG/PAIL         0           PRIMARY OIL BURNER         1           PRODURO OIL FD-1 60         1100/TOTES         8           PRODURO TO -4+ SYNTH         ALL SEASON 205L         25			
PERMATEX ORING&RUBBER ADHESIVE         11           PETROSOL 3139         205LT         1           PH 4.01 SOLUTION         HANNA INSTRUMENT PH TESTER         5           PH 7.01 SOLUTION         HANNA INSTRUMENT PH TESTER         6           PINE-SOL         443ML         0           POTASSIUM NITRATE         FA209A         0           PRECISION SYNTHETIC EMB         TUBE         90           PRECISION SYNTHETIC GREASE         TUBE         270           PRECISION XL EMB GREASE         TUBE         179           PRECISION XL EP2 GREASE         TUBE         782           PRECISION XL EP2 GREASE DRUM         15           PREMIX FLUX 66PB026SODA4.5         ORANGE 19KG/PAIL         0           PRIMARY OIL BURNER         1           PRODURO OIL FD-1 60         1100/TOTES         8           PRODURO TO -4+ SYNTH         ALL SEASON 205L         25			
PETROSOL 3139         205LT         1           PH 4.01 SOLUTION         HANNA INSTRUMENT PH TESTER         5           PH 7.01 SOLUTION         HANNA INSTRUMENT PH TESTER         6           PINE-SOL         443ML         0           POTASSIUM NITRATE         FA209A         0           PRECISION SYNTHETIC EMB         TUBE         90           PRECISION SYNTHETIC GREASE         TUBE         270           PRECISION XL EMB GREASE         TUBE         179           PRECISION XL EP2 GREASE         TUBE         782           PRECISION XL EP2 GREASE DRUM         15           PREMIX FLUX 66PB026SODA4.5         ORANGE 19KG/PAIL         0           PRIMARY OIL BURNER         1           PRODURO OIL FD-1 60         1100/TOTES         8           PRODURO TO -4+ SYNTH         ALL SEASON 205L         25		(1000/274)	
PH 4.01 SOLUTION  PH 7.01 SOLUTION  HANNA INSTRUMENT PH TESTER  FINE-SOL  POTASSIUM NITRATE  PRECISION SYNTHETIC EMB  PRECISION SYNTHETIC GREASE  PRECISION XL EMB GREASE  PRECISION XL EMB GREASE  PRECISION XL EP2 GREASE  PRECISION XL EP2 GREASE DRUM  PREMIX FLUX 66PB026SODA4.5  PRIMARY OIL BURNER  PRODURO OIL FD-1 60  PRODURO TO -4+ SYNTH  HANNA INSTRUMENT PH TESTER  5  HANNA INSTRUMENT PH TESTER  6  HANNA INSTRUMENT PH TESTER  5  HANNA INSTRUMENT PH TESTER  6		205LT	
PH 7.01 SOLUTION         HANNA INSTRUMENT PH TESTER         6           PINE-SOL         443ML         0           POTASSIUM NITRATE         FA209A         0           PRECISION SYNTHETIC EMB         TUBE         90           PRECISION SYNTHETIC GREASE         TUBE         270           PRECISION XL EMB GREASE         TUBE         179           PRECISION XL EP2 GREASE         TUBE         782           PRECISION XL EP2 GREASE DRUM         15           PREMIX FLUX 66PB026SODA4.5         ORANGE 19KG/PAIL         0           PRIMARY OIL BURNER         1           PRODURO OIL FD-1 60         1100/TOTES         8           PRODURO TO -4+ SYNTH         ALL SEASON 205L         25			
PINE-SOL         443ML         0           POTASSIUM NITRATE         FA209A         0           PRECISION SYNTHETIC EMB         TUBE         90           PRECISION SYNTHETIC GREASE         TUBE         270           PRECISION XL EMB GREASE         TUBE         179           PRECISION XL EP2 GREASE         TUBE         782           PRECISION XL EP2 GREASE DRUM         15           PREMIX FLUX 66PB026SODA4.5         ORANGE 19KG/PAIL         0           PRIMARY OIL BURNER         1           PRODURO OIL FD-1 60         1100/TOTES         8           PRODURO TO -4+ SYNTH         ALL SEASON 205L         25			
POTASSIUM NITRATE         FA209A         0           PRECISION SYNTHETIC EMB         TUBE         90           PRECISION SYNTHETIC GREASE         TUBE         270           PRECISION XL EMB GREASE         TUBE         179           PRECISION XL EP2 GREASE         TUBE         782           PRECISION XL EP2 GREASE DRUM         15           PREMIX FLUX 66PB026SODA4.5         ORANGE 19KG/PAIL         0           PRIMARY OIL BURNER         1           PRODURO OIL FD-1 60         1100/TOTES         8           PRODURO TO -4+ SYNTH         ALL SEASON 205L         25			
PRECISION SYNTHETIC EMB         TUBE         90           PRECISION SYNTHETIC GREASE         TUBE         270           PRECISION XL EMB GREASE         TUBE         179           PRECISION XL EP2 GREASE         TUBE         782           PRECISION XL EP2 GREASE DRUM         15           PREMIX FLUX 66PB026SODA4.5         ORANGE 19KG/PAIL         0           PRIMARY OIL BURNER         1           PRODURO OIL FD-1 60         1100/TOTES         8           PRODURO TO -4+ SYNTH         ALL SEASON 205L         25			
PRECISION SYNTHETIC GREASE         TUBE         270           PRECISION XL EMB GREASE         TUBE         179           PRECISION XL EP2 GREASE         TUBE         782           PRECISION XL EP2 GREASE DRUM         15           PREMIX FLUX 66PB026SODA4.5         ORANGE 19KG/PAIL         0           PRIMARY OIL BURNER         1           PRODURO OIL FD-1 60         1100/TOTES         8           PRODURO TO -4+ SYNTH         ALL SEASON 205L         25			
PRECISION XL EMB GREASE         TUBE         179           PRECISION XL EP2 GREASE         TUBE         782           PRECISION XL EP2 GREASE DRUM         15           PREMIX FLUX 66PB026SODA4.5         ORANGE 19KG/PAIL         0           PRIMARY OIL BURNER         1           PRODURO OIL FD-1 60         1100/TOTES         8           PRODURO TO -4+ SYNTH         ALL SEASON 205L         25			
PRECISION XL EP2 GREASE         TUBE         782           PRECISION XL EP2 GREASE DRUM         15           PREMIX FLUX 66PB026SODA4.5         ORANGE 19KG/PAIL         0           PRIMARY OIL BURNER         1           PRODURO OIL FD-1 60         1100/TOTES         8           PRODURO TO -4+ SYNTH         ALL SEASON 205L         25			
PRECISION XL EP2 GREASE DRUM         15           PREMIX FLUX 66PB026SODA4.5         ORANGE 19KG/PAIL         0           PRIMARY OIL BURNER         1           PRODURO OIL FD-1 60         1100/TOTES         8           PRODURO TO -4+ SYNTH         ALL SEASON 205L         25			
PREMIX FLUX 66PB026SODA4.5         ORANGE 19KG/PAIL         0           PRIMARY OIL BURNER         1           PRODURO OIL FD-1 60         1100/TOTES         8           PRODURO TO -4+ SYNTH         ALL SEASON 205L         25		1.002	
PRIMARY OIL BURNER         1           PRODURO OIL FD-1 60         1100/TOTES         8           PRODURO TO -4+ SYNTH         ALL SEASON 205L         25		ORANGE 19KG/PAII	
PRODURO OIL FD-1 60         1100/TOTES         8           PRODURO TO -4+ SYNTH         ALL SEASON 205L         25		OTOTINGE TOTO/I AIL	
PRODURO TO -4+ SYNTH ALL SEASON 205L 25		1100/TOTES	
	PRODURO TO-44 STNTH	205LT/DRUM	9

PRODURO TO-4 SYN ALL SEASON	1040LT IBC	43
PRODURO TO-4 XL SYN LO-TEMP	1040LT	20
PROLEACH KG	101021	10
PROLITE MOP STICK 54	#AG-1674	17
PROPANE FUEL TANK	16.9OZ	133
PVC GLUE W/ BRUSH	711 WELD*ON 946ML	16
PVC PRIMER WITH BRUSH	P70 500ML	2
QUICK LIME	1700KG 0-2 5MM 1152	2768
REAGENT TUBE	280 X 32MM F/ CHS500	2700
REAGENT TUBE	200 X SZIVIIVI F/ CI ISSUU	1
REAGENT TUBE		1
RUBBER CLEANER RUB-O-MATIC	4 LITED	
	1 LITER	119
SAND FOR SANDBLAST JETMAG	GRIT 30-60 25KG OLIVINE	316
SILICA SAND	SILICA SAND 22.7KG	177
SILICON FOOD GRADE GREASE	4 OZ FOR AMP SERIES PUMPS	0
SILICONE LUBRICANT		11
SILVER ELECTRODE	M2.4 3/32" .5KG/TUBE	1
SILVER FOIL	1 ONCE 99.999% PURE	52
SILVER NITRATE	500GRAM	3
SODA ASH NA2CO3	25KG MR118	11
SODIUM CYANIDE	PELLETS 1000KG	1677
SODIUM HYDROXIDE	SCRUBBER FILL	8
SODIUM HYPOCHLORITE	20/LITERS	52
SODIUM NITRATE	22.27KG 98% INDUSTRIAL GRADE	226
SOLVENT VARSOL	PLASTIC BOTTLE 3.78LT	68
SPRAY SPATTER BLOCK	W/TRIGGER 500ML	10
STOKOLAN HAND CREAM		35
SULPHUR PRILLS	99.5% 1000KG	4497
SUPER 3000 MORTAR		4
SUPER 77 SPRAY ADHESIVE		0
SUPER 90 ABC DRY CHEMICAL	PAIL FOR HVY EQUIP FIRE SUPPRE	30
SUPER DUTY MOTOR OIL	4LT	18
SUPER FLUID KLAR PILOT		199
SWIVEL CASTERS WHEEL	8"	8
SYNDURO SHB150	205LT/DM	59
SYNDURO SHB32	20LT/BUCKET	262
SYNDURO SHB32 SYNT.	COMPRESSOR OIL 205L/DRUM	14
SYNDURO SHB460		2
SYNTETHIC SHB 68	2051 T 450 AL	7
	1200L1-40GAL	<i>1</i>
	205LT-45GAL 20OZ 550G	
SYNTEX FAN MOP HEAD	20OZ 550G	70
SYNTEX FAN MOP HEAD SYNTHETIC 75W140	20OZ 550G 1040LT/TOTE	70 2
SYNTEX FAN MOP HEAD SYNTHETIC 75W140 THREAD SEALANT	20OZ 550G 1040LT/TOTE W/ PTFE	70 2 17
SYNTEX FAN MOP HEAD SYNTHETIC 75W140 THREAD SEALANT THREAD SEALANT W/TEFLON	20OZ 550G 1040LT/TOTE W/ PTFE PERMATEX 118ML	70 2
SYNTEX FAN MOP HEAD SYNTHETIC 75W140 THREAD SEALANT THREAD SEALANT W/TEFLON THREADLOCKER	20OZ 550G 1040LT/TOTE W/ PTFE PERMATEX 118ML 36ML GREEN	70 2 17 56
SYNTEX FAN MOP HEAD SYNTHETIC 75W140 THREAD SEALANT THREAD SEALANT W/TEFLON THREADLOCKER THREADLOCKER THREADLOCKER 272 HIGH-TEMP	20OZ 550G 1040LT/TOTE W/ PTFE PERMATEX 118ML 36ML GREEN LOCTITE 250ML	70 2 17 56 4 2
SYNTEX FAN MOP HEAD SYNTHETIC 75W140 THREAD SEALANT THREAD SEALANT W/TEFLON THREADLOCKER THREADLOCKER 272 HIGH-TEMP TRANSFORMER OIL	20OZ 550G 1040LT/TOTE W/ PTFE PERMATEX 118ML 36ML GREEN LOCTITE 250ML VOLTESSO 205LT	70 2 17 56 4 2
SYNTEX FAN MOP HEAD SYNTHETIC 75W140 THREAD SEALANT THREAD SEALANT W/TEFLON THREADLOCKER THREADLOCKER THREADLOCKER 272 HIGH-TEMP TRANSFORMER OIL TRAXON E SYN 80W140	20OZ 550G 1040LT/TOTE W/ PTFE PERMATEX 118ML 36ML GREEN LOCTITE 250ML VOLTESSO 205LT 1040LT/DRUM	70 2 17 56 4 2 1
SYNTEX FAN MOP HEAD SYNTHETIC 75W140 THREAD SEALANT THREAD SEALANT W/TEFLON THREADLOCKER THREADLOCKER THREADLOCKER 272 HIGH-TEMP TRANSFORMER OIL TRAXON E SYN 80W140 TRAXON E SYN CD50	20OZ 550G 1040LT/TOTE W/ PTFE PERMATEX 118ML 36ML GREEN LOCTITE 250ML VOLTESSO 205LT 1040LT/DRUM 205LT/DRUM	70 2 17 56 4 2 1 3 8
SYNTEX FAN MOP HEAD SYNTHETIC 75W140 THREAD SEALANT THREAD SEALANT W/TEFLON THREADLOCKER THREADLOCKER 272 HIGH-TEMP TRANSFORMER OIL TRAXON E SYN 80W140 TRAXON E SYN CD50 TRAXON ENGRENAGE	20OZ 550G 1040LT/TOTE W/ PTFE PERMATEX 118ML 36ML GREEN LOCTITE 250ML VOLTESSO 205LT 1040LT/DRUM 205LT/DRUM 20LT 85W140	70 2 17 56 4 2 1 3 8
SYNTEX FAN MOP HEAD SYNTHETIC 75W140 THREAD SEALANT THREAD SEALANT W/TEFLON THREADLOCKER THREADLOCKER 272 HIGH-TEMP TRANSFORMER OIL TRAXON E SYN 80W140 TRAXON E SYN CD50 TRAXON ENGRENAGE TRAXON XL 75W90	20OZ 550G 1040LT/TOTE W/ PTFE PERMATEX 118ML 36ML GREEN LOCTITE 250ML VOLTESSO 205LT 1040LT/DRUM 205LT/DRUM 20LT 85W140 205LT/DRUM	70 2 17 56 4 2 1 3 8 1
SYNTEX FAN MOP HEAD SYNTHETIC 75W140 THREAD SEALANT THREAD SEALANT W/TEFLON THREADLOCKER THREADLOCKER 272 HIGH-TEMP TRANSFORMER OIL TRAXON E SYN 80W140 TRAXON E SYN CD50 TRAXON ENGRENAGE TRAXON XL 75W90 TRAXON XL SYNTH BLEND 75W90	20OZ 550G 1040LT/TOTE W/ PTFE PERMATEX 118ML 36ML GREEN LOCTITE 250ML VOLTESSO 205LT 1040LT/DRUM 205LT/DRUM 20LT 85W140	70 2 17 56 4 2 1 3 8 1 2 5
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ULTIMA EP150	205LT	2
ULTRA CLEAR PREMIUM OIL LAMP	2031	3
URATHANE BRUSH	F/ URETHANE WINDOW&WINDSHIELD	33
URETHANE DUR-X-LINE MATERIEL	780001277 WRM-80T 1KG KIT	15
URETHANE DUR-X-LINE MATERIEL	780001277 WRW 601 TRG KIT	5
URETHANE SEALANT IN TUBE	700001270 WIKIW-001 4KG KH	275
VALVE LUBRICANT AND SEALANT	400GR	40
VARSOL	PARTS CLEANER 45GAL/DM	8
VICTAULIC LUBRICANT	ONE QUART	0
VULTREX G-124 GREASE	TUBE	59
VULTREX GEARSHIELD NC	205 LITERS	120
VULTREX GEARSHIELD NC VULTREX OGL SYNTHETIC	ALL SEASONS 54KG KEG	120
VULTREX OGL SYNTHETIC VULTREX OGL SYNTHETIC GREASE	ALL SEASON 680, 54KG	70
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WELDING ELECTRODE BRONZE	3.2MM 1/8 SODEL 661 5KG/BX	2
WELDING ELECTRODE MG	1/8" 5KG/BX	
WELDING ELECTRODE MG	3/32" 2.5KG/BX	2
WELDING ELECTRODE TRACTALOY	M2.4 3/32" 5KG/BX	2
WELDING FACE SHIELD	CTUD VTDAOT COUDOTEC FIXO/DV	15
WELDING ROD	STUD-XTRACT SOUDOTEC 5KG/BX	2
WELDING ROD	0.156" NON FERROUS	12
WELDING ROD	3/32" 10.20KG/BOX 624P-3	5
WELDING ROD	1/8" 12.90KG/BX 624P-309	14
WELDING ROD	5/32" 12.90KG/BX 624P-309	7
WELDING ROD	3/32" 10KG/BX LA-11018	6
WELDING ROD	1/8" 20KG/BX LA-11018-M	5
WELDING ROD	5/32" 20KG/BOX LA-11018-M	5
WELDING ROD	3/32" 10KG/BX LA6010	14
WELDING ROD	1/8" 20KG/BX LA6010	14
WELDING ROD	3/32" 10KG/BX LA7018	8
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WELDING ROD	5/32" 20KG/BX LA7018	24
WELDING ROD 1/4	6 X 450MM 19.5KG/CS	1
WELDING ROD 5/32	4 X 450MM 18.6KG/CS	1
WELDING ROD ALU LITE	3/32 2.5KG/BX	10
WELDING ROD ALU LITE	1/8 2.5 KG/BX	10
WELDING ROD CARBON ARC DCCC	1/8" X 12" 100/BX	15
WELDING ROD CARBON ARC DCCC	3/16" X 12" 50/BX	41
WELDING ROD CARBON ARC DCCC	1/4" X 12" 50/BX	22
WELDING ROD CARBON ARC DCCC	5/16" X 12" 50/BX	71
WELDING ROD CARBON ARC DCCC	3/8" X 12" 50/BX	98
WELDING ROD CARBON ARC DCCC	1/2" X 14" 50/BX	28
WELDING ROD FLAT DCCC	3/8" X 5/32" X 12" 50/BX	20
WELDING ROD FLAT DCCC	5/8" X 3/16" X 12" 50/BX	18
WELDING ROD HARD 58	1/8" 5KG/BX	6
WELDING ROD HARD 58	5/32" 5KG/BX	14
WELDING ROD STEEL ALLOY	1/8" ( 3.2mm) 5 KG/BOX	5
WELDING ROD TRI-CAST	3/32 5KG/BX	9
WELDING ROD TRI-CAST	1/8 5KG/BX	10
WELDING ROD XTREME	1/16 0.5KG/BX	11
WELDING ROD XTREME	3/32" 5KG/BX	7
WELDING ROD XTREME	1/8" 5KG/BX	7
WELDING WIRE LA 111 T1-K3M	1/16 FLUX CORE 15KG SPOOL	68
WELDING WIRE LA T-91	.045 CARBON STEEL 15KG SPOOL	155
WELDING WIRE LA T-91	1/16 CARBON STEEL 15KG SPOOL	215
WELDING WIRE OUTERSHIELD	0.045 33LBS	52

WELDING WIRE OUTERSHIELD	0.062 33LBS-	0
WET WASHING SIEVE 200 MESH		2
WHITE GREASE	KLEEN FLOW 225G/TUBE	51
WINDEX	765ML	437
WINDOW PRIMER	F/ URETHANE WINDOW&WINDSHIELD	6
WINDSHIELD GLUE TREMSHIELD		44
WINDSHIELD WASHER CONCENTRATE	SOLUTION 1000LT TOTE	54
WINDSOCK (ORANGE/WHITE)	AVIOATION STANDARD 36" x 12'	6
WIRE OPEN ARC	110-O 1/16 33LB WB	15
XL3 MOLY ARCTIC GREASE	54KG/KEG	636
ZEP LIQUID BOTTLE WASHER	X-2887 20LT/PAIL	4

# Appendix C

## Cyanide

C.1: Cyanide – Properties, Uses, Storage & Handling (Dupont)

C.2: Material Safety Data Sheets – Sodium Cyanide

<u>C.1 Cyanide – Properties, Uses, Storage & Handling (Dupont)</u>

# Sodium Cyanide PROPERTIES, USES, STORAGE, AND HANDLING

**DUPONT CHEMICAL SOLUTIONS ENTERPRISE** 



#### Notice:

Sodium cyanide may be fatal if swallowed, inhaled, or with prolonged skin contact. Contact with acids, water, or weak alkalies liberates poisonous gas. Causes eye burns and may irritate skin. See "Personal Safety and First Aid." See DuPont's Sodium Cyanide Material Safety Data Sheet (MSDS) for more detailed safety and health information.

#### For Emergency Assistance, Call DuPont at

(901) 357-1546

(This is a transportation emergency Cyanide Hotline to our Memphis, TN plant. Do not use for routine technical or commercial information.)

> For Transportation Emergencies, Call DuPont at (901) 357-1546, Then Call CHEMTREC at (800) 424-9300

(See "Transportation Emergencies")

For commercial or technical information, call your DuPont marketing representative or a sales office listed on the back cover.

Sodium Cyanide: UN 1689

DO NOT USE AS A PESTICIDE.

See DuPont's MSDS for detailed instructions for treatment of cyanide poisoning.

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#### **Product Information**

#### Introduction

DuPont sodium cyanide (NaCN) is a white crystalline solid, available in a briquette or granular form. The briquettes are uniform in size, average 18 g (about ½3 oz) in weight, and have overall dimensions of approximately  $3.5 \times 3.5 \times 1.3$  cm ( $138 \times 138 \times 1/2$  in). They are resistant to breakage and dusting, easy to scoop up, and readily soluble in water. The granules are irregularly shaped particles, typically sized to generate a minimum of dust, and pass 90–100% through a 38-in screen and 3% maximum through a USS Sieve No. 50. Cyanobrik and Cyanogran are DuPont trade names (see **Figures 1** and **2**).

The Chemical Abstract Service Registry Number for NaCN is 143-33-9.

Table 1. Physical Properties of Sodium Cyanide

Formula Weight	49.007
Melting Point, °C (°F)	564 (1047)
Boiling Point, °C (°F)	1496 (2725)
Specific Gravity, Solid, 25°C (77°F)	1.60
Apparent Bulk Density, Solid, kg/m³ (lb/ft³)	880-960 (55-60)
Specific Gravity, Liquid, 850°C (1560°F)	1.19
	1.15
Heat of Formation, ΔH° f	
25°C, cal/g	<del>-</del> 438
25°C, kJ/kg	-1833
77°F, Btu/lb	<b>-</b> 788
Specific Heat, 26-73°C (78-163°F)	
Btu/lb-°F or cal/g-°C	0.335
kJ/kg-K	1.402
Heat of Fusion, mp, Btu/lb	77
cal/g	43
kJ/kg	179
Heat of Vaporization, bp, Btu/lb	1309
cal/g	727
kJ/kg	3041
Vapor Pressure, mmHg	•
800°C (14 <b>70</b> °F)	0.76
1200°C (2190°F)	89.8
1360°C (2480°F)	314.0
Solubility in Water, g NaCN/100 g water	
(see Figure 3), -20°C (-4°F)	35.4
20°C (68°F)	58.3

Table 2. Specifications and Typical Analysis

	Cyanobrik°/Cyanogran° and Bulk Solution Specifications	Typical Analysis*
Product Code 1220 (Cyanobrik®)		
Product Code 1222 (Cyanogran®)		
Sodium Cyanide, %	98.0 minimum	99
Sodium Hydroxide, %	0.5 maximum	0.3**
	0.06 minimum	
Product Code 1254 (Mining Grade)		
Sodium Cyanide, %	96.0 minimum	98
Sodium Hydroxide, %	0.5 maximum	0.3**
	0.06 minimum	
Product Code 1249 (30% Solution)		
Sodium Cyanide, %	28 minimum	30
Sodium Hydroxide, %	0.5 minimum	1

Typical analyses based on historical production performance. DuPont does not make any express or implied warranty that future production will demonstrate or continue to possess these analyses.

<sup>\*\*</sup>CAUTION: Sodium hydroxide (NaOH) content can be below 0.1% versus 0.3%, typical. NaOH should be added as outlined on page 3 to suppress hydrogen cyanide formation when making a water solution.

Figure 1. Cyanobrik®



#### **Uses and Applications**

The mining, metal, and chemical industries are the principal consumers of sodium cyanide. Typical uses include:

#### Ore Extraction and Ore Flotation

The cyanide process for extracting gold and silver from low-grade ores uses aqueous solutions of sodium cyanide with oxygen (air) to convert the noble metal (M) to soluble NaM(CN)<sub>2</sub>, from which M can be recovered either by precipitation with zinc dust or aluminum powder, carbon absorption, or electrowinning.

In the flotation of galena (lead sulfide) to separate it from mixed ores containing sphalerite (zinc sulfide) and pyrite (iron sulfide), sodium cyanide acts as a depressor; that is, it reduces the tendency of gangue materials to travel along on the froth and so impair the separation. Sodium cyanide finds similar use in the separation of pentlandite from pyrrhotite and molybdenite from copper concentrates by flotation. It is also used to purify the molybdenite by extraction of copper impurities.

#### **Electroplating**

Cyanide brass, cadmium, copper, gold, silver, and zinc baths deposit decorative and/or functional metal coatings on a variety of substrates. The good throwing power of the electrolyte causes relatively uniform deposition of the metal on intricately shaped parts. Small amounts of special additives in the baths give bright metal deposits, even on recessed surfaces of the work. Cyanide electroplating baths are versatile and capable of high production rates, whether plating large or small parts.

Figure 2. Cyanogran®



#### **Case Hardening Steel**

Molten salt baths containing 10–30% sodium cyanide find extensive use for case hardening steels at temperatures below 870°C (1600°F). The molten bath process is fast, easy to operate, and yields mixed carbon-nitrogen cases that have excellent wear resistance and uniformity. The addition of activators or accelerators to the bath results in deeper cases than those obtained with plain cyanide baths, but nitrogen pickup is usually less.

The life of keen-edged tools improves when the highspeed steel is cyanide-nitrided in molten cyanide baths at about 565°C (1050°F).

#### **Metal Cleaning**

Aqueous solutions of sodium cyanide are effective metal cleaners, especially for smut removal after acid pickling.

#### **Chemical Manufacture**

Sodium cyanide is used to make other chemicals that lead to such diverse products as pharmaceuticals, vitamins, animal food supplements, dyes and pigments, insecticides, sequestrants, polymers, and catalysts (see "Chemical Reactions" section).

In any synthesis or formulation involving sodium cyanide, no cyanide compound should survive in the final product as an impurity. This is especially important with regard to consumer products.

#### **Chemical Reactions**

The most hazardous reaction of sodium cyanide is with acids to form lethal hydrogen cyanide (HCN) gas, which is invisible and has a very weak odor. Smaller amounts of HCN gas can develop from contact with water and weak alkalies. When working with sodium cyanide, special provisions are needed to address HCN and cyanide toxicity.

Sodium cyanide deliquesces in moist air. Crystals of the dihydrate, NaCN-2H<sub>2</sub>O, form when saturated solutions of sodium cyanide cool at temperatures below 35°C (95°F) (see **Figure 3**). Sodium cyanide dissolves in methanol (6.05 g/100 mL saturated solution at 15°C [59°F]). It also dissolves in liquid ammonia (3.7 g/100 mL NH<sub>3</sub> at -33°C [-27°F]).

#### Sodium Cyanide Reactions in Water

Sodium cyanide dissolved in water forms an equilibrium between ionized sodium cyanide and highly volatile HCN. In sodium cyanide solutions, HCN concentrations must be kept low and/or contained to avoid toxic fumes. HCN formation varies with pH, cyanide concentration, and temperature. HCN in the air around a sodium cyanide solution will also be influenced by the amount of solution surface area and ventilation. At pH 8 or less, essentially all of the cyanide will be in the HCN form in dilute solutions (see **Figure 5**). To suppress HCN formation in typical concentrated sodium cyanide make-up solutions, a pH of 12 minimum (preferably 12.5–13) should normally be

used. In operating tanks, HCN in the vapor space above a 23% solution at room temperature typically will be about 250 ppm (without pH adjustment). With the pH raised to 12–12.5, HCN levels drop to around 125 ppm and below 50 ppm, around pH 13. Higher temperatures and solution concentrations increase HCN fumes. The following recommendation is made to minimize HCN formation with a modest pH increase.

When making a concentrated (e.g., 10–30%) cyanide solution, the proper procedure is to add about 0.5% sodium hydroxide (caustic) (about 50 lb [22.7 kg] sodium hydroxide/1000 gal [3785 L] water) before adding the cyanide. More sodium hydroxide will not be chemically harmful to the cyanide and will further reduce HCN levels; however, increased alkalinity increases eye hazards from splashes. For most operations, pH 12.5–13.0 is a good compromise to reduce HCN without excessively high alkalinity. If process chemistry prevents adding caustic, adequate precautions in design and operation must be taken to protect against HCN fumes, HCN polymerizatron, and cyanide hydrolysis.

pH is a log scale measurement, which means it takes about ten times as much sodium hydroxide to raise the pH each subsequent unit than the previous. For example, if it took 1 lb (0.45 kg) of sodium hydroxide to go from pH 9 to 10, it would take 10 lb (4.5 kg) to raise the pH from 10 to 11 and 100 lb (45.4 kg) from 11 to 12, etc. Therefore, even pH 11 water will need

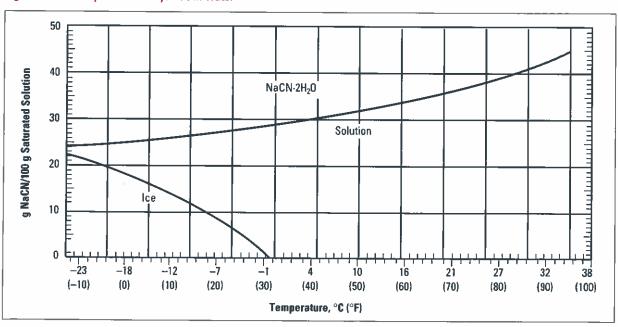
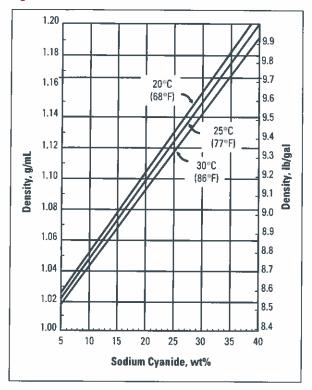


Figure 3. Solubility of Sodium Cyanide in Water

Figure 4. Densities of NaCN Solutions

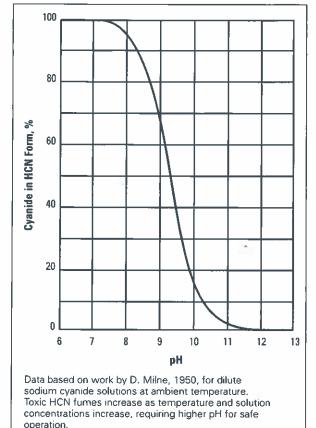


nearly as much sodium hydroxide added to it as would the same amount of water with pH 6 to 11. Water at pH 10 or 11 does not eliminate the need to add sodium hydroxide to reduce HCN.

# NOTE: Lime (calcium hydroxide) is not as effective as sodium hydroxide because of limited solubility, but it can be substituted to raise the pH to around 12.

Hydrogen cyanide molecules will polymerize to form the extremely inert HCN polymer. It is not unusual for HCN polymerization to occur in sodium cyanide solutions made without additional alkali, particularly if stored at elevated temperatures. In dilute solutions, HCN polymer will generate colors ranging from pale yellow to dark reddish brown. In stronger solutions, a dark brown precipitate resembling iron rust can form, which will interfere with heat transfer, plug pumps, orifices, etc., and may cause significant cyanide loss. HCN polymer will discolor chemical products. Again, high pH values give low HCN concentrations, which reduces the tendency for polymer formation.

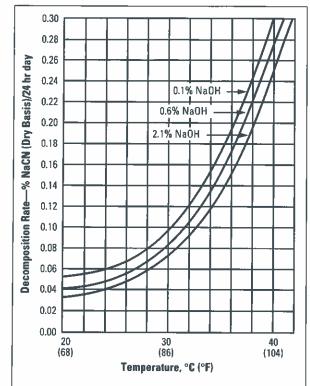
Figure 5. Effect of pH on Cyanide Ionization



Cyanide also reacts with water to form ammonia and formate ions. In the acid pH range, hydrolysis products are formic acid and ammonium salts. Alkaline solutions produce formate salts and volatile ammonia. With strong solutions, the volume of ammonia evolved can cause dangerous pressure buildup. One gallon of 30% sodium cyanide solution can produce more than 25 ft³. For this reason, extra vent capacity is recommended for large, heated storage tanks.

Ordinarily, the reaction between cyanide and water proceeds slowly. However, the reaction rate increases exponentially with an increase in temperature. The critical range is around 60–70°C (140–158°F). At temperatures below this range, the reaction can be controlled by cooling and, where practical, by dilution. At higher temperatures, however, the reaction can be uncontrollable in large tanks for highly concentrated solutions and may proceed until substantially all the cyanide has been consumed, unless temperature control and adequate cooling and venting capacity exist (see **Figure 6**).

Figure 6. Decomposition Rate of NaCN Solutions



NOTE: The % NaOH shown above is the concentration in the final solution. The NaCN (as shipped-containing 0.1% NaOH), when diluted to a 30% solution, will have only 0.03% NaOH in the final solution, unless additional NaOH is added. (Decomposition rates based on DuPont experimental data using 35% NaCN solution.)

Heated sodium cyanide solution storage tanks should be equipped with facilities to measure and control solution temperature (see "Equipment" section). Heating may be needed to assist in dissolving the NaCN and to prevent freezing (see **Figures 3** and **7**). Cooling could be critically important, if the hydrolysis reaction begins to generate heat faster than it can be dissipated to the surroundings.

All the reactions discussed above consume a portion of the stored cyanide, and all are inhibited by maintaining low solution temperature and high pH.

If special precautions are taken, acidification of sodium cyanide to produce HCN gas for a chemical reaction is an acceptable procedure, but only when handled in special equipment by technically qualified people after detailed planning. HCN operations require much more stringent plans, procedures, and standards for safe operation.

#### CAUTION

Even in laboratory quantities, the accumulation and storage of liquid or gaseous HCN should not be considered until its properties and the required safety precautions for handling it have been studied carefully. In addition to toxicity considerations, violent exothermic polymerization reactions can occur with liquid HCN, even in the absence of air or oxygen.

#### Other Reactions

Oxidants, such as alkaline hypochlorite solutions, hydrogen peroxide solutions, and permanganate solutions can oxidize cyanide to sodium cyanate. These oxidation reactions find wide use in the control of cyanides in effluents. They must be done in dilute solutions at proper pH to avoid formation of highly toxic gases (see "Cyanide Destruction" section).

Strong oxidants, such as nitrites and chlorates, react violently when added to molten sodium cyanide (or vice versa).

With the exception of lead and platinum, most metals (when finely divided) dissolve in aqueous sodium cyanide in the presence of oxygen.

Alkaline solutions of sodium cyanide dissolve waterinsoluble cuprous and zinc cyanide with formation of sodium tricyanocuprate and tetracyanozincate, respectively.

Reacting an alkyl halide, sulfate, or toluene-sulfonate ( $p\text{-CH}_3\text{C}_6\text{H}_4\text{SO}_2\text{OR}$ ) with sodium cyanide in aqueous alcohol, dimethylformamide (DMF), or similar aprotic solvent, leads to an alkyl cyanide (nitrile). Fusing a sodium aryl sulfonate with sodium cyanide yields the aryl nitrile; for example, sodium benzene-sulfonate (sodium phenyl sulfonate) gives benzonitrile (phenyl cyanide).

Hydrogen cyanide, generated by reacting an acid with sodium cyanide, is capable of adding to isolated double bonds and to the carbonyl group of an aldehyde or ketone. In the case of acetophenone, for example, the corresponding cyanohydrin forms, which hydrolyzes to atrolactic acid (a-phenylacetic acid,  $C_6H_5[CH_3]C(OH)COOH)$ . Similarly, when preparing an alpha-amino acid from an aldehyde or ketone by Strecker synthesis, the hydrogen cyanide and ammonia needed can come from ammonium cyanide formed in the reaction of sodium cyanide with ammonium chloride.

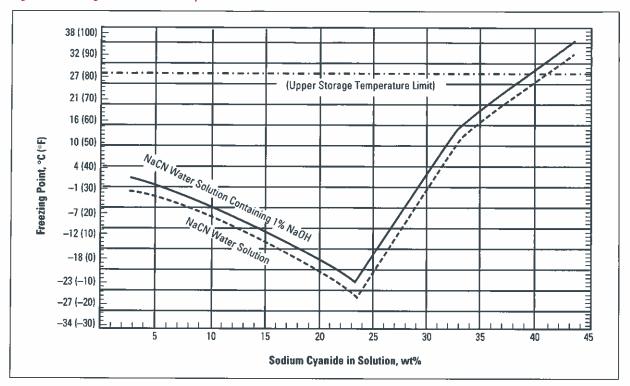


Figure 7. Freezing Points of Sodium Cyanide Solutions

One method of synthesizing the sodium salt of ethylen ediaminetetraacetic acid (tetrasodium EDTA, a chelating agent) combines ethylenediamine with formaldehyde and sodium cyanide in hot (80°C [175°F]) alkaline solution.

#### **Personal Safety and First Aid**

#### Health and Safety Hazards

See DuPont's MSDS for detailed instructions for treatment of cyanide poisoning.

Because of the toxicity of sodium cyanide, all persons working with it should be completely familiar with and observe the established safety practices.

Sodium cyanide is a fast-acting poison that can cause death quickly at low levels of exposure. Its toxic effect results from the inhibition of specific processes in body cells by restricting oxygen use in cellular respiration, particularly cells in the brain and heart. Poisoning can result from breathing cyanide gas, dust, or solution; absorption through the skin, particularly the eyes and other membranes and feet; and from ingestion. Contact with the skin may cause irritation and poisoning,

particularly with prolonged contact, or if open wounds, skin abrasions, or mucous membranes are involved. Sodium cyanide is alkaline and causes eye burns. Because of the possibility of skin absorption of hydrogen cyanide fumes, air monitoring for HCN is required, even for someone wearing an air mask.

Cyanide is not a cumulative poison, and it is not a carcinogen. It is believed that there are no chronic effects of cyanide poisoning, unless repeated, prolonged exposures, well above the established limits, were to occur. With prompt treatment, recovery from overexposure is normally quick and complete.

#### **CAUTION**

Sodium cyanide in contact with acids liberates highly toxic and flammable hydrocyanic acid gas. Also, toxic amounts of HCN can be liberated from water solutions of sodium cyanide or from contact with weak alkalies, if ventilation is inadequate (see "Sodium Cyanide Reactions in Water").

#### Safety Precautions

The basic safety precautions are:

- Do not breathe sodium cyanide dust, solution mist, or HCN gas. Wear an approved toxic dust and mist respirator when there is danger of inhaling cyanide dust or mist. Additional protection is required for HCN gas. The respirator should be one approved by the Mine Safety and Health Administration (MSHA) or by the National Institute for Occupational Safety and Health (NIOSH).
- Avoid skin contact with cyanides, particularly contact
  with open wounds or skin abrasions. Wash skin
  promptly and thoroughly if contact occurs. Wear
  protective gloves when handling solid cyanides.
  Wear rubber gloves when handling cyanide solutions
  (butyl rubber has very low permeability; neoprene is
  more rugged with low HCN permeability and is best for
  many jobs involving sodium cyanide).
- Do not get in eyes. Wear approved chemical splash goggles when handling cyanide solutions and when there is danger of splashing.
- Have available and wear other protective clothing as needed for job safety. Develop clothing change procedures to ensure cyanide is not scattered around the site or inadvertently carried home.
- Immediately sweep up any spilled cyanide and place in a suitable container. Wash area and/or treat contaminated area with dilute hypochlorite solution to destroy the cyanide. Comply with federal, state, or local regulations. If approved, drain to neutral chemical waste sewer.
- Take every precaution to keep acids from contacting sodium cyanide. Do not store with acids or weak alkalies.
- Do not eat, drink, or smoke in areas where cyanide is present. Do not handle or store food or beverages in cyanide areas.
- Store sodium cyanide in a ventilated, locked area.
  Containers should be kept closed and their contents
  dry. Do not store under sprinklers; sodium cyanide
  will not burn, but sprinkler activation could cause an
  environmental problem. Local fire regulations may
  require sprinklers. Always check and follow local
  regulations. If sprinkling is required, the area must be
  diked to contain the runoff.
- Have antidote, emergency plans, and training in place before using cyanide. See DuPont's Sodium Cyanide MSDS for detailed instructions.

#### Sodium Cyanide Exposure Limits

The U.S. Department of Labor (OSHA) has ruled that an employee's exposure to sodium cyanide in any 8-hr work shift of a 40-hr week shall not exceed a time-weighted average (TWA) of 5 mg of cyanide per cubic meter of air. It also cautions that because cyanide may penetrate the skin, control of vapor or dust inhalation alone may not be sufficient to prevent absorption of an excessive dose.

#### **HCN Exposure Limits**

The current OSHA workplace exposure limit for HCN is 11 mg/m³ (10 ppm), 8-hr average. A 1989 revision of the HCN limit (along with several hundred other chemicals) to 5 mg/m<sup>3</sup> (4.7 ppm), 15-min average, was vacated by court order, and the pre-1989 limit has been reinstated. OSHA (and others) also cautions that because hydrogen cyanide may penetrate the skin, control of vapor inhalation alone may not be sufficient to prevent absorption of an excessive dose.2.3 During all of this, the U.S. Mine Safety and Health Administration (MSHA) limit stayed at 10 ppm for HCN. The American Conference of Governmental Industrial Hygienists (ACGIH) recommends a 4.7 ppm limit instantaneous ceiling value with a similar skin notation.4 DuPont's experience supports the current OSHA and MSHA regulatory levels. However, as a matter of practice, DuPont does not have people working for prolonged periods under conditions approaching our upper limits, because we can design/operate to avoid prolonged exposure.

In summary, HCN air quality requirements will vary from jurisdiction to jurisdiction, and it is incumbent on each user to be aware of and comply with the rules regulating exposure to HCN in their regulatory jurisdiction. The specific OSHA and MSHA exposure limit for HCN is currently 11 mg/m³ (10 ppm) for an 8-hr TWA. The ACGIH Threshold Limit Value (TLV) is 5 mg/m³ (4.7 ppm), 15-min TWA. This is also a ceiling value. The DuPont Acceptable Exposure Limit (AEL) is 4.7 ppm, 15-min TWA with current regulatory ceiling limitations. All of these exposure limits carry a "skin" notation indicating that HCN may penetrate the skin; therefore, control of vapor inhalation alone may not be sufficient to prevent cyanide poisoning. Also, exposure limits are subject to change, and users should stay current with regulatory changes.

#### Symptoms of Cyanide Poisoning

Personnel should be constantly alert for symptoms of cyanide poisoning in themselves and others. The following poison symptoms can result from other causes, but should be investigated promptly when they occur around cyanide:

Reddening of the eyes*	Nausea*	
Irritation of the throat	Headache*	
Palpitation	Weakness of arms and legs	
Difficulty in breathing	Giddiness	
Salivation	Collapse	
Numbness	Convulsions	

#### Effects of Exposure to HCN Vapor

The following toxicity data show the "Reported Human Response to Various Concentrations of HCN Vapor":

Odor threshold
OSHA and MSHA exposure limit, 8-hr TWA <sup>2</sup>
Slight symptoms after several hours
Tolerated for ½ to 1 hr without significant immediate or delayed effects
Fatal within 1/2 to 1 hr
Rapidly fatal (if no treatment)

These numbers should be considered reasonable estimates only, because data are not exact and effects vary for different people. Also, heavy breathing from physical work will increase cyanide intake and reduce the time for symptoms to show. The "rapidly fatal" exposure level of 300 ppm assumes no first aid or medical treatment; either is very effective if used quickly.

Prompt administration of the recovery techniques has proven very effective, but emphasis must be placed on quick action. Seconds count, and treatment should be provided within about 200 sec (3–4 min). In case of overexposure to cyanide, quick action is required to sound the alarm, remove the patient from the contaminated area, and provide treatment. With prompt treatment as prescribed, recovery is normally quick and complete with no serious aftereffects. Treatment after 3–4 min can still be effective, but chances of recovery are reduced without prompt treatment. Unlike many poisons, cyanide is not cumulative. While cyanide poisoning can be rapidly fatal, no case should be considered hopeless. Treatment should be continued until a physician certifies death.

#### First Aid and Medical Treatment

See DuPont's MSDS for detailed instructions for treatment of cyanide poisoning.

# Ordering Cyanide Poisoning Antidote Kits and Amyl Nitrite

To obtain cyanide poisoning antidote kits and/or amyl nitrite ampules:

- Obtain a prescription from your local physician (required because amyl nitrite is a prescription product).
- Purchase the cyanide antidote kit from your pharmacy.
   The pharmacy can obtain the kit from Akorn
   Pharmaceuticals at (800) 932-5676.
- Amyl nitrite can also be purchased from your local pharmacy or from Save-A-Life Systems in Ft. Wayne, IN at (800) 933-5885.

#### Shipping

#### **Containers**

DuPont produces sodium cyanide in briquette and granular forms

A variety of containers are used as follows:

#### Nonreturnable Drums

Net weight 50-kg (110.2-lb) steel drums stacked 9–27 to a pallet.

Net weight 100-kg (220.4-lb) steel drums stacked eight to a pallet (see **Figure 8**).

Note: Drums can be stored three pallets high in a warehouse.

Reddening of the eyes (and skin) is one of the earliest symptoms, with nausea and/or headache common in low level exposure. These three are the most readily identifiable symptoms of low level cyanide overexposure.

Figure 8. Palletized 100-kg (220-lb) Drums Being Loaded into a Truck



Figure 10. Partially Loaded Container of IBCs



Figure 9. A Tuff-Pak Box Full of Bags



#### Tuff-Pak

 48 20-kg (44-lb) pinch-bottom, multiwall composite bags that are hermetically sealed and water-resistant.
 The bags are packaged in a wooden box on a self-contained pallet. Net weight 960 kg (2116 lb). Individual bags are not to be sold separately (see Figure 9).

#### Nonreturnable Intermediate Bulk Container (IBC)

Water-resistant package holding 1000 kg (2205 lb).
 Box dimensions are 44¾ × 44¾ × 44¾ in high (see Figure 10). For shipment, there are normally 20 IBCs in a container.

# Returnable FLO-BIN® Containers (Briquettes Only)

 1361- and 1497-kg (3000- and 3300-lb) net returnable FLO-BIN® containers, 12–14 bins per truck (see Figures 11 and 14).

#### **Bulk Trucks**

- 30% solution tank trailers (18,000 lb, 100% basis— 8180 kg) are available from the Carlin, NV terminal.
   They can be unloaded using the customer's pump or by plant or truck air (see Figure 13).
- Excel I tank trucks (6804–9526 kg [15,000–21,000 lb]).
   These trucks are equipped with circulation pumps that will permit water addition, dissolving by circulation, and then pumping off into the customer's tank (see Figure 15).
- Excel II tank trucks (15,876–18,144 kg [35,000–40,000 lb]) are unloaded by circulating premeasured water from a storage tank by a driver/technician (see Figures 12 and 16).

Figure 11. Bins corded two abreast on a flatbed trailer.

The bins are strapped to the trailer to prevent movement during transportation.



#### **Transportation**

Sodium cyanide must not be shipped by U.S. mail. The U.S. Department of Transportation (DOT)<sup>3,6</sup> hazard classification is Class 6.1 (Toxic) with an ID number of UN1689. A DOT toxic label is required. Transportation equipment must also be placarded with toxic placards in accordance with DOT requirements.

Sodium cyanide drums, Tuff-Paks, and IBCs should be shipped in vehicles that have secondary containment, such as vans. Pickup trucks, etc., should not be used. In case of an accident, secondary containment will minimize the impact of spilled material. Also, the driver must be in a separate compartment isolated from the cyanide.

Sodium cyanide must not be shipped with any acids (dry or liquid), food (human or animal), or ingredients for products used for human or animal consumption, including food, pharmaceuticals, food supplements, etc. Shipment with flammables and strong oxidizers should be avoided, as these mixed shipments can cause fire fighting complications, including cyanide runoff, in case of an accident and subsequent fire.

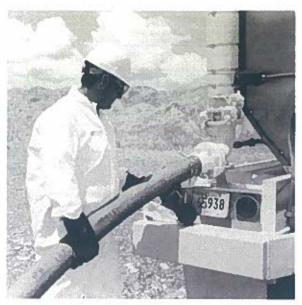
#### Storage and Handling

Storage and use areas should be designed so that accidental spillage can be contained and disposed of safely.

#### Storage Security

When sodium cyanide is stored, security should be maintained so only authorized people have access to it. Locked rooms or locked fenced areas can be used. Only the quantity required for immediate use should be removed from storage.

Figure 12. Excel II Truck



#### **Drums**

Drums of sodium cyanide should be stored inside and segregated from acids, weak alkalies, and strong oxidizing materials such as nitrates. It is also recommended that sodium cyanide be stored away from flammables and combustibles to minimize the chance of cyanide-water runoff as a result of fire fighting. Where local regulations permit, sodium cyanide drums should not be stored under sprinklers, because sodium cyanide will not burn in ordinary fires and cyanide runoff must be avoided. Storage with food or intermediates for human or animal products must be avoided. Observe all the precautions given under "Safety Precautions."

Figure 13. NaCN Solution Truck



If possible, open cyanide containers in the areas in which the cyanide is to be used. Remove the cover from the container, and remove the cyanide with a metal scoop or dump the cyanide from the container as required. Replace the cover on the container if the drum still contains cyanide. Store appropriately. Immediately pick up any spillage.

#### **Drum Disposal**

Sodium cyanide drums are nonreturnable, and it is against U.S. DOT regulations to reship or recoup the drum, except when approved for disposal of waste materials. Empty drums should be visually inspected for cyanide removal, flushed with large volumes of water, and then drained. This flush and drain cycle should be repeated three times to comply with federal regulations. Rinse water should be collected, treated, and disposed of according to local regulations (see "Cyanide Destruction" section). After cleaning, drum labels should be removed or obliterated to confirm cleaning, and the drum destroyed to prevent reuse. After the above, recycling as scrap metal is appropriate.

#### FLO-BIN®

A typical FLO-BIN® unloading and storage system is shown in **Figure 14**. A special design manual is available from DuPont. Contact DuPont's sales representative to discuss package and delivery options to meet specific needs.

Sodium cyanide is shipped in returnable FLO-BIN° containers (600 lb tare weight) to customers by truck or rail. In trailers, bins are shipped two abreast. Road weight limitations restrict the truck load to 12–14 bins. The advantages of FLO-BIN° deliveries are:

**Economics**—Customers using about 100,000 kg (200,000 lb) or more per year of sodium cya-nide can effect direct cost savings versus other smaller packages.

#### FLO-BIN® Customer Shipping Responsibility

When returning bins, the customer becomes the shipper and bears the responsibility for seeing that all safety precautions are carried out. DOT regulation 49 CFR 173.29 requires that a returnable container offered for transportation must meet the same standards as when the container previously held a greater quantity of a hazardous material. Returning bins do not have to be cleaned internally. Internal water washing is discouraged, because cyanide solution rundown is likely to create spillage, unless the bins are dried. External cleaning and inspection of each bin is required to ensure no cyanide is left on the outside and that the camlocks are locked closed with locking pins or wires.

When returning bins, secure bins with equipment provided. DO NOT reverse the poison placards (four) on car or truck. DO NOT remove or deface product label on bin.

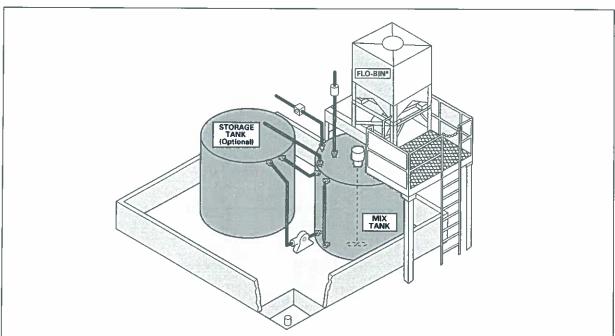


Figure 14. Typical FLO-BIN® Unloading System

#### Intermediate Bulk Container (IBC)

IBCs are the ideal package for most large consumers of NaCN who are not near a manufacturing facility. IBCs are readily handled with forklift trucks. DuPont recommends stacking IBCs two high for storage. The DuPont IBC holds 1000 kg (2205 lb) of NaCN. When diluted to 23% (the minimum freezing point of a NaCN/water solution) with pH at 12 or above, the IBC will make about 3900 L (1030 gal).

The IBC is emptied by lifting the bag by the straps using a forklift or hoist and then positioning and lowering the bag onto the specially designed knife slitter that cuts the bag, allowing the contents to drop into the dissolving tank.

#### **IBC** Decontamination and Disposal

Decontamination and disposal of used IBC materials must be properly handled to prevent environmental contamination and meet regulations. The bags should be empty-this should be confirmed visually or by weight before they are sent to a disposal facility. Then, a flush and drain cycle, repeated three times, will dissolve any residual cyanide left in the bag. Care must be taken to ensure the bag material does not overlap and prevent water contact—interfering with the dissolving process. Rinse water should be collected and recycled or treated and disposed of according to local regulations. As part of the cleaning process, labels should be removed or obliterated. If burning is the method of disposal, keep in mind that all of the NaCN will probably not be destroyed during the burning process, and the ashes must be properly contained.

#### 30% NaCN Solution

The DuPont terminal in Carlin, NV ships 30% NaCN solution as far away as 300 miles. The specially designed trailers hold 6300 gal—equivalent to 18,000 lb of dry NaCN. DuPont 30% NaCN solution is often the most convenient way to receive NaCN. The drivers are specially trained to make these deliveries and have a safety record envied in the trucking industry. DuPont offers technical assistance and support to assist with the design or modification of an existing system.

#### **Excel Trucks**

Excel trucks combine transportation and unloading safety by permitting shipment of solid sodium cyanide and unloading by dissolving the cyanide in place and then pumping the solution into appropriate storage. Excel I (see **Figure 15**) is ideal for customers with annual usage of ½ to 1 million lb, where 30% solution may not be desirable,

but Excel I is only available in limited geographical areas. Excel II delivery systems (see **Figure 16**) are ideal for many large sodium cyanide users and usually require an annual NaCN usage of about 1 million lb per year to justify the larger investment compared to handling FLO-BIN® containers. Cost factors such as location (transportation), expected operating life, available space, inventory requirements, etc., should be evaluated with DuPont to determine the best system for each specific situation. Design manuals are available for Excel systems.

When dissolving the sodium cyanide in Excel systems, position the tank truck so that the hose connection can be made between the truck pipe headers and the storage tank and pump piping.

For Excel II, meter into the storage tank the amount of water and sodium hydroxide (NaOH) needed to make the desired concentration of sodium cyanide solution (about 363 kg [800 lb] NaOH for 18,144 kg [40,000 lb] NaCN). The water temperature needed for dissolving the NaCN depends on the solution concentration needed, the circulation rate, and weather conditions. The water can be preheated up to about 38°C (100°F) to speed the dissolving, but heated water is frequently not needed, unless cold weather and cold water are involved (see "Chemical Reactions" section).

Cyanide decomposition rates increase with higher temperatures, with sodium formate and ammonia being formed. Because the decomposition reaction is exothermic, provision must be made for temperature monitoring and emergency cooling, if heating is used (see "Temperature Indicators, Insulation, Heating, and Cooling").

#### **Excel II Unloading Procedures**

Position valves. Start the pump. Check the system for leaks. Circulate the water continuously from the storage tank through the tank truck from the bottom to top to flood the truck and overflow back to the storage tank. Listen to the rattling briquettes by placing your ear near the bottom of the tank trailer. Dissolving should be complete about 30 min after the rattling stops, but system experience will provide the best guide. Then, pump the sodium cyanide solution from the tank truck into the storage tank. The dissolving time varies with circulation rate, water temperature, and final concentration, but dissolving can be complete in about 1½ hr under best conditions. Typically, 3–4 hr are needed in winter, without heat, for a 20–25% concentration.

Figure 15. Typical Excel I Unloading System

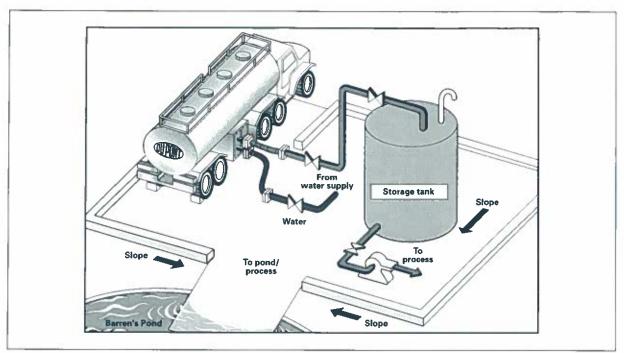
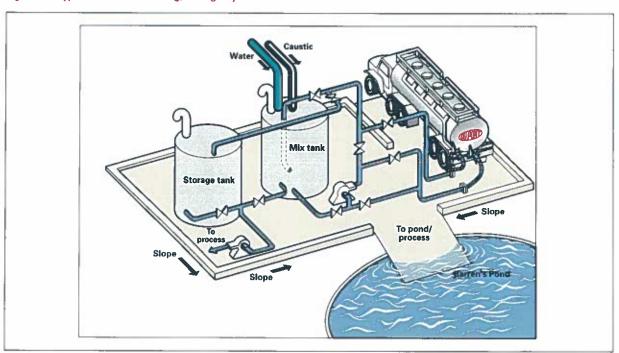


Figure 16. Typical Excel II Unloading/Storage System



#### Equipment

#### **Materials of Construction**

Carbon steel equipment is usually satisfactory for sodium cyanide solutions where velocities are not over 1.2-1.5 m/sec (4-5 ft/sec). At higher velocity, 304 or 316 stainless steel is sometimes recommended, because an erosion-corrosion effect occurs on steel. Carbon steel with a corrosion allowance may be acceptable instead of stainless to reduce cost, particularly if flow is frequently shut off so no erosion-corrosion is occurring. Even at very low velocities, welded, not threaded, piping should be used for all pipe materials to avoid leaks. To avoid leaks, no threaded connections should be used for piping instruments, drains, or any other connection. For pumps and instruments, 316 stainless is recommended. Valve operating conditions will determine whether carbon steel versus stainless can be used. Gaskets of Teflon® or nitrile-butadiene rubber (NBR), with Keylar® filler, are recommended for sodium cyanide solutions.

#### Solution Storage Tank

Sodium cyanide solution is stored in a tank typically fabricated from 1/4-in carbon steel plate. For bulk installations, top nozzles are recommended for a 15.2to 20.3-cm (6- to 8-in) pipe vent, a 10-cm (4-in) fill and circulating line, level indicator, high-level alarm, provision for water, and caustic additions and manway. A top 4-in nozzle with a physical break in the water line will prevent backflow. Bottom openings must also be provided for a 15-cm (6-in) pump suction line, temperature control-alarm, and (optional) heating/cooling coils. The size of the storage tank depends upon the sodium cyanide shipment size and concentration of solution required. For example, 18,150 kg (40,000 lb) of sodium cyanide makes 71,000 L (18,750 gal) of 23% solution. A vertical tank 4.9 m (16 ft) in diameter by 5.0 m (161/2 ft) high has a nominal 95,000-L (25,000-gal) capacity, which is sufficient to allow some outage and/or solution inventory (see Figure 17). The tank may be lined with neoprene to prevent buildup of iron content, if this is critical to the process. All pipe nozzles should be schedule 40 pipe minimum.

To provide mixing, a properly aligned dip tube/mixer with a siphon vent must be installed.

If the storage tank is located inside a building, all tank openings must be sealed and the tank vent routed outside the building to a safe location. This will prevent the discharge of hydrogen cyanide inside the building when the tank is being filled (see "Caustic Addition" on page 15).

#### Pump

For Excel II, a 316 stainless steel pump with a 10.2-cm (4-in) suction and a 7.6-cm (3-in) discharge is needed. It should be capable of delivering 2271–2650 L (600–700 gal) per minute at 18.3–21.3 m (60–70 ft) head. Small pumps will not provide sufficient agitation for tank car cyanide dissolving. Totally enclosed, fan-cooled, 25-HP motors are recommended.

#### Water Meter and Supply

A 7.6-cm (3-in) water meter with a preset totalizer and an automatic cutoff is recommended in the storage tank water addition line. There should be a physical disconnection in the water supply line to prevent cyanide from backing up into the water system.

#### Pipe and Hoses

Welded, not threaded, carbon steel (or 304 or 316 stainless steel) pipe with minimum flanges can be used (see "Materials of Construction" for piping and gaskets). Excel II circulation piping of 10.2-cm (4-in) is recommended (except for the line from the tank to the pump inlet, which should be 6 in, to minimize NPSH losses) with all valves, pumps, etc., located inside the dike and minimum flanges outside the dike. Tank car and truck hoses should be overdesigned to ensure against failure. Hose pressure rating should be 225psi minimum with burst pressure (including end connections) at least twice the rated pressure. Contact DuPont for hose design and vendor recommendations. Circulation piping system, including hoses, should be inspected before each use to protect against failure and a major spill. Hoses should be long enough to permit hookup, regardless of the direction the vehicle comes into the facility. Sodium cyanide solution trailer connections are located at the rear (bumper level) and middle (on top) of the trailer; Excel II trailer connections are located at the rear (bumper level); and Excel I connections are in the box located in the middle of the trailer (ground level). All connections are quick connects, except for the top solution connection, which may be either bolted or quick connect.

#### **Drainage Control**

The storage tank should be diked and have a sealed concrete bottom. No dike drain should be installed, because it might leak or be left open. The unloading area should be curbed and drainage control provided that will prevent spilled cyanide solution from draining into public water courses (see "Pipe and Hoses"). Specific spill control requirements depend on surroundings and local regulations. Impounded sodium cyanide can be reclaimed or chemically destroyed.

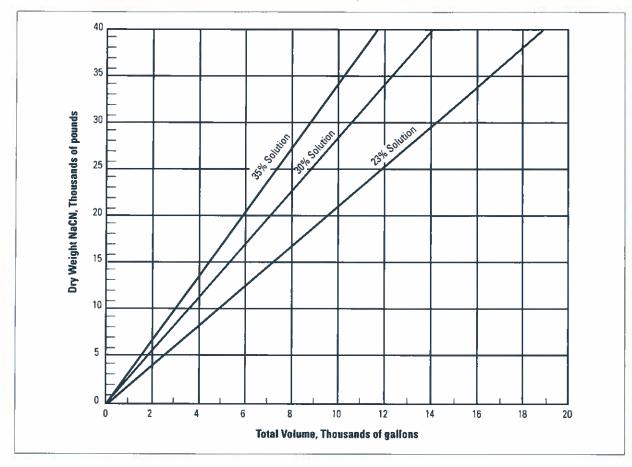


Figure 17. Solution Volume Curves—Gallons of Solution from Dry Weight at 35°C (95°F)

#### Filter

To obtain a clear solution, a filter can be used. It should be located so that it filters the solution between the tank car and the storage tank and, also, between the storage tank and process. Filters are not needed if a clear solution is not required.

#### Level Indicator and Alarm

A sonic liquid level indicator is preferred over a float-type instrument, as it is more reliable, easier to read, and can be installed at a convenient location. It is recommended that a high-level alarm system, equipped to shut off the pump, be installed to prevent overflowing the storage tank.

# Temperature Indicators, Insulation, Heating, and Cooling

Sodium cyanide solution should be stored above the crystallization point (see **Figure 3**), but normally below 38°C (100°F), when possible, to reduce decomposition (see **Figure 6**). A temperature control system may be needed for high concentrations. Tank insulation can be fiberglass with a sheet aluminum cover, if climate and solution concentration warrant. Low pressure steam

can be used to reduce localized overheating. The same coils can be used for circulating cold water when necessary. Alternately, live steam can be injected, if small concentration changes from condensation are acceptable.

#### CAUTION

Read the "Chemical Reactions" section carefully and note the dangers at high temperatures.

#### **Caustic Addition**

To minimize highly toxic HCN formation and prevent color formation from HCN polymerization in the stored sodium cyanide solution, sufficient caustic (sodium hydroxide) is added to give a pH 12, preferably 12.5–13. Caustic addition to provide a 0.3–0.5% solution (about 50 lb NaOH per 1000 gal water) is usually sufficient. A 50% caustic solution can be used during the summer, but 25% solution is recommended for winter to avoid freezing. Use of 22.7-kg (50-lb) bags of bead caustic may be convenient. Additions can be made directly to the tank. Caustic should be added before sodium cyanide is added. Where process chemistry prevents caustic addition, HCN formation will increase, which must be controlled by ventilation and/or other means.

#### **Transportation Emergencies**

#### How to Get Help

DuPont wants to be called about any transportation incident involving DuPont cyanide, regardless of whether a spill occurred. In the event of a transportation incident or other problem involving DuPont cyanide that requires immediate help, call the DuPont Cyanide Hotline at our Memphis, Tennessee plant:

Call Collect, Day or Night

(901) 357-1546

NOTE: Do not use this number for non-emergencies. Contact the sales office listed on the back cover for routine commercial or technical information.

Calling the DuPont Cyanide Hotline is the fastest way DuPont can provide guidance to assist in handling an emergency. DuPont will evaluate whether a team of specialists should be sent to the scene.

In the United States and Canada, CHEMTREC can also be called at:

(800) 424-9300

In the rest of the world, call CHEMTREC at:

001-703-527-3887

CHEMTREC uses Language Services for non-English speakers.

The DuPont or CHEMTREC information specialist on duty will ask the name and location of the caller, the name of the shipper, the product, the shipping point and destination as well as what happened, nature of any injuries, weather conditions, proximity to populated areas, etc. If you call CHEMTREC, the information specialist will then contact the manufacturer (DuPont) for further assistance.

In Canada, CANUTEC can also be called in Ottawa, Ontario, at:

#### (613) 996-6666

#### Action at the Scene

The following is intended to provide guidance to first responders to a DuPont sodium cyanide transportation emergency incident.

 For any transportation incident involving DuPont sodium cyanide, call DuPont for assistance as soon as possible, regardless of whether there is a spill.

- 2. Avoid overreaction that can occur because "cyanide" is involved. Remember, in most cases, you are dealing with a dry, solid, nonvolatile material that is normally easy to clean up, unless the cyanide has contacted acid or some other incompatible chemical or is spilled into a water system. If sodium cyanide solution is spilled, the amount of HCN gas evolved will probably be greater than if dry sodium cyanide was spilled, but because of the amount of caustic contained in sodium cyanide solution, the amount of HCN will probably still be well below lethal limits (see "Effects of Exposure to HCN Vapor" on page 8)—unless the HCN vapors are somehow contained or the solution is in contact with an acid. Gasoline, diesel, or other motor oils do not generally cause large amounts of cyanide gas.
  - The need for evacuation is highly unlikely. Unless acid and cyanide are mixed, hydrogen cyanide gas formation is limited.
  - b. While rain or any water contact with sodium cyanide can produce hydrogen cyanide gas, the amount of gas is small and would not require evacuation. While dangerous levels of gas can develop in enclosed spaces, wet sodium cyanide in the open can be shoveled up by standing upwind during cleanup.
- Shovel the cyanide into drums, plastic bags, or any suitable container.
- 4. If sodium cyanide solution is spilled, contain the spill as soon and as much as possible. Keep sodium cyanide out of lakes, streams, or any other water. Block off sewer system, drainage, or any other water access. Even small concentrations of cyanide can be fatal to aquatic life. As soon as is practical, place the spilled material into a container suitable for movement to a proper disposal area.
- As with all chemical spills, approach the scene from upwind to determine what chemicals are involved. With sodium cyanide spillage, check for battery acid spillage.
- 6. Keep people (nonresponders) away.
- 7. Halt or divert traffic to prevent spreading the cyanide.
- If raining, cover any spilled sodium cyanide with a tarp, plastic, or anything available to minimize water contact and subsequent cyanide-water runoff. Divert any water streams around the cyanide.
- 9. To repeat, call the DuPont Cyanide Hotline at:

(901) 357-1546

## **Cyanide Destruction**

The entire process in which by-products are generated should be reviewed for possible recycle of sodium cyanide, instead of disposal. If recycle is not feasible, ion exchange and reverse osmosis may be useful for concentrating cyanides, but destruction is usually easier and more economical.

The most effective and widely used chemical methods to destroy cyanide are oxidizing it to cyanate (CNO) with hypochlorite or hydrogen peroxide. Both methods are effective for oxidizing free and weak acid-dissociable cyanide.

For concentrated cyanide solutions, long-term hightemperature heating will destroy much of the cyanide with associated ammonia release.

#### Chlorination

#### CAUTION

Concentrated hypochlorite should not be mixed with concentrated cyanide solutions or solid cyanide, because highly toxic cyanogen chloride gas will be released. Very dilute solutions, in the correct pH range, should be used.

Chlorination of dilute sodium cyanide solutions can be accomplished by treatment with diluted solutions of sodium hypochlorite, calcium hypochlorite, or by generating hypochlorite from NaOH and Cl<sub>2</sub> gas. The choice of hypochlorite is an economic and safety decision. Solution concentrations of 1% sodium cyanide and 1% hypochlorite can be reacted if mixed slowly (over, say, 10 min) and with proper pH control.

Hypochlorite reacts with cyanide ions (CNT) to produce highly toxic cyanogen chloride, which, at pH 10–11, hydrolyzes promptly to form cyanate ions (CNOT). Because cyanogen chloride is a poisonous gas with little water solubility, the treatment process must be designed and operated to prevent cyanogen chloride fumes. Fumes are best controlled by limiting the cyanide concentration to a few thousand parts per million and controlling pH. Below pH 10, cyanogen chloride release increases; above pH 11, cyanide destruction slows, particularly above pH 11.5.

Further chlorination to destroy cyanate, sometimes referred to as "complete" chlorination, can be accomplished with additional chlorine. After reaction at pH 10.5 for 10 min or more, the pH must be reduced to 7.5–9, preferably 8–8.5, and maintained at that pH until the reaction is complete. Completion of both reactions typically requires at least 2 hr and can use eight or more parts of Cl<sub>2</sub> per part of CN<sup>-</sup> (versus about three parts of

 $\text{Cl}_2$  for oxidation to CNO<sup>-</sup>), while producing  $\text{CO}_2$  and  $\text{N}_2$  as reaction products. Chlorination is effective for cyanide destruction and can be automated for continuous systems. However, other waste stream components are often chlorinated, which increases chlorine consumption and may produce undesirable by-products in the effluent.

#### pH 10-11

Normally fastest reaction rate. Reduced HCN release and pH drop during treatment favor starting around pH 11. Higher pH will slow reaction, particularly above 11.5.

#### **CAUTION**

Adequate ventilation and HCN monitoring are important and more so as cyanide concentrations increase and pH decreases, particularly below pH 11.

#### pH Below 10

Causes slower reaction and release of HCN and/or cyanogen chloride gas (highly toxic, like HCN, and a powerful lachrymator, causing tearing of the eyes). Also, there is greatly increased concern about HCN release.

#### Acid pH

#### **CAUTION**

In addition to toxic gas release, acidic conditions can result in nitrogen trichloride formation that can separate as an insoluble oil-like material and explode violently, even in small amounts.

#### **Hydrogen Peroxide Oxidation**

#### **CAUTION**

Concentrated hydrogen peroxide should not be mixed with concentrated cyanide solutions or solid sodium cyanide, because highly toxic HCN or ammonia gas could be released. Also, high heat and oxygen gas release may cause foaming or eruption and splash workers. Dilution minimizes these problems.

Depending on the composition of the waste, additions of copper or formaldehyde may be required to destroy cyanide. The waste liquor is adjusted to pH 11 (10.5–11.5), formaldehyde or copper ions (typically with copper sulfate) added if needed, and hydrogen peroxide mixed with the solution. The solution must be agitated mechanically or with air. The reaction rate is dependent on temperature. Dilute wastes can be warmed to 38–54°C (100–130°F), but temperature elevation is usually less economical than adding 10–20% excess peroxide to shorten reaction time (which is normally about ½–1 hr at ambient temperature). Dilution and/or controlled addition rate may be needed when treating more concentrated wastes.

Chlorination is faster than peroxide oxidation and is frequently more adaptable to continuous destruction systems. Where speed is not critical, such as in batch tanks, hydrogen peroxide has several advantages including:

- Cyanogen chloride and chlorinated by-products are not produced.
- More concentrated cyanide wastes can be treated safely.
- · The hazards of handling chlorine are avoided.
- Chlorine/chloride in water discharges are prohibited in some locations and can be avoided with peroxide.
- Sulfur compounds will react with hypochlorite, but not peroxide, and can increase hypochlorite costs substantially.
- Peroxide may destroy other objectionable organics.

By-products from peroxide treatment are cyanate, ammonia, and glycolic acid amide. Cyanate does not revert to cyanide in surface waters or sewage treatment systems, according to a U.S. Public Health Service study. Both the cyanate and glycolic acid amide are biodegradable. The cyanate can be readily hydrolyzed in acid solutions to ammonia.

### Hydrolysis

Hydrolysis is sometimes a practical treatment for strong sodium cyanide solutions. Simply heating a 10% sodium cyanide solution for about 36 hr to 95–100°C (about 210°F) should reduce the cyanide content well below 1%, where chemical oxidation can be used more effectively. Provisions should be made to accommodate the ammonia that will be generated (see "Sodium Cyanide Reactions in Water").

#### **Metal Complexes**

Strongly bonded metal cyanides, especially iron cyanides (ferrocyanide and ferricyanide), are apt to be found in cyanide waste streams. These will not be detected by simple analytical procedures, such as titration with silver nitrate, which are normally used for measuring "free" or "weak acid-dissociable" cyanides. However, they will be included in the "total cyanide" analyses using acid distillation procedures. These complexes are not effectively destroyed by the commonly used waste treatment processes. If regulations require removal of these generally stable complexes of low toxicity, other treatment methods such as precipitation to produce a solid waste may be required.

#### Handling Spills

Sodium cyanide spills should be cleaned up promptly to minimize exposure of people and the environment. Shovel and sweep dry spilled material into a drum or suitable container. Keep dry spilled material dry. If solutions are spilled, immediately contain them to prevent contaminating nearby water. Contact DuPont for additional actions at a spill scene. If raining, covering the spill will reduce sodium cyanide dissolving and runoff. Decontamination of an area, after cleaning up as much cyanide as possible, can be accomplished with hypochlorite solution. A small amount of caustic (1 oz/5 gal hypochlorite solution) will help keep the pH in the 10–11 range.

#### **References and Notes**

- Elial, E. L., and Freeman, J. P., "Organic Syntheses," Wiley, New York, Coll. Vol. 4, 58–62.
- 2. OSHA, 29 CFR 1910.1000, Air Contaminants.
- 3. Due to changing governmental regulations, such as those of the Department of Transportation, Department of Labor, U.S. Environmental Protection Agency, and the Food and Drug Administration, references to governmental requirements may be superseded. Consult and follow the current governmental regulations, such as Hazard Classification, Labeling, Worker Exposure Limitations, and Waste Disposal procedures, for up-to-date requirements for sodium cyanide.
- 4. "HYDROGEN CYANIDE and CYANIDE SALTS" published in 2001 by American Conference of Governmental Industrial Hygienists (ACGIH) 1330 Kemper Meadow Drive, Cincinnati, OH 45240; telephone (513) 742-2020. The ACGIH recommends a 4.7 ppm ceiling for HCN. Both OSHA and ACGIH advise avoiding skin contact.
- "Occupational Exposure to Hydrogen Cyanide and Cyanide Salts," NIOSH Criteria Document, U.S. Department of Health, Education, and Welfare, 1976.
- 6. DOT, 49 CFR 712.101, Hazardous Material Table.

## **DuPont Chemical Solutions Enterprise**

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Wilmington, DE 19880-0023
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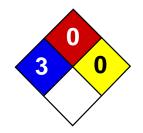
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C.2 Material Safety Data Sheets – Sodium Cyanide



Health	3
Fire	1
Reactivity	0
Personal Protection	J

# Material Safety Data Sheet Sodium Cyanide MSDS

# **Section 1: Chemical Product and Company Identification**

Product Name: Sodium Cyanide

Catalog Codes: SLS2314, SLS3736

CAS#: 143-33-9

**RTECS: VZ7525000** 

TSCA: TSCA 8(b) inventory: Sodium Cyanide

CI#: Not available.

Synonym:

Chemical Name: Sodium Cyanide

Chemical Formula: NaCN

**Contact Information:** 

Sciencelab.com, Inc. 14025 Smith Rd. Houston, Texas 77396

US Sales: 1-800-901-7247

International Sales: 1-281-441-4400

Order Online: ScienceLab.com

CHEMTREC (24HR Emergency Telephone), call:

1-800-424-9300

International CHEMTREC, call: 1-703-527-3887

For non-emergency assistance, call: 1-281-441-4400

# **Section 2: Composition and Information on Ingredients**

#### Composition:

Name	CAS#	% by Weight
Sodium Cyanide	143-33-9	100

**Toxicological Data on Ingredients:** Sodium Cyanide: ORAL (LD50): Acute: 6.44 mg/kg [Rat]. DERMAL (LD50): Acute: 10.4 mg/kg [Rabbit].

#### **Section 3: Hazards Identification**

#### **Potential Acute Health Effects:**

Very hazardous in case of skin contact (irritant), of eye contact (irritant), of ingestion, of inhalation. Hazardous in case of skin contact (permeator). Corrosive to eyes and skin. The amount of tissue damage depends on length of contact. Eye contact can result in corneal damage or blindness. Skin contact can produce inflammation and blistering. Inhalation of dust will produce irritation to gastro-intestinal or respiratory tract, characterized by burning, sneezing and coughing. Severe over-exposure can produce lung damage, choking, unconsciousness or death. Inflammation of the eye is characterized by redness, watering, and itching. Skin inflammation is characterized by itching, scaling, reddening, or, occasionally, blistering.

#### **Potential Chronic Health Effects:**

CARCINOGENIC EFFECTS: Not available. MUTAGENIC EFFECTS: Not available. TERATOGENIC EFFECTS: Not available. DEVELOPMENTAL TOXICITY: Not available. The substance may be toxic to skin, eyes, central nervous system (CNS). Repeated or prolonged exposure to the substance can produce target organs damage. Repeated exposure of the eyes to a low level of dust can produce eye irritation. Repeated skin exposure can produce local skin destruction, or dermatitis. Repeated inhalation of dust can produce varying degree of respiratory irritation or lung damage. Repeated exposure to a highly toxic material may produce general deterioration of health by an accumulation in one or many human organs.

#### Section 4: First Aid Measures

#### **Eye Contact:**

Check for and remove any contact lenses. In case of contact, immediately flush eyes with plenty of water for at least 15 minutes. Cold water may be used. Get medical attention immediately.

#### **Skin Contact:**

In case of contact, immediately flush skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. Cover the irritated skin with an emollient. Cold water may be used. Wash clothing before reuse. Thoroughly clean shoes before reuse. Get medical attention immediately.

#### **Serious Skin Contact:**

Wash with a disinfectant soap and cover the contaminated skin with an anti-bacterial cream. Seek immediate medical attention.

#### Inhalation:

If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical attention.

#### Serious Inhalation:

Evacuate the victim to a safe area as soon as possible. Loosen tight clothing such as a collar, tie, belt or waistband. If breathing is difficult, administer oxygen. If the victim is not breathing, perform mouth-to-mouth resuscitation. WARNING: It may be hazardous to the person providing aid to give mouth-to-mouth resuscitation when the inhaled material is toxic, infectious or corrosive. Seek immediate medical attention.

#### Ingestion:

If swallowed, do not induce vomiting unless directed to do so by medical personnel. Never give anything by mouth to an unconscious person. Loosen tight clothing such as a collar, tie, belt or waistband. Get medical attention immediately.

Serious Ingestion: Not available.

# **Section 5: Fire and Explosion Data**

Flammability of the Product: May be combustible at high temperature.

Auto-Ignition Temperature: Not available.

Flash Points: Not available.

Flammable Limits: Not available.

Products of Combustion: Some metallic oxides.

Fire Hazards in Presence of Various Substances: Slightly flammable to flammable in presence of acids, of moisture.

### **Explosion Hazards in Presence of Various Substances:**

Risks of explosion of the product in presence of mechanical impact: Not available. Risks of explosion of the product in presence of static discharge: Not available.

#### **Fire Fighting Media and Instructions:**

SMALL FIRE: Use DRY chemical powder. LARGE FIRE: Use water spray, fog or foam. Do not use water jet.

### Special Remarks on Fire Hazards:

Dangerous on contact with acids, acid fumes, water or stream. It will produce toxic and flammable vapors of CN-H and sodium oxide. Contact with acids and acid salts causes immediate formation of toxic and flammable hydrogen cyanide gas. When heated to decomposition it emits toxic fumes hydgrogen cyanide and oxides of nitrogen

**Special Remarks on Explosion Hazards:** Fusion mixtures of metal cyanides with metal chlorates, perchlorated or nitrates causes a violent explosion

#### Section 6: Accidental Release Measures

Small Spill: Use appropriate tools to put the spilled solid in a convenient waste disposal container.

#### Large Spill:

Corrosive solid. Poisonous solid. Stop leak if without risk. Do not get water inside container. Do not touch spilled material. Use water spray to reduce vapors. Prevent entry into sewers, basements or confined areas; dike if needed. Eliminate all ignition sources. Call for assistance on disposal. Be careful that the product is not present at a concentration level above TLV. Check TLV on the MSDS and with local authorities.

# **Section 7: Handling and Storage**

#### Precautions:

Keep locked up.. Keep container dry. Keep away from heat. Keep away from sources of ignition. Empty containers pose a fire risk, evaporate the residue under a fume hood. Ground all equipment containing material. Do not ingest. Do not breathe dust. Never add water to this product. In case of insufficient ventilation, wear suitable respiratory equipment. If ingested, seek medical advice immediately and show the container or the label. Avoid contact with skin and eyes. Keep away from incompatibles such as oxidizing agents, acids, moisture.

Storage: Keep container tightly closed. Keep container in a cool, well-ventilated area. Do not store above 24°C (75.2°F).

# **Section 8: Exposure Controls/Personal Protection**

#### **Engineering Controls:**

Use process enclosures, local exhaust ventilation, or other engineering controls to keep airborne levels below recommended exposure limits. If user operations generate dust, fume or mist, use ventilation to keep exposure to airborne contaminants below the exposure limit.

#### Personal Protection:

Splash goggles. Synthetic apron. Vapor and dust respirator. Be sure to use an approved/certified respirator or equivalent. Gloves.

#### Personal Protection in Case of a Large Spill:

Splash goggles. Full suit. Vapor and dust respirator. Boots. Gloves. A self contained breathing apparatus should be used to avoid inhalation of the product. Suggested protective clothing might not be sufficient; consult a specialist BEFORE handling this product.

#### **Exposure Limits:**

STEL: 5 (mg/m3) from ACGIH (TLV) [United States] SKIN CEIL: 4.7 from NIOSH CEIL: 5 (mg/m3) from NIOSHConsult local authorities for acceptable exposure limits.

## **Section 9: Physical and Chemical Properties**

Physical state and appearance: Solid. (Granular solid. Flakes solid.)

Odor:

Faint almond-like odor. Odorless when perfectly dry. Emits odor of hydrogen cyanide when damp.

Taste: Not available.

Molecular Weight: 49.01 g/mole

Color: White.

pH (1% soln/water): Not available.

Boiling Point: 1496°C (2724.8°F)

Melting Point: 563°C (1045.4°F)

Critical Temperature: Not available.

Specific Gravity: 1.595 (Water = 1)

Vapor Pressure: Not applicable.

Vapor Density: Vapor Density of Hydrogen Cyanide gas: 0.941

Volatility: Not available.

Odor Threshold: Not available.

Water/Oil Dist. Coeff.: Not available. Ionicity (in Water): Not available.

**Dispersion Properties:** See solubility in water.

Solubility:

Soluble in cold water. Slightly soluble in Ethanol

# **Section 10: Stability and Reactivity Data**

Stability: The product is stable.

**Instability Temperature:** Not available.

Conditions of Instability: Excess heat, moisture, incompatibles.

Incompatibility with various substances: Reactive with oxidizing agents, acids, moisture.

Corrosivity:

Corrosive in presence of aluminum. Non-corrosive in presence of glass.

### **Special Remarks on Reactivity:**

Violent reaction with fluorine gas, magnesium, nitrates, nitric acid. Dangerous on contact with acids, acid fumes, water or stream. It wil produce toxic and flammable vapors of CN-H and sodium oxide. Cyanide may react with CO2 in ordinary air to form toxic hydrogen cyanide gas. Strong oxidizers such as acids, acid salts, chlorates, and nitrates. Contact with acids and acid salts causes immediate formation of toxic and flammable hydrogen cyanide gas.

Special Remarks on Corrosivity: Corrosive to aluminum

Polymerization: Will not occur.

# **Section 11: Toxicological Information**

Routes of Entry: Absorbed through skin. Dermal contact. Eye contact. Inhalation. Ingestion.

**Toxicity to Animals:** 

Acute oral toxicity (LD50): 6.44 mg/kg [Rat]. Acute dermal toxicity (LD50): 10.4 mg/kg [Rabbit].

Chronic Effects on Humans: May cause damage to the following organs: skin, eyes, central nervous system (CNS).

Other Toxic Effects on Humans:

Very hazardous in case of skin contact (irritant), of ingestion, of inhalation. Hazardous in case of skin contact (permeator).

Special Remarks on Toxicity to Animals: Not available.

**Special Remarks on Chronic Effects on Humans:** May cause adverse reproductive effects (maternal and paternal fertility) based on animal data.

#### **Special Remarks on other Toxic Effects on Humans:**

Acute Potential Health effects: Skin: May cause itching and irritation. May be fatal if absorbed through injured skin with symtpoms similar to those noted for inhalation and ingestion. Eyes: May cause eye irritation and eye damage. Inhalation: May cause respiratory tract irritation. May be fatal if inhaled. The substance inhibits cellular respiration causing metabolic asphyxiation. May cause headache, weakness, dizziness, labored breathing, nausea, vomiting. May be followed by cardiovascular effects, unconciousness, convulsions, coma, and death Ingestion: May be fatal if swallowed. May cause

gastrointestinal tract irritation with nausea, vomiting. May affect behavior and nervous systems(seizures, convulsions, change in motor activity, headache, dizziness, confusion, weakness stupor, aniexity, agitation, tremors), cardiovascular system, respiration (hyperventilation, pulmonary edema, breathing difficulty, respiratory failure), cardiovascular system (palpitations, rapid heart beat, hypertension, hypotension). Massive doses by produce sudden loss of conciousness and prompt death from respiratory arrest. Smaller but still lethal doses on the breath or vomitus. Chronic Potential Health Effects: Central Nervous system effects (headaches, vertigo, insomnia, memory loss, tremors, fatigue), fatigue, metabolic effects (poor appetite), cardiovascular effects (chest discomfort, palpitations), nerve damage to the eyes, or dermatitis, respiratory tract irritation, eye irritation, or death can occur. may prolong the illness for 1 or more hours. A bitter almond odor may be noted

# **Section 12: Ecological Information**

Ecotoxicity: Not available.

BOD5 and COD: Not available.

#### **Products of Biodegradation:**

Possibly hazardous short term degradation products are not likely. However, long term degradation products may arise.

Toxicity of the Products of Biodegradation: The products of degradation are less toxic than the product itself.

Special Remarks on the Products of Biodegradation: Not available.

# **Section 13: Disposal Considerations**

#### **Waste Disposal:**

Waste must be disposed of in accordance with federal, state and local environmental control regulations.

# **Section 14: Transport Information**

**DOT Classification:** CLASS 6.1: Poisonous material. **Identification:** : Sodium cyanide UNNA: 1689 PG: I **Special Provisions for Transport:** Marine Pollutant

# **Section 15: Other Regulatory Information**

#### **Federal and State Regulations:**

Connecticut carcinogen reporting list.: Sodium Cyanide Illinois chemical safety act: Sodium Cyanide New York release reporting list: Sodium Cyanide Rhode Island RTK hazardous substances: Sodium Cyanide Pennsylvania RTK: Sodium Cyanide Minnesota: Sodium Cyanide Massachusetts RTK: Sodium Cyanide Massachusetts spill list: Sodium Cyanide New Jersey: Sodium Cyanide New Jersey spill list: Sodium Cyanide Louisiana RTK reporting list: Sodium Cyanide Louisiana spill reporting: Sodium Cyanide California Director's List of Hazardous Substances: Sodium Cyanide TSCA 8(b) inventory: Sodium Cyanide TSCA 4(a) final test rules: Sodium Cyanide TSCA 8(a) PAIR: Sodium Cyanide TSCA 8(d) H and S data reporting: Sodium Cyanide TSCA 12(b) one time export: Sodium Cyanide SARA 302/304/311/312 extremely hazardous substances: Sodium Cyanide CERCLA: Hazardous substances:: Sodium Cyanide: 10 lbs. (4.536 kg)

### Other Regulations:

OSHA: Hazardous by definition of Hazard Communication Standard (29 CFR 1910.1200). EINECS: This product is on the European Inventory of Existing Commercial Chemical Substances.

#### Other Classifications:

#### WHMIS (Canada):

CLASS B-6: Reactive and very flammable material. CLASS D-1A: Material causing immediate and serious toxic effects (VERY TOXIC). CLASS E: Corrosive solid.

#### DSCL (EEC):

R27/28- Very toxic in contact with skin and if swallowed. R41- Risk of serious damage to eyes. S1/2- Keep locked up and out of the reach of children. S26- In case of contact with eyes, rinse immediately with plenty of water and seek medical advice. S28- After contact with skin, wash immediately with plenty of water S36/37- Wear suitable protective clothing and gloves. S39-Wear eye/face protection. S45- In case of accident or if you feel unwell, seek medical advice immediately (show the label where possible). S46- If swallowed, seek medical advice immediately and show this container or label.

#### HMIS (U.S.A.):

**Health Hazard: 3** 

Fire Hazard: 1

Reactivity: 0

Personal Protection: i

## National Fire Protection Association (U.S.A.):

Health: 3

Flammability: 0

Reactivity: 0

Specific hazard:

#### **Protective Equipment:**

Gloves. Synthetic apron. Vapor and dust respirator. Be sure to use an approved/certified respirator or equivalent. Wear appropriate respirator when ventilation is inadequate. Splash goggles.

## **Section 16: Other Information**

References: Not available.

Other Special Considerations: Not available.

Created: 10/11/2005 01:58 PM

Last Updated: 11/01/2010 12:00 PM

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Hazardous Materials Management Plan
March 2019

# Appendix D

**Hazardous Material Storage Area Inspection Report** 



Date:	Inspected By	:		
Location:		Responsible department:		
Subject	Conform	Non-conform	N/A	Picture(s) #
Are storage containers clearly labelled to identify Hazmat substance?				
Are storage containers in good condition? Is there any visible damage or leaks? Can the doors be sealed shut?				
Is HAZMAT in containers properly segregated?				
Is HAZMAT arrangement to prevent from falling or dislodging?				
Where necessary – Is HAZMAT placed on pallets i.e. Drums?				
Where necessary – Are containers with product stored in an upright position?				
Where necessary – Are Quatrex bags closed properly?				
Do you see any potential environmental hazards posed by these HAZMAT containers/materials?				
				-
Comments:				



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Picture 2: Description



Picture :	3: Description

Picture 4: Description



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Picture 6: Description

Hazardous Materials Management Plan
March 2019

# Appendix E

**Procedure Poster Hazardous Material Storage** 



# HAZARDOUS Materials/Waste Management and Storage Procedures

- AEM is committed to the safe and appropriate storage of fuels, hazardous materials, and hazardous wastes.
- AEM Environmental Department will be conducting routine inspections on each departments HAZMAT area to ensure proper procedures and storage are being met. This not only meets the requirements of our license, but is also a cost-savings initiative.
- When Hazardous Materials are not properly segregated, additional handling costs are added to the total cost of shipping our Hazardous Material down south.
- AEM's general guidelines for storing fuels, hazardous materials and hazardous wastes are listed below.

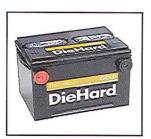
# Hazardous Materials/Waste includes:

Waste Oil, Grease, Filters & Hoses, Spray Cans, Rags with Oil, Grease or Chemical Product, Paints, Batteries, Fluorescent Lights





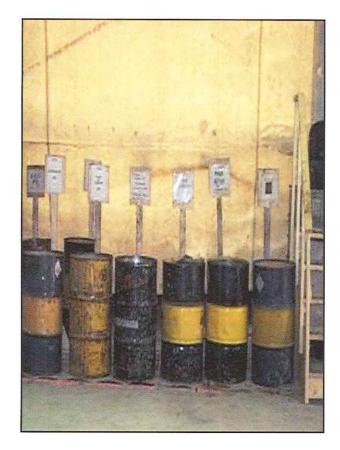


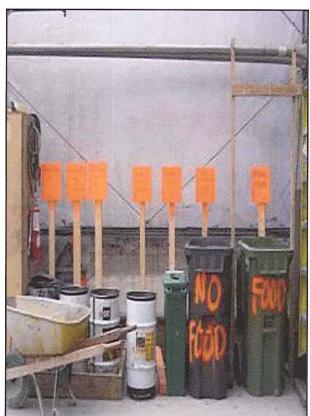






# HAZARDOUS MATERIALS/WASTE MUST BE SEPARATED (See Example Below)







The Hazardous Materials/Waste Storage Area is located near the Fuel Farm and Incinerator



# When your HAZMAT is ready to transport to the Hazardous Materials/Waste Storage area, we ask that you follow these steps:

- HAZARDOUS MATERIALS MUST BE SEGREGATED AND STORED IN PROPER DRUMS, QUATREX, OR CONTAINER TO ALLOW ACCESS FOR INSPECTION AND EMERGENCY RESPONSE IN THE EVENT OF A SPILL OR RELEASE
- ALL OF THE CONTAINERS IN THE HAZMAT STORAGE AREA ARE CLEARLY LABELED. IDENTIFY THE STORAGE CONTAINER THAT MATCHES THE HAZMAT THAT YOUR TRANSPORTING (FOR EXAMPLE—SEE BELOW)

**AEROSOL CANS** 

INTO

AEROSOL CONTAINER





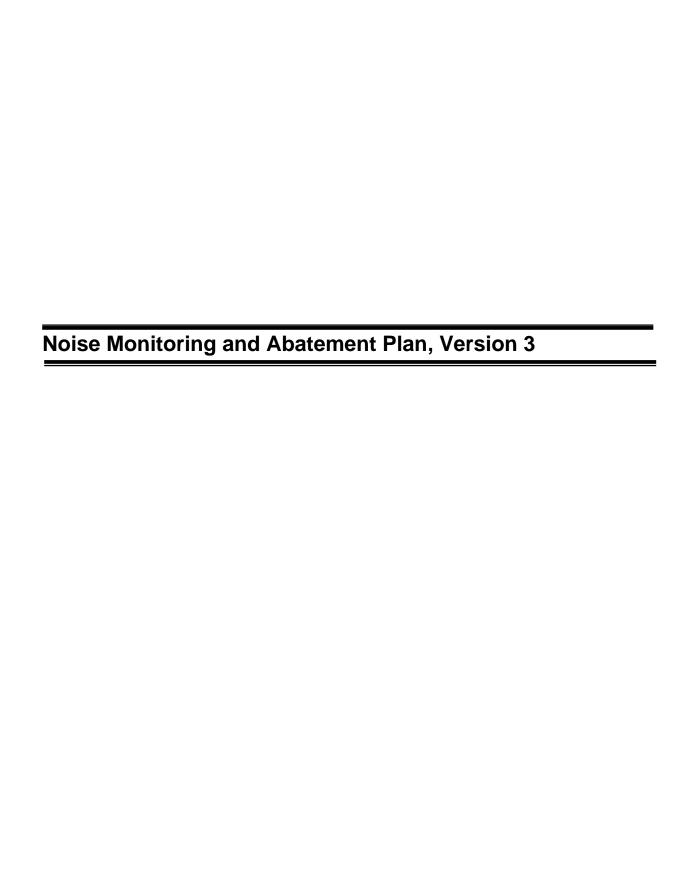


 WHEN PLACING HAZMAT PRODUCT INTO THE STORAGE AREA CONTAINERS, GENERAL HOUSE KEEPING RULES APPLY.
 CONTAINERS WITH PRODUCT SHALL BE KEPT IN AN UPRIGHT POSITION AND MATERIAL SHALL BE ARRANGED TO PRE-VENT DAMAGE FROM FALLING OR DISLODGING

Hazardous Materials/Waste Management requires the commitment and participation of all site personal. If you have questions or are unsure of where to dispose of your Hazardous Material/Waste please call:

Site Services at extension 6902, Environment Department at extension 6747

THANK YOU FOR YOUR CO-OPERATION





# MEADOWBANK GOLD PROJECT WHALE TAIL PIT PROJECT

# **Noise Monitoring and Abatement Plan**

In Accordance with NIRB Project Certificates No. 004 and No.008

Prepared by: Agnico Eagle Mines Limited

Version 3

June 2018

#### **EXECUTIVE SUMMARY**

#### **GENERAL INFORMATION**

This Noise Monitoring and Abatement Plan (NMAP) describe the operational procedures for noise abatement and monitoring at the Meadowbank Gold Project site and Whale Tail Pit Project, with respect to wildlife disturbance and potential offsite human receptors. This plan is an updated version of the Noise Management and Abatement Plan (Version 2) –January 2014.

#### **ANNUAL REVIEW**

The NMAP will be reviewed regularly and updated as necessary. Completion of the review of the NMAP will be documented through signatures of the personnel responsible for reviewing, updating and approving the NMAP.

#### **RECORD OF CHANGES**

A record will document all significant changes that have been incorporated in the NMAP subsequent to the latest review.

## **DISTRIBUTION LIST**

Agnico Eagle Mines Limited (AEM) will maintain a distribution list for the NMAP, providing information about all parties that receive the plan.

i

# **IMPLEMENTATION SCHEDULE**

The proposed implementation schedule for this Plan is effective immediately (June 2018) subject to any modifications proposed by the NIRB as a result of the review and approval process.

# **DISTRIBUTION LIST**

Agnico Eagle Mines - Environmental Superintendent Agnico Eagle Mines - Environmental Coordinator

# **DOCUMENT CONTROL**

Version	Date	Section	Page	Revision
1	09/2009			
2	01/2014	All		See Record of Changes
3	06/2018	All		Plan including Meadowbank and Whale Tail Pit

Version 3

Prepared By: Environment Department

Approved By:

Nancy Duquet Harvey

Environmental Superintendent

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## **SECTION 1 • INTRODUCTION**

The following document presents Meadowbank and Whale Tail Pit Noise Monitoring and Abatement Plan (the Plan) in support of Meadowbank Nunavut Impact Review Board (NIRB) Project Certificate No.004 Condition 62 and Whale Tail NIRB Project Certificate No.008 Conditions 4 and 5. This plan outlines Agnico Eagle's strategy for reducing noise disturbance on and near the Meadowbank and Whale Tail mine sites, with particular regard to wildlife and potential offsite human receptors.

Section 2 of this Plan describes the site's target sound levels based on Environment and Climate Change Canada (2009) guidelines.

Section 3 describes the onsite noise monitoring program that will be conducted to track typical noise levels in the local study area and to assist in the continual improvement of noise mitigation whenever possible.

Finally, Section 4 describes the onsite noise abatement plan for anticipated common noise sources and intense noise occurrences.

#### **SECTION 2 • TARGET SOUND LEVELS**

#### 2.1 WILDLIFE

As no specific noise guidelines were found for the Meadowbank and Whale Tail project area, recommendations made by Environment and Climate Change Canada's "Environmental Code of Practice for Metal Mines" (2009) were adopted. This document states that:

"In residential areas adjacent to mine sites, the equilibrium sound pressure level ( $L_{\rm eq}$ ) from mining activities should not exceed 55 dBA during the day and 45 dBA at night. Ambient noise can also affect wildlife, so sites in remote locations should also work to meet these objectives for off-site ambient noise levels."

Therefore, target sound levels at the perimeter of the Meadowbank and Whale Tail sites are:

Daytime 
$$(0700 - 2300 \text{ h}) \text{ L}_{eq} (1\text{hr}) = 55 \text{ dBA}$$

Nighttime 
$$(2300 - 0700 \text{ h}) L_{eq} (1\text{hr}) = 45 \text{ dBA}$$

Results from noise monitoring stations located at the perimeter of the Meadowbank and Whale Tail sites (including the noise monitoring stations located near the Amaruq Exploration/Haul Road) are compared to these guidelines to assist in ongoing noise management (see Section 3).

To further ensure that mine site activities are not impacting wildlife more than predicted, Agnico Eagle maintains a Terrestrial Ecosystem Management Plan (Agnico Eagle, 2018), as per Condition 54 of the Meadowbank NIRB Project Certificate and Condition 28 of the Whale Tail NIRB Project Certificate.

#### 2.2 OFFSITE HUMAN RECEPTORS

Although no offsite impacts to human receptors were identified in the FEIS due to the remote location of the mine site, a Permissible Sound Level (PSL) may be developed in the event of construction of a dwelling in an impacted location. Based on the Alberta Energy and Utilities Board (EUB)'s "Noise Control Directive User Guide" (1999, 2007) this value will be the existing noise level at the new dwelling, when constructed.

#### **SECTION 3 • NOISE MONITORING**

#### 3.1 OBJECTIVE

The objective of noise monitoring at the Meadowbank and Whale Tail sites is to measure representative noise levels at the perimeter of the mines and roads, and to assist in the implementation of noise mitigation measures, wherever feasible (see Section 4).

#### 3.2 MONITORING LOCATIONS

Agnico Eagle will continue to monitor noise levels around the Meadowbank mine site at five locations previously determined in consultation with Golder Associates Ltd. UTM coordinates for the base noise monitoring stations are provided in Table 1, and are shown in relation to the mine site features in Figure 1. All sites are located at a distance from noise sources to be representative of sound levels in locations where wildlife may be expected to occur, and where noise-related PPE is not required. These locations may be adjusted as mine site operations change, to target specific activities or receptors.

Table 1 - Meadowbank Site Base Noise Monitoring Locations

Location Name	Easting	Northing
R1	636018	7217101
R2	636795	7214435
R3	641121	7214417
R4	639441	7218750
R5	633779	7214494

Agnico Eagle will also monitor noise levels around the Whale Tail mine site and Whale Tail Pit Haul road at six locations. As per the Condition 5 of NIRB Project Certificate No.008, for noise monitoring, four (4) monitoring stations are located in the vicinity of the Whale Tail Pit and two (2) are along the Haul road. Four (4) of the chosen locations (R6, R7, R8 and R9) are the same receptor locations used for baseline monitoring (refer to Volume 4, Whale Tail FEIS, Agnico Eagle, 2016). Two (2) additional locations (R10 and R11) were selected close to Whale Tail Pit. UTM coordinates for the base noise monitoring stations are provided in Table 2, and are shown in relation to the mine site features in Figure 2.

Table 2 – Whale Tail Site Base Noise Monitoring Locations

Location Name	Easting	Northing
R6	640708	7221964
R7	620194	7239038
R8	610725	7256677
R9	602488	7255946
R10	609516	7254055
R11	608 786	7257008

#### 3.2.1 R1

Location R1 is approximately 700 m south of the explosive storage area, 400 m north of the all-weather access road, and 3,500 m north of the Meadowbank camp. Third Portage Lake is nearby to the south, and surrounding terrain is rocky tundra with some vegetation.

#### 3.2.2 R2

Location R2 is approximately 600 m southwest of the airstrip, and 1,600 m northwest of the Meadowbank camp. Third Portage Lake is to the west and southwest and surrounding terrain is vegetated tundra with rocky outcrops.

## 3.2.3 R3

Location R3 is approximately 1,800 m east of the East Dike, and 3000 m east of the Meadowbank camp. Second Portage Lake is to the west and east, and surrounding terrain is vegetated tundra with rocky outcrops.

#### 3.2.4 R4

Location R4 is approximately 1,100 m southwest of Phaser Pit, and 5,350 m north of the Meadowbank camp. Turn Lake is to the west, and surrounding terrain is vegetated tundra with rocky outcrops.

#### 3.2.5 R5

Location R5 is in the exploration camp area, near the all-weather access road, approximately 3,500 m west of the airstrip and 4,500 m west of the Meadowbank camp. Third Portage Lake is immediately to the east, and surrounding terrain away from the shoreline is vegetated tundra with rocky outcrops. This location is situated on a known caribou migration route.

#### 3.2.6 R6

Location R6 is located approximately 1,500 m east from the proposed Whale Tail Pit Haul road and approximately 1,500 m north from the centre of the Vault Pit. The terrain is relatively flat and covered by vegetation typical of tundra (i.e., low vegetation). In addition, the ground surface near

the receptor is covered by scattered rocks. The waste rock storage area of the Vault Pit is located approximately 750 m south from the monitoring site.

#### 3.2.7 R7

Location R7 is located approximately 1,500 m east from the proposed Whale Tail Pit Haul Road. The ground surface around the monitoring site is generally covered by vegetation typical of tundra (i.e., low vegetation). In addition, the ground surface is covered with scattered rocks.

#### 3.2.8 R8

Location R8 is located on an elevated plateau approximately 1,500 m northeast from the Whale Tail Pit site. The ground surface is covered by vegetation typical of tundra (i.e., low vegetation) and covered by scattered rocks.

#### 3.2.9 R9

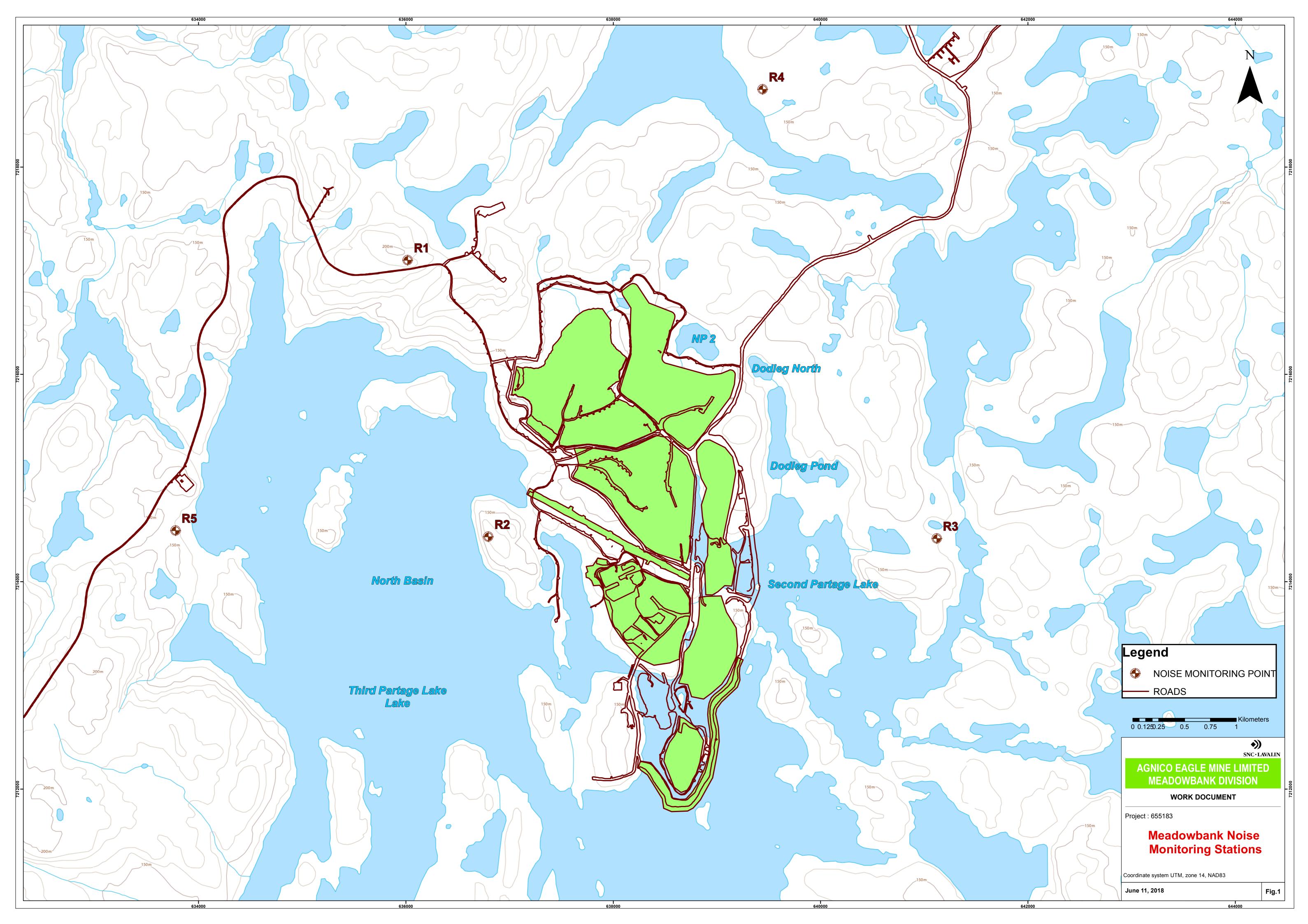
Location R9 is located approximately 1,500 m northwest from the proposed Whale Tail Pit. The ground surface is covered by vegetation typical of tundra (i.e., low vegetation) and covered by scattered rocks.

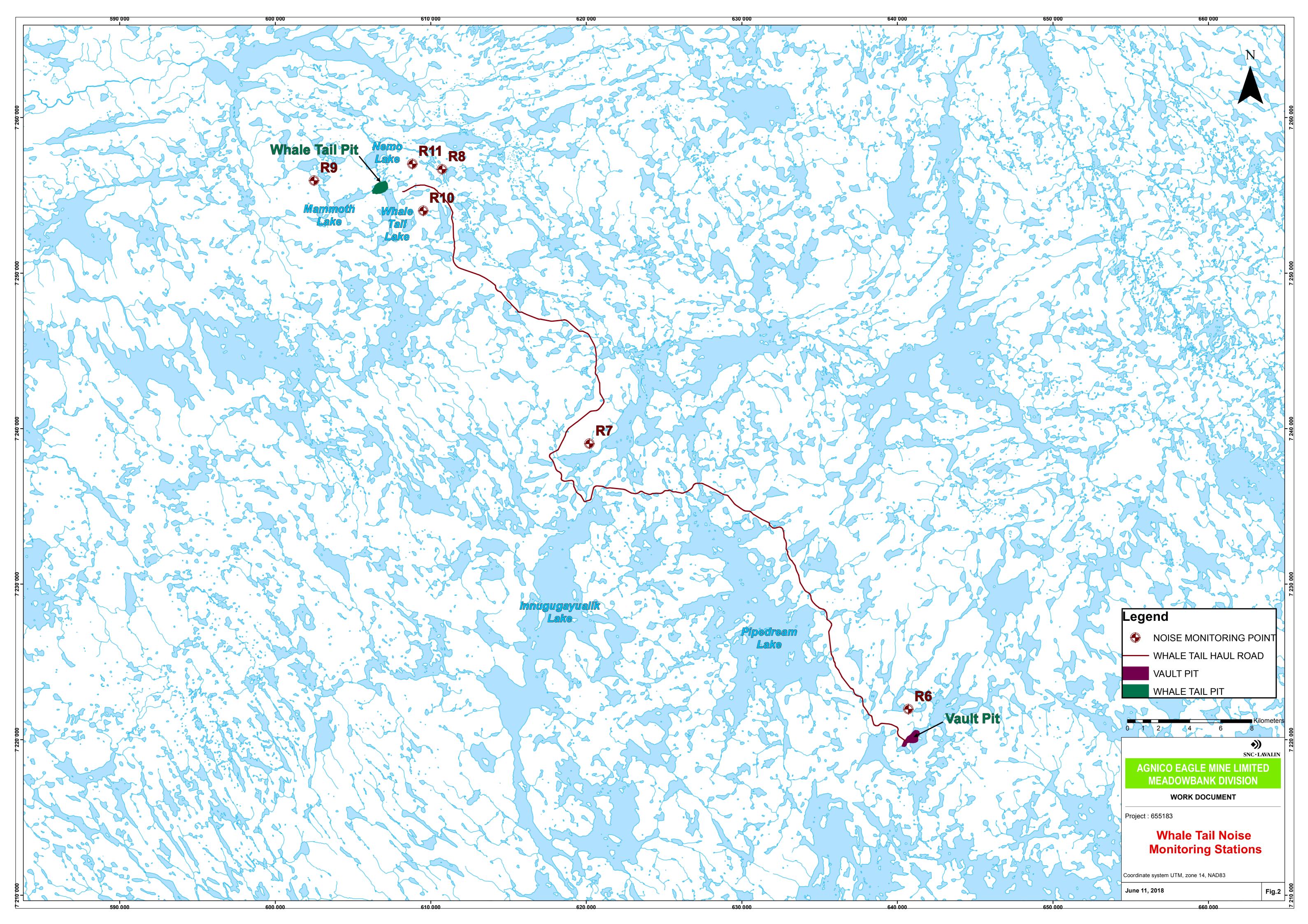
#### 3.2.10 R10

Location R10 is located approximately 1,000 m southeast from the Whale Tail Pit site, on the east side of Whale Tail Lake.

#### 3.2.11 R11

Location R11 is located approximately 1,000 m north from the Whale Tail Pit site, on the east side of Nemo Lake.





#### 3.3 MONITORING FREQUENCY

Agnico Eagle field staff will aim to conduct a minimum of two noise surveys per year at each of the locations described in Section 3.2. Each survey will be for a 2-4 days period to ensure significant data is collected. These surveys provide data on average noise levels during a typical day, as well as variability of noise levels within the day.

#### 3.4 SOUND LEVEL METER

A Bruel and Kjaer Model 2250 integrating sound level meter will be used to conduct the noise surveys at the locations described in Section 3.2. The noise level logging rate will be set at one-minute intervals, and sound will be recorded in 10 minute intervals.

The parameters logged each minute will be:

- Integrated average sound level, in dBA − Leq
- Absolute maximum sound level, in dBA Lmax
- Absolute minimum sound level, in dBA Lmin

#### 3.5 WEATHER DATA

Weather data for the noise monitoring periods is collected using onsite weather stations. Hourly data for wind, temperature and relative humidity is available from this station. This data is used to screen out sound levels collected under inappropriate conditions (see Section 3.7).

#### 3.6 FIELD NOTES

A pocket weather meter (Kestrel 3000) will be used by field staff to record wind speed, direction and temperature at the beginning and end of each monitoring period. Other records include precipitation, cloud cover and observed noises during instrument set-up and take-down. See Appendix A for an example field monitoring sheet.

#### 3.7 QUALITY CONTROL

Calibration of the sound level instrument will be performed before and after each monitoring period using a Bruel and Kjaer Type 4231 Calibrator, to ensure variance is within 0.5 dB. Calibration results are recorded in field notes. Estimated uncertainty of the calibrator is  $\pm$  0.12 dB at a 99% confidence level. Professional calibration of the instrument will be performed as described in Section 5.

#### 3.8 DATA ANALYSIS

Since noise levels vary over time, the monitoring instrument used measures near-continuously and reports a single-number value for each minute, representing the "equivalent sound level" ( $L_{\rm eq}$ ). This value is the average sound level occurring over the specified time period (i.e.one minute). Alternatively, it is the sound level that would produce the same total amount of acoustical energy in the specified time period as the measured sound levels did.

Data downloaded from the instrument will be filtered to remove measurements collected outside of acceptable weather conditions (wind speed > 4.17 m/s; relative humidity > 90%). All data points associated with the first and last 30 min of measurement will be filtered out to remove noise from technicians, and more than 30 min of data will contribute to hourly averages.

One-minute  $L_{eq}$  values produced by the instrument will be used to calculate hourly, day-time (7am-11pm), night-time (11pm-7am) and 24 hr  $L_{eq}$  values. These time periods are based on Health Canada recommendations, as described in Golder (2012).  $L_{eq}$  values for each time period are calculated as the geometric mean of filtered one-minute  $L_{eq}$  values.

### 3.9 REPORT

Results of the noise monitoring program will be compiled annually and reported to NIRB and Environment and Climate Change Canada. Reports will include, for each station:

- ullet Visual display of one-minute  $L_{\text{eq}}$ , one-minute maximum and one-minute minimum values:
- Hourly, daytime, nighttime and 24 hr L<sub>eq</sub> values, including number of hours of valid data contributing to each;
- Weather data for each monitoring period (temperature, wind speed and direction);
- Audible noises noted on field logs and in sound files, especially those corresponding with intense noise occurrences (see Section 4.3);
- Comparison of daytime and nighttime L<sub>eq</sub> values to target sound levels, for applicable stations (those located at the site perimeter);
- A historical comparison of daytime, nighttime and 24-hr L<sub>eq</sub> values, and comparison to predicted noise levels for the Projects;
- Recommendations for additional monitoring or for implementation of additional abatement measures, if possible, when sources of intense noise occurrence are confirmed.

#### **SECTION 4 • NOISE ABATEMENT**

#### 4.1 GENERAL PRACTICES

The Meadowbank and Whale Tail Pit mine sites infrastructure are laid out to concentrate all activities within a small footprint (see Figures 1 and 2). As a result, the common noise sources at site are in close proximity to one another and for the most part are contained within separate buildings (i.e. facilities such as the crusher, SAG mill are indoors to reduce noise intensity). Personnel office spaces and accommodations are separate from these operational buildings. The Meadowbank and Whale Tail site infrastructure are oriented to reduce intense noise occurrences that may impact wildlife or personnel. These attenuation measures taken during the design and construction of the infrastructure are an important component of noise abatement on the mine sites.

In general, all departments will strive to ensure that equipment manufacturers have incorporated noise attenuation into their design as much as possible, will maintain equipment in good working condition, and will position stationary equipment away from potential receptors of concern or in enclosed areas.

#### 4.2 DAILY NOISE OCCURRENCES

Common noise sources that are daily occurrences may include road traffic, air traffic, impact equipment, stationary equipment (such as generators, compressors or pumps), construction activities, blasting, material handling (i.e. crushers, cranes), earth movers (i.e. truck loaders and dozers) and the Meadowbank primary plant facilities (i.e. SAG mill, ball mill and power plant).

Table 3 describes the project-related noise sources that have been identified as well as proposed mitigation/management measures to be implemented whenever possible during operation of the facility.

Table 3 - Standard mitigation measures for daily noise occurrences.

Noise Source	Noise Mitigation Measures
Whale Tail Haul Road Construction	<ul> <li>Operate construction equipment within specification and capacity (i.e., don't overload machines)</li> <li>Adequate equipment maintenance</li> <li>Avoid operating numerous pneumatic tools at the same time, and spread operation throughout working periods</li> <li>Avoid prolonged idling</li> <li>If blasting is required, preference for daytime blasting</li> </ul>
Road traffic (mine site, AWAR) and Haul Roads operation	<ul> <li>During maintenance, check that noise abatement devices are in good order (e.g., brakes, exhaust mufflers, engine hoods)</li> <li>Enforce speed limits</li> <li>Use shallow slopes for haul road</li> </ul>

Noise Source	Noise Mitigation Measures
	<ul> <li>Educate truck drivers about the characteristics of diesel engines (i.e., that the flat torque characteristic allows ascending an incline in a higher gear, which is a less noisy operation)</li> <li>Keep road surfaces in good repair to reduce tire noise</li> <li>Avoid prolonged idling</li> <li>Avoid trucking operation during night time on access road, when possible</li> </ul>
Air traffic (Meadowbank)	<ul> <li>Avoid low altitude flights (not lower than 610 m in sensitive bird/wildlife areas), except on take-off and landing</li> <li>Restrict air traffic to daytime hours except for emergencies</li> </ul>
Impact equipment (pile drivers, jack hammers, drills, pneumatic tools)	Avoid operating numerous pneumatic tools at the same time, and spread operation throughout working periods
Stationary equipment (compressors, generators, pumps)	Keep equipment in good condition
Blasting	<ul> <li>Use delays, both surface and down hole</li> <li>Preference for daytime blasting</li> <li>Blasting in depressed pits (normal production practice)</li> </ul>
Outdoor material handling equipment (crushers, concrete mixers, cranes)	<ul> <li>Place crushers in sheltered/enclosed locations if possible</li> <li>Maintain equipment in good working condition</li> <li>Turn equipment off when not in use if practicable</li> </ul>
Earth moving equipment (trucks, loaders, dozers, scrapers)	<ul> <li>Aim to restrict equipment age so only newer, more efficient machinery will operate onsite</li> <li>Operate equipment within specification and capacity (i.e., don't overload machines)</li> <li>Use noise abatement accessories such as sound hood and mufflers</li> </ul>
Primary plant facilities (gyratory primary crusher, SAG mill, ball mill, power plant)	<ul> <li>Provide building with walls absorbing noise</li> <li>Maintain equipment on a regular basis, replace worn parts, lubricate as required</li> <li>Provide diesel plant units with efficient intakes and exhaust silencers</li> <li>Use conveyor system with low noise output, paying particular attention to rollers</li> <li>Enclose conveyors where necessary</li> </ul>
Utilities and services	Ensure that a rotating biological contactor treatment system operates quietly     Dump solid waste behind barriers

#### 4.3 INTENSE NOISE OCCURRENCES

#### 4.3.1 Strategy

It has been found that people (and therefore, potentially, wildlife) are more tolerant of louder continuous background noise than a quieter baseline punctuated by high-level peaks. Therefore, the intense noise abatement strategy acknowledges the common continuous noise sources, and aims to reduce the occurrence of intense noise peaks. For the purposes of this Plan, intense noise occurrences are considered to be those that exceed the target sound levels described in Section 2. Examples of these may be low flying air traffic, exceedingly loud blasting or nearby impact equipment. Since noise monitoring stations may be located away from the site perimeter, the target sound levels are only used as a conservative benchmark to filter audio files for closer analysis and adaptive noise management.

#### 4.3.2 Identification

Through the annual monitoring program, 24-h sound profiles for each monitoring station will be developed, and the daytime equivalent sound level ( $L_{eq}$ ) identified (see Section 3.7). Recorded sound files will then be reviewed in conjunction with field notes to attempt to determine the sources of intense noises (> target sound levels).

#### 4.3.3 Abatement

When sources of intense noises are confirmed, the Environment Department staff will work with the responsible party to determine whether further abatement of the noise is possible. At a minimum, this will include ensuring the previously identified mitigation measures (Table 3) are being applied. If all abatement practices are in use and the source continues to contribute to intense noise occurrences in subsequent monitoring events, the implementation of additional appropriate measures will be investigated. This method of intense noise identification means that there will be a continual effort to reduce the sounds contributing to the loudest, most disruptive noise peaks onsite, even as site operations evolve and average noise levels change.

#### **SECTION 5 • MANAGEMENT AND OPERATION**

The following presents the plan's management responsibility, and operational procedures for the Bruel and Kjaer Model 2250 integrating sound level meter.

#### 5.1 MANAGEMENT RESPONSIBILITY

Operation and monitoring of the noise stations will come under the responsibility of the Environment Superintendent. Designation of training requirements is the responsibility of the Environment Department.

#### 5.2 EQUIPMENT OPERATION

The Environment Department will be responsible for the operation of equipment and collection of samples by appropriately trained personnel consistent with detailed written operating instructions (SOP – Appendix B) from qualified personnel. The SOP will be kept up-to-date and any changes will be communicated to relevant personnel.

#### 5.3 EQUIPMENT MAINTENANCE

As recommended by the manufacturer and to make sure results are in compliance with good practices, the meter will be factory calibrated and certified per the schedule outlined below.

Calibration	Interval
Microphone	2 years
Meter	2 years
Calibrator	1 year

## **SECTION 6 • PLAN REVIEW**

The Noise Monitoring and Abatement Plan will be reviewed regularly by the Environmental Superintendent and be updated if any changes to the equipment or the program occur.

#### **SECTION 7 • REFERENCES**

Agnico Eagle (2018). Terrestrial Ecosystem Management Plan, Meadowbank Division. June 2018.

Agnico Eagle (2016). Final Environment Impact Statement (FEIS) Volumes 1 to 8, Whale Tail Pit Project, Meadowbank Division. Volume 4 – Atmospheric Environment

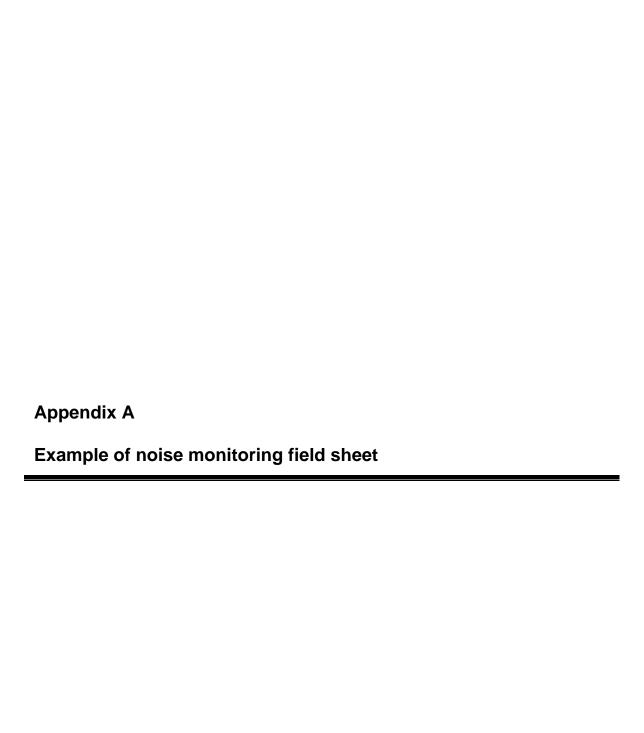
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Environment Canada (2009). Environmental Code of Practice for Metal Mines. 1/MM/17 Mining Section, Mining and Processing Division, Public and Resources Sectors Directorate, Environmental Stewardship Branch.

Health Canada (2005) Noise Impact Assessment Orientation Document for Projects Triggering CEAA. Prepared by the Healthy Environments and Consumer Safety Branch. Health Canada, May 2005.

Golder Associates (Golder), 2012. 2011 Noise Monitoring, Meadowbank Division, Nunavut. Prepared for Agnico-Eagle Mines Ltd. February, 2012.



ή	MONITORING STA	RTS		- 1
Operator:				
Location:				-
Noise Meter Start Time:				
Date:				
Calibration complete 7:				
Sensitivity				
Derviation				
Time of Calibration:				
Battery Power Check:	-(1)-7	Good		Poor
Photographs of Setup (Y/N)		711111		
Photographs of Surrounding (Y/N)				
Check available disk memory (Y/N)	- 3			
Cloud cover:		cloudy	partly cloudy	sunny
Height of cloud (feet):		0-10,000	10,000-25,000	25,000 +
Air Temperature (C):			-	
Wind Speed (km/hr):				
Wind Direction:	*		N	
North wind (wind blows from North)				
Barometric Pressure (kPa):			,	
Relative Humidity (%)	8			- 7
Precipitation:		none	drizzle	rain
	GENERAL SITE DESCI		12	
GPS Location	GENERAL STILL DESCRIPTION	Latitude	Localesto	Altitude
GPS Location		Latitude	Longitude	Altitude
Type of Ground Surface:				
Acoustic Environment:				
Traffic				
Human activities				
Other noise sources				
	MONITORING EN	DS		
Operator:				
Record Data File Name	9			
Total Monitoring Period	-			
Noise Meter End Time: Date:				
Calibration complete ?:	8			
Sensitivity	1			
Derviation	3			
Time of Calibration:	39			
Check file size (GB)	8	V.M 11		10 0000
Battery Power Check:	-(L)	Good	(6)	Poor Co
Cloud cover.		cloudy	partly cloudy	summy
Height of cloud (feet):	- 7	0-10,000	10,000-25,000	25,000 +
Air Temperature (C):		- Japan	tolana solana	
			1-1-2	<del></del>
Wind Speed (km/hr):				
Wind Direction: North wind (wind blows from North)				
Barometric Pressure (kPa)	=			
Relative Humidity (%)		201.000		
Precipitation:		none	drizzle	rain
Deputure Time:				

## Appendix B

**Environmental Noise Monitoring Guide - Bruel and Kjaer 2250 Sound Level Meter** 

## **GOLDER ASSOCIATES**

# ENVIRONMENTAL NOISE MONITORING GUIDE



Doc. No. 747 Ver.0 08-1428-0007/4000/4100

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#### 1.0 LONG-TERM MONITORING CONFIGURATION

The Bruel and Kjaer 2250 sound level meter (2250 SLM) can be configured for short or long term noise monitoring. The photo below shows the long-term monitoring setup including the weather protective case. In long-term monitoring, the following components are required:

- 2250 SLM;
- Microphone and Preamp Assembly;
- Outdoor Microphone Kit;
- Microphone Extension Cable;
- Tripod;
- External 12 Volt DC Power Supply;
- Power Supply Cable Connector;
- External Memory Card (CF-Card or SD-Card);
- Support Pegs; and
- Electrical Tape.



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## 1.1 Storage Case Setup

The monitoring components and setup for the equipment storage case are shown below.





## 1.2 Outdoor Microphone Assembly

The procedure for assembling the outdoor microphone is summarized below:



## 1.3 Hardware Setup Procedure

#### 1.3.1 Tripod

Extend the tripod to its maximum extension. Secure a support peg to end of each tripod leg, making sure that the pegs are parallel to the leg. Using electrical tape (note electrical tape is ideal as it is durable and can be easily removed) to secure the tripod legs to the support pegs such that little to no swaying or tipping is possible. Insert the support pegs into the ground far enough to provide ample support of the legs of the tripod.



#### 1.3.2 Outdoor Microphone Kit

Remove the outdoor microphone kit windscreen and extension cable and attach it to the top of the extension pole. Run the microphone extension cable down one of the tripod legs securing it with electrical tape approximately every 2 feet along the leg as shown below.



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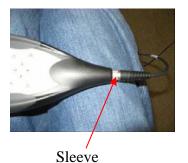
#### 1.3.3 Extension Cable Connection

Connect the microphone extension cable to the input of the B&K 2250 Analyzer making sure that the dot on the extension cable is lined up with the dot on the input of the Analyzer (see left figure below).





Note, when dismantling the meter it may be difficult to remove the microphone extension cable from the B&K 2250 Analyzer. If difficulties do arise, place a cloth over the sleeve and use pliers to gently grip and pull back the sleeve to release the connection as shown below.









Use pliers to gently pull back sleeve.

#### 1.3.4 Long Term Power Supply (12V DC)

Connect the power supply cable from the 12V Panasonic battery to the external power supply located at the base of 2250 SLM. There are two indicators to confirm that 12V DC power supply is connected successfully to the 2250 SLM:

 The green LED which is located at the bottom of the B&K 2250 Analyzer should be on; and



Check 2250 Analyzer LED for power.

• The battery symbol on the B&K 2250 Analyzer screen display changes from a battery to a power plug symbol - as shown in the figure below.



External power symbol indicating that external power is connected.

A flashing green LED light indicates the internal battery of the Sound Level Meter is fully charged (100%).

#### 1.3.5 Extension Cable Arrangement

There are two data cable available (3 m and 10 m). Use the 3 m when connect to the handheld microphone pre-amp and use the 10 m extension cable when using the outdoor microphone kit. The microphone extension cable must extend across the notched portion of the sound level meter case as shown below.



Extend microphone extension cord over notched portion of protective case.

After securing the cables of the sound level meter, the case should be placed underneath the three legs of the tripod as shown below. Coil the excess cable length and store it inside the case. Tape the microphone extension cord along the tripod to avoid tripping and noise contamination (wind).



Tape microphone extension cord along tripod.

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## 1.4 SLM Setup Procedure

- 1.4.1 Data Storage Card 4.0 GB Memory (CF/SD) Card
- 1. Insert an empty 4 Gigabyte memory card into the B&K 2250 Analyzer. Upon inserting the CF/SD card, the B&K 2250 Analyzer should acknowledge the card and display the prompt to accept the card. Click "Yes" to this.



2. Select the "Main Menu" which is shown by three bars to the lower right on the B&K 2250 Analyzer screen as shown above left. Then select the "Explorer" (see below) option so that a folder can be created on the CF/SD card.

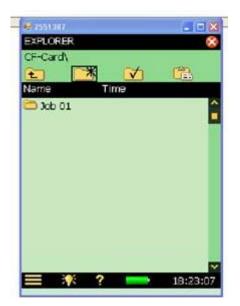


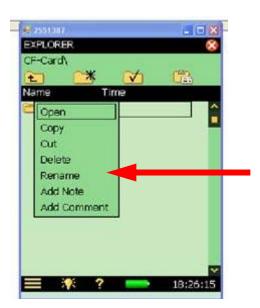
3. The next step involves creating a folder on the CF/SD card in which to store the noise data. Creating a new folder is done by selecting the folder icon with a star as shown in the figure below left. A prompt will display that a new job folder will be created. Select "Ok".



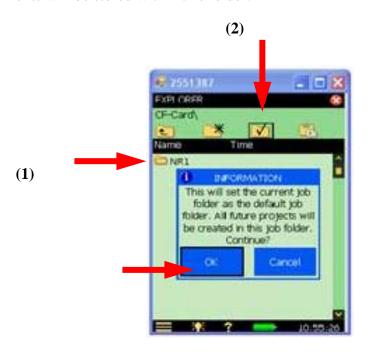


4. Renaming the folder is the next step. Select the folder, right click mouse button, and then select the "Rename" option. Choose the name of the folder appropriately to help with identification of noise monitoring location during data analysis and processing later (*e.g.*, MEADOWBANK030308).





5. Once the folder has been renamed, the folder must be identified as the default for data storage. This is done by selecting the folder itself and selecting the "Open" option (1 below). Now select the folder icon with the check mark (2 below) on it to set the current job folder (NR1 in photo below) as the default job folder, *i.e.*, all measurements will be stored within this folder.



6. Observe the file path that is shown at the top of the display screen, it should display that the CF/SD card is at the top level and that the folder (NR1 in photo below) is one level below, *i.e.*, "CR-Card\NR1" as is shown in the below left screen.



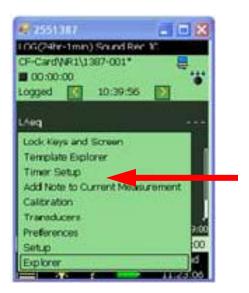
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7. Exit the "Explorer" screen by selecting the red "x" at the top left of the display screen.

#### 1.4.2 Monitoring Template

The 2250 SLM is loaded with 10 standard monitoring templates. Each of the 10 standard templates performs a different type of measurement. The standard templates can be modified and saved as a Project Template to retain specific display settings and measurement setups. The template itself does not store any measurements. A Project Template named "MEADOWBANK 24hr LOGGING" has been designed to conduct the 24 hr noise monitoring. Use the following procedures to load the template.

1. Select the "Main Menu" and select the "Template Explorer" option as shown below. All the available templates will be shown on the screen.



- 2. Choose the "MEADOWBANK 24hr LOGGING" and then select "Open".
- 3. The common measurement settings selected in this template are shown in the following table:

## MEADOWBANK 24hr LOGGING SETTING

Input			
Input	Top Socket		
Trans. Used	4152_0 (#######) Check serial # on mic	Outdoor kit	
Sound Field Correction	Free-field		
Extended Low Frequency	Off		
Fre	equency Weightings		
Broadband (excl.Peak)	AZ	Z is linear	
Broadband Peak	A		
Spectrum	Z		
Ban	ndwidth (1/3-octave)		
	Statistics		
Broadband Statistics based on	LAF		
Spectral Statistics based on	LXF		
Percentile 1	1 %		
Percentile 2	5 %		
Percentile 3	10 %		
Percentile 4	50 %		
Percentile 5	90 %		
Percentile 6	95 %		
Percentile 7	99 %		
Me	easurement Control		
Preset Logging Time	1.00:30:00	1 day and 30 minutes	
Logging Period	00:01:00	1 minutes	
Synchronize with Clock	Yes	Save at 1:00, 1:01, 1:02	
L	ogged Broadband		
Full Statistics	Yes		
Broadband Parameters	Selected		
Parameter 1	LAeq		
Parameter 2	LApeak		
Parameter 3	LAFmax		
Parameter 4	LAFmin		
Parameter 5	LZeq		
Parameter 6	LAIeq		
Parameter 7	LCeq-LAeq		
Parameter 8	Overload		
Logged Spectrum			
Full Spectral Statistics	Yes		
Spectrum Parameters	Selected		
Spectrum	LZeq		

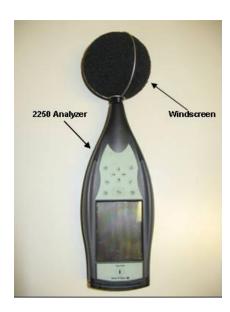
## **MEADOWBANK 24hr LOGGING SETTING continued**

Level Trigger (OFF)			
Trigger	Off		
Start Slope	Rising		
Start Level	50 dB		
Start Duration	2 s		
Stop Level	40 dB		
Stop Duration	2 s		
Parameter	LAF (SPL)		
Sound Recording			
Recording Control	Automatic		
Recording Quality	Fair (6.6 kHz)		
Recorded Signal	Input Z-weighted		
Automatic Gain Control	On		
Duration Limits	Off		

#### 2.0 SHORT TERM MONITORING CONFIGURATION

The following components are for short term monitoring:

- 2250 SLM;
- Microphone and Preamp assembly;
- Windscreen;
- External Compact Flash Memory Card (CF/SD-Card);
- Tripod; and
- Tripod mounting bracket.



Since short term measurements rarely require an external power source. The B&K 2250 internal battery is typically used as the power source which can supply the meter for approximately 7 hours of operating time. The battery icon will display the estimate battery life remain in the internal battery. The photo on the left shows the hand-held configuration assembly.

#### 2.1 B&K 2250 Hand-held Configuration

1. Connect the microphone to the pre-amplifier.



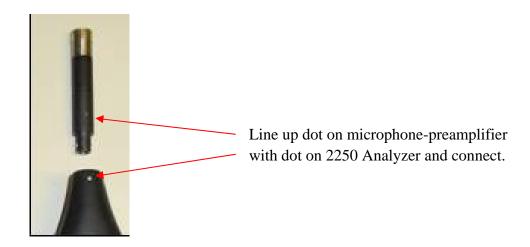


Option:

3 m extension cable can be inserted here for extension purposes.

(*e.g.*, ventilation fans on building wall)

2. Insert the microphone and pre-amplifier component into the B&K Analyzer making sure to line up the dot on the preamplifier with the dot on the B&K Analyzer.



3. Connect the windscreen to the microphone-preamplifier.





Gently insert windscreen over microphone.

4. Mount the SLM on the tripod with the tripod adaptor.



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## 2.2 Frequency Analyzer Template

Select the "Main Menu" and select the "Template Explorer" option as shown in Section 1.4.2 above. All the templates available will be shown on the screen. Choose the Project template named "MEADOWBANK SHORT-TERM FREQ ANALYZER", and then select "Open". This template is setup so that the B&K 2250 Analyzer records the frequency content in 1/3-octave measurements and broadband sound level measurements simultaneously. The measurement settings selected in this template are shown in the following table:

## MEADOWBANK SHORT-TERM FREQUENCY ANALYZER SETTING

Input			
Input	Top Socket		
Trans. Used	4189 (######) Check serial # on mic	mic with preamp	
Sound Field Correction	Free field		
Windscreen Auto Detect	On		
Extended Low Frequency	Off		
Trigger Input	None		
Fre	quency Weightings		
Broadband (excl.Peak)	AZ	Z is linear	
Broadband Peak	Z		
Spectrum	Z		
Ban	dwidth (1/3 Octave)		
	Statistics		
Broadband Statistics based on	LAF		
Spectral Statistics based on	LXF		
Percentile 1	1 %		
Percentile 2	5 %		
Percentile 3	10 %		
Percentile 4	50 %		
Percentile 5	90 %		
Percentile 6	95 %		
Percentile 7	99 %		
Measurement Control			
Measurement Mode	Manual		
Sound Recording (Off)			

#### 3.0 POWER SUPPLY

## 3.1 Panasonic 12 Volt External Battery Charging

A long term measurement duration can be anywhere between 7 to 36 hours. When an external batter supply is used, the 2250 m draws first from it until it is depleted. When the fully charged external battery is depleted (roughly 3 days) then the meter begins to draw from the internal power supply (roughly 7 hours). To recharge the 12 Volt Panasonic batteries used for long term measurements do the following:

• Connect the battery power supply cord to the battery charge cord;



• NOTE: The battery charger input rating is 120V, connecting it directly to a 220-230V AC supply will DESTROY IT!



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- Connect the battery charger to the power outlet and observe the colour of the battery chargers LED.
  - GREEN battery is being charged, NOT READY
  - YELLOW battery is being charged, READY FOR USE
  - RED battery malfunction or bad connection

## 3.2 2250 SLM Internal Battery Charging

Connect AC/DC power supply adaptor to 2250 SLM power inlet as shown in the photo below. The 2250 internal battery will take up to 10 hours to charge. The battery will typically last 7 to 8 hours in warm temperature.



## 4.0 FIELD MEASUREMENT RECORDS

Important information such as field observation, measurement location, weather, acoustic environment must be recorded prior to any measurement period. The following field record sheets shows example for the record entries in Long Term and Short Term Measurements:

	MONITORING STARTS		
Operator:			
Location:			
Noise Meter Start Time:			
Date:			
Calibration complete ?:			
Sensitivity			
Derviation			
Time of Calibration:			
Battery Power Check:	Good	Poor	
Photographs of Setup (Y/N)			
Photographs of Surrounding (Y/N)			
Check available disk memory (Y/N)			
Cloud cover:	cloudy	partly cloudy	
Height of cloud (feet):	0-10,000	10,000-25,000	
Air Temperature (C):			
Wind Speed (km/hr):			
Wind Direction:		N	
North wind (wind blows from North)		NW	
		/ \  / \ _	
		w( <del>                                     </del>	
		$\bigvee$ $ \bigvee$	
		SW	
		8	
Barometric Pressure (kPa):			
Relative Humidity (%)			
Precipitation:	none	drizzle	
	GENERAL SITE		
GPS Location	Latitude	Longitude	
Type of Ground Surface:			
Acoustic Environment:			
Traffic			
Human activities			
Animal			
Other noise sources			
[			
l			
[			
	MONITOR	ING ENDS	
Operator:			
Record Data File Name:			
Total Monitoring Period			
Noise Meter End Time:			
Date:			
Calibration complete ?:			
Sensitivity			
Derviation			
Time of Calibration:			

#### 5.0 CALIBRATION

#### 5.1 Calibrator

The 2250 SLM requires regular calibration to confirm the meter meets the precision requirement. It is mandatory to perform a calibration before and after each measurement program. Calibration is carried out via the B&K 4231 Calibrator shown in following photos.





Without case

With case

#### 5.2 Calibration Procedure

The following steps are to be taken for proper calibration:

1. Choose the Main Menu to access the "Calibration" option as shown below.



2. Insert the B&K 4231 Calibrator on to the microphone; pushing it until it becomes flush (bottoms out). Press the start button. The way in which the calibrator is installed for the hand-held and outdoor kit configuration is shown below. There are two ways of checking that the calibrator is working. The first is by simply turning it

on prior to inserting it onto the microphone and listening. Alternatively, confirming that the LED light on the calibrator is lit.





Calibrator LED on

**Outdoor Calibration** Configuration

Hand-held Calibration Configuration

- 3. On the display screen the "Start Calibration" should appear. Select this and let the calibration begin.
- 4. It is important to conduct the calibration in a quiet environment (e.g., no car engine idling or conversation). High ambient noise will disrupt calibration.
- 5. Observe the dB level in the 2250 SLM display measuring the calibration signal. This level should be at or very close to 94 dB.





- 6. Just before the end of the calibration, the meter will display "New Sensitivity" information. This information should be documented on the "Noise Field Sheet" for later use (see Noise Field Sheet form in Section 4 above). Note that the value "Deviation from last" should be no more than  $\pm 0.1$  dB. Repeat the calibration if the deviation exceeds the  $\pm 0.1$  dB limit.
- 7. Select yes to "Accept calibration?" and then "Exit Calibration".





## 5.3 High Deviation Level

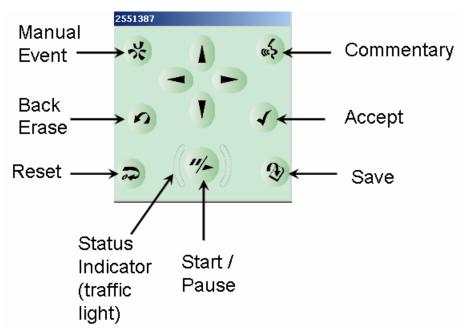
The following may be reasons for the deviation value being consistently outside the acceptable limit of  $\pm 0.1$  dB during calibration:

- High humidity levels;
- High ambient noise level surrounding the calibration environment; and/or
- Poor connection between the preamplifier and the B&K outdoor kit body. The preamplifier should be firmly screwed into B&K outdoor kit body; however, not so tight as to damage the fine threads of the preamplifier, or not to be able to unscrew the amplifier after use.

#### 6.0 START NOISE MONITORING

After completing the setup and calibration, the following steps are to be carried out to begin noise measurements during long-term monitoring:

- 1. Press the "Reset Measurement" button.
- 2. Press the "Start" button.



Because the measurement control setup is manual during short-term monitoring, you will have to repeat the following steps for each measurement:

- Reset
- Start
- Stop/Pause
- Save

The following information should be recorded on the Noise Field Sheet shown in Section 4:

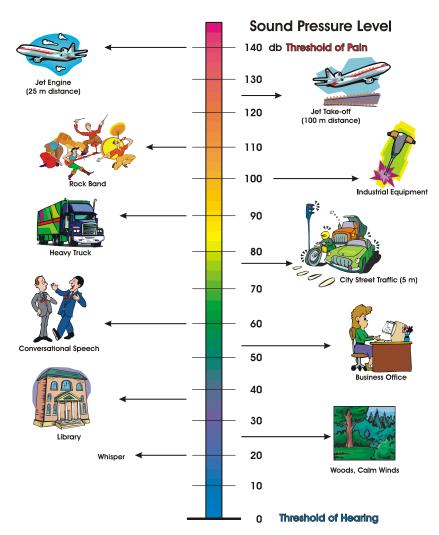
- Save file number
- Location of measurement
- Overall level

Upon starting a measurement, one will see a time history forming which fluctuates with time as shown in the below figure.



It is recommended to remain silent for a minute after starting a measurement so as to let the meter "settle-down" and to determine whether the noise levels being recorded are representative for the study area. The following figure lists some typical noise level ranges for different environments. It should be used as a rough guide when on site taking noise measurements.

### **Common Sounds**



#### 7.0 POST MEASUREMENT PROCEDURES

After completing a long-term noise measurement (*i.e.*, after 24 hours has passed), it is time to retrieve the equipment from the field to set it up at some other desired location.

#### 7.1 Data Check

Prior to completely dismantling the equipment, the quantity of the data that has been recorded should be verified.

A series of checks can be performed to confirm that the noise data has been collected. Prior to removing the CF/SD card from the B&K 2250 Analyzer, the amount of data recorded on the CF/SD card should be checked on the 2250 Explorer display. As a general rule of thumb, a 24 hour noise measurement should represent approximately 2.4-2.7 Gigabytes of data (or thereabouts). This leaves about 1.6 Gigabytes of storage space remaining on the card.

Select the Main Menu to access Explorer. Select the up one folder icon (folder with up arrow on it) to view both the "Internal Disk" and the "CF/SD card" as shown below.



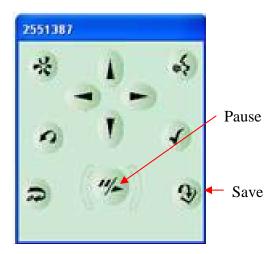
In the example above, it can be seen that there is 3.90 Gigabytes of free data storage space available on the CF/SD card. Note Explorer displays "Free" space on the storage medium and not used space. This means that 0.01 Gigabytes has been used; not enough for a 24 hour monitoring period. Again, approximately 1.6 Gigabytes of free data storage space should be available following a 24-hour monitoring period.

#### **7.2** Save

The recorded data will be saved automatically into the specified file upon completion of the specified measurement period (24 hours). However, if the measurement period is terminated before the specified period, the data must be saved manually.

#### Only save the file if the specified measurement period has not been exceeded.

In such case, the SLM is still recording upon arrival. The data record file display on the top will show an asterisk '\*' at the end of the filename (*e.g.*, CF-card\Project001\*). Press the Pause button and then the Save button.



#### 7.3 Calibration

Before powering down the B&K 2250 Analyzer, the sound level meter needs to be recalibrated. Following procedure outlined in Section 5 for post measurement calibration.

#### 8.0 DATA DOWNLOAD

The data download requires the following steps:

- 1. Connect CF/SD card to the card reader;
- 2. Activate the B&K BZ5503 software to copy data files from CF/SD card into archive files on a computer;
- 3. Export the archive file to a format for the Evaluator 7820-7821 Software; and
- 4. View recorded data in Evaluator 7820-7821 Software.

The following equipment is required to complete the data download:

- Computer with USB port;
- CF/SD card reader; and
- B&K USB dongle key for the use of the B&K Evaluator software.

Refer to the document "BZ - 5503 Data Download Procedure" provided with the noise monitoring equipment for further details.



#### 8.1 CF/SD Card Reader and USB Dongle Key

After connecting the dongle key to the computer, start/run the B&K BZ 5503 software and connect the card reader using the computer USB connection as shown in the figures below:



Insert B&K Dongle



Remove CF/SD card from 2250 Analyzer and insert into card reader



Connect USB connection to USB port

#### 8.2 Data Archive

The data from each 24-monitoring location should be archived and the entire archive directory should be burnt to a DVD. A typical 24 hour monitoring program will occupy one 4GB DVD.

#### 9.0 EQUIPMENT TROUBLESHOOTING CASE STUDY

The following are examples of potential equipment malfunctions and possible reasons for those malfunctions.

#### 9.1 Failed Power Connection

The following reasons can result in external power supply failure:

- Loose power supply connecting cable;
- Uncharged battery; and
- Bad fuse.

#### 9.2 Invalid Data Collection

Invalid data collection is typically found when analyzing the time history of the sound file. The data ends up having either higher or lower sound levels (dBA) than would be representative of the area. Regular field visits during the monitoring period to check on the measurement levels will reduce the potential for invalid data being recorded. The following are common causes of invalid data:

- Power failure;
- Poor weather heavy rainfall, high wind gust;
- Tampering with sound level meters;
- No calibration check; and
- Incorrect setup.

#### 9.2.1 Poor Weather: Wind Speed and Precipitation

Poor weather conditions are probably the biggest reason for invalid data. Poor weather conditions include rain and high winds. Long-term noise measurements are rarely if ever done during winter months. Ideal noise monitoring conditions require that wind be no more than 20 km/hr (5.6 m/s) and that there be no precipitation during the measurement period. High wind has the effect of masking the true noise at a distance from different sources. Flutter noise is a type of noise due to velocity gusts impacting the microphone. In both cases the data collected during these non ideal conditions must be removed in order to have valid noise data set. The Energy Resources Conservation Board (ERCB) has established guidelines, namely, Directive 0038, for "Favourable summertime weather conditions" as shown in the below table:

Parameter	Preferred Condition		
Ground Cover	No snow, water, or ice (frozen) ground cover.		
Precipitation	No steady precipitation, monitoring invalid.		
Wind Speed	Wind speed limits (noise data may be invalid if limits are exceeded):  Less than 500 m from noise source  Upwind: 10 km/hr limit  Crosswind: 15 km/hr limit  Downwind: 15 km/hr limit  Upwind: 5 km/hr limit  Crosswind: 10 km/hr limit  Crosswind: 10 km/hr limit  Upwind: 10 km/hr limit  Crosswind: 10 km/hr limit  Downwind: 10 km/hr limit  Crosswind: 10 km/hr limit  Ownwind: 10 km/hr limit  Townwind: 10 km/hr limit  Upwind: 10 km/hr limit		

When doing a long-term noise measurement, it is not always possible to determine whether rain has occurred over the entire 24 hours of the study. The possibility of rain should be investigated prior to the noise field trip. The following website is useful for determining weather conditions across Canada: <a href="www.theweathernetwork.com">www.theweathernetwork.com</a> or <a href="http://www.weatheroffice.gc.ca/canada\_e.html">http://www.weatheroffice.gc.ca/canada\_e.html</a>.

In addition, a couple of indicators may help determine whether rain has occurred including:

- Visible signs of water on the protective sound level meter case and the surrounding ground.
- Cross referencing the B&K Evaluator sound file with the weather data obtained from
  the site weather station. If rain can be heard upon listening to the sound file, and the
  humidity is close to 100 %, then there is good reason to believe that rain occurred
  during that time period.

#### 9.2.2 B&K 2250 Analyzer Calibration Fault

Calibrating the sound level meter before and after each measurement is a necessary part of the noise monitoring process. Not carrying out this necessary step can result in invalid data. Calibrating the noise level meter essentially tests the B&K 2250 Analyzer's ability to sense correct noise levels. The B&K 4231 calibrator itself must have new or fully charged batteries so that it too outputs the correct test signal (94 dBA at 1000 Hz). As an example during one noise field study, the microphone on the B&K 2250 Analyzer was found to become wet from the rain. Upon performing a post measurement calibration, the B&K 2250 Analyzer was found to be observing larger than normal values. Typically, the B&K 2250 Analyzer outputs a reading in the range between 49-52 mV/Pa (millivolts per Pascal). With the moisture in the microphone, the values were found to be much higher than this. After the water evaporated, the calibration was again found to be in normal range.

#### 10.0 EQUIPMENT MAINTENANCE

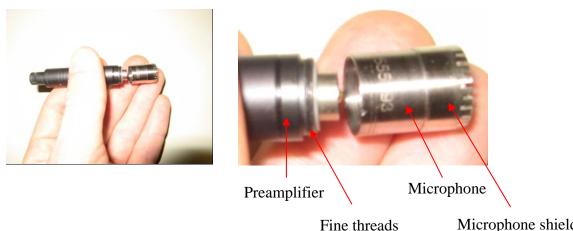
#### 10.1 Microphone Maintenance

The following maintenance procedures are recommended keeping order to maintain the microphone in good working order:

• When not in use, keep the microphone in an environmentally controlled area with moderate to low humidity levels, as humidity will alter the sensitivity of the microphone. Condensation of water vapour within the microphone can cause significant negative effects, the worse of which is electrical continuity between the diaphragm and the back plate. Thus, it is necessary to prevent the microphone from coming into contact with any liquid whatsoever. Keep the microphone and preamplifier assembly in the designated case when not in use for long periods of time as shown in the figure below:



- When connecting the microphone to the preamplifier or the outdoor kit body, thread
  the microphone VERY CAREFULLY to avoid damaging the threads. Do not remove
  the microphone shield as the microphone drum can fall out and become damaged or
  lost (see photos below).
- The Microphone and SLM should be calibrated every two years.



Microphone shield

#### 10.2 **B&K 2250 Analyzer Maintenance**

The following maintenance procedures are recommended to keep the B&K 2250 Analyzer in good working order:

- Keep the Analyzer in the protective case when not in use.
- Be careful not to drop the meter as the touch display screen can be damaged.
- Avoid using solvents when cleaning the touch display screen. Instead use a damp cloth as recommended by B&K.
- To remove the microphone extension cable, make sure to pull back the spring loaded sleeve gently before pulling the connection from the meter. If difficultly arises in removing the connection, put a cloth over the sleeve and use pliers to gently grip the cloth while pulling back to release the connection.
- The B&K 2250 Analyzer should be sent to the B&K North America service department every two years for maintenance. This facility is located at:

Bruel & Kjaer North America 2815-A colonnades Court Norcross, GA 30071-1588

Phone: 800-332-2040 Fax: 770-447-4033 www.bkhome.com

#### 10.3 B&K 4231 Calibrator Maintenance

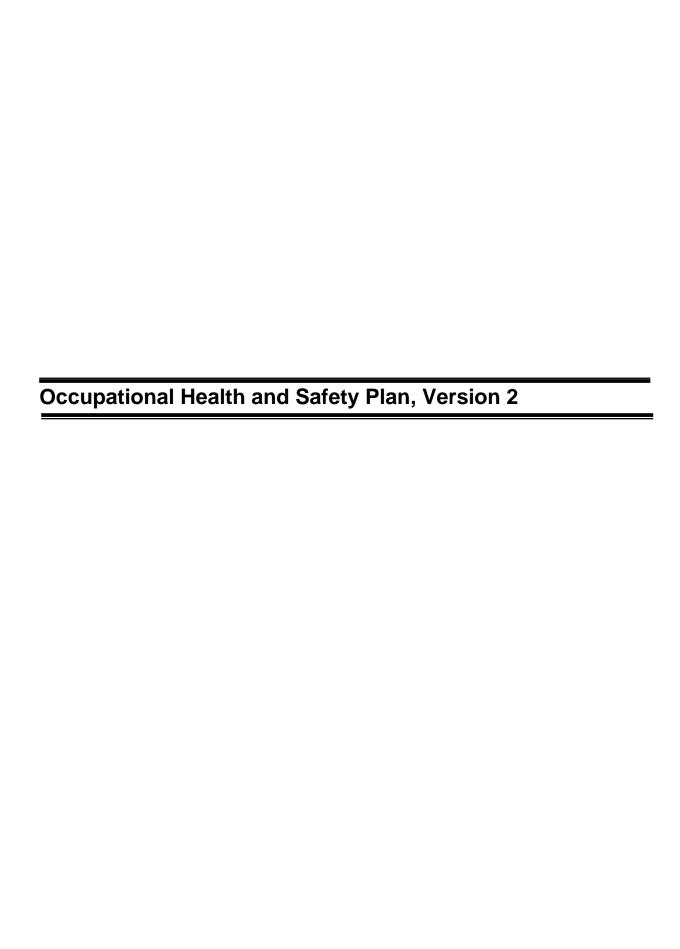
The following maintenance procedures are recommended to keep the B&K 4231 Calibrator in good working order:

- Keep the calibrator in its case at all times. There is no need for the leather case to be removed except for when the batteries need to be changed.
- The B&K 4231 Calibrator should be sent to the B&K North America service department every year for maintenance. This facility is located at the same address as that given above.

#### 10.4 Outdoor Microphone Assembly Maintenance

- Keep the windscreen on the outdoor microphone body, as this protects the microphone.
- Clean the windscreen from any debris that may accumulate on it after field work, as any build up of debris will serve to impede sound from being transmitted to the microphone.

#### HSL/JC/TD/DRW/rs







PROGRAM NUMBER: MBK-HSS-PLN - Occupational Health and	
Safety Plan	

People concerned	All employees, contractors and visitors	Prepared by	Health and safety
		Authorized by	Markus Uchtenhagen Health and Safety Superintendent
Effective Revised	April 24, 2013 December 6, 2018	"Safety First, Safety Last Safety Always!"  "No Repeats" – Our Stepping Stone to ZERO HARM	

This program corresponds to the required minimum standard. Each and every one also has to comply with the rules and regulations of the Nunavut Government in terms of health and safety at work.

#### **Objective:**

 To establish the framework, rules and procedures for ensuring the health and safety of all employees, contractors and visitors at Meadowbank and Amaruq sites.

#### **Concerned departments:**



All departments

#### **Required equipment:**

Knowledge

#### Risks /Impacts legend









Health & Safety

Process/Quality

Costs

Environment





### Sustainable **Development Policy**



#### **Our Commitment**

At the core of our Policy we are committed to creating value for our shareholders while operating in a safe, socially and environmentally responsible manner, contributing to the prosperity of our employees, their families and the communities and respecting human rights culture, custom and values of those impacted by our activities. This has translated into the fundamental values of our Sustainable Development Policy: operate safely and maintain a healthy workplace, protect the environment, and treat our employees and communities with respect.

#### This means we commit to:

- From one leadenship, personal commitment and accountability to these principles from all employees and contractors, both on and off the job;
- . Assess potential impacts and risks associated with our activities throughout the life cycle of our projects or operations, including impacts of purchasing or acquisition decisions on the basis of our sustainability values:
- . Ensure sufficient resources are allocated to implement and manage these commit
- Design and operate our facilities to ensure that effective controls and technologies are in place to minimize and mitigate the identified risks;
- Evaluate, control, eliminate or minimize risks through the implementation of a Respo Mining Management System;
- . Measure and verify regularly our performance;
- Stive for continuous improvement by setting targets, measuring results against those targets and recogniting and rewarding performance;
   Comply in full with our internal policies, Code of Business Conduct and Ethics, with the
- levs and regulations in each country in which we operate as well as other industry standards to which the company subscribes;
- Uphoid fundamental human rights as defined in the United Nations Universal Declaration of Human Rights;
- Implement emergency and citals response plans to eliminate or minimize and mitigate the impacts of unforeseen events;
- Build a relationship with our stakeholders based on trust through open and transparent communication and full disclosure of payments to all levels of government;
- Provide appropriate planning and appendion to ensure that our policies, procedures and Responsible Mining Management System are implemented by all.

#### Respect for OUR EMPLOYEES



#### Respect for OUR ENVIRONMENT



#### Operate a SAFE AND HEALTHY WORKPLACE



#### Respect for OUR COMMUNITY







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#### **AGNICO EAGLE**

The following document presents Meadowbank and Whale Tail Pit Occupational Health and Safety Plan (the Plan) in support of Meadowbank Nunavut Impact Review Board (NIRB) Project Certificate No.004 and Whale Tail NIRB Project Certificate No.008, condition 57. This plan outlines Agnico Eagle's strategy for Health and Safety.

#### 1. Goals for the Occupational Health and Safety Plan

The prevention program focuses on eliminating dangers to health, safety and protects the physical integrity of all workers (this includes all Agnico-Eagle Mines employees, Contractors and visitors).

#### Specific objectives:

- Identify and assess the risks in the process and the work environment;
- Propose effective and sustainable technical controls to ensure the health and safety of employees/contractors;
- Adequately protect workers exposed to specific risks by setting health and safety standards;
- Adequately protect all personnel and contractors working on sites against specific risks, by setting health and safety standards, for every risk encountered;
- Ensure the preventive maintenance of personal and collective protective equipment;
- Train the employees and contractors on the risks related to their work and their environment.

#### 2. Policy

Agnico Eagle Mines – Meadowbank Division recognizes the importance of eliminating as much as possible the risks of an accident and/or occupational disease. To achieve this goal, Agnico Eagle Mines - Meadowbank Division established a policy for these objectives, and, always maintains harmonious relations with their employees.

#### 3. Application

The prevention program is for all employees of the Meadowbank Mine, Agnico and contractors. All contractors, suppliers and visitors working at the Meadowbank Division site must comply with the content of this program.

Accident prevention necessitates the involvement of everyone. Every employee and contractor has a specific role to play and is responsible for their health and safety. In other words, we can say that, at Agnico Eagle Mines, Meadowbank Division, we have as many safety specialists as we have employees, contractors at the site.





#### 4. Responsibilities of the parties

#### 4.1 Management team

- Provide material, financial and human resources to implement, maintain, update and improve the prevention program;
- Maintain the prevention programs to provide workers and contractors a safe and healthy work environment;
- Participate actively in the assessment, review and monitoring of the program activities;
- Ensure the implementation, improvement and monitoring of the Supervisors' Formula and the work card;
- Ensure that the employees and contractors have the training and the necessary information to avoid endangering their health or safety and / or their colleagues;
- Correct with immediacy, a known situation that might endanger the health or safety of someone; and
- Collaborate with the occupational health and safety committee and with any public health and safety institution or regulator.

#### 4.2 Health and Safety/Training Officers/Emergency Response Coordinators/Security

- Coordinate the implementation, application and improvement of the prevention program;
- Coordinate all activities by managing health and safety and security;
- Support and coach employees, Supervisors and Management in performing their duties;
- Collaborate in the identification, evaluation and controlling risks in their respective workplaces;
- Ensure compliance with Act and Regulations, Standards and Site policies/procedures;
- Inform members of the management team of any suspicious circumstances that may affect the health or safety or security;
- Ensure the implementation, improvement and the follow-up of the Supervision Formula and the work card;





- Ensure that workers have the necessary training and information to minimize the possibility of endangering their health, safety or security and / or their colleague;
- Correct with immediacy, a known situation that might endanger the health or safety or security of someone;
- Collaborate with the safety representatives in the various mandates entrusted to them:
- Collaborate with the (Workers Safety and Compensation Commission) WSCC inspectors or other regulators during their visits;
- Collaborate with health team on site or mandated by the WSCC; and
- Ensure an effective and properly trained Emergency Response Team. Ensure an adequate number of trained personnel for both Surface and Underground settings.

#### 4.3 Supervisors

- Correct immediately any potential hazard in the workplace;
- Collaborate in the identification, evaluation and control of any hazardous situation in the workplaces;
- Inform the Health and Safety Department of any situation that could affect the health or safety of the workers:
- Provide individual and/or collective protective equipment for workers;
- Ensure that workers have the training and the necessary information to avoid endangering their health and safety and / or their colleague;
- Follow the Act/Regulations, rules, standards, procedures and site Policies/Protocols;
- Ensure the implementation, improvement and follow-up of the Supervision Formula and the work card with an emphasis on "immediacy" for the corrective actions to be taken;
- Ensure that all incidents are properly reported in a timely manner to the Health and Safety Department, and Department, using the appropriate forms;
- Investigate all incidents/accidents and document findings and recommend corrective measures on appropriate forms; and
- Work with the Occupational Health and Safety Committee and the safety representative in the various mandates that were given to them.





#### 4.4 Worker

- Protect their health, safety and physical integrity or that of others in the workplace;
- Respect the preventive measures established in the Health and Safety plan;
- Respect the information given during the induction program, postings, and safety meetings;
- Participate in the identification, evaluation and control of hazards in the workplace;
- Wear personal protective equipment and/or collective protective equipment required for specific jobs to protect their health and safety;
- Participate in identifying and quantifying of the contaminants in the workplace;
- Respect the Act/Regulations, safety rules, standards, procedures and policies/protocols at all times;
- Inform the supervisor of any doubtful situations that may affect the health or safety;
- Report all accidents, incidents or close calls (near misses) to the supervisor immediately (within the working shift);
- Participate in training or/and health and safety information sessions; and
- Work with the Joint Occupational Health and Safety Committee on different health and safety issues that were mandated to the committee.

#### 4.5 Nurse (Health Care Provider)

- Coordinate the health program for the site;
- Inform managers, supervisors and workers on contaminants potentially present in their workplace;
- Propose to the management team methods to control risks that could affect the health or safety of workers;
- Initiate screening biological tests on contaminants potentially present in the workplace;
- Provide immediate care to injured personnel and follow-up;
- Training as required;
- Participate in the identification of Health hazards in the workplace;





- Provide information on sexual health and well-being; and
- Work with the Occupational Health and Safety Committee on the various mandates given to the committee.

#### 4.6 Industrial Hygiene Technician

- Identify all the contaminants in the workplace that could pose a health and safety hazard to workers;
- Determine the potential exposure of workers to the identified contaminants with good sampling and analysis strategy;
- Inform supervisors and workers on the results of exposure present in their workplace and how to protect themselves;
- Provide managers with methods to control risks that could affect the health and/or safety;
- Perform maintenance and monitor the calibration of measuring instruments used in industrial hygiene;
- Develop and maintain an Industrial Hygiene Program;
- Develop and maintain an Asbestos Management Plan;
- Provide training in Industrial Hygiene subjects with all concerned; and
- Work with the Occupational Health and Safety Committee on the various mandates given to the committee.

#### 4.7 Contractors

Transmit to Agnico Eagle Mines
 – Meadowbank Division a Health and Safety program specific
to their activities on the site. Agnico Eagle Mines
 – Meadowbank Division reserves the right to
request changes that they consider important;

Note: Any contractor on site for a period of less than fifteen (15) days does not have to submit a Health and Safety program. However, they must comply with the Health and Safety program of the site and made available to workers.

- Transmit (before the job starts) all plans certified, signed and sealed by an engineer recognized in the Nunavut Territory for construction on surface;
- Provide Agnico Eagle Mines Meadowbank Division with a current letter indicating that they
  are in good standing with WSCC in Nunavut;





- Transmit the Health and Safety program specific to their activities on the site, which must contain a list of risks in regards to construction work and, indicate the controls put in place in regards to those risks;
- Submit in writing to Agnico Eagle Mines
   — Meadowbank Division all changes that were made to the work procedures and have them available for the workers and their supervisors;
- Take measures to ensure that all workers under their supervision are informed of the risks they are exposed to;
- Inform, immediately, Agnico Eagle Mines- Meadowbank Division of any accident/incident in the execution of various contracts:
- Inform in writing Agnico Eagle Mines— Meadowbank Division of any writing or report issued by the WSCC to the contractor;
- Update a bulletin board dedicated exclusively to health and safety at work inside the trailer or any other location easily accessible to workers;
- Hold a weekly safety meeting for each crew. Send a copy of the minutes of the meeting with the names of participants to Agnico Eagle Mines – Meadowbank Division Health and Safety Department;
- Provide a written document stating that your enterprise as a contractor on the site will abide to Agnico Eagle Mines

  – Meadowbank health and safety programs;
- Provide monthly hours worked by their employees and sub-contractors (if applicable) as well as its accident/incidents statistics:
- Provide workers with personal protective equipment determined by legislation or by the Occupational Health and Safety Committee according to the tasks they must accomplish;
- Ensure that the employees wear their personal protective equipment at all times while at work and that they use the proper tools to accomplish their tasks;
- Ensure that the corrective measures requested by Agnico Eagle Mines— Meadowbank Division be completed in the time frame prescribed;
- Submit a list of workers who have a valid or current first aid certificate:
- Ensure that all equipment complies with Agnico Eagle Mines Meadowbank Division and Nunavut Regulations;
- Provide a list of all current MSDS sheets for products that you as a contractor are bringing on site;





• Ensure that all temporary structures and / or permanent are safe and that they comply with legislation or site specifics ex. (railings, guarded openings, etc.).

If the contractor or any person within its jurisdiction fails to comply with the terms of the program, Agnico Eagle Mines— Meadowbank Division can then take any necessary action to correct the situation, and that at the expense of Contractor.

#### 4.8 Suppliers

Comply with the Health and Safety program of Agnico Eagle Mines

– Meadowbank Division, standards and procedures applicable to them (especially when they perform delivery or assemble their products or equipment on site).

#### 4.9 Joint Occupational Health and Safety Committee

- Approve the Health and Safety Plan;
- Make periodic follow-up of the Health and Safety plan by actively participating in various activities to identify, assess and control;
- Cooperate with the WSCC representatives;
- Encourage the participation of managers, supervisors and workers in various elements of the program; work within the "Terms of Reference" guidelines;
- Receive suggestions and complaints from employees, employee representatives on health and safety issues at work;
- Receive and review the planned inspection reports, accident investigations, safety meetings and the WSCC mine inspector reports;
- Receive and analyze the accidents and incidents statistics:
- Receive and analyze the accidents / incidents investigations reports;
- Participate in accidents/incidents investigations and analysis and risk assessments for all job tasks on site;
- Hold a meeting with the Joint Occupational Health and Safety Committee members at least once a month:
- Provide recommendations to Management to resolve Health and Safety issues; and
- Actively and positively promote Health and Safety for all workers, contractors on site.





#### 5. Elements of the program

#### 5.1 Risk identification

Identify all potential hazards from different health and safety activities in place within the Meadowbank and Amaruq site. Among these activities, we find the planned inspections, investigations and analysis of accidents/incidents, close calls, task observations, monthly safety meetings, job hazard analysis (JHA), and the workers comments on their work card.

In addition, periodic meetings are held with all the personnel to complete the list of possible hazards. This process requires the participation of every department and requires an effort from everyone. A listing of possible risks is presented at these meetings to guide workers in selecting potential hazards in their work place. The potential risks are then stored in a tabloid format. Once the list of potential risks is developed, a selection process is started to prioritize the hazards. This prioritization step consists of a consultation process with officials from each department and each committee member of risk management program.

#### 5.2 Prioritization of risks

Prioritizing risks is mathematically based on a prioritization grid containing different risk parameters and control:

#### Legal requirement

- Site specific
- Extent of risk
- Probability of risk
- Severity of risk
- Risk of fire
- Effect on health as a function of exposure
- Administrative control
- Operational Control
- HR Dimension

Once the list is completed, every department will develop an action plan to address the most significant risks determined in the prioritizing process. In addition, the departments will also have created a list of training needs, a list of critical tasks to be observed and a list of hazards. Job Hazard Analysis will be completed when and where required.

#### 5.3 Revision

The process of identification, assessment and risk control will be revised every three (3) years.





#### 5.4 Activities and Specific Management Programs

#### 5.4.1 Supervision Formula and work card

The Supervision Formula is a philosophy and is the basis for our entire Health and Safety Program, here at Meadowbank.

To meet due diligence, the supervisor must take immediate action on all situations that could endanger the health or safety of the employees. In other words, he must use the "immediacy" to correct outstanding situations and involve the employees.

#### 5.4.1.1 Summary of Supervision Formula

The Supervision Formula is divided into six (6) phases which are:

- Greeting
- Inspection
- Planning
- Decision
- Execution
- Worker's comments

The **Greeting** phase allows the supervisor to discuss with workers on the tasks to be done during the day, list the equipment and tools they may need, check the understanding and above all, arousing all workers to have "a safety minded attitude all the time", followed by a talk about known abnormal conditions reported by the previous shift and the hazards they may encounter during the day.

The **Inspection** phase enables workers and supervisors to inspect the access to the work place, workplaces, tools, equipment to detect any anomalies that could lead to an incident or accident in the short, medium and long term. It also eliminates these deficiencies "immediately" when discovered. The inspection is the most important phase of the Supervision Formula, because at this stage, if we take the time to inspect and correct the deficiencies found, the risks will be minimized or even eliminated.

The **Planning** phase is the logical extension of the inspection, because when anomalies are found, we must define how to correct them. Then the planning of the day's tasks to be accomplished is revised with the employee on how it will be done, what tool and/or equipment to use and the most important part is to identify the specific risks that could be generated and how to control the risks identified.

The **Decision** phase is when the supervisor gives his/her agreement to do the task as planned. Before giving the agreement he/she must make certain that the employee understood him and agrees with the planning, the workplace is up to standard, the tools and equipment are good, the hazards have been identified and controlled, the employee has the training to accomplish the task, and then the supervisor will give the authorization to continue the work.

The **Execution** phase is to accomplish the work as agreed in the planning phase. However, we must remember at this stage to be vigilant at all times, because during the execution of work, we may have to repeat all the phases of the **Supervision Formula** that is: inspection, planning, decision and





execution.

Reviewing the **Worker's Comments** on the work card (at end of shift) is an extremely important part of communication for the incoming shift. This part allows workers to report any anomalies/deficiencies observed during their shift which could affect the health and safety of other workers. Workers also reports broken equipment, missing material etc.

#### The ideal tool for conveying the supervision formula is:

#### "The work card"

#### 5.4.1.2 Using the work card

Every day, the employees/contractors receive a work card that they must complete at the workplace before the work begins. Workers notes on the work card the state of the access to the workplace, the work place, material to be used and equipment with special attention to sub-standard conditions. During his/her tour while applying the Supervision Formula, the supervisor approves the continuation of work by comparing the information written on the card to his own observations. Exchanges are done between the employees/contractors at the workplace and the supervisor.

At the end of the shift, the cards are handed by the employees to the supervisor so that he can read the comments and the situation of the work place. The supervisors will leave instruction to the incoming shift.

The work cards are kept in files for a period of one (1) year.

An evaluation on the quality of the work cards used by the employees and supervisors is done on a quarterly basis by the 2<sup>nd</sup> level supervisors. The evaluation results are then presented to the follow-up Committee of the Supervision Formula.

#### 5.4.1.3 Follow-up Committee of the Supervision Formula

A follow-up committee meets periodically to evaluate the application of the supervision formula and the results of the work card. The follow-up team is composed of members of management and two (2) representatives of the Health and safety department.

#### 5.4.2 The Health Program

The health program is part of the health and safety plan. It identifies some hazards associated with physical or mental health of workers and recommends a series of actions to protect all employees against the hazards in their work tasks or their environment.

#### 5.4.2.1 The Medical Staff (Health Care Providers)

Two (2) registered nurses are present at the Meadowbank mine site, and (1) one nurse is present at Amaruq 24 hours a day, 365 days a year. They are registered in Nunavut territories and have accredited training in trauma (ACLS/TNCC).





To complement the health and safety team, a medical director conducts periodic visits to the mine site. During these visits, the medical director will do the medical examinations required by the legislation.

#### 5.4.2.2 First Aid Emergency

First aid is provided by anyone who is qualified to give first aid. In addition our Health Care Providers provide higher level of treatment when necessary. They can direct the patient to specialized care if necessary. However, several people have been trained and can give first aid. The injured employee if/when transported must be accompanied by a nurse or paramedic in the ambulance or airplane.

#### 5.4.2.3 Trained First aid personnel

First aid training is provided to a sufficient number of workers who are able to respond at all times. To ensure the continuous presence of rescuers/first aiders on all shifts, all supervisors are trained from all areas of the mine site. Furthermore, all Emergency Response team members received first aid training. A minimum of twenty (20) emergency response team members are on site all the time and trained to face every type of emergency.

In addition, some Emergency Response team members are trained to the advanced first aid level.

#### 5.4.2.4 Emergency First Aid Kits

Emergency first aid kits are available in all AEM vehicles and workplaces at different locations on the site. The contents respect legislation requirements. We have MASS Casualty First Aid Supply is in place by entrance to Gymnasium. Our ERT teams are equipped to handle most Emergencies that can occur on site.

#### 5.4.2.5 Registers and accident reports

In case of accident, an initial report is completed by the supervisor with the employee. The original report is then forwarded to the Health and Safety department. When the accident causes bodily harm that requires medical assistance, the Health Care Providers will open a file on the accident and if needed, they will fill out the necessary WSCC claim reports. All medical files are kept at the clinic under lock.

A weekly report is communicated to the management and the accident statistics are tabulated and communicated on a monthly basis to site and WSCC.

#### 5.4.2.6 Clinic

(At Meadowbank site) The clinic is located on the ground floor of the service building adjacent to the Maintenance team offices and shop. (At Amaruq site), the clinic is located in the Exploration camp at far end – West adjacent to the fire hall.

The following equipment is available at the clinic:

- Oxygen and defibrillators
- Examination table





- Eye wash station
- Scale, Bandages
- Medications
- Burn Kits
- I.V. solution
- Material Safety Data Sheets (MSDS)
- First Aid Equipment
- Heart monitoring equipment
- Trauma Supplies
- Multiple Casualty equipment

#### 5.4.2.7 Medical Examinations

#### **Medical pre-employment**

Prior to employment with Agnico-Eagle Mines, Meadowbank Division, each candidate must have a full medical examination and a hearing test. The pre-employment medical ensures that the candidate is fit for the job for which he/she is hired.

When hired, the new employee/contractor completes an induction session (e-learning) with different modules. A Health Care Provider explains their programs such as what to do in case of an accident or sickness. Each worker will have a confidential medical record kept under lock in the clinic. Only nurses and physicians will have access to the medical files. In addition, the physician will meet with workers upon their request.

#### 5.4.2.8 Monitoring during an illness or accident

During a prolonged absence from work, the Health Care Provider is responsible for systematically monitoring the health of the worker. If the absence lasts more than three (3) days, the procedures for insurance is undertaken jointly with the worker and Human Resources Department. For absences due to an accident at work, the case is managed with the WSCC.

During a medical visit following an accident, the worker must contact the nurse or his supervisor to transmit the doctor's decision if he has allowed the injured worker to be assigned to light duty work as soon as possible.

To facilitate rehabilitation, the worker is assigned to light duty work until his/her injury is healed. The supervisor is notified of employees' work limitations/restrictions as well as the probable date of return





to regular work. At the clinic, each employee has a separate file for personal sickness and for work related accidents.

#### 5.4.2.9 Medical exam when leaving the company

Every employee leaving the company shall, before his/her departure, pass a hearing test if his last test exceeds six (6) months and be referred to a specialist if required.

#### 5.4.2.10 Health and Well-Being

Our Health Care Providers have included health and well-being information in our employee orientation program and our "Site Readiness" program. When any new employee arrives on site, they will be informed of topics such as sexual health, well-being, mental health, fatigue management, addictions, being "fit for duty" etc.

They will communicate and share with all workers the range of health services available onsite and update it as necessary as new services are available.

Periodic crew meetings with the different departments to inform our employees of our health and well-being services on site.

Brochures are developed and made available to all employees on subject matter.

We have also made available condoms on our site to promote sexual health.

We endeavor to ensure that all brochures are available in English and Inuktitut.

#### 5.4.2.11 Review of Health Program

To audit the health program, an annual evaluation of the program is made by the Health Care Providers.

Any request for modification, addition and revision should be made to the Health Care Providers.

#### 5.4.3 Investigation and analysis program

The investigation program and accident analysis aim to ensure and maintain a process of investigation and clear analysis so that it will:

- Clarify the responsibilities of all concerned parties;
- Ensure the quality of investigation reports and analysis based on criteria established and recognized;
- Identify the immediate and root cause of accidents or incidents:
- Recommend preventive and corrective measures following related events;





- Follow-up preventive and corrective measures;
- Eliminate the hazards and threat to health and safety of workers.

#### **Important Information:**

Under the NU – Mines Safety Health Act and Regulations, the employer must inform a WSCC Mines Inspector, as soon as possible (without delay) (ex. by telephone), and, within (72) hours, make a written report with the information required by regulations, regarding the events that have caused:

- Fatal injury to an employee;
- Serious injury to a worker; (as defined by Section 16.01 and 16.02 of NU Mines Safety Health Act and Regulations (Reportable Incident).

Furthermore, the NU Mine Safety Health Act and Regulations states that the inspector must be advised as soon as possible for any Dangerous Occurrence incident as defined by Section 16.01 (within 24 hours). The Dangerous Occurrence final investigation report must be submitted to the Mines Inspector within (72) hours.

At Agnico Eagle Mines – Meadowbank Division, the WSCC mine inspector will be informed by the General Manager, or by the Health and Safety Superintendent or Designate.

#### 5.4.3.1 Procedure for investigation and accident analysis

At Agnico Eagle Mines - Meadowbank Division, accidents are divided into the following categories: fatality, lost time accidents, accidents resulting in modified/light duty assignment, medical aid, first aid, reported incidents, fire incidents, incidents (but no injury) and near miss or close calls.

Depending on the frequency and severity of the situation, some accidents/incidents must be investigated, in order to collect all the information and evidence or facts that cause the accident/incident. This information is used to determine the root causes of the accident/incident and finally, to recommend corrective and preventive measures to prevent its recurrence. The following chart summarizes the accidents that should be investigated.





Fact PARTICIPANTS

### **ACCIDENT/INCIDENT**











Guidelines for assembling persons for the investigation process: always keep in mind the "potential" severity and not the result.

Worker; Supervisor; JOHSC Representative General Foreman; Dept. Superintendent/Designate Health and Safety Dept. Rep. General Manager /Designate (if required)

Worker; Supervisor; JOHSC Representative General Foreman; Dept. Superintendent/Designate (if required) Health and Safety Dept. Rep.

Worker; Supervisor; JOHSC Representative to review; General Foreman to review Health and Safety Department Rep.;

Worker; Supervisor; JOHSC Representative to review; General Foreman (if required); Health and Safety Department Rep (if required);

\* If an investigation is requested Worker; Supervisor; JOHSC Representative to review Health & Safety Dept. (if required); General Foreman to review

Note: All accident/incident reports are to be forwarded to Meadowbank Health and Safety Department!!!





#### 5.4.3.2 Accident report

#### Steps:

- 1. Any employee/contractor involved or that witnesses an accident must immediately notify their immediate supervisor or designate of the situation and keep the scene intact or undisturbed to allow time for the investigation, except to prevent further accidents.
- 2. Any worker involved or witnesses an accident must complete with the supervisor the initial incident report form, as soon as possible after the event but at the very least before the end of the shift.

Note: The official accident with bodily harm log book is located in the clinic.

3. The immediate supervisor or his designate must immediately notify the general foreman who will notify the health and safety department of the accident. Depending on the severity and/or potential of the accident/incident, the OHSC representative will also be notified by the Health and Safety department or by the Department Management in which the event occurred.

Note: Reportable incidents – (Any incident listed in the "Serious Injury" portion and as described in Section 16.01 of the Regulations must be reported without delay to a Nunavut Mines Inspector and OHSC Co-chairs, by the Manager and/or his designate.

Dangerous Occurrences – (Any incident listed in the "Dangerous Occurrence" portion and as described in Section 16.01 of the Regulations must be reported within 24 hours to a Nunavut Mines Inspector by the Manager and/or his designate and OHSC Co-chairs.

Within 72 hours after a "Dangerous Occurrence" or "Reportable Incident", the Manager and/or designate shall send a report to the Mines Inspector and OHS Committee Co-chairs.

#### The investigation:

- 1. When an accident happens, the supervisor shall, if possible, go immediately to the scene of the accident to control the scene and collect the facts of the accident. The scene shall be secured pending investigation and only released after all facts have been gathered. In the case of a "Dangerous Occurrence" and/or "Reportable Incident", the scene shall not be released until the Mine Manager and/or his designate release it and only after consultation with Mines Inspector and OHSC Co-Chairs.
- 2. The supervisor will evaluate the loss and he will contact the appropriate officials.

A Supervisor or Health and Safety Department representative may demand an investigation for an accident without injury or even a first aid accident in the case if the consequences could have been worst (potential severity).

- 3. The immediate supervisor or designate will immediately initiate, if necessary, the process of the investigation, if possible, with the injured worker or workers who witnessed the accident. The investigation will be done whenever possible at the scene of the accident.
- 4. The supervisor fills out the investigation report with, if possible, the injured worker or/and the worker/s that witnessed the accident.





5. The investigation report must be signed and a copy must be sent to the Health and Safety Department as soon as possible. The Health and Safety Department is responsible for forwarding a copy of the investigation to the Manager (as needed) and to the Occupational Health and Safety Committee without delay. A copy of the investigation report must also be reviewed by the OHSC safety representative.

#### **Accident analysis:**

An analysis must accompany every accident investigation. This analysis is essential to determine the root causes of the accident and to recommend corrective and preventive measures necessary to prevent the accident from recurring. The analysis includes three (3) major steps:

- Initial analysis of all the information gathered in the investigation to keep only the contributing factors;
- Identification of all the causes and factors that contributed to the accident;
- Separation of contributing factors into two (2) categories:
  - Immediate causes
  - Root causes

#### The method of analysis:

This method involves taking the consequences as a starting point and looking for causes by asking "Why?" At each step, ask the following question: "Why did it happen this way?"

Each answer must be complete and sufficient to explain the reason the accident happened. If they do not explain it completely, there is/are another cause/s to be determined.

Please find enclosed the steps in completing an accident/incident investigation:





# The accident/Incident

Need a complete description of the event, location and who was involved.





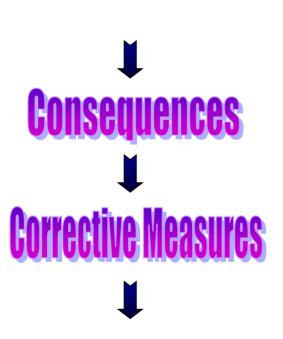
Immediate Causes categories:

- Work practices, behaviors
- Environmental conditions, equipment/material
- Use of protective equipment
- Conditions of protective equipment

**Fundamental Root Causes** 

Fundamental (Root) Causes categories:

- Personal factors
- Organizational factors



Results in Injury, Damage to Equipment, Fires, Damage or Spills to Environment, Loss to Process

Ensuring good corrective measures will prevent Re-occurrence of accident/incident Communication of incident/accident is very important as well

Follow-Up

Ensuring that corrective measures are in place, in force and doing what they were designed to do Sharing corrective measures within the Department and site wide to prevent similar accidents/incidents from occurring again





To do this, the immediate supervisor or his designate must initiate the review process once the investigation is completed. The analysis may be conducted away from the scene of the accident by completing the investigation and analysis formula of the accidents.

Furthermore, it is essential that recommendations and remedial measures following the investigation and analysis of the accident are followed-up for the immediacy of corrective actions.

#### 5.4.3.3 Training in investigation and analysis

Training in investigation and analysis of accident is a must for all supervisors, general supervisors and occupational health and safety committee members. This training aims to provide supervisors and members of the occupational health and safety committee good knowledge, techniques and skills to effectively fulfill their responsibilities outlined by the management team. A refresher course will be given when needed.

#### 5.4.3.4 Review the program of investigation and analysis of accidents, incidents

The accident investigation and analysis program is revised as needed.

Any request for modification, addition and/or revision must be made to the Health and Safety Department.

#### 5.4.3.5 Entry into Intelex – tracking system

All incidents / accidents will be logged into Intelex in a timely manner and incidents will be closed out on a monthly basis.

#### 5.4.4 Inspection of workplace

Objectives of the inspection of the workplaces:

- Eliminate accidents, improve the quality of life, increase productivity and efficiency;
- Protect the health, safety and integrity of workers;
- Identify and correct the situations and conditions that may cause loss;
- Identify non-compliances with the standards in the work areas;
- Develop appropriate remedial action following non-compliances and ensure follow-up.





#### 5.4.4.1 Description of the different types of inspections

#### **General planned inspection:**

Systematically inspect one or more areas to check compliance of area, equipment and work environment. Pay attention to the working methods to detect dangerous actions or methods. Good housekeeping is a must.

#### **Specific inspection:**

Check one specific aspect following an investigation and analysis of accident/incident, a specific request of the JOHSC, an evaluation of the accident log book or any other situation with a potential of loss.

#### Daily inspection (work card):

Daily inspection of access, work places, tools, equipment listed on the work card to detect and correct with immediacy sub-standard conditions. This inspection is to be done by worker/Supervisor.

#### Daily pre-use inspection of equipment:

All users of mobile equipment must check compliance of their mobile equipment and complete inspection card associated with the equipment at the beginning of each shift to ensure that equipment is compliant and it creates no risk to the safety and health for operator and others. Once completed, the cards are stored and kept for a period of one (1) year.

#### 5.4.4.2 Frequencies of the inspections

- **Site General Manager** will plan and participate in general inspections to cover the surface operations as needed (2) times per year.
- **Department Superintendent/Assistant:** must attend a minimum of four (4) planned, general inspections with the supervisors, or general foremen of his department, or area of responsibility.
- **General Foreman** must attend a minimum of four (4) inspections with the supervisors via Supervision Formula and (1) planned inspection per month in area of responsibility.
- Supervisor will conduct daily inspections planned in his sector with his workers (as per work card) and occasionally with a member of the Health and Safety Department. Monthly, he and an OHSC rep. will conduct (1) planned inspection in his/her working area.





- Health and Safety Department personnel: (Health and Safety Superintendent/Assistant and H & S Advisors) will conduct minimum of (2) inspections per rotation in different areas of the site.
- **JOHSC Representatives** will be invited to participate in monthly inspections with each level of the management team named above in their area of responsibility. Note: JOHSC must conduct one inspection per month as legislated in the Mine Regulations Section 3.19 3.22.
- **Worker** will conduct a daily inspection of access, work places, tools, equipment listed on the work card to detect and correct with immediacy sub-standard conditions.

#### 5.4.4.3 Methodology of Inspection

To be effective, the people responsible for the inspection must be prepared, organized and have the right tools. Four (4) steps are necessary to ensure an inspection of quality:

- Planning
- Inspection
- Report
- Corrective actions and follow-ups

#### **Objectives of the inspection report:**

- Identify all items inspected (compliant or non-compliant); (Note: non-compliance must be based and in reference to Mine Regulations, Company Policies/Procedures etc.)
- Identify the sector and / or equipment inspected;
- Classify risks for each observed deviation;
- Determine corrective action:
- Identify a person responsible for each corrective action;
- Determine a timeframe:
- Indicate the number of the work order and/or completed formulas to apply corrective measures.

Note: the report must be written legibly or typed, saved electronically

#### Distribution of the inspection reports:

Once the report is completed, participants in the inspection must send the original to the health and safety department. A copy of the report must be sent to the department heads concerned by the inspection and to the manager.

The participants keep a copy of the inspection report and when the sub-standard anomalies have been corrected, they will send a copy of the report with the corrective actions completed to the department heads concerned by the inspection and the safety and health department.





#### Follow-up of the corrective action:

The responsibility to follow-up the corrective action should be incumbent to those who conducted the inspection. The department head will make certain that the follow-up is completed.

The Health and Safety Department will produce an update on the frequency of inspections and the amount of corrective actions that were completed every month. The report will be sent to the JOHS Committee for review.

Classification and time frame for the corrective measures

Severity		Time frame for temporary corrective actions	Time frame for permanent corrective actions
A)	Action or condition that could have resulted in permanent disability, fatality, loss of a limb; damages that created a loss of production and/or material exceeding \$50,000	Immediately	Started Immediately and corrections completed within (24) hours following the report  Note: if corrections cannot be completed within (24) hours – a plan must be put in place to ensure the health and safety of all concerned.
B)	Action or condition that could cause a temporary disability with a duration of more than the day of the accident; damages that created a loss of production and/or material exceeding \$10,000 but less than \$50,000	Immediately	Started Immediately and repairs completed within (3) days (72 hours) following the report
C)	Action or condition that could cause a minor accident necessitating first aid treatment and or a medical assistance without a loss of time; damages that created a loss of production and/or material less than \$10,000	Within (24) hours	Started Immediately and repairs completed within (7) days following the report
H)	Action or condition that is considered a housekeeping item and if left unattended or not taken care of could result in trip and fall or other injury or damage to equipment or environment.	Within (24) hours	Started immediately and maintained continuously.  No time limit to fix, repair or clean up. An on-going effort is required to maintain good housekeeping.





#### 5.4.5 Objectives of management of cutting and welding activities

- Identify the contaminants in the welders' workplace;
- Assess the physical and chemical contaminants in the cutting and welding activities;
- Provide effective lasting controls to ensure health and safety of employees;
- Train and inform employees about the contaminants in their asks and their environment;
- Prevent fire hazards;
- Follow up on these activities;

The risk assessment will be done through field inspection, task analysis and sampling of contaminants on/with the personnel. The sampling methods used are consistent with those proposed by the Institute of research for Health and Safety (IRSST), OSHA and A.C.G.I.H.

5.4.5.1 Information on contaminants potentially released with the activities of cutting and welding

Health effects of certain metals may be present in fumes from welding and cutting

Contaminants	Source or process	Possible effects on the health
Aluminum oxide	Composition of welding rods or aluminum alloy.	Aluminosis: particle deposition forming of fibroids in the lungs.
Cadmium oxide	Silver electrode surface in some alloys and rustproof of the steel.	Highly toxic substance that can cause lung and kidney lesions. Carcinogen.
Chrome	Alloy in stainless steel, rust-proof paint or covering chromed parts	May cause lung damage and asthma. Carcinogen.
Copper	Copper concentrate and copper welding electrodes (brass or bronze).	May cause metal fume fever (fever welders) similar to that of zinc.
Tin	Welding electric wires and copper pipe.	Lungs irritation
Iron Oxide	Ferrous metals and steel, welding electrode, may represent 50 to 60% of welding fumes.	Respiratory irritation, low toxicity dusts of iron oxide, may be due to siderosis.
Manganese	Alloy steel rods and composition of capital.	Irritation of upper respiratory tract attacks the nervous tissue and causes weakness and poor coordination.





Molybdenum	Composition of some steel alloys.	Irritation of eyes and lungs.
Nickel	Metals nickel, stainless steel.	Carcinogen.
Lead	Metals coated with paint containing lead present in certain alloys and metals, coatings and tank armor, welding tin.	Toxic substances that affect blood, nervous tissue, gastrointestinal tract and brain.
Silica	Embedding electrode can be found in welding fumes.	May cause lung damage.
Titanium	Coating of electrodes and in some alloys (ferrovanadium).	Respiratory irritant that can cause fibrosis.

Health effects of certain gases may be present in fumes from welding and cutting

Gas	Source or process	Possible effects on the health
Ozone	Gas with a characteristic odor formed during arc welding resulting from the action of UV on oxygen.	Low concentration: irritation of nose, throat and respiratory tract. Elevated: headache, dizziness, nausea, vomiting, fainting
Carbon Monoxide	Produced by the incomplete combustion of organic matter in the form of plaster, paint or coating electrodes, welding under protective gas (CO2).	Low concentration: headache, dizziness.  Elevated: nausea, vomiting, unconsciousness, asphyxia resulting in death.
Nitrogen oxides	Suffocating gas and highly flammable formed during the process of arc welding or welding in shielding gases especially when welding stainless steel.	Low concentration: irritation of eyes, nose and lungs.  Elevated: irritation of the eyes, coughing, chest pain, and pulmonary edema.
Phosgene	Irritating gas formed when a flame or heated surface at high temperatures or UV rays of the arc are in contact with chlorinated solvents.	Low concentration: sensation of dryness and burning throat, numbness, vomiting, difficulty breathing.  Elevated irritation leading to pulmonary edema, chronic bronchitis, pulmonary emphysema
Hydrogen fluoride	Formed by heat flux, decomposition coatings (applied on stainless steel), coated electrodes	Low concentration: irritation of nose, throat, nose bleeds.  Elevated pain in the eyes and nose, pulmonary edema, burning the skin. Chronic Exposure: disease = bone fluorosis (increased bone density).





#### 5.4.5.2 Reduction at the source

The reduction at the emission point is the most effective way to protect the health of workers potentially exposed to contaminants in the air. It is to prevent the emission of contaminants into the air.

Variants of the welding process must be adjusted to produce maximum performance while reducing emissions of contaminants into the air.

Parameters affecting production of contaminants

Parameters	Consequences
The power intensity	In general, the higher the amperage, the higher the emission of smoke.
The diameter of the electrode	With/when equal current is used: the small diameter electrodes produce more smoke than those with larger diameter.
The tension	The amount of smoke rises in direct proportion to the tension.
The polarity of the electrodes	The welding direct current positive at up to 30% more smoke than welding in direct current negative.
The length of the arc	The longer the arc, the more smoke is produced.
The shielding gas	The type of shielding gas used helps determine the volume of emissions. For example, the volume of emissions can be reduced by 15% to 25% by the addition of argon to carbon dioxide instead of using it in its purest form. Ozone concentrations are reduced significantly when adding nitric oxide gas protection in welding of aluminum MIG.
Substitution	Is characterized by the fact of replacing certain ingredients in the welding electrode by others with similar metallurgical characteristics, but emitting less smoke (ex. replacing an electrode lead with an electrode containing lead and tin).
The cleaning of the surfaces	The surface cleaning (grease, dust, paint, etc.) reduces the emission of contaminants into the air.

#### 5.4.5.3 Means of technical control

Ventilation is the primary means of technical control to reduce the exposure to welders from fumes produced by welding and cutting.





#### General ventilation:

General ventilation can dilute contaminants dispersing in the work area. General ventilation can be mechanical (fans) or natural (open door). It can be very effective if used in order to remove the contaminants from the breathing zone of the welder.

#### Local ventilation:

The local exhaust ventilation will capture pollutants as close as possible to their emission sources and remove them from the workplace. Since most emissions occur near the arc, the local exhaust ventilation is more effective than general ventilation. The system of local exhaust ventilation is designed to capture fumes and gases before the welder breathes it. However, the performance of the local exhaust systems may be greatly affected by air currents and the distance between the contaminant source and the sensor arm (90% efficiency at 22 inches).

The extension arms are inspected periodically to determine the system performance. This assessment takes place every six (6) months and is made by the industrial hygienist. The data collected is stored in the log book.



Example of a "smoke eater" as used by welders

Example of an extension arm with a fume captor







#### 5.4.5.4 Respiratory Protective Equipment

The personal protective equipment for respiratory system should be used as a last resort when other means of control are not possible. These personal protection devices must be used according to specifications of the Respiratory Protection Program of the establishment (next section).

#### 5.4.5.5 Other risks related to activities of cutting and welding

Other risks associated with welding, apart from the fumes and gases, are radiation, noise, electricity, sparks, heat and explosions.

#### Protection against radiation:

The ultraviolet radiation emitted by the welding process can cause eye problems ranging from simple irritation to conjunctivitis. Therefore, eye protection devices (properly shielded safety eyewear) must be worn by the entire welder group and those assisting them in their work, unless protective screens are used and in place.

The presence of shield against radiation is necessary for places where bystanders are likely to be exposed to radiation.





Example of shields against radiation

Tinted goggles (grade 5) may be used for small amount of cutting or brazing with torch (flame cutting) while the face shield should be used for all other types of welding and cutting. Different degrees of protection for the lenses are necessary depending on the type of welding.

The welder must change the protective lenses when they are damaged.

#### **Protection against sparks:**

Sparks projected during the cutting or welding can cause burns, fire or explosion. Welders must wear protective clothing (flame retardant) such as Indura soft (like coveralls) at all times while performing





work of cutting and welding. Long non-flammable gloves should also be used. This equipment, gloves and clothing must be changed when they are damaged.

#### 5.4.5.6 Hot Work Permit

Welding and cutting are not permitted without obtaining a Hot Work Permit. Hot Work permits are required whenever welding, cutting or any task where open flames are required such as torch use, tiger torch, whether working inside or outside (except in designated areas such as a welding bay).

On the permit is a list of precautions to be taken. This must be completed by the welder himself/herself before commencing work. It is important that all safety precautions listed on the permit are followed as they are subject to rigorous inspection by the worker. During his inspection, the supervisor approves the continuation of work by signing the permit on the back. When the work is completed, workers must clean up their workplace and conduct a continuous check for fire for 30 minutes and monitor and check the area for a minimum of 2 hours after the welding, cutting or burning activities are finished. The employee that does the final check for fire ultimately signs the permit and gives it to the supervisor. It is kept in a register for a period of one (1) year.

To ensure the strict enforcement of permits for cutting welding, Agnico-Eagle has established an audit program with the following objectives:

- Maintain good standards of application in terms of how to safely perform hot work;
- · Ensure compliance of hot work performed;
- Promote the importance of fire protection on the site.

The audits will be held every four (4) months and the results will be compiled in a register.

#### **Fire Extinguishers:**

In addition to fire extinguishers located at strategic locations and near building EXIT doors on the site and in buildings, every oxy/acetylene cutting torch set up (fixed) or (dolly) mobile is equipped with a fire extinguisher. Fire extinguishers must always be in working order. An inspection must be made before commencing work. Note: this is part of the "work card" inspection process.

All extinguishers are checked on a monthly basis. Extinguishers on equipment are checked daily as part of the pre-operational vehicle check.

#### Stop Work:

When welding and cutting are suspended even for a short period of time, welding machines and cutting torches must be turned off, the electrodes must be removed from their rack, valves and equipment for the cylinder compressed gas must be closed and / or stored in a safe place (as defined in the procedure for hot work).





#### 5.4.6 Lock out and tag out

Repairs, installation and verification of equipment powered by electricity or any other energy are always a risk. Each employee must take some responsibility and ensure his/her own safety and that of fellow employees respecting the lock out tag out procedure and ensure "zero energy" state.

The lockout procedure and making a "zero energy" state is part of the prevention program at the Meadowbank Division.

#### 5.4.6.1 Tools

The tools for the lock out tag out have several components. These various types of locks, multiple lock link, lock-boxes, keys, covers valves, chains and labels.

#### Personal Padlocks and departmental padlock:

Each worker exposed to a hazard that necessitates to lockout tag out must have a "brass" padlock with a single key and identification tag. This "brass" lock will have the owner's identity on it. Locks for service department cannot be used in a personal way. It is forbidden to lend your personal lock to another person.

#### 5.4.6.2 Zero-energy Procedure

No piece of equipment can be de-energized and locked to zero energy until the workers in the area where the work is to be performed have been told. The supervisor will then allow the employee to stop the equipment. The supervisor involved must make sure to inform all the other employees on the work to be done by the crew.

All contractors must follow the lockout procedure of Agnico-Eagle.

Note: In many areas, there are specific procedures related to certain equipment. Before you lockout inform the supervisor.

Examples: mobile equipment, radioactive devices, overhead crane, etc.

#### Application of the procedure:

#### Locking out equipment of 750 volts or less

When repairs or check-ups requiring a simple lockout, the worker shall, lockout the equipment and check to see if the equipment can start after being locked out to make sure that the equipment is not operational. Lock the master switch on equipment in the off position. It is important that other workers working on this equipment affix their padlocks by using a multiple lockout system. The last hole of the multiple lockout system must be kept to add another multiple lockout devise if ever we must add more padlocks.





#### Multiple lockout equipment of 750 volts or less

To accomplish a checkup or repair on equipment, it is required to use multiple lockout system (multiple padlock devices). The qualified person responsible for checking the deactivation or lockout of the equipment must take the necessary amount of locks to ensure through testing by startup of the equipment. He must lockout the master switch on the equipment in the off position and put the keys in the red lockout box by ensuring that the identification numbers of the locks are visible. The lockout box should be locked with a multiple lockout system and locked with padlocks. A lockout tag must be installed and a final start-up of the equipment must be made to make certain that the equipment will not start. All other employees who work on such equipment must affix their locks on the lockbox.

#### Lockout equipment at high voltage (over 750 volts) equipped with knives switch (inside a closed box)

All equipment of high voltage with knives switches are identified and require the presence of an electrician to cut the power. He ensures that there is no more energy or power on the line. Then the lockout procedure applies.

#### Lockout equipment of high voltage (over 750 volts) with motorized switches (medium voltage circuit breaker) or aerial disconnect breakers

All equipment with high voltage motorized switch (medium voltage circuit breaker) or aerial disconnect breakers requires the presence of an electrician to cut off the power. He must use the specific procedure to accomplish the cutoff of power. Then the lockout single or multiple lockout procedures must be applied.

#### • Ensuring zero energy on piping or pressure vessels:

Use the single or multiple lockout procedure considering that the energy source is compressed air or steam. Beware of secondary or residual energy that may remain under pressure. Leave the drain valve in case of a leak in the isolation valve.

Various mechanisms are available to lock the valves of different types: handles, chains, etc. We must ensure that the mechanism is reliable. If in doubt, check with your supervisor.

#### 5.4.6.3 Removing locks from a lock out situation

When an employee must leave, he/she must remove his/her lock. After the work is completed, the equipment must be unlocked in order to verify proper operation. Notify the responsible supervisor that repairs are completed and the equipment is functional.

During a shift change or when an employee must leave before the work is completed and the person replacing him/her has not placed his personal lock, he/she must ensure that equipment is locked by a Departmental padlock with a tag-out informing his replacement to put his padlock on. He/she must also notify his/her supervisor or the job leader. When work resumes, a start test should be performed.





#### 5.4.6.4 Cut padlock security

If an employee forgets to remove his/her lock and that employee is no longer on site or at work, the supervisor or his/her delegate has the authority to cut the lock. This must be done with great care and a good judgment. Firstly, we must try to reach the employee. If he/she can't be reached, we must make certain that the employee is no longer on the site. The "Lock Removal Form" must be completed and the procedure in place before cutting the lock. Return the form to the general supervisor of the lockout.

5.4.6.5 Training on the lockout and ensuring zero-energy It is important to note that the implementation of such a procedure must be accompanied by specific training. Training on lockout and ensuring zero energy aims particularly the employees working on equipment that may be started by others during the repairs.

The training includes the following:

- · Legal aspects of standards and regulations lockout;
- Effects on safety;
- Tools:
- Lockout procedure and ensuring zero energy;
- Practical exercises.

#### 5.4.6.6 Review

The lockout procedure and ensuring zero energy is revised annually by the Health and Safety Department and Training Department.

Any request for modification, addition and revision should be made to the Health and Safety Department and Training Department.

#### 5.4.7 Respiratory Protection Program

The objective of the Respiratory Protection Program is to effectively protect personnel working in workplaces where technology controls do not permit or are not sufficient to eliminate the source of contaminants in the air.

This program also aims to help managers to identify ways to control the selection, use, and maintenance of respiratory protection.

#### 5.4.7.1 Risk Assessment

The risk assessment is done by sampling personnel in the workplace. These assessments help to determine the type of respiratory protection and appropriate filters to be used.

#### 5.4.7.2 Means of Risk Control

#### Reduction at the source





Reduction at the source is the objective of the establishment and is the most effective way to protect the health of workers potentially exposed to contaminants in the air. It is to prevent the emission of contaminants into the air.

#### Control techniques

Control techniques are used to vacuum, abate or dilute the contaminant emissions in air. Among these, we find the air ducks, hoods, primary and secondary fan systems to induce the fresh air, dust collectors and sprinklers.

#### Personal Protective Equipment

The personal protective equipment for the protection of the respiratory system must be used as a last resort when other means of control are impossible. For respiratory protection, there are several types of equipment. The apparatus of respiratory protection used in Agnico-Eagle Meadowbank Division includes: filter type respirators, cartridge type, air powered (PAPR) and self-contained breathing apparatus (SCBA). According to protective factors established by NIOSH and CSA, these appliances offer different levels of protection ranging from 10 to 10,000 depending on the equipment.

#### Information on respirators:

#### ✓ Appliances Air Purification

This category includes all half-masks and full face using chemical cartridges or as a particulate filters contaminants. These masks are negative pressure, which is to say that the lungs of the user are the generators of the circulation of air. To meet the requirements, different types of respirators are available in three (3) sizes: small, medium and large.

#### ✓ Appliances Air purification Air powered

This category includes mainly helmets or masks complete type of manufacturer 3M RACAL engine which propels the air inside a helmet then filters through chemical cartridges and particulate. Currently, the agencies give this product a protective factor that varies from 25 to 1000.

#### ✓ SCBA:

This category includes all full-face respirators equipped with a cylinder of compressed air breathing unrelated to an external airline. In setting, only mine rescue teams, firefighters and some specially trained workers are allowed to wear such equipment. This equipment provides a minimum protection factor of 10 000.

#### 5.4.7.3 Criteria for selecting respirators

The choice of a proper respiratory protection is essential to protect the worker. We must therefore evaluate the following parameters when choosing a type of respirator:





#### Level of oxygen in the air

The NIOSH states that "the percentage of oxygen by volume in air at any workstation of an establishment must not be less than 19.5% at normal atmospheric pressure". All respirators Air-purifying approved by the National Institute for Occupational Safety and Health (NIOSH) should be used in workplaces only when the oxygen concentration exceeds 19.5%. Otherwise, the worker must wear respiratory protection equipment independently.

#### Types of contaminants present or potentially present

The industrial hygiene department established the physical, chemical and toxicological properties of contaminants, including their concentration, toxicity, nature, condition, the detection characteristics of each and their potential for eye irritation and skin absorption.

#### · Intended use of the respirator

To make the best choice, workers and supervisors must take into account various environmental parameters and conditions to use a respirator, for example:

- √ workplace;
- ✓ task:
- ✓ duration of use:
- √ frequency of use;
- ✓ effort to the task:
- ✓ industrial process used;
- ✓ comfort of the user:
- ✓ need for mobility;
- ✓ need for communication;
- ✓ extreme temperature conditions (very cold or very hot).

#### FIT test:

Users of respiratory protection must be tested for sealing quality with the respirator. This fit test is required prior to issuing of a respirator.

The fit testing is conducted by the Training Department, Health and safety department or industrial hygiene technician. This training shows the user how to use proper respiratory protection.

Once the initial fit test done (when issuing the respirator), additional fit testing is required only when one has suffered of a facial morphology (ex. scarring, loss of weight, acne, etc.). He/she must be fit

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tested again for leakage before using respiratory protection. Those who pass the fit test are logged in a log book.



Example of a quality fit test

#### 5.4.7.4 Training on respiratory protection

It is important to note that the implementation of such a program must be supported by training. At Agnico-Eagle Mines— Meadowbank Division, we have training on respiratory protection. The training aims particularly the users of masks to purify air using chemical cartridges and / or particulate and users of helmet air-purifying (positive pressure). This course covers the selection, use and checking of disposable masks and chemical cartridge.

#### The training covers the following:

- ✓ Legal aspects of regulations and standards in respiratory protection;
- ✓ Inventory of contaminants and basic rules of industrial hygiene;
- ✓ Health effects of contaminants:
- ✓ Fit Tests:
- ✓ Technical knowledge on the function of all models of respirators;
- ✓ Inspection, maintenance, cleaning and storage of respirators;
- ✓ Practical exercise.
- ✓ Refresher training is also needed each year for workers, supervisors, responsible for the fit testing and the person responsible for checking and cleaning of respirators.

#### 5.4.7.5 Revision of the respiratory protection program

The respiratory protection program is reviewed annually by the Health and Safety Department and Training Department.

Any request for modification, addition and revision should be made to these departments.

#### **5.4.8 Hearing Conservation Program**

#### 5.4.8.1 Exposure assessment of workers





In order to identify work areas where noise exceeds 85 decibels (83 dBA or workers, working 12 hour shifts), the exposure of workers by job or workplace, is measured in accordance with CSA Standard Z.107.2-1973 entitled "Methods for measuring sound levels".

Employees with exposure to noise exceeding 85 decibels (A) are included in this program. Wearing hearing protection is mandatory for workers unless the means of source reduction of technical and administrative controls are in place.

The assessment strategy for the noise levels are in the "Industrial Hygiene Program" as well as legal requirements. Assessments must be made when purchasing new equipment or changes in processes or equipment.

#### 5.4.8.2 Identification of noise zones

The areas likely to exceed 83 decibels must be identified with a poster at the entrance area or where there is noisy equipment. The sign identifies the requirement to wear hearing protection.

#### 5.4.8.3 Potential Risks to health associated with exposure to noise

The main physiological risks associated with working in noisy environments are a loss of hearing (temporary or permanent) when exposed to noise without hearing protection. Hearing loss associated with exposure in industrial work will affect the high frequencies. The loss is recognized as an occupational disease when it reaches the thresholds listed in the Regulation on the scale of industrial injuries.

#### 5.4.8.4 Methods used to reduce noise exposure

Management and workers must take steps to protect their health, their safety and physical integrity as required by the Occupational Health and Safety. The reduction at the source and engineering controls are the best means to reduce exposure of workers to noise. If these means do not reduce noise to an acceptable level, then use the personal protective equipment. Any reduction in noise, even a few decibels, reduces hearing loss, improves communication and improves concentration. All sources of noise must be evaluated to determine the appropriate method of protection.

#### Reduction at the source:

The reduction at the source involves a reduction of noise from equipment:

- ✓ Replacement of equipment;
- ✓ Relocation of noisy equipment.

#### **Technical Means of control:**

The technical means of control are expected to reduce workers' exposure to noise by changing the environment in which they work:

- ✓ Modification of vector transmission noise (acoustic insulation);
- ✓ Reduction of the reverberation (absorbent materials for walls and ceilings);
- ✓ Reduced vibration equipment (carpets, preventive maintenance);
- ✓ Changing a method of work;





✓ Mufflers.

#### **Means of Administrative Control:**

The administrative control is to reduce the duration of worker exposure to noise:

- ✓ Modify the hours of work;
- ✓ Rotate tasks to high and low exposure;
- ✓ Start-up of noisy machines when few workers left the area.

#### Personal and collective protective equipment:

This is the last possible alternative when the noise reduction is less than the permissible exposure limit after implementing technical and administrative controls. The hearing protectors designed to reduce transmission of the wave to the ear.

The effectiveness of hearing protection varies from one worker to another, it depends on proper protective equipment, fitted and worn during the entire period of exposure to noise.

#### Types of hearing protectors:

Earplugs: plastic foam Max TaperFit 2 UltraFit, Décidamp2, Ear Caps Caboflex) (category preformed caps);

Shells: passive type deductions with a headband (PELTOR H6b, Peltor H7B) or attached on each side of the safety helmet with headphones (PELTOR HTM7P3E) or without headset (PELTOR H7P3E, PELTOR H9P3E).

#### Noise abatement related to the hearing protector:

The sealing and acoustical properties of the materials determine the level of protection provided by the hearing protector. The shells form a seal around the ear while the ear plugs are against the wall of the canal. The index of noise reduction from the manufacturer (IAB or NRR (English word is: "Noise Reduction Ratio") is set in ideal laboratory conditions.

It is recommended by NIOSH 1996 (Summary of Appendix B, Methods for Estimating the Adequacy of Hearing Protector Attenuation, in the Occupational Noise Standard 29 CFR 1910.95) in calculating the exposure of a worker on its protection hearing, to deduct a percentage for each specific type of hearing protector. This percentage reduction prepared by NIOSH takes into account the performance offered by each type of hearing protector.

Type of hearing protection	Reduction percentage
For the shell type	75 % of the manufacture IAB
2. Earplugs	50 % of the manufacture IAB





Taking into account the criteria set by NIOSH, the factor of noise reduction for each type of hearing protector has been calculated.

Indices noise abatement set by the manufacturer for each hearing protector available to Agnico-Eagle to the mitigating factors under criteria modified NIOSH 1996.

Type of hearing protection	IAB (dBA)	(dBA) IAB Modified
Plastic foam plug Taper Fit 2	32	16
Plastic foam plug Ultra Fit	25	13
Plastic foam plug Decidamp	29	15
Plastic foam plug Max	33	16
Plastic foam plug Ear Caps	17	9
Plastic foam plug Caboflex	20	10
Shell PELTOR H9P3E (yellow)	23	17
Shell PELTOR H7P3E (green)	24	18
Shell PELPOR H10PE3 (black)	27	20
Shell PELTOR H7B (green for helmet)	22	17

Note: The attenuation factor (IAB) proposed by type of protector is conditional to constant wearing of the protectors during exposure.

#### Medical Surveillance:

#### An audiogram is conducted for all employees as follows:

- ✓ Every employee working where the noise levels exceed 83 dB is required to pass an audiometric test every three (3) years;
- ✓ Employees and the clerical employees are required to pass an audiometric test every five (5) vears or as needed:
- ✓ All employees leaving the company shall, before departure, have an audiometric test completed;
- ✓ In the hiring process, a person must pass an audiometric test.

#### 5.4.8.5 Training Information

Training is mandatory for all workers likely to work near a source of noise. This training consists of the following:

- Regulations;
- Responsibilities of employees;
- Effects on health over the hearing capacity and the body: short and long term;
- Source reduction:
- Control methods: technical and administrative;
- Hearing protection equipment selection, maintenance and use;
- Meaning of posters;
- Audiogram.





#### 5.4.8.6 Hearing Conservation Program

The program for hearing protection is revised as needed by the Health and Safety Department.

#### **5.4.9 Confined Space Management Program**

The program management to work in confined space remains an important reference tool for all supervisors and workers involved in supervising and working in confined spaces area. Depending on the nature of work and the nature of the confined spaces, the risks will vary. It is the responsibility of the supervisors and workers to ensure that all preventive measures are taken when there is work to be done inside a confined space area.

#### 5.4.9.1 Definition of a Confined Space:

"Confined Space" means a tank, process vessel, underground vault, tunnel or other enclosure that is not designed or intended for human occupancy and that a person would only enter if there were work to be done.

#### 5.4.9.2 Assessment of potential hazards in confined spaces

#### **Atmospheric Risk:**

Confined spaces are regular atmospheric hazards that make the air unsafe to breathe for the worker. Whether a lack of oxygen, super oxygenation, the presence of flammable or toxic gases, all of these conditions pose a significant risk to the worker and should be considered before entering inside a confined space.

#### **Physical hazards:**

Physical hazards potentially present in a confined space are numerous: there is a restraint entry or exit, a dangerous work area, a risk of engulfment, mechanical parts in motion, the presence of electricity, heat or cold, noise or poor visibility.

#### 5.4.9.3 Preventive measures

#### Ventilation:

For some cleaning, welding, cutting, fabrication of fiber glass, sandblasting abrasive and solvent use, ventilation must be provided before and / or during the task is being done. The duration of this ventilation vary depending on the nature of work, the size of confined space and movement of natural air flow inside the confined space.

The natural or mechanical ventilation of the confined space must be done to avoid exposing other workers to contaminants. Therefore, the breathing of the air should be prioritized in certain activities (ex: welding and cutting activities).





#### Lock-out and tag-out the energy:

The lockout procedures and ensuring zero energy must be followed. In addition, some confined spaces, must be completely isolated by disconnecting, purging and sealing of all supply lines.

#### 5.4.9.4 Entry Permit Confined Space

The entry permit for confined space is a written authorization indicating the location, staff involvement, hazard identification and control for a given enclosure. This is only valid for a period of 12 hours of uninterrupted work.

The permit must be completed before the start of work by a qualified person and it applies only to a single workstation. The permit must remain in the workplace so that work is ongoing and when the job is completed, the permit must be return to the Health and Safety Department.

If environmental conditions change in the environment or the execution of work, the permit must be corrected and the testing methods must be reassessed.

#### 5.4.9.5 Opening an confined space at high risk

The opening of the confined space must be performed with appropriate respiratory protection. The specific list of confined space for each department indicates adequate protection for the contaminant found in the enclosed space.

However, when the concentration of contaminants inside the confined space is unknown, it is considered highly dangerous to life and health. The opening of the enclosure must be done with maximum care and if necessary, with a self-contained breathing apparatus.

#### Evaluation of the air inside the confined space:

#### To evaluate the quality of air we must:

- ✓ Check the quality of air with an appropriate instrument that measures gas and of oxygen, and this even before opening the enclosed space;
- ✓ Assess the quality of air near the opening by inserting the sampling probe inside the confined space. This step is essential when you suspect the presence of toxic or flammable gases:
- ✓ Assess the entire volume of air inside the enclosure to verify the presence of heavy gas, light gas and neutral gas.

#### 5.4.9.6 Confined Space Training

It is important to note that the implementation of such a program must be accompanied by a sustained training.

It is prepared primarily for workers, supervisors and project leaders who are likely to work in confined spaces.

#### The training Recognition of confined spaces:

- ✓ Responsibility of all parties:
- ✓ Risks associated with confined spaces;





- ✓ Risk assessment:
- ✓ Preventive measures put in place for every task in confined spaces;
- ✓ Entry permit;
- ✓ Emergency procedures;
- ✓ Tools;
- ✓ Assessment of air quality.

A refresher training course will last approximately two (2) hours and will be given if required to the workers, supervisors that were previously trained on confined spaces.

#### 5.4.9.7 Review of Confined Space Management Program

The management program for confined space work is revised as needed by the Health and Safety Department.

Any request for modification, addition and revision must be made to the Health and Safety Department.

#### 5.4.10 Fall Protection

#### 5.4.10.1 The safety measures against falls from height

Falls from heights or in dangerous openings account for (40% of injury cases); they can and usually cause serious injuries.

The legislation states that all workers must be protected against falling when exposed to a fall of more than 3 meters from a working position;

- when he may fall into a liquid or a hazardous substance, on moving parts, on equipment or materials presenting a danger;
- if exposed to a fall of over 1.2 meters using a vehicle.

Agnico-Eagle Mines – Meadowbank Division endeavors to reduce at the source instead of using other means. But, if this is impossible, here are other preventive measures that are used to ensure the safety of workers:

#### **Guard Rails:**

Guard Rails is the means of protection most appropriate for protecting workers against the risk of falling. There is a fence along the opening that restricts the movement of workers and ensures that he/she will not be exposed to a free fall. The guardrail must be placed alongside of an elevated floor, roof, a platform of a scaffold, stairway or ramp, around an excavation or any other place where a worker may fall:

- in water;
- from a height of 1.2 meters or more if he is using a vehicle;
- from a height of 5 meters or more of a perimeter roof and 3 meters in other cases.

They are made of various materials and must meet minimum strength and built as stipulated in the safety Code for construction work. On the site, the majority of the railings are fixed permanently. They are inspected periodically.





Warning: The installation of guardrail must always be made with a full body harness

#### **Fixed ladders:**

Fixed ladders are used to replace the stairs. They must be strong enough to withstand a weight of 90 kg in middle of a rung and exceed the upper tier of at least 900 mm. Finally, fixed ladders must be equipped with guardrails surrounding the floor opening with a removable rigid barrier (not chain) giving access to it.

#### Ladder Safety Training:

All persons working at Meadowbank must have ladder safety training as delivered by the Training Department.

3-Point contact should be practiced and followed at all times when ascending and descending any equipment, staircases, ladders, basically any place where handrails are provided – use them.

- > All ladders are to be inspected before use
- Always use the 4:1 rule when setting up a ladder i.e.: 4' rise X 1' from the wall or structure that you are putting the ladder against
- Always secure extension ladders
- Always have a minimum of three rungs extending past the landing or exit point off of ladder at top
- Never use a conductive type ladder near electrical installations

There are many types of ladders in use at our operation. Extension ladders, folding ladders, straight ladders, and they come in assorted sizes and lengths.

#### 5.4.10.2 Personal Protective Equipment

#### Safety Miners' Belts

When a safety belt is made available to a worker, it can be used in combination with a lanyard to limit the movement of the worker or to keep him/her in his/her working position and this for all workers working near an opening where a (3) meter or greater fall can occur.

**Caution:** The miners' belt cannot be used as personal protective equipment to stop the fall of a worker. In other words, the safety belt is used to prevent workers from reaching the point of fall (ex. Dangerous openings or shafts).

#### Safety Full Body Harness

Wearing a Full Body safety harness is mandatory for workers exposed to a fall of more than three (3) meters (9.8 feet) from his working position.

The full body safety harness is used with an energy absorber which is connected to a lanyard not





allowing a free fall of more than 1.2 meters (3.9 feet) or a retractable lifeline (also known as SALA BLOCK name) which includes the energy absorber.

#### Safety harness

Wearing a safety harness is mandatory for workers exposed to a fall of more than three (3) meters (9.8 feet) from his working position.

The safety harness is used with an energy absorber which is connected to a lanyard not allowing a free fall of more than 1.2 meters (3.9 feet) or a retractable lifeline (also known as SALA BLOCK name) which includes the energy absorber.

All persons required to use Fall Arrest Equipment – must have training in good standing.





Only harnesses classified class A (according to CSA-Z259.10) with straps for shoulders and thighs are used on the site.

**Warning:** It is strictly forbidden for a worker to reuse a safety harness and energy absorber which was used in a fall. It is the responsibility of the worker involved in the fall to discard the equipment and send it to garbage.

#### **Energy absorber:**

The shock absorber is actually a breaking device which must always be part of a safety harness, and this, in order to absorb the shock that the employee would have in cases of a free fall.

We have (2) types of dampers. The conventional damper comprising a pouch containing various types of energy absorbers and terminal loops and the lanyard shock absorber provided with an outer envelope longer than the inner part.

#### Lanyard:

We use two (2) types of lanyards made of synthetic fiber with or without shock absorbers built.





The lanyard without damper is always accompanied by a miner's belt and can be used as equipment used to arrest a fall. The lanyard with integrated shock is always accompanied by a safety harness and shall not permit a free fall of over 1.2 meters.

Furthermore, all lanyards shall be provided with a hook with a safety self-latching latch.

#### **Anchor points:**

The attachment point for the lanyard to a safety harness or safety belt shall be:

- Anchored to an element having a rupture capacity of a least 18 kilo Newton (4046.6 pounds);
- Attached to an approved slide line;
- Attached to a system of horizontal lifeline and anchorage, designed an certified by an engineer, certificate available on the mine site

Inspection before use of anchorage systems fall arrest is essential for the safety of the worker.

Every anchor point that was involved in a fall arrest must be re-checked and certified by an engineer.

#### Horizontal lifeline:

The horizontal cable is a steel cable with a diameter of 12 mm released at an angle less than 5 degrees from the horizontal and the distance between anchors points shall not be greater than 12 meters. The anchors points of a horizontal lifeline shall have a rupture capacity of a minimum 90 kilo Newton (20,000 lbs.) and cannot be used by more than two (2) workers simultaneously. The cable clamps must be tensioned using a torque wrench as specified by the manufacturer.

Any lifeline involved in a fall must be changed or re-certified by an engineer.

#### 5.4.10.3 Training on Fall Protection

Training sessions and information are conducted periodically by training department with the collaboration of the health and safety department. The objective of this training is to train and inform about collective and personal protection in place to protect the health and safety of workers working at heights.

Workers participating to this training are documented stating the type of training, names of participants, name of contact person and the duration of the meeting. Monitoring of these meetings is to periodically respond to demands for improvement from participants. This monitoring is the responsibility of the training department.

#### 5.4.10.4 Revision

The fall protection program is revised as required by the Health and Safety department in collaboration with all departments.

Requests for amendments, additions and revisions should be made to the Health and safety Department.





#### 5.4.10.5 Site Management

Good housekeeping can eliminate some hazard related to the workplace and minimize the tripping hazards. In fact, if we tolerate the presence of debris and spills, it becomes easy to overlook serious risks.

In addition to basic cleanliness, good housekeeping requires that work areas are clean of debris and that the floors and hallways do not pose a risk of slipping or tripping. We must include demarcation areas, demarcation of travel ways and pedestrian crossings. The lack of storage space could be critical to maintain good housekeeping. Good housekeeping of the premises must be maintained all the time.

To achieve this, Agnico-Eagle Mines— Meadowbank division will have the resources to improve and maintain housekeeping on its site, and this, through the Supervision Formula and the work card. Furthermore, planned inspections under the theme "Hazard and Housekeeping" occur systematically in each department and this on an ongoing basis.

#### Waste Disposal:

The waste must be collected regularly to ensure good housekeeping of the site and to facilitate the recycling program in the waste management program. Leaving waste materials accumulate, becomes a waste of time and energy because we must go back and take the time to do the cleaning. In order to encourage and facilitate the removal of debris, containers are placed near the working areas. All waste containers are clearly identified (ex. glass, plastic, metal, etc.). To ensure compliance to this element, the environment department makes regular inspections, writes reports to the department that was inspected and makes a follow-up for the corrective actions.

#### 5.4.11 Management of Sulphur Dioxide (SO2)

#### 5.4.11.1 Means of Control

#### Preventive maintenance

In order to minimize the risk of dispersion of SO2 in the environment in the workplace, facilities are thoroughly inspected and all employees assigned to maintenance of the system receive specific training.

Several stationary SO2 gas monitors are strategically placed throughout the process plant and SO2 Plant to ensure everyone's safety.

#### Personal Protective Equipment

In accordance with the respiratory protection program for the selection, testing, maintenance and inspection of respirators, the following provisions apply in the presence of sulfur dioxide gas:

Sulphur dioxide in the AIR	Types of respirators	Comments
0-2 ppm	No protection needed.	Concentration is lower than the prescribed threshold limit for 8 hours
2 –20 ppm	A cartridge half mask with sulphur dioxide filters	





20-100 ppm	Full-face mask with sulphur dioxide cartridge.	Eye irritation at 20 ppm and over
100 ppm et plus	A self-contained breathing apparatus	
Emergency entrance	A self-contained breathing apparatus.	
with unknown values		

#### 5.4.11.2 Training Information

Each year, a reminder is provided to all workers and supervisors who may perform work in the presence of sulfur dioxide.

#### 5.4.12 Cyanide Management







In case of leakage, it evaporates rapidly producing a toxic gas lighter than air, hydrogen cyanide (HCN), a colorless gas smelling of bitter almonds.

#### 5.4.12.1 Means of Control

#### **Preventive maintenance**

To minimize the risk of spreading the cyanide into the environment and in the workplace, facilities are thoroughly inspected and all employees assigned to maintenance of the system receive specific training.

#### **Personal Protective Equipment**

As explained in the respiratory protection program for the selection, testing, maintenance and inspection of respirators, the following provisions apply in the presence of cyanide

HCN Concentration in the air	Type of respirators	Comments
0-10 ppm	Do not need a respirator.	Concentration is lower than the permissible maximum for 8 hours
10 ppm et plus	SCBA needs a self-contained breathing apparatus	Maximum value permissible for 8 hours
Emergency entrance with unknown values	Must enter with a self-contained breathing apparatus	

#### **HCN** detection and alarms:

Gas sensors positioned at strategic locations to ensure plant reliability. These are calibrated periodically with standard gases of known concentration and the results of these calibrations are recorded in the register provided for that purpose and kept at the mill.





#### 5.4.12.2 Training

All persons working with Sodium Cyanide must have received the mandatory Cyanide Awareness Training. This training will cover such topics as: what PPE is required, how to use and manipulate sodium cyanide totes, first aid procedures in the event of exposure, proper hygiene and cleaning practices that should be followed to prevent exposure etc.

Each year, a refresher course is given to all workers and supervisors that may have to work on the cyanide system. They must be able to easily recognize the warning signals and be fully aware of procedures to follow in case of alarms. They must also know the emergency plan and have conducted drills with their crew.

Under WHMIS, workers, supervisors and guardians officers are also informed about the use of cyanide (and hydrogen cyanide) and first aid measures in case of overexposure.

Finally, employers and workers concerned are trained for respiratory protection.

#### 5.4.12.3 Dealing with Ammonia

Ammonia is a by-product gas produced by the Electro winning of Gold in the carbon stripping process in the Plant. There are stationary Ammonia gas monitors strategically located in the process plant to ensure everyone's safety.

Stationary gas monitors are in place for all gases that may be produced in the process plant. The control room operator monitors the gas readings on a 24/7 basis. If there is a release of gas in any area of the process plant, the gas monitor will alarm and the control room operator will proceed with the safe procedures for evacuating the mill and/or have the area checked out by competent trained persons.

Proper PPE such as SCBA's, portable gas monitors are provided for trained persons to do so.

#### 5.4.13 WHMIS Review and Training

#### 5.4.13.1 WHMIS 2015 training

All new employees and contractors will receive Workplace Hazardous Materials Information System (WHMIS 2015) training during their induction at Meadowbank site.

WHMIS 2015 training is mandatory for all employees and contractors no matter if the employee and contractor have received it in the past.

Refresher training is available on a yearly basis in the form of a safety meeting huddle and/or as requested.

#### 5.4.13.2 SDS sheets

A "product review form" is used for all new products coming to site. This form is filled out by the Department requesting the new product.





The SDS sheet is then attached to the "product review form" and is sent to Health and Safety Department.

The "product review form" and SDS sheets are reviewed and signed off by:

- Health and Safety Department
- > Environmental Department
- > JOHS Committee Representative, and
- Purchasing Department

Once the "product review form" and SDS has been reviewed and signed by all concerned, the SDS sheet is then entered into the Maetrix Electronic Binder Online service by the Health and Safety Department?. From this point on, the SDS Online service is responsible in ensuring that the most up to date SDS sheets for products are kept on file.



This is the icon that is on all AEM computers which when used will access all of our SDS sheets.

Hard copies of SDS sheets are kept on file in the clinic (First Aid room) and the Warehouse.

#### 5.4.14 Induction to Site

#### 5.4.14.1 Emergency Measures Induction

All new employees, contractors, and visitors arriving at site for the first time receive an Emergency Measures Induction. This induction occurs on the same day as the persons arrive @ 5:00 p.m. and is delivered by a Health and Safety Department Representative.

Topics covered during the Emergency Measures Induction:

- > Fire Alarm and Evacuation Route
- ➤ Muster Stations and how to access physically shown locations
- ➤ How to initiate a "Code 1" Emergency on radio and/or telephone
- > What to do if you get injured how to access Medical help (location of clinic)
- > Wearing of slippers to keep camp clean
- Kitchen/cafeteria hours
- Confectionary store access and hours
- Mandatory Induction Training to site (Saturdays and Sundays)
- Agnico-Eagle Mines Meadowbank Division Emergency Response Capabilities
- ➤ How to access Security on site (lost keys etc.)
- Working language @ Meadowbank is English
- ➤ Blasting in Open Pit mine Noise and shaking Blasting info etc.
- Noise and Respect for neighbors in Camp dorm room and wings
- ➤ Smoking Policy where smoking is permitted legislation





- > Dry camp No drugs or alcohol permitted on site
- ➤ Food and wildlife issues no food outside and in domestic garbage
- > Safety items such as using Man doors and not large garage doors to access buildings
- Danger / Caution Tape rules and respect for such
- ➤ Tagging in or signing in to access the Mill Mill Evacuation procedures
- > Respirator mandatory use in Mill, Crusher Buildings, Some areas of Assay Lab
- > PPE zones and requirements for site
- > Recreational walking/running on site
- > Use and location of telephone booths
- Wireless Internet services
- Laundry facilities
- Use of gymnasium physically shown location and equipment
- > Review use of Fire Extinguisher
- Luggage Tags Check Out Time
- ➤ Health Services that are available on site such as sexual health, well-being (The clinic discusses these topics at the end of the induction, where the employees fill their medical forms.)

#### 5.4.14.2 Mandatory Induction Training

The following topics are covered in great detail during the mandatory induction (e-learning) here @ Meadowbank. All employees, contractors (who will be at site for longer than 15 days) will receive this training prior to arriving at the site.

General Induction – (includes the following: Human Resources, Camp, Security, Environment, Health and Safety, Clinic – Health Care Providers) Each of these groups give an overview of what persons can expect from them, rules to follow, expectations etc.)

- > Fire Extinguisher safety and use
- Workplace Hazardous Materials Information System WHMIS
- > SOP Surface Driving anywhere on surface but not in the Pit or Mine
- Stairs and Ladder Safety
- Job Hazard Analysis
- Work Card (as per Supervision Formula philosophy)

#### 5.4.14.3 Other Training provided

The following training is provided by our Training Department on an on-going basis and/or upon request. This list is not all inclusive but rather a general breakdown on some of the more common type of training that occurs at our site.

- ➤ SOP Mine Driving in Pit and/or Mine a person requires SOP Surface before he/she is eligible to be trained in SOP Mine.
- Aerial Work Platform
- Backhoe Operation
- Forklift Operation
- > Telehandler Operation
- Over Head Crane Operation
- Lock Out / Tag Out Safety
- > Fall Protection





- Confined Space
- Skid Steer
- Respiratory Protection
- Standard First aid CPR Oxygen Therapy
- Mill Induction

#### 5.4.15 Emergency Response Program

#### 5.4.15.1 Selection of Candidates

Person(s) wanting to become part of Meadowbank's Emergency Response Team may do so by filling out the application form and submitting it to the Health and Safety Department. Person(s) with previous experience in Emergency Response, Mine Rescue, Fire Fighting, Ambulance, First Aid, etc. are encouraged to apply.

#### 5.4.15.2 Medical Evaluation

All person(s) wanting to be an active member of the Emergency Response Team must undergo and pass a Medical Evaluation. This medical is conducted by our Health Care Providers and results are sent down to our Medical Director who will review and advise accordingly.

#### 5.4.15.3 Basic Mine Rescue Training

All person(s) who have completed and passed their medical evaluation will receive Basic Mine Rescue training. Training is of 40 hour duration and involves:

- ➤ Introduction: Principles, Requirements and Certification
- Mine Rescue Operations: Emotional Stress, Personal Safety and PPE, Team Procedures
- Mine Gases: Recognition, Effects and Treatment, TLV's, Hazards, Gases and Chart
- Gas Detection and Equipment: Introduction, Gas detection pumps and tubes, Electronic Devices
- > Oxygen Therapy: When, The oxygen unit, Safe Practices, Storage and Handling
- Electrical Safety: Basic Facts and Hazards, Potential Injuries, Safe Approach and Lock Out / Tag Out
- > Rescue Rigging: Introduction, Webbing and Rope, Equipment, Knots.
- Fire: Safety, Ignition Temperatures, Combustion, Fire Phases, Ventilation, Fire Habits, Fire Extinguisher. Fire-Fighting and PPE
- > Respiratory Protective Equipment: Introduction, Hazards, SCBA, Donning, Doffing
- Rescue Rigging: Harnesses, Lowering, Anchoring, Packaging Systems and Shallow, Slope Rescue
- Special Hazards of Winter Conditions.
- > Rescue Operations: Tools, Airbags, Winching, Vehicles, Buildings and Cave Ins
- Scene Assessment and Incident Command: ICS, Activation, Team, Classifications, Scene / Hazard Size Up / Zones
- > Team Practical: Fire Drill Exercise, Equipment Donning, Searching
- > Team Practical: Rescue Rigging, Repelling
- Final Evaluation and Written Exam.





Upon successful completion of the Mine Rescue course – the individual will receive a Certificate from WSCC.

At the present time, we have three qualified Mine Rescue Instructors at site.

#### 5.4.16 Critical Procedures

#### 5.4.16.1 The Critical Procedures

- The Fundamental Critical Procedure
- > Fit For Work
- Lifting and Mechanical Handling
- Working at Heights
- Permit to Work
- Energy and Machinery Isolation
- Confined Spaces
- Water Bodies and Liquid Storage
- > Chemicals and Hazardous Substances
- Surface Mining
- > Mobile Equipment and Light Vehicle
- Equipment Guarding

The Critical Procedures are designed to explain how we the Meadowbank Division will operate safely while conducting tasks associated with these rules.

Each Critical Procedure will have policies, procedures, standards and training associated with them, which helps our workforce to safely conduct work related to the rule.

#### 5.4.17 Environmental Spills / Wildlife

#### 5.4.17.1 How to Handle Spills

Any person noticing or causing a spill shall:

- 1. Stop the activity causing the spill
- 2. Contain (avoid spreading)
- 3. Decontaminate
- 4. Segregate soil/snow use pads, or booms
- 5. If larger than 100 liters Call the Environmental Dept.: ext. 6747, 6728, or Radio channel 9.
- 6. Complete an Environmental Spill Report and give to Environment Department

#### 5.4.17.2 How to Handle Wildlife

- 1. Make no sudden moves
- 2. Find a Safe shelter
- 3. Call Environmental or Security Department Environmental (6747, 6728 or Radio channel 9), (Security 6748, 6817 or channel 9)
- 4. Do not provoke animals
- 5. Do not feed animals
- 6. Do not liter





- 7. Properly dispose of your food waste
- 8. Beware of animals while driving
- 9. Report all animal sightings date, time, specific area, number of animals etc.

#### 6. Review of Health & Safety Plan

On a yearly basis, the Health and Safety Department will produce a Health and Safety report. The purpose of this report and analysis is, among others, to reveal a tendency on the type of accidents that occur most often and to reveal the root causes behind these events, and this, in order to establish action plans for the coming months.

The results are presented to the Joint Occupational Health and Safety committee and the management team to assist them in their future goals. It must contain the following aspects:

#### **Health Section:**

- number of injuries and incidents;
- frequency of events
- severity of events;
- part of the body injured:
- type of injury;
- · nature of injury;

#### **Safety Section:**

- root causes behind the events:
- main immediate causes behind the events;
- equipment involved in the events;
- time of day when events occur;
- sequence of work where events occur;
- trade affected:
- seniority workers to the task when an event occurs;
- event involving a fire hazard;
- comparison to previous years;

To be reviewed by Management and the OHSC on yearly basis.





### MEADOWBANK GOLD PROJECT

### **Quality Assurance / Quality Control (QA/QC) Plan**

In Accordance with Water License 2AM-MEA1526 and 2AM-WTP1826

Prepared by:
Agnico Eagle Mines Limited – Meadowbank Division

Version 4 March 2019

#### **EXECUTIVE SUMMARY**

This document presents the Meadowbank and Whale Tail Sites Quality Assurance / Quality Control (QA/QC) Plan, a requirement of the Meadowbank Type A Water License No. 2AM-MEA1526 Part I Item 16 and 2AM-WTP1826 Part I Item 19. This Plan also supports the following conditions of the Meadowbank Project Certificate No. 004 Condition 6 and 23, issued by the Nunavut Impact Review Board (NIRB). The plan has been developed in accordance with the current standard method and with the Crown-Indigenous Relations and Northern Affairs Canada (CIRNAC) 1996 'Guidelines for Use by Class "A" Licensees in Meeting SNP Requirements and for Submission of a QA/QC Plan'

The objective of quality assurance and quality control (QA/QC) program is to assure that the chemical data collected are representative of the material being sampled, are of known quality, are properly documented, and are scientifically defensible. Data quality was assured throughout the collection and analysis of samples using specified standardized procedures, by the employment of accredited laboratories, and by staffing the program with experienced technicians.

## **IMPLEMENTATION SCHEDULE**

As required by Water License 2AM-MEA1526 and 2AM-WTP1826 Part B, Item 11, the proposed implementation schedule for this Plan is outlined below.

This Plan will be immediately implemented (March 2019) subject to any modifications proposed by the Analyst or the NWB as a result of the review and approval process.

## **DISTRIBUTION LIST**

Agnico Eagle - Environment Superintendent

Agnico Eagle – Environment General Supervisor

Agnico Eagle – Environmental Coordinator

Agnico Eagle – Environmental Technician

## **DOCUMENT CONTROL**

Version	Date (YMD)	Section	Page	Revision
1	09/01/01			Comprehensive plan for Meadowbank Project
2	14/06/20			Comprehensive update of the plan for Meadowbank Project
3	15/09	2.2.4	4	Modify Preservation section
	10/00	2.2.5	5	Add trip blank and field blank
4	2019/03	All	All	Integration of Whale Tail Site

Prepared By: Environmental Department

Approved by:\_

Robin Allard

Environment General Supervisor

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## **SECTION 1. INTRODUCTION**

The objective of quality assurance and quality control (QA/QC) program is to assure that the chemical data collected are representative of the material being sampled, are of known quality, are properly documented, and are scientifically defensible. Data quality was assured throughout the collection and analysis of samples using specified standardized procedures, by the employment of accredited laboratories, and by staffing the program with experienced technicians.

This Plan documents the QA/QC program for the Meadowbank Project required by Type A Water License 2AM-MEA1526 and 2AM-WTP1826. It has been developed in accordance with the current standard method and with the Crown-Indigenous Relations and Northern Affairs Canada (CIRNAC) 1996 'Guidelines for Use by Class "A" Licensees in Meeting SNP Requirements and for Submission of a QA/QC Plan', which includes the following definitions:

<u>Quality Assurance</u>: the system of activities designed to better ensure that quality control is done effectively; and

<u>Quality Control</u>: the use of established procedures to achieve standards of measurement for the three principal components of quality – precision, accuracy and reliability.

This QA/QC Plan sets out standard procedures for sample and data collection with respect to surface water and groundwater sampling in support of monitoring programs outlined in the *Water Quality and Flow Monitoring Plan*, *Groundwater Monitoring Plan* and *Core Receiving Environment Monitoring Program (CREMP)*. The QA/QC plan will be reviewed as needed and updated as required by the Environment General Supervisor.

Section 2 includes procedures for field sample collection and handling, Section 3 outlines external and internal laboratory requirements and Section 4 sets out data verification procedures and regulatory reporting requirements.

## SECTION 2. FIELD SAMPLING

Sampling stations, frequency and parameters are set out in Type A Water License 2AM-MEA1526 and 2AM-WTP1826 Schedule I – Conditions Applying to General and Aquatic Effects Monitoring<sup>1</sup> and Metal and Diamond Mining Effluent Regulations (MDMER). All sampling stations have a GPS location and are landmarked. All stations are used repeatedly with the same qualified personnel and techniques to reduce operational error. The following sections outline the standard procedures for collection and handling of all surface water and groundwater samples.

#### 2.1 SAMPLING EQUIPMENT

New laboratory supplied containers are used for sample collection. The bottles are either polyethylene plastic or glass, dependent on the specific parameter being analyzed.

Different handheld instruments are used to collect, as required, field parameters such as turbidity, temperature, pH, conductivity and dissolved oxygen. Instruments are calibrated before each sample event to ensure optimal performance and calibration results are recorded for future reference, if needed. Calibration and maintenance procedures are followed as set out by the supplier's operation manual. Equipment and bottles are selected so that they do not contaminate or alter the concentrations of parameters of interest according to laboratory standards.

For the groundwater sampling, CREMP sampling and to collect water samples at depth from the surrounding lake receiving and references environments, a pump with tubing is used. Low Density Poly Ethylene (LDPE) tubing (groundwater only), filter apparatus, manual pump and tubing, ash less filter paper are used to filter water for chlorophyll and inline filter for dissolved metal and/or for depth integrated sampling (i.e. chlorophyll a, phytoplankton or biological oxygen demand).

## 2.2 SAMPLING METHODS AND HANDLING

## 2.2.1 Sample Identification

All samples have a unique sample identification name based on a station identifier, date and time of collection. For duplicate, field blank and trip blank, the sample identification are still based on the station identifier, date and time but followed by DUP (duplicate), FB (field blank) or TB (trip blank).

All sample bottles are identified with the sample identification and date of collection. This information is marked on a label with a water resistant pen and affixed to the sample bottle. Additional information like time of sampling and parameters to analyses are included in the analysis request that will be sent to the accredited laboratory.

<sup>&</sup>lt;sup>1</sup> Refer to Meadowbank Water Quality Flow and Monitoring Plan Section 2.3 and Whale Tail Water Quality and Flow Monitoring Plan Section 2.3 for more detailed description of station locations and both Meadowbank and Whale Tail Type A License Schedule I – Tables 1 and 2. The actual location of each sampling site will be marked with a highly visible stake with appropriate signage attached that will define the exact location of the collection point

## 2.2.2 Surface Water Sampling

The bottles are pre-labelled with the required sample identification before going on the field. Surface grab samples are collected by submerging the sample bottle to half depth of the stream/lake. For sumps, diversion ditches and piped discharge points, sample are collected below the surface of the water.

Samples bottles are provided by the accredited laboratory. Bottles are received pre-rinsed and prepreserved or pre-rinsed with vials of preservative that are added in the field by qualified technicians or biologists. In the case that bottles are not pre-preserved, bottles are rinsed three times with sample water before filling. When sampling bottle contains preservative, the bottle is filled by using another clean bottle to avoid any release of preservative. Sometimes, a preservative is added after filling as directed by the laboratory; see Section 2.2.4 for more detail on preservation. The bottles are filled properly to allow mixing, preservative addition and thermal expansion.

Samples analyzed for dissolved metals are filtered through ash less filter paper at the time of collection when the delay before analysis is long. However, when the delay before analyses is fast the accredited laboratory will filter the sample before analyses. For chlorophyll A analysis, the sample is filtered through the ash less filter paper. In some case, when the analysis delay is long, the sample is frozen to prevent parameter degradation.

## 2.2.3 Groundwater Well Sampling

## Well Preparation for Sampling

At the time of purging and sampling the heat trace cables are activated to warm the well pipe. Once the well has been thawed the well is purged.

## Well Purging

Depending on the depth of the well, purging is performed by inserting a ¾" Low Density Polyethylene (LDPE) Waterra tube to approximately 20 meters below the water surface and to use a compressor to push the water out. The wells are purged to remove standing water inside the well and to induce the flow of fresh groundwater from the rock formation. The Waterra tube is lowered to 20 meters below the remaining water and a compressor is used to completely dry the well. The quality of the purged water is monitored for pH, conductivity, temperature, water clarity and color (visual observation) during this activity. Three (3) well volumes of water between the in-well packer and bottom of screened interval) are removed prior to sampling or until the monitored parameters stabilize (values remaining within 10% for three consecutive readings).

## Groundwater Sampling

Groundwater is sampled immediately after purging by lowering the intake of the DVP tubing to 3 to 5 meters above the screened interval.

A groundwater sample is collected in clean, laboratory-supplied containers as per the instructions in the previous section. Samples analyzed for dissolved metals are filtered through a 45 µm inline filter.

Samples are collected in duplicate (see Section 2.2.5) and submitted to the analytical accredited laboratory. Duplicate samples are collected.

Measurements of groundwater temperature, pH, electrical conductivity, turbidity and salinity are obtained in the field during purging and sampling. Measurements are recorded for future reference and to check against laboratory data.

The following procedures are followed to provide data quality control on the samples:

- Measurement of field parameters at selected intervals until stable readings (within 10% of each other);
- Minimization of the exposure of the sampled water to the atmosphere;
- Use of compressed, inert gas (nitrogen) to evacuate water for sample collection;
- In-situ measurement of sensitive chemical parameters (pH, conductivity, where applicable); and
- Abiding by sample preservation methods (refrigeration and use of preservatives where needed);
   and specified holding times.

Bottles are labelled with required information.

## 2.2.4 Preservation

Preservatives, if required, are added to sample bottles by the laboratory or added by the technician after filling, as directed by the analytical laboratory. Table 2.1 summarizes the minimum sample volumes, preservation and holding times for each analyte. This information was provided by the accredited laboratory H2Lab and revised with them in compliance with their protocol. It should be noted that pH, conductivity, turbidity, dissolved oxygen are parameters analyses on the field.

**Table 2-1: Summary of Sampling Requirements** 

Parameter	Minimum Volume (mL)	Bottle Type	Preservation	Holding Time
рН	250	250 mL, glass or plastic, filled to the top	4°C	Analyze immediately
Conductivity	125	250 mL, glass or plastic	4°C	28 days
Hardness	250	250 mL plastic, filled to the top	4°C, HNO₃	6 months
Oil and Grease (total)	1000	1 L amber glass	4°C, H <sub>2</sub> SO <sub>4</sub>	28 days
Turbidity	125	250 mL, glass or plastic	4°C	48 hours
Total Dissolved Solids (TDS)	125	250 mL glass	4°C	7 days
Total Suspended Solids (TSS)	125	250 mL glass	4°C	7 days
Total Alkalinity	250	250 mL, glass or plastic, filled to the top	4°C	14 days
Bicarbonate Alkalinity	250	250 mL, glass or plastic, filled to the top	4°C	14 days
Carbonate Alkalinity	250	250 mL, glass or plastic, filled to the top	4°C	14 days
Total Cyanide	125	250 mL, glass or plastic	4°C, NaOH	14 days
Free Cyanide	125	250 mL, glass or plastic	4°C, NaOH	14 days
Benzene, Toluene, Ethylbenzene & Xylene	40 (per vial)	3 X 40 mL, glass, filled to the	4°C	7 days

Parameter	Minimum Volume (mL)	Bottle Type	Preservation	Holding Time
(BTEX)		top		
Total Petroleum Hydrocarbons(TPH)	1000	1L, glass	4°C, H₂SO₄	28 days
Total Metals (ICP-MS) (Aluminum, Antimony, Arsenic, Boron, Barium, Beryllium, Cadmium, Cobalt, Copper, Chromium, Iron, Lithium, Manganese, Mercury, Molybdenum, Nickel, Lead, Selenium, Tin, Strontium, Titanium, Thallium, Uranium, Vanadium, Zinc, Potassium, Magnesium, Sodium)	125	250 mL plastic	4°C, HNO₃	6 months
Dissolved Metals (Aluminum, Antimony, Arsenic, Boron, Barium, Beryllium, Cadmium, Cobalt, Copper, Chromium, Iron, Lithium, Manganese, Mercury, Molybdenum, Nickel, Lead, Selenium, Tin, Strontium, Titanium, Thallium, Uranium, Vanadium, Zinc)	125	250 mL plastic	4°C, Filtered on- site, HNO₃	6 months
Ammonia-nitrogen	250	250 mL, glass or plastic, filled to the top	4°C, H₂SO₄	28 days
Total kjeldahl nitrogen	250	250 mL, glass or plastic, filled to the top	4°C, H <sub>2</sub> SO <sub>4</sub>	28 days
Nitrate nitrogen	125	250 mL, glass or plastic	4°C	48 hours
Nitrite nitrogen	125	250 mL, glass or plastic	4°C	48 hours
Ortho-phosphate	125	250 mL, glass or plastic	4°C	14 days
Total phosphorous	125	250 mL, glass or plastic	4°C, H <sub>2</sub> SO <sub>4</sub>	28 days
Total organic carbon	125	250 mL glass	4°C, H₂SO₄	28 days
Dissolved organic carbon	125	250 mL glass	4°C, H₂SO₄	28 days
Chloride	125	250 mL, glass or plastic	4°C	28 days
Fluoride	125	250 mL plastic	4°C	28 days
Sulphate	125	250 mL, glass or plastic	4°C	28 days
Radium 226	500	1L plastic	4°C, HNO₃	1 month
Reactive Silica	250	500 mL, plastic	4°C	28 days

## 2.2.5 Field Duplicates, Field Blanks and Trip Blanks

One field duplicate, one filter blank, and one field blank are collected for a) every 10 samples (i.e. randomness duplicate samples are taken for 10% of the samples), b) each sampling event or c) once per year as shown in Table 2.2. Field duplicates and filter blanks are collected and handled in the same manner as the other samples in the field. Field blanks are samples of deionized (DI) water handled concurrently and in the same manner as the other samples in the field. Trip blank, laboratory pre-filed bottles with DI water are carried to the sampling location and are left unopened, will be collected for a total of 10% annually.

**Table 2-2: Quality Control Sample Frequency** 

Sampling Site	QA/QC Sampling Frequency
Compliance Monitoring Program	
Attenuation and reclaim ponds	1 field duplicate and 1 field blank per 10 samples
Mine facilities - operations	1 field duplicate and 1 field blank per year

Mine facilities - closure	1 field duplicate and 1 field blank per year		
Mine facilities - post-closure	1 field duplicate and 1 field blank per year		
Seep water chemistry	I field duplicate and 1 field blank per 10 samples		
Groundwater chemistry	1 field duplicate per groundwater sampling event. One field blank and 1 trip blank per year		
Receiving water chemistry	Blind field duplicates, laboratory and field blanks, sediment cleaning swipes, laboratory matrix spike duplicates per 10 samples (CREMP)		
Event Monitoring Program			
Each event	1 field duplicate and 1 field blank per 10 samples		

## 2.2.6 SAMPLE TRANSPORT

All water samples are stored upright in coolers with ice packs and preserved as specified by the laboratory. Samples are shipped to the external laboratory as soon as possible via chartered aircraft and dedicated ground transportation to ensure arrival in a safe and timely manner. If sample can't be shipped the same day, there are conserved in a refrigerator at 4°C until shipping.

A Chain of Custody form with the following information is completed for every shipment of samples:

- Company name and sampler's name;
- Sample identification name;
- Time and date of sampling;
- Presence and type of preservative and whether the sample was filtered or not;
- Requested analytical parameters for each bottle;
- Time and date of shipping; and
- Analytical laboratory address and contact person.

One electronic or PDF copy is send by email to the laboratory and one electronically copy is kept at the mine site for reference.

## **SECTION 3. LABORATORY ANALYSIS**

## 3.1 EXTERNAL LABORATORY

All analytical chemistry analyses are performed by an accredited laboratory.

In many cases these analyses are performed by H2Lab, an accredited facility (see Appendix A) that is located in Val D'Or, Quebec. This ensures that samples collected meet holding time requirements for all regulatory sampling. All data from H2Lab undergoes a rigorous internal QA/QC process, including the use of spiked samples and duplicate samples. All QA/QC data passed the laboratories acceptable limits.

All toxicity tests were performed by an accredited laboratory, generally Maxxam Analytique in Quebec City and/or Aquatox in Guelph, ON. Testing was conducted as stipulated in the corresponding Environment Canada Biological Test Methods.

Agnico also require the services of laboratory as Maxxam in Edmonton, Alberta, and SGS in Lake Field, Ontario for some parameters that H2Lab is not accredited for. Agnico also uses the services of ALS for many of the CREMP and AEMP water quality analysis.

## 3.2 INTERNAL LABORATORY

The assay lab at the Meadowbank site is not an accredited laboratory but is periodically used for "real-time" results for some parameters like TSS, Copper and WAD Cyanide. These results are for observational purposes and do not meet the standards of an accredited laboratory.

## **SECTION 4. DATA REQUIREMENTS**

## 4.1 DATA COLLECTION

Starting in 2018, Agnico implemented the use of an environmental database named EQuiS. All historical data and future sampling result of all water sampling data is maintained at the Meadowbank and Whale Tail sites. The database has been designed based on the sample stations in the compliance monitoring program of 2AM-MEA1526 and 2AM-WTP1826 Schedule I, the various discharge limits designated in the license, the MDMER regulation and CCME guideline. The database functionality includes trend analysis and flagging out of compliance samples, all to enhance the effectiveness of the QA/QC program. All of this information is presented to regulators in the annual report.

The following data is collected for each sample in the field and will be entered into the database by the sampler for the corresponding sampling station:

- a) Sample identification name;
- b) Name of sampler;
- c) Date and time of sampling or measurement; and
- d) Physical characteristics (pH, temperature etc.), if required.

Upon receipt of sample results from the laboratory, the data will be input to the database and matched on sample identification name.

The analysis certificate for each sample from the accredited laboratory will include but not limited to:

- a) Analytical methods or techniques used;
- b) Date of analysis;
- c) Name of the person(s) / laboratory that approved the certificate; and
- d) Results of any analysis.

## 4.2 DATA VERIFICATION

Upon reception of analytical results, the field blank and duplicate analyses will be verified for potential contamination and accuracy, respectively. Results will be interpreted and recommended actions will be taken if results are not accurate.

## 4.3 EXCEEDENCE REPORTING

Any measured concentration at a sample station exceeding a regulated discharge criterion stipulated in Water License 2AM-MEA1526, 2AM-WTP1826 or the Metal and Diamond Mining Effluent Regulations (MDMER) will be reported to the NWB, ECCC and CIRNAC water inspector as soon as the analysis result is received. In addition, results of the action plan will be reported and, where necessary, mitigation options identified within 90 days after receipt of the analyses.

# **Appendix A H2Lab Accreditation Certificate**

H2Lab's Laboratories					
ix legend:		Location legend :			
Drinking Water		RN : Rouyn-Noranda			
waste water, GW: Ground water, SW: Surface water		VD : Val-d'Or			
oil, SO: Solid, Lix: Lixiat		SAM : Sainte-Agathe-des-Monts			
Dangerous mannor		Jol: Joliette			
Demonstrate to	D. C. marrier	Madhad	la a stia u		
n Parameters 1 Total and fecal coliforms or Escherichia coli	Matrix DW, GW	Method  Membrane filtration	location RN, SAM, JOL		
2 AAHB, Enterococcus	DW, GW	Culture, Membrane filtration	RN, SAM, JOL RN, SAM, JOL		
3 Pseudomonas aeruginosa, Staphylococcus aureus	DW, GW	Culture, Membrane filtration	SAM, JOL		
4 Total coliforms (presence/abscence), Escheria coli (presence/abscence)	DW, GW	Presence/Absence	RN, SAM, JOL		
6 Coliphage virus (presence/absence)	DW, GW	Presence/Absence	SAM, JOL		
11 Ba, B, Cd, Cr, Pb, Cu	DW, GW	ICP-MS	RN		
12 Hg 13 As, Se	DW, GW DW, GW	Mercury analysor ICP-MS	RN		
14 U	DW, GW	ICP-MS	RN RN		
15 CN, F, NO2-NO3, Turbidity	DW, GW, SW	Colorimetry, ionic chromatography, ion analyzer, turbidimetor	RN		
17 NH3-NH4, dissolved Bromine, CNd, NO2, NO3, Ptot, H2S	DW, GW, SW, Lix	Ion analyzer, ICP-MS, Colorimetry, Ion analysor, Optique-ICP, Colorimetry	RN		
18 Turbidity	DW, GW, SW	Turbidimetor	SAM, JOL		
<b>20</b> T.O.C.	WW, SW	Infrared	VD		
21 Nitrites-Nitrates	DW, GW, SW	Colorimetry	SAM		
23 Ca, Fe, Mg, Mn, Na 26 Cl, SO4	GW GW	ICP-MS Ion analyzer	RN, SAM SAM		
28 Sb	DW, GW	ICP-MS	RN		
29 Fluoride	DW, GW	lon analyzer	SAM		
30 Fecal coliforms	DW, GW, SW, Lix	Membrane filtration	RN, SAM, JOL		
31 Total coliforms	WW, SW	Membrane filtration	RN, SAM, JOL		
40 BOD5, COD	DW, WW	Specific electrod, Colorimetry	RN, SAM		
41 TSS (total suspended solids), VSS (Volatil suspended solids) 42 NH3-NH4, NTK, OPO4, Ptot	WW WW, SW	Gravimetry Colorimetry, ICP	SAM RN, SAM		
42 NH3-NH4, NTK, OPO4, Ptot 43 Total solids	ww, sw	Gravimetry	VD, RN		
49 Phenol index (colorimetric)	WW, GW, SW, Lix		VD, KN		
50 TSS (total suspended solids)	WW, GW, Lix	Gravimetry	RN		
58 Conductivity	WW, GW	Automatic Titration	VD, RN, SAM		
60 Chloride, color, pH, SO4	WW, Lix	lon analyzer, Colorimetry, automatic titration, ion analyzer	RN		
63 As, Hg, Se	WW, Lix WW, Lix	ICP-MS ICP-MS	RN RN		
64 Cd, Cr, Cu, Fe, Ni, Pb, Zn 66 Oils and greases	WW LIX	Gravimetry	VD		
77 Al, Sb, Ag, As, Ba, Be, Ca, Co, Mg, Mn	WW, Lix	ICP-MS	RN		
86 pH	DW, WW, GW, Lix		VD, SAM		
88 Al, Ag, As, Cd, Cr, Cu, Fe, Mn, Hg, Ni, Pb, Se, Na, V, Zn (mining metals)	WW, Lix	ICP-MS	RN		
91 NH3-NH4, CNO, Cn, NO2+NO3, MES, H2S, SCN, S2O3	WW, SW	Colorimetry, Ionic Chromatography, Gravimetry	RN		
92 TSS (Total suspended solids)	WW	Gravimetry	VD		
95 Ptot, TSS (total suspended solids) 97 Ba, Sn, Mo	WW, SW WW	Colorimetry, gravimetry ICP-MS	SAM RN		
97 Bd, Sti, W0 109 C10-C50 (Petroleum hydrocarbon)	DW, WW, SW, Lix		VD		
120 Policyclic aromatic hydrocarbon (PAH) Benzo (a) pyrène	DW, WW, GW	GC-MS	VD		
123 PAH	WW	GC-MS	VD		
124 PAH	WW, GW, Lix	GC-MS	VD		
131 Phenolic compounds (GC-MS) 140 VOC (MAH,CAH, BTEX)	GW DW, GW, WW, Lix	GC-MS	VD		
140 VOC (MAH,CAH, BTEX) 150 Trihalomethane (THM)	GW, GW, WW, LIX	GC-MS GC-MS	VD VD		
209 C10-C50 petroleum hydrocarbons	S, MD, SO	GC-FID	VD		
210 Leaching	SO SO	Leaching	RN		
213 As, Hg, Se	S,MD,SO	Optic-ICP, Mercury analyzer	RN		
214 Ag, Ba, Cd, Cr,Co, Cu, Sn,Mo, Ni, Pb, Zn	S, SO,MD	Optic-ICP	RN		
215 Al, Ca, Mg, Mn, K	S, SO, MD	Optic-ICP	RN		
217 pH, TSS (total suspended solids), VSS (Volatil suspended solids) 222 Sulfur	S0 S, S0	Electrode, gravimetry Thermal decomposition, Infrared	SAM RN		
226 Acid generating potential	S, S0 S, S0	Titration, Thermal decomposition, Infrared	RN		
227 Water Leaching	\$, 30 \$0	Leaching	RN		
228 Acetic acid Leaching	SO	Leaching	RN		
229 Acid rain simulation Leaching	SO SO	Leaching	RN		
320 PAH	MD, SO	GC-MS	VD		
330 Phenolic compounds (GC-MS)	S, So, MD	GC-MS	VD		
342 VOC (MAH,CAH, BTEX) 700 Sampling	S, MD, SO DW	GC-MS Sampling	VD RN, SAM		
800 Radium	DW	Scintillation	VD		
802 Tritium	DW	Scintillation	VD		
850 Radium	WW	Scintillation	VD		
n Parameters	Matrix	Method	location		
Alcalinity		Automatic Titration	VD, RN		
Carbonate		Automatic Titration	VD, RN		
Bicarbonate Dissolved parameters		Automatic Titration  Same as for total method with filtration	VD, RN RN		
Carbonated BOD5		Same as for total method with filtration  Selective electode	RN, SAM		
DOC, TIC, DIC		Infrared	VD VD		
Petroleum product identification		GC-FID	VD		
other analysis please contact the lab manager					
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ooul. Industriel /n-Noranda, Oc.		900 Sème avenue Val-D'Or, Qc.			
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ooul. Industriel n-Noranda, Qc. 6P2 19-797-0550		900 5ème avenue Val-D'Or, Oc. J9P 1B2 Tel: 819-874-0350  H2Lab Joliette			
ooul. Industriel m-Noranda, Qc. 6P2 119-797-0550		900 5ème avenue Val-D'Or, Qc. J9P 182 Tel: 819-874-0350  H2Lab Joliette 963, rue Papineau			
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## **MEADOWBANK MINE**

## **Spill Contingency Plan**

Meadowbank Mine Site
All Weather Access Road (AWAR)
Whale Tail Pit
Whale Tail Haul Road
Baker Lake Facilities

In Accordance with Water License 2AM-WTP1826 & 2AM-MEA1526

Prepared by: Agnico Eagle Mines Limited – Meadowbank Division

Version 7 February 2019

## **EXECUTIVE SUMMARY**

This document presents the Spill Contingency Plan for Agnico Eagle Mines Limited (Agnico Eagle) Meadowbank Mine Site, All Weather Access Road (AWAR), Whale Tail Mine Site, Whale Tail Haul Road, and Baker Lake Marshalling Facilities, which is a requirement of the Meadowbank Gold Project Type A Water License No. 2AM-MEA1526 issued on July 23, 2015 and 2AM-WTP1826 issued on July 11, 2018.

The Spill Contingency Plan (SCP) designates lines of authority, responsibility, establishes proper reporting and details plans of action in the event of a spill. This plan applies to the operational phase of the Project and is applicable to all Agnico Eagle employees and any contractors associated with the project located at latitude 65°01'52"N and longitude 96°04'22"W approximately 70 km north of Baker Lake in Nunavut including the Baker Lake Marshalling Facilities located at latitude 64°18'36"N and longitude 95°58'04"W, Whale Tail Project located at latitude 64°24'14" and 96°40'50", the All-Weather Access Road (AWAR), and the Whale Tail Haul Road between Meadowbank and Whale Tail sites.

## **IMPLEMENTATION SCHEDULE**

As required by Water License 2AM-WTP1826 Part B, Item 13 & 2AM-MEA1526 Part B Item 11, the implementation schedule for this Plan is effective immediately (February 2019) subject to any modification proposed by the NIRB and NWB as a result of the review and approval process.

## **DISTRIBUTION LIST**

Agnico Eagle – Environmental Superintendent

Agnico Eagle - Environmental General Supervisor

Agnico Eagle – General Mine Manager

Agnico Eagle – Engineering Superintendent

Agnico Eagle - Health and Safety Superintendent

Agnico Eagle – Geology Superintendent

Agnico Eagle - Mill Superintendent

Agnico Eagle – Maintenance Superintendent

Agnico Eagle – Mine Superintendent

Agnico Eagle - Energy & Infrastructure Superintendent

## **DOCUMENT CONTROL**

Version	Date (YMD)	Section	Page	Revision
1	08/08/08			Comprehensive plan for Meadowbank Mine Site, Exploration Camp and Baker Lake Facilities
2	11/12/04			Update of Contacts, Spill management materials, include AWAR map and Spill KIT Location Map
3	12/07/25			Update of the hazardous materials stored on site
4	2013/11			Comprehensive revision and update with info for Baker Lake Jet-A Tank
5	2014/11	Appendices I & J		Include the prohibition of adding neutralizing chemicals to drainages or near or within water bodies
6	2015/09	3		Change definition of a major spill and minor spill
		Table 4		Contact Information
		5.1.3		Add point that procedure MBK-ENV-0016 will be followed for reporting spills
		5.6		Addition of section on event monitoring. Seepage monitoring included in section.
		Appendix L		Dyno Nobel Emergency Response Plan added in Appendix J
		Appendix M		MBK-ENV-0016 Spill Response Procedure Added
7	2019/02	Complete document		Added Whale Tail pit and haul road to the Spill Plan.

Prepared By: Environmental Department

Approved By:

Robin Allard

General Supervisor Environment

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## LIST OF ACRONYMS

Agnico Eagle Agnico Eagle Mines Limited
ANFO Ammonium Nitrate Fuel Oil
AWAR All-Weather Access Road

CCME Canadian Council of Ministers of the Environment

CIRNAC Crown-Indigenous Relations and Northern Affairs Canada

DFO Fisheries and Oceans Canada

ECCC Environment and Climate Change Canada EMS Environmental Management System

ERP Emergency Response Plan ERT Emergency Response Team

ERTC Emergency Response Team Coordinator

GN Government of Nunavut HCN Hydrogen Cyanide

HMMP Hazardous Materials Management Plan

LEL Lower Explosion Limit
MSDS Materials Safety Data Sheets

NIOSH National Institute for Occupational Safety and Health

OHSP Occupational Health & Safety Plan

PCB Polychlorinated Biphenyls
PPE Personal Protective Equipment

PTA Product Transfer Area
SCP Spill Contingency Plan
TBD To Be Determined

TDG Transportation of Dangerous Goods

WHMIS Workplace Hazardous Materials Information System

## 1. INTRODUCTION

## 1.1 PURPOSE AND SCOPE OF THE SPILL CONTINGENCY PLAN

The overall purpose of creating a spill contingency plan is to minimize the impacts of spills by the establishment of predetermined lines of response and plans of action. This plan has been designed to facilitate effective communication and the efficient clean-up of potentially hazardous materials spills. These materials include:

- Hydrocarbon liquids such as diesel fuel, aviation fuel (Jet-A), gasoline, hydraulic oil;
- Soluble solids such as ammonium nitrate prills;
- Soluble liquids, such as glycols, acids, paints;
- Corrosive liquids such as sulphuric acid and corrosive solids such as sodium cyanide; and
- Any deleterious substances such as suspended solids, arsenic, copper, lead, nickel, zinc etc.

More specifically the objectives of this Spill Contingency Plan (SCP) are to:

- Identify roles, responsibilities, and reporting procedures;
- Provide readily accessible emergency information to the cleanup crews, management, and government agencies;
- Comply with federal and territorial regulations and guidelines pertaining to the preparation of contingency plans and notification requirements;
- Promote the safe and effective recovery of spilled materials; and
- Minimize the environmental impacts of spills to water or land.

This plan has been prepared in accordance with the following reference documents:

- Crown-Indigenous Relations and Northern Affair Canada (CIRNAC) 2007. Guidelines for Spill Contingency Planning;
- Government of Canada, Department of Fisheries and Ocean (DFO) 2016, Fisheries Act,
- Government of Canada, Environment and Climate Change Canada (ECCC) 1999, Canadian Environmental Protection Act (CEPA) Environmental Emergency Regulations;
- Government of Canada, Environment and Climate Change Canada (ECCC) 2017, Migratory Birds Convention Act 1994;
- Government of Canada, Environment and Climate Change Canada (ECCC) 2018, Metal and Diamond Mining Effluent Regulations;
- Government of Nunavut (GN), Contingency Planning and Spill Reporting in Nunavut. A Guide to the New Regulations;
- Government of Nunavut (GN) 2002, Guideline General Management of Hazardous Wastes in Nunavut, and
- Northwest Territories Resources Wildlife and Economic Development, Environmental Protection Service. 1988. Spill Contingency Planning and Reporting Regulations.

## 2 PROJECT DESCRIPTION

The Meadowbank Gold Project, operated by Agnico Eagle Mines Limited, is located approximately 70 km north of the Hamlet of Baker Lake in Nunavut. The project is located on Inuit Owned surface lands (IOL BL-14) and has the following coordinates:

Latitude: 65°01'52"N Longitude: 96°04'22"W NTS map sheet 66H/1

Meadowbank Project components include marshalling facilities in Baker Lake, the 110 kilometer All-Weather Access Road (AWAR) from Baker Lake, the Meadowbank mine site (Figure 9), the Whale Tail Project and the Whale Tail Pit Haul Road between Meadowbank and Whale Tail sites (Figure 10). The Meadowbank mine site consists of the process plant, landfarm, sewage treatment plant, water intake, accommodation buildings, power plant, tank farm, warehouse, truck shop, emulsion plant, open pit (Figure 1) and Vault area (Figure 2). The Baker Lake Marshalling Area consists of a laydown transfer area to temporarily store materials prior to the delivery to the Meadowbank mine site. The Baker Lake fuel farm consists of six (6), ten (10) million litre tanks for diesel fuel, within secondary containment (Figure 3) and eighteen (18) 100,000L double walled tanks, within secondary containment, for aviation fuel (Figure 4). Agnico Eagle is in the permitting process to add two 10,000,000 L tanks in Bake Lake. The Whale Tail camp (Figure 5) consists of sewage treatment plant, water intake, accommodation buildings, power plant, 1,500,000 bulk fuel storage area, warehouse, maintenance shop, and open pit. The Whale Tail Haul Road has one diesel tank of 1,915L installed at Km 132.

The fuel is delivered in bulk by sealift to the Baker Lake fuel farm. From there, fuel is hauled to the Meadowbank and Whale Tail sites by contractor tanker trucks on the AWAR and on the Whale Tail Pit Haul Road, respectively. Diesel fuel coming from the Baker Lake Tank Farm is stored at the Meadowbank site into a single 5.6 million litre tank, within secondary containment, and the aviation fuel into eight (8) – 50,000L double walled tanks in proximity of the airstrip. Fuel at the Whale Tail site will be stored in one 1,500,000 L tank. From there, the diesel is redistributed around site by an onsite fuel truck to site fuel tanks. Fuel storage locations have been designed to meet the CCME guidelines for Aboveground Storage Tank Systems Containing Petroleum and Allied Petroleum Products.

Emergency spill response equipment (i.e. spill kits) is installed at each fuel storage location. Spill kits contain the appropriate type, size and quantity of equipment for the volume and type of product present at the storage location. Transport trucks, heavy equipment and light vehicles are all equipped with spill kits.

Construction at the Meadowbank mine site began with the issuance of the Type A Water License and other relevant authorizations in July 2008 with operations commencing in January 2010. Mining of ore at Meadowbank is expected to cease in Q3 2019. The Meadowbank site is expected to be extended through the operation of the Whale Tail Project which will supply ore to the Meadowbank process plant. Construction of the Whale Tail open pit has started in July 2018.

#### 2.1 PREVENTION AND INSPECTIONS

The first step in spill contingency planning is to take actions to prevent spills from occurring.

Transport, transfer and storage of materials are performed by trained personnel using secondary containment, with well- maintained equipment and containers. Refueling stations in Baker Lake, at the mine site, and at the Whale Tail site are equipped with a lined area to contain any minor leaks or spills while refueling. Transfer of fuel from tanks to tanker trucks are performed with the aid of fuel pumps. A Product Transfer Area Assessment were conducted for the Baker Lake Oil Handling Facility and can be found in Appendix M. Good housekeeping practices are adopted especially in areas such as storage facilities, loading and unloading zones. Site orientations are conducted with all employees and spill prevention and response is discussed in detail. Regular worksite inspections are conducted to identify measures to minimize the risk of spills. All personnel are trained to be aware of the potential hazards associated with the fuel/chemicals with which they are assigned to work. In addition to work site inspections conducted by area specific employees, the Environmental Department conducts weekly inspections to audit facilities handling or storing hazardous materials (Appendix A).

Agnico Eagle supports the following general principles for spill prevention:

- Provide up-to-date and accessible Material Safety Data Sheets (MSDS) for all hazardous materials;
- Regular inspections of fuel/chemical storage areas for leaks (including flex connectors and plumbing) and platform shifting;
- Regular inspections of hazardous materials storage areas;
- Train workers in the use of safe work procedures for hazardous materials, and procedures to clean up spills;
- Encourage workers to take reasonable measures to prevent spills;
- Keep drums/containers sealed or closed when not in use;
- Place drums/containers within a suitable form of secondary or spill containment;
- Keep "overpack" or "salvage" drums nearby to contain leaking drums:
- Keep storage areas secure from unauthorized access;
- Segregate incompatible materials;
- Ensure chemical storage areas are adequately protected from weather and physical damage; and
- Provide adequate spill response materials at storage areas (details of spill response equipment are outlined in Section 8).

Figure 1: Layout Meadowbank Mine Site

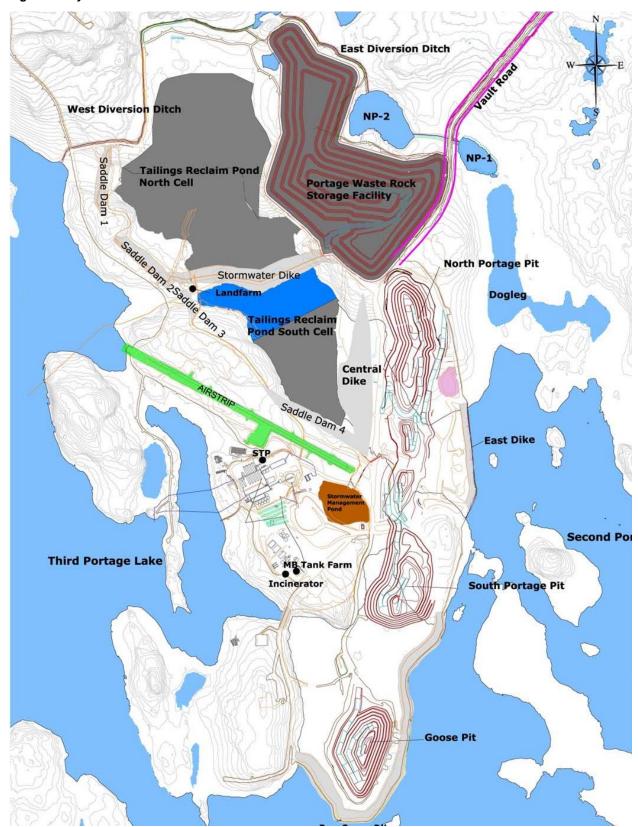


Figure 2: Layout Vault Site

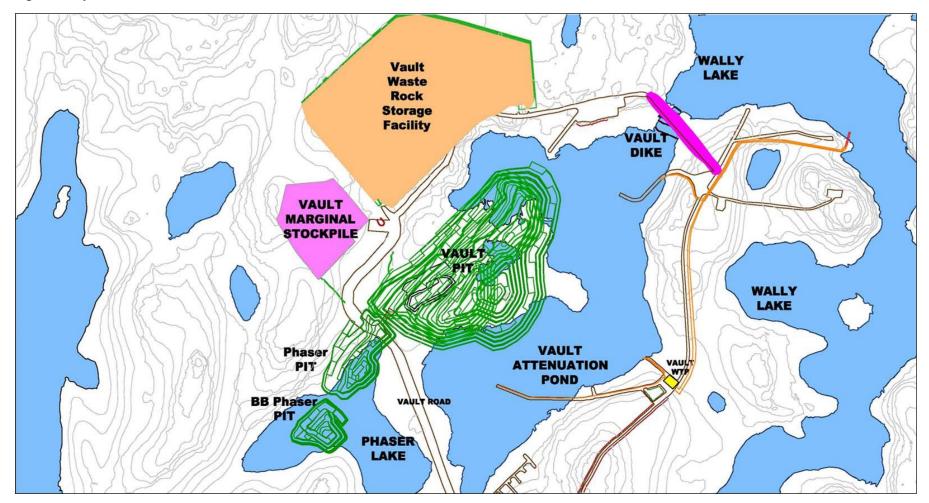


Figure 3: Baker Lake Diesel Fuel Tank Farm

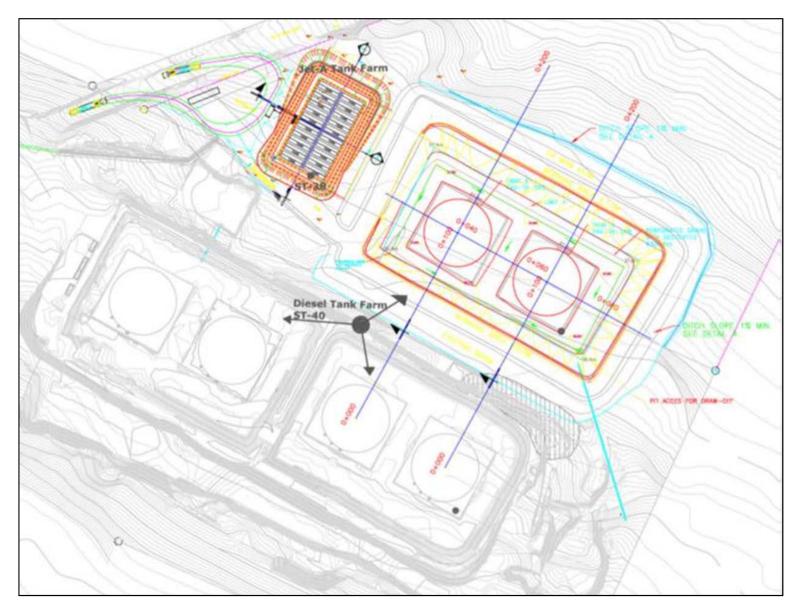


Figure 4: Baker Lake Jet-A Fuel Tank Farm

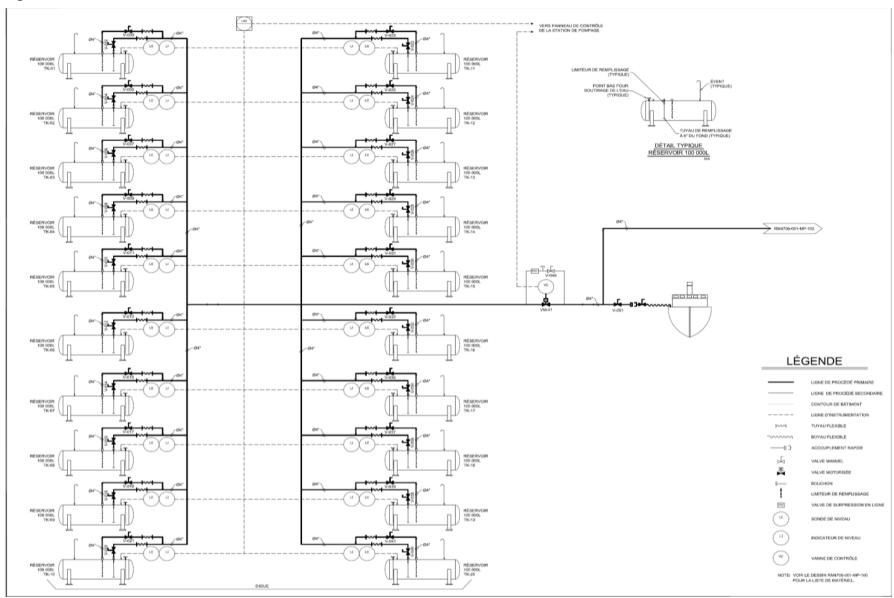
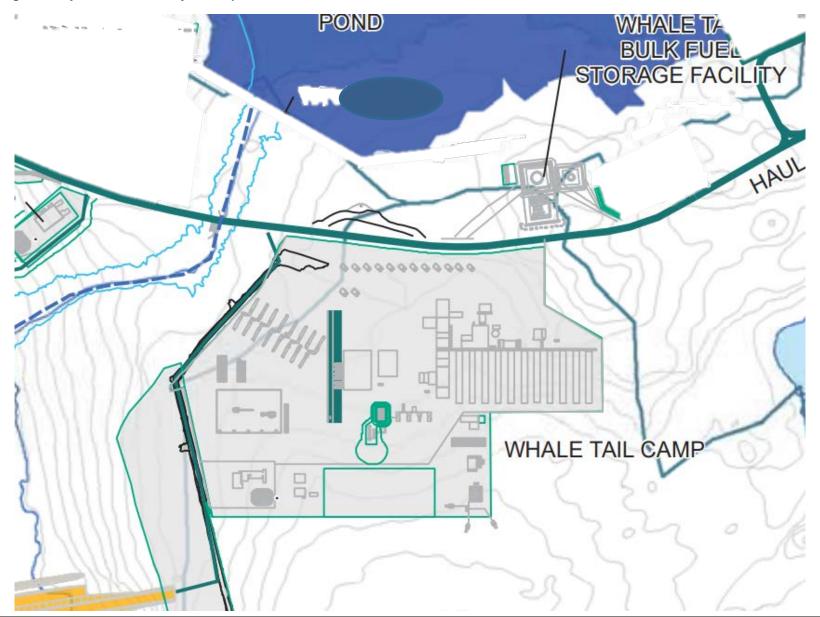


Figure 5: Layout Whale Tail Project Camp



## 3 DEFINITIONS

#### 3.1 WHAT IS A SPILL?

For the purposes of this plan, a major spill is defined as an accidental release of product into the environment that has the potential for adverse impacts to the receiving environment, Agnico Eagle property or human health. This can include potential impacts to water, surface and groundwater, land, equipment, buildings, local communities, human health and the atmosphere.

A minor spill is defined as any spill that does not involve a toxic, reactive, or explosive material in a situation that does not pose a significant risk to the environment, human health or Agnico Eagle property. Minor spills are generally contained within Agnico Eagle facilities.

## 3.2 MATERIALS AND REPORTABLE (TO REGULATORY AUTHORITIES) SPILLS ON SITE

As a precaution, if there is any doubt as to whether the quantity spilled meets the minimum thresholds for reporting to regulatory authorities listed in Table 1, the spill incident will be reported. Furthermore, Agnico Eagle maintain a detailed log of all spills reportable to authorities and those non-reportable for all materials listed in Section 1.1. As part of Agnico Eagle's overall environmental management system and in the spirit of a continuous improvement of environmental performance, procedures will be implemented to ensure **all** spills irrespective of location are reported to the Meadowbank Environment Department.

To ensure compliance with Section 36(3) and 38(5) of the Fisheries Act, Section 5(1) of the Migratory Birds Convention Act, the CEPA Environmental Emergency Regulations, Nunavut Spill Regulation and the Metal and Diamond Mining Effluent Regulations all spills of fuel or hazardous/deleterious materials, regardless of quantity, into a water body (including frozen), shall be reported immediately to the NT-NU 24-HOUR SPILL REPORT LINE (at 867.920.8130 or online at spills@gov.nt.ca). All spills on land that reach the reportable quantity listed in Table 1 need to be report to the NT-NU 24-HOUR SPILL REPORT LINE within 24 hours of the spill occurrence.

Table 1 - Spill quantities that must be reported to the NT-NU 24-HOUR SPILL REPORT LINE

Transportation Class	Type of Substance	Compulsory Reporting Amount
1	Explosives	Any amount
2.1	Compressed gas (flammable)	Any amount of gas from containers with a capacity
		exceeding 100 L
2.2	Compressed gas (non-corrosive,	Any amount from containers with a capacity
	non- flammable)	exceeding 100 L
2.3	Compressed gas	Any amount
2.4	Compressed gas (corrosive)	Any amount
3.1, 3.2, 3.3	Flammable liquid	100 L
4.1	Flammable solid	25 kg
4.2	Spontaneously combustible solid	25 kg
4.3	Water reactant solids	25 kg
5.1	Oxidizing substances	50 L or 50 kg
5.2	Organic peroxides	1 L or 1 kg
6.1	Poisonous substances	5 L or 5 kg
7	Radioactive substances	Any amount
8	Corrosive substances	5 L or 5 kg
9.1 (in part)	Miscellaneous substances	50 L or 50 kg
9.2	Environmentally hazardous	1 L or 1 kg

Transportation Class	Type of Substance	Compulsory Reporting Amount
9.3	Dangerous wastes	5L or 5 kg
9.1 (in part)	PCB mixtures of 5 ppm or more	0.5 L or 0.5 kg
None	Other contaminants	100 L or 100 kg
None	Deleterious substances, Seepage	Any amount

Note: L = litre; kg = kilogram; PCB = polychlorinated biphenyls; ppm = parts per million

## 4 RESPONSE ORGANIZATION

This section addresses the response organization and the responsibilities of each individual during response to an incident.

Figure 6 and 7 illustrates Agnico Eagle's Spill Reporting Procedure Steps in the event of a spill and Sections 4.1 -4.9 list the major responsibilities of site staff that will be participating in the emergency response management.

The first person (first responder) to notice, or come in contact with, any spill situation either initiates a Code 1 (i.e. If a tanker truck overturns on the AWAR/Whale Tail Haul Road) or reports to his/her immediate supervisor (i.e. All other spills on land or water). The supervisor is responsible to report the incident to the designated Incident Commander for a major spill or to the environmental department for a minor spill. If a Code 1 is initiated, the Incident Commander will respond in conjunction with the Emergency Response Team (ERT). Major responsibilities such as initial coordination, spill clean-up and mobilizing the ERT are part of the Incident Commander's duties.

The Incident Commander will contact the Environmental Superintendent and/or General Mine Manager or alternate, who in turn will inform the Senior Vice President, Environment and Sustainable Development. After all information has been collected, the Environmental Superintendent or alternate will submit a spill report and follow up spill report to the NWT/NU Spill Line, Nunavut Water Board, Kivalliq Inuit Association, Environment and Climate Change Canada (ECCC) and Crown-Indigenous Relations and Northern Affairs Canada (CIRNAC). Incidents that require media communications will be the responsibility of Agnico Eagle General Mine Manager or alternate.

In the event of a major spill during a ship-to-ship transfer or due to unforeseen circumstances, the shipping company will be solely responsible for responding to the spill. The containment and clean-up of inadvertent spills resulting from the tankers in transporting the fuel is the responsibility of the shipping company. In the unlikely event where a major fuel spill becomes unmanageable, the shipping company could call on external resources such as the Canadian Coast Guard for assistance. In these situations, Agnico Eagle would provide whatever assistance it can to the shipping company1. Due to the lack of resources Agnico Eagle possess to counter act such a large scale marine spill, Agnico Eagle's assistance would be limited to providing support to preserve the shoreline environment. Agnico Eagle would put its resources to the best use possible during such an event, and assist as much as possible with the resources at hand. The Shipboard Oil Pollution Emergency Plan (SOPEP) is the responsibility of the shipping company; it covers the ship-to-ship transfer of fuel near Helicopter Island. Please refer to the Oil Pollution Emergency Plan for more details. Please refer to the certificate of entry and acceptance boats of shipping company, communication protocol, safety management system for entry into confined water and monthly safety meeting forms found in the Oil Pollution Emergency Plan.

<sup>&</sup>lt;sup>1</sup> The Emergency Response Team will not be equipped or trained to respond to spills offshore in the Marine environment. They will however be able to respond to spills in the near shore area

Figure 6: Spill/incident reporting procedure

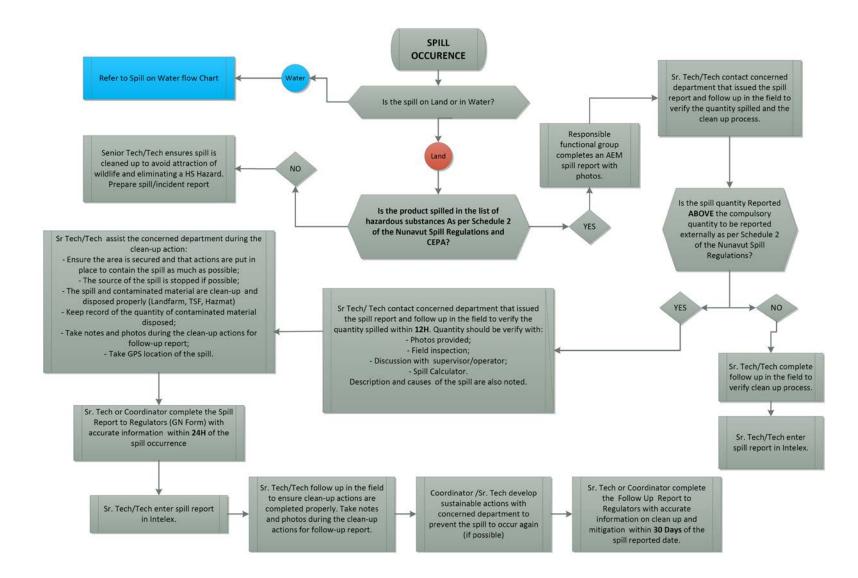
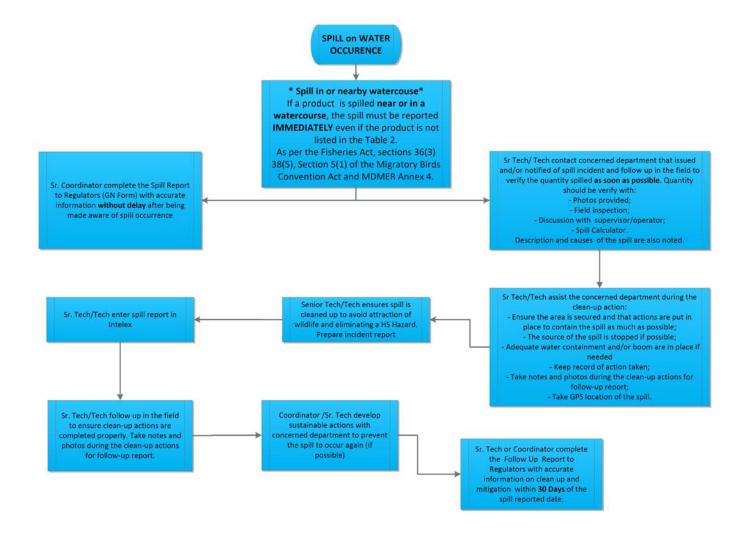


Figure 7: Spill/incident on Water Reporting Procedure



## 4.1 FIRST RESPONDER

The person who has caused a spill or the first to observe the spill is the first responder. The responsibilities of the first responder are as follows:

- In case of major incident (example: tanker truck overturn) and/or spill in or nearby watercourse, initiate a Code 1. Remain on radio to provide guidance to the ERT;
- In case of spill to land or water, contact the supervisor to report the incident;
- Immediately identify and contain the spill, IF SAFE TO DO SO; and
- Participate in spill response as a member of the clean-up crew.

## 4.2 SUPERVISOR

The responsibilities of the Supervisor are as follows:

- Initial assessment of the severity of the incident;
- Contacts the Incident Commander or Environmental Department;
- Gathers facts about the spill; and
- Participate in spill response as a member of the clean-up crew.

## 4.3 INCIDENT COMMANDER

Responsibilities of the Incident Commander are as follows:

- Assume complete authority over cleanup personnel and the spill scene, as well as assume responsibility for all mitigation efforts;
- Evaluate the initial situation and assess the magnitude of the problem;
- Activates the initial response plan;
- Alert and assemble key personnel in the response team, as deemed appropriate, to handle the situation:
- In consultation with the Environmental Superintendent or designate, develop the overall plan of action for containment and cleanup of the specific incident, as well as direct and implement the plan;
- Ensure assigned responsibilities are carried out and the activities of team members are coordinated:
- Assess the requirements for people, equipment, materials, and tools to contain the spill in light of what resources are immediately available; urgency will depend on the nature of the spill; and
- In consultation with the Environmental Superintendent or designate mobilize any additional resources that may be required and arrange for the transportation of necessary personnel and/or materials to the site.

#### 4.4 EMERGENCY RESPONSE TEAM

Agnico Eagle has an Emergency Response Team (ERT) that is trained and responsible for controlling major spills, including those that could occur should a tanker truck overturn along the AWAR or on the Whale Tail Haul Road, and assisting with medical and other emergencies that may occur at the Meadowbank Mine, wherever the location. ERT team members attend regular training sessions.

## 4.5 EMERGENCY RESPONSE TEAM COORDINATOR

The responsibilities of the Emergency Response Team Coordinator (ERTC) are as follows:

Mobilize all ERT personnel, equipment, personal protective equipment and supplies as

- required to the site of the spill;
- Assist Incident Commander in obtaining any additional resources not available on site;
- Ensure that appropriate PPE is worn properly;
- Assist in developing and implementing emergency response training programs and exercises; and
- Ensure that all spill response personnel receive adequate training to fulfill their responsibilities as part of the ERT.

## 4.6 ENIVRONMENTAL SUPERINTENDENT OR DESIGNATE

The Environmental Superintendent or designate is responsible for implementing and maintaining the SCP. In addition, the Environmental Superintendent's or designates responsibilities in the case of a spill are to:

- Liaise with the Incident Commander;
- Provide technical advice on the anticipated environmental impacts of the spill;
- Advise on the effectiveness of various containment, recoveries, and disposal options, and suggest the most appropriate approach;
- Prepare and submit any formal reports (see Appendix B for NWT/NU Spill Report Form) to regulators and Agnico Eagle management detailing the occurrence of a spill;
- Contact the Senior Vice President Environment and Sustainable Development immediately for a major spill;
- Act as the spokesperson with regulatory and government agencies;
- If authorized by the General Mine Manager, act as a spokesperson with the public and media, as required;
- Implement a sampling protocol for the collection and analysis of samples to identify and monitor possible contaminant levels resulting from the spill;
- Ensure on-site resources for spill response and cleanup are available:
- Monitor the effectiveness of the cleanup operation and recommend further work, if necessary;
- Reviews incident occurrences and recommends preventative measures; and
- Assists in implementing training and simulation requirements for spill response personnel.

## 4.7 GENERAL MINE MANAGER ON DUTY

The General Mine Manager/designate is required to inform team members of the detailed nature of the operations to be performed in the event of a major spill during the operations phase. The responsibilities of the General Mine Manager/designate are as follows:

- Liaise with Agnico Eagle personnel resources and keep them informed of cleanup activities;
- Incidents that require media communications will be the responsibility of Agnico Eagle General Mine Manager or alternate; and
- Assist the Incident Commander and ERT as needed, particularly in obtaining any additional resources not available onsite for spill response and cleanup.

## 4.8 HEALTH AND SAFETY SUPERINTENDENT OR DESIGNATE

The following are the responsibilities of the Health and Safety Superintendent or designate in conjunction with the Training Department:

- Maintain emergency and health and safety records;
- Assist in conducting emergency spill response exercises:
- Track all emergency and health and safety training that on-site staff have received, and

- when retraining will be required;
- Notify the Incident Commander (related to ERT) when retraining is required;
- Ensure that employees are retrained in appropriate emergency response skills, Workplace Hazardous Materials Information System (WHMIS) training, Hazard Communication (HAZCOM), Occupational Health and Safety Administration (OHSA) training, first aid, and respirator fit-testing prior to expiry of existing training certification; and
- Consult with appropriate organizations regarding retraining requirements and schedules.

## 4.9 ON-SITE HEALTH CARE PROVIDERS

On-site medics are responsible for the following:

- Providing on-site first aid and other medical support; and
- Providing additional training for ERT members.

In addition to the health care providers on site, the Baker Lake Hamlet health professionals will be called first on the scene, if required.

## 4.10 SPILL RESPONSE TEAM CONTACT INFORMATION

Internal contact information is contained in Table 2 for all Agnico Eagle personnel involved in spill recovery and subsequent reporting. Table 3 provides contact information for Agnico Eagle contractors present at the mine site and transportation contractors. Important external contacts such as regulatory agencies and health organizations are listed in Table 4. Table 5 provides contact information for external contractors should incident warrant assistance from outside sources.

**Table 2 - Internal Contacts** 

Title	Name	Telephone No.
Sr. Vice President, Environment and	Louise Grondin	416.847.8656
Sustainable Development		Cell: 819.24.2020
Vice President of Environment	Michel Julien	416-947-1212 ext. 4013738
		Cell: 514.244.5876
Corporate Director, Communications &	Dale Coffin	416.847.8669
Public Affairs		Cell: 647.274.4154
Manager of Nunavut Services Group	Jason Allaire	819.759.3555 ext. 4608004
		M: 819.355.2608
Meadowbank General Mine Manager	Luc Chouinard	819.759.3555 ext. 4606896
		Cell: 819.859.8160
H&S Superintendent	Markus Uchtenhagen	819.759.3555 ext.4606720
or		Cell: 819.860.6258
H&S Ass. Superintendent		
Emergency Response Counselors	André Rouleau or	819.759.3555 ext.4606809
	Philip Beaudoin	Cell: 819.355.2191
		or
		819.759.3555 ext.4606809
		Cell: 450.847.4214
Environmental Superintendent	Nancy Duquet Harvey	819.759.3555 ext.4606980
		Cell: 819.856.4385
Environmental General Supervisor	Robin Allard	819.759.3555 ext.4606838
Environmental Coordinator	Martin Archambault	819.759.3555 ext.4606744
	or	
	Tom Thomson	
Environmental Department	Environmental	819.759.3555
	Technicians	ext.4606747/4606759
Incident Commander	Nancy Duquet Harvey	819.759.3555 ext. 4606838
	or Robin Allard	
On-site Medics	On-site Nurses	819.759.3555 ext.4606734 or
		4606751
Site Security	On-site Security	(867) 793-4610 ext. 4606748

**Table 3 - Contractor Contacts** 

Title	Telephone No.	Contact in Emergency for:
Nolinor Aviation Services	Protocol Agent	Flight services for additional crew, or additional supplies
	867.759.3700 ext. 4608008	
First Air	1-800-267-1247	Flight services for additional crew, or additional supplies
Calm Air	1-800-839-2256	Flight services for additional crew, or additional supplies
Dyno Nobel Explosives Ltd.	(819) 825-5441	Heavy Equipment, Man power, Emergency Blasting
Desgagnés Transarctik Inc.	(450) 635-0833	Fuel Hauler
Baker Lake Contracting &	(867) 793-2831	Man power, equipment, trades personnel i.e.
Supplies	Press #1	pipefitter, plumber, electrical
Peter's Expediting	(867) 793-2703	Equipment, man power, Ground transportation services
Arctic Fuel Services	(867) 793-2311	Fuel hauling, trucking, man power.

**Table 4 - External Contacts** 

Organization/Authority	Telephone Number	Fax Number
NT-NU 24-Hour Spill Report Line	(867) 920-8130	(867) 873-6924
	spills@gov.nt.ca	
Workers Safety and Compensation Commission	(867) 979-8500	(867) 979-8501
Kivalliq Inuit Association	(867) 645-5725	(867) 645-2348
Nunavut Water Board	(867) 360-6338	(867) 360-6369
CIRNAC Inspector	(867) 669-2442	(867) 669-2871
Environment and Climate Change Canada – Pacific Prairies and the North	(780)-951-8600	780-495-2615
Government of Nunavut – Department of Environment	(867) 975-7700	(867) 975-7742
Kivalliq Health Services – Baker Lake	(867) 793-2816	(867) 793-2812
	Dial 0	
Baker Lake Hamlet Office	(867)-793-2874	(867) 793-2509
Baker Lake Fire Emergency	(867) 793-2900	
RCMP Regular Hour	(867) 793-0123	
RCMP 24 Hour Emergency Number	(867) 793-1111	
Canadian Coast Guard (in the event of a spill to the marine environment)	(800) 265-0237	(519) 337-2498
	(519) 383-1954	
Superintendent Environmental Response		
	(519) 381-6186 (cell)	
Transport Canada – Marine Safety		
Shane Sadoway	(780)-495-7079	
Philip Levesque	(204)-984-5786	(204)-801-6951

<sup>\*</sup>All above phone numbers are current as of February 1, 2019

## 5 ACTION PLAN

Spills may be the result of any of the following occurrences:

- Tanks, drums or containers may develop leaks or rupture:
- Failure of equipment such as valves, piping or containment structures;
- Overfilling;
- Improper storage;
- Spills during transfer of fuel, chemicals or waste products;
- Spills resulting from accidents during transportation; and
- Seepage that may migrate off site to receiving water or land; and
- Discharge to receiving environment of a deleterious substance exceeding the MDMER and/or NWB Water License and/or any other regulation.

## 5.1 INITIAL ACTION

For all spill emergencies, it is required that priority actions be undertaken. These are:

- · Respond Quickly;
- · Ensure Safety; and
- Report the Spill;

## 5.1.1 Respond Quickly

- · Identify the spilled material;
- Be alert ensure safety of yourself and others by notifying them of the incident;
- Shut off ignition sources such as vehicles and unplug electrical equipment NO SMOKING:
- Attend to the injured;
- Assess the severity of the spill; and
- Contact the Incident Commander, identify the location and request assistance as required. If required the Incident Commander will mobilize the Emergency Response Team.

The primary form of ensuring safety is by using preventative measures. All personnel who deal with chemicals must have training in first aid and safe materials handling, including the Workplace Hazardous Materials Information System (WHMIS). In addition, regular training updates and site-specific exercises/drills are integral to preventing incidents.

## 5.1.2 Ensure safety

- Consult the MSDS and Product Guides for further information on the substance;
- Keep people away from spill site;
- Wear appropriate PPE such as impervious clothing, goggles, and gloves when containing the spill;
- Approach spill from upwind IF IT IS SAFE TO DO SO;
- Assess whether the spill, leak, or system failure can be readily stopped or brought under control;
- Stop product flow or leak if possible and IF IT IS SAFE TO DO SO:
- Do not contain compounds (e.g. gasoline, aviation fuel) if vapors might ignite allow them to evaporate; and
- Depending on the type of compound spilled and IF IT IS SAFE TO DO SO, contain product using booms, berms, absorbent pads, earthen dike, trenches or improvise with materials at hand.

## 5.1.3 Report Spill

- Spill reporting will follow Spill Reporting procedure MBK-ENV-0016. This procedure can be found in Appendix K
- Obtain all necessary information to complete the spill report form (reportable or not) and provide to Environment Staff within 12 hours. Spills that meet regulatory reporting criteria must be reported to the NWT-NU 24 Hour Spill Line/CIRNAC/ECCC/Kivalliq Inuit Association and the NWB by Agnico Environment Staff within 24 hours. Any spills near and/or in water must be reported immediately to NWT-NU 24 Hour Spill Line/CIRNAC/ECCC/Kivalliq Inuit Association and the NWB by Agnico Environment Staff even if not meeting regulatory criteria describe in Table 1; and
- For spills that meet regulatory reporting criteria, a detailed spill report will be submitted to
  the CIRNAC Water License Inspector, ECCC inspector and the KIA Land's Inspector by
  Agnico Eagle Environment Staff no later than 30 days after the initial reporting of the spill.
  This report will contain the amount and type of spilled product, the GPS location of the spill
  and the measures taken to contain, cleanup and restore the spill site.

Procedures will vary depending on the season and materials spilled. The MSDS for spilled materials and/or Transport Canada's "Emergency Response Guidebook" must be consulted to ensure that safety procedures are followed. Response procedures specific to spills on land, water, snow and ice are presented in the following sections as general guidelines.

### 5.2 SPILLS ON LAND

Response to spills on land will include control techniques involving the use of two types of barriers: dikes and trenches. Barriers should be placed down-gradient (down-slope) from the source of the spill, and as close as possible to the source of the spill. Barriers will slow the progression of the material spilled and will also serve as containment to allow for recovery.

Depending on the volume spilled, the site of the spill as well as available material, a dike may be built with soil, booms, lumber, snow, etc. A plastic liner, if necessary, can be placed at the toe of and over the dykes to protect the underlying soil or other material and to facilitate recovery of the material. Dikes will be constructed in such a way as to accumulate a thick layer of free product in a single area (V-shaped or U-shaped).

Trenches are useful in the presence of permeable soil and when the spilled material is migrating below the ground surface. A plastic liner should be placed on the down-gradient edge of the trench to protect the underlying soil. Liners should not be placed at the bottom of the trench to allow water to continue flowing underneath the layer floating oil.

The use of absorbent materials to recover a large volume of spilled liquids such as petroleum based material should be avoided. Large volumes of free-product should be recovered, as much as possible, by using vacuums and pumps, and containerized. Mixtures of water and fuel may be processed through an oil-water separator. However absorbent materials work well for smaller volumes of spilled hydrocarbon based materials such as fuel. Absorbent sheets should be used to soak up residual fuel on water, on the ground (soil and rock), and on vegetation. Peat moss may also be sprinkled on vegetation to absorb films of petroleum products.

## 5.3 SPILLS ON WATER

Response to spills on water will include procedures that include containment, diversion and recovery techniques. The following elements must be taken into consideration when conducting response operations:

- To ensure compliance with Section 36(3) and 38(5) of the Fisheries Act and Section 5(1) of the Migratory Birds Convention Act all spills of fuel or hazardous materials, regardless of quantity, into a water body (including frozen), shall be reported immediately to the NT-NU 24-HOUR SPILL REPORT LINE (at 867.920.8130).
- Type of water body or water course (lake, stream, river);
- Water depth and surface area;
- Wind speed and direction;
- · Type of shoreline; and
- Seasonal considerations (open-water, freeze-up, break-up, frozen).

The most common type of spill that could be anticipated is a petroleum hydrocarbon (diesel) spill during fuel transfers/transport. Containment of an oil slick in water will require the deployment of mobile floating booms to intercept, control, contain and concentrate (i.e., increase thickness) the floating oil. One end of the boom will be anchored to shore while the other will be towed by a boat and used to circle the oil slick and return it close to shore for recovery using a skimmer. Reducing the surface area of the slick will increase its thickness and thereby improve recovery. Mechanical recovery equipment (i.e., skimmers and oil/water separators) will be mobilized to site if required.

Measures will be taken to protect sensitive and accessible shoreline. The oil slick will be monitored to determine the direction of migration. In the absence of strong winds the oil will likely flow towards the discharge of the lake. Measures will be taken to block and concentrate the oil slick at the lake discharge using booms where it will subsequently be recovered using a portable skimmer, vacuum, or sorbent materials.

In small slowly-flowing rivers, streams, channels, inlets or ditches, inverted weirs (i.e., siphon dams) will be used to stop and concentrate moving oil for collection while allowing water to continue to flow unimpeded. In the case of floating oil, in a stream, heading for a culvert (i.e., at a road crossing) a culvert block will be used to stop and concentrate moving oil for collection while allowing water to continue to flow unimpeded. In both cases oil will then be recovered using a portable skimmer or sorbent materials.

In the case of spills in larger rivers, with fast moving currents, diversion booming will be used to direct the oil slick ashore for recovery. Single or multiple booms (i.e., cascading) may be used for diversion. Typically, the booms are anchored across the river at an angle. The angle will depend on the current velocity. Choosing a section of a river that is both wider and shallower will make boom deployment easier. Diversion booming may also be used to direct an oil slick away from a sensitive area to be protected.

### 5.4 SPILLS ON SNOW AND ICE

In general, snow and ice will slow the movement of hydrocarbons. The presence of snow may also hide the oil slick and make it more difficult to follow its progression. Snow is generally a good natural sorbent, as hydrocarbons will have a tendency to be soaked up by snow through capillary action. However, the use of snow as a sorbent material will be limited as much as possible. Snow and frozen ground will also prevent hydrocarbons from migrating down into soil or at least slow the migration process. Ice will prevent seepage of fuel into the water.

Most response procedures for spills on land discussed previously may be used for spills on snow and ice. The use of dykes (i.e., compacted snow berms lined with plastic sheeting) or trenches (dug in ice) will slow the progression of the fuel and will also serve as containment to allow recovery of the fuel.

Free-product will be recovered by using a vacuum, a pump, or sorbent materials. Contaminated snow and ice will be scraped up manually or using heavy equipment depending on volumes. The contaminated snow and ice will be placed in containers or within plastic lined berms on land.

### 5.5 DISPOSAL OF SPILLED MATERIAL

All contaminated spill pads, and booms are placed within Quatrex bags for shipment to an approved disposal facility. All the petroleum hydrocarbon contaminated soil is placed into the Meadowbank landfarm for treatment, this includes contaminated soil from the Baker Lake and Whale Tail facilities. Spills over 100 L of non-petroleum hydrocarbon material (e.g. solvents, glycol) will be placed in drums and stored in the on-site hazardous material area for shipment south to approve facilities during barge season. Spills of non-petroleum hydrocarbon material fewer than 100 L will be placed in the Tailings Storage Facility (TSF).

Spills under 100 L of petroleum hydrocarbon contaminated snow will be placed in a designated area of the landfarm and treated as contact water after snowmelt. Spills over 100 L of petroleum hydrocarbon contaminated snow will be excavated and stored in labeled drums or at the TSF. After snow melt, the contaminated water will be pumped through the site's oil-water separator (carbon filter) to remove petroleum hydrocarbon residue. The treated water will be sampled per Part F, Item 6 of the NWB 2AM-MEA1526 Water License, and discharged to the respective Stormwater Management Pond at Meadowbank and Whale Tail if criteria are met. If criteria are not met, water will be treated as hazardous material and shipped south. Also, after snowmelt, visible product will be cleaned up with absorbent pads or booms.

For more information refer to the Meadowbank Landfarm Design and Management Plan.

### 5.6 EVENT MONITORING

The Event Monitoring (EM) program addresses the site specific monitoring that is required following any accidental release. A "release" may be caused by a spill or an emergency (Emergency Response Plan; January 2018).

The EM program is designed to verify whether contamination of the surface soil, nearby receiving environment and active zone has occurred as a result of an accidental release of a hazardous material or contaminated water, through monitoring of surface runoff and nearby receiving environment following remediation of any release. It is anticipated that owing to the presence of permafrost beneath most of the mine footprint, there will be minimum impact to groundwater. A complete list of hazardous materials in use during operations at all sites is provided in the Hazardous Materials Management Plan (June 2016).

The EM plan is developed on a site-specific basis subsequent to a spill or accidental release, and considers the type of product spilled, the potential receptors, and the potential for any remaining contamination after clean up. The plan is done in coordination with the Environmental Superintendent.

In the event of an accidental release, the water quality of the downstream receptor and possibly upstream of the receiving point, if any, is to be sampled (during the ice-free season) and analyzed. Should the spill have happened over snow cover, water and possibly soil sampling is to take place at the earliest feasible time after thaw to verify if there has been any impact to the receiving water or soil quality. The specific parameters monitored as part of the EM program will depend on the nature of the spill, and will be determined for the specific hazardous material released.

EM sampling is to occur following the clean-up of a release and the frequency of sampling will depend on the type of material spilled (wet or dry spill), the environment into which the chemical was released (surface water body or soil; frozen or thawed), and the quantity of spill material. The EM program for a particular spill will cease upon obtaining satisfactory analytical results (within 20% of background level, to accommodate for analytical accuracy) from the potentially affected areas or as required by regulators.

In the event of a seepage from the TSF and/or rock storage facility (RSF), water will be pumped back to the North Cell TSF (or South Cell if necessary). Visual inspections will be conducted regularly to confirm that the seepage is appropriately contained and will not enter into the receiving environment.

## **6 HAZARDOUS MATERIALS STORED ON SITE**

A variety of petroleum products and other hazardous materials will be used as part of mining operations. Large quantities of petroleum products will be stored at various sites at the Meadowbank Mine and at Whale Tail Project. Explosives will also be stored on site. Other hazardous materials will be used but in smaller quantities. Nonetheless, all these products are considered as potential environmental and safety hazards.

Material Safety Data Sheets (MSDS) of all materials transported, stored and used on-site will be made available at strategic locations near to where hazardous materials or toxic substances are stored or utilized. Appendices C to H provide General Response Procedures for Spilled Chemical Substances.

Table 5 identifies the predominant hazardous materials transported, stored and generated at the sites. Those destined for use in the process plant will only be stored at Meadowbank. Refer to the *Hazardous Materials Management Plan* for more details.

Table 5 - Materials stored at site during operations

Material	Maximum Anticipated on - site	Maximum Amount transported per unit	Storage Location
Acetylene	500 cylinders	300 cylinders per sea can	Inventory Lay down
Acid Hydrochloric	120 L	NA	Inventory Lay down, Laboratory
Activated Carbon	350 Mt	10 Mt per sea can	Inventory Lay down and Process Plant lay down
Ammonium Nitrate	10,000 Mt	20 Mt per sea can	Emulsion plant
Ammonium Nitrate Fuel Oil (ANFO)	Manufactured on demand	20,000 kg per truck	Emulsion plant
Anionic Flocculent	99,000 Kg	750 kg/bag	Inventory Lay down
Motor Oil	Estimated at 800,000L	20,800L per sea can	Inventory Lay down, garage
Trojan Boosters (Blasting Systems)	34,000 kg	15 Mt per sea can	Emulsion plant
Borax, Anhydrous	7,500 kg	3,375 kg per sea can	Inventory Lay down and Process Plant lay down
Calcium Chloride	600,000L	10,000L per sea can	Inventory Lay down
Carbon Dioxide	10 cylinders	10 cylinders per sea can	Inventory Lay down
Caustic Soda	138,000 Kg	1,000kg/Bag	Inventory Lay down
Copper Sulphate	500 Mt	20 Mt per sea can	Inventory Lay down and Process Plant lay down
Diesel Fuel	5.6 million Litres	40,000L per tanker	Meadowbank Tank farm
Diesel Fuel	1.5 million Litres	40,000L per tanker	Whale Tail Tank farm
Diesel Fuel	60 million Litres	NA	Baker Lake Tank farm
Dyno Split (Detagel)	135,000 kg	15 Mt per sea can	Emulsion plant
Lead nitrate	350,000 kg	1,000kg/bag	Inventory Lay down
Nonel EZTL	1,400 kg	15 Mt per sea can	Emulsion plant

Material	Maximum Anticipated on - site	Maximum Amount transported per unit	Storage Location
Nonel MS	1,800 kg	15 Mt per sea can	Emulsion plant
Ethylene Glycol	60,000L	10,000L per sea can	Inventory Lay down
Jet A Fuel	400,000L	11,000L Tanker	Meadowbank Tank, tarmac
Jet A Fuel	1,800,000L	NA	Baker Lake Tank Farm
Lead Acid Batteries	500L	500L per sea can	Warehouse
Magnafloc 10 (Flocculant)	300 Mt	15 Mt per sea can	Inventory Lay down
Metabisulfite	22,000,000kg	1,000kg/bag	Inventory Lay down
Nitric Acid	120,000L	8,000L per sea can	Inventory Lay down
Portland Cement	3,500 Mt	20 Mt per sea can	Dyke and Construction lay down
Sodium Cyanide	1,550,000kg Mt	· -	Inventory Lay down and Process Plant lay down
Sodium Hydroxide	10 kg	10 kg in sea can	Warehouse
Sodium Nitrate	10.2 Mt	5.1 Mt per sea can	Inventory Lay down
Sulfur	4,600 Mt	•	Inventory Lay down Process Plant lay down
Quick Lime	600,000,000kg	1,700kg/bag	Inventory Lay down
Unleaded Gasoline	50,000L	40,000L tanker	Meadowbank and Baker Lake Tank
Varsol	4,000L	2,000 L per sea can	Inventory Lay down

## 7 POTENTIAL SPILL ANALYSIS

To prepare for emergency spill response, potential spill analyses were conducted using various worst case scenarios. These exercises serves to identify potential risk areas, as well as to determine the fate of spilled products and their environmental effects. One such potential scenario was identified for the Meadowbank Gold Project, this being a tanker truck spilling its contents into a waterbody somewhere between Baker Lake and Meadowbank alongside the AWAR. Such a scenario could also be applied to a tanker truck going off the Whale Tail haul road and spilling its contents.

## Scenario #1: Road Accident Tanker Truck Spill on AWAR

<u>Description of incident</u>: Spill of the contents of a fuel tanker to the ground or water during transport from Baker Lake to the Meadowbank site.

Potential causes: Vehicle accident, human error, mechanical failure

Hazardous products spilled: Diesel fuel, aviation fuel

Maximum volume spilled: 40,000 litres

Immediate receiving medium: Stream, river or lake

Distance and direction to nearest receiving body of water: N/A

Resources to protect: Streams, rivers and lakes

Estimated emergency response time: Maximum time is 90 minutes depending on location of spill (assuming truck driver is injured and cannot commence spill response procedures). Minimum time to respond to a spill on the AWAR is 15 minutes.

Spill response procedures: Contain and recover oil slick downriver as described in Section 5.3, protect shorelines using sorbent booms. Collect free-product for temporary storage. Clean-up soiled shorelines. If the response crew arrives before the complete loss of fuel from the tanker truck seal the leak if feasible, contain and recover oil spill on ground using dykes, sumps or trenches as described in Section 5.2. Also, if the truck driver is not injured, he will act as a first responder and immediately initiate the spill contingency plan as defined in Section 5 using the spill kit kept in fuel trucks.

## 8 RESPONSE EQUIPMENT

#### 8.1 GENERAL EQUIPMENT

This section addresses the emergency response machinery, equipment, tools and other resources that will be made available on-site for spill counter measures.

Mobile Equipment available to Agnico Eagle that will be used for spill contingency includes:

Winch Trucks Graders Pickup Trucks Cranes **Generator Sets** Snowmobiles Vacuum Truck Fire Truck Loaders **Aluminum Boats** Backhoe **Fuel Trucks** Bulldozer **Bobcat** Forklift Haul Trucks Water Trucks **Snow Cat** 

Excavators

If required, additional equipment on site will be made available to assist with spill recovery. Temporary containment systems are also available on site and include:

- Booms
- Drums
- Tanks
- Tailings Pond
- Spill absorbent material packages/pads
- Silt fencing
- Maritime Barrier

Emergency transportations that will be used under an emergency situation are:

- Aircraft (fixed wing or helicopter)
- 4-wheel drive vehicles
- Snowmobiles
- Boats
- Tundra Buggy

Communication equipment at Meadowbank and Whale Tail includes radios, telephones, faxes and other wireless communication systems that will be used in the event of an emergency situation.

Spill Response kits are strategically located where required around the Meadowbank (Figure 8) and Whale Tail (TBD) sites. Each department and work area is responsible for providing sufficient spill response kits in their respective work areas. The kits are kept in marked and accessible locations. The locations include all fuel storage areas, chemical storage areas and so on.

All of the mobile equipment on all sites (heavy equipment) contains an emergency spill kit.

An Environmental Emergency Trailer, which is easily accessible and mobile, is located on site at Meadowbank and contains the following items:

- Pump Elastec
- Pump accessories
- Vacuum ends
- 45 gallons top
- Tubing 2 inches diameter
- Tubing 3 or 4 inches diameter
- Diesel Fuel jerry can (place on a miniberm)
- Spill kit accessory (red box)
- Drums opener
- Wescot (to open empty drum screw)
- Empty drums
- 2 drums berm
- 4 drums berm 4x8
- Tarp 20x30
- Tarp 30x50
- Oil white spill pads
- Universal boom 5x10
- Universal boom 8x10
- ABS pipe: 10' (4")
- ABS pipe: 10' (6")
- Cell U-Sorb
- Sphagsorb
- 3 Size of Wedge wood
- Plug pattie
- Quattrex bags
- Hand shovel
- Ice braker chisel
- Sledge hammer
- Rod bar (4')

Along the AWAR there are 9 environmental emergency sea cans (Figure 9). Currently, there is two (2) environmental emergency sea cans installed along the Whale Tail Haul Road at Km 125.5 and Km 147, between Whale Tail Pit and Meadowbank. More environmental sea can are planned to be installed. Approximate location are detailed on Figure 10 below. These sea cans are, or will be placed, strategically placed along the roads at water crossings. Each environmental emergency sea can contains the following material:

- Empty drums (Sealed)
- Mini berm 36"x36" x4'
- 4 drum spill berm 4x8
- Tarp 20'x30'
- Tarp 30'x50'
- Oil white spill pads
- Universal boom 5"x10' (Chemical)
- Universal boom 8"x10' (Chemical)
- Oil only booms 5"x10' (Hydro-carbons)
- Maritime barrier (Baffle)
- ABS pipe: 10' (4")
- Cell U-Sorb
- Amerisorb peat moss
- Oil gator absorbent
- Plug pattie
- Quattrex bags

- Fork lift crate (pallets)
- Long handle round point shovel
- Chisel point crow bar 16 lbs 57"
- Ice braker chisel
- Sledge hammer 12 lbs 36"
- Rod bar (4')

If required, external resources are available in the Hamlet of Baker Lake and those contacts are found in Table 5.

Figure 8: Spill Response Equipment Location at Meadowbank

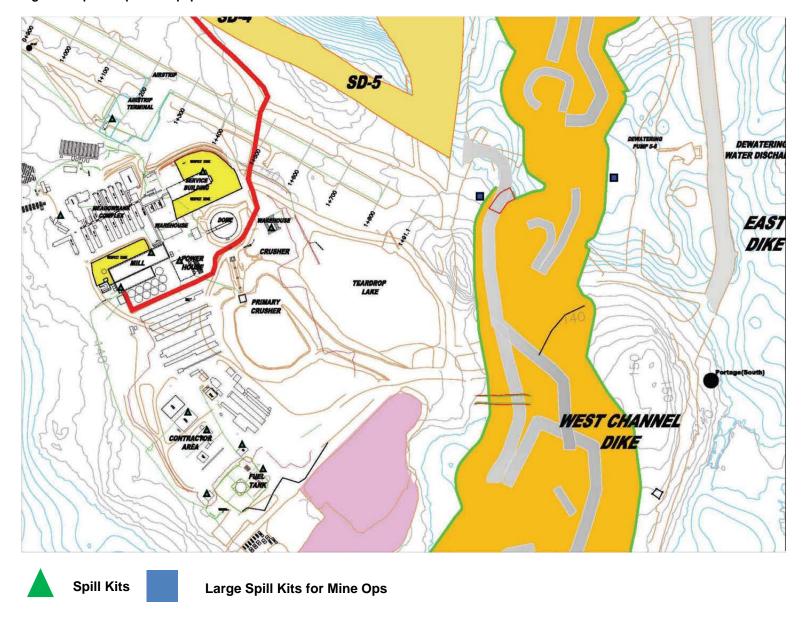
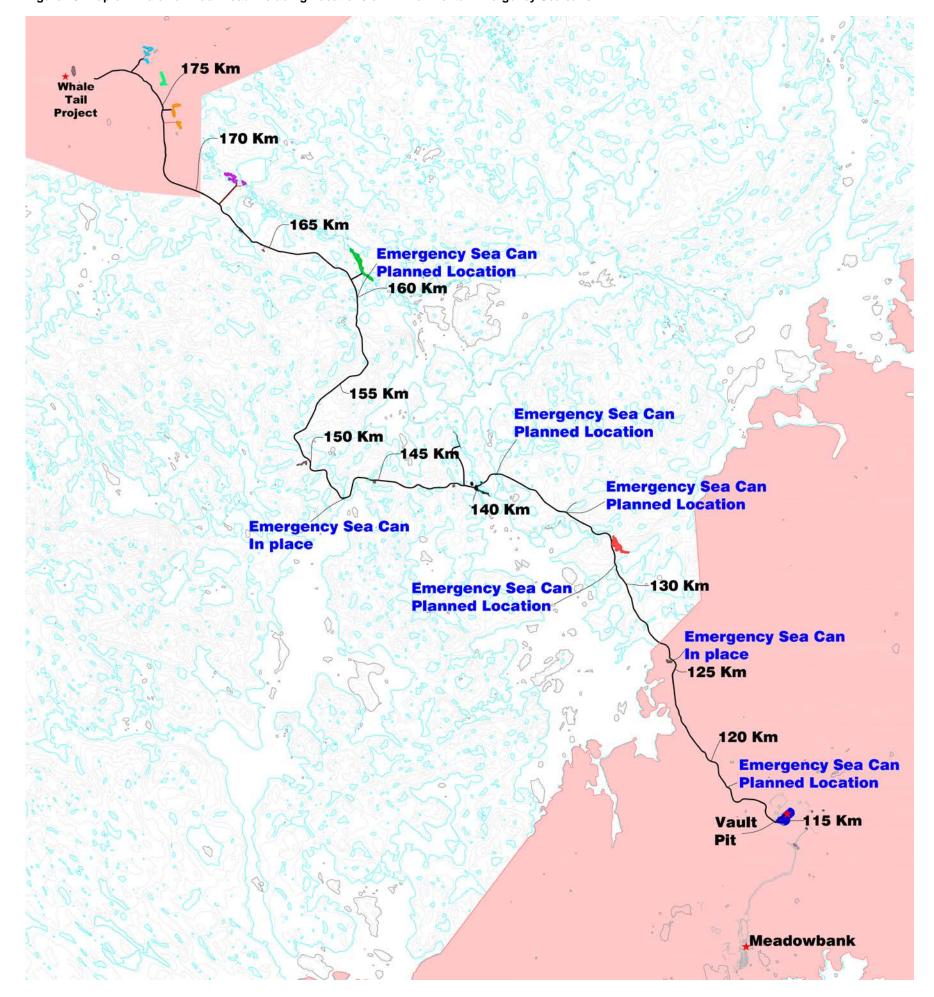


Figure 9: Map of AWAR Including Locations of Environmental Emergency Sea cans



Environmental Emergency Sea cans

Figure 10: Map of Whale Tail Haul Road Including Locations of Environmental Emergency Sea cans



## 9 TRAINING & EMERGENCY SPILL/EXERCISE

A designated Emergency Response Team (ERT) consisting of on-site personnel has been established at Meadowbank and another team will be established at Whale Tail. Agnico Eagle will ensure that the ERTs are trained and present for major spill response at all times. All members of the teams are trained and familiar with emergency and spill response resources, including their location and access, the SCP, and appropriate emergency spill response methodologies. The ERT has up to 40 members, each of whom train 8 hours per month.

The following training is included:

- A review of the spill response plan and responsibilities of the ERT members;
- The nature, status, and location of fuel and chemical storage facilities;
- The on-site and off-site spill response equipment and how to use it;
- · Emergency contact lists;
- Desktop exercises of "worst case" scenarios;
- The likely causes and possible effects of spills; and
- On-site personnel.

Every employee at Agnico Eagle receives spill and waste management training during their initial site orientation so they are able to respond to small spills and raise the alarm if a larger response is required. ERT members receive more extensive HAZMAT training and learn how to respond while wearing personal protective equipment (PPE).

A training program is being developed to provide more complete training to all personnel (Agnico and contractors) that will cover safe spill response and intervention as well as awareness to different guidelines pertaining to spills. This training would be mandatory for all staff and renewable yearly.

The road crews between Baker Lake and Meadowbank, and Meadowbank and Whale Tail also received or will receive training regarding the actions that they have to carry out during an emergency or major spill on the road. You can find records of different trainings that Agnico Eagle personnel have attended in Appendix I. Agnico also performed each year a Mock Spill Scenario in Baker Lake. You can find the detailed of the 2018 Mock Spill in Appendix L. A Product Transfer Area Assessment for Baker Lake Oil handling Facility was also completed and can be found in Appendix M. The Environmental Department regularly attends tool-box sessions to provide information on spill response, spill prevention and spill reporting procedures.

## Appendix A

**Environmental Department weekly inspection template** 



Environmental Inspection report for MBK Refuelling Station, Jet-A tank and fueling area, Tank farm, and Camp Gensets

Date:	Inspected By:
Time:	Weekly Inspection

Compliance with	Subject	Conform	Non- conform	N/A	Comments
NIRB Condition 26	Ensure that spills, if any, are cleaned up immediately and that the site is kept clean of debris, including windblown debris.		COMOTH		
NIRB Condition 25	Management and control waste in a manner that reduces or eliminates the attraction to carnivores and/or raptors.				
NWB Part D Item 29 MBK - SCP	Spills on the ground				
NWB Part H Item 4 NIRB Condition 27	Secondary containment for fuel, Jet-A, and chemical storage in place				
NWB Part D Item 29	Refuelling procedures followed (secondary containment at every connection and 3 persons)				
MBK Bulk Fuel Storage Monitoring Plan Section 6.1	Precipitation or runoff accumulation in secondary containment				
MBK Bulk Fuel Storage Monitoring Plan Section 6.1	Any visible sheen on water.				



	Water in secondary		
NIME DO	containment of MBK		
NWB Part F	Bulk Fuel Storage		
Item 23	Facility and Jet-A		
	storage being		
	measured and		
	recorded in m <sup>3</sup> .		
NWB Part F			
Item 9	Discharge of water		
NIRB Condition	not causing erosion		
12			
MBK Bulk Fuel	Any viaual atmustural		
Storage	Any visual structural		
Monitoring Plan	issues with		
Section 6.1	containment berms		
NWB Part F	10 days' notice		
Item 8	given to inspector		
Tem o	prior to discharge?		
	Water being		
NIMD Dowt P			
NWB Part F	discharged to land		
Item 6	meets water quality		
	limits		
MDWD II E I	Any indicators that		
MBK Bulk Fuel	would suggest		
Storage	damage to liner for		
Monitoring Plan	secondary		
Section 6.1	containments		
NWB Part F	Discharge of water		
Item 9	>30m from ordinary		
	high water mark		
	Discharge from MBK		
NWB Part F	Fuel Storage Facility		
	being directed to		
Item 5	Stormwater		
	Management Pond		
	Is the discharge		
NWB Part I	volume being		
Item 10(e)	tracked?		
NIMD Dowt E			
NWB Part F	Discharge of water		
Item 9	not directly flowing		
	to water body		
NIMD Down II	Prevention in place		
NWB Part H	to disallow		
Item 3	chemicals,		
	petroleum products		
NIRB Condition	and waste from		
27	entering Water		
NWB Part H	Date of last Env.		
Item 5	visual inspection		
	(weekly)		



MBK Bulk Fuel Storage Monitoring Plan Section 6.1	Weekly manual or electronic dip tests were conducted for inventory reconciliation. Date of last test			
CCME - Above Ground Storage Tank Guidelines	Non-smoking sign, Extinguisher, and tank identification present			
MBK - SCP	Spill Kits Present			
NWB Part D Item 22 NWB Part D Item 33	Erosion present / Erosion control in Place			
NWB Part D Item 36 NIRB Condition 27	All tanks and piping are not altered from approved construction.			
NWB Part I Item 9	Are signs identifying monitoring stations in place and posted in English, Inuktitut and French			
NWB Part I Item 12 (l)	Annual Geotechnical inspection completed			
MBK Wildlife Management Plan	Any nesting taking place on tanks or stairways of tank farm			
ВМР	Are there any additional environmental hazards/potential impacts that require attention?			
MINE ACT	Are there any Health and Safety issues that should be addressed to prevent injury to workers?			
Comments/F	Recommendations:	:		



Environmental Personnel Name:	_
Signature:	_
Actions Corrected:	
Site Service Supervisor Name:	
Signature:	
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Picture 1: Description



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Picture 2	2: Description	
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Picture 3: Description



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Picture 5: Description



Picture 6: Description



**Environmental Inspection report for Baker Lake Marshalling Area, Refuelling Station, Jet-A, and Tank farm** 

spected By:
1

Time: Weekly Inspection

NWB WL	Subject	Conform	Non-	N/A	Comments
NIRB Cert			conform	,	
NIRB Condition 26	Ensure that spills, if any, are cleaned up immediately and that the site is kept clean of debris, including windblown debris.				
NIRB Condition 25	Management and control waste in a manner that reduces or eliminates the attraction to carnivores and/or raptors.				
NWB Part D Item 29 MBK SCP	Spills on the ground				
NWB Part H Item 4 NIRB Condition 27	Secondary containment for fuel, Jet-A, and chemical storage in place				
NWB Part D Item 29	Use of the bucket when refilling fuel truck				
NWB Part D Item 29	Refuelling procedures followed (secondary containment at every connection and 3 persons)				
MBK - BLFSF Monitoring Plan Section 6.1	Precipitation or runoff accumulation in secondary containment				



			ı	
MBK - BLFSF	Any visible sheen on			
Monitoring Plan Section	water.			
6.1				
0.1				
NWB Part F	Water in secondary			
Item 23	containment of			
10111 25	Marshalling Area			
	Bulk Fuel Storage			
	Facility and Jet-A			
	storage being			
	measured and			
	recorded in m <sup>3</sup> .			
NWB Part F	Discharge of water			
Item 9	not causing erosion			
NIRB Condition				
12 MBK - BLFSF	Any vioual atmost-			
	Any visual structural issues with			
Monitoring Plan Section	containment berms			
6.1	containment berins			
0.1				
MBK - BLFSF	Any indicators that			
Monitoring	would suggest			
Plan Section	damage to liner for			
6.1	secondary			
	containments			
NWB Part F	Discharge of water			
Item 9	>30m from ordinary			
NIRB Condition 12	high water mark			
NWB Part I	Is the discharge			
Item 8(g)	volume being			
NIMED Devel D	tracked?			
NWB Part F Item 9	Discharge of water not directly flowing			
NIRB Condition	to water body			
12	to water body			
NWB Part F	Waste disposal area			
Item 19	>30 m from high			
NIRB Condition	water mark			
12	A111: -1			
NWB Part F	All solid waste			
Item 22 NIRB Condition	disposed of at approved disposal			
25	facility			
NWB Part H	Prevention in place			
Item 3	to disallow			
	chemicals,			
NIRB Condition	petroleum products			
27	and waste from			
	entering Water			



			I	I
EC	Date of last pipe and			
Requirement	tank visual			
	inspection Site			
	Services (monthly)			
NWB Part H	Date of last env.			
Item 5	visual inspection			
	(weekly)			
MBK - BLFSF	Weekly manual or			
Monitoring	electronic dip tests			
Plan Section	were conducted for			
	inventory			
6.1	reconciliation. Date of			
	last test			
CCME Above	Non-smoking sign,			
Ground Storage	Extinguisher, and tank			
Tank Guidelines	identification present			
MBK SCP	Spill Kits Present			
NWB Part D	No material stored on			
Item 31	Ice of lake or streams.			
NWB Part D	No equipment stored			
Item 32	<30m from high water			
	mark			
NWB Part D	Erosion present /			
Item 22	Erosion control in			
NWB Part D	Place			
Item 33				
NWB Part D	Any rutting or ground			
Item 30	disturbance present			
NWB Part D	All tanks and piping			
Item 36	are not altered from			
itelli 30				
NIRB Condition	approved			
	construction.			
27				
NWB Part E Item	Measures in place to			
10	prevent the generation			
	and deposition of dust			
NWB Part H	Copies of current			
Item 7	OPEP, ERP, and SCP			
MBK OPEP	available at			
MBK SCP	Marshalling area			
NWB Part H	Designated area			
Item 8	present with measures			
NIRB	to collect motor fluids,			
Condition 27	waste, and contain			
	spills in the case of			
	required emergency			
	maintenance and			
	Servicing.			
NWB Part H	Emergency			
Item 8	maintenance and			
Teem o	servicing is being			
NIRB Condition	undertaken in			
27				
4/	designated areas		]	



NWB Part I Item	Are signs identifying			1
9	monitoring stations in			
	place and posted in			
	English, Inuktitut and			
	French			
NWB Part I Item	Annual Geotechnical			
12 (l)	inspection completed			
NIRB Condition	Is security in place to			
81	ensure safe and secure			
	storage of any			
	hazardous or explosive			
	comp			
MBK Wildlife	Any nesting taking			
Management	place on tanks or			
Plan	stairways of tank farm			
BMP	Are there any			
	additional environmental			
	hazards/potential			
	impacts that require			
	attention?			
MINE ACT	Are there any Health			
	and Safety issues that			
	should be addressed to			
	prevent injury to			
	workers?			
<b>Comments:</b>				
Recommend	ntion :			
Recommend	ation.			
Environmont	tal Personnel Nam			
Environmen	lai Personnei Nami	е:		
	Signature: _			
	· ·			
<b>Actions Corr</b>	ected:			
Sita Sarvica S	Supervisor Name: _			
Site Service S	upervisor Name: _			
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Picture 4: Description



Picture :	5: Description	
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Picture 6: Description



## **Environmental Inspection Report for the Hazardous Material Storage Area**

Date:	Inspected By:
-------	---------------

Location: HAZMAT area Weekly Inspection

In		Conform	Non-	N/A	Comments
Compliance	Subject		conform	,	
with					
NWB Part B Item	Sign posted to inform of				
15	a waste disposal facility				
NWB Part D	Are there any visual				
Item 29	spills?				
MBK SCP NIRB Condition					
26					
NWB Part F Item	All Hazardous Waste				
19	disposal is located 30m				
	from the ordinary high water mark.				
	water mark.				
NWB Part H	Resources in place to				
Item 3	prevent any chemicals,				
	petroleum products, or unauthorized Wastes				
	from entering a water				
	body.				
NWB Part H	Is secondary				
Item 4	containment for				
	chemical storage provided.				
NWB Part I Item	Monitoring signs are				
9	posted in English,				
	French, and Inuktitut.				
MBK SCP	Spill Kits Present				
NWB Part F Item	All Hazardous waste				
14	generated is sent off site				
	to an approved disposal				
NWB Part F	facility All Hazardous waste				
Item 15	sent off site is				
	manifested				
NWB Part F	Manifests are sent to				
Item 15	Government of Nunavut				
NIRB Condition	Ensure that spills, if any,				
26	are cleaned up immediately and that				
	the site is kept clean of				
	debris, including wind-				



	blassa deliside	<u> </u>	I	<u> </u>
	blown debris.			
NIDD C 200	3.5			
NIRB Condition	Management and			
25	control waste in a			
	manner that reduces or			
	eliminates the			
	attraction to carnivores			
NIDD C. IV	and/or raptors.			
NIRB Condition	Ensure the hazardous			
27	material area is			
	contained using			
	environmentally			
	protective methods			
	based on practical best			
	management practices			
	Are storage containers			
	clearly labelled to			
	identify Hazmat			
	substance?			
	Are storage containers			
	in good condition? Is			
	there any visible			
	damage or leaks? Can			
	the doors be sealed			
	shut?			
	Is HAZMAT in			
	containers properly			
	segregated?			
	Is HAZMAT			
	arrangement to prevent			
	from falling or			
	dislodging?			
	Where necessary – Is			
	HAZMAT placed on			
	pallets i.e. Drums?			
	Where necessary - Are			
	containers with product			
	stored in an upright			
	position?			
	Where necessary – Are			
	Quatrex bags closed			
	properly?			
	Do you see any			
	potential environmental			
	hazards posed by these			
	HAZMAT			
DIAD	containers/materials?			
BMP	Are there any additional			
	environmental			
	hazards/potential			
	impacts that require			
	attention?			
MINE ACT	Are there any Health			
	and Safety issues that			
	should be addressed to			
	prevent injury to			
	workers?	I	1	1

# Agnico-Eagle Mines: Meadowbank Division Environment Department

Signature:



Misc.	In the punctured spray		
	can c-can, do we have		
	non-punctured spray		
	can?		
	In the grease c-can, do		
	we have open top		
	drums without top, or screw?		
	In the empty pails c-can,		
	do we have metal pails		
	that should be in the		
	metal recycling c-can?		
comment	s/Recommendations :		
	s/Recommendations : ental Personnel Name:	Signature:	
	ental Personnel Name:	Signature:	
Environm -	ental Personnel Name:	Signature:	
Environm -	ental Personnel Name:	Signature:	
Actions Co	ental Personnel Name:	Signature:	

# Agnico-Eagle Mines: Meadowbank Division Environment Department



Picture [	1: Open c-can doors	
Picture (	e 1: Open c-can doors	
Picture :	e 1: Open c-can doors	
Picture :	e 1: Open c-can doors	
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Picture	2 1: Open c-can doors	

Picture 2:

# Agnico-Eagle Mines: Meadowbank Division Environment Department



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Picture 3:

Appendix B

**NWT/NU Spill Report Form** 





# **NT-NU SPILL REPORT**

OIL, GASOLINE, CHEMICALS AND OTHER HAZARDOUS MATERIALS

NT-NU 24-HOUR SPILL REPORT LINE

TEL: (867) 920-8130 FAX: (867) 873-6924 EMAIL: spills@gov.nt.ca

#### REPORT LINE USE ONLY

Α	REPORT DATE: MONTH – DAY	-YEAR		REP	ORT TIM	1E	□ C OR			REPORT NUMBER
В	OCCURRENCE DATE: MONTH	– DAY – YEAF	R	occ	URREN	CE TIME		IPDATE # THE ORIGINAL SPILL I	REPORT	
С	LAND USE PERMIT NUMBER (	(IF APPLICABL	.E)	ı	WA	ATER LICENCE NUMBER	R (IF	APPLICABLE)		
D	GEOGRAPHIC PLACE NAME (	OR DISTANCE	AND DIRECTION FROM NAMED L	OCAT	ION	REGION  NWT NUNAVU	JT	☐ ADJACENT JURIS	DICTION	OR OCEAN
Е	LATITUDE				LO	NGITUDE				
_	DEGREES	MINUTES SECONDS				GREES	ION	MINUTES	SI	ECONDS
F	RESPONSIBLE PARTY OR VE	VESSEL NAME RESPONSIBLE				ESS OR OFFICE LOCAT	ION			
G	ANY CONTRACTOR INVOLVED CONTRACTOR		ADDR	ESS OR	OFFICE LOCATION					
	PRODUCT SPILLED		QUANTITY IN LI	TRES	, KILOG	RAMS OR CUBIC METR	ES	U.N. NUMBER		
Н	SECOND PRODUCT SPILLED	ED (IF APPLICABLE) QUANTITY IN LI		TRES	, KILOG	RAMS OR CUBIC METR	ES	U.N. NUMBER		
Ι	SPILL SOURCE	SOURCE SPILL CAUSE						AREA OF CONTAMIN	IATION IN	SQUARE METRES
J	FACTORS AFFECTING SPILL (	OR RECOVER	Y DESCRIBE ANY	' ASSI	STANCE	REQUIRED		HAZARDS TO PERSO	ONS, PRO	PERTY OR EQUIPMENT
K	K									
L	REPORTED TO SPILL LINE BY	POSITIO	DN	EMP	EMPLOYER LO		LOC	OCATION CALLING FROM		ELEPHONE
M	ANY ALTERNATE CONTACT	POSITIO	DN	EMP	LOYER		ALTERNATE CONTACT  LOCATION  ALTERNATE TELL  LOCATION		LTERNATE TELEPHONE	
			REPORT LIN	E US	E ONLY	,			1	
N I	RECEIVED AT SPILL LINE BY	POSITIO	ON	EMP	EMPLOYER LO		LOC	OCATION CALLED		REPORT LINE NUMBER
N		STATIO	N OPERATOR				YEL	ELLOWKNIFE, NT		867) 920-8130
LEAD	AGENCY DEC DCCG DC	GNWT □ GN	□ ILA □ INAC □ NEB □ TC	S	SIGNIFIC	CANCE   MINOR   MA	JOR	OR _ UNKNOWN FILE STATUS _ OPEN _ CLOSED		JS □ OPEN □ CLOSED
AGEI	NCY	CONTACT NA	ME	(	CONTAC	TTIME		REMARKS		
	AGENCY			+						
	T SUPPORT AGENCY  OND SUPPORT AGENCY									
				+			$\dashv$			
THIRD SUPPORT AGENCY										

## Appendix C

## **General Response Procedures for Spilled Chemical Substances**

**Explosives** 

**C.1 Ammonium Nitrate** 

C.2 Ammonium Nitrate Fuel Oil (ANFO)

#### **C.1 Ammonium Nitrate**

Agnico Eagle commits to review, modify and approve as required to establish this procedure as appropriate for use at the Meadowbank and Whale Tail sites.

The first step against prevention of potential spills and association hazards is the application of proper storage procedures for bulk Ammonium Nitrate, including the following:

- Good housekeeping of the storage facility will prevent spilling and or contamination of materials;
- Ammonium nitrate should be stored away from combustible materials and fuels, as well as
  other blasting accessories (i.e. boosters, delays, detonating cords and detonators);
- The storage facility should be well ventilated;
- Proper signage restricting the use/exposure of ammonium nitrate to ignition sources should be posted (e.g. no hot work, smoking or vehicle maintenance); and
- The storage facility should be locked at all times with only authorized personnel allowed access.

The following is a general spill response procedure for ammonium nitrate. Consult the MSDS for the specific spilled compound to determine whether deviations from the general guidance are required. Agnico Eagle commits to review and test, and if necessary, modify and update this spill response procedure on an annual basis.

#### For an ammonium nitrate spill (solid):

- 1. Isolate and evacuate the spill area;
- Contact your Supervisor who will then contact the On-Scene Coordinator and coordinate appropriate spill response materials outside the spill area. Obtain and read the MSDS for the substance to determine the chemical-specific hazards and to identify any special precautions that must be taken;
- 3. Put on appropriate personal protective equipment. For an ammonium nitrate spill this includes:
  - a) Gloves as recommended by the MSDS or glove manufacturer;
  - Protective eyeglasses or chemical safety goggles or face shield as recommended by the MSDS;
  - c) Lab coat, coveralls or TyvekTM coveralls as recommended by the MSDS; and
  - d) Half mask air-purifying respirator with cartridges and/filters as recommended by the MSDS or respirator manufacturer;
- 4. Ventilate (open windows/doors to outdoors) closed spaces before entering;
- 5. Remove all sources of heat and ignition (no smoking, flares, sparks or flames in immediate area) and remove uncontaminated combustible materials and organic compounds (wood,

paper, oil, etc.,) from spill area;

- 6. For spills to land, protect the spill area from storm water runoff by constructing a ditch or dike using suitable absorbent materials, soil or other appropriate barrier;
- 7. Vacuum or sweep the spill residue using non-metal, non-sparking tools and place the residue in a labelled, plastic, container (plastic pail with lid or double heavy duty plastic bags) for re-use or off-site disposal at a licensed disposal facility;

Note: Recovered solid, if generally free from impurities, may be suitable for its intended use. In this case, place solid in suitable container with lid, and **clearly label the container per WHMIS Guidelines**.

Note: Minimize dust generation during the operation.

8. Remove and bag personal protective equipment for cleaning and disposal at a licensed facility. Thoroughly wash potential skin contact locations after handling.

#### C.2 Ammonium Nitrate Fuel Oil (ANFO)

Currently no ANFO is stored at the Meadowbank or Whale Tail sites. ANFO is fabricated on demand using ammonium nitrate and fuel oil. In the event that ANFO would be stored at the sites, Agnico Eagle commits to review, modify and approve as required to establish this procedure as appropriate for use at the Meadowbank Gold Project. Proper handling and disposal of ANFO is an important first step in mitigating against spills and associated hazards.

The proper storage procedures are as follows:

- ANFO should only be used under the supervision of authorized trained personnel;
- ANFO should be kept away from heat, sparks, and flames, as well as initiating explosives, oxidizing agents, combustibles, and other sources of heat;
- Containers should be protected from physical damage and in dry, well ventilated conditions;
- Transportation to the Mine site will be in accordance with Section 14 of the Mines Act and Regulations and the Transportation of Dangerous Goods Act. Transport vehicles will be in sound mechanical condition and equipped with proper safety equipment. Loaded vehicles will not be left unattended and only authorized personnel will be responsible for the security of the explosives under their control; and
- Explosives that have been identified as deteriorated or damaged will need to be disposed
  of or destroyed. The appropriate method of disposal or destruction and subsequent course
  of action will be determined by authorized personnel or the explosive supplier.

The following is a general spill response procedure for ammonium nitrate fuel oil – ANFO. The following procedure does not apply to emulsions or other explosives. Consult the MSDS for the specific spilled compound to determine whether deviations from the general guidance are required. Agnico Eagle commits to review and test, and if necessary, modify and update this spill response procedure on an annual basis.

#### For an ANFO spill (solid):

- 1. Isolate and evacuate the spill area;
- Immediately extinguish any open flames and remove ignition sources (no smoking, flares, sparks in immediate area) IF SAFE TO DO SO. Fires involving large quantities of ANFO should not befought;
- 3. Contact the On-Scene Coordinator who will assemble ERT members and the appropriate spill response materials outside the spill area. **Obtain and read the MSDS** for the substance to determine the chemical- specific hazards and to identify any special precautions that must be taken;
- 4. Put on appropriate personal protective equipment. For an ANFO spill this includes:
  - a. Gloves as recommended by the MSDS or glove manufacturer;
  - b) Protective eyeglasses or chemical safety goggles or face shield as recommended by the MSDS:
  - c) Lab coat, coveralls or TyvekTM coveralls as recommended by the MSDS;
  - d) Shoe covers or rubber boots;
  - e) Half mask air-purifying respirator with cartridges and/filters as recommended by

#### the MSDS or respirator manufacturer;

- 5. If the spill has occurred outdoors, stay upwind and avoid low lying areas. Ventilate (open windows/doors to outdoors) closed spaces before entering. Ensure adequate explosion proof ventilation for clean-up;
- 6. Remove all sources of heat and ignition (no smoking, flares, sparks or flames in immediate area) and remove uncontaminated combustible materials and organic compounds (wood, paper, oil, etc.) from spill area;
- 7. Do not operate radio transmitters within 100 m of electric detonators;
- 8. For spill on land, protect the spill area from storm water runoff by constructing a ditch or dike using suitable absorbent materials, soil or other appropriate barrier. For spill to water, utilize damming, and/or water diversion to minimize the spread of contamination;
- Collect, sweep or shovel spilled material and the other contaminated material/soil using non- metallic, spark- proof tools and place residue into a labelled, plastic, waste container (plastic pail with lid or double heavy duty plastic bags) for off-site disposal at a licensed disposal facility;

Note: Recovered solid, if generally free from impurities, may be suitable for its intended use. In this case, place solid in suitable container with lid, and clearly label the container per WHMIS Guidelines.

Note: The drums/containers/residues are to be stored in ventilated areas away from incompatible materials for eventual off-site disposal at a licensed disposal facility.

10. Remove and bag personal protective equipment for cleaning or disposal at a licensed disposal facility. Thoroughly wash with soap potential skin contact locations after handling. Properly dispose of contaminated leather articles including shoes that cannot be decontaminated.

## Appendix D

## **General Response Procedures for Spilled Chemical Substances**

## **D.1 Compressed Gases**

#### **D.1 Compressed Gases**

Agnico Eagle commits to review, modify and approve as required to establish this procedure as appropriate for Meadowbank Gold Project.

The following is a general spill response procedure for compressed gases. Consult the MSDS for the specific spilled compound to determine whether deviations from the general guidance are required.

Agnico Eagle commits to review and test, and if necessary, modify and update this spill response procedure on an annual basis.

#### For a compressed (inert and flammable) gas leak:

- 1. IF SAFE TO DO SO and it will stop the gas leak, turn off cylinder valve;
- 2. If the leak cannot be stopped by closing the cylinder valve, and it is an inert atmospheric gas (e.g. nitrogen, carbon dioxide, etc.) isolate and evacuate the affected area. If the leak is a flammable gas and the leak is outside of a ventilated building enclosure that will contain the gas, immediately activate the fire alarm system and evacuate the area/building;
- Contact the On-Scene Coordinator who will assemble spill response team members and the appropriate spill response materials outside the spill area. Obtain and read the MSDS for the substance to determine the chemical-specific hazards and to identify any special precautions that must be taken;
- 4. If possible and safety permits, adjust leaking cylinder so that gas escapes rather than liquid;
- 5. If possible and safety permits, eliminate all ignition sources (no smoking, flares, sparks or flames in immediate area) and turn off electrical equipment;
- 6. If the spilled has occurred outdoors, stay upwind and avoid low lying areas. If the spill has occurred inside a building, prevent spread of vapour throughout the building by closing doors to other rooms and hallways. If the room's air exchange system distributes air throughout the building, then it may also be necessary to have it shut-down. Allow vapours to ventilate outdoors by opening windows and doors to the exterior; and
- 7. Isolate area until gas has dispersed. On-Scene Coordinator to verify safe conditions.

## Appendix E

## **General Response Procedures for Spilled Chemical Substances**

**E.1 Flammable and Combustible Liquids** 

#### E.1 Flammable and Combustible Liquids

Agnico Eagle commits to review, modify and approve as required to establish this procedure as appropriate for use at the Meadowbank Gold Project. The following is a general spill response procedure for flammable or combustible liquids, particularly petroleum hydrocarbon products. Consult the MSDS for the specific spilled compound to determine whether deviations from the general guidance are required.

Agnico Eagle commits to review and test, and if necessary, modify and update this spill response procedure on an annual basis.

#### For a spill of flammable or combustible petroleum hydrocarbon product (liquid):

- 1. Isolate and evacuate the spill area;
- 2. Immediately extinguish any open flames and remove ignition sources (no smoking, flares, sparks in immediate area) IF SAFE TO DO SO;
- 3. Stop leak and contain spill (see Step 9) IF SAFE TO DO SO;
- 4. Contact the On-Scene Coordinator who will assemble ERT members if required and the appropriate spill response materials outside the spill area. **Obtain and read the MSDS** for the substance to determine the chemical-specific hazards and to identify any special precautions that must be taken;
- 5. Put on appropriate personal protective equipment. Depending on the scale of the spill and properties of the spilled substance, this can include:
  - a) Gloves as recommended by the MSDS or glove manufacturer;
  - b) Splash goggles or face shield;
  - c) Shoe covers or rubber boots;
  - d) Lab coat or TyvekTM coveralls; and
  - e) Half mask air-purifying respirator with **organic vapour or combination** cartridges, or **as otherwise recommended by the MSDS or respirator manufacturer**.
- 6. If the spilled has occurred outdoors, stay upwind and avoid low lying areas. If the spill has occurred inside a building, prevent spread of vapour throughout the building by closing doors to other rooms and hallways. If the room's air exchange system distributes air throughout the building, then it may also be necessary to have it shut-down;
- Ventilate (open windows/doors to outdoors) closed spaces before entering. Ensure adequate explosion- proof ventilation for clean-up. A vapour suppressing foam or water spray may be used to reduce vapours;
- 8. Remove all sources of ignition (no smoking, flares, sparks or flames in immediate area) and combustible materials (wood, paper, oil, etc.) within the spilled area;
- 9. Contain spill by using spill absorbent, spill pads or pillows, soil or snow to construct a dike that limits flow and prevents entry to sewer, waterways or onto ice. For spills to land,

excavation of trenches/pits to capture spill flow may also be appropriate. If possible, compact soil or snow dikes, and place plastic tarps over the dike and at its foot to allow the product to pool on the plastic for easy recovery;

Note: Do not use paper towels to absorb spill as this increases the rate of evaporation and vapour concentration in the air.

Note: Do not flush with water into drainage areas or ditches as this will spread spill.

Note: Snow works well as a natural absorbent to collect and contain spilled petroleum hydrocarbons. However, its use in containing a spill will result in a water-contaminant mixture that may be more difficult to manage. It is important to scrape up the contaminated snow and ice as soon as possible.

- Carefully cover the spill area with spill absorbent, spill pads, soil or snow, starting at the outside and working inward. Do not touch or walk through spilled material;
- 11. Sweep up or shovel the residue using non-metallic, spark-proof tools and place the residue into a labelled, plastic, waste container (plastic pail with lid or double heavy duty plastic bags). For larger spills to land, excavate impacted absorbent material and soil, place in lined and bermed temporary storage area or directly into sealed drums/containers;

Note: The drums/containers/residues are to be stored in ventilated areas away from incompatible materials for eventual treatment at on-site landfarm or off-site disposal at a licensed disposal facility. Electrically ground all containers and transporting equipment.

Note: Larger pools of product may be pumped into empty storage tanks or drums.

- 12. If spill is indoors, mop the affected area using detergent and water. Dispose of this water to drums for eventual off-site disposal at a licensed disposal facility. Spills to land may require further excavation or remediation of contaminated soil until acceptable soil quality is achieved. The On- Scene Coordinator and/or Environmental Superintendent will assess this requirement;
- 13. For spills to water, immediately limit the area of the spill on water using absorbent pads and booms and similar materials to capture small spills on water. Deploy and slowly draw in absorbent booms to encircle and absorb the spilled product. Recover larger spills on water with floating skimmers and pumps, as required, and discharge recovered product to drums or tanks:

Note: Petroleum hydrocarbons are generally hydrophobic, and as such, do not readily dissolves in water. They typically tend to float on the water's surface. Absorbent booms are often relied on to recover hydrocarbons that escape land containment and enter water.

Note: Antifreeze sinks and mixes with water. If released to water, attempt to isolate/confine the spill by damming or diverting the spill. Pump contaminated water to tanks or drums.

14. Remove and bag personal protective equipment for cleaning, informing laundry personnel of contaminant hazards, or disposal at a licensed disposal facility. Thoroughly wash with soap potential skin contact locations after handling. Properly dispose of contaminated leather articles, (including shoes) that cannot be decontaminated.

## Appendix F

## **General Response Procedures for Spilled Chemical Substances**

**Oxidizing Substances** 

F.1 Liquids

F.2 Solids

#### F.1 Liquids

Agnico Eagle commits to review, modify and approve as required and to establish this procedure as appropriate for use at the Meadowbank Gold Project. The following is a general spill response procedure for liquid oxidizer compounds. Consult the MSDS for the specific spilled compound to determine whether deviations from the general guidance are required.

Agnico Eagle commits to review and test, and if necessary, modify and update this spill response procedure on an annual basis.

#### For a liquid oxidizer spill:

- 1. Isolate and evacuate the spill area;
- 2. Stop leak and contain spill (see Step 8) IF SAFE TO DO SO;
- Contact the On-Scene Coordinator who will assemble ERT members if required and the
  appropriate spill response materials outside the spill area. Obtain and read the MSDS for
  the substance to determine the chemical-specific hazards and to identify any special
  precautions that must be taken;
- 4. Put on the appropriate personal protective equipment. Depending on the scale of the spill and properties of the spilled substance, this can include:
  - a) Gloves as recommended by the MSDS or glove manufacturer;
  - b) Splash goggles or face shield;
  - c) Shoe covers or rubber boots;
  - d) Lab coat, coveralls or TyvekTM coveralls as recommended by the MSDS; and
  - e) Half mask air-purifying respirator with cartridges and/or filters as recommended by the MSDS or respirator manufacturer.
- 5. Ventilate closed spaces before entering. Ensure adequate explosion-proof ventilation for clean-up;
- 6. Remove and/or moisten with water any combustible material (wood, paper, oil, etc.) affected by the spill;
- 7. Use water spray to reduce vapours or divert vapour cloud drift, if required;
- 8. Contain spill by using non-combustible spill absorbent, soil or snow to construct a dike that limits flow and prevents entry to sewer, waterways or onto ice. For spills to land, excavation of trenches/pits to capture spill flow may also be appropriate;
  - Note: Flushing area with flooding quantities of water may also be appropriate assuming this does not make clean up and waste management more difficult— **refer to the MSDS**.
- Carefully cover the spill area with spill absorbent, soil or snow, starting at the outside and working inward. Use non-combustible absorbent. Do not touch or walk though spilled material.
- 10. Sweep up or shovel the spill residue using non-metal, non-sparking tools and place the residue into a labelled, plastic, waste container (plastic pail with lid or double heavy duty plastic bags) for off- site disposal at a licensed disposal facility:
- 11. For indoor spills, mop the affected area using detergent and water. Flushing area with

flooding quantities of water may also be appropriate – **refer to the MSDS**. Dispose of this water to the sanitary sewer, process stream or waste drums as appropriate. Spills to land may require further excavation or remediation of contaminated soil until acceptable soil quality is achieved. The On- Scene Coordinator and/or Environmental Superintendent will assess this requirement; and

12. Remove and bag personal protective equipment for cleaning, informing laundry personnel of contaminant hazards, or disposal at a licensed disposal facility. Thoroughly wash with soap potential skin contact locations after handling. Properly dispose of contaminated clothing that cannot be decontaminated.

#### F.2 Solids

Agnico Eagle commits to review, modify and approve as required to establish this procedure as appropriate for use at the Meadowbank Gold Project.

The following is a general spill response procedure for solid oxidizer compounds. Consult the MSDS for the specific spilled compound to determine whether deviations from the general guidance are required.

Agnico Eagle commits to review and test, and if necessary, modify and update this spill response procedure on an annual basis.

#### For a solid oxidizer spill:

- 1. Isolate and evacuate the spill area;
- Contact the On-Scene Coordinator who will assemble ERT members if required and the
  appropriate spill response materials outside the spill area. Obtain and read the MSDS for
  the substance to determine the chemical-specific hazards and to identify any special
  precautions that must be taken;
- 3. Put on the appropriate personal protective equipment. Depending on the scale of the spill and properties of the spilled substance, this can include:
  - a) Gloves as recommended by the MSDS or glove manufacturer;
  - b) Safety glasses or goggles;
  - c) Lab coat; and
  - d) Half mask air-purifying respirator with **N95 or greater protection** particulate filter or **as** recommended by the MSDS or respirator manufacturer.
- 4. Remove all sources of heat and ignition (no smoking, flares, sparks or flames in immediate area) and remove uncontaminated combustible materials and organic compounds (wood, paper, oil, etc.,) from spill area;
- For spills to land, protect the spill area from storm water runoff by constructing a ditch or dike using suitable non-combustible absorbent materials, soil or other appropriate barrier.
   For spill to water, utilize damming, and/or water diversion to minimize the spread of contamination;
- 6. Vacuum, sweep or shovel the spill residue using non-metal, non-sparking tools and place the residue into a labelled, plastic, container (plastic pail with lid or double heavy duty plastic bags) for re- use or off-site disposal at a licensed disposal facility;

Note: Recovered solid, if generally free from impurities, may be suitable for its intended use. In this case, place solid in suitable container with lid, and clearly label the container per WHMIS Guidelines.

Note: Minimize dust generation.

- 7. If there is still oxidizer residue left in the spill area, neutralize with appropriate agent as recommended by the MSDS, or for spills to land continue to excavate until no visible spilled solid remains. Use non-combustible spill absorbent or soil to absorb the neutralized residue. Place in suitable drums/containers for disposal to a licensed facility;
- 8. For indoor spills, mop the affected area using detergent and water. Dispose of this water to the sanitary sewer, process stream or waste drums as appropriate; and

9. Remove and bag personal protective equipment for cleaning, informing laundry personnel of contaminant hazards, or disposal at a licensed disposal facility. Thoroughly wash with soap potential skin contact locations after handling. Properly dispose of contaminated clothing that cannot be decontaminated.

## Appendix G

## **General Response Procedures for Spilled Chemical Substances**

**Poisonous and Toxic Substances** 

**G.1 Sodium Cyanide** 

#### **G.1 Sodium Cyanide**

Agnico Eagle commits to review, modify and approve as required to establish this procedure as appropriate for use at the Meadowbank Gold Project. The following is a general spill response procedure for solid Sodium Cyanide.

Agnico Eagle commits to review and test, and if necessary, modify and update this spill response procedure on an annual basis.

#### For a Sodium Cyanide (solid) spill:

- 1. Isolate and evacuate the spill area;
- Contact the On-Scene Coordinator who will assemble ERT members and the appropriate spill response materials outside the spill area. Obtain and read the MSDS for the substance to determine the chemical- specific hazards and to identify any special precautions that must be taken;
- 3. Put on the appropriate personal protective equipment. Depending on the scale of the spill and properties of the spilled substance, this can include:
  - a) Impermeable Gloves as recommended by the MSDS or glove manufacturer;
  - b) TyChem; and
  - c) SCBA Self Contained Breathing Apparatus
  - d) Rubber Boots

Note: For worker safety, maintain readily accessible supply of cyanide response kits on site.

- 4. Ventilate area of spill or leak;
- 5. Avoid exposure to acids, water or weak alkalis which can react to form toxic hydrogen cyanide (HCN) gas.
- 6. Contain spill to prevent release to sewer, waterway or onto ice. For spills to land, protect the spill area from storm water runoff by constructing a ditch or dike using absorbent materials, soil or other appropriate barrier. If raining, cover spill area with tarp or plastic to minimize contact with water and prevent subsequent runoff. For spill to water, utilize damming, and/or water diversion to minimize the spread of contamination;
- 7. Shovel the spilled material into labelled drums, containers or plastic bags for re-use or offsite disposal at a licensed disposal facility.

Note: Recovered solid, if generally free from impurities, may be suitable for its intended use. In this case, place solid in suitable container with lid, and **clearly label the container per WHMIS Guidelines**.

Note: Minimize dust generation.

8. If there is still spilled sodium cyanide residue left in the spill area, neutralize with appropriate agent **as recommended by the MSDS** (sodium or calcium hypochlorite solution), or for

spills to land continue to excavate until no visible spilled solid remains. Use suitable spill absorbent or soil to absorb the neutralized residue. Place in suitable drums/containers for disposal to a licensed facility. Collect material and place in a closed container for recovery or disposal.

<u>IMPORTANT:</u> It is strictly prohibited to add any chemicals or neutralizing solutions to a Sodium Cyanide Spill near a drainage system, or near or in a water body.

- 9. For indoor spills, mop the affected area using detergent and water. Dispose of this water to waste drums/containers for disposal to a licensed facility; and
- 10. Remove and bag personal protective equipment for disposal at a licensed disposal facility. Thoroughly wash with soap potential skin contact locations after handling. Properly dispose of contaminated clothing that cannot be decontaminated.

## Appendix H

### **General Response Procedures for Spilled Chemical Substances**

#### **Corrosive Substances**

H.1 Acids, Liquids

H.2 Acids, Solids

H.3 Bases/Alkali, Liquids

H.4 Bases/Alkali, Solids

#### **Response to Spilled Chemicals**

<u>IMPORTANT:</u> It is strictly prohibited to add any chemicals or neutralizing solutions to a Spilled Chemicals near a drainage system, or near or in a water body.

#### **H.1 Acids, Liquids**

Agnico Eagle commits to review, modify and approve as required to establish this procedure as appropriate for use at the Meadowbank Gold Project.

The following is a general spill response procedure for liquid acid compounds. Consult the MSDS for the specific spilled compound to determine whether deviations from the general guidance are required.

Agnico Eagle commits to review and test, and if necessary, modify and update this spill response procedure on an annual basis.

#### For a liquid acid spill:

- 1. Isolate & evacuate the spill area;
- 2. Stop leak and contain spill (see Step 8 below) IF SAFE TO DO SO;
- Contact the On-Scene Coordinator who will assemble ERT members if required and the
  appropriate spill response materials outside the spill area. Obtain and read the MSDS for
  the substance to determine the chemical-specific hazards and to identify any special
  precautions that must be taken;
- 4. Put on appropriate personal protective equipment. Depending on the scale of the spill and properties of the spilled substance, this can include:
  - a) Gloves as recommended by the MSDS or glove manufacturer;
  - b) Splash goggles or face shield;
  - c) Shoe covers or rubber boots;
  - d) Lab coat or TyvekTM coveralls; and
  - e) Half mask air-purifying respirator with acid gas or combination cartridges, or as otherwise recommended by the MSDS or respirator manufacturer.
- 5. If the spill has occurred outdoors, stay upwind and stay out of low areas. If the spill has occurred inside a building, prevent spread of vapour throughout the building by closing doors to other rooms and hallways. If the room's air exchange system distributes air throughout the building, then it may also be necessary to have it shut-down;
- 6. Ventilate (open windows/doors to outdoors) closed spaces before entering;
- 7. Remove all sources of ignition (no smoking, flares, sparks or flames in immediate area);
- 8. Contain spill by using spill absorbent, spill pads or pillows, or dry soil to construct a dike

that limits flow and prevents entry to sewer, waterways or onto ice. For spills to land, excavation of trenches/pits to capture spill flow may also be appropriate. Ideally, use spill absorbent that contains a mild neutralizing agent as recommended by the MSDS;

Note: Many acids, particularly concentrated acids react violently in the presence of water. Do not flush spill area with water unless the **MSDS** indicates acceptable.

Note: Nitric Acid reacts violently and explosively with organic chemicals and organic material such as wood, cotton and paper; therefore, do not use organic absorbent material on Nitric acid.

Note: Hydrofluoric acid will fume during neutralization. Provide adequate ventilation and approach from upwind. Neutralize carefully with sodium bicarbonate, soda ash or lime. Use water spray to disperse the gas/vapour if required. Remove all sources of ignition.

 Carefully cover the spill area with spill absorbent, spill pads or dry soil, starting at the outside and working inward. If practical, neutralize spill using MSDS-recommended or commercially available neutralizers. Use pH indicator paper to determine if spill is neutralized (pH 7);

- 10. Sweep or shovel the neutralized spill residue using non-metal, non-sparking tools and place the residue into a labelled, plastic, waste container (plastic pail with lid or double heavy duty plastic bags) for off-site disposal at a licensed disposal facility;
- 11. Check the pH of the spill area. If it is less than pH 6, then further neutralize with a dilute solution of a suitable reagent **as identified on the MSDS** or for spill to land continue to excavate contaminated soil:
- 12. For indoor spills, mop the affected area using detergent and water. Dispose of this water to the sanitary sewer, process stream or waste drums as appropriate;
- 13. Remove and bag personal protective equipment for cleaning, informing laundry personnel of contaminant hazards, or disposal at a licensed disposal facility. Thoroughly wash with soap potential skin contact locations after handling. Properly dispose of contaminated clothing that cannot be decontaminated; and
- 14. After the spill has been cleaned up, the area should be free of vapours. However, if personnel note odours or irritation, isolate the spill area; re-clean the area as per **Steps 11** and 12 or wait at least 1 hour before re-entering or until considered safe by the On-Scene Coordinator or Environmental Superintendent.

#### H.2 Acids, Solids

Agnico Eagle commits to review, modify and approve as required to establish this procedure as appropriate for use on the Meadowbank Gold Project.

The following is a general spill response procedure for solid acid compounds. Consult the MSDS for the specific spilled compound to determine whether deviations from the general guidance are required.

Agnico Eagle commits to review and test, and if necessary, modify and update this spill response procedure on an annual basis.

#### For a solid acid spill;

- 1. Isolate and evacuate the spill area;
- Contact the On-Scene Coordinator who will assemble ERT members if required and the
  appropriate spill response materials outside the spill area. Obtain and read the MSDS for
  the substance to determine the chemical-specific hazards and to identify any special
  precautions that must be taken;
- 3. Put on the appropriate personal protective equipment. Depending on the scale of the spill and properties of the spilled substance, this can include:
  - a) Gloves as recommended by the MSDS or glove manufacturer;
  - b) Safety glasses or goggles;
  - c) Lab coat; and
  - d) Half mask air-purifying respirator with N95 or greater protection particulate filter, or as otherwise recommended by the MSDS or respirator manufacturer.
- 4. Contain spill to prevent release to sewer, waterway or onto ice. For spills to land, protect the spill area from storm water runoff by constructing a ditch or dike using absorbent materials, dry soil or other appropriate barrier. If raining, cover spill area with tarp or plastic to minimize contact with water and prevent reaction and/or subsequent runoff. For spill to water, utilize damming, and/or water diversion to minimize the spread of contamination;
- 5. If necessary to minimize dust production, slightly moisten the solid. Use water, or if the material is water reactive, another inert liquid **as recommended by the MSDS**;
- 6. Sweep up or shovel the residue using non-metallic, spark-proof tools and place the residue into a labelled, plastic, waste container (plastic pail with lid or double heavy duty plastic bags) for reuse or off-site disposal at a licensed disposal facility;

Note: Recovered solid, if generally free from impurities, may be suitable for its intended use. In this case, place solid in suitable container with lid, and clearly label the container per WHMIS Guidelines.

7. Remaining solid acid residue may be neutralized using a dilute solution of appropriate agent as recommended by the MSDS (e.g. sodium bicarbonate - baking soda), or for spills to land continue to excavate until no visible spilled solid remains. Check the pH of the spill area; the final pH should be between pH 6 and 10. Use spill absorbent, spill pads or

dry soil to absorb the neutralized residue;

- 8. For indoor spills, mop the affected area using detergent and water. Dispose of this water to the sanitary sewer, process stream or waste drums as appropriate; and
- 9. Remove and bag personal protective equipment for cleaning, informing laundry personnel of contaminant hazards, or disposal at a licensed disposal facility. Thoroughly wash with soap potential skin contact locations after handling. Properly dispose of contaminated clothing that cannot be decontaminated.

#### H.3 Bases/Alkali, Liquids

Agnico Eagle commits to review, modify and approve as required to establish this procedure as appropriate for use at the Meadowbank exploration camp.

The following is a general spill response procedure for liquid alkali or base compounds. Consult the MSDS for the specific spilled compound to determine whether deviations from the general guidance are required.

Agnico Eagle commits to review and test, and if necessary, modify and update this spill response procedure on an annual basis.

#### For a liquid alkali or base spill:

- 1. Isolate & evacuate the spill area;
- 2. Stop leak and contain spill (see Step 8) IF SAFE TO DO SO;
- Contact the On-Scene Coordinator who will assemble ERT members and the appropriate spill response materials outside the spill area. Obtain and read the MSDS for the substance to determine the chemical- specific hazards and to identify any special precautions that must be taken;
- 4. Put on the appropriate personal protective equipment. Depending on the scale of the spill and properties of the spilled substance, this can include:
  - a) Gloves as recommended by the MSDS or glove manufacturer;
  - b) Splash goggles or face shield;
  - c) Shoe covers or rubber boots;
  - d) Lab coat or TyvekTM coveralls; and
  - e) Half mask air-purifying respirator with cartridges/filters as recommended by the MSDS or respirator manufacturer.
- 5. If the spill has occurred outdoors, stay upwind and stay out of low areas. If the spill has occurred inside a building, prevent spread of vapour throughout the building by closing doors to other rooms and hallways. If the room's air exchange system distributes air throughout the building, then it may also be necessary to have it shut-down;
- 6. Ventilate (open/windows to outdoors) closed spaces before entering;
- 7. Remove all sources of ignition (no smoking, flares, sparks or flames in immediate area) and combustible materials (wood, paper, oil, etc.);
- 8. Contain spill by using spill absorbent, spill pads or pillows, or dry soil to construct a dike that limits flow and prevents entry to sewer, waterways or onto ice. For spills to land, excavation of trenches/pits to capture spill flow may also be appropriate. Ideally, use spill absorbent that contains a mild neutralizing agent **as recommended by MSDS**;

Carefully cover the spill area with spill absorbent, spill pads or dry soil, starting at the
outside and working inward. If practical, neutralize spill using MSDS-recommended or
commercially available neutralizers. Use pH indicator paper to determine if spill is
neutralized (pH 7);

- 10. Sweep or shovel the neutralized spill residue using non-metal, non-sparking tools and place the residue into a labelled, plastic, waste container (plastic pail with lid or double heavy duty plastic bags) for off-site disposal at a licensed disposal facility;
- 11. Check the pH of the spill area. If it is greater than pH 10, then further neutralize with a dilute solution of a suitable reagent **as identified on the MSDS**, or for spill to land continue to excavate contaminated soil;
- 12. For indoor spills, mop the affected area using detergent and water. Dispose of this water to the sanitary sewer, process stream or waste drums as appropriate;
- 13. Remove and bag personal protective equipment for cleaning, informing laundry personnel of contaminant hazards, or disposal at a licensed disposal facility. Thoroughly wash with soap potential skin contact locations after handling. Properly dispose of contaminated clothing that cannot be decontaminated; and
- 14. After the spill has been cleaned up, the area should be free of vapours. However, if personnel note odours or irritation, isolate the spill area; re-clean as per Steps 11 and 12 or wait at least 1 hour before re- entering or until it is considered to be safe by the On-Scene Coordinator or Environmental Superintendent.

#### H.4 Bases/Alkali, Solids

Agnico Eagle commits to review, modify and approve as required to establish this procedure as appropriate for use at the Meadowbank Gold Project.

The following is a general spill response procedure for solid alkali or base compounds. Consult the MSDS for the specific spilled compound to determine whether deviations from the general guidance are required.

Agnico Eagle commits to review and test, and if necessary, modify and update this spill response procedure on an annual basis.

#### For a solid alkali or base spill;

- 1. Isolate and evacuate the spill area;
- Contact the On-Scene Coordinator who will assemble ERT members if required and the
  appropriate spill response materials outside the spill area. Obtain and read the MSDS for
  the substance to determine the chemical-specific hazards and to identify any special
  precautions that must be taken;
- 3. Put on the appropriate personal protective equipment. Depending on the scale of the spill and properties of the spilled substance, this can include:
  - a) Gloves as recommended by the MSDS or glove manufacturer;
  - b) Safety glasses or goggles;
  - c) Lab coat; and
  - d) Half mask air-purifying respirator with **N95 or greater protection** particulate filter or as recommended by the **MSDS** or respirator manufacturer.
- 4. Contain spill to prevent release to sewer, waterway or onto ice. For spills to land, protect the spill area from storm water runoff by constructing a ditch or dike using absorbent materials, dry soil or other appropriate barrier. If raining, cover spill area with tarp or plastic to minimize contact with water and prevent reaction and/or subsequent runoff. For spill to water, utilize damming, and/or water diversion to minimize the spread of contamination;
- 5. If necessary to minimize dust production, slightly moisten the solid. Use water, or if the material is water reactive, another inert liquid **as recommended by the MSDS**;
  - Note: Do not use water to flush bases in powdered form, such as calcium oxide (lime), as this material is not very soluble.
- 6. Sweep or shovel the residue using non-metallic, spark-proof tools and place the residue into a labelled, plastic, waste container (plastic pail with lid or double heavy duty plastic bags) for offsite disposal at a licensed disposal facility;
  - Note: Recovered solid, if generally free from impurities, may be suitable for its intended use. In this case, place solid in suitable container with lid, and **clearly label the container per WHMIS Guidelines**.
- 7. Remaining solid alkali or base residue may be neutralized using a dilute solution of

- appropriate acid. Check the pH of the spill area; the final pH should be between pH 6 and 10. Use spill absorbent, spill pads or dry soil to absorb the neutralized residue;
- 8. For indoor spills, mop the affected area using detergent and water. Dispose of this water to the sanitary sewer, process stream or waste drums as appropriate; and
- 9. Remove and bag personal protective equipment for cleaning, informing laundry personnel of contaminant hazards, or disposal at a licensed disposal facility. Thoroughly wash with soap potential skin contact locations after handling. Properly dispose of contaminated clothing that cannot be decontaminated.

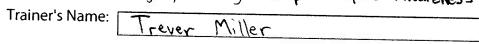
Spill	Co	ntingend	cy I	Plan
Version	7.	Februar	v 2	2019

## Appendix I

Agnico Eagle Spill Response Training Records

# **Group Training Report**

Course Name:	Emergency	Planning and	Spill Respon	se Awareness
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Agnico-Eagle Mines Ltd. Meadowbank Division

Date:	,	
Date: Jan. 15/	2013	
	<u> </u>	

	0	W-12/8012						
М		Name	Company	<u>Ci</u>		ours		
-	1			Signature	TRG.	ASS.	Total Hours	Code
		Jeffrey Pratt	AEM				10	
	2	Fanny Laporte	AEM				10	
	3	RICHARD TACKSON	AEM	Rois			10	
	4	Tom Thomson	AEM				10	
	5	MAURICE RAPIREAU	AKM					
	6	DAVID ACE XANDER	AKM AEM	Character of the second			10	
	7	Martin Theriault	AEM	The P			10	
	8		110	1000				
	9		The second secon					
1	0							
	 	COMMENTS:						
		Sommertis.						
	L							
raine	r's s	signature: 1)		Codes: 1. AEM Permit			Assessment Cod A+: Very Good	es:

2. Restrictive Permit

3. Temporary Permit

4. Training Completed

5. Training Not Completed

6. Fail

A:Good

B: Average

C: Below Average

Tom Thomson

## SWAT OILSPILL ISSUES WORKSHOP

## Situation Analysis - Truck Rollover

- Incident 45 m<sup>3</sup> diesel spills/plus oil/acid Originates on Land, flows into the River
- Spill occurred 22:00 hrs on March 20, 2013
- River water flow, 5 km/hr, braided channels; approx 15 km to Baker Lake
- Lake winds from the North West at 20 km/hr. Tide is high.

Km 23 - Bridge 3

1. List the issues linked to this scenario:

Response Time & Mouling Equipment / Resources to the Area Light & Temperature
Fish Bearing Stream

Speed of Contamment / Cut off Point
Vast Contaminated area - Type of Contaminate

\* Safety of Personel, Communications, Environment,

tiguipment

2. What resources are required?	
Baker Lake Contracter / Peters Exp.	
- Baker Lake Command Center Camp at Spill Locati	i on
Ert Personal + Relieve	
Emergency Traller - Environmental	
Emergency, C-Cans/Rolloffs	
lighting benerators	
Transportation	
- Safety officer(s)	
AEM Personal From Baken Lake	
Mapping of Area	
3. What are the initial spill response steps and what does your ICS look like?	
3rd Control/Crises Centre	
on Site Commander	
Bake Cake	
Cogistic, Planning, Finance	
1) Review ERP & Spill Ontingency Plan	
Prepare J. H. A on Spyll	
Establish Safety Zones - Not, Warn, Cold	



4. What is your oil spill containment and recovery <b>strategy</b> ?
Shut of Stop Spell - Went by Source
Contain Spell - Trench , Bell or (POE)
Martin Books v Absorbants
Estimate Direction of spell & find a cut off points
By Using 10-30-4 - Protect Shapline and dist
By Using 10-30-4 - Protect Shareline and diverting
$\pm 150$
Y P - 10 - 8/
* Pre plan - Plan + Now
5. What is your strategy for shoroling alconum anarotics of the community
5. What is your strategy for shoreline <u>cleanup</u> operations; if using SCAT what are the forecasted shoreline types, what is your treatment options for each type and
what is your end point criteria
Vacumes Pump, Absorbants, Oil Junter Sparter
- Rocky - Excavet a 1 Eil
- Vegatad Shore lines
OFO, ENU Canada
OFO, ENU Canada
- Do a guick wash rleave it for Bis remediation
<i>H</i> 3.3. (mco.co.)



o. What are	some <u>safety</u> issues?  Drinking Water - Baken Lake
	cature + N+5 of Response Teams
	ou manage your <u>waste?</u> x, 45 Gallons, oil/water separtor nated 530 pad
general ov	to make it to the lake what is your containment, recovery, cleanup and verall response?  Additional  Additional  Because Authority  DFO, EC, Bake, Lake
	DFO, E(', Bake. La/le



Farmy Caporde.

#### SWAT OILSPILL ISSUES WORKSHOP

Situation Analysis - Truck Rollover

KM 23.

45000 Litro KM 23

- Incident 45 m³ diesel spills/plus oil/acid Originates on Land, flows into the River
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- Lake winds from the North West at 20 km/hr. Tide is high.

1. List the issues linked to this scenario: Communication issue Contamination

o Back to land water contamination wildlife.

To whitethink lake fishing major steeper and distance from camp.

Narch & still snow - could be cold.

Accident to Health Sofety (Driver) (les ponder of Acid & add another issue & less.

o Bose Lake water intakey

Public relation (ase Inform the Loby appropriate pusm Community)

2. What resources are required? 760 peoples	
· Labor - with incident Command Plan / every body	
has a task in the organization / ERT. Team.	
· Commandernet Trailer & facilities close to site	1
· de Contamination area.	2 tc
· Machiney - Doader - Truck - Shovel.	
Disposal and containing material Deves	15
Disposal and containing material Drupas/ (being - secondry meterial) Vacum - emergency trail with supply	len
Tradial to black to the trade of the supply	J ·
· Towerlight - & be cause it is right redient empty tank helicopter for next morning.	Cen
3. What are the initial spill response steps and what does your ICS look like?	
Command TCS:	
Of MSDS Sheets - Planning - Logistic	
V ( - C)HA	
NO. S.R.P Spill response plan. / ERP. / SRP/	
3 Find VCSSOVICES / General Briefing.	
3) Logistic and reassess at all change (FLRA)	
operations.	
Recover - Remediate	
wildlife / Sp.)	
- Wask management Level 3 emerging	
Sampling.	
Secure 17	
Because it is night and impact combe desastions	
Zeonsulting Inc. —	
desastras	

4. What is your oil spill containment and recovery strategy?  1	*
4. What is vour oil spill portains and a little of the spill and the spi	C
4. What is your oil spill containment and recovery strategy?	
- Invalence Stop the leaks	
3) evaluate when the contaminent, are	
- wind - oslope - o current.	
the biggest part of the oil.	
(S) Snow barrier it reeded.	
(6) Cut all entries to other ponds and	
(7) Vaccium the contaminant and dispose the waster adequatby.	
(B) transpose what is Still in the tapker to	
CONDINES CONTAINES	
5. What is your strategy for shoreline <u>cleanup</u> operations; if using SCAT what are	
the forecasted shoreline types, what is your treatment options for each type and	
what is your end point criteria	
- of respect the shore / contain with some bacrie.	
- Monitoring offen and sample v	
Quick wosh.	
then proling/ sample and vaccimitiveded	
Det notire take over.	
+ if the too much - excavate the shore	
and venove contaminent. and dispose	



The fire toxic Gases.  Description of the perpense from and exception of the perpense from the property of the perpense from the perpense from the perpense from the perpense from the perpense of the perpens	6. What are some <u>safety</u> issues? Under the ice. — Weave it.
7. How do you manage your waste?  1. How do you manage your waste?  1. Wed Fre   => Sent back South to appropriate pla  1. Ved Absorbant supply => Ship down South in Quadrex  1. If it were to make it to the lake what is your containment, recovery, cleanup and general overall response?	* LEL Fire / toxic Gazes.
7. How do you manage your waste?  Used Fre! = Sent back south to appropriate pla  Used Absorbant supply = Ship down South in Quadrex  brought to  Material = Land farm  Clean and ringe - PPE  8. If it were to make it to the lake what is your containment, recovery, cleanup and general overall response?	The state of the s
Used Fre   = Sent back South to appropriate pla  red absorbant sipply - Ship down South in Quadrex  brongs to  material - Land far m  Clean and ringe - PPE  8. If it were to make it to the lake what is your containment, recovery, cleanup and general overall response?	- Darkness - Uneven Bround / Strain ankle
sed absorbant sipply to Ship down South in Quadrex  material to Land farm  Clean and rinse - PPE  8. If it were to make it to the lake what is your containment, recovery, cleanup and general overall response?	7. How do you manage your <u>waste</u> ?
maferial - Land far m  Clean and rinse - PPE  8. If it were to make it to the lake what is your containment, recovery, cleanup and general overall response?	used Fre 1 = sent back south to appropriate place
8. If it were to make it to the lake what is your containment, recovery, cleanup and general overall response?	brought to
general overall response?	Clean and rinse - PPE
general overall response?	
See # 4 for dusting.	general overall response?
	See # 4 - Carstie answer.
ocut the Hamlet Water intake.	-p cut the Hamlet Water intake.
Inform additional Autorities.	The state of the s
Skirnmy Vossels  4 Skirnmy Vossels  Boats - UV J	Skinneds Vossels  4 Skinneds Vossels

Jeff Pratt

#### **SWAT OILSPILL ISSUES WORKSHOP**

#### Situation Analysis - Truck Rollover

- Incident 45 m³ diesel spills/plus oil/acid Originates on Land, flows into the River
- Spill occurred 22:00 hrs on March 20, 2013
- River water flow, 5 km/hr, braided channels; approx 15 km to Baker Lake
- Lake winds from the North West at 20 km/hr. Tide is high.

- 90km From mino - Dark out - Very Cold - Vacinty to lake	-low tide will such	204
- Dark out		
- Very Cold		
- Vacinty to lake		



2	What resources a	are required?				
- Pers	nnel					
	mand center both a	on site & Baker L	ahe			
	Nenins					
	nities for personn	cl				
- 50il	Response Equi	ioment				
Trai	sportation					
***************************************						
	. What are the <u>i<b>niti</b>a</u>		nse steps ar	nd what do	es your l	CS look lik
- Aler	ERT and immobi		nse steps ar	nd what do	es your l	CS look lik
- Aler	ERT and immobi	lize				CS look lik
- Aler - Aler - Revi	t ERT and immobile ICS wof Spill Contin	gency - Play	nning for	mobilizat	ìon	CS look lik
- Aler - Aler - Revi	ERT and immobi	gency - Play	nning for	mobilizat	ìon	CS look lik
- Aler - Aler - Revi	t ERT and immobile ICS wof Spill Contin	gency - Play	nning for	mobilizat	ìon	CS look lik
- Aler - Aler - Revi	t ERT and immobile ICS wof Spill Contin	gency - Play	nning for	mobilizat	ìon	CS look lik
- Aler - Aler - Revi	t ERT and immobile ICS wof Spill Contin	gency - Play	nning for	mobilizat	ìon	CS look lik
- Aler - Aler - Revi	t ERT and immobile ICS wof Spill Contin	gency - Play	nning for	mobilizat	ìon	CS look lik
- Aler - Aler - Revi	t ERT and immobile ICS wof Spill Contin	gency - Play	nning for	mobilizat	ìon	CS look lik
- Aler - Aler - Revi	t ERT and immobile ICS wof Spill Contin	gency - Play	nning for	mobilizat	ìon	CS look lik
- Aler - Aler - Revi	t ERT and immobile ICS wof Spill Contin	gency - Play	nning for	mobilizat	ìon	CS look lik
- Aler - Aler - Revi	t ERT and immobile ICS wof Spill Contin	gency - Play	nning for	mobilizat	ìon	CS look lik



4. What is your oil spill containment and recovery strategy?
- Stop the release - Plug hole or build berm.
- Contain release - Do Not Let Enter Lake
- Place boom along methodeltas From the tributaries
- Have to create ice road to down stream collection points
- Extract contaminent from down stream been point
5. What is your strategy for shoreline <u>cleanup</u> operations; if using SCAT what are the forecasted shoreline types, what is your treatment options for each type and what is your end point criteria
- Create Hot, Warm, Cold Zones
Rocky Sand & Substate
Leave to summer Valatilize



6. What are some <b>safety</b> issues?
- No light - Cold Weather
- PPE For Chemical S
7. How do you manage your <u>waste</u> ?
- Company of the state of the s
- Quatrex Days
- Totes for liquid Conteminants
8. If it were to make it to the lake what is your containment, recovery, cleanup and general overall response?



M. Theriaut

## **SWAT OILSPILL ISSUES WORKSHOP**

## Situation Analysis - Truck Rollover

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1. List the issues linked to this scenario:  - bl water intako
-impact to the land I to the water
- Croing towards white hills lake Cfishing lake)
- Distance from camp / time of event / Weather With
- HS for the driver and responder + Possible acid reaction
Spaliding of cont.
- Wildlife (tish)
- Public relationship (IAFAT have the appropriate person)
Dispersion (
- Convinication, Road Accesse
<b>EGWAD</b>
Consulting Inc.—

	nat resources are required?
-Equipme	ent: Boat, Maritime Barrier, Shovel, truck, Quadrex waste disposal, Secondary containment, Spot Ctown Vaccom (Emergency trailer)
0	Decontamination unit, Commandement unit
- Yersomna	, see , poeses (Control Supp
helic	opter
0 14/1	
	at are the initial spill response steps and what does your ICS look like?
	at are the <u>initial spill response steps and what does your ICS look like?</u> Sheet, $JHA$ , $ERP$ , $SRP$ ,
MSDS General	sheet, JHA, ERP, SRP, Brieffing
MSDS General	sheet, JHA, ERP, SRP,
MSDS General	Sheet, JHA, ERP, SRP, Brieffing essource and equipment and make them ava
MSDS General	Sheet, JHA, ERP, SRP, Brieffing essource and equipment and make them ava
MSDS General	Sheet, JHA, ERP, SRP,  Brieffing essource and equipment and make them ava  m.s Field Leve Risk Assessment  4 Isolation - contain - fecovery est Wildlife - Illaste Ma
MSDS General Find re Operation	Sheet, JHA, ERP, SRP,  Brieffing essource and equipment and make them ava  m.o Field Level Risk Assessment  4 Tsolation - contain - fecovery est. Wildlife - Whate Man
MSDS General	Sheet, JHA, ERP, SRP,  Brieffing essource and equipment and make them ava  m.o Field Level Risk Assessment  4 Tsolation - contain - fecovery est. Wildlife - Whate Man



4. What is your oil spill containment and recovery strategy? Take sure everything is safe, gaz detector, PE ect.
Plug the hole / Stop the leak
Dig a ditch close to the shore
Evaluate the location of the contaminate in the watere
Install maritime barrier to enclose the leaking share
Cut all entries to other channels
Vaccoum the accountate diesel /transfert the diesel
Adequately disposo the waste
5. What is your strategy for shoreline <u>cleanup</u> operations; if using SCAT what are the forecasted shoreline types, what is your treatment options for each type and what is your end point criteria
insport the shore, Keep the matition barrier
containing the fuel close tostere, monitore and sample
if needed, vaccum, let nature take over
If too much contaminant Keep coming from the
induground, dig everything



HARW

6. What are some <b>safety</b> issues?
· LEL / fire / toxic gamon
- WATER /ICE
- cold weather
- Heavy equipment
- Uneven soil, darkness (Strain ankle)
7. How do you manage your <u>waste</u> ?
7. Flow do you manage your <u>waste</u> ?
- used fuel send back south to appropriate location
observed send back south to appropriate location
- MDAAC has T Stull 11Call 1
most ben start used humed or ship down south
- Contaminated soil send to landfarm
- O
- Kinse all the PPE
8. If it were to make it to the lake what is your containment, recovery, cleanup and
general overall response?
,
See question #4
The state of the s



R-Jackson

#### **SWAT OILSPILL ISSUES WORKSHOP**

Situation Analysis - Truck Rollover

23

74

- Incident 45 m³ diesel spills/plus oil/acid Originates on Land, flows into the River
- Spill occurred 22:00 hrs on March 20, 2013
- River water flow, 5 km/hr, braided channels; approx 15 km to Baker Lake
- Lake winds from the North West at 20 km/hr. Tide is high.

_	RES Penser RIME
_	Moving frankles + Earl
	LICHT FARTER
	FISH BENGING
_ :	SPEED OF CONFIGURENT
-1	145T CONTHINNOUS AREA
_	



2. What resources are required	2.	What	resources	are	required
--------------------------------	----	------	-----------	-----	----------

- BLCS + PETER EXPEDITING HEATY EXCUPLIENT
- ELI VERSIEL + VELIEE DERENIA
- COM de Aus CENTER DU STE + AT COMP
- EMBLGENCY SEA CMS POLLOKE PRICE
- Lightling BENERARAS
- IN FERMINOU + STREET CIPICIN
- MAPPING OF THE BLEAK

# 3. What are the initial spill response steps and what does your ICS look like?

LUCEMENT	comput
	PREPLANED JIM + HUSTHENT ANNEXE
0.16/1	
Con	
Fin	hair Chrysan
Logistics N2	turing Fire
D <sub>1</sub>	
KI	



4. What is your oil spill containment and recovery strategy? COUTHIN SPILL CSTOP SPILL ATTHE SEARCE DREVENT KURTHER ENTRY TREACH BELLHOLE ESSIMPTE DIRECTURE SPICE MARISIME FIND CUT OF PINTS By Using 10/20 QY RUCE DIRECT FLOW TO AND 5. What is your strategy for shoreline cleanup operations; if using SCAT what are the forecasted shoreline types, what is your treatment options for each type and what is your end point criteria

- Uneu pund	
- Uter pump - PAOS - Serbaus	
- SERBAUTS	



6. What are some <b>safety</b> issues?
LEL
COLD TO
Cow / UMMARIA
CONTANIMATION
File
waster over pur
7. How do you manage your <u>waste</u> ?
QUARREN PREK
45 Sal Demo
cie was substance
Car Mulvery Soic PAD
8. If it were to make it to the lake what is your containment, recovery, cleanup and
general overall response?



DALEXANDEL

#### **SWAT OILSPILL ISSUES WORKSHOP**

#### Situation Analysis - Truck Rollover

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WATER INFICIENTIATION AND AWAY
Sound atom Pitch DARK. I
FMPRIES
Set-up block betole in fother into BAKER LAKE
LOW TIDE when it comes will make it worse



2. What resources are required?
THE READILER - ALDER BAKEN LANG FIRE DEM
COMMAND CENTRE AT MENDOW + BAKER
LIGHTING
WARM up For STAFF
SPILL RESYONSE EQUIP.
TRANSPOLT FROM MINE
- So-60 people of Act off at MB
3. What are the initial spill response steps and what does your ICS look like?
ALFRI FRI ALFRI ERT THEL ENIRO MINE SUPER
H+S SUPER SITE SERVICES HR
REVIEW CONTINGENCY PLANNING FOR MORLIDATION
ERT CAPTAIN - WITH ENVIRO, WOULD ASSES REPORT
BACK to the ICS



4. What is your oil spill containment and recovery <b>strategy</b> ?
STOP FEDERAL SPILL CONTAIN From ently into LAKE.
CHECK ASSECTION TRYOR OF BUILD BERN
YCREN ASSIGNED.
- INSTALL ROOM ALONG THE DELATA MOUTH
OF INTERIORIES THE LAKE
= WITH VACUUM TRUCK
-ECTABLISH ZONES
I-C MACONE)
•
5. What is your strategy for shoreline cleanup operations; if using SCAT what are
the forecasted shoreline types, what is your treatment options for each type and
what is your end point criteria
ROCKY SANDY SYDSTRATE, WAIT TIL SUMMER
VALILISE.
ZONE OFF.



·	6. What are some safety issues?
C	ald weather
_4	PROPER PPE
-	
Arrana	7. How do you manage your <u>waste</u> ?
	VHCOUM THUCK
	>
	8. If it were to make it to the lake what is your containment, recovery, cleanup and general overall response?



M. BARIBANU

#### **SWAT OILSPILL ISSUES WORKSHOP**

#### Situation Analysis - Truck Rollover

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1. List the **issues** linked to this scenario:

- 90 kms From Stle

- lotol Dark Very cold.

- Sarufy to lake.

Set up on Site operational Post.

- Low These well bleave week away.



2. What resources are required?	
> Manpown - Ca	
5 Boot. Geght Town, ammentes	
5 Baler late Free fight,	
& Rusmul have justation!	
- Mean of Consumacation.	
I Snall loader, Varaceum Thick -	***************************************
·	
	**************************************
	····
	······································
3. What are the initial spill response steps and what does your ICS look like?	
3. What are the initial spill response steps and what does your ICS look like?	
3. What are the initial spill response steps and what does your ICS look like?	 
3. What are the initial spill response steps and what does your ICS look like?  Set up JeS  How Popular, HA, Sete Service Coence.	- gal
Set up JeS 16+5, Mul Populat, HA, Sate Surie Come Survey spill.	- eal
Set up JeS 1605, Provi Populat, HA, Sate Surie Come Service spill. -Reggen energy ex contingens Mar.	- Land
Set up JeS 1605, Provi Populat, HA, Sate Surie Come Service spill. -Reggen energy ex contingens Mar.	s situa
Set up JeS 1605, Provi Populat, HA, Sate Surie Come Service spill. -Reggen energy ex contingens Mar.	- Land
Set up JeS 1605, Provi Populat, HA, Sate Surie Come Service spill. -Reggen energy ex contingens Mar.	- Land
Set up JeS 1605, Provi Populat, HA, Sate Surie Come Service spill. -Reggen energy ex contingens Mar.	- Land
Set up JeS 16+5, Knv (Populat, HA, Sate Suries Come Survey spill. -Region energy ex contingens Mar.	- Land
Set up JeS 16+5, Mul Populat, HA, Sate Surie Come Survey spill. -Region energy ex contingens Man.	- Land
Set up JeS 1605, Provi Populat, HA, Sate Surie Come Service spill. - Reggen energy ex contingues Mar.	- Land



4. What is your oil spill containment and recovery <u>strategy</u> ?
Etap I'm Belease newest by
- sheet of Mous / Bull 2
-> Block III
2
at A A A A A A A A A A A A A A A A A A A
Man we had to colleten ford,
5. What is your strategy for shoreline <u>cleanup</u> operations; if using SCAT what are
the forecasted shoreline types, what is your treatment options for each type and
what is your end point criteria
A A
Trocky Sail Months Ceaux fell
money said Marin law let
Juppur.



6. What are some safety issues?
Measur ree thekness
= 6164TING
- cold weather
- acid h
- asses Coming
7. How do you manage your <u>waste</u> ?
7. How do you manage your <u>waste</u> :
8. If it were to make it to the lake what is your containment, recovery, cleanup and
general overall response?



## **Group Training Report**

		1	
-3	400		
	400	 177	5
		III (2	<u> </u>

Course Name:	se Name:
--------------	----------

course manne.	
Trainer's Name:	

Agnico-Eagle Mines Ltd. Meadowbank Division

M Name Company Signature TRG. ASS. Total Hours  1 Jamie Kataluk AEM and HARD TO  3 Dave Hamston AEM, BLANCHETTE FGL Trackette DD DD  6 LUC BLANCHETTE FGL Trackette DD DD  8 DD  9 DD  1 Jamie Kataluk AEM AEM DD  1 JO  1 JO		013-01-16			Ho	urs		
2 RODIN ANARD AFEM DEG DO TO  3 Drux Hamston AEM, SHOW DEG DO TO  4 Alain Genesse A-E-M DEG DO TO  5 Stephane Larose AEM DEG DEGLESTE FGL ACCLETTE DEGLESTE	М	Name	Company	Signature	TRG.	ASS.	Total Hours	Cod
Alain Genesse A-E-M  5 Stephane Larose AEM  6 Luc BLANCHETTE FGL  7   8	1	Jamie Kataluk	AEM	las HD			10	
AlAIN GENESSE  5 Stéphane Larose  6 Luc BLANCHETTE  FGL  8		Robin ALARD	] AEM	1625			10	
AlAIN GENESSE  5 Stéphane Larose  6 Luc BLANCHETTE  FGL  8	3	Does Halmston	JEM,	2 11				
Stéphane Larose  6 Luc BLANCHETTE  FGL  7   8		Alain GENESSE	A-E-M	The state of the s				
LUC BLANCHETTE FGL frachette			AEM					
	6	LUC BLANCHETTE	FGL	Harchet	te I			
	7							
	8							
	9							
10	10							
COMMENTS:		COMMENTS:						

Trainer's signature:\_\_\_\_\_

Date: \_\_\_\_\_

Codes:

1. AEM Permit

2. Restrictive Permit

3. Temporary Permit

4. Training Completed

5. Training Not Completed

6. Fail

Assessment Codes:

A+: Very Good

A: Good B: Average

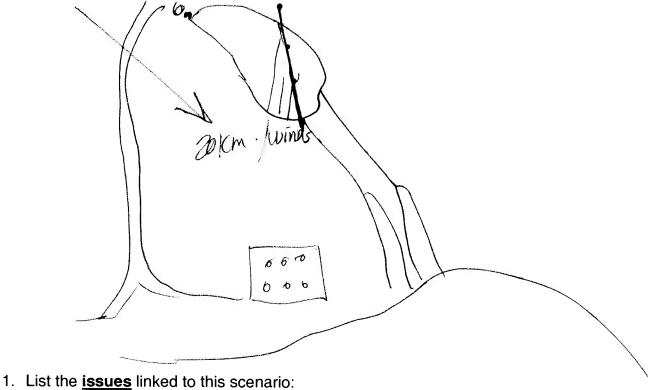
C: Below Average

STÉPHANE LAROSE

#### **SWAT OILSPILL ISSUES WORKSHOP**

#### Situation Analysis - Truck Rollover

- Incident 45 m³ diesel spills/plus oil/acid Originates on Land, flows into the River
- **Spill** occurred 22:00 hrs on March 20, 2013
- River water flow, 5 km/hr, braided channels; approx 15 km to Baker Lake
- Lake winds from the North West at 20 km/hr. Tide is high.



heading to Baker take (15 km away)

Being two than 3 hours to peat.

Contain the spell before the lake (Before to 2 sivers)

Secure and take gare of the driver.



2. What resources are required?
- Helicopton to have look on the scene (speed of the spil
team at the peene (accident) to contained
The poill at the pource to Stop the flow before the lake.
- Boots/maritime barrier/ boom, etc light plan
DERT TEAM on pase of fire.
e empty tarker to pemp in.
> Good communication
NSDS - Proper PPE
3. What are the initial spill response steps and what does your ICS look like?
3. What are the <u>initial spill response steps and what does your ICS look like</u> ?
3. What are the <u>initial spill response steps and what does your ICS look like?</u> — Scare purvey (malyse) (ms per tim)
3. What are the initial spill response steps and what does your ICS look like?  — Scene purvey (malyse) (mapetion)  — Make the plan (planning)  — Decision (delegates people)  — trecention
3. What are the initial spill response steps and what does your ICS look like?  — Scene purvey (maluse) (inspection)  — Make the plan (planning)  — Decision (delegative people)  Command
3. What are the initial spill response steps and what does your ICS look like?  Scene purvey (malyse) (inspection)  - Make the plan (planning)  - Decision (delegates people) (command)  - Execution  Assumb OPERATION logistique cost



4. What is your oil spill containment and recovery <b>strategy</b> ?	
Install barrier before the sivers (less contam	instin
- Recover the fuel oil Stimmer)	
	<b></b>
<ol> <li>What is your strategy for shoreline <u>cleanup</u> operations; if using SCAT what are the forecasted shoreline types, what is your treatment options for each type ar what is your end point criteria</li> </ol>	e nd
- Avert the Charoling Stuation and ask	
- Automotive for the second for the	
trained people to evaluate of use need	
to clean and what we have to do.	
10 person with the same to person	
- Flush	
PISIT transferable?	



6. What are some <b>safety</b> issues?
- Ride of Dina
- Falling Into water lie.
Noor insibility of night.
- Hypathermia
Platurer.
PPPE (:
7. How do you manage your <u>waste</u> ?
Fring to the proper facility dispose (FW. DET)
(D) (Barta RAC)
(WAIRER DAG)
8. If it were to make it to the lake what is your containment, recovery, cleanup and
general overall response?
DETAIL DETAILS
- Pretect the unter intake of the town.
Do waterer it takes at all rost.
TO WHENER IN CORES OF ONE JUST.
- Inform community

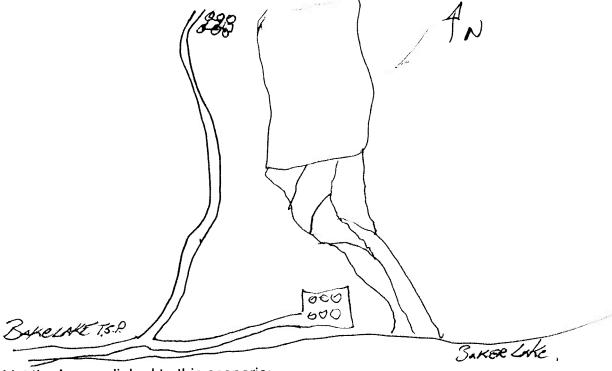


Dave Holmstrom.

## SWAT OILSPILL ISSUES WORKSHOP

#### Situation Analysis - Truck Rollover

- Incident 45 m³ diesel spills/plus oil/acid Originates on Land, flows into the River
- Spill occurred 22:00 hrs on Warch 20, 2013
- River water flow, 5 km/hr, braided channels; approx 15 km to Baker Lake
- → Lake winds from the North West at 20 km/hr. Tide is high.



	Q - 1: 24 14 and the destinguistry
	FROT moving water (FresHET) High travel rate / ICE,
_	Potential Impact to spruning grounds.
_	15 IT STOPEN? - TRUCK Roll over XXX Contained
	what we the sonsilive areas.
	Time Farme / Braided chamiel extended 3HORELINE
	LEL.,-
	Row Farthe / Security
	7

Consulting Inc.

		- STOP SO	overy <u>strategy</u>		1
Saxol on	Encluster	n = comin	EsTAblish	Booms 1	for Rive
		- Recove	/ /	used sp	les using
J			uck the	7	on ther
<del></del>		1 -4	tainers -	e Kinner	Leones D
		= Dungs de	m bottom	V. U. 5	Boom,
		- Invalled	onsat 1	30 4 4	
,		- Install poor	per bell x	ole pur	of from
			· · · · · · · · · · · · · · · · · · ·		
** ** **** ** **** ** **** **** ****					
Nhat is ⊲	our strategy fo	or shoreline <u>clean</u>	<b>up</b> operations;	f using SCAT	what are
ne foreca	sted shoreline	e types, what is yo	our treatment of	otions for eacl	n type and
	ur end point c	riteria			
	Typas	<del>`</del>			
yo	a Types				
yo yo	sort Organia	gnies.			
yo yo	SCAP	Lore lesse less	trum - F	ock-1	nothing
yo yo	Sefend s	docelein ly	Ten	ock - 1	bronker
yo yo	Sefend s	dois.	trees - Tim	ock - 1 dra - 6 d, gatizi	nothing bronks
yo	Seferal s	done les life	- Tun	ock - 1 dra - 5 d gates t transfer	bronks bronks
yo yo	Scal s	donies.	Tun - Tun - 101	ock - ) dra - S d, gatexis t transfers	broker broker krego



6. What are some safety issues?
-LEL BONDING
- recovered truck
- water Dee approtion The Assessment.
- other road frattic.
- Porability of Corninely water supply
- Will This ward
7. How do you manage your <u>waste</u> ?
Harmat / Quarrex / TOTE / DRUMS/SOI/Pal.
Soil faint Treenoute
8. If it were to make it to the lake what is your containment, recovery, cleanup and
general overall response?
- U-Boom
- V-Boom.
J. Brown
- Corralit Install Browns & POE.
- Lostall isoms Cy



## SWAT OILSPILL ISSUES WORKSHOP

#### Situation Analysis - Truck Rollover

- Incident 45 m³ diesel spills/plus oil/acid Originates on Land, flows into the River
   Spill occurred 22:00 hrs on March 20, 2013
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- Lake winds from the North West at 20 km/hr. Tide is high.

1. List the <b>issues</b> linked to this scenario:	
Flow in River.	Safety Divon
-solose Batos Jake - robertial	
- Protential Emport to Wildlife	COL ISSUE.
Stop possible a not -	
Sensitive area	High frau.
TIME PRAME.	
+ Surface for Braided.	
Rood usus	1



4. What is your pil spill containment and recovery strategy?
- Prevent, from soing to WATER.
s from for continuent
- Decorat Fruit / Ditest / Use TRUCK
40E- IF 1655/BE
- DOTTOM / BOTTOM / BOTTOM / BOTTOM / BOTTOM
- Callet Sime
2 + + 10 2 0 0 c
thoron show the
<ol> <li>What is your strategy for shoreline <u>cleanup</u> operations; if using SCAT what are the forecasted shoreline types, what is your treatment options for each type and what is your end point criteria</li> </ol>
SCAT
Porte Oscanic Motte -
to No SHEEN / Small minimal.
Took - Hothis
Or + Startents/mm Nature
TRANSFERT



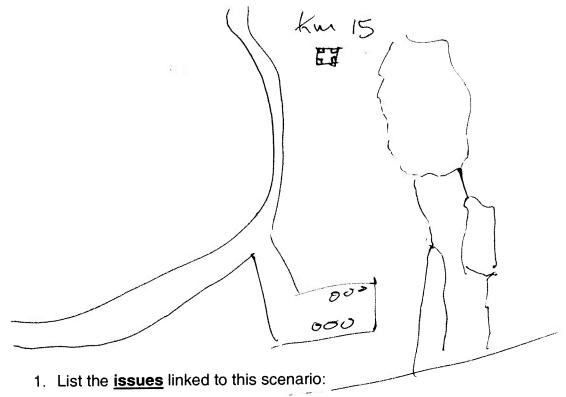
6. What are some <u>safety</u> issues?
Secones of trud
on unter the operation assement.
<b>k</b>
FAST WATER
DRINKING WATER.
7. How do you manage your <u>waste</u> ?
10000 10000
MAZIMAT QUALCES / TOTES / PRIMS
652
8. If it were to make it to the lake what is your containment, recovery, cleanup and
general overall response?
U Boon J Boon
J Boch
J Book.



### SWAT OILSPILL ISSUES WORKSHOP

### Situation Analysis - Truck Rollover

- Incident 45 m³ diesel spills/plus oil/acid Originates on Land, flows into the River
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- Lake winds from the North West at 20 km/hr. Tide is high.



- POSSIBLE CONTAMINATION OF COMMUNITIES WHITER SUPPLY
- FRESHET WILL MAKE IT HARDER TO COLLECT CONTAMINANTS.
- BRATDED CHANNELS INCREASE THE CHANCES OF MORE CONTAMINATED ARE
- MAY DISTURB SPAUNING AREAS - FISH
- TIDES WILL INCREASE THE CONTAMINATION OF SOIL.
- SHORT TIME FRAME
- SHEETY OF THE DRIVER



# 2. What resources are required?

- HEAVY EQUIPMENTS TO BUTLD TRENCHES
- ENOUGH MATERIAL TO DO ENTIRE CLEMNUP, (LAND & RIVER)
- DRAFE FOR TO PROJET TO HILL PERSONEL
- THORKH MATERIAL TO DISPOSE CONTAMENATED MATERIAL (TUTES, SEALED DRUMS
- ADEQUATE MATERIAL TO BRING CONTAMINATED MATERIAL TO MINE SITE.
- SAFETY MONITORING DEVICE BEFORE STARTING HAY CLEANUR.
- PROPER COMMUNICATION.
- MSDS.
- MATERIAL TO MOVE THE TRUCK.
- H&S AND ENVERONNEMENT PERSONNEZ.
THE O HIST CHAPTER THE
the state of the second state and what does your ICS look like?
3. What are the initial spill response steps and what does your ICS look like?
- CONE 1 RADIO CALLED
- CODE 1 RADIO CALLED  - TO INFORMS TEAM OF SITUATION AND DOES HEADOWNT DEFORE DEPUNION FEM
- CODE 1 RADIO CALLED  - IC INFORMS TEAM OF SITUATION AND DOES HEADOWNT DEFORE DEPUVING TEAM  - CONTRE SITUP - INCLUDE MANAGEMENT TO ASSISTS IN DECISER
- GODE 1 RADIO CALLED  - IC INFORMS TEAM OF SITUATION AND DOES HEADOWNT DEFORE DEPLOYING TEAM  - COMMAND CENTRE SET UP - INCLUDE MANAGEMENT TO ASSISTS IN DECISERA  - MONITOR AND DEVELOPPE A SAFETY ZONE IN THE SPILL AREA.
- CODE 1 RADIO CALLED  - IC INFORMS TEAM OF SITUATION AND DOES HEADOWNT DEFORE DEPUVING TEAM  - CONTRE SITUP - INCLUDE MANAGEMENT TO ASSISTS IN DECISER
- GODE 1 RADIO CALLED  - IC INFORMS TEAM OF SITUATION AND DOES HEADOWNT DEFORE DEPLOYING TEAM  - COMMAND CENTRE SET UP - INCLUDE MANAGEMENT TO ASSISTS IN DECISERA  - MONITOR AND DEVELOPPE A SAFETY ZONE IN THE SPILL AREA.
- GODE 1 RADIO CALLED  - IC INFORMS TEAM OF SITUATION AND DOES HEADOWNT DEFORE DEPUVING TEAM  - COMMAND CENTRE SET UP - INCLUDE MANAGEMENT TO ASSISTS IN DECISER  - MONITOR AND DEVELOPPE A SAFETY ZONE IN THE SPILL AREA.  - IDENTIFY HASAEDS.
- GODE 1 RADIO CALLED  - IC INFORMS TEAM OF SITUATION AND DOES HEADOWNT DEFORE DEPLOYING TEAM  - COMMAND CENTRE SET UP - INCLUDE MANAGEMENT TO ASSISTS IN DECISERA  - MONITOR AND DEVELOPPE A SAFETY ZONE IN THE SPILL AREA.
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- GODE 1 RADIO CALLED  - IC INFORMS TEAM OF SITUATION AND DOES HEADOWNT DEFORE DEPUVING TEAM  - COMMAND CENTRE SET UP - INCLUDE MANAGEMENT TO ASSISTS IN DECISER  - MONITOR AND DEVELOPPE A SAFETY ZONE IN THE SPILL AREA.  - IDENTIFY HASAEDS.



4. What is your oil spill containment and recovery <b>strategy</b> ?
- PREVENT FURTHER ENTRY.
- PUTLO TRENCHES OF BARRIERS TO AVOID THE SPREADING OF THE SPILL.
- PLACE BOOMS INSIDE BARRIERS TO PICK UP CONTAUTNANTS
- ONCE BOOMS ARE FULL - REPLACE WITH NEW ONES PLACE
CONTINUATED BOOMS IN PROPERT CONTINERS.
- JEND QUADREX BAGS TO MINE SITE AND PLACED INSIDE SEACHNS,
PROPERLY LABELLED
- WATER - PLACE MARITIME BARRIER INSIDE LAKE.
TLACE BOSM) OF FIBUROS ON OUTS TO THE TENTE
ALONG MARITIME BARRIERS.
5. What is your strategy for shoreline cleanup operations; if using SCAT what are
the forecasted shoreline types, what is your treatment options for each type and
what is your end point criteria
- ASSES THE SHORELINE
- FLUSH THE SHORFLINE
- STOP THE CLEANING WHEN CONTAMINANTS IS
NOT TRANSFERABLE.



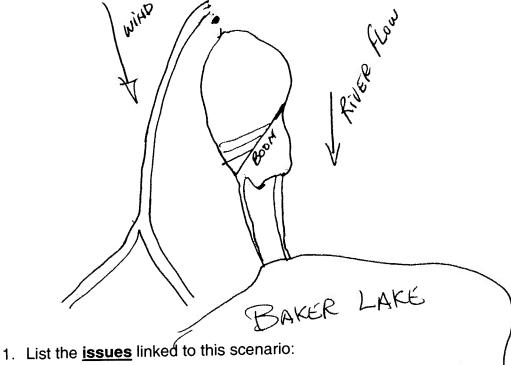
6. What are some safety issues?
- TIRENESS OF THE CREW
- LECS
- REMOUAL OF THE TRUCK
- WORK ON ICE AND NEAR EAST WATER,
- WILDLIFE
7. How do you manage your <u>waste</u> ?
- BIT IT INTO DRIMS OF TOTES TO BURN IT OR
- FUT IT INTO DEMANS OF TOTAL
STORP IT - D MINE SITE.
- IF IT HITS THE WHITER SET UP A VIJON U BOOM
- IF IT HITS THE WHITER, SET UP A VIU 600W
8. If it were to make it to the lake what is your containment, recovery, cleanup and
general overall response?
SETUPAV, JOR U BOOM.



# SWAT OILSPILL ISSUES WORKSHOP

# Situation Analysis - Truck Rollover

- Incident 45 m³ diesel spills/plus oil/acid Originates on Land, flows into the River
- Spill occurred 22:00 hrs on March 20, 2013
- River water flow, 5 km/hr, braided channels; approx 15 km to Baker Lake
- Lake winds from the North West at 20 km/hr. Tide is high.



- DIESEL FLOWING ONTO THE RIVER, HEADING TO BAKERLAKE (IS KM AWAY) giving us LESS THAN 3 HRS TO CONTAIN THE SPILL BEFORE IT GETS TO THE LAKE.

- ISOLATE THE VEHICULE.

- MAKE SURE THE DRIVER IS OK.



2. What resources are required?
- HELICOPTER TO ASSESS THE SPILL ON THE RIVER AND THE ACTUAL SPEED OF THE SPILL
AND THE ACTUAL SPEED OF THE SPILL
- A TEAM OF RESPONDERS AT THE ACCIDENT TO CONTAIND
THE SPILL AT THE SOURCE.
- ANOTHER TEAM FURTHER DOWN STREAM BEFORE THE
LAKE TO PREVENT ANY SPICE INTO THE LAKE
- HEED BOATS, MARITIME BARRIERD, SKIMERS, LIGHT PLANTS
- E.R.T. TEAM IN CASE OF FIRE
-M/T TANKER TRUCK TO PUMP THE REST OF THE LOAD  MSDS -P.P.E.
- M.S.D.S P. F. E.
a will be the second and what does your ICS look like?
3. What are the initial spill response steps and what does your ICS look like?
- ANALIZE THE SCENE, DELEGATE PEOPLE
- MAKE A PLAN, MAKE A DECISION, TAKE ACTION
- CALL PROPER AUTHORITHO
- CALL PROPER ALLTHORITY
- CALL PROPER AUTHORITHM
- CALL PROPER ALLTHORITY
- CALL PROPER ALLTHORITY
- CALL PROPER ALLTHORITY
- CALL PROPER ALLTHORITY  - SAFETY  - COMMAND
- CALL PROPER ALLTHORITY



	AU E	300M	ACROS	\$5 T	HE RI	VER	POUND	BEFORE
11 9	575	1470	THE	æ_	KINER	s (c	EFEK)	4HD
THE	Big	LAKE						
FABRIC	ATE A	BI	em					
10-3	80-4	B	ARRIEK	>				
		<i></i>	11-1-11-28					
							***************************************	
				***************************************				
					7			
						<del></del>		
		7						
								****
				e <b>clean</b>	<b>up</b> opera	tions; if	using SCA	AT what are
the for		horeline	types, w					ich type and
the for what is	ecasted s s your end	horeline I point c	types, w riteria	hat is yo	our treatm	ent op		
the for what is 15555	ecasted s s your end s THE To EV	horeline I point c	types, writeria	hat is yo ジャ ルモノ	our treatm	ent op	tions for each	NNED VIF YES
the for what is 15555	ecasted s s your end s THE To EV	horeline I point c	types, writeria	hat is yo ジャ ルモノ	our treatm	ent op	tions for each	NNED
the for what is 155ES	ecasted so syour end so THE TO EV	horeline I point c SHO ALVA1	types, w riteria RELINE E JF	that is you  Size  WE  IY  70	PATION VEED	ASE	TRAIL	NNED VIF YES
the for what is	ecasted s s your end s THE To EV	horeline I point c SHO ALVA1	types, w riteria RELINE E JF	that is you  Size  WE  IY  70	PATION VEED	ASE	TRAIL	NNED VIF YES
the for what is seen to see the see th	ecasted so syour end so THE TO EV	horeline I point c SHO ALVA1	types, w riteria RELINE E JF	that is you  Size  WE  IY  70	PATION VEED	ASE	TRAIL	NNED VIF YES
the for what is seen to see the see th	ecasted so syour end so THE TO EV	horeline I point c SHO ALVA1	types, w riteria RELINE E JF	that is you  Size  WE  IY  70	PATION VEED	ASE	TRAIL	NNED VIF YES
the for what is	ecasted so syour end so THE TO EV	horeline I point c SHO ALVA1	types, w riteria RELINE E JF	that is you  Size  WE  IY  70	PATION VEED	ASE	TRAIL	NNED VF YES



6. What are some safety issues?
- RISK OF FIRE
- FALLING INTO WATER
- BISK OF FIRE - FALLING INTO WATER - DEALING WITH POOR VISIBILITY (DARK AT NIGHT) - WATER & ICE - POTOBILITY
- WATER & ICE
- POTABILITY
TO TABLE ST. T.
7. Haw de veu monago vour <b>waete</b> ?
7. How do you manage your <u>waste</u> ?
The of the appare Discount Facility.
- BRING TO THE PROPER DISPOSAL FACILITY.
8. If it were to make it to the lake what is your containment, recovery, cleanup and
general overall response?
- PROTECT THE WATER INTAKE FOR THE TOWN
- DO WHATEVER IT TAKES AT ALL COST.
- INFORM THE COMMUNITY.
- INFORM / HE COMBINATION
- U-BOOM, V-BOOM, J-BOOM
- U-DOOM, V-DOOM, ~ DOOM



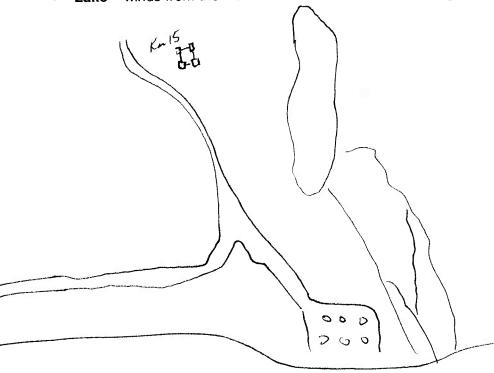
+4

Janie Katalut

# SWAT OILSPILL ISSUES WORKSHOP

Situation Analysis - Truck Rollover considered Tier 3 incident

- Incident 45 m³ diesel spills/plus oil/acid Originates on Land, flows into the River
- Spill occurred 22:00 hrs on March 20, 2013
- River water flow, 5 km/hr, braided channels; approx 15 km to Baker Lake
- Lake winds from the North West at 20 km/hr. Tide is high.



1. List the issues linked to this scenario:

possible contomination of communitys water supply
freshet will make it harder to collect contaminants
braided channels - increases chances of more contamination area
may disturb spauning areas - fish
fides will increase contamination of soil
response time
other road users



2. What resources are required?
heavy equipment to build trenches (COMMS) ERP
heavy equipment to build frenches (COMMS) ERP enough material to do entire year up
proper PPE for all personel personnel
enough material to dispose contaminated material to mine site safety monitoring devices before starting any year up
adequate equipment to bring contaminated material to mine site
safety monitoring devices before starting any year up
, , ,
2 What are the initial anill resonance stand and table to the standard of the
3. What are the initial spill response steps and what does your ICS look like?  Code I on radio called - safety  - K informs from of situation and does a head count before deplying for
Code I on radio called - satisfy
Code I on radio called - satisfy
Code I on radio called - satisfy
Code I on radio called - satisfy
Code I on radio called - satisfy
Code I on radio called - satisfy
Code I on radio called - satisfy
Code I on radio called - satisfy
3. What are the initial spill response steps and what does your ICS look like?  Code I on radio called - safety  IC informs from of structure and does a head count before deplying for command centre setup—include management to assist in decisions  develop a safety zone in spill area
Code I on radio called - satisfy



-pla	ild bellholes or barriers to avoid spreading of confaminants see booms inside parriers to pick up contaminants e booms are full, replace with new ones - place contaminated by another bags and wattrex bags to mine site and placed inside seasons - properly
one	e borns are full replace with new ones - place contaminated &
into	anattrex bags
Se	nd Quattrex bags to mine site and placed inside seasons-properly
place	e maritime barrier inside lake
Space	e maritime barrier inside lake se booms along shore to profect soil-also along maritime barrie
Calle	ef January Jan
5.	What is your strategy for shoreline <u>cleanup</u> operations; if using SCAT what are
	the forecasted shoreline types, what is your treatment options for each type an what is your end point criteria
	what is your end point chiena
······································	



6. What are some <u>safety</u> issues?  LEL
fatque
water and ice
renoval of fruck
ofter road weers
fust water
wildlife
7. How do you manage your <u>waste</u> ?  place Confaminated material - rags, booms - inside quattrex bags  Send bags to mine site - placed into seacons
to a pros to a site - placed into seacons
JEND DYS 10 MINE SHE PSI TO 1010 DO
8. If it were to make it to the lake what is your containment, recovery, cleanup and general overall response?



# Group Training Report

iner's Na te: The	ne 18, 2013	and					Agnico-Eagle / Meadowbank	Mines Ltd	
					Ho	Jrs			
4	Name	Company	Signature		FRG.	ASS.	Total Hours	Code	
	TEAN-CLAUDE POTTRAS	AEM	1 Parties		1.5			i i	
2	Bernard Paradis	AEM	11/12		1.5				
3	4. CHIEC POITRAS	PR0-413							
4 5	ERSE PARE.	AEM						4	
5	RAYCARUSON	AEM	RAG-					7	
6									
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15									
16									
17									
		Induction De Human Resources: Camp:	partment Signatures:	Comments:					
ner's sign	nature	Nurse:		Codes:			Assessment Cod	es:	
J.		Security:		1. AEM Perm			A+: Very Good A : Good		
Pate: 18 June, 2013		Health & Safety:	Health & Safety:		3. Temporary Permit B: Ave		B: Average	age	
		Environment:		4. Training C 5. Training N			C: Below Average		
		Training:		6. Fail					



chi a

# **Tool box Meeting attendance sheet**

Topic: Date Department Name (Print) Signature STEPHEN EASTERBY terreita Filho

# Appendix J

Dyno Nobel Emergency Response Plan
Please refer to the approved Meadowbank Spill Contingency Plan Version 4
(November 2013)



# **EMERGENCY RESPONSE PLAN**



Meadowbank Mine Site.

# Magazine, Plant and Work Sites

This Emergency Response Plan (ERP) addresses incidents and potential incidents involving the manufacturing, handling and storage of explosives and related products in Dyno Nobel Canada Inc.' magazines, plants and worksites. This ERP has been developed for Dyno Nobel Canada Inc. and all of it's wholly-owned subsidiaries (DNX Drilling). Actions detailed within this plan are compulsory, under the approval and authorization of DNCI's Regional Operations Managers.

"This document, as presented on Dyno Nobel's database, is a controlled document and represents the version currently in effect. All printed copies are uncontrolled documents and may not be current".

Note: Information provided within this document may be privileged and is not intended for general distribution.

Publication/Amendment

Changes To Prior Edition Date Pg. 15 Oct 03 New document All 26 Apr 04 Amendment # 1 Renumbering of Appendices 6 – 13 App. 7 – 14 Miscellaneous Typos & Amendment Dates A11 17 March 08 Amendment #2 **Updated Contact information** Addition of definitions Included Calling and responding emergency procedures Addition Duties of Key personnel Addition of response to Natural disasters Addition of visitor and contractors access control -Replaced the Appendices and renumbering Included a Emergency Report form Addition of Nitric acid, Aluminum and Diethylene glycol and CFE Addition of alternate methods of communication Addition of Reportable Substance list All Miscellaneous Typos & Amendment Dates August 18, 2010 Amendment #3 Updated Scope and ERP Outline Added Sign-off sheet for Annual Fire Department Review Added Appendix for Employee Training sign-off **Updated Reporting Incidents Flowchart** Updated procedure for Raw Material Truck Spills **Updated Bomb Threat Checklist** February 14, 2011 Amendment #4 Updated site contacts Updated site evacuation & Muster locations July 14, 2011 Amendment #5 Updated site contacts Updated site evacuation & muster loaction (Map drawn) Site specific emergency procedures

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### 1.0 SCOPE

This document provides a Work Site Emergency Response Plan covering fire/explosion, spills, security breach, bomb threat, evacuation and prescribed actions that employees must take to ensure employee and public safety in the event of an emergency. The general reference to DNCI's "Work Sites" throughout this document includes magazines, plants and miscellaneous work locations.

The Emergency Response Plan appearing on Dyno Nobel Canada Inc.' database is a controlled document. Uncontrolled copies of this ERP are provided to customers and associates who own the land on which DNCI's worksite is located, plus applicable municipal and regulatory authorities. As well, uncontrolled copies are issued to all Company employees and are placed in all central offices and Company delivery vehicles.

### 2.0 RELATED DOCUMENTS

The following documents also relate to emergency situations that can arise and should be held at each Work Site:

- Federal, Provincial and Municipal regulations, standards and guidelines
- Corporate Policies plus HSE Management System Standards & Procedures
- Standard Operating Procedures (SOP's)
- Dyno Nobel General and Specialized Work Rules
- Material Safety Data Sheets
- Prime Contractor's / Customer's ERP
- Transportation ERAP #2-1037
- Crisis Communication Plan

### 3.0 ERP OUTLINE

3.1 The following materials are covered by this ERP:

Fuel Oil

ATF Hydraulic Fluid

Ammonium Nitrate Prills and Solution

Sodium Nitrite

Sodium Thiocyanate

**ANFO** 

**Emulsion** 

Packaged Explosives

Detonators

Diethylene glycol

### 3.2 The following situations are addressed in this ERP:

- Fire / Explosion
- Storage Tank Failure
- Spills from Product Delivery Trucks
- Spills from Raw Material Delivery Trucks
- Process Spills
- Shut down due to weather, floods, lightning, fires, explosions and other threats to the security and operation of DNCI's facilities, equipment and material.
- Bomb Threats
- Quantities of spills and reportable to Dyno Nobel and authorities

### 3.3 This ERP covers:

Preparation Reporting

Training Waste Disposal Permits

Lines of Authority Containment
Notification Inspection
Decontamination Maintenance

# 3.4 The following definitions apply to this plan:

<u>DNCI Corporate contact</u>: A DNCI corporate employee who is assigned to receive Emergency Calls at all times from the answering service.

<u>ER Advisor:</u> Emergency Response Advisor (ERA), who will normally be the applicable General Manager, Area Manager, or Technical Advisor who will liaise with First Responders.

OSC: (DNCI) On Scene Coordinator, the Senior DNCI employee at an incident site who manages and controls DNCI resources in support of First Responders and incident recovery.

<u>ERT:</u> Emergency Response Team, DNCI personnel dispatched to an incident site to assist First Responders and conduct incident recovery under the direction of the OSC.

### 4.0 PREPARATION AND PLANNING

In order to provide competent emergency response at Dyno Nobel Canada Inc. magazines, plants and worksites, first responders (local fire departments and mine rescue personnel) must be thoroughly briefed on an annual basis of the potential hazards involved in a Dyno Nobel Canada Inc. worksite fire. To this end, Work Site Supervisors must take fire department plus mine safety and security representatives on an annual magazine/plant tour to view:

Explosives Storage Areas Bulk Emulsion Equipment ANFO Blending Area Fire Fighting Equipment Sites Evacuation (Meeting) Area Communications Equipment Facility Layout (Waste) Burn Facilities

A record of each explosives worksite tour and the names of the first responder representatives attending are to be documented and kept on file.

Annual Fire Department Review Form (Appendix 9)

- 4.2 All DNCI employees shall review this ERP on an annual basis and participate in ERP drills / exercises when scheduled.
- 4.3 All worksite accidents involving fire, explosion, reportable spills/emissions, breaches of security and bomb threats are to be reported to applicable authorities and senior management. As per incident reporting procedure
- 4. 4 Spill procedures for each of the materials listed in section 3.1 are outlined in Table 6-3. All procedures specify: Method of Cleanup, Method of Disposal and Protective Clothing. Based on the procedures presented in Table 6-3, worksite supervisors must ensure that adequate clean-up equipment and materials are readily available and in good condition.
- 4.5 Worksite information for each of DNCI's facilities is contained in the attached appendices. The ERP is revised whenever significant changes are made.
- 4.6 Current Material Safety Data Sheets (MSDS) are to be kept at each Work Site for all hazardous materials that are stored and handled at the Work Site. Copies of current product MSDS' are also made available to customers and landowners. Obsolete MSDS' will be replaced as new ones are issued.

4.7 Each Work Site will hold and maintain in good repair, appropriate fire fighting and spill control equipment for potential emergencies. Fire extinguishers, hoses and other fire fighting equipment are to be visually inspected on a monthly basis to ensure Magazine, Plant, Work Site and delivery vehicle readiness.

### 5.0 TRAINING

- 5.1 All employees will complete training on the contents of this Plan during their "new hire" orientation and review the plan annually.
- 5.2 A trained person is considered to have reviewed all related documents (Section 2.0), to have been instructed on the use of related equipment and procedures, and to have discussed with their Supervisor or trainer, questions and issues of concern.
- 5.3 Training records, including certificates for training completed, are to be kept onsite in the Employee's Training Record.
- 5.4 The Magazine, Plant or Work Site Supervisor/Manager will certify their employees as having received training by signing the training form. In signing the training form, the Supervisor / Manager will have satisfied themselves that trained employees are able to:
  - Recognize fire and explosive hazards for the materials and processes to which they are exposed /involved with;
  - Competently use Fire Fighting / Fire Protection Equipment (Note: employees should receive refresher training in the use of fire extinguishers at least every three years)
  - Competently use applicable personal protective equipment (PPE) when handling hazardous substances;
  - Recognize and be familiar with substances which become hazardous wastes when spilled; and
  - Follow SOP's and use established work practices to minimize the potential for fires, explosions, environmental releases and other accidents.
  - Worksite Managers / Supervisors will ensure that all contractors receive a
    worksite orientation before commencing work or being left unaccompanied
    in the worksite. Following the orientation process, the contractors will be
    required to sign off on the Contractor Checklist acknowledging training in
    the applicable areas including the site emergency response plan.

- All Plant & Magazine sites will have in place, a continuous (24 hour) access control system to control the entrance, presence and exit of visitor and contractors and their equipment and materials
- Employees must be trained on Reportable Quantities to the Government in the unlikely event of a spill.
- All employees are aware of evacuation routes, muster point location, and all-clear notice procedure.
- New/Transferred employee or Annual Refresher sign-off form located in Appendix 8

### 6.0 EMERGENCY PROCEDURES AND LINES OF AUTHORITY

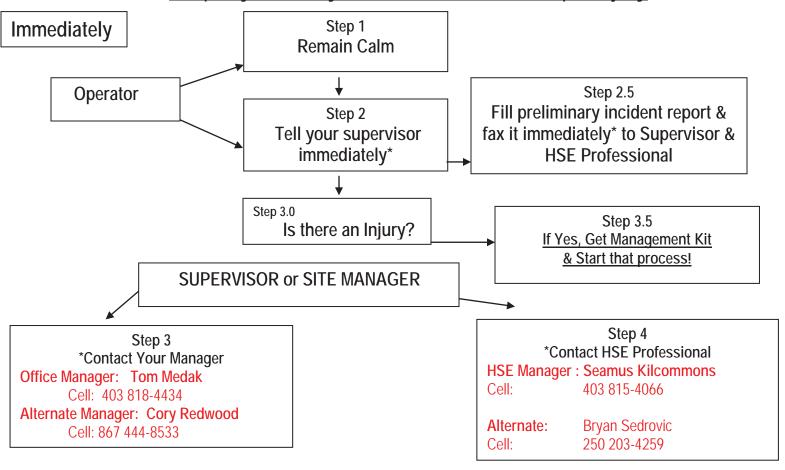
### 6.1 GENERAL

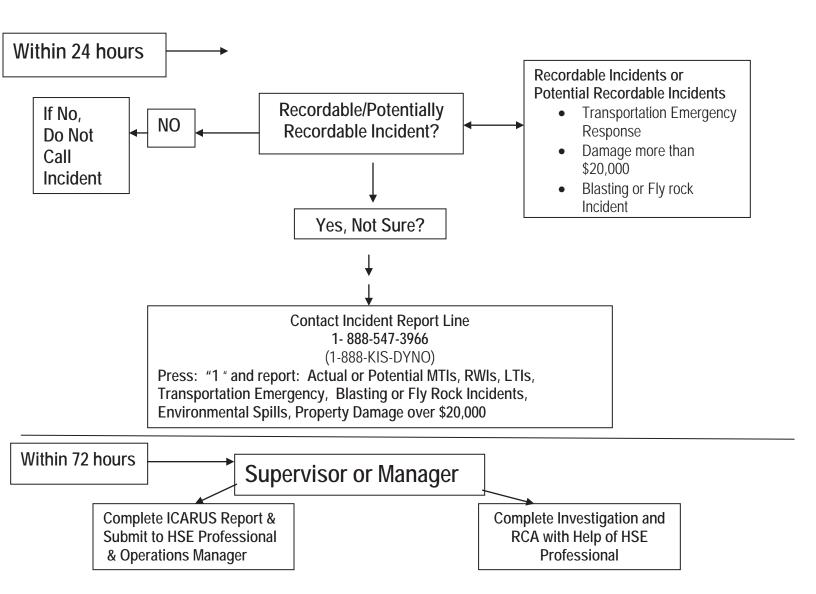
Reporting Incidents Flow Chart (Following page)

Table 6-1 Emergency Response Flow Chart

# Reporting Incidents

Property Loss/Fly Rock/Environmental Spill/Injury





# SITE SUPERVISOR/DELAGATE EXPERIENCING EMERGENCY / POTENTIAL EMERGENCY

### CALL FOR EMERGENCY ASSISTANCE

In the event of an emergency, accidental release or imminent accidental release involving explosives, eliminate potential sources of detonation where possible (eg. turn off the ignition of a vehicle), call <u>6911</u> (or the local emergency number) for immediate assistance, **call the site Supervisor/Area Manager** and initiate the site's Emergency Response Plan. If normal phone systems are down other methods of communication can include two way radios, satellite phones, pager, e mail and vehicle satellite tracking systems.

### WARN PUBLIC WITHIN EVACUATION DISTANCES IF RISK OF DETONATION

Should there be explosive detonations, or the risk of detonations due to the presence of fire or other detonating factors, advise the First Responders (or anyone within the immediate vicinity if First Responders are not at the scene) of the risk and applicable safety distances per Table 6-4, page 17 (liaise with Emergency Response Advisor (ERA) if time permits). Help organize perimeter guards to prevent people from entering the evacuation zone.

Note: See ERP, page 17 Table 6-4 for Evacuation Procedures.

### ASSIST LOCAL AUTHORITIES

Assist First Responders and Local Authorities in eliminating the emergency situation, and liaise with DNCI's On-Call Employee / ERA until relieved by the Company's Emergency Response Team (ERT).

### TO RESPOND TO AN EMERGENCY CALL

### **DNCI Corporate contact instructions:**

Upon receiving a call for emergency response assistance, keep a log of all subsequent communications and actions, and do the following:

- 1. Immediately obtain the name and callback number of the caller, in case the telephone line is lost.
- 2. Obtain information as fully and accurately as possible following the emergency report form (see appendix 1).
- 3. Call an ER Advisor for the applicable Region (see appendix 2) and report the emergency situation. In turn, the ER Advisor will phone the emergency scene caller, establish ongoing contact, assess the emergency, determine what Company resources and/or contracted emergency response services are required and organize an Emergency Response Team ERT to proceed to the emergency scene if required.

- 4. Assist the Emergency Response Advisor (ERA).
- 5. Liaise with Company Executive / Senior Managers.

### **Emergency Response Advisor (ERA) instructions:**

- 1.Call the Branch/Plant Supervisor nearest the emergency scene plus territorial & federal authorities (see applicable appendix to Annex D) to advise them of the situation and the need for an emergency response.
- 2. Designate, assemble and dispatch an Emergency Response Team (ERT), made up of Groups 1 & 2 personnel (see ERAP pg. 16 and Annex D) under the leadership of an On Scene Coordinator (OSC), if required.
- 3. Authorize the dispatching of additional resources, communications, transportation and contracted services as necessary.
- 4. Contact and instruct the designated Emergency Response Team (ERT) to proceed to the emergency scene with the required vehicles and equipment.
- 5. Liaise with the Person in Charge of the Emergency) and/or Local Authorities to obtain a situation update.
- 6.Advise Local Authorities as appropriate, regarding the properties, hazards and handling procedures for the explosives involved in the emergency. In particular, advise the Local Authorities of appropriate evacuation distances per Table 6-4 pg. 17.
- 7. Continue to consult with the Local Authorities as appropriate, plus the Company's On-Scene Coordinator (OSC), to stabilize and eliminate the emergency.
- 8. Refer to **Regional Manager** (*Tom Medak, Willard Pierce, Dale Bodnarchuk or Francois Lambert*) for any media requests in accordance to the Crisis Communication Plan (CCP). Media contacts shall be through Regional Manager designated for the area.
- 9. Contact the explosives supplier and / or transporter (if other than DNCI) to advise them of the emergency and to request their assistance if/as required.

### **ON-SCENE CO-ORDINATOR (OSC)**

- The On-Scene Coordinator (OSC) is the Company's representative and local authority in charge of all company actions and resources at the emergency scene. Once the OSC arrives at the emergency scene, the ERA will transfer communication with First Responders/Local Authorities to the OSC. In turn, the OSC will liaise with the ER Advisor as required. Throughout the Company's emergency response, the OSC will ensure that First Responders and Company personnel (employees and contractors) observe all safety and regulatory standards and procedures.
- The OSC may revise / adjust the composition of the Emergency Response Team (ERT) and supporting resources as required. The OSC may, in consultation with the ER Advisor, contract commercial services to assist in addressing and resolving the emergency situation.
- The OSC will oversee the Company's local involvement with emergency services, government (municipal & provincial) and public interests until the emergency is fully resolved. Post-emergency activities (clean-up, restoration, etc.) under the direction of the Environment Manager may be delegated to an appropriate Branch, Plant or Area Manager. **EMERGENCY RESPONSE TEAM (ERT)**
- Selected emergency response personnel will take their direction to assemble and proceed to the emergency scene from the ERA or their representative. Team members will immediately report to the On-Scene-Coordinator.
- The primary role of the ERT is to provide a competent and trained / certified workforce plus specialized equipment and material to assist First Responders / Local Authorities in the stabilizing and elimination of an 'explosives emergency', and to retrieve / recover, repackage and remove to safe and secure storage, nondetonated explosives.
- While at the emergency scene, ERT members will take their direction from the Company's OSC and remain available until released by the OSC.

### NOTE:

ONLY INDIVIDUALS WHO HAVE RECEIVED TRAINING AS REQUIRED UNDER THE TRANSPORTATION OF DANGEROUS GOODS (CLEAR LANGUAGE) REGULATIONS, OR WHO ARE WORKING UNDER THE DIRECT AND CONTINUOUS SUPERVISION OF AN EMPLOYEE WHO HAS BEEN TRAINED FOR CLASS 1 DANGEROUS GOODS UNDER TDG, MAY PARTICIPATE IN SITE CLEAN-UP ACTIVITIES SUCH AS PICKING UP, REPACKAGING AND TRANSPORTING EXPLOSIVE MATERIAL.

- 6.1.1 In any emergency the Work Site Supervisor/Manager or their delegate must take certain actions, including the following:
  - Call local fire/emergency authorities (at mine sites, also call Mine Fire, Safety and Security if different and give relevant information).
  - Account for all employees and visitors. Arrange for Rescue of anyone who may be trapped, without endangering oneself or others.
  - Notify Dyno Nobel Canada Inc. ERA's so that necessary arrangements can be made for technical / administrative support, including accident reporting and investigation plus continued/alternate production. The following information should be provided and refer to appendix 1:

What Occurred Time of Occurrence
Action Taken People Contacted
Status of Situation Anticipated Follow-up

### 6.2 FIRE & EXPLOSIVES

- 6.2.1. There are three categories of fire that may involve explosives:
  - I. Fires Directly Involving Class 1 Explosives and Blasting Agents
    - **DO NOT FIGHT THE FIRE.** Instruct all fire fighters on the scene not to fight fire with explosives.
    - Shut off power at main breakers if possible. At mine sites, call Mine Security or Fire/Rescue. At all other DNCI locations call local Fire/Rescue personnel.
    - Evacuate all personnel from the Work Site to the safe meeting place as outlined in the Work Site Appendix.
    - Set up a communications base at the meeting place and guard
    - against anyone entering the area.
  - II. <u>Fires Involving Components For Manufacture of Blasting Agents</u>
    Bulk blasting agents may be in the form of emulsion or ANFO. ANFO is a mixture of prilled ammonium nitrate and fuel oil.

Under conditions of large mass, intense heat, confined dust / vapor buildup, and the right mixture combination of the basic ingredients, emulsion and ANFO will explode. The probability of explosion with

ammonium nitrate (AN) alone is very small, but increases when under intense heat and confinement. Table 6-1 includes recommended fire fighting procedures for each of these substances.

### III. Fires Involving Dyno Nobel Canada Inc. Trucks

In cases where the Dyno Nobel Canada Inc. delivery trucks are in a building that is on fire, if there is no explosives and safe to do so, may be moved provided access to the truck and exit from the building is not barred by flames or smoke, with available fire extinguishers with caution only if the fire is small and not in the storage compartment.

Fires on re-pump or other bulk explosive delivery vehicles shall not be fought if the fire involves the explosives compartment. Fire fighting measures should be taken immediately to prevent any fire such as a tire, electrical or cab fire from reaching the explosives compartment.

Fires on other transport vehicles may be fought with caution. Fires that cannot be controlled sufficiently to avoid involvement of the vehicle's fuel compartment shall be left and personnel evacuated to a safe distance.

**6.2.2.** When a fire is small and does not involve any explosive agents, it may be fought with plant extinguishing equipment. If the fire is widespread and intense, all personnel, including visitors and contractors should be evacuated to the meeting area outside the main gate.

### Table 6 - 2 FIRE FIGHTING INFORMATION

MATERIAL	RECOMMENDED FIRE-FIGHTING METHODS	SPECIAL CONSIDERATION
Ammonium Nitrate Prill – Odorless white to light tan crystaline solid	Use flooding amounts of water in early stages of fire. Keep upwind. AN is an oxidizing agent which supports combustion and is an explosive hazard if heated under confinement that allows high-pressure buildup. Ensure good ventilation and remove combustible materials if it can be safely done. Evacuate to designated area if fire cannot be controlled.	Toxic oxides of nitrogen are given off during combustion. Fire fighters require self-contained positive pressure breathing apparatus. Avoid contaminating with organic materials. Many powdered metals such as Al, Sb, Si, Cd, Cr, Co, Cu, Fe, Pb, Mg, Mn, Ni, Sn, Zn and brass react violently and explosively with fused AN below 200°C Sensitivity to detonation increases when heated.
Ammonium Nitrate Solution- Colorless/Odourless Liquid – white paste like solid when cooled	Use flooding amounts of water in early stages of fire. Cool containing vessels with flooding quantities of water until after fire is out	Material will not burn, but thermal decomposition may result in flammable/toxic gases being formed. These products are nitrogen oxides and ammonia. (NO,NO <sub>2</sub> NH <sub>3</sub> ). Product may form explosive mixtures when contaminated and comes in contact with organic materials. Explosive when exposed to heat or flame under confinement. Avoid temperatures over 210°C (410°F)  A self contained breathing apparatus should be used to avoid inhalation of toxic fumes
Sodium Thiocyanate – White solid - odourless	Use extinguishing media most appropriate for the surrounding fire	Wear self contained breathing apparatus – MSHA/NIOSH approved or equivalent, and full protective gear. During a fire, irritating or highly toxic gases may be generated by thermal decomposition or combustion.
Sodium Nitrite – Oxydizing agent - white to light yellow crystals- faint odour	Flammability class – not regulated. Flood with water only – Isolate materials not involved in the fire and cool containers with flooding quantities of water until well after the fire is out.	Self contained apparatus should be worn in a fire involving Sodium Nitite.Thermal decomposition will cause reddish brown nitrogen oxides to be released.
Fuel Oil (No. 2 diesel) Dyed or pale yellow liquid with petroleum odor; and/or ATF Fluid	Use water spray to cool fire-exposed surfaces and to protect personnel. Shut off fuel from fire. Use foam, dry chemical or water spray to extinguish fire.  Avoid spraying water directly into storage container due to danger of boil-over.	Avoid strong oxidizing agents.

Explosive emulsions, ANFO, packaged explosives and firing devices.	Fire involving explosive materials must never be fought. Evacuate the incident scene. Do not confine (ventilate to prevent / reduce pressure build-up if safe to do so).	Explosion hazard.
Enviro CFE	Dry chemical, foam, water spray (fog). Use water spray to cool exposed surfaces and containers	OIL FLOATS ON WATER. Do not use direct or heavy water stream to fight fire. Use organic vapour respirator or self-contained breathing apparatus to fight fire.

Table 6 - 3 CONTROL MEASURES FOR FIRE				
MATERIAL	RECOMMENDED FIRE- FIGHTING METHODS	SPECIAL CONSIDERATION		
Diethylene glycol	Small fire: type ABC dry chemical or CO <sub>2</sub> fire extinguisher. Large fire: water fog.	Keep away from oxidizers (nitrates and perchlorate). Explosion hazard if heated under confinement.		

### **EVACUATION PROCEDURES**

Advise the first emergency responders at the scene (police or fire) of the need to evacuate using the guidance in the Emergency Response Plan. Employees at the scene should assist local emergency services to the best of their ability to accomplish this. For incidents within a worksite such as a mine, quarry or construction operation, in most cases access is radio controlled. The quickest way of alerting people, therefore, is by site radio. Clearly state your location, situation and call for assistance in evacuating the area.

DO NOT FIGHT EXPLOSIVES FIRES. EVACUATE THE AREA AND LET THE FIRE BURN ITSELF OUT.

THE MINIMUM EVACUATION DISTANCE IS AS OUTLINED IN TABLE 6-4 (Pg. 17) FOR ALL DIRECTIONS (which is based on a higher traffic / risk / population density within the area, without benefit of protective features such as berms and hills. (Transport Canada requires 1,600 meters for situations that involve high-risk surroundings) upon determining actual quantity of explosives refer to Table 6-4 as per ERD quantity of distances.

Table 6 - 4
EVACUATION DISTANCES
Based On Amount of Explosives Present

<b>Explosive <u>Quantity</u></b>	Metric <u>Distance</u>	English <u>Distance</u>
250 kg	70 Meters	230 Feet
500 kg	100 Meters	320 Feet
1,000 kg	150 Meters	500 Feet
2,000 kg	240 Meters	800 Feet
5,000 kg	400 Meters	1,300 Feet
7,000 kg	450 Meters	1,450 Feet
10,000 kg	480 Meters	1,550 Feet
20,000 kg	700 Meters	2,300 Feet
40,000 kg	800 Meters	2,640 Feet
60,000 kg	870 Meters	2,860 Feet
80,000 kg	960 Meters	3,150 Feet
100,000 kg	1040 Meters	3,420 Feet
120,000 kg	1100 Meters	3,610 Feet
>120,000 kg	1600 Meters	5,250 Feet

### 6.3 ENVIRONMENTAL RELEASES

### 6.3.1 Procedure For Fuel Oil Storage Tank Failure

- Assess the magnitude of the leak.
- If the leak is slow and the source can be determined, take the appropriate action to prevent further leakage.
- Transfer fuel from storage tank into drums if necessary.
- Collect spilled material, including contaminated soil, with absorbent pads or inert solid absorbent and store in drums labeled for disposal.
- If the leak is large and further leakage cannot be prevented, allow the dyke to fill. Transfer to drums, label for reuse or disposal, and store.
- Inspect empty tank to identify failure/cause of leak and repair tank.

#### 6.3.2 Procedure For Raw Material Truck Spills

- Identify the material involved, assess the magnitude of the spill or leak and assist the driver to take appropriate action to stop the leak, taking care to prevent run off and/or entry into any water course or drainage system near the spill site.
- For AN prill, shovel spilled material into drums, label for reuse or disposal, and store. Use a non-sparking shovel to transfer spilled material into lined drums.
- For spilled fuel, contain by dyking with earth. Collect spilled fuel with absorbent pads or solid inert absorbent, transfer into drums, label and store for disposal.
- Remove contaminated soil for disposal in conformance with Environment Canada standards.

#### 6.3.3 **Procedure For Process Spills**

- Identify the material involved and assess the magnitude of the spill or leak, taking care to prevent run off and/or entry into any watercourse or drainage system near the spill site.
- For AN prill, shovel spilled material into drums, label for reuse or disposal, and store.
- For spilled fuel, contain by dyking with earth. Collect with absorbent pads or solid inert absorbent, transfer into drums, label, and store for disposal.
- In the case of leaking bags of ANFO, sweep or shovel the spilled material into a clean drum or other suitable container, label for reuse or disposal, and store
- Remove contaminated soil for disposal in conformance with Environment Canada standards.
- Have any process equipment (pumps, process lines, parts, gauges, etc.) involved in a leak or spill inspected and repaired or replaced. Re-inspect and test if necessary after repair is affected.

#### 6.3.4 Procedure For Emulsion Tank Failure

- Assess the magnitude of the leak.
- If the leak is slow and the source can be determined, take the appropriate action to prevent further leakage.
- Transfer remaining emulsion from leaking storage tank into another storage tank, a tanker trailer if available, or into drums as necessary.
- Collect spilled material using double diaphragm pump(s) and store in labeled drums for reuse or disposal at the mine.
- If the leak is large and further leakage cannot be prevented, allow the room to fill. Transfer to drums, label for reuse or disposal, and store.
- Inspect empty tank to identify failure/cause of leak and repair or replace the tank

#### 6.3.5 **Procedure For Fire**

- In the event of a raw material or product fire, take care to protect all
  persons from exposure to smoke and gaseous emissions from the fire.
- Potential toxic gaseous emissions from fires involving explosive materials include:

Oxides of Nitrogen Carbon Monoxide Cyanide Gas

- All fires must be reported to local authorities and Mine Site Security as soon as possible.
- Self contained breathing apparatus is required for fighting a fire in the plant.
- Follow procedures outlined above for any spills and leaks resulting from fire when it is safe to do so

# Table 6 – 5 ENVIRONMENTAL RELEASE PROCEDURES

MATERIAL	SPILL AND LEAK PROCEDURES	WASTE DISPOSAL
Ammonium Nitrate Prill (odorless white to light tan crystalline solid)	Remove source of heat and ignition. Sweep or shovel spill into a clean, non-combustible container. Wash remaining trace residues with water. Wear rubber gloves and safety glasses to minimize contact with skin and eyes.	Re-use if possible or give it to a farmer as a fertilizer. If not possible, dispose of as-is in approved. Remove as much as possible the spilled material as a solid.
Ammonium Nitrate Solution- Colorless/Odourless Liquid – white paste like solid when cooled	Small spill - Dike and contain spilled material. Ensure spilled material does not enter sewers, wells or water courses. Allow to solidify. Use appropriate tools to place in container for disposal. Larger spill - Dike and contain spilled material. Ensure spilled material does not enter sewers, wells or water courses. Notify downstream water users. Allow to solidify. Use appropriate tools to place in container for disposal.	Call for assistance for disposal. Ensure disposal complies with regulatory requirements and regulations.
Fuel Oil (dyed or pale yellow liquid with petroleum odor)	Eliminate any source of ignition. Prevent spills from entering watercourses or drainage systems. Contain with sand or earth. Recover with pump or inert absorbent material into clean container. Wear safety glasses and rubber gloves to prevent contact with the eyes and skin.	Dispose of recovered material in approved landfill or other waste disposal facility.
ANFO (Ammonium Nitrate Fuel Oil)	This material is an explosive. Remove all sources of heat and ignition. Transfer into clean plastic container with a plastic shovel. Label drums. Wear rubber gloves.	Recycle product, if possible. If not practical, explode it inside a borehole or burn it in an authorized burning ground.
Emulsion	This product is a blasting agent. Remove all sources of heat and ignition. Prevent spills from entering watercourses or drainage systems. If large amount of emulsion is involved, contain spill with earth or sand found locally. Recover spilled material with a diaphragm pump. Use of a diaphragm pump also requires an air compressor. Limitation of the pump suction is approximately 2.5 meters, pump discharge is approximately 8 meters. Use a screening device on pump suction hose. Out of area spills will require taking two pumps and extra hose. Transfer the product into a tanker trailer or clean 200 liter drums. If small amount of emulsion is involved, transfer material into a clean plastic container with a plastic shovel. Label tanker trailer or drums. Wear rubber gloves and rubber boots.	Recycle product, if possible. If not practical, explode it inside a borehole or if large amount is involved, demulsify it with liquid detergent.

Enviro CFE	Eliminate any source of ignition. Prevent spills from entering watercourses or drainage systems. Contain with sand or earth. Recover with pump or inert absorbent material into clean container. Wear safety glasses and rubber gloves to prevent contact with the eyes and skin.	Dispose of recovered material in approved landfill or other waste disposal facility.
Sodium Thiocyanate  — White solid - odourless	Ensure adequate ventilation whe handling Sodium Thiocyanate. Keep containers closed when not in use. Wear appropriate PPE – eye protection, gloves and appropriate clothing to prevent skin exposure.	Vacuum or sweep up material and place into a suitable disposal container. Avoid run off into storm sewers and ditches which lead to waterways. Not regulated as a hazardous material. Chemical waste generators must consult appropriate hazardous waste regulations to ensure complete and accurate classification.
Sodium Nitrite – Oxydizing agent - white to light yellow crystals- faint odour	In the event of a spill or leak, contact the vendor (403-263-8660) for advice. Wear respirator, protective clothing and gloves. Vacuuming is the recommended method to clean up spills. Do <b>not</b> sweep or use compressed air for clean up. Recover spilled material on non-combustible material, such as vermiculite. Use non-sparking tools and place in covered containers for disposal. Any recovered material mau be used for it's intended purpose, depending on contamination.	Dispose of the waste material at an approved hazardous waste treatment/disposal facility.
Acetic Acid – Colourless liquid with a pungent odour	Wear appropriate PPE – evacuate downind areas as required to prevent exposure and to allow fumes and vapours to dissipate. Prevent entry into sewers or streams. Dike if needed. Eliminate all sources of ignition. Neutralize the residue with sodium carbonate or crushed limestone. Absorb win an inert dry material and place in an appropriate container for disposal. Flush area with water to remove trace residue.	Waste disposal must be done in accordance with provincial and federal regulations. Empty containers must be recycled or disposed of through an approved waste management facility.

#### 6.4 SECURITY

6.4.1. In the event of a breach of security at a Dyno Nobel Canada Inc. Work Site, a call is to be made to the RCMP / local Police Department at the discretion of the Supervisor/Manager, or their delegate. In the case of a breach of security, Dyno Nobel Canada Inc.' HSE, Regulatory Affairs and Executive / Senior Management shall also be informed immediately and provided with the same information as outlined in Section 6.1

6.4.2. Any person(s) apprehended during the course of a serious security breach shall be detained until the Police arrive (note: employees are not to put themselves at undue risk by attempting to apprehend or restrain a potentially violent person).

#### 6.5 **BOMB THREAT**

- 6.5.1. The safety of employees and the public is of primary concern. A person receiving a bomb threat over the telephone should attempt to remain calm and keep the caller talking by asking the questions listed in Table 6-6 (ERP pg. 20). Recording (writing) as much information about the caller and their comments is also very important for future reference. If possible, alert a co-worker to the situation while talking to the caller.
- 6.5.2. The police / mine security should be advised of the bomb threat as soon as possible. Unless there is good reason to the contrary, all personnel should evacuate the Work Site and await the arrival of the police / first responders at the designated meeting area. Suspicious objects should be reported but not tampered with and other people should be prevented from entering the Work Site until the local authority has authorized a return to the Work Site. Employees should be prepared to assist local authorities in their search / inspection of the Work Site as necessary.

# Table 6 - 6 CONVERSATION GUIDELINES IN THE EVENT OF RECEIVING A BOMB THREAT See Appendix 7

#### 6.6 LINES OF AUTHORITY

6.6.1 Based upon the information available at the time of the incident, the Work Site Supervisor/Manager, in consultation with others (such as DNCI Senior Management, Mine/local authorities and/or Dyno Nobel advisors), will evaluate the incident and proceed with appropriate steps to implement this ERP. A decision on when to return to the scene of a serious incident will be made in like fashion, subject to approval by public authorities overseeing the incident.

6.6.2 The Work Site Supervisor/Manager will have overall responsibility for the implementation of this ERP and the supervision of all Company activities. Public authorities and the site owner have ultimate authority regarding the resumption of normal production activities.

#### 7.0 NOTIFICATION AND REPORTING

7.1 Any incident that activates this ERP shall be documented on the DYNO Incident (Cintellate) Report. The Corporate Emergency Response Advisor must also be notified and in turn will advise the:

HSE Manager Area Manager Vice President Operations

It is the responsibility of the HSE Manager or his delegate to report the incident to DYNO's HSE Management Team. A major incident involving a fire with emissions and/or a hazardous material spill shall be reported to a provincial Environment Officer under the direction of the Environmental Manager. Major incidents shall also be reported to the Chief Inspector, Explosives Branch, Natural Resources Canada; a Provincial/Territorial Safety Officer; and as applicable, an Emergency Measures Official.

Any incident which involves a spill at a Mine Site shall be immediately reported to the Mine Site Environmental Representative, and followed up with a copy of the incident report when complete.

#### 7.2 Spills and Releases – Reportable and Significant Classifications

### 1) Determine if the spill/release is reportable

All environmental incidents are to be input into Cintellate. Reportable spills/releases are not only input into Cintellate, but the investigation and corrective action sections of Cintellate must be completed. To assist in determining if a spill/release is reportable, a listing of common materials with assigned reportable quantities is referenced (see Appendix 5, Reportable Substance List). The reportable quantities utilize the most stringent "reportable quantity" in Canada. Even if the spill/released material is recovered, the media impacted by the spill/release may be reportable to authorities (e.g., a portion of a spill reaching a source of drinking water or wetland). In addition, a spill/release is reportable if the amount equals or exceeds the Dyno Nobel Default Threshold.

#### 2) Determine if the spill/release is significant

• Significant spills/releases are disclosed in the company's annual report. Significant spills/releases trigger time-critical internal actions as required by the company's procedures (crisis communication, internal investigation, etc)

The following table is provided to assist in making these determinations:

#### Reporting of Environmental Spills

#### Is the spill reportable?

- Yes if above a Reportable Quantity
- Yes if oil sheen is visible or sludge/emulsion is deposited beneath water surface
- Yes if water quality standards are exceeded
- Yes if from a UST exceeding 25 gallons or result in a sheen

#### Is the spill significant?

- Yes if authorities implement a national contingency plan
- Yes if "sensitive" environmental features have been impacted
- Yes if neighbors are evacuated
- Yes if authorities and/or neighbors file complaints and/or demand response activities
- Yes if financial impact is >US\$100K
- Yes if media coverage is adverse.
- 7.3 Internal investigation reports will include:
  - Name, work address, and phone number of the investigating (reporting) individual
  - Identification and quantity of the released substance
  - Time, duration, and location of the release
  - Nature and quantity of injuries, property damage, production loss, administrative penalty and/or legal liability
  - Precautions taken during the incident
  - Relevant environmental conditions
  - Corrective actions taken at the time of the incident
  - Recommended corrective actions to prevent future occurrence
- 7.4 Senior Management shall be immediately informed by telephone of any major incident that requires Government notification as per Dyno Nobel's reporting procedures.
- 7.5 Major incidents involving explosive material shall also be reported to the Chief Inspector, Explosives Branch, and Natural Resources Canada by the applicable Regulatory Affairs Coordinator.

# Table 7 - 1 REPORTABLE SUBSTANCE QUANTITY LIST

Marrial	Reportable	Dyno Nobel Default		
Material Released	If Recovered	If Unrecoverable/ Abandoned / Disposed	Threshold (Proposed)	
	Not Reportable if it can be used as a product	45 Kg (100 lbs) as released oxidizer (not media specific)		
ANGLE	44 Kg (100 lbs) for ammonia if released into water	45 Kg (100 lbs) for ammonia if released into water		
AN Solution	Report if released to Drinking Water (DW std at 10mg/L-N)	Report if released to Drinking Water (DW std at 10mg/L-N)	225 Kg (500 lbs)	
	Report if released to aquatic ecosystem (NH3 toxic to fish)	Report if released to aquatic ecosystem (NH3 toxic to fish)		
	Not Reportable if it can be used as a product	45 Kg (100 lbs) as released oxidizer (not media specific)		
	45 Kg (100 lbs) for ammonia if released into water	45 Kg (100 lbs) for ammonia if released into water		
	Report if released to Drinking Water (DW std at 10mg/L-N)	Report if released to Drinking Water (DW std at 10mg/L-N)	225 Kg (500 lbs)	
AN Prill	Report if released to aquatic ecosystem (NH3 toxic to fish)	Report if released to aquatic ecosystem (NH3 toxic to fish)		
	Report if released to Drinking Water (DW std at 10mg/L-N)  Report if released to Drinking (DW std at 10mg/L-N)			
	Report if released to Drinking Water (DW std at 10mg/L-N)	Report if released to Drinking Water (DW std at 10mg/L-N)		
	45 Kg (100 lbs)	45 Kg (100 lbs)		
Sodium Nitrite	Report if released to Drinking Water (DW std at 1mg/L-N)	Report if released to Drinking Water (DW std at 1mg/L-N)	225 Kg (500 lbs)	
	Reportable if sheen on surface of pond, stream, etc. or sludge within such	Reportable if sheen on surface of pond, stream, etc. or sludge within such		
Fuel Oil	State Regulations - Varies from Any Amount to specific Trigger Amounts	State Regulations - Varies from All Spills to specific Trigger Amounts	225 Kg (500 lbs); 261 L (69 gallons)	
	95 L (25 gallons) from UST	96 L (25 gallons) from UST		
Mineral Oil	Reportable if sheen on surface of pond, stream, etc. or sludge within such	Reportable if sheen on surface of pond, stream, etc. or sludge within such		
	State Regulations - Varies from Any Amount to specific Trigger Amounts	State Regulations - Varies from All Spills to specific Trigger Amounts	225 Kg (500 lbs); 261 L (69 gallons)	
	95 L (25 gallons) from UST	96 L (25 gallons) from UST		

Emulsifier Agents	Reportable if sheen on surface of pond, stream, etc. or sludge within such	Reportable if sheen on surface of pond, stream, etc. or sludge within such	225 Kg (500 lbs); 261	
	State Regulations - Varies from Any Amount to specific Trigger Amounts			
	Not Reportable if it can be used as a product	45 Kg (100 lbs) as released oxidizer (not media specific)		
	45 Kg (100 lbs) for ammonia if released into water	45 Kg (100 lbs) for ammonia if released into water		
ANFO	Report if released to Drinking Water (DW std at 10mg/L-N)	Report if released to Drinking Water (DW std at 10mg/L-N)	225 Kg (500 lbs)	
	Report if released to aquatic ecosystem (NH3 toxic to fish)  Report if released to aquatic ecosystem (NH3 toxic to fish)  Report if released to aquatic ecosystem (NH3 toxic to fish)			
	Reportable if sheen on surface of pond, stream, etc.	Reportable if sheen on surface of pond, stream, etc.		
	Not Reportable if it can be used as a product	45 Kg (100 lbs) as released oxidizer (not media specific)		
	44 Kg (100 lbs) for ammonia if released into water	45 Kg (100 lbs) for ammonia if released into water	225 Kg (500 lbs)	
Emulsion	Report if released to Drinking Water (DW std at 10mg/L-N)	Report if released to Drinking Water (DW std at 10mg/L-N)		
	Report if released to aquatic ecosystem (NH3 toxic to fish)	Report if released to aquatic ecosystem (NH3 toxic to fish)		
	Reportable if sheen on surface of pond, stream, etc. or sludge within such	Reportable if sheen on surface of pond, stream, etc. or sludge within such		
Ethylene Glycol	2250 Kg (5000 lbs)	2250 Kg (5000 lbs)	225 Kg (500 lbs)	
	45 Kg (100 lbs)	45 Kg (100 lbs)		
Sodium Thiocyanate	Report if released to Drinking Water (DW std at 1mg/L-N)	Report if released to Drinking Water (DW std at 1mg/L-N)	225 Kg (500 lbs)	

#### 8.0 DECONTAMINATION

8.1 DNCI's Standard Operating Procedures and safety rules establish work practices that minimize employees' direct and indirect contact with hazardous substances.

8.2 Equipment, rubber boots, gloves and clothes that have been contaminated can be washed with soap and water. Wash water should be collected and disposed of in an approved manner with other contaminated material.

#### 9.0 WORKSITE CLOSURE / SHUT DOWN

#### 9.1 Plant Shutdown (use appropriate lock-out/tag-out procedures)

- In the event that a plant is shut down due to weather, flood, or other
  adverse situation, the Plant Manager / Supervisor or his delegate will
  ensure that all non-essential power is shut off. The Plant Manager /
  Supervisor will secure all valves and flow devices so as to prevent
  accidental opening.
- The Plant Manager / Supervisor shall determine if any raw material or raw material storage will be contaminated or at risk of fire/explosion, and take steps to move the material or isolate it from the contamination / hazard source.
- If the power and/or gas will create a dangerous situation the Plant Manager / Supervisor will cut the outside supply of power, thereby isolating all plant equipment.
- The Plant Manager /Supervisor will advise local Mine authorities of the plant shutdown and preventative actions taken.
- All sensitive documents must be secured.

### 9.2 <u>Magazine Closure</u> (use appropriate lock-out/tag-out procedures)

- In the event that a magazine is closed due to weather, flood, or other adverse situation, the Supervisor/Manager or his delegate will ensure that all non-essential power is shut off. Also, the Supervisor/Manager will ensure that all magazines and compound gates are locked before leaving the site.
- The Supervisor/Manager shall determine if any products or raw materials will be contaminated and take steps to move the material or isolate it from the contamination source.
- If power and/or gas will create a dangerous situation the Supervisor/Manager will cut the outside supply of power, thereby isolating all magazine equipment.

#### 10. RESPONSE TO NATURAL DISASTER

Hurricanes, tornadoes, floods, slides, forest fires, and earthquakes, have the ability to damage or destroy everything in their path. Yet much of the

damage or destruction associated with such phenomena is the result of some secondary event, e.g. fallen power lines, ruptured tanks valves, pipes etc. If reasonable warning of an approaching disaster is received, efforts can be made to minimize damage by taking specific preventative measures. These measures are outlined in the following procedures.

- 1. Consult the Site Supervisor for guidance and proceed according to his direction.
- 2. If so directed, notify key personnel regarding the action being taken.
- 3. Collect important files, records and papers for safekeeping.
- 4. Open main electrical breaker to cut off all power to the site. (The main breaker is marked for easy identification).
- 5. Secure all buildings and equipment and lock the site gate.
- 6. Evacuate the site taking mobile equipment to safety.
- 7. Post Guards on site access routes to monitor the activities of unauthorized personnel.
- 8. A report of the incident must be submitted to the Area Manager within 24 hours.

#### 10.1 PREVENTIVE MEASURES

#### 10.2 Waste Disposal Permits

If nitrate waste is generated, a disposal permit must be obtained and kept up to date if the product will be disposed of off-site, or in mine tailings. Permits to dispose of other collected waste in the event of spills or leaks (such as described in Section 6.3) must also be obtained in consultation with mine / provincial environmental representatives

# 10.3 Liquid Containment

All fuel / oil storage tanks must be dyked according to the provisions of Federal and/or Provincial regulations (eg. National Fire Code, Environmental Protection Act), or have a double-walled tank.

A plan must be in place and materials on hand to create a dyke in the event of a large fuel or solution leak or spill or other emergency spill situation.

#### 10.4 **Inspection**

All site emergency storage areas and equipment must be inspected monthly by qualified personnel, monthly for physical condition and serviceability, and the results recorded according to quality and safety standard operating procedures. All recommendations/orders made by NRC Explosives Branch inspectors, Fire Marshals and insurance inspectors must be responded to and acted upon accordingly. Copies of their reports are to be forwarded to DNCI's HSE representative for the region.

#### 10.5 **Maintenance**

All preventive and breakdown maintenance must be carried out and recorded in accordance with standard operating procedures.

# 11.0 WORK SITE START UP (Restoration of Business)

- 11.1 Before startup, the condition prompting the shutdown / closure must be over / corrected (i.e. flood, fire, explosion or blizzard).
- 11.2 All decontamination procedures must be followed and the site cleared and cleaned of any environmental waste hazards.
- 11.3 All repairs to plant equipment involving safety shutdowns and essential operating machinery must be completed.
- 11.4 All electrical circuits, plumbing and piping must be tested.
- 11.5 The Work Site Supervisor / Manager will ensure that all lockout and tag-out procedures have been followed and signed off.
- 11.6 The Work Site Supervisor / Manager will start up the facility by turning on individual switches to the components that have been shutdown.
- 11.7 Operational checks will be done to ensure that all equipment is functioning at safe working pressures and voltage.
- 11.8 The Work Site Supervisor / Manager will give the verbal "all clear" before workers will be allowed to return to work.
- 11.9 The Work Site Supervisor / Manager or one of their delegates will cancel / remove all roadblocks, terminate evacuation activities, and notify employees to return to normal activities.

# DNCI'S EMERGENCY REPORT FORM FOR INCIDENTS INVOLVING EXPLOSIVES

WHO IS CALLING? NAME:				
PHONE #:	TIME:	DA	ATE:	
CALLER'S ORGANIZATION:				
LOCATION OF INCIDENT:				
WHAT IS THE EMERGENCY? <u>PROBLEM</u> : (Motor Vehicle Accident, F	Fire, Scattered Pro	oduct, Disable	d Truck, etc.)	
PRODUCTS INVOLVED: VISIBLE	PLACARDS?	YES	NO	
SHIPPING NAME(S)				
UN NUMBER(S)				
HAZARD CLASSIFICATION (ex: 1.1 I	D) :			
QUANTITY:				
INJURIES:				
PROPERTY DAMAGE:				
EXPLOSIVES VEHICLE UNIT NUMB	ER:	LICENSE	NO	
DRIVER:	CARRIER:			
WHEN DID INCIDENT OCCUR? D	OATE:	TII	ME:	
WHERE IS THE EMERGENCY? (City,	, Town, Rural Are	ea, Lat. & Long	g., Specific Directions	s)
ARE THERE RESIDENCES, BUSINESS THE EVACUATION ZONE (what, wh		PUBLIC GAT	HERING PLACES W	VITHIN
WHAT ACTION HAS BEEN TAKEN (Medical, evacuation, fire fighting, etc.)	TO THIS POINT	IN TIME?		

# **DNCI Corporate contact**

Name	Position	Cell number
Benoit Choquette	Environmental Manager - Canada	(514) 246-6285
Nicholas Ebsworth	General Manager HSE - Canada	(514) 708-5417
Hubert Fafard	HSE Manager Eastern Canada	(418) 570-9257
Willard Pierce	Regional Manager -West	(403) 836-9029
Francois Lambert	Regional Manager -East	(514) 212-3490
Dale Bodnarchuk	Regional Manager - Central	(705) 715-6672
Seamus Kilcommons	HSE Manager Western Canada	(403) 815-4066
Brad Rhude	Sales Manager - Central	(705) 494-5171
Rick Chopp	HSE Manager - Central Canada	(705) 498-2855
Pierre Poulin	Sales Manager - Quebec/Maritimes	(418) 569-5565
Greg Brown	Sales Manager Western	(403) 512-5127
Bryan Sedrovic	HSE/ Regulatory Affairs Coordinator West	(250) 203-4259

<u>APPENDIX 3</u>

<u>DNCI Emergency Response Advisors (ERA) per area</u>

Name	Position	Cell number	Area (West, Central or East)
Tom Medak	Mgr, Bulk Emulsion Operations	(403) 818-4434	West
Ralph Olson	Operations Manager, Vancouver Island	(250) 713-8720	West
Darren Woodhead	Gregg River worksite supervisor	(780) 223-4491	West
Randy Armella	Bulk Operations Manager	(780) 865-6580	West
Cory Redwood	Manager dnx Drilling/ Joint Ventures	(867) 444 - 8533	West
Kevin S Kelly	Operations Manager - Seismic	(403) 934-0753	West
Tyrone McClean	Operations manager, Manitoba and Saskatchewan	(204) 687-0046	Central
Scott Smith	Operations Manager, Red Lake Ontario	(807) 727-7300	Central
Mike Ertel	Operation Manager - Ontario	(807) 629-9660	Central
Joss Forget	Operations Manager Northern Ontario	(705) 471- 8745	East
David Roy	Manager Plant operations	(418) 570-5604	East
Francois Lambert	Operations Manager	(514) 212-3490	East
Daniel Roy	Dyno Consult , Ste-Sophie	(514) 213-5889	East
Pierre St-George	Regulatory Affairs Canada	(613) 677 - 1051	Canada

# SITE: Meadowbank Site

#### MANAGEMENT AND WORK SITE CONTACT LIST

NAME	TITLE	BUSINESS PHONE	HOME PHONE	CELL PHONE
Doug Robertson	Site Supervisor	(867) 793-4610 (Option 2; option 1 ext 6804)		(867) 222-3930
Dennis Wall	Site Supervisor	(867) 793-4610 (Option 2; option 1 ext 6804)		(867) 222-3930
Site employees	All employees on shift	(867) 793-4610 (Option 2; option 1 ext 6804)		
Tom Medak	Operations Manager	(403) 723-7530		(403) 818-4434
Seamus Kilcommons	HSE Manager	(403) 236-9160 Ext 7547		(403) 815-4066

#### **EXTERNAL CONTACT NUMBERS**

ORGANIZATION/CONTACT	LOCATION	PHONE NUMBER	
Mine security	Meadowbank	Ext. 6817	
Local Fire; ERT	Hinton	Ext 6911	
Local Ambulance	Hinton	Ext 6911	
Baker Lake RCMP	Hinton	867 793-1111	

**Area Office Address:** 

Meadowbank site Baker Lake, NU Type of Facility: Emulsion Plant AN Tote storage

#### **Emergency Meeting Place Upon Evacuation:**

As identified on site orientation forms, employees and visitors are to meet at muster point for head count. Once all persons are accounted for, all will proceed to the Muster Point located at Security Gate #1, located at junction of All Weather Road. (see map)

#### **Emergency Equipment On Hand:**

Fire Extinguishers, First Aid Kits, Fire alarm system, video monitoring,

# FY 2011 drill conducted

# **BOMB THREAT CHECKLIST**

Exact time of call:						
Exact words of caller	Exact words of caller:					
	•	QUESTION	IS TO ASK			
1- When is bomb going	g to explode?					
2- Where is the bomb	)?					
3- What does it look like	ke?					
4- What kind of bomb	is it?					
5-What will cause it to	explode?					
6- Did you place the I	bomb?					
7- Why?						
8- Where are you calling	ng from?					
9- What is your address	s?					
10- What is your name	?					
		CALLER'S V	OICE (circle)			
	Calm	Slow	Crying	Slurred		
	Stutter	Deep	Loud	Broken		
	Giggling	Accent	Angry	Rapid		
	Stressed	Nasal	Lisp	Excited		
	Disguised	Sincere	Squeaky	Normal		
If voice is familiar, who	om did it sound	like?				
Were there any background	ound noises?					
Remarks:						
Person receiving call:			Telephone numbe	r call received at:		
Date:			Report call immed	liately to:		

# **NEW/TRANSFERED EMPLOYEE OR ANNUAL REFRESHER FORM**

		HSE Employee Orientation Form To Be Completed By Supervisor (within 2 to 4 weeks of hiring)		
(Employee Surname)	(Given Names)		(Worksite (Date of Hire)	)
(Job / Position)		(RFT/ RPT/ Casual / Temp)	(End date if a	oplic)
	<u>Date</u> Completed	Show & Tell		<u>Date</u> <u>Completed</u>
Tour Of Facility			Introduction To Staff	
Emergency/Fire Exits & Procedures			Workplace Hazards & Controls	
Environmental Clothing Issued			First Aid & WCB Reporting	
Overview Of Organization			Telephone Contacts	
Work Schedules			Time Sheets & Pay Periods	
Security & Key Control			E-mail & Website Access	
Expense Claims Procedures			Other:	

	Documentation Given To &/or	
	<u>Discussed With Employee</u>	
		DYNO G & S
Position Description		Work Rules
Worksite ERP, TDG	٦	
ERAP & CCP		MSDS's
21011 0 001	_	Webe 3
Handling/Transporting	7	
Explosives		SOP's
	_	
		Policy: HSE &
Employee Guidelines		Quality
	٦	
Dallary Drivesov S		Policy: Substance
Policy: Privacy & Confidentiality		Abuse
Confidentiality		Abuse
icy: Violence In The	7	
Workplace		Policy: Security
-	_	
Policy: Smoking In		Performance
The Workplace		Reviews
Other:		Other:
	New Hire Training Completed	
Customer Orientation		WHMIS
		PPE (as
TDG Clear Language	_	applicable)
Handling/Transporting	٦	Fire
Explosives		Extinguisher
Explosives		Extriguistici
ICARUS (Incident	7	Take 5 (Hazard
Reporting)		Assessment)
	_	
Worksite ERP,		
TDG ERAP &		
CCP		
Supervisor (Print Name)	Supervisor Signature	Date



# ANNUAL ERT VISIT REVIEW FORM

# Information to be released to Emergency Services

From: Local Emerg	jency Services		
Subject: Emergend	sy Response Plan fo	or	
prepared by Dyno	Nobel Inc. Has been		
kept on file for futu	re reference. If que	RP has been discussed and bestions arise, we have been g	iven
Onresponder	the	of 2011, AEM ERT attended the Dyno Nobel	I
Weadowbank Site f	or an annual visit a	na ERP review.	
Signed:			
Position:			

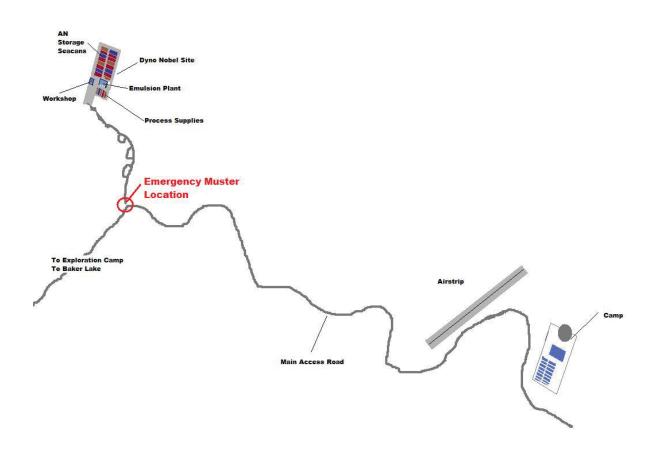
Date:	
	APPENDIX 9

# Transportation of Dangerous Goods Regulation Class Quantity Emission Limit

1	Any quantity that could pose a danger to public safety or 50 kg
2	Any quantity that could pose a danger to public safety or any sustained release of 10
	minutes or more
3	200 L
4	25 kg
5.1	50 kg or 50 L
5.2	1 kg or 1 L
6.1	5 kg or 5 L
6.2	Any quantity that could pose a danger to public safety or 1 kg or 1 L
	Any quantity that could pose a danger to public safety. An emission level greater
7	than the level established in section 20 of the Packaging and Transport of Nuclear
	Substances Regulations
8	5 kg or 5 L
9	25 kg or 25 L

Table identified in Section 8.1(1) of Part 8 of the Transportation of Dangerous Goods Regulation Class Quantity Emission Limit

# **Evacuation/ Muster location**



Spill	Co	ntingend	Э	Plan
Version	7.	Februar	V	2019

# Appendix K

MBK-ENV-0016 Spill Reporting Procedure



# Spill Reporting Procedure



<b>NV-0016</b>

People concerned	All Departments	onto.	Prepared by	Jeff Pratt Erika Voyer Environment Coordinator	
		ients	Authorized by	Kevin Buck Assistant Environmental Superintendent	
Effective :	January 18, 2	015	"Safety First, Safety Last Safety Always!"  "No Repeats" – Our Stepping Stone to ZERO HARM		

This procedure corresponds to the required minimum standard. Each and everyone also have to comply with the rules and regulations of the Nunavut Government in terms of health and safety at work.

#### **Objective:**

As per Meadowbank's Water License we must have and employ a Spill Contingency Plan. The
overall purpose of creating a spill contingency plan is to minimize the impacts of spills by the
establishment of predetermined lines of response and plans of action. The plan has been
designed to facilitate effective communication and the efficient clean-up of spills from potentially
hazardous materials. The Plan also specifies the reporting of all spills on site to the Environment
Department. The Plan details which spills will be reported to regulators.

#### **Concerned departments:**



**ALL DEPARTMENTS** 

#### Risks/ Impacts Legend



Health & Safety



Process/quality



Costs



Environment



# Spill Reporting Procedure



### **Definitions:**

- A) A <u>Major spill</u> is defined as an accidental release of product into the environment that has the potential for adverse impacts to the receiving environment, AEM property or human health. This can include potential impacts to water, surface and groundwater, land, equipment, buildings, human health and the atmosphere.
- B) A <u>Minor spill</u> is defined as any spill that does not involve a toxic, reactive, or explosive material in a situation that does not pose a significant risk to the environment, is not human health or AEM property.

	Procedure	Risks/ Impacts
1.	<u>All Spills</u> on the Meadowbank site regardless of size, quantity, location, or time of spill are to be reported to the Environment department.	<b>O</b>
2.	Spills must be immediately reported to the Supervisor.	
3.	The supervisor will determine if the spill is a major or minor spill.	
	A) If the spill is <i>Major</i> , supervisor will call CODE 1 to dispatch (Mine, AWAR, or Control room).	
	B) If the spill is <i>Minor</i> the supervisor will contact the Environment Department ( <b>Channel 9</b> or extension 6747 or 6759 Techs / 6980 or 6728 Coordinators)	
4.	Whether the spill is Major or Minor the following must be verbally reported:	
	a) Product description (diesel, hydraulic oil, sodium cyanide)	
	b) Estimated quantity of the product	
	c) Location of Spill	A 12 1
	d) Area contaminated (#meters x # meters)	
	e) Cause of spill – If this is not yet know best assumption	
	** if photos can be taken of the spill, please submit to the environment department with spill report	
5.	For a <i>Major Spill</i> the Supervisor will ensure the area stays safe until the ERT team arrives to intervene. The environment department will assist the ERT team.	



# Spill Reporting Procedure



6.	For a minor spill the supervisor and the Environment department will then determine the clean-up method and the location in which the contaminated material will be taken too.  **Environment department may want to investigate the spill prior to clean up.	
7.	A spill report will need to be completed, <i>In Full</i> , and submitted to the environment department within <u>12 hrs.</u> of the spill occurring. Thus allowing time for the environment department to determine if it needs to be reportable to the Governing bodies.  **Spill report is attached below or can be found here: http://mymeadowbank/documentcentre/Documents/Health%20and%20Safety/2014%20- %20AEM%20Internal%20Spill%20Report%20Form_V03.pdf	
8.	Spills found on site that have not been reported to the environment department will be deemed as Non-Reported spills.	

# Agnico Eagle Mines Meadowbank Project: Internal Spill Reporting Form

(Spills greater than the *Reportable Volume*, see Spill Contingency Plan, require the completion and submission of the *Nunavut Spill Report Form*)

	Meadowbank Project	Spill report #.
AGNICO EAGLE		
Date and time of spill :		
Location of spill :		
First responder name :		
Company Name:		
AEM Contact:		
Nature of contaminant :		
Volume/quantity of the container /	tank (L)	
Quantity spilled (L):		
Cause of the spill :		
Contaminant collected by :		
Follow-up done by :		
Actions taken :		
Report completed by:		Date :
Incident investigation recommende	ed: YES 🗌	NO
Government agency notified :	YES 🗌	NO
Date of notification to government	agency:	
Date of report :	Signature of environmen personnel :	tal

Spill	Co	ntinge	ency	Pla	an
Version	7.	Febru	Jarv	201	9

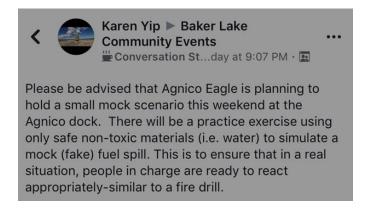
# Appendix L

2018 Mock Spill

#### Mock Spill Baker Lake

September 8<sup>th</sup>, 2018

Karen Yip, AEM Community Liaison Coordinator in Baker Lake sent a Facebook message to advise the community of the scenario, in case that we use the radios and call a code one or that information is spread on this simulation event.



<u>Scope/event</u>: During the Jet A discharge, simulation of a breaking valve in the secondary containment and overflow of the secondary containment;

Environment technician on site; Fanny Laporte & Jonathan Pameolik

#### **Event:**

16:04 the Intertek crew discovered the leaking valve and advised ship captain to stop the fuel discharge

16:05 communication from Intertek to AEM staff at the spud barge, Freddy Riveron and Jean-Noel Vigneault explaining the emergency

16:05 Guillotine activated on the fuel line by the labor in charge of the inspection of the line /Employee of PetroNav Desgagnés

AEM employee left right away to the Environment spill response sea cans and grabbed the necessary supplies to contain the spill, absorbent booms, pads, PPEs, ½ cut drum, yellow secondary containment

16:07 confirmation from the vessel captain that the discharge has stopped- AEM spud barge team arrive at the location of spill Jet A.

Action taken to stop the spreading of the spill, installation of absorbent, etc.

16:12- call from the crew to AEM environment team- AEM E&I supervisors for extra resources, if not available- Arctic Fuel services will be called.

• Shovel to make a trench

- Vacuum truck
- Emergency pump and drums
- Truck for transportation, etc.

Emergency document and phone list was available at the spud barge office.

16:20 Debriefing; review of the *General Spill Procedure, section 10* of the OPEP, *Oil Pollution Emergency Plan* 

Proper PPEs were worn- rubber gloves for the worker in contact with Jet A and safety glasses.

Good communication between the Intertek and AEM crew,

#### Recommendation from Environment;

Secure the perimeter: block access to the spill site with a pickup, a ribbon or/and message on the radio

Call dispatch for CODE 1, if the spill is significant or uncontrolled or the environment impact is major, e.i running to the lake.

Pick up at the spud barge need to have a hitch to put the boat in the water in case of emergency, it was not the case at the moment of the mock scenario.

Some documents related to OPEP and Emergency Spill response plan are outdated in the binder at the spud barge office; they need to be updated with the new documents. (as for example Woodward is now replaced by PetroNav Desgagnés, etc.)

#### Recommendation from the Intertek crew for H&S and environment;

To have a dock or a bridge section for pedestrian, they have to walk on the dock around the heavy equipment and they often have glass fuel jars that can break while they try to jump from the boat to the dock (they mention that the access is not easy and unsafe)

While doing the scenario, the Intertek employee recommended that they have a spill kit ready in a box in their pick up at all time during the discharge. This plastic box or cut drum can contain the minimum required to react to an eventual spill without having to drive down to the emergency sea-can, putty, absorbent, PPE- gloves, etc.

#### Recommendation/question from the spud barge personnel;

Why isn't there a permanent pipe & manifold with valve for the Jet A as well as the fuel tank, as of right now, there is probably 5000 feet of hoses which increase the risk of a spill while assembling/dismantling, connections, etc.

#### Varia;

Sulfur was removed from the Jet A fuel as per new regulation, therefore, the Jet A does not have a strong odor anymore and a spill may not be detected by the smell.

Camera, radio, electronic devices are not allowed around the discharge to prevent the risk of explosion

Low pressure alarm will go off in case of any loss of pressure, therefore, spill will or leak can easily be taken in charge early.



Employee of AEM getting supplies for spill response



Guillotine was pre-installed as per discharge protocol and it was closed right after the call of the leak



Scene where the mock spill occurred



Intertek and AEM crew installing the secondary containment and spill supplies





Drums, spills kits, quattrex and totes were available



Boat, gasoline, safety items were also available- the boat works, we went on the lake



Debriefing

Spill	Co	ntingend	Э	Plan
Version	7.	Februar	V	2019

# Appendix M

Product Transfer Area Assessment - Baker Lake Oil Handling Facility



Meadowbank Gold Project

Product Transfer Area Assessment – Baker Lake Oil Handling Facility

February 15<sup>th</sup>, 2019

**Prepared for:** 

**Environment and Climate Change Canada** 

Prepared by:

Agnico Eagle Mines Limited – Meadowbank Division

## **Document Control**

Version	Date	Tank/EC number	Section	Revision	Author
1	February 2019	EC# 00025772 and 00026142		Implementation of the Product Transfer Area Assessment – Baker Lake Oil Handling Facility for the ERP	Robin Allard, General Supervisor Environment
2					

Prepared by: Environmental Department

Approved By:

Robin Allard

Meadowbank General Supervisor Environment

## 1 Introduction

The purpose of this document is to satisfy the requirement of Section 15 of the Storage Tank Systems for Petroleum Products and Allied Petroleum Products Regulations (STSPPR) (SOR/2008-197) made pursuant to Canadian Environmental Protection Act, 1999 which states:

**15 (1)** The owner or operator of a storage tank system must ensure that petroleum product and allied petroleum product transfer areas are designed to contain any releases in liquid form in the environment that occur during the transfer process.

In accordance to the STSPPR, a "transfer area" means:

the area around the connection point between a delivery truck, railcar, aircraft or vessel and a storage tank system in which the tanks have an aggregate capacity of more than 2,500 L.

Furthermore, Subparagraph 2.1(2) of the STSPPR states:

a person must not release - or permit or cause any release of - a petroleum product or allied petroleum product, in liquid form in the environment, during the transfer of the product to or from a storage tank system if, in the case of a system that has a transfer area, the release during transfer reaches outside the transfer area.

In accordance with the above requirement, the following information intents to be the Product Transfer Area Assessment –for the Baker Lake Oil Handling Facility for both the Jet-A and the Diesel Tanks.

# 2 Fuel Transfer Area Description

#### 2.1 Baker Lake Oil Handling Facility

The Baker Lake Oil Handling Facility (OHF) consists of six (6), ten (10) million liter tanks for diesel fuel, within secondary containment (Figure 1). The steel fuel tanks have been field-erected and built to API-650 standards with each bermed area holding two tanks. This area is capable of containing 110% of the volume of one ten (10) million liter tanks storage tank. Agnico Eagle is currently in the permitting process to add two (2) 10 ML diesel tanks in Baker Lake. The additional diesel tank will not change the current Product Transfer Area Assessment, as the process for fuel transfer will remain the same, i.e. no additional transfer area will be created.

The OHF also consist of eighteen (18), 100,000L double walled tanks, within secondary containment, for aviation fuel (Jet-A) (Figure 1). The steel fuel tanks have been field-erected and built to API-650 standards with the bermed area holding eighteen tanks. This area is capable of containing >110% of the volume of one 100,000L storage tank. Both Jet-A and Diesel storage area were designed by qualified engineering firm.

The Diesel and Jet-A tanks are refilled during the barge season on an annual basis, generally from July to October.

#### 2.2 Ship to shore transfer area

The Diesel fuel transfer area from ship to tank farm consists of a permanent 6 inches steel pipe, 266m long. Two (2) shipper certified transfer hoses, 4 inches and 178m long, are connected to the shore permanent based pipeline manifold for the transfer of diesel fuel to the diesel tank farm (Photo 2). The diesel transfer rate is 200 m³/hr. At the connection of the ship's transfer hose to the OHF manifold a portable containment pool is erected and in place during the transfer of product. This pool is capable of holding ~250L of liquid in the case that there is a leak at the flange or residual drips out of the conduit or hard wall pipe. Spill "pop-up" pools are also place under each joint for the transfer hose used to fill the Fuel tanks. These popup pools are only capable of holding 20-50 L of fuel and are in place to catch residual and be a first line of defense in the case of a leak. There is also a permanent watcher at the fuel manifold to detect any leak.

For Jet-A fuel, separate shipper certified hoses are laid out from the vessel to the Jet-A manifold located in the Jet-A Secondary Containment (Photo 3). As detailed in Section 2.1 above, this area is capable of containing >110% of the volume of one 100,000L storage tank. A total of 582m of 4" certified hose are required to reach the Jet-A transfer area. The Jet-A transfer rate is 100 m³/hr. Spill "pop-up" pools are place under each joint for the transfer hose used to fill the Fuel tanks. These popup pools are only capable of holding 20-50 L of fuel and are in place to catch residual and be a first line of defense in the case of a leak.

#### 2.3 Refueling station to truck transfer area

For both the Diesel and Jet-A transfer area, there is one loading arm with dry quick connect coupling for tank truck filling operation (Photo 4). Loading arm is connected to an insulated pumping station (Photo 5) and consist of a single continuous 4m x 3 ½ inches pipe from the loading arm to the fuel truck. Both refueling system are equipped of a Scully System. These systems are capable of controlling fills and eliminating spills of tanker trucks. All fuel truck are equipped of a sensor that connected directly with the fuel dispenser. When the volume reach 90% of the truck tank capacity, the sensor stopped the refueling. The flow rate is approximately 715 L/min for both the Jet-A and Diesel. During refueling activities, a portable containment is place under the dry quick connect coupling to capture small spills that may result during disengagement of the loading arm. At the Diesel refueling station, a secondary containment area of 5,000L was constructed.

Location: 64°18'22.76" N, 95°57'33.99" W. Baker Lake, Nunavut

**Diesel Tank System ID:** EC# 00025772 **Jet-A Tank System ID:** EC# 00026142

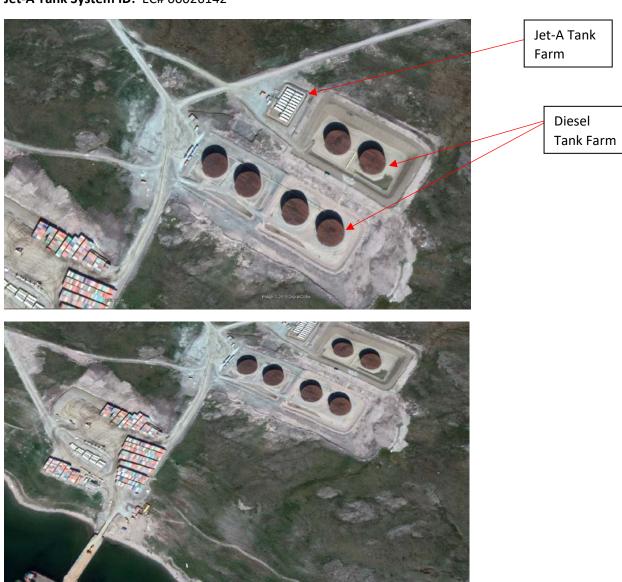


Photo 1: Agnico Eagle Ltd.'s Baker Lake Oil Handling Facility





Figure 2: Diesel Transfer - Connection between shipper transfer hoses and Agnico permanent pipeline



Photo 3: Jet-A Transfer - Connection between shipper transfer hoses and Agnico permanent pipeline



Photo 4: Agnico Eagle Ltd.'s Refueling Station – Loading arm and Scully System



Photo 5: Agnico Eagle Ltd.'s Refueling Station – general view

## 3 Legislation

#### 3.1 Ship to shore transfer area

Transfer of from ship to shore is performed in conformance with procedures outlined in:

- Canada Shipping Act;
- Response Organizations and Oil Handling Facilities Regulations;
- Vessel Pollution and Dangerous Chemical Regulation;
- Environmental Response Arrangements Regulations;
- Oil Handling Facilities Standards (TP 12402E);
- Response Organization Standards (TP 12401);
- Arctic Waters Oil Transfer Guidelines (TP 10783);
- Environmental Prevention and Response National Preparedness Plan (TP 13585);
- Release and Environmental Emergency Notification Regulations;
- Guidelines for reporting Incidents Involving Dangerous Goods, Harmful Substances and/or Marine Pollutants;
- Requirements of the Central & Arctic Regional Response Plan;
- National Fire Code of Canada (NFCC);
- Storage Tank Systems for Petroleum Products and Allied Petroleum Products Regulations 2008;
   and
- Canadian Council of Ministers of the Environment, "Environmental Code of Practice of Aboveground and Underground Storage Tank Systems Containing Petroleum Products and Allied Petroleum Products – 2003 (Updated in 2013).

#### 3.2 Refueling station to truck transfer area

Transfer of fuel into trucks is performed in conformance with procedures outlined in:

- National Fire Code of Canada (NFCC);
- American Petroleum Institute (API) Standard: 2610-94: "Design, Construction, Operation, Maintenance and Inspection of Terminal and Tank Facilities";
- Canadian Petroleum Products Institute (CPPI, 1992): "Professional Driver's Manual";
- Canadian Council of Ministers of Environment (CCME) Code of Practice (COP) 2003; and
- Agnico Eagle fuel transfer procedure.

# 4 Analysis of Product Transfer Area Risks

The diesel and Jet-A storage tank system owned by Agnico Eagle Mines, located in Baker Lake, Nunavut, was evaluated in accordance with Environment and Climate Change Canada's (ECCC) approach to transfer area protection. A number of potential incidents, risk and related receiving environments were identified for this product transfer area.

The table below lists potential incidents, outcomes, description of PTA and receiving environments that have been identified for the storage tank system on site. The table also provides an evaluation of identified risks and an assessment on whether further action is required, and a list of mitigation measures.

Table 1: Product Transfer Risk Assessment – Ship to shore

Potential Incident	Outcome	PTA and Receiving Environment	Spill Consequence	Probability	Potential Impact	Evaluation	Mitigation Measures
Leakage if fuel remains in line after offloading and leakage at all couplings in the line (by the boat and outside the connections)	Maximum of ~7,900L of diesel and ~4,800L of Jet-A is released to Baker Lake	Secondary containment  Adjacent soil/gravel area within ~10m	Low: the product is confined secondary containment.  Moderate: the product reaches bare ground.	Moderate	High	No Action Required	Trained Intertek Personal oversee product transfer at all time  Line is cleared of fuel following transfer  Portable containment used under each transfer hose connection
Coupling/equipment fails at onshore coupling	Maximum of ~7,900L of diesel and ~4,800L of Jet-A is released to Baker Lake	Baker Lake	High: the product reaches a water body.	Moderate	High	No Action Required	Ships pumping system shuts off if hose pressure is lost.  Trained Intertek Personal oversee product transfer at all time  Transfer point is up gradient of pumping point so line does not completely drain if uncoupled  Emergency Response Plan and Spill Contingency Plan  Oil Pollution Emergency Plan  Shipboard Oil Pollution Emergency Plan  Marine spill response equipment adjacent to transfer point
Coupling/equipment fails at offshore coupling	Maximum of ~7,900L of diesel and ~4,800L of Jet-A is released to Baker Lake			Moderate	High	No Action Required	Spill contained onboard at pumping area  Shipboard Oil Pollution Emergency Plan
Public interference	Transfer hose is damaged by passing boat or			Low	High	No Action Required	Community awareness conducted by Agnico

	transfer impacted by public protest					Boat traffic monitored by Desgagnes and Intertek
Operator spills small amount of fuel while uncoupling hose	~1 L of fuel is captured in secondary containment		High	Low	No Action Required	Portable containment used under each transfer hose connection
Vehicle contact with piping between transfer point and tank	Broken piping releases ~5,000L of fuel to adjacent gravel area, potentially reaching Baker Lake		Low	High	No Action Required	No road where pipes are installed for the transfer  Trained Intertek Personal oversee product transfer at all time  Fuel lines connected to tank farm can only release contents of the line.

Table 2: Product Transfer Risk Assessment - refueling station to fuel truck

Potential Incident	Outcome	PTA and Receiving Environment	Spill Consequence	Probability	Potential Impact	Evaluation	Mitigation Measures
Overfill during loading of fuel truck	Approximately 95L product is captured in secondary containment	Secondary containment  Adjacent soil/gravel area within ~10m	Low: the product is confined secondary containment.  Moderate: the product reaches bare ground.	Moderate	Low	No Action Required	Secondary containment  Scully fitted with optic overfill prevention system  Permanent indoor structure with visual display for operator in cold weather
Overfill device fails	Product flows into secondary	Bake Lake	High: the product reaches a water body.	Moderate	Low	No Action Required	Live cameras to Agnico Security Officer office Shut off button and tanker overfill pipe
	containment					rtoquilou	Scully System  Permanent visual contact while refueling
Coupling/equipment fails at pump	Broken piping/hose			Moderate	Moderate	No Action Required	Shut off button, drainage to low point on roadside

station-hose connection.	releases ~121L of fuel to adjacent gravel area.					Emergency Response Plan Spill Contingency Plan Trained spill response staff equipment for large spills or
Absence of inspection (pre-op, checklist)	Faulty component or leak is not detected resulting in slow release of ~1L of product		Moderate	Moderate	No Action Required	Spill kit Pre-op inspection (daily) Standard Operating Procedu (SOP)
Public access	Member of the public attempts to take or release fuel		Low	Low	No Action Required	Signage and surveillance car Fuel system security coded Community awareness conductory Agnico
Vehicle contact with building/equipment	Broken piping releases ~1,000L of fuel to adjacent gravel area.		Low	Moderate	No Action Required	Secondary containment structure protects fuel station from colliby forming a barrier.  Fuel lines connected to tank to can only release contents of the line.
Inappropriate equipment for arctic conditions (arm/valve)	Valves and components fail in arctic conditions releasing ~121L of product		Moderate	Moderate	No Action Required	Valves and hoses suitable for arctic conditions installed.  Pre-op inspection (daily)
Operator spills small amount of fuel while uncoupling hose	~1L of fuel is captured in secondary containment		High	Low	No Action Required	Portable containment used ur dry quick connection

Please see Appendix A for the calculations relating to the product transfer areas. In summary, potential product spillage, volume has been calculated as follows:

Fueling station: a maximum delivery rate of 715 L/min and an emergency shut off time of 8 seconds would result in a product spillage volume of approximately 95.36L. Based on 8.9 cm hose at 4.06 m in length, a maximum potential spill at the tank / hose connection would result in an additional volume of 25.24 L, for a total 120.6 L of fuel spilled.

Ship to shore: a diesel maximum delivery rate of 3,333 L/min and an emergency shut off time of 8 seconds would result in a product spillage volume of approximately 444.4 L. Based on shipper transfer hose (10 cm diameter/178m in length \* 2 hoses) and permanent pipeline (15 cm diameter/266 m in length), a maximum potential spill at the tank / hose connection would result in an additional volume of 7,492.65 L, for a total 7,937 L of diesel spilled.

Ship to shore: a Jet-A maximum delivery rate of 1,667 L/min and an emergency shut off time of 8 seconds would result in a product spillage volume of approximately 222.24 L. Based on 10 cm hose at 582 m in length, a maximum potential spill at the tank / hose connection would result in an additional volume of 4,568.70 L, for a total 4,790.94 L of Jet-A spilled.

# 5 Mitigation of Risks

#### 5.1 Ship to shore transfer area

In the event of a spill, three (3) potential receiving environments have been identified for the fuel transfer system: the soil/gravel area partially surrounding the transfer area secondary containment and extending a distance of approximately 10 meters, the adjacent soil/ground surface, and the adjacent water body Baker Lake.

Any product amount of 100L or less that spills onto the gravel area can be recovered using the spill kit and shovels/equipment available on site. For spills of over 100 L, the product will likely reach the adjacent soil/ground surface and/or Baker Lake directly via overland surface flow (depending on the season). The following mitigation measures include:

- 250L secondary containment pool at onshore connection point;
- 20-50L spill 'pop-up' pools are also place under each joint for the transfer hose used;
- Pump and 1,000L portable containments on standby during transfer;
- Trained Intertek Personnel oversee product transfer at all time;
- Emergency Response Plan and Spill Contingency Plan on site;
- Oil Pollution Emergency Plan updated annually and review with all personnel involved in the ship to shore fuel transfer;
- Marine spill response equipment on site;
- As the ship to shore transfer only occurred during open water season, there is no potential spill risk during winter;
- Shipboard Oil Pollution Emergency Plan;
- The ship's pumping system is fitted with an emergency shut off system which is activated when pumping pressure is lost; and
- Annual MOCK spill and result analysis;

#### 5.2 Refueling station to truck transfer area

In the event of a spill three (3) potential receiving environments have been identified for the refueling system: the gravel area surrounding the refueling station and extending a distance of approximately 10 meters, the adjacent soil/ground surface, and the adjacent water body Baker Lake.

Any product amount of 1,000L or less that spills onto the gravel area can be recovered using the spill kit and heavy equipment on site. For spills of over 1,000L, the product will likely reach the adjacent soil/ground surface and/or the Baker Lake directly via overland surface flow (depending on the season). During winter, the likely hood of product flowing to the shoreline increases; however, snow berms can be quickly installed. Mitigation measures include;

- Secondary containment for hose storage;
- Secondary containment for refueling of fuel trucks;
- Standard Operating Procedure (SOP);
- Inspection to determine if SOP are followed;
- Trained operators;
- Spill kit at refueling area containing absorbent pads;
- Marine spill response equipment on site;

- Personnel monitor transfer from viewing window in pump station; and
- Scully system wire optic transfer system to prevent overfill.

# 6 Standard Operating Procedure (SOP)

#### 6.1 Refueling station to truck transfer area

The Agnico procedure for diesel and Jet-A refueling fuel trucks in summarized as follows;

- 1. Perform an inspection of the vehicle.
- 2. Park the vehicle in the vicinity of the refueling tank and shut off your ignition.
- 3. Install wheel chocks on either side of the tanker tire.
- 4. Inspect the entire working area including the steps up to the HMI and the area in front of the loading arm and scully system; call your supervisor if there are problems.
- 5. Install the portable spill containment underneath the connection point.
- 6. Check the maximum capacity for the tanker being used. Ensure to only fill the tanker at 90% of the capacity to have room for fuel expansion at different temperatures, and a safe level for haulage. Fill the tanker to maximum 40,000L.
- 7. At the valve control panel, lift all the levers up, and make sure the valves are open.
- 8. Remove the cap of the scully plug and push and twist it onto the receiving end on the truck. Make sure the green light is on before continuing.
- 9. Connect the loading arm to the tanker.
- 10. Make sure the valves are open on each side.
- 11. Open the valve on the building.
- 12. Enter the control room and begin to program the fuel loading on the HMI.
- 13. Enter the applicable Microload identification and load sequence.
- 14. Enter the volume measure with the pop-up keypad.
- 15. Select the start button to activate the pump.
- 16. Once the fueling begins, the operator must monitor the situation diligently; this includes checking for leaks or monitoring any other unusual situations. The operator must be at the connection point at all times during fueling.
- 17. When finished pumping, close the valve on the building.
- 18. Disconnect the loading arm first, and then the truck level control.
- 19. Put the arm back and the truck level control in place. Close the valve.
- 20. Put the protection bag over the scully and the hose. Verify if the caps are put back on the truck.
- 21. Put back the portable spill containment.
- 22. At the valve control panel, pull down all the lever to close valve, and make sure they are closed.
- 23. Complete the mechanical verification in the pump station. Make sure they have no leaks on the equipment.
- 24. Before you leave, make sure the three doors are close at the fuel station.
- 25. Remove the wheel chocks and fully inspect the vehicle before beginning to bring the fuel to the Meadowbank Fuel Tank Farm.
- 26. If you encounter any emergency or a spill occurs, call your supervisor immediately and the Road supervisor of Agnico Eagle Mine Meadowbank.

### 6.2 Ship to shore transfer area

For a completed review of procedure during fuel transfer, refer to the Oil Pollution Emergency Plan. The fuel transfer is overseen by Intertek (contracted first responder). The Agnico procedure for refueling diesel and Jet-A tanks in summarized as follows:

- 1. The Oil Pollution Emergency Plan (OPEP) must be reviewed on an annual basis and updated prior to the first annual discharge. This will include but not limited to:
  - a) Reviewing the phone numbers for emergencies
  - b) Updating maps
  - c) Review and if necessary update equipment lists
  - d) Review roles and responsibilities
  - e) Update Declaration
- 2. Contact Canadian Coast Guard and Transport Canada Pollution Prevention and make them aware of plans for transferring of fuel into our Oil Handling Facility (OHF) for that season
- 3. Complete Inventory report for Spill Response Sea Can at Agnico's Oil Handling Facility in Baker Lake
- 4. Ensure Shipping Company has provided Hose Testing Annual certification
- 5. All personnel who will be a part of the fuel transfer (including Baker Lake Supervisor and third part contractor Intertek) must review the OPEP and be familiar with preventive measures to take and with the steps to take in the case of a spill event while fueling
- 6. Install and monitor secondary containment underneath each connection of conduit on land
- 7. Ensure there is two-way functional communications between the OHF and the off-loading vessel
- 8. Ensure there is lighting in place at the transfer flange to provide illumination during any transfers taking place during the low to no light hours
- 9. Prior to any discharge, Agnico Eagle must receive a copy of the ship/shore checklist completed by the shipping company. Agnico Eagle should also verify this has been completed (as much as realistically possibly without boarding the ship)
- 10. The Pre-discharge Checklist for Agnico's Oil Handling Facility in Baker Lake must be completed, signed and provided to the Environment Department prior to discharge
- 11. During the ship-to-shore transfer, Agnico Eagle will have competent personnel on location at all times to monitor the fuel transfer and maintain contact with the tanker's crew
- 12. Monitor the fuel transfer at the beginning of each transfer and after that on an hourly basis checking the manifold, conduit, tank, and any connection points on land for spills and/or leaks. Communication between shore and ship should take place on an hourly basis
- 13. Have a fuel spill scenario annually

#### 7 Conclusion

Agnico Eagle have the ability to respond and prevent spill to the fuel transfer area in Baker Lake according to the following management plan and refer the reader to those plan for more details:

- Oil Pollution Emergency Plan
- Spill Contingency Plan
- Shipboard Oil Pollution Emergency Plan
- Product Transfer Area Assessment Baker Lake Oil Handling Facility

Furthermore, in the event of a spill reaching Baker Lake, a dedicated boat (open water season), containment booms, anchors, trench shovels, absorbent pads, pumps and are accessible year-round, and

regular spill response training is conducted with members of the Meadowbank Emergency Response Team and Environment Department. Meadowbank Environmental Technicians also conduct regular inspections of the Baker Lake OHF in order to ensure proper spill prevention and containment equipment is available, and that proper fuel transfer protocols are followed. All of the measures noted above are in place in order to contain, mitigate and prevent spills during the process of transferring fuel.

## **Appendix A - Potential Spill Quantities**

#### 1- Diesel Ship to shore

Flow rate = 200 m<sup>3</sup>/hr (3,333 L/min) maximum rate Transfer hose length: 17,800 cm, 10 cm diameter Permanent pipeline: 26,600 cm, 15 cm diameter

#### Volume of Spill (from time it takes operator to shut off pumping)

3,333L/60s = 55.55 L/s
8s = time it takes for operator to turn off the pump should the tank start to overflow
Volume = 55.55L/s \* 8s
= 444.4L

#### Volume of the Shipper Transfer Hose

Radius = (diameter of the pipe / 2)
 Radius = (10/2)
 = 5

 Volume of a cylinder: V = πr2h
 Volume = 3.14 \* 5² \* 17,800
 = 1,397,300 cm³

1 Liter = 1,000m<sup>3</sup>
 Volume in Liters = (volume in cm<sup>3</sup>) \* (1L/1,000cm<sup>3</sup>)
 Volume = (1,397,300 / 1,000 L)
 = 1,397.3 L

Two (2) shipper transfer hose use to connect the permanent pipeline manifold
 = 1,397.3 \* 2
 = 2,794.6 L

#### Volume of the permanent pipeline

1. Radius = (diameter of the pipe / 2) Radius = (15/2) = 7.5

2. Volume of a cylinder:  $V = \pi r^2 h$ Volume = 3.14 \* 7.5<sup>2</sup> \* 26,600 = 4,698,225 cm<sup>3</sup>

1 Liter = 1,000m<sup>3</sup>
 Volume in Liters = (volume in cm<sup>3</sup>) \* (1L/1,000cm<sup>3</sup>)
 Volume = (4,698,225 / 1,000 L)
 = 4,698 L

The maximum amount of a potential spill at the site would be **7,937L**.

#### 2- Jet-A Ship to shore

Flow rate = 100 m<sup>3</sup>/h (1,667 L/min) maximum rate Transfer hose length: 58,200 cm, 10 cm diameter

#### Volume of Spill (from time it takes operator to shut off pumping)

1,667L/60s = 27.78 L/s

8s = time it takes for operator to turn off the pump should the tank start to overflow

Volume = 27.78L/s \* 8s = 222.24L

#### **Volume of Transfer Hose**

1. Radius = (diameter of the pipe / 2)
Radius = (10/2)
= 5

Volume of a cylinder:  $V = \pi r^2 h$ Volume = 3.14 \* 5<sup>2</sup> \* 58,200 = 4,568,700 cm<sup>3</sup>

1 Liter = 1,000m<sup>3</sup>
 Volume in Liters = (volume in cm<sup>3</sup>) \* (1L/1,000cm<sup>3</sup>)
 Volume = (4,568,700 / 1,000 L)
 = 4,568.7 L

The maximum amount of a potential spill at the site would be 4,790.94 L.

#### 3- Diesel and Jet-A Fuel Station to Fuel Truck

Flow rate = 715 L/min

Scully arm and hose length: 406cm, 8.9cm diameter

#### Volume of Spill (from time it takes operator to shut off pumping)

715L/min = 715L/60s = 11.92 L/s

8s = time it takes for operator to turn off the pump should the tank start to overflow

Volume = 11.92L/s \* 8s = **95.36** L

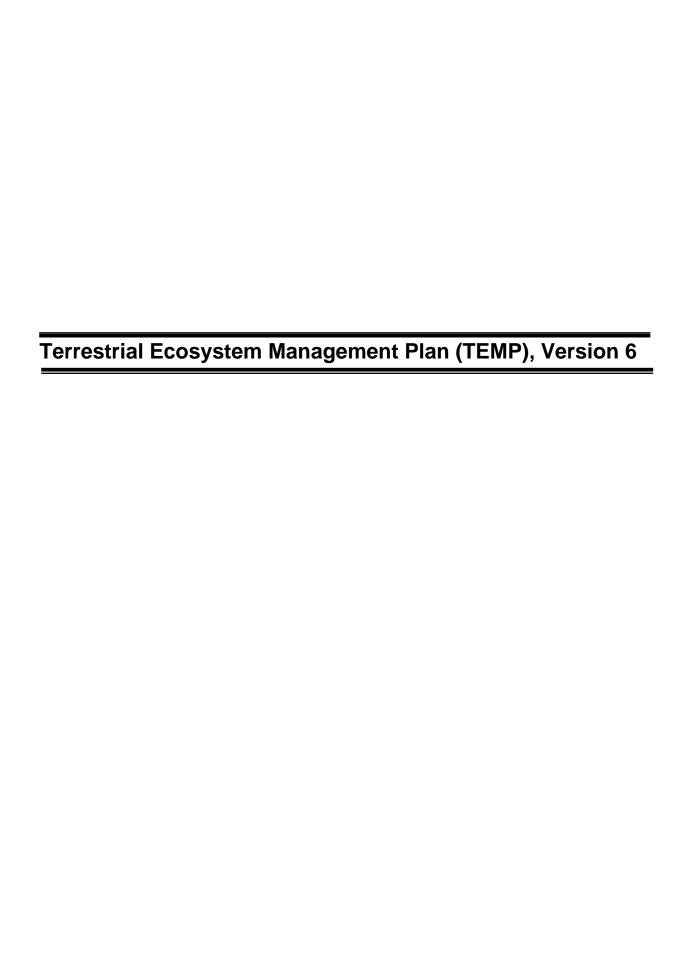
#### Volume of Loading Arm

1. Radius = (diameter of the pipe / 2) Radius = (8.9/2) Volume of a cylinder:  $V = \pi r^2 h$ 

Volume = 3.14 \* 4.45<sup>2</sup> \* 406 = 25,245.02 cm<sup>3</sup>

2. 1 Liter = 1,000m<sup>3</sup> Volume in Liters = (volume in cm<sup>3</sup>) \* (1L/1,000cm<sup>3</sup>) Volume = (25,245.02 / 1,000 L) = 25.24 L

The maximum amount of a potential spill at the site would be **120.6L**.





# **M**EADOWBANK DIVISION

# **Terrestrial Ecosystem Management Plan**

Prepared by: Agnico Eagle Mines Limited – Meadowbank Division

> Version 6 December 2018

#### **EXECUTIVE SUMMARY**

As a requirement of the Whale Tail Pit Project Certificate No.008, Condition 28, and Meadowbank Project Certificate No.004, Condition 54, this report provides an updated Terrestrial Ecosystem Management Plan (TEMP) for Agnico Eagle Mines Ltd. (Agnico Eagle) Meadowbank Gold Mine, which includes the All-Weather Access Road (AWAR) from Baker Lake to the Mine, the Vault Pit Haul Road, and the extension of the Meadowbank Mine through the Whale Tail Pit and Haul Road (inclusively the Project). In addition, the TEMP also applies to the proposed Whale Tail Expansion Project that includes a small expansion to the previous LSA to accommodate an additional pit (IVR Pit), underground mining and a vertical and minor horizontal expansion of the existing waste rock storage facility (WRSF). All other infrastructure related to processing (e.g., mill and tailings), camps, and airstrip, among others, remain unchanged. The Project is located approximately 90 to 150 km north of Baker Lake and 300 km inland from the northwest coast of Hudson Bay.

This revised TEMP has been written as a requirement of Project Certificate No.004 and No.008 in association with the Meadowbank Terrestrial Ecosystem Impact Assessment and the Whale Tail Pit Final Environmental Impact Statement, which identify potential residual effects of the Project to wildlife and wildlife habitat. For each potential effect, mitigation measures are proposed. To confirm that residual effects (i.e., after mitigation) are acceptable, a comprehensive monitoring plan is presented that evaluates the response of wildlife habitat and wildlife populations to the effects of the Project and Project-related activities, and measures effects against thresholds.

Adaptive management is used to assess the effectiveness of the mitigation. Ongoing review of the TEMP through the Whale Tail Pit regulatory process and annual Wildlife Monitoring Summary Reports by regulatory agencies, technical reviewers, Terrestrial Advisory Group, and stakeholders will further ensure that local and regional concerns have been adequately addressed.

This revised comprehensive TEMP builds on the successes of the original TEMP (October 2005) and incorporates the extension of the Meadowbank Mine through the Whale Tail Pit operations. To date, the TEMP has been effective in identifying, monitoring, and managing residual effects of the Project on wildlife and wildlife habitat. This revised TEMP has incorporated detailed decision trees outlining monitoring and adaptive management for varying scenarios of wildlife occurrence, and should enhance the ability of operations managers to respond to changes in wildlife distribution, abundance, and movement. This method provides transparency based on agreed upon approaches, thereby minimizing and mitigating potential Project/wildlife interactions.

i

#### **IMPLEMENTATION SCHEDULE**

This Plan will be implemented immediately subject to any modifications proposed by the Nunavut Water Board and Nunavut Impact Review Board as a result of the review and approval process.

#### **DISTRIBUTION LIST**

Agnico Eagle – General Manager

Agnico Eagle – Engineering Superintendent

Agnico Eagle – Geotechnical Engineer

Agnico Eagle – Environment Superintendent

Agnico Eagle – Environmental Coordinator

Agnico Eagle – Environmental Technician

#### **DOCUMENT CONTROL**

Version	Date (YMD)	Section	Revision
1	October 2005		Comprehensive plan for Meadowbank Project
2	May 2016	All	Update to include Whale Tail Pit and Haul Road
3	February 2017	All	Update in response to Whale Tail environmental assessment information requests
3.1	May 2017	All	Further revisions following meetings with GN, KivIA, HTO in Ottawa, February 22 and 23, 2017
3.2	June 2017	2.2, 3.4 and 4.0	Following EIS Technical Session and Community Roundtable in Baker Lake, April 28 – May 2, 2017
4	July 2017	All	Further revisions following meetings with GN, KivIA, HTO in Winnipeg, June 20 and 21, 2017
5	June 2018	All	Final revisions following final hearings, receipt of NIRB Project Certificate No.008 and comments from the TAG meeting.
6	December 2018	All	Revisions following receipt of NIRB Project Certificate No.008, TAG meeting and for review of the proposed Whale Tail Expansion Project.

Prepared By: Nunavut Environmental Consulting, Dougan & Associates, Golder Associates Ltd., and Meadowbank Environment Department

Approved by:

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**Nunavut Permitting Lead** 

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#### 1. INTRODUCTION AND APPROACH

#### 1.1 BACKGROUND

This report provides the Terrestrial Ecosystem Management Plan (TEMP) for Agnico Eagle Mines Ltd. (Agnico Eagle) Meadowbank Gold Mine, which includes the All-Weather Access Road (AWAR) from Baker Lake to the Mine, the Vault Pit Haul Road, and the Whale Tail Pit and Haul Road extension (inclusively the Project; see **Figures 1** and **2**). In addition, the TEMP also applies to the proposed Whale Tail Expansion Project that includes a small expansion to the previous Local Study Area (LSA) to accommodate an additional pit (IVR Pit), underground mining and a vertical and minor horizontal expansion of the existing waste rock storage facility (WRSF). All other infrastructure related to processing (e.g., mill and tailings), haul road, camps, and airstrip, among others, remain unchanged. The Project is located from approximately 90 to 150 km north of Baker Lake and 300 km inland from the northwest coast of Hudson Bay. The Project area is above the tree line near the Arctic Circle. The local physiography is characterized by numerous lakes and low, rolling hills covered mainly by lichen/rock complexes, and heath tundra.

This TEMP has been written to ensure consistency in association with the Meadowbank Terrestrial Ecosystem Impact Assessment (EIA; Cumberland 2005a), the Whale Tail Pit Final Environmental Impact Statement Addendum (EIS; Golder 2016) and proposed Whale Tail Expansion activities, which identify potential residual effects of the Project to vegetation and wildlife. The EIAs are based on an analysis of Project components and their effects on terrestrial Valued Ecosystem Components (VECs). In addition to being a revision of the original TEMP (Cumberland 2005a) and building on the monitoring experience at Meadowbank, this TEMP has also benefitted from collaborative input from the Government of Nunavut Department of Environment (GN), the Kivalliq Inuit Association (KivIA), and the Hunters and Trappers Organization (HTO) of Baker Lake through annual report reviews, technical reviews, workshops, and discussions through the Terrestrial Advisory Group (TAG).

A summary of environmental effects and a description of mitigation measures that have already been implemented during the design, construction, and operations phases of the Project, and those that will be implemented, are provided in this document. A detailed description of potential environmental effects is provided in the Project's EIA documents.

For each potential effect (described in detail in the EIAs), mitigation measures are proposed. To measure residual effects (i.e., after mitigation), a monitoring plan is presented that evaluates the response of vegetation communities and wildlife to the effects of the Project and Project-related activities, and measures effects against thresholds (see **Figure 3**).





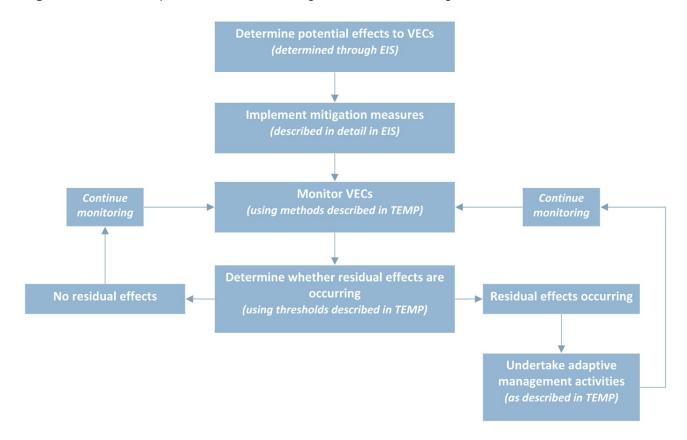


Figure 3: Relationship between Effects, Mitigation, and Monitoring

Where monitoring determines that unacceptable residual effects exist, an adaptive management approach will be taken to assess the monitoring and mitigation. Additional mitigation will be the most likely means by which this will be accomplished. Adaptive management is an ongoing process that evolves throughout the life of the Project as better and more effective ideas are introduced in a process that is designed to be continually improving. Ongoing review of the TEMP and annual Wildlife Monitoring Summary Reports (which provide results of TEMP monitoring programs) by regulatory agencies, technical reviewers, and stakeholders will further ensure that local and regional concerns have been adequately addressed. All of these approaches or plans have been previously reviewed by Nunavut Impact Review Board (NIRB). For example, due to concerns raised by local stakeholders, Agnico Eagle has updated the Air Quality and Dustfall Monitoring Plan (Agnico Eagle 2018) to continue to measure dustfall along the Baker Lake to Meadowbank AWAR and Whale Tail Haul Road, and a Screening Level Risk Assessment Plan (Appendix A). In addition, response procedures have been developed for when Ungulates, Predatory Mammal dens, and Raptor nests are in close proximity to Project facilities.

The mitigation and monitoring procedures identified in this TEMP will be integrated into all stages of the Project to ensure that mine operation and future mine development can proceed as scheduled while accommodating wildlife management needs. The TEMP also outlines strategies for identifying how natural changes in the environment can be distinguished from Project-related

effects. Reporting of natural versus Project-related effects will be in the annual Wildlife Monitoring Summary Report.

This TEMP builds on the success of the original TEMP (October 2005) and subsequent meetings and feedback from the Kivalliq Inuit Association (KivIA), the Baker Lake Hunter and Trapper Organization (HTO), the Kivalliq Wildlife Board (KWB), and the Government of Nunavut (GN). The revised TEMP includes monitoring of the extension of the Meadowbank Mine through the operation of Whale Tail Pit and proposed Whale Tail Expansion, and additions (e.g., decision trees for wildlife monitoring and management) will increase the transparency of the monitoring and mitigation, and enhance the ability of operation managers to protect wildlife occurring in the area.

#### 1.2 PURPOSE AND OBJECTIVES

While specific monitoring objectives for each VEC are provided in later sections, the TEMP should meet the following global objectives:

- Provide information to test the predicted wildlife-related effects of the Project
- Estimate the effectiveness of environmental design and mitigation efforts
- Incorporate local and traditional ecological knowledge (Inuit Qaujimajatuqangit)
- Monitor for action levels or thresholds that could be used to initiate additional mitigation or studies
- Reduce uncertainties and provide information that increases confidence in environmental assessment predictions of future developments
- Consider regional and collaborative environmental monitoring programs, and contributions to regional or national monitoring initiatives
- Reduce Project related effects to wildlife

#### 1.3 RELEVANT ENVIRONMENTAL MANAGEMENT PLANS

This document includes overlap with other environmental management plans for the Meadowbank Mine, Whale Tail Project, and proposed Whale Tail Expansion. The following other plans contain elements of mitigation and monitoring that are relevant to the terrestrial environment.

- Air Quality and Dustfall Monitoring Plan
- Hazardous Materials Management Plan
- Landfarm Design and Management Plan
- Landfill Design and Management Plan
- Noise Monitoring and Abatement Plan

- Spill Contingency Plan
- Traffic Monitoring Plan
- Transportation Management Plan All-weather Private Access Road
- Wildlife Protection and Response Plan
- Predatory Mammal Den Management and Protection Plan
- Migratory Bird Mitigation Plan

#### 1.4 VALUED ECOSYSTEM COMPONENTS SELECTION

Valued Ecosystem Components were selected through consultation with regulatory and governmental authorities and members of the local community (e.g., Hamlet of Baker Lake, Baker Lake HTO), and a review of VECs identified in other northern mines. Selection of VECs was further refined through the consideration of one or more of the following criteria: conservation status, relative abundance within the Project study area, importance in subsistence lifestyle and economy, importance in predator-prey systems, habitat requirement size and sensitivity, and contribution to local area concerns.

Based on this selection process, the key terrestrial VECs were determined to be: Wildlife Habitat, Ungulates, Predatory Mammals, Raptors, Waterbirds, and Upland Breeding Birds. Key species associated with these VECs are shown in **Table 1.** 

Table 1: Valued Ecosystem Components in the Meadowbank and Whale Tail Study Areas

VEC	Common Name	Scientific Name
Vegetation	N/A	N/A
Ungulates	barren-ground caribou muskox	Rangifer tarandus ssp. groenlandicus Ovibos moschatus
Predatory Mammals	grizzly bear wolverine gray (Arctic) wolf Arctic fox	Ursus arctos Gulo Canis lupus Vulpes lagopus
Raptors	peregrine falcon gyrfalcon rough-legged hawk snowy owl	Falco peregrinus ssp. tundrius Falco rusticolus Buteo lagopus Nyctea scandiaca
Waterbirds	Canada goose long-tailed duck loons waterfowl <sup>(a)</sup>	Branta canadensis Clangula hyemalis Gavia spp.
Upland Breeding Birds	rock ptarmigan lapland longspur horned lark semipalmated sandpiper sandhill crane	Lagopus mutus Calcarius lapponicus Eremophila alpestris Calidris pusilla Grus canadensis

a) Waterfowl, in general, are included based on concerns related to potential for bycatch of diving birds during fish-outs, see Section 2.3.5

#### 1.5 SPECIES OF CONCERN

Species of concern include those species identified by the Committee on the Status of Endangered Wildlife in Canada (COSEWIC) as being At Risk or Threatened, and may be impacted by the Project. Species of concern for the Project are listed in **Table 2**.

Table 2: Species of Concern Meadowbank and Whale Tail Study Areas

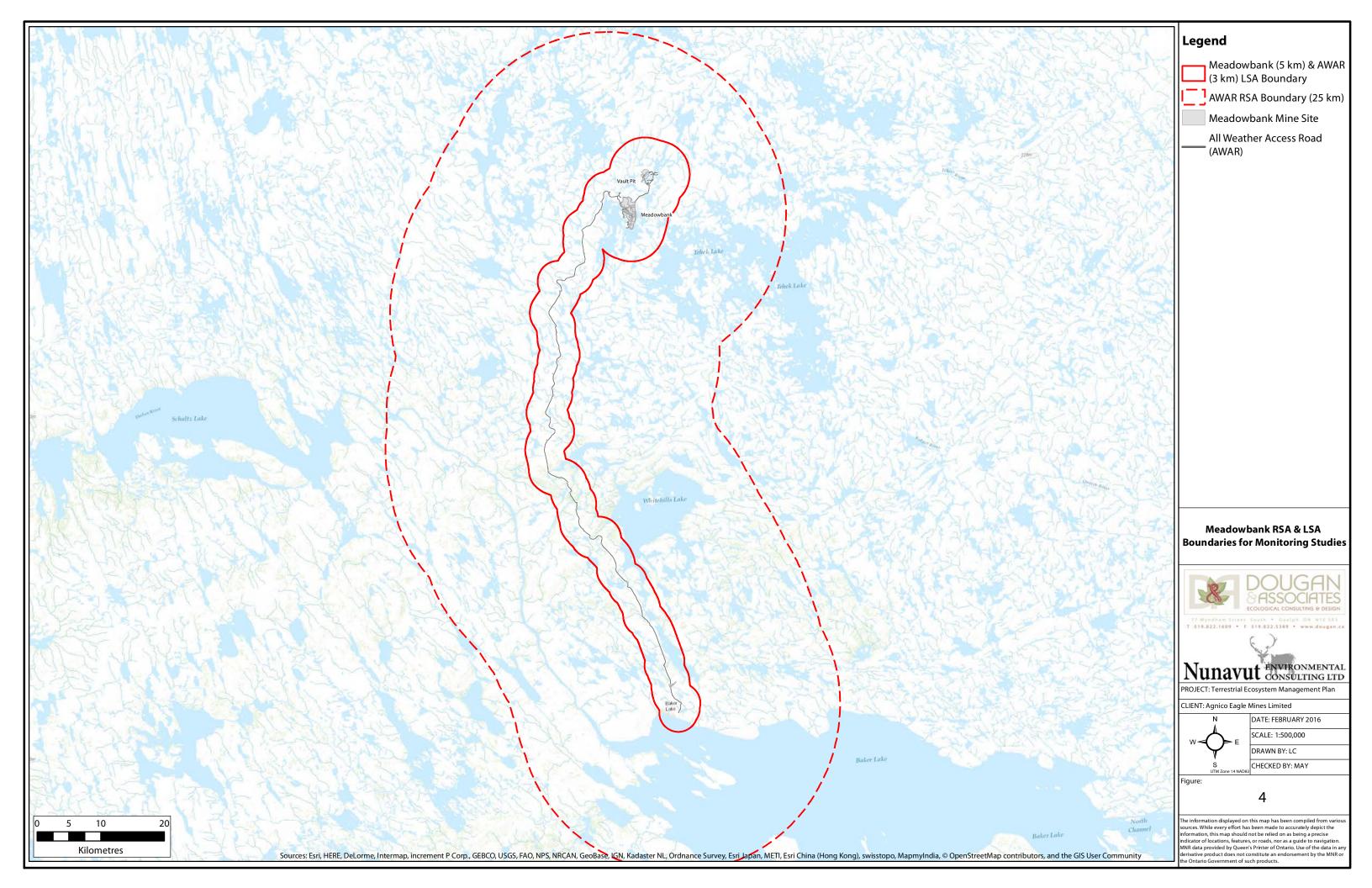
Species	COSEWIC Status	SARA Status	Effects Pathways
Barren-ground	Threatened	No schedule	<ul> <li>mortality due to vehicle collisions</li> <li>habitat loss</li> </ul>
caribou			change in harvest due to improved access
			<ul> <li>barriers to movement and changes in behaviour</li> </ul>
	Special Concern	No schedule	habitat loss
Grizzly bear			mortality due to attraction or vehicle collisions
Polar Bear	Special Concern	Schedule 1	None anticipated
Wolverine	Special Concern	No schedule	<ul><li>habitat loss</li><li>mortality due to attraction or vehicle collisions</li></ul>
Short-eared Owl	Special Concern	Schedule 1	habitat loss
Peregrine Falcon	Special Concern	Schedule 1	physical hazards to nests on mine infrastructure or in quarries
Red-Necked Phalarope	Special Concern	No schedule	habitat loss

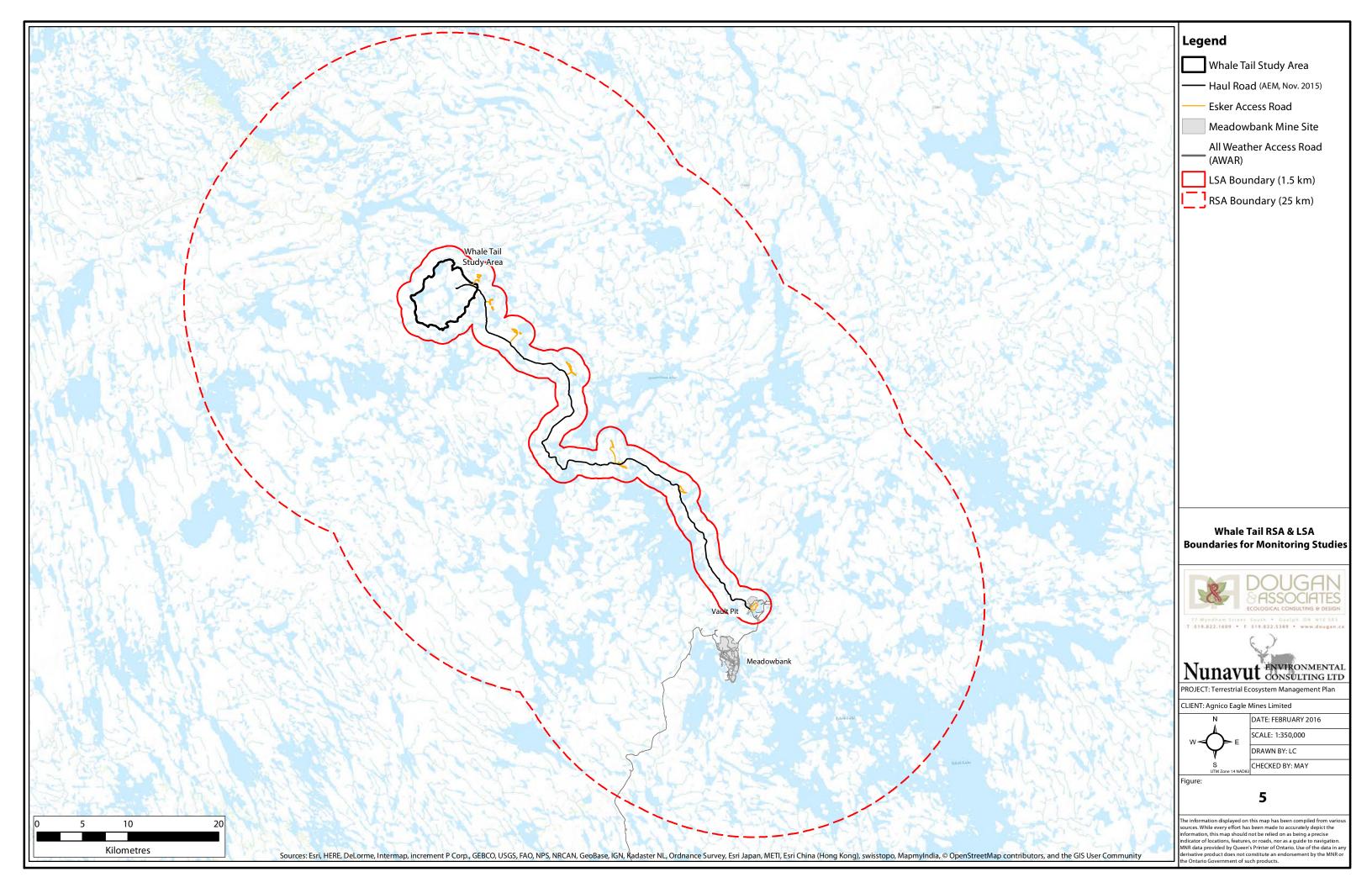
As per Project Certificate No.008, Condition 35, Agnico Eagle will ensure that the mitigation and monitoring strategies developed for Species at Risk (SARA) are updated as necessary to maintain consistency with any applicable status reports, recovery strategies, action plans, and management plans that may become available through the duration of the Project. Updates to the SARA will be considered during annual review and with each new revision of the TEMP. **Appendix B** highlights the Project Certificate No.008 Term or Condition related to the TEMP.

#### 1.6 SPATIAL BOUNDARIES

The Meadowbank Mine local study area (LSA) includes a 5 km radius area centred on the Mine site and a 5 km radius around the Vault Site creating an elliptical shape with a total area of 154 km<sup>2</sup>. The AWAR LSA consists of a 3 km wide corridor centred on the AWAR between Baker Lake and the Meadowbank Mine (**Figure 4**). The regional study area (RSA) encompasses an area that includes a 25 km radius area around the Main and Vault sites and a 50 km wide corridor along the AWAR for a total area of 5,077 km<sup>2</sup> (**Figure 4**).

The Whale Tail LSA is a 3 km corridor centered on the Whale Tail Haul Road and borrow site access roads (i.e., 1.5 km on either side of the road and 1.5 km around borrow areas) and includes an approximate 1.5 km buffer around development areas at the Whale Tail Pit area, for a total area of 282 km². The Whale Tail RSA is a 50 km corridor centred on the Haul Road alignment (i.e., 25 km on either side of the Haul Road and borrow site access roads, and 25 km around borrow areas), with a total area of 5,017 km² (**Figure 5**).





#### 1.7 RESIDUAL EFFECTS

Residual effects are Project effects that remain after implementation of all mitigation. A comprehensive assessment of the expected residual effects on vegetation and wildlife has been provided in the Meadowbank Terrestrial Ecosystem Impact Assessment (Cumberland 2005a), the Whale Tail Pit Environmental Impact Statement (Golder 2016) and the proposed Whale Tail Pit Expansion Addendum (Golder 2018). The effectiveness of mitigation (described in **Section 2.0**) and magnitude of residual effects will be determined via monitoring programs outlined in this document, and compared against thresholds described in **Section 3.0**. Where monitoring determines that residual effects are outside established thresholds of acceptability, adaptive management will lead to more intensive monitoring or additional mitigation.

### 2. MITIGATION

#### 2.1 GENERAL MITIGATION

General mitigation applicable to most wildlife are provided in **Table 3** below, while **Section 2.2** summarizes the anticipated environmental effects and mitigation specific to each VEC.

Table 3: General Mitigation for the Meadowbank Mine, and Whale Tail Pit and Haul Road

#### **Environmental Education**

Employees will participate in a wildlife awareness program during their induction, including bear safety procedures, instructions on wildlife rights-of-way, and other wildlife protection measures (see Wildlife Response and Protection Plan in **Appendix C**).

Feeding of wildlife is prohibited.

#### Wildlife on Site

A wildlife reporting system (e.g., wildlife log) will be maintained by environmental staff. Where human safety or wildlife well-being is an issue, employees will be notified regarding procedures (up to an including stopping work in the affected area). The Wildlife Protection and Response plan includes a staff organizational chart indicating who has responsibility for predatory mammal-human interactions, and procedures to be followed (see **Appendix C**).

#### **Road Access and Restrictions**

Public use of the AWAR is monitored by the Safety Department. For mine safety reasons, Baker Lake residents will be prohibited from travelling beyond the 85 km mark of the AWAR (see **Figure 2**). Because the Vault and Whale Tail Haul Roads begin within existing mine facilities and are beyond km 85, public access to these roads will be limited (see **Figure 2**). Voluntary hunting use data will be collected by Agnico Eagle at the gatehouse, and further action regarding acquiring this information is being considered to evaluate the presence of ATVs and hunting (i.e., shooting) as a mechanism affecting caribou interactions with the AWAR and as a component of the Hunter Harvest Survey (HHS).

The *Wildlife Act* prohibits discharging firearms along or across roads or within 1 km of dwellings (see **Figure 2** for no shooting zone). Upon notification by Agnico Eagle or this public, this is to be enforced by the Government of Nunavut (GN). Marker posts will be placed periodically to delineate the 1 km buffer along the road.

To avoid unnecessary degradation of wildlife habitats, Project vehicles will be restricted to existing roads.

Wildlife have the right-of-way on roads.

Maximum speed limits of 50 km/hr will be enforced, including periods of reduced speed limits when caribou, and/or other wildlife, are on or adjacent to the road.

All road-killed wildlife will be reported immediately to Meadowbank Mine environmental staff and removed to avoid attracting scavengers. If necessary, animals will be examined by the Environment Department to determine cause of death; ungulate and predatory mammal mortalities will be reported to the GN wildlife conservation officer. If approved by the GN officer, disposal of ungulates and predatory mammals will be through incineration at the mine or as directed by the GN. In the case of an ungulate and predatory mammal collision, drivers must fill out a vehicle/animal collision report to document the conditions and circumstances surrounding the incident. All such incidents will be reported using the Incident Report Form (Appendix D).

#### Hunting

Hunting and harassment of any wildlife species by mine employees while on shift will be prohibited.

Access by way of All Terrain Vehicle (ATV) from Baker Lake to km 85 on the AWAR for hunting, is permissible according to NIRB Project Certificate No.004, Condition 32. See **Figure 2** 

#### Table 3: General Mitigation for the Meadowbank Mine, and Whale Tail Pit and Haul Road

Agnico Eagle will enforce the policy of a "no-hunting zone" from km 85 to Whale Tail Pit, to reduce road-related effects on wildlife and to protect employee safety. A 1 km marker at the gatehouse will be used to ensure all hunters are aware of these restrictions. Periodic markers will be used along the AWAR to delineate the 1 km no-hunting zone between the Baker Lake gatehouse and km 85. See **Figure 2**.

Except for designated persons (e.g., wildlife monitors, environmental technicians), employees will not be permitted to carry firearms.

#### **Spills and Contamination**

All spills will be immediately cleaned up or isolated to minimize the potential for exposure to wildlife or degradation of the surrounding environment (see the Spill Contingency Plan).

Water that has the potential to come into contact with the mining activities will be intercepted, contained, and will meet license limits prior to discharge.

#### 2.2 CARIBOU PROTECTION MEASURES

Caribou Protection measures employed by the project will be evaluated, in collaboration with, and through data sharing among Terrestrial Advisory Group (TAG) members, including the components outlined in **Table 4**.

**Table 4:** Caribou Protection Measure Components to be Evaluated

#### **Caribou Protection Measures**

# Caribou protection measures employed the project will evaluated, including the following components

Tests of the monitoring methods that are used to detect caribou near the Project in order to quantify: (i) the probability of detecting groups; (ii) the effective range of detection; and (iii) the spatial extent of detection capacity relative to the mitigation distance buffers;

The collection of additional data on caribou group sizes to confirm the relevance of group size thresholds used in mitigation;

Collection and analyses of collar data to quantify the Zone-of-Influence (ZOI) associated with the Whale Tail Project, its haul road and the existing Meadowbank mine (and all-weather-access-road [AWAR]);

Collection and analyses of collar data to quantify the effects of the Whale Tail Project, its haul road and the existing Meadowbank mine (and AWAR) on the movements of caribou, in particular during migratory periods;

Collection of accurate records documenting the detection of caribou and the subsequent implementation of mitigation measures;

Analyses of collar Government of Nunavut (September 21, 2017) Construction and Active Phases To be completed within 5 years of commencement If active mining life span extended, the evaluation should be updated every 5 years NIRB Final Hearing Decision for the Whale Tail Pit Project NIRB File No. 16MN056 Page B-2 No. Subject Commitment Issue Raised by (Date of Commitment) Project Phase/Timing data comparing the movements of individuals that were and were not subject to the implementation of mitigation measures.

#### **Evaluation of Caribou Protection Measures**

The scope of this evaluation will include the following:

A study area or areas that encompass the Whale Tail mine site, haul road, Meadowbank mine and all-weather-access-road (including all activities utilizing this infrastructure including on-going exploration), all of which are integral components of the Project;

The use of accepted scientific methods and experimental designs to provide quantitative information;

The engagement of recognized subject matter experts in each area of the evaluation;

Collection of data with sufficient statistical power to detect potential impacts;

Guidance on study designs, analyses and interpretation from the Project's TAG;

The collection of data during both the construction and active mining phases of the Project;

Completion of the evaluation within 5 years of Project commencement (beginning with construction) to ensure that any adverse effects or deficiencies in caribou protection measures are revealed prior to potential extensions in the use of Project infrastructure;

A technical report, as noted above in (g), for the evaluation to be submitted to NIRB; and if the Project's active mining life span is extended beyond that currently proposed (i.e. 2022), including extended use of the haul road to support other projects, the evaluation should be updated every 5 years.

#### 2.3 VEC-SPECIFIC MITIGATION

#### 2.3.1 Wildlife Habitat

#### 2.3.1.1 Summary of Potential Environmental Effects

Permanent habitat loss will occur due to the construction footprint of mine facilities, including mine buildings, haul roads, and access roads to quarry and borrow sites. Dewatering of Whale Tail Lake at the end of the construction phase, will result in the flooding of a number of tributary lakes upstream of the Whale Tail Dike to the Mammoth Lake Watershed, thereby altering flows to Mammoth Lake and downstream lakes. This change in water regime can strongly influence plant species composition, community structure, and biological diversity (Vale et al. 2015). These temporary changes in water levels will affect soil moisture, and may result in localized effects to vegetation quality through decreased species abundance and flooding. All terrestrial habitats provide some value to wildlife VECs. Consequently, loss or degradation of any of these habitats may result in localized negative effects on wildlife.

Another potential effect on Wildlife Habitat is degradation from dust and exhaust. Bryophytes and lichens may experience the largest effects close to roads where the greatest amount of deposition frequently occurs. Consistent with current dustfall monitoring and terrestrial monitoring along the AWAR, the EIA and EIS predicted that the primary effects of dust are generally confined to the immediate area next to roadways (Cumberland 2005a; Golder 2016; Everett 1980; Walker and Everett 1987). A recent study found that dust on plant leaves from diamond mine haul roads was significantly higher in a zone of up to 1000 m from the road (Chen et al. 2017).

#### 2.3.1.2 Mitigation for Wildlife Habitat

Proposed mitigation for Wildlife Habitat are summarized in **Table 5**.

**Table 5:** Mitigation to Minimize Effects to Wildlife Habitat at the Meadowbank Mine, and Whale Tail Pit and Haul Road and proposed Whale Tail Expansion

Mitigation	Design	Construction	Operations	Closure/ Post-Closure
Minimizing Wildlife Habitat Loss				
Avoid high value habitats (e.g., eskers)	Х	Х		
Cluster facilities and minimize footprints	Х			
Minimize haul and access road width and length	Х	X		
Minimize borrow area size	Х	Х	Х	
Construct boardwalks and helicopter pads		Х	Х	Х
Stay on roads		X	Х	X
Clearly mark road edges		X	Х	X
Restore and revegetate disturbed habitats			Х	Х
Scarify roads, remove facilities, restore drainage patterns, and stabilize slopes			×	X
Minimizing Wildlife Habitat Degradation				
Minimize vehicle traffic and speeds to reduce dust		X	Х	X
Contain (berms) fuel storage areas	Х	X	Х	X
Follow hazmat and spill contingency guidelines	Х	X	Х	X
Implement dust control measures (including dust suppressants) on mine roads and airstrip		Х	X	X
Use landfill area to dispose of inorganic waste (e.g., concrete, plastic). All other materials shipped and disposed off-site		X	х	Х
Maintain natural drainage patterns	Х	Х	Х	Х
During water diversion, pump discharge using natural drainage patterns when possible		Х	Х	Х
Remove and dispose of contaminated soil (see 'Environmental Guidelines for Site Remediation', GN-DOE 2009		Х	Х	Х

#### 2.3.2 Ungulates

#### 2.3.2.1 Summary of Potential Environmental Effects

Caribou and muskox are susceptible to habitat loss and sensory disturbance associated with Project facilities and activities. The potential for direct effects such as vehicle-animal collisions and increased hunting pressure are concerns, as are indirect effects related to contaminated water and vegetation. Although caribou may be present during any season, movements of collared caribou through the Meadowbank RSA are most common during the spring (April 1 to May 25) and fall (October 15 to November 7) migratory periods, (Agnico Eagle 2016; Golder 2016 Appendix 5-D). Likewise, while there are areas of the AWAR with more frequent observations of caribou, caribou may be observed along the entire length of the AWAR (Agnico Eagle 2016). Roadside observations of caribou from 2007 to 2016 show that caribou within and adjacent to the Meadowbank RSA are most common during the winter (44% of caribou observed), rut and fall

migration (34% of caribou observed) and spring (16% of caribou observed) (see **Table 6**). Data from collared caribou also closely follow the seasonal pattern of caribou observations observed from the AWAR and the Meadowbank Mine.

**Table 6:** Summary of AWAR Caribou Observations from 2007 to 2016 by Season and Collar Data from the Ahiak/Beverly, Lorillard, and Wager Bay Herds (2000 to 2016)

Season	Total Number of Caribou Observed from AWAR (% of Total)	Range of AWAR Count Observations (min-max)	Collar Days in Whale Tail RSA (% of Total in RSA)
Spring Migration (April 1 to May 25)	15,510 (16%)	230 to 6042	224.01 (23%)
Calving (May 26 to June 25)	4,213 (4%)	33 to 1,163	3.34 (0.3%)
Post-Calving (June 26 to July 31)	220 (0.2%)	0 to 135	18.42 (2%)
Summer Dispersal (August 1 to September 15)	1,815 (2%)	2 to 1,815	139.31 (14%)
Rut and Fall Migration (September 16 to November 7)	32,934 (34%)	44 to 9,856	155.15 (16%)
Early and Late Winter (November 8 to March 31)	43,500 (44%)	152 to 13,568	438.22 (44%)
Total	98,192	0 to 13,568	978.45

Monitoring at other mines suggests that caribou herds change their distribution around diamond mine developments, where probability of occurrence increases with distance from the mine (Boulanger et al. 2012; Johnson et al. 2005; Rescan 2007; Golder 2011a). This area is termed the zone of influence (ZOI), and likely results from sensory disturbance that may be related to smell, noise, taste and sight. A study using aerial survey and satellite-collar data collected around the Diavik, Ekati, and Snap Lake mines estimated that caribou relative abundance was reduced near the mine, and reached expected levels at up to 14 km (Boulanger et al. 2012). Golder (2011a) detected ZOI ranging from 12 to 40 km around the Diavik mine and Lac de Gras, although the estimates may be confounded by the presence of Lac de Gras, which affects caribou distribution. Ground-based monitoring at Ekati suggested that caribou groups with calves spend less time feeding within 5 km of the footprint (BHPB 2004). At the smaller Snap Lake Mine, a ZOI of 6.5 to 28 km was detected (Golder 2008; Boulanger et al. 2009), which increased with the level of mining activity (Golder 2008). Adding to the uncertainty, interviews with hunters in Kulguktuk familiar with mining reported that caribou are often observed at active mines; appearing undisturbed and staying for days at a time. Caribou are even attracted to mine infrastructure for mosquito relief (Golder 2011b). To date, although ZOI have been demonstrated to varying degrees around mine sites, they are poorly understood in terms of their mechanism, their extent, and the effects to individual caribou and populations. Agnico Eagle completed a preliminary ZOI study for the Lorillard and Wager Bay herds and found no ZOI effect with the exception of a weak effect during the winter months at a distance of 35 km. As part of the ZOI study, the Ahiak/Beverly herds were considered; however, there were too few collar locations within the RSA to include these data in the analysis. Through further discussions with the TAG and potentially additional workshops, additional studies are being considered in collaboration with the GN and other interested and qualified parties to better understand the presence of a ZOI, and potential barrier effects from mine infrastructure and the AWAR.

Road-related mortality may be a source of residual effects if not carefully managed. Although muskox are not considered a species at risk, their low reproductive rate, sedentary nature, and tendency to stand their ground when threatened make them vulnerable to disturbance and overhunting.

A minor concern is the potential for caribou or muskox to drink potentially contaminated water from the tailings impoundments or possibly runoff from the waste rock piles; however this has not been documented. Approved deterrent methods have been implemented at Meadowbank Mine when necessary to remove caribou from areas of risk. On-site environmental staff will monitor the tailings facilities daily.

#### 2.3.2.2 Mitigation for Ungulates

Proposed mitigation for Ungulates are summarized in **Table 7**. See also General Mitigation in **Table 3** and the Wildlife Protection and Response Plan.

**Table 7:** Mitigation to Minimize Effects to Ungulates at the Meadowbank Mine and Whale Tail Pit and Haul Road and proposed Whale Tail Expansion

Pit and Hauf Road and proposed Whale Tall Expansion						
Mitigation	Design	Construction	Operations	Closure/ Post-Closure		
Minimizing Wildlife Habitat Loss (see Table 5 for Wi	Idlife Habi	tat)				
Minimizing Wildlife Habitat Degradation (see Table 5	for Wildli	fe Habitat)				
Reducing Sensory Disturbance (see also General M	easures, T	able 3)				
Site-wide notifications of caribou presence (see  Figure 6 and Figure 7)						
Caribou on or crossing the road are given right-of- way		Х	×	X		
Construct the Whale Tail Haul Road during the winter to avoid effects to caribou during potentially sensitive periods (e.g., spring and fall migration)	х	х				
Minimize engine noises, as per the Noise Abatement and Monitoring Plan		Х	×	X		
Limit blasting when caribou are near (Figure 9); Maintain blasting windows (see Transportation Management Plan: All Weather Private Access Road and Whale Tail Haul Road Management Plan)		×	Х			
Enforce speed limits on the AWAR and haul roads (Transportation Management Plan: All Weather Private Access Road and Whale Tail Haul Road Management Plan)		х	х	Х		
Aircraft pilots are instructed to avoid caribou, and will receive site-wide notifications of caribou movements. Recommended minimum distance is 300 m altitude and 1 km horizontal		Х	Х	Х		
Report Ungulates in the vicinity of the road to environmental staff and road dispatcher		Х	Х	Х		
Reduce speed to 30 km/h when caribou are observed from the haul road and Level 3 caribou mitigation is triggered ( <b>Figure 7</b> )		Х	х			

**Table 7:** Mitigation to Minimize Effects to Ungulates at the Meadowbank Mine and Whale Tail Pit and Haul Road and proposed Whale Tail Expansion

Fit and fladi Noad and proposed Whale Fall Expansion						
Mitigation	Design	Construction	Operations	Closure/ Post-Closure		
Other mitigative action as determined by the Environmental Supervisor, possibly including: grouping haul trucks into convoys (e.g., 2X2 or groups of 4 or more vehicles), imposing additional speed limits, using pilot vehicles, stopping traffic near caribou attempting to cross haul roads, complete closure of haul roads, suspending blasting in accordance with <b>Figures 6</b> through <b>9</b>		X	X	X		
Reducing Ungulate Project-related Mortality (see als	so General	Measures, Sect	ion 2.2)			
Along pits, graduate slope angles to diminish likelihood of slippage	Х	X	Х			
Herd ungulates off airstrip only prior to arrivals and departures (see Access and Air Traffic Management Plan) if air traffic could not be delayed		Х	Х	X		
Avoiding Exposure to Potentially Contaminated War	ter and Wi	Idlife Habitat				
Deter ungulates attracted to potentially contaminated water in tailings ponds or runoff, documented using the Incident Report Form (Appendix D)		Х	X	Х		
<b>Avoiding Disruption of Movement or Migration Patter</b>	erns					
Road shoulders are designed with a low profile and are sloped to ground level to accommodate haul trucks. Roads will be top dressed with eskersourced. Consequently, roads are not perceived to be a physical barrier to caribou movement	X	X	×			
Implement special measures if Ungulates are in close proximity to Project facilities and roads (see <b>Section 3.5</b> )		X	Х			
Contour snow banks to avoid creating barriers		Х	Х	X		
Post updated maps of known migration corridors and report to GN, KivIA, and HTO personnel		Х	X			
During road decommissioning, flatten and scarify road edges			Х	Х		

### 2.3.3 Predatory Mammals

#### 2.3.3.1 Summary of Potential Environmental Effects

Predatory Mammals are susceptible to animal/vehicle collisions, loss of denning habitat, and sensory disturbance associated with Project construction and operation. Grizzly bears and wolverines may be particularly vulnerable to road development. Due to their wide-ranging and scavenging natures, they are drawn to road edges where road kills may be readily available. Once they have been attracted, habituated or food-conditioned to a site, they may be difficult to avert and may eventually become a human safety concern. One wolverine and three wolves have been killed along the Meadowbank AWAR between 2007 and 2015 (Gebauer et al. 2016).

The potential for direct loss of denning habitat for some predatory mammals, especially wolves, is also a concern during road construction and borrow pit development. Wolves use unconsolidated materials (e.g., eskers), to excavate den sites, and the same den sites may be used from year to year (Cluff et al. 2002). Occasionally, adults with pups have been sighted along the AWAR area in summer denning months, and most recently, an active den and nursery site was identified within the borrow area at Esker #3 in the Whale Tail Haul Road study area (Dougan & Associates and Nunavut Environmental 2015). Wolf denning occurs between early May and late September (May et al. 2012).

Grizzly Bears are also known to use habitats such as eskers for denning (Mueller 1995), wolverines have been linked to areas of persistent snow cover and boulders because of their reliance on cached food as they litter during late winter (Inman et al. 2012). Sensory disturbance from road construction and operation could result in an indirect loss of nearby functional denning habitat (May et al. 2012).

Other potential effects to Predatory Mammals, such as changes in prey abundance, distribution, or health, are of lesser concern. Mitigation to ensure that the viability and integrity of prey populations are maintained (e.g., Ungulates) will also mitigate the potential effects to Predatory Mammals.

#### 2.3.3.2 Mitigation for Predatory Mammals

Proposed mitigation for Predatory Mammals are summarized in **Table 8**. See also General Measures in **Table 3** and the Wildlife Protection and Response Plan.

**Table 8:** Mitigation to Minimize Effects to Predatory Mammals at the Meadowbank Mine and Whale Tail Pit and Haul Road and proposed Whale Tail Expansion

Mitigation	Design	Construction	Operations	Closure/ Post-Closure	
Reducing Project-related Mortality (see also Genera	l Measure	s, Table 3)			
Apply response plan (see <b>Appendix C</b> ) when individuals are near		Х	X	X	
Manage mine food wastes and odors (Appendix C)		X	Х	Х	
Instruct mine workers to keep lunches inside vehicle cabs or buildings		Х	X	X	
Remove or incinerate all wildlife carcasses to avoid attracting predators to facilities		Х	X	Х	
Continue to improve waste segregation techniques and procedures	Х	Х	Х	Х	
Incinerate all kitchen waste, wood/paper products daily		X	X	X	
Seal and store all aromatic products (e.g., paint) in bear-proof containers		X	X	X	
Construct skirts or sheathing along all facilities with potential to attract Predatory Mammals	Х	Х	Х		
Use deterrents if necessary for human and wildlife safety (Appendix C)		Х	Х	X	
Avoiding Disturbance of Den Sites					

**Table 8:** Mitigation to Minimize Effects to Predatory Mammals at the Meadowbank Mine and Whale Tail Pit and Haul Road and proposed Whale Tail Expansion

Mitigation	Design	Construction	Operations	Closure/ Post-Closure
Initiate a den-specific response plan when a wolverine, grizzly bear or wolf den site is detected within 1 km of activities (see <b>Section 3.6</b> )		X	Х	Х
Restrict human and vehicle activity in the vicinity of den sites		Х	Х	Х

# 2.3.4 Raptors

#### 2.3.4.1 Summary of Potential Environmental Effects

Available survey data indicate that few Raptors nest in the vicinity of the Project area, and possibly also in old quarries and open pits. However, direct effects to breeding Raptors are expected to be very low (Cumberland 2005b; Dougan & Associates and Nunavut Environmental 2015). Ongoing monitoring (see **Section 3.7**) will document active nests if they are near mine facilities, or along the AWAR, Whale Tail Haul Road, and access roads to quarry/borrow sites.

Other potential effects to Raptors may result from changes in abundance, distribution, and health of prey populations due to road activities. Mitigation to minimize Wildlife Habitat removal (see **Section 2.3.1)** will reduce effects to prey populations.

#### 2.3.4.2 Mitigation for Raptors

Proposed mitigation for Raptors are summarized in **Table 9**. See also General Measures in **Table 3**.

**Table 9:** Mitigation to Minimize Effects to Raptors at the Meadowbank Mine and Whale Tail Pit and Haul Road and proposed Whale Tail Expansion

Mitigation	Design	Construction	Operations	Closure/ Post-Closure	
Minimizing Wildlife Habitat Loss (see Table 5 for Wi	ildlife Hab	itat)			
Minimizing Wildlife Habitat Degradation (see Table 5 for Wildlife Habitat)					
Avoiding Disturbance to Nesting Raptors					
Develop a nest-specific response plan for identified raptor nests within areas of concern to ensure that nesting success is not affected by development activities (see <b>Section 3.7</b> )		X	Х	Х	
Follow GN-DoE guidelines (GN-DOE 2005) for avoiding disturbance to raptor nests		X	X	Х	
Consult with GN (with respect to obligations under the Wildlife Act, SNU 2003, c.26) as per Project Certificate No.008, Condition 36. If deemed appropriate, discourage raptors from establishing nests on artificial structures, pit walls, or other facilities (see <b>Appendix E</b> )			X		

Mitigation	Design	Construction	Operations	Closure/ Post-Closure
Limit ferrying flight altitudes to a minimum height of 300 m above ground level where possible		Х	X	Х

#### 2.3.5 Waterbird

#### 2.3.5.1 Summary of Potential Environmental Effects

During baseline data collection and operational monitoring, only a small number of nesting Waterbirds were documented within the Meadowbank Mine and along the AWAR (see annual Wildlife Monitoring Summary Reports). Given these low densities of nests identified within the Project area since 2005 (i.e., too low to determine whether changes in nest abundance or success have occurred), and the absence of data suggesting that road-related effects were occurring, the Waterfowl nest survey program at Meadowbank was discontinued in 2012 (Gebauer et al. 2013). Initial waterfowl surveys for the Whale Tail study area have also documented low numbers of nesting waterfowl (Dougan & Associates and Nunavut Environmental 2015).

Waterbirds that use flooded portions of the tailings impoundment areas for resting or roosting purposes during the summer and migratory periods may be exposed to contaminants; however, residence times are not expected to be long due to the lack of wetland vegetation, and the absence of fish or invertebrates in the tailings impoundment and water management areas. There is a possibility that Waterbirds (e.g., geese) may forage on potentially contaminated graminoid vegetation (e.g., vegetation that may have been contaminated by fugitive dust fall from vehicles); however, results of recent risk assessments for the Meadowbank Mine have indicated no excess risk to Waterbirds as a result of Project activities (Agnico Eagle 2014).

The proposed expansion at Whale Tail will require a fish-out, which may lead to mortality of diving birds that can get caught in nets. Further, possible flooding during the nesting season may lead to loss of nests.

#### 2.3.5.2 Mitigation for Waterbirds

Proposed mitigation for Waterbirds are summarized in **Table 10**. See also General Measures in **Table 3**.

**Table 10:** Mitigation to Minimize Effects to Waterbirds at the Meadowbank Mine and Whale Tail Pit and Haul Road and proposed Whale Tail Expansion

Mitigation	Design	Construction	Operations	Closure/ Post-Closure	
Minimizing Wildlife Habitat Loss (see Table 5 for Wildlife Habitat)					
Stay 30 m away from shoreline areas during design except where necessary for constructing road crossings and pit development	Х	Х	Х		
Provide foraging opportunities for Waterbirds, particularly geese, over the long term in revegetated areas and flooded mine pits			Х	Х	

**Table 10:** Mitigation to Minimize Effects to Waterbirds at the Meadowbank Mine and Whale Tail Pit and Haul Road and proposed Whale Tail Expansion

Fit and Hadi Noad and proposed Whale Tall Expansion					
Mitigation	Design	Construction	Operations	Closure/ Post-Closure	
Minimizing Wildlife Habitat Degradation (see Table 5	5 for Wildli	fe Habitat)			
Where high levels of contaminants have been identified in water or vegetation, undertake reclamation activities to manage risks to Waterbirds		Х	Х	Х	
Avoiding Disturbance to Nesting Waterbird					
Clear land outside the breeding season (mid-May to mid-August) unless a nest survey by a qualified wildlife biologist has determined that no Waterbird nests are present		Х	Х	Х	
Helicopter ferrying flight altitudes should remain above 300 m, where possible		Х	×	X	
Where important bird areas (e.g., moulting areas, goose breeding colonies etc.) are identified, observe a 1,000 m vertical and 1,500 m horizontal distance whenever possible (Hines and Wiebe 1997). Make all pilots aware of these flight restrictions		Х	X	Х	
Reducing Waterbird Project-related Mortality (see a	lso Genera	ıl Measures, Tab	le 3)		
Monitor tailings, reclaim ponds, and storm water retention ponds daily to ensure that Waterbird have not landed on these waterbodies. Where Waterbird have landed on ponds, use aversive tactics to scare them away		Х	Х	Х	
Implement mitigation for nests in flooding zones at the Whale Tail Project ( <b>Appendix F</b> )		Х			
Implement mitigation for diving bird mortality during Whale Tail Lake fish-out (see the Fishout Diving Waterbird Protection Plan)		X			

#### 2.3.6 Upland Breeding Birds

#### 2.3.6.1 Summary of Potential Environmental Effects

The greatest effect to Upland Breeding Birds (e.g., songbirds) is the removal, flooding, or degradation of nesting habitat. Virtually all terrestrial habitat within the study area provides foraging or nesting habitats for one or more species. Some species prefer shrubby terrain (e.g., Savannah Sparrow), others are found primarily in open tundra (e.g., lapland longspur), whereas some are restricted to wet meadows (e.g., semipalmated sandpiper).

Another potential environmental effect is the reduced habitat effectiveness due to human activity, although passerines appear to readily habituate to these activities compared to larger species such as Raptors and Waterbird. Studies have documented avoidance effects and reduced bird densities within 1 km of human infrastructure (Reijnen et al. 1997; Benitez-Lopez et al. 2010). Conversely, a study of lapland longspurs by Male and NoI (2005) showed no difference in nest success between sites with high and low levels of human noise at the Ekati Diamond Mine.

In addition, no decrease in upland bird species richness or abundance from mine activity has been observed at the Meadowbank Mine (Gebauer et al. 2012, 2013) or at the Ekati Diamond Mine (Smith et al. 2005; Rescan 2010).

Buildings, pits, and other facilities will provide new perching opportunities and possibly nesting opportunities for Raptors. The potentially higher densities of Raptors in the area, and potentially increased depredation rates on passerines, are possible negative effects of the Project on songbirds.

#### 2.3.6.2 Mitigation for Upland Breeding Birds

Proposed mitigation for Upland Breeding Birds are summarized in **Table 11**. See also General Measures in **Table 3**.

**Table 11:** Mitigation to Minimize Effects to Upland Breeding Birds at the Meadowbank Mine and Whale Tail Pit and Haul Road and Proposed Whale Tail Expansion

and Whale Tall Fit and Hadi Noad and Floposed Whale Tall Expansion						
Mitigation	Design	Construction	Operations	Closure/ Post-Closure		
Minimizing Wildlife Habitat Loss (see Table 5 for Wil	dlife Habi	tat)				
Minimizing Wildlife Habitat Degradation (see Table 5	for Wildli	fe Habitat)				
Where high levels of contaminants have been identified in water or vegetation, undertake reclamation activities to manage risks to Upland Breeding Birds		X	X	Х		
Avoiding Disturbance to Nesting Upland Breeding Birds						
Clear land outside the breeding season (mid-May to mid-August) unless a nest survey by a qualified wildlife biologist or technician has determined that no Upland Breeding Bird nests are present		Х	X	X		
If nest found within Project facilities, set up buffer zone if possible		Х	Х	Х		
Avoid human activity around nest sites to avoid attracting predators to site		Х	Х	Х		
Reducing Upland Breeding Bird Project-related Mor	tality (see	also General Me	asures, Table	3)		
Deter Raptors from nesting or roosting on mine facilities (see <b>Appendix E</b> ). Locally breeding Raptors will increase predation rates on songbirds		Х	Х	Х		
Deter Upland Breeding Bird nesting attempts on equipment and facilities		Х	Х	Х		
Implement mitigation for nests in flooding zones at the Whale Tail Project ( <b>Appendix F</b> )		Х				

# 3. MONITORINGOVERVIEW

A comprehensive suite of monitoring activities are being undertaken for the Project facilities, haul roads and AWAR. **Table 12** summarizes all of the monitoring activities, their frequency, and the VEC each activity targets.

**Table 12:** Monitoring Activities Being Undertaken for the Project Facilities, Haul Roads, and All-Weather Access Road

7 111 17 5 5 111	ei Access Road			VE	Cs		
Monitoring Activity	Frequency	Wildlife Habitat	Ungulates	Predatory Mammals	Raptors	Waterbird	Upland Breeding Birds
Traffic Monitoring for AWAR and Haul Roads	Currently completed and will be provided in the annual summary report		Х	Х	X	Х	Х
Public Use of Roads	Tracked at security gate and incidental observations, and will be provided in the annual summary report		X	Х	X	Х	Х
Habitat monitoring	Every three years post-construction, or if greater than 25% of the overall mine footprint changes	x					
Dustfall monitoring	Monthly around Meadowbank Mine and Whale Tail Pit; detailed study conducted annually along the AWAR and the Whale Tail Haul Road	Х					
Habitat reclamation monitoring	At Year 2 post-closure and every 3 years until Year 12 post-closure	Х					
Caribou satellite- collaring program	Data provided to Agnico Eagle from GN at least 1x/week		Х				
Zone of Influence or other Mechanistic Investigation Studies	As necessary and identified through the TAG		X				
Haul Roads, Pits and mine site ground surveys	At least 1x/week, includes inspections of waste streams for scavenger attractants		Х	X	X	х	
Road surveys (AWAR and Haul Roads)	At least 1x/week		Х	Х	Х	Х	Х
Height-of-Land surveys	At least 1x/week		Χ	Χ			
Vehicle encounter reports	Ongoing		Х	Х	Х	Х	Х
Incident reports	Ongoing (when incidents with wildlife occur)						
Hunter Harvest Survey	Will be redeveloped and implemented in collaboration with the GN, KivIA and HTO (see Section 3.5.2.8)		Х	Х			
Active den site surveys	Initiated by the detection of an active den (grizzly bear, wolf or wolverine) within the active footprint or vicinity of Project facilities (see <b>Figure 12</b> )			Х			

**Table 12:** Monitoring Activities Being Undertaken for the Project Facilities, Haul Roads, and All-Weather Access Road

				VE	Cs		
Monitoring Activity	Frequency		Ungulates	Predatory Mammals	Raptors	Waterbird	Upland Breeding Birds
Active Raptor nest monitoring	During nesting season (May 1 to Sept 15) if active nest is within the active footprint and vicinity of Project facilities: within area of concern – 1x/day; not within area of concern – 1x/week (see <b>Figure 13</b> )				X		
Waterbird nest surveys	Active nests identified within 100 m of Project facilities and all roads monitored, if deemed necessary Additional monitoring may be required during fish-out or flooding					X	
PRISM plot surveys	Once every three years in collaboration with ECCC						Х
North American Breeding Bird Survey (BBS)	Once every three years during closure and post closure complete a North American Breeding Bird Survey (NABBS) route and contribute to the NABBS						Х

#### 3.2 GENERAL MONITORING

#### 3.2.1 Road Surveys

#### Meadowbank AWAR and Vault/Whale Tail Haul Road

Methods: Systematic ground surveys will be conducted along the AWAR and Whale Tail Haul Road by two observers (one can be the driver) in a vehicle. Survey vehicles will travel no more than 30 km/h to maximize observations of all wildlife along the route. All wildlife observations recorded incidentally as part of regular traffic along the haul roads and AWAR will be known at the start of ground surveys so that observers are aware of the location of wildlife observations and can focus attention in these areas. For each sighting, a UTM coordinate will be taken along the route along with distance of the animal from the haul road or AWAR, nearest road marker, and a variety of other information (see field data form in **Appendix D**). Behavior of Ungulates will also be recorded for each encounter and comments on disturbance related to a particular behavior (e.g., running) will be made (see field form in **Appendix D**). Raw data (i.e., field forms) will be included in the annual Wildlife Monitoring Summary Report. Further information on these surveys as they relate to caribou interaction are described below in Section 3.5.2.3. Timed observation scans (i.e., roadside observation locations) are also currently being considered, in addition to driving scans, where locations offer a unique vantage point for farfield detection of caribou and other wildlife (e.g., muskox).

### Height of Land Surveys

*Methods:* While conducting the ground surveys, two observers will stop at the Height-of-Land (HOL) survey locations (see **Appendix G**) for 20 minutes to survey the area, focusing on furtherfield areas (i.e., likely up to 4 to 5 km). Raw data (i.e., field forms) will be included in the annual Wildlife Monitoring Summary Report. Further information on these surveys as they relate to caribou are described below in Section 3.5.2.3.

Frequency (haul roads and AWAR): January to April and July to August, once per week; May to June and September to December (frequency will increase when caribou are present, see **Figure 6**, **Figure 7**, and **Figure 9**; **Table 12**).

# 3.2.2 Pits and Mine Site Ground Surveys

Methods: Within the Meadowbank Mine and Vault sites (e.g., tailings pond, haul road to Vault Site) and the Whale Tail Pit site, systematic ground observations of Ungulates will be conducted by on-site environmental technicians/monitors who record details on species, numbers, sex, habitat type, and location. Behavior of Ungulates will also be recorded for each encounter and comments on disturbance related to a particular behavior (e.g., running) will be made (see field form in **Appendix D**).

Frequency: Once per week (frequency will increase if caribou are present, Figure 6, Figure 7, and Figure 9; Table 12).

#### 3.3 WILDLIFE HABITAT

#### 3.3.1 Objectives

The objectives of monitoring Wildlife Habitat will be to ensure that measures to minimize the amount (or area) of Wildlife Habitat lost to Project construction and operation are effective, and that concentrations of contaminants in vegetation do not exceed acceptable levels for wildlife health. Residual effects will be assessed, and opportunities for reclamation or habitat creation will be identified (e.g., recontouring, stabilization, and restoration of drainage patterns). Monitoring will also ensure that potentially contaminated vegetation is removed (or isolated from wildlife), and that the site is restored to its natural state. **Table 13** describes the framework that has been established for monitoring effects to Wildlife Habitat.

**Table 13:** Monitoring Approach for Wildlife Habitat for the Meadowbank, Whale Tail Project and proposed Whale Tail Expansion

p. 5p 5 5	Cu Whale Tall Lx				
Potential Effect	Impact Prediction	Quantitative Monitoring Variable	Thresholds	Monitoring Activity	Frequency
Habitat Loss  Meadowbank Mine and Vault Pit and Haul Road (Mine Site)	Loss <eia prediction and subsequent approvals (see Gebauer et al., 2015)</eia 	Area of altered habitat	5% above predicted EIA values of 867 ha for the Mine site	Habitat monitoring	Every three years post-construction, or if greater than 25% of the overall mine footprint changes.
Habitat Loss Meadowbank AWAR	Loss <eia prediction and subsequent approvals (see Gebauer et al., 2015)</eia 	Area altered habitat	5% above predicted EIA values 281 ha for AWAR	Habitat monitoring	Every three years post-construction, or if greater than 25% of the overall mine footprint changes.
Habitat Loss Whale Tail Pit and Haul Road	Loss < EIS prediction (see Golder 2016)	Area of altered habitat	5% above predicted Els values of 820 ha for the Pit and Haul Road	Habitat monitoring	Every three years post-construction, or if greater than 25% of the overall mine footprint changes.
Habitat Degradation by Contamination Meadowbank Mine site and Haul Roads	Dust and emissions will not result in unacceptable levels of contaminants in vegetation	Concentrations of contaminants	See Screening Level Risk Assessment Plan, <b>Appendix A</b> and Air Quality and Dustfall Monitoring Plan (Agnico Eagle 2018)	Screening Level Risk Assessment Dust fall monitoring	SLRA: Every three years Dust fall monitoring : annually
Habitat Reclamation following Project Closure	Vegetation will be naturally established on reclaimed sites	Proportion of disturbed areas revegetated	Up to 80% of the reclamation will be completed by year 12. Refer to the reclamation and closure plan for more details	Habitat reclamation monitoring	At Year 2 post- closure and every 3 years until Year 12 post-closure

# 3.3.2 Monitoring Approach

As per Project Certificate No.008, Condition 33, Agnico Eagle will continue to document and map sensitive wildlife features such as denning sites, caribou crossing sites, raptor nests and other nesting sites (representative figures are provided in **Appendix H**; from Dougan & Associates 2017). Initial documentation and mapping has been completed for the Whale Tail Pit and Haul Road (Dougan & Associates 2017) and information related to other development areas will be compiled into a single spatial dataset to guide monitoring activities. There are no caribou calving areas within the regional study area.

Monitoring activities for Wildlife Habitat will be carried out post-construction and post-closure. The following are the methods and frequency for the monitoring efforts for each measurable parameter.

#### 3.3.2.1 Habitat Loss

Methods: Total area of habitat disturbance will be determined following Project construction using a combination of ground and aerial surveys, photography, ground-truthing (with the aid of GPS), as-built reports, and possibly satellite imagery. Monitoring of habitat loss will occur at three

primary locations: Meadowbank Mine (includes Vault Pit and Haul Road), AWAR (including quarry sites), and Whale Tail Pit and Haul Road (includes borrow sites and access roads). Reporting will describe the overall area of different ELC units lost due to Project development. For the Meadowbank Mine and AWAR locations, thresholds are disturbance of 5% above predicted EIA values of 867 and 281 ha (includes approved changes), respectively. For the Whale Tail and Haul Road location, the threshold is disturbance of 5% above a predicted EIS value of 820 ha.

*Frequency:* Every three years post-construction or if changes are greater than 25% of the overall mine site footprint from the previous year ELC was evaluated. This frequency may be reduced during the operation phase if the amount of new disturbance and reclamation areas is relatively unchanged.

### 3.3.2.2 Habitat Degradation by Contamination

Methods: A comprehensive environmental health monitoring program has been initiated that compares contaminant levels in soil and vegetation (i.e., lichen, berries, and sedges) before and after Project activities. Samples taken from the Project area are also compared to reference sites that are not influenced by Project activities. This Screening Level Risk Assessment program is described in **Appendix A** of this document. Additional information is provided through dustfall monitoring along the AWAR and Whale Tail Haul Road, as described in Air Quality and Dust Monitoring Plan (Agnico Eagle 2018).

#### 3.3.2.3 Habitat Reclamation Post-Closure

Methods: Reclamation efforts will focus on providing conditions conducive to natural recolonization of the site by surrounding native vegetation. There is a lack of available soils in the Project area that, in conjunction with the harsh climatic conditions (short cold and dry growing season), makes it difficult to establish vegetation over large areas. Reclamation activities and natural re-vegetation of disturbed areas during the closure and post-closure phases will reduce overall residual effects within the LSA.

*Frequency:* Vegetation plots and mapping will be conducted during the second growing season following closure and every three years thereafter up to Year 12 post-closure (considered to be a reasonable period of time within which to expect revegetation of most disturbed areas) to ensure effort is made to re-vegetate and that re-vegetation of previously disturbed areas is progressing.

#### 3.3.3 Thresholds

Should the thresholds outlined in **Table 13** be exceeded, the following actions will be undertaken.

#### 3.3.3.1 Habitat Loss

Where mapping indicates a loss of habitat area beyond that predicted, discussions will be held with construction contractors and Project personnel to resolve the concern. Additional mitigation may include clearer delineation of work space, road areas, and designated no-disturbance areas. Where unauthorized off-road vehicle activity is noted, more stringent off-road access control measures will be implemented. Habitat reclamation and restoration of natural drainage patterns and contours may be ordered depending on the scale of the disturbance.

#### 3.3.3.2 Habitat Degradation by Contamination

See **Appendix A -** Screening Level Risk Assessment Program

#### 3.3.3.3 Habitat Reclamation Post-Closure

If progress of revegetation is not occurring, further reclamation activity will be undertaken and may involve reseeding (e.g., native-grass cultivars and forbs such as nitrogen-fixing legumes).

#### 3.4 INVASIVE PLANT MONITORING

The invasive plant monitoring component outlines the means by which Agnico Eagle plans to reduce Project-related effects to plant populations and communities, primarily through the mitigation and management of invasive species, and includes both environmental and follow-up monitoring (Project Certificate No.008, Condition 25). Proactive measures and monitoring programs are used to track conditions and implement further mitigation as required, while follow-up monitoring is used to verify the accuracy of impact predictions and adaptively manage and implement further mitigation as required.

#### 3.4.1 Objectives and Thresholds

The objectives of the vegetation monitoring and management component are as follows:

- measure distribution and abundance of non-native invasive plant species
- using industry standards and best practices, equipment and bulk supplies must arrive to Project site free of soil or plant debris to minimize the risk of invasive plant introduction

Specific thresholds for invasive plant monitoring include the following:

• no non-native invasive species will occur as a result of mining operations (i.e., new equipment or materials arrival).

# 3.4.2 Monitoring Approach

Monitoring programs for non-native invasive plant species will be completed during the construction and operations phase of the Project. Surveys for non-native invasive plant species will be undertaken in disturbed areas (e.g., active mine site, borrow pits) to identify and document the extent of any non-native invasive plant species that may occur during construction and operations. Additionally, invasive plant inspection surveys will be completed on cargo in Becancour, prior to being loaded onto shipping vessel(s).

The early detection of non-native invasive plant species is important, as preventing these species from becoming established is the most effective mitigation that can be employed. If non-native invasive plant species are identified in the Project area, they will be reported to Government of Nunavut Department of Environment (GN DoE), as per DoE guidelines. As part of the reporting process, the following information will collected and sent to DoE:

- location of the species (i.e., GPS coordinates);
- species identification and population extent;
- photographs of the species in question to confirm identification; and
- species-specific management and eradication recommendations.

# 3.4.3 Mitigation

# **Terrestrial Pathways**

- All Equipment and supplies brought to the project sites are clean and free of soils that could contain plant seeds or organic matter not naturally occurring in the area
- Vehicle tires and treads are inspected prior to initial use in project areas

## **Specific Cleaning Measures**

- Equipment and bulk supplies will be cleaned using brooms, brushes, shovels, water, or compressed air. Areas of particular concern include tires, tracks, skids, buckets, scoops, and packing materials.
- Accumulated soil, plant material or crop debris from openings, tracks, skids, wheels, buckets, scoops, and packing materials using a hand scraper, shovel, broom, or other methods.
- Additional focus should be made to areas where soil or plant debris can accumulate (i.e., tires or undercarriage).

#### 3.5 UNGULATES

As previously mentioned, decision charts (**Figures 6** through **10**) outlining monitoring and mitigation (adaptive management) measures for ungulates have been developed for each phase as follows:

- Figure 6 caribou and mining operations;
- Figure 7 caribou and haul roads;
- Figure 8 caribou and the All Weather Access Road (AWAR);
- Figure 9 caribou and blasting; and
- Figure 10 muskox and operations.

### 3.5.1 Objectives

The monitoring objectives are to detect if effect thresholds have been exceeded, to test the efficacy of mitigation, and understand Project-related effects to Ungulates. For Ungulates, it is also an objective to manage sensory disturbance to caribou approaching the Project, leading to monitoring to detect caribou approaching the project and mitigation to reduce sources of sensory disturbance. Due to the collar data sharing agreement, extensive range, large numbers of caribou and muskox, and history of analysis, this evaluation is done in collaboration with the GN.

Figure 6: Thresholds for Monitoring and Mitigation of Caribou in Proximity to Mine Operations

Cari	bou Group S	Size Threshold	(GST)	
Sensitive		Sensitive		
Season		Season		WHALE TAIL
Fall	Winter	Spring	Summer	MINE OPERATIONS
Sept 22 to	Dec 16 to	Apr 1 to	May 26 to	IVIINE OPERATIONS
Dec 15	Mar 31	May 25	Sept 21	
GST - 110	GST - 25	GST - 12	GST - 25	
caribou	caribou	caribou	caribou	
				•
				NORMAL OPERATIONS
				WILDLIFE HAVE RIGHT OF WAY
				BASIC MONITORING ACCORDING TO TEMP
				<b>*</b>
				1 caribou within 25 km,
				based on caribou
				collaring data
				LEVEL 1 TRIGGERED FOR 5 DAYS THROUGHOUT THE YEAR
				LEVEL I TRIGGERED FOR 5 DATS TIMOOGNOOT THE TEAK
			Mo	NITORING MITIGATION
		l l a i a h		TVIIII O T
				eys every 2 days (during sensitive seasons)  - Daily site-wide notification that caribou could be encountered
				ound surveys every 2 days (during sensitive seasons) caribou could be encountered information reviewed 2x/week
				> GST within 4 km
				(or maximum
				distance observed)
				<b>↓</b>
			LEVEL 2 T	RIGGERED 10 DAYS DURING SENSITIVE SEASONS; 5 DAYS OTHERWISE
			Monito	DRING MITIGATION
	- H	eight-of-Land si		
		-		- Dispatch provides caribou updates to drivers every 3 hou

- Pit and mine site ground surveys every 2 days
- GN satellite collar information reviewed daily, or as frequently as made available to Agnico Eagle
- Dispatch provides caribou updates to drivers every 3 hours
- Notify KivIA, GN, HTO
- Environmental Supervisor may initiate additional mitigation consistent with Level 3, depending on caribou distribution, abundance and proximity to operations.



# LEVEL 3 TRIGGERED REMAINDER OF YEAR

- Speeds reduced to 30 km/hr on-site
- Hourly site-wide notification by dispatch of caribou presence and location as confirmed by Environmental Technicians
- Consult daily with KivIA, GN, HTO
- Level 2 monitoring continues

# \* Non-essential vehicles and heavy equipment - all vehicles or heavy equipment except those operated for the purpose of maintaining the safety of personnel. For clarity, non-essential vehicles shall include vehicles and equipment used to continue mining operations or hauling of ore. Essential vehicles includes vehicles operated for the purpose of maintaining the safety of personnel, Emergency Response Team (ERT), security and wildlife monitoring.

# LEVEL 3 TRIGGERED APRIL 1 TO MAY 25 AND SEPTEMBER 22 TO DECEMBER 15

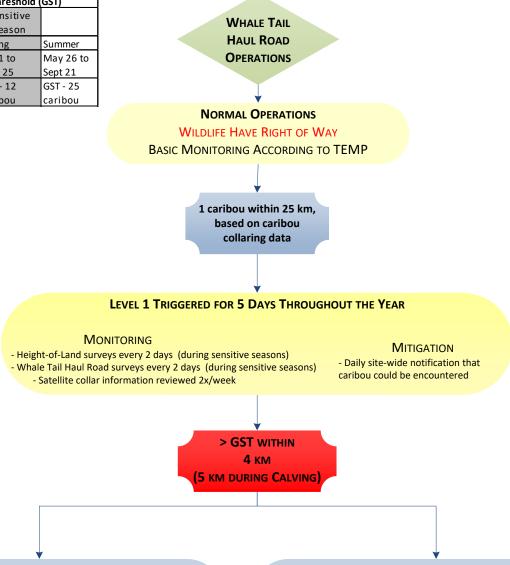
- Suspend non-essential vehicles and heavy equipment\* within a 500 m radius of the group of caribou year round, and a 1 km radius during calving/post-calving periods
- Speeds reduced to 30 km/hr for essential equipment; as required, Environment Technician piloting convoy
- Hourly site-wide notification by dispatch of caribou presence; location and proximity of caribou confirmed by Environment dept
- Consult daily with KivIA, GN, HTO to discuss response and options to continue activities
- Mining activities will resume if project tolerant caribou are grazing next to roads and not migrating; 30 km/hr speed limit imposed along project roads

#### **Level 3 Monitoring:**

- Height-of-Land, pit and mine site surveys at least 2 x daily
- Haul road surveys and Height-of-Land surveys daily
- GN satellite collar information reviewed daily, or as frequently as made available to Agnico Eagle

Figure 7: Thresholds for Monitoring and Mitigation of Caribou in Proximity to the Whale Tail Haul Road

Caribou Group Size Threshold (GST)					
Sensitive		Sensitive			
Season		Season			
Fall	Winter	Spring	Summer		
Sept 22 to	Dec 16 to	Apr 1 to	May 26 to		
Dec 15	Mar 31	May 25	Sept 21		
GST - 110	GST - 25	GST - 12	GST - 25		
caribou	caribou	caribou	caribou		
•	•	-			



# LEVEL 3 TRIGGERED REMAINDER OF YEAR

- Speeds reduced to 30 km/hr near caribou
- Limit non-essential traffic
- Site-wide notification of caribou presence and location will be confirmed by Environmental Technicians
- Consult with KivIA, GN, HTO
- Level 2 monitoring continues

# LEVEL 3 TRIGGERED APRIL 1 TO MAY 25 AND SEPTEMBER 22 TO DECEMBER 15

- Suspend non-essential vehicles\* within a 500 m radius of the group of caribou must stop and yield to caribou
- Road will be closed to non-essential vehicles
- Trips in progress will be completed to the mill and could be accompanied by a pilot vehicle; 30 km/hr speed limit imposed on haul road
- Haul road gates closed and non-essential vehicle use ceases
- Hourly site-wide notification by dispatch of caribou presence; location and proximity of caribou confirmed by Environment Technician
- Consult daily with KivIA, GN, HTO to discuss response and options to reopen road Road may be re-opened if Project tolerant caribou are grazing next to road and not migrating; 30 km/hr speed limit imposed along haul road

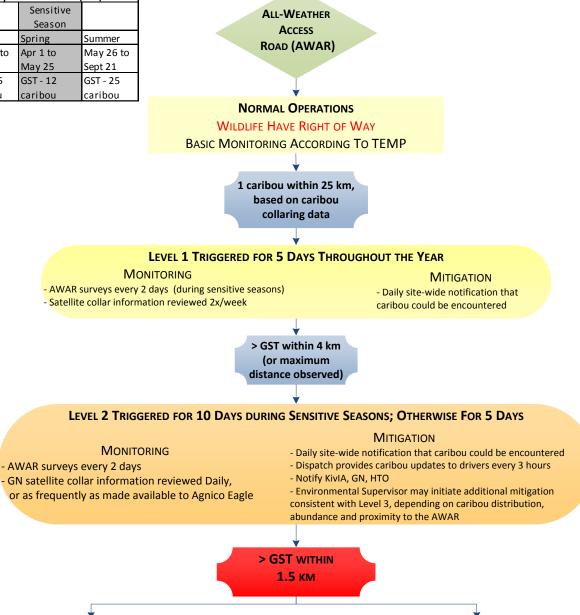
#### Level 3 monitoring:

- Height-of-Land surveys at least 2 x daily nearest to the group of caribou
- Haul road surveys and Height-of-Land surveys daily
- GN satellite collar information reviewed daily, or as frequently as made available to Agnico Eagle

<sup>\*</sup> Non-essential vehicles and heavy equipment - all vehicles or heavy equipment except those operated for the purpose of maintaining the safety of personnel. For clarity, non-essential vehicles shall include vehicles and equipment used to continue mining operations or hauling of ore. Essential vehicles includes vehicles operated for the purpose of maintaining the safety of personnel, Emergency Response Team (ERT), security and wildlife monitoring.

Figure 08: Thresholds for Monitoring and Mitigation of Caribou in Proximity to the All Weather Access Road (AWAR)

Caribou Group Size Threshold (GST)					
Sensitive		Sensitive			
Season		Season			
Fall	Winter	Spring	Summer		
Sept 22 to	Dec 16 to	Apr 1 to	May 26 to		
Dec 15	Mar 31	May 25	Sept 21		
GST - 110	GST - 25	GST - 12	GST - 25		
caribou	caribou	caribou	caribou		



# **LEVEL 3 TRIGGERED** REMAINDER OF YEAR

- Public access will not be restricted; except at the request of the HTO and KivIA
- Speeds reduced to 30 km/hr near caribou
- Limit non-essential traffic
- Site-wide notification of caribou presence and location will be confirmed by Environmental staff
- Consult with KivIA, GN, HTO
- Level 2 monitoring continues

#### \* Non-essential vehicles and heavy equipment - all vehicles or heavy equipment except those operated for the purpose of maintaining the safety of personnel. For clarity, nonessential vehicles shall include vehicles and equipment used to continue mining operations or hauling of ore. Essential vehicles includes vehicles operated for the purpose of maintaining the safety of personnel, Emergency Response Team (ERT), security and wildlife monitoring.

#### **LEVEL 3 TRIGGERED**

### APRIL 1 TO MAY 25 AND SEPTEMBER 22 TO DECEMBER 15

- Public access will not be restricted; except at the combined request of the HTO and KivIA
- Suspend all non-essential vehicles\*. Trips in progress will be completed
- Consult with KivIA, GN, HTO to discuss response and options to re-open AWAR
- If agreed upon, day time (700 to 1900) trips will be in a convoy accompanied by a pilot vehicle; 30 km/hr speed limits imposed; closure of AWAR at night (between 1900 to 700)
- Hourly site-wide notification by dispatch of caribou presence; location and proximity will be confirmed by Environment dept
- AWAR may be re-opened if Project tolerant caribou are grazing next to road and not migrating

#### Level 3 monitoring:

- AWAR surveys daily
- GN satellite collar information reviewed daily, or as frequently as made available to Agnico Eagle

Figure 09: Thresholds for Monitoring and Mitigation of Ungulates in Proximity to Blasting Activities

Caribou Group Size Threshold (GST)					
Sensitive		Sensitive			
Season		Season			
Fall	Winter	Spring	Summer		
Sept 22 to	Dec 16 to	Apr 1 to	May 26 to		
Dec 15	Mar 31	May 25	Sept 21		
GST - 110	GST - 25	GST - 12	GST - 25		
caribou	caribou	caribou	caribou		



#### **NORMAL OPERATIONS**

WILDLIFE HAVE RIGHT OF WAY
BASIC MONITORING ACCORDING TO TEMP

> GST within 4 km (or maximum distance observed)

LEVEL 2 TRIGGERED FOR 10 DAYS DURING SENSITIVE SEASONS; OTHERWISE FOR 5 DAYS (NOTE: NO LEVEL 1 FOR BLASTING)

#### MONITORING

- Height-of-Land surveys every 2 days
- GN satellite collar information reviewed Daily, or as frequently as made available to Agnico Eagle
  - Environmental staff monitor animals before, during, and after blast

#### **MITIGATION**

- Daily site-wide notification that caribou could be encountered
- Notify KivIA, GN, HTO before blasting



# LEVEL 3 TRIGGERED REMAINDER OF YEAR

- Site-wide notification of caribou presence and location will be confirmed by Environmental Technicians
- Consult with KivIA, GN, HTO
- Level 2 monitoring continues

# LEVEL 3 TRIGGERED

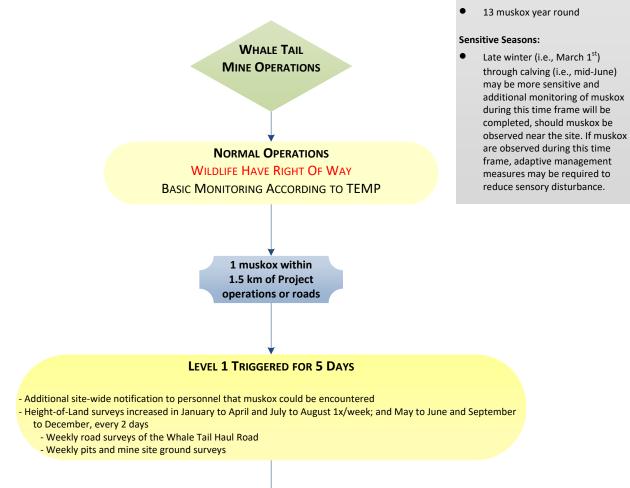
# APRIL 1 TO MAY 25 AND SEPTEMBER 22 TO DECEMBER 15

- Blast is postponed
- 2 x daily site-wide notification of ungulates to Blast Supervisor; location and proximity to be confirmed by Environmental Technicians
- Consult with KivIA, GN, HTO to discuss response and options to continue activities
- If blast cannot be safely suspended and project tolerant ungulates remain within the blast zone, following consultation, Environmental staff may herd animals out of blast zone
- Environmental staff monitor animals before, during, and after blast

#### **Level 3 Monitoring:**

- Height-of-Land, pit and mine site surveys at least 2 x daily
  - Haul road surveys and Height of Land surveys daily

Figure 10: Thresholds for Monitoring and Mitigation of Muskox in Proximity to the Project



Muskox Group Size Threshold (GST):

#### LEVEL 2 TRIGGERED FOR 5 DAYS (10 DAYS DURING SENSITIVE SEASONS)

> GST within 500 m (or maximum distance observed)

- Continue site-wide notification to personnel that muskox could be encountered
- Dispatch announces potential muskox presence every 3 hours
- Height-of-Land surveys increased to 2x/week
- Road surveys increased to 2x/week
- Pits and mine site ground surveys increased to 2x/week
- Contact GN conservation officer and KivIA lands inspector for advice; notify GN, KivIA, and HTO
  - Environmental Supervisor may initiate additional mitigation such as blasting cessation, heavy equipment cessation depending on muskox distribution and abundance and proximity to operations

# 3.5.2 Monitoring Approach

Monitoring activities for Ungulates will be carried out prior to, during, and following construction. Following are the methods and frequency for the monitoring efforts for each measurable parameter.

**Table 14** describes the framework which has been established for monitoring effects to Ungulates. As described above, an objective is to reduce sensory disturbance to caribou approaching the Project. This objective is not linked to an impact prediction, as the monitoring is to trigger mitigation rather than to test a threshold. **Figure 6** through **Figure 10** describe monitoring and mitigation for caribou/muskox approaching the Project site for all aspects of the operations. Documents reviewed to develop monitoring and mitigation strategies included:

- Caribou Road Mitigation Plan for the Jay Project (Golder 2017)
- Wildlife Mitigation and Monitoring Program Plan for the Back River Project (ERM 2017)
- Management of Caribou Post-Calving Areas in the Kivalliq Region, Nunavut (Poole and Gunn 2016)

Distance thresholds for caribou monitoring have the ultimate objective of detecting caribou group size triggers up to a distance of 4 km (or maximum distance observed); however, not all caribou will be able to be observed at this distance in all circumstances and areas associated with the Project. During the spring and fall migration period, alongside HTO and KivlA representatives, additional personnel will be on-site to determine the best and most logistically feasible methods of recording data to document caribou detection thresholds from roads (e.g., AWAR and Haul Road) and for HOL survey locations. On-site environmental supervisors may use discretionary mitigation measures at level 2 of caribou and initiate adaptive management in collaboration with KIA and HTOP. This could include the addition of specific automatic measures intended to prepare for an operational shutdown if caribou move closer to mine operations or roads. In addition, a retrospective analysis using presence/absence data and wildlife features to determine "hot spots" near infrastructure to focus monitoring and mitigation. Data during field surveys and through strategically placed motion sensing cameras, will provide an understanding of caribou behaviour when approaching infrastructure (e.g., within 500 m of AWAR) and when interacting with infrastructure (e.g., caribou on road with no traffic vs caribou on road with traffic vs caribou near road with ATV and hunters). These data will be analyzed, discussed with the TAG and reported annually or on a relevant frequency commensurate with data volume.

Although the monitoring and mitigation is focused on caribou, muskox are also observed along the AWAR, with approximately 2500 animals from 299 observation records, of which nearly 2/3 of observations consist of 5 animals or less. A specific monitoring and mitigation decision chart for muskox has also been developed (**Figure 10**).

To provide additional clarity and support to the decision trees, the following definitions are provided:

'Project tolerant' as: an animal or group of animals (i) observed within a mitigation distance buffer for greater than 72 hours during the winter or 48 hours during other seasons; and (ii) not visibly disturbed by the Project.

'Non-Essential Vehicles': include vehicles and equipment used to continue mining operations or hauling of ore.

'Essential Vehicles': include vehicles operated for the purpose of maintaining the safety of personnel, Emergency Response Team (ERT), security and wildlife monitoring.

 Table 14: Monitoring Approach for Ungulates for the Project

Potential Effect	Impact Prediction	Quantitative Monitoring Variable	Thresholds	Monitoring Activity	Frequency
Habitat Loss Meadowbank Mine, and Vault Pit and Haul Road	Loss <eia prediction and subsequent approvals (see Gebauer et al., 2015)</eia 	area of altered habitat	10% above total loss of high suitability habitat (for ungulates) predicted in EIA  Meadowbank Mine and Vault Site - 240 and 191 ha for the growing and winter seasons, respectively	Habitat monitoring	Every three years post-construction or based on TAG meeting outcomes
Habitat Loss Meadowbank AWAR	Loss <eia prediction and subsequent approvals (see Gebauer et al., 2015)</eia 	area of altered habitat	10% above total loss of high suitability habitat (for Ungulates) predicted in EIA  Meadowbank AWAR - 63 and 188 ha for the growing and winter seasons, respectively	Habitat monitoring	Every three years post-construction or based on TAG meeting outcomes
Habitat Loss Whale Tail Pit and Haul Road	Loss <eis prediction (see Golder 2016)</eis 	area of altered habitat	10% above total loss of high suitability habitat (for Caribou) <sup>(a)</sup> predicted in EIA  Whale Tail Site – 30 and 342 ha for the growing and winter seasons, respectively	Habitat monitoring	Every three years post-construction or based on TAG meeting outcomes
				Pits and mine site ground surveys	Weekly increased up to every two days as per triggers (see <b>Figure 6</b> )
				Whale Tail Haul Road surveys	Weekly increased up to every two days as per triggers (see <b>Figure 7</b> )
Sensory Disturbance	N/A	Caribou presence	Monitoring is continuous, but with	Caribou satellite- monitoring program	Data provided to Agnico Eagle from GN weekly, requested daily as per triggers(see Figure 6 through Figure 9)
to Caribou			through 9)	ZOI and Mechanistic Studies	Through discussions/workshops with TAG members, determine new analysis requirements to better understand the indirect effects of mining on caribou as new data is acquired (Project Certificate No.008, Condition 29)
				Incident reports	As occurring

 Table 14: Monitoring Approach for Ungulates for the Project

Potential Effect	Impact Prediction	Quantitative Monitoring Variable	Thresholds	Monitoring Activity	Frequency		
				Height-of-land surveys	Weekly increased up to every two days as per triggers (see Figure 6 through Figure 9)		
Sensory Disturbance to Caribou from Blasting	N/A	Intensity of blast	NPC-119 criteria  Monitoring is continuous, but with increasing intensity as caribou approach the blasting site (see Figure 9)	Monitoring of blast frequency, noise, and vibration	Blast is postponed. 2 x daily site-wide notification of ungulates to Blast supervisor; location and proximity to be confirmed by Environmental Technicians (see <b>Figure 9</b> )		
				Pits and mine site ground surveys	Weekly increased up to 2x/week as per triggers (see <b>Figure 10</b> )		
Sensory Disturbance	N/A	Muskox presence	Muskox presence	increasing intensity as muskox	Whale Tail Haul Road surveys	Weekly increased up to 2x/week as per triggers (see <b>Figure 10</b> )	
to Muskox			approach the Project (see <b>Figure 10</b> )	Incident reports	As occurring		
				Height-of-land surveys	Weekly increased up to 2x/week as per triggers (see <b>Figure 10</b> )		
				Pits and mine site ground surveys	See above		
Vehicle Collisions	Ungulates will not be killed by vehicles	Ungulates killed by vehicles	Ungulates killed		2 individuals	Whale Tail Haul Road and All Weather Access Road surveys	See above
				Incident reports	As occurring		
Hunting by Baker Lake Residents	Harvest intensity in the Meadowbank RSA will increase <20%	Correlation between spatial distribution of Ungulate harvest and road development Monitor trend in harvest from Hunter Harvest Study	>20% adjustment in harvest distribution Meadowbank AWAR use. This metric will further be refined as part of the revised HHS design and implementation	Baker Lake Hunter Harvest Study	Initiated in 2007 and active until 2015. Re-initiated in September 2017 with quarterly data collection; Yearly reporting		

Table 14: Monitoring Approach for Ungulates for the Project

Poten Effe		Quantitative Monitoring Variable	Thresholds	Monitoring Activity	Frequency
	No increase in harvest from Whale Tail Haul Road RSA	Monitor trend in harvest distribution or total harvest from Hunter Harvest Study	No change in harvest	Baker Lake Hunter Harvest Study  Satellite-collaring program	Initiated in 2007 and active until 2015. Re-initiated in September 2017 with quarterly data collection; Yearly reporting  Data provided to Agnico Eagle from GN weekly, requested up to 2x/week as per triggers (see Figure 6 through Figure 9)

Note: Frequency for some activities may change, see Figure 6 through Figure 9

<sup>(</sup>a) For Whale Tail extension, effects on muskox were screened out during the EA process; therefore, they are not included in habitat loss calculations for the Whale Tail Site

#### 3.5.2.1 Caribou Group Size

The environment department representative or observer (i.e., biologist, technician, and local hunter conducting caribou surveys) responsible for determining exceedance of triggers will monitor and document a "group of caribou" defined as:

An aggregation of caribou that are sufficiently close together that they can see and react to another animal's behaviour, and have the potential of responding should one or more animal in the aggregation become startled.

At the discretion of the observer, if an aggregate of caribou are separated by approximately 500 m, this may be considered 2 groups of caribou depending on level of interaction and behaviour of groups. Agnico Eagle observes will work with GN, KivIA, and HTO representatives to ensure consistency in the application of this definition.

#### 3.5.2.2 Group Size Thresholds

Group size numbers of caribou collected from observation monitoring along the AWAR are shown in **Table 15**. A group size of 50, which has been used to trigger adaptive management for caribou to date at the Meadowbank Mine, has been shown to encompass almost 2/3 (i.e., 64%) of all caribou observed from roadside surveys from 2007 to 2016 (**Table 15**). In addition, the majority of caribou groups greater than or equal to 50 are observed in the rut and fall migration and winter seasons (i.e., 91%).

**Table 15:** Summary of Caribou Numbers by Group Size Thresholds along the All-Weather Access Road (AWAR) from 2007 to 2016

Group Size	Total Number of Observations	Total Number of Caribou Represented in Group Size	% Total Caribou Observed
≥500	30	24,204	24.6%
≥100	181	52,513	53.4%
≥50	346	62,503	63.7%
≥40	423	65,772	67.0%
≥30	572	70,666	72.0%
Total	3,961	98,192 <sup>(a)</sup>	

<sup>(</sup>a) Represents the total number of caribou observed from AWAR surveys between 2007 and 2016, consequently it will not be the sum of the Total Number of Caribou

Through discussions with the GN and the KivIA, a desired minimum protection level of 75% of all caribou observed will be used as the foundation for group size thresholds (GST). Consequently, GSTs have been developed for the three main periods when caribou are observed on-site: early and late winter, fall rut and migration, and spring migration (**Table 16**). These data are also presented in **Appendix I** as graphs for each season. To be further conservative of caribou protection, the lower Confidence Interval value was used for the GST to trigger adaptive management (**Table 16**).

**Table 16**: Seasonal Caribou Group Size Thresholds Representing the Protection of 75% of All Caribou Observed, with 95% Confidence Intervals

Season	Group Size Threshold	Average Group Size	Upper/Lower 95% Confidence Intervals (CI)
Spring Migration	14	14.6	14.9/14.3
Early and Late Winter	35	35.3	35.7/34.9
Fall Rut/Fall Migration	140	175.0	209.6/140.4

Agnico Eagle reviewed GSTs to protect 75% of the caribou interacting with the Project. Agnico Eagle is committed to caribou conservation through the implementation of adaptive management based on group size and distance thresholds, but these measures have to be done in a manner that balances mining operations, and at this point it is uncertain how operations will be affected using a GST of 75%. Although Agnico Eagle suggests using the 75% GST and revisiting this number during the TAG meeting provided that this percentage balances operations and caribou conservation, as per Project Certificate No.008, Condition 30, Agnico Eagle will continue to collect additional data on caribou group sizes in proximity to the project and will work with the TAG to refine appropriate caribou GSTs. As mentioned earlier, the indirect effects of sensory disturbance on wildlife populations is poorly understood in terms of affecting the distribution and abundance of wildlife in relation to a mining development, even less is known of how these effects can translate to population level effects. Resource management objectives are typically devised around direct effects to wildlife populations such as hunting and habitat conservation, among others. Nevertheless, as per Project Certificate No.008, Condition 30, Agnico Eagle will initially adopt GSTs presented in **Table 17**.

Table 17: Initial Seasonal Caribou Group Size's as per Project Certificate No.008, Condition 30

Sensitive Season		Sensitive Season	
Fall	Winter	Spring	Summer
Sept 22 to Dec 15	Dec 16 to Mar 31	April 1 to May 25	May 26 to Sept 21
GST - 110 Caribou	GST - 25 Caribou	GST - 12 Caribou	GST - 25 Caribou

Based on the seasonal group size that will be used in the field, to implement heightened mitigation measures, more emphasis will be placed on understanding group size and the variation of group sizes within each biological season. In addition, whenever possible, the presence of collars will also be noted so that a linkage between collar presence and overall herd numbers can begin to be developed for each season<sup>1</sup>. As GSTs are the main trigger for mitigation and management, it is critical to understand the efficacy of these GSTs for overall herd protection.

<sup>&</sup>lt;sup>1</sup> Collars can be challenging to see and observed at distances <300 m; all effort will be made to locate collars.

#### 3.5.2.3 Zone of Influence and Mechanistic Studies

As per Project Certificate No.008, Condition 29, Agnico Eagle will work in collaboration with the GN and other relevantly interested parties, to collect additional caribou data and conduct analysis of this data to address questions about the direct and indirect effects of mining on caribou distribution and abundance. To date, Agnico Eagle completed a preliminary ZOI study. Agnico Eagle will continue to collaborate with the GN so that additional caribou data relevant to Agnico Eagle's operations can be collected to further explore a ZOI and/or other effects on caribou. For example, there appears to be an interaction between caribou and the road during seasonal movements, whereby caribou movements may be delayed at the local scale (i.e., not necessarily a delay to the ultimate destination of the calving grounds) when they encounter the road. Ground-based studies as part of the Whale Tail Pit Haul Road (referred to as the Haul Road) monitoring are being considered to determine the mechanisms that may be responsible for this delay. The Haul Road monitoring would specifically look at collecting the following information:

- Surveys inform of caribou distribution and relative abundance, and the AWAR datasheet
  has been the means for collecting information using the following parameters: date, time,
  species, number (group size), behavior, habitat, location coordinates, direction from road,
  distance from road, and general comments.
- Suggested changes to the objectives, methods, and data collection parameters are as follows and will be implemented in 2018:
  - Agnico Eagle developed GSTs to guide mitigation/management; these GSTs are seasonal and based on a protection measure of 75% of the herd (i.e., 75% of the total caribou numbers are represented by group sizes of the seasonal threshold or higher);
  - When caribou are near the Roads, monitoring intensity goes up through a phased approach to daily monitoring;
  - To improve data collection, Agnico Eagle is suggesting to better understand detection distance thresholds from the roads (AWAR/Haul Road) and we can do this by testing detection and measuring using range finders, people on the landscape, and installing visual markers at 1 km perpendicular distances from the road;
  - Observers will also record the maximum observable distance even when caribou observations are 0 and can retrospectively use collar data to try and determine detectability;
  - Agnico Eagle is now employing a consistent definition of groups but it is likely still important to note the distance of one group from another and record that behavior on the data sheet (i.e., are they separate groups?) to determine if they are interacting (exchanging individuals or responding to one another). The alternative

- approach is to only record data for group you know is unique (i.e., if they are close spatially assume it's the same group<sup>2</sup>).
- O Haul Road surveys are drive and scan, with un-controlled stops to confirm caribou numbers or to let caribou pass. However, Agnico Eagle is going to implement some trials of time-limited scans in certain locations along the Haul Road (i.e., where there's trails, elevation advantages, etc.) to help with detectability. Depending on how many surveys are completed in each season and based on caribou numbers, there may be enough data to generate an occupancy map of the Haul Road by breaking it into segments with presence-absence data (observed or not). The result wold be a heat map of the Haul Road, which could then be used to focus mitigation and monitoring. We would also consider other co-variates such as elevation (i.e., a DEM), caribou trail presence, or survey-specific covariates (e.g., distance to observation, weather).

These minor modifications are intended to better facilitate the determination of detection distance thresholds (i.e., how far out can we detect caribou from these areas when we know the caribou are coming based on collar data), caribou distribution, how many caribou, group size, and ideally even caribou behaviour at various distances from the road and qualified based on road activity level.

TAG meetings specific to caribou analysis to understand the direct and indirect effects of mining on caribou distribution and abundance will be established. Agnico Eagle wishes to work collaboratively with the GN, the KivIA, and other interested relevant and qualified parties to help understand the key effects and the optimal mitigation and management. Studies and reports will be completed on an as-needed basis throughout the operations of the mine as determined through the TAG and as additional data is acquired.

## 3.5.2.4 Blasting Thresholds

Nunavut does not have any regulations or guidelines related to potential environmental noise and vibration effects from blasting and the NIRB does not endorse or recommend any specific regulation or guideline as being appropriate for assessing potential environmental effects from blasting. As such, the approach used here is that safety procedures for the protection of caribou due to blasting should follow the standards and procedures for humans.

The Ontario Ministry of Environment Noise Pollution Control (NPC) Publication 119 (OMOE 1978) represents best practices with respect to the assessment of potential noise and vibration effects from blasting. As such, NPC-119 assessment methods and criteria were used in the Project Noise Impact Assessment. The EIS estimates that blasting noise during haul road construction will reach the NCP-119 limit of 120 dBZ at 300 m from the blast, and at 1,000 m for Whale Tail Pit operations. Noise is also reduced when receptors are not within the line-of-sight of the blast (such as when the blast is in a deep open pit or when receptors are behind a hill). For vibration, the EIS estimates that blasting vibration from haul road construction will reach the NCP-119 limit of

<sup>&</sup>lt;sup>2</sup> Based on field observations, animals can be considered a single group if they are 500 to 1,000 m apart.

10 mm/s at 165 m from the blast, and at 1,150 m for Whale Tail Pit operations. Blasting vibrations from the Whale Tail Pit operations decay quickly from the source and are 504 mm/s at 100 m from the source, 38 mm/s at 500 m from the source, and down to 4 mm/s 2 km from the source.

#### Caribou Response to Noise and Vibration

Research into the range of caribou frequency sensitivity has found that caribou are less sensitive to low frequency noise than humans (Flydal et al. 2001). For example, the caribou hearing threshold at 63 Hz is approximately 30 decibels (dB) higher than the human hearing threshold at 63 Hz. Put another way, a human could be expected to detect a low frequency noise approximately 30 dB quieter than could be detected by a caribou.

Because human hearing is more sensitive to low frequencies than caribou hearing, using human-centric thresholds for effects to caribou can be considered conservative – i.e., tending to overestimate the magnitude of the effect.

Blasting noise and vibration are measured by two parameters:

- Peak Particle Velocity (PPV) expressed in millimetres per second (mm/s)
- Peak Pressure Level (PPL) expressed in unweighted or linear decibels (dBZ)

Caribou hearing is less sensitive at low frequencies than human hearing (Flydal et al. 2001); therefore, it is likely that humans will be able to detect airborne PPL associated with blasting at larger distances than will caribou. In contrast, Inuit Qaujimajatuqangit (IQ) indicates that caribou feet are sensitive; therefore, it is likely that caribou will be able to detect ground-borne PPV associated with blasting at larger distances than humans. In the absence of research identifying specific vibration detection thresholds for caribou feet, it is not possible to estimate specific distances over which caribou will be able to detect ground vibration from Project blasting, although Reimers and Coleman (2001) noted that aerial bombing in military exercises did not typically elicit a visible behavioural response from reindeer at distances between 1.8 and 3.0 km. The EIS indicates that PPV from blasting at the Whale Tail Pit is predicted to drop to effectively 0 mm/s for distances of 4.0 km from the blasting site. As such, it seems reasonable to conclude that PPV associated with blasting would not be detectible by even the most sensitive caribou feet at distances beyond 4.0 km from the blasting site. Conversely, PPV is predicted to be at 13 mm/s at 1.000 m from the source and 7 mm/s at 1.5 km from the site.

Agnico Eagle will implement a field-based study to understand and document the visual and physical parameters of the blast and quantify the response of caribou to the blast.

The Study design will be implemented during the 2018/2019 winter period and followed up again during snow free conditions. The objective of the proposed program is to first characterize blasting and vibration levels on the landscape as a result of operational blasting activities. The measurement data will be used to characterize the relationship between noise/vibration levels and blasting parameters (e.g., charge mass, burden depth), and the relationship between noise/vibration levels and propagation conditions (e.g., air temperature, wind speed/direction). The study will achieve the following:

- The measurement program will consist of long-term blast monitoring over two different time windows. The first-time window will cover nominal summertime conditions (i.e., unfrozen ground, temperatures above 0°C). The second time window will cover nominal wintertime conditions (i.e., frozen ground, temperatures below 0°C).
- The monitoring program will characterize ground vibration from blasting using the Peak Particle Velocity (PPV) parameter. The monitoring program will characterize noise from blasting (also known as airblast overpressure) using the Peak Pressure Level (PPL) parameter.
- Based on blasting schedule and knowledge of caribou distribution and group sizes, opportunistically capture caribou behavioural response to blasting.
- Existing blast monitoring program is in place to measure noise and vibration, will use this data to extrapolate vibration measurements across the landscape.
- Characterize each blast in the field based on sound (develop a relative scale similar to the Beaufort scale for wind), visibility of dust plume (Y/N), if so describe it (i.e., height, width, visual longevity, etc.).
- Characterize caribou response to blast basic behavioural parameters including the initial startle or not. Group and focal behaviour scans will help to quantify the behavioural response and to understand how many individuals respond versus how long. In addition, behavioural monitoring has been scrutinized and requires several hours of effort to determine meaningful results. Consequently, observations from Inuit hunters will be made and incorporated and video of caribou responses will also be used to gather a weight of evidence approach to answering the question.
- The logistical challenge will be to get an accurate distance of caribou groups from the blast, right now Agnico Eagle is considering 250 to 500 m increments. Agnico Eagle is also considering the use of laser range finders that can measure the distance from observer to caribou and distance from observer to blast and the angle to triangulate.
- The objective is to demonstrate the response of caribou to blasting at varying distances.

The approach outlined in **Figure 9**, will be followed. In addition, following threshold to delay a blast will be used:

- If caribou or other wildlife are observed within the danger zone for humans surrounding the blast, where there may potentially be fly rock or debris, as determined by the Blast Supervisor – typically 600 m radius from blast centre
- If the caribou Level 3 mitigation is triggered, when the caribou seasonal GST are observed within 1.5 km of the Project facilities (**Figure 9**)

#### 3.5.2.5 Habitat Loss & Degradation

Methods: Habitat loss and degradation will be monitored and assessed through habitat monitoring (see **Section 3.3.2** for details). An analysis of the loss of High suitability habitats will be conducted and compared to thresholds (see **Table 13**).

Frequency: See Section 3.3.2.

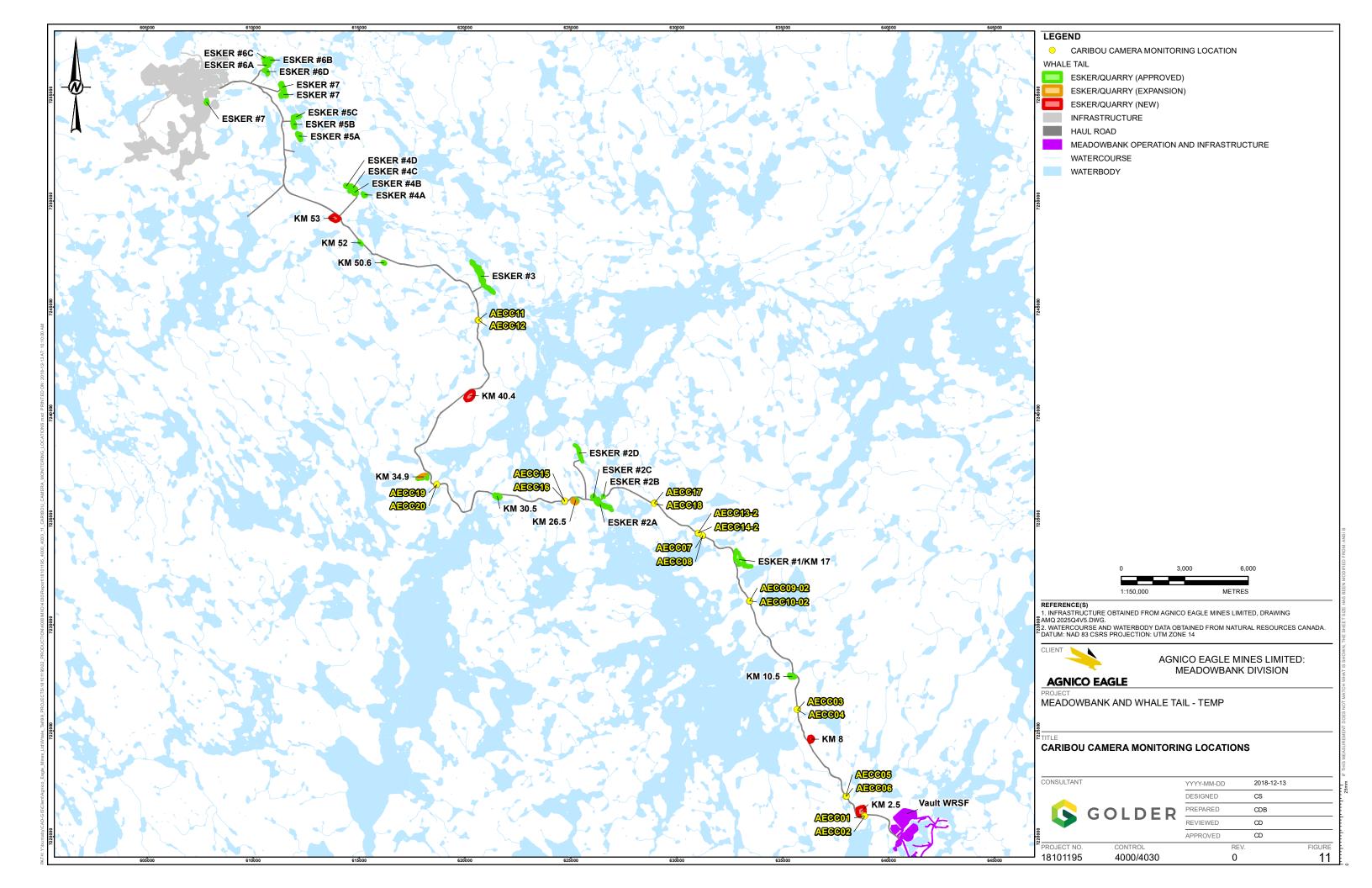
## 3.5.2.6 Sensory Disturbance and Disruption of Movements

The primary goal of monitoring for sensory disturbance and disruption of movements of Ungulates is to provide an early detection of animals approaching a project (Poole and Gunn 2015). Once animals are detected, operational activities will be adjusted, as described in **Figure 6** through **Figure 10**, to reduce sensory disturbance. When the caribou seasonal GST are observed within 1.5 km of the Whale Tail Haul Road, additional mitigation will be implemented of reducing speeds to 30 km/h and any caribou crossing the Whale Tail Haul Road will be given the right-of-way. The following monitoring will be used to detect caribou.

- Caribou Satellite-Collaring Program
- Height-of-Land Surveys (see Section 3.2.1)
- Road Surveys (see Section 3.2.1)
- Pit and Mine Ground Surveys (see Section 3.2.2)

Monitoring and mitigation triggers for caribou include one collared caribou within 25 km of the Project (i.e., Level 1), which initiates more intensive monitoring and heightened awareness for Project staff that caribou are in the area. See **Table 17** for seasonal specific GSTs.

During the June, 2018 TAG meeting, several topics were evaluated regarding sensory effects to caribou related to general monitoring to examine group size, distribution, seasonality and implement mitigation, blasting (see Section 3.5.2.4 for a study to be immediately implemented) and road interactions, particularly along the haul road in relation to traffic. To gather additional information on caribou interactions with the Whale Tail Haul Road, 20 remote cameras were placed along the haul road (**Figure 11**). This initial monitoring is to determine any trends related to distribution of caribou road crossing, effects of traffic/activity to caribou road monitoring, which can then guide more fine-scale mitigation of traffic, road activity and potentially roadside marker design.



## **Caribou Satellite-Collaring Program**

Methods: As part of its ongoing monitoring program for the Project, Agnico Eagle is collaborating with the GN in a caribou satellite-collaring program in the Meadowbank RSA. The joint satellite-collaring program will provide seasonal and regional information on caribou distribution within the Meadowbank and Whale Tail RSAs, and data collected during spring and fall migration periods will inform mitigation and management activities. In collaboration with the GN, data are formally analyzed for caribou migration trends and analyzed annually.

To determine whether caribou not observed from the Project are being disturbed (e.g., if their movement is deflected to avoid the Project), a one-time comprehensive analysis of satellite-collaring data since 2008 will be undertaken collaboratively by the GN and Agnico Eagle, but will be led by the GN. Results of the analysis will be included in the annual Wildlife Monitoring Summary Report. In addition, Agnico Eagle has initiated an initial analysis to explore the extent of a potential ZOI from the Project and will provide this information as it is available.

Frequency: Initiated in 2008 with four subsequent deployments. Data provided to Agnico Eagle from GN weekly, requested up to twice per week (see **Figure 6** through **Figure 9**).

## **Height-of-Land Surveys**

Methods: Five, easily accessible, HOL survey locations are established along the Whale Tail Haul Road, one of which is near the Whale Tail Pit and another near the Vault Pit. The locations are within 500 m of the Whale Tail Pit Haul Road, and provide an unobstructed view (up to 360°) of the surrounding terrain. Appendix G shows a viewshed analysis showing the amount of land available within a 4 km viewshed from each HOL survey location and a 1.5 km viewshed from the AWAR and Whale Tail Haul Road and includes available collar data. The HOL locations also show where caribou observations, signs, and trails were observed, which were used to guide these survey locations. The HOL surveys provide an 'early warning' system of the presence of caribou in proximity to the Whale Tail Pit and Haul Road after the collar data has shown that caribou may be moving towards the Project area and/or collars are within 25 km of the Project area. The surveys can be easily accessed from the Haul Road and will be conducted by environmental technicians or trained wildlife monitors. A minimum of 20 minutes will be spent surveying at each of the locations using a combination of naked eye, binoculars, and scopes. The surveyors will independently view the landscape for caribou starting at opposite cardinal directions and will scan 180° for 5 minutes at a time, but move 90° every 5 minutes. Results will then be compared to determine if GST is triggered, but consensus on numbers is not necessary as each survey will generate a separate result for each observer so that variability can be incorporated into detection rates. Further, where possible, this will also be tested with collar data. If feasible, a representative photo of the herd will be taken if GSTs (refer to decision trees) are exceeded; the environmental supervisor will be contacted immediately.

Information collected will be similar to that collected during systematic pits and mine site ground surveys (see **Table 13**, field data form in **Appendix D**, and **Appendix G**). Behavior of Ungulates will also be recorded for each encounter and comments on disturbance related to a particular behavior (e.g., running) will be made (see field form in **Appendix D**).

A summary of field confirmation details regarding the viewscape analysis at HOL locations includes the following (M. Young, Dougan Associates, 2017, pers. comm.):

HOL Survey Point	Average Maximum Observable Distance	Comments
1	9.2 km	This site was slightly relocated to improve the visibility of the road. Small blind spots (50 to 100 m wide) facing S and NW
2	7.2 km	Small blind spots facing S, SW, and W
3	9.1 km	Small blind spots facing S, SE, NW, and E
4	8.9 km	Lars Qaqqaq identified this location as a movement corridor for Barren Ground Caribou Small blind spots facing SE, W
5	5.5 km	Road at this section is not currently built.  Small blind spots facing SW, NW, NE. SW, and NE blinds spots to be opened up when eskers removed for road construction.

The viewshed analysis is an important component of the overall monitoring program as it provides direction for monitoring locations that best capture caribou movements through the Project area during the spring and fall migration periods. Consequently, the survey locations chosen based on the results of the viewshed analysis will be continually reviewed and updated with the TAG. Additional tasks remaining related to the viewshed and survey locations still need to be completed prior to construction of the Whale Tail Pit and Haul Road, which include the following:

- Additional HOL survey location is to be added on the west side of the Whale Tail Pit to capture areas not currently covered by survey locations as revealed in the viewshed analysis. Suitable locations will be determined in 2018 field season and tested.
- Selected points along the road may fill in monitoring gaps in the viewshed, these sites have not yet been selected but an initial set of locations will be determined in 2018.
- Determine the amount of the landscape covered by HOL survey locations and roadside surveys within an area that buffers the HOL locations by 4 km and the road by 1.5 km to determine if there is sufficient monitoring coverage from the existing surveys.

Frequency: Surveys will be conducted weekly from January to April and July to August, twice per week from May to June and September to December. Increased up to every two days as per triggers (see **Figures 6, 7, 9**, and **10**).

## 3.5.2.7 Project-Related Mortality – Vehicle Collisions

Methods: Monitoring will be conducted during ground surveys at pits and the mine site, and along roads. Incident report (**Appendix D**) to be submitted following every vehicle collision with an Ungulate. The thresholds level of mortality beyond which further mitigation will be required is two mortalities per year (see **Table 14**).

Frequency: Incident reports (Appendix D) submitted when road-related mortalities occur. Ungulate mortality will be reviewed on an annual basis.

#### 3.5.2.8 Project-Related Mortality – Hunting by Baker Lake Residents

Methods: As stated in the TEMP (Cumberland 2006), the Hunter Harvest Study (HHS) was established to monitor the spatial distribution, seasonal patterns, and harvest rates prior to and following construction of the AWAR. A survey of hunter harvests was conducted among Baker Lake residents from 2007 through 2015; however, declining participant rates has led to revaluation of the HHS approach.

Agnico Eagle has discussed and met with stakeholders (GN, KivIA, and HTO in November 2016 [Winnipeg], January and June 2017 [Ottawa]) to broaden the scope of the HHS and facilitate greater involvement of the local community in future years of the study.

The primary objectives of the HHS are to monitor potential Project related effects on harvesting of wildlife by residents of Baker Lake. This objective is achieved by estimating the following key metrics:

- The distribution of caribou, muskox, and wolverine harvest by residents of Baker Lake;
   and
- 2. The total level (or an index of) caribou, muskox, and wolverine harvest by residents of Baker Lake.

Other objectives of the HHS may be established in consultation with TAG or other participants and may include:

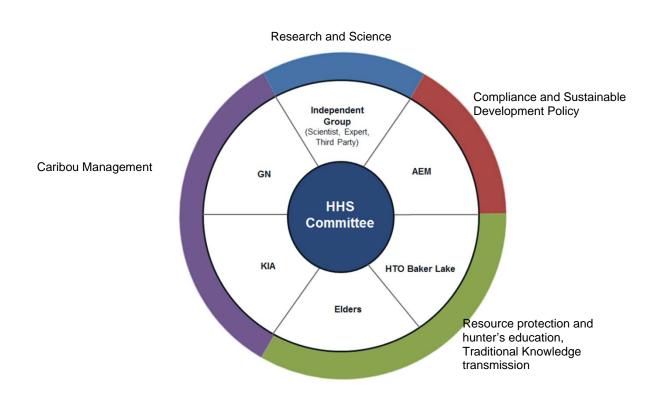
- 1. Supporting creel surveys by gathering information on Arctic Char (*Salvelinus alpinus*), Lake Trout (*Salvelinus namaycush*), Lake Whitefish (*Coregonus clupeaformis*), and Arctic Grayling (*Thymallus arcticus*) catch rates and Inuit-use patterns in the Baker Lake area;
- 2. Understanding regional distribution of hunting and fishing activity:
- 3. Investigating seasonal timing of hunting and fishing activity; and
- Determining whether increased harvest and catch rates are associated with the AWAR.

As discussed during consultation with stakeholders, HHS will further seek to:

- increase and maintain the hunter participant rate in the future of the program;
- improve resource protection,
- improve hunter awareness and education;
- increase the integration of Inuit Qaujimajatuqangit and Traditional Knowledge; and
- increase availability of data collected for a collective approach to understanding wildlife harvest, assist Agnico Eagle in mitigative actions and the GN in management decisions.

The HHS will promote involvement/partnership of the local stakeholders; including the HTO, Elders, GN officer, and KivIA in a collaborative format conceptually illustrated in **Figure 12.** Detailed survey methods, survey timing, and promotional strategies will tentatively include HHS Committee members visit hunter harvest study participants on a regular basis to document harvests and discuss general hunting trends and observations. The members will also conduct communication actions and post promotional material around the Hamlet of Baker Lake. The use of social media will also be assessed and potentially used to increase awareness within the community and especially towards a younger generation of hunters.

Figure 12: Conceptual Hunter Harvest Study Partnership, Participants, and Relevant Objectives



The use of a third-party group was suggested and intended to facilitate the collection, preservation, exchange, and use of local observations and knowledge of the community. The emphasis would be targeted on supporting community-based efforts to direct research and monitoring based on priorities and information needs. It would also link between stakeholders and provide expertise towards community led initiatives in the HHS.

Frequency: Data will continue to be collected at least quarterly and analyzed at the end of each calendar year and provided within the annual Wildlife Monitoring Summary Report.

#### 3.5.3 Thresholds

Should the thresholds outlined in **Table 14** exceeded, the following actions will be undertaken.

## 3.5.3.1 Habitat Loss & Degradation

See Section 3.3.3.

## 3.5.3.2 Sensory Disturbance and Disruption of Movements

Agnico Eagle has developed a tiered caribou monitoring procedure to increase levels of monitoring and mitigation if caribou are found to be in the vicinity of the site. **Figure 6** through **Figure 9** describes the tiers and triggers of this procedure and the appropriate actions to be undertaken.

## 3.5.3.3 Project-Related Mortality – Vehicle Collisions

If an Ungulate mortality occurs (i.e., threshold of two mortalities exceeded), an investigation into the circumstances and factors leading up to the incident will be conducted by the on-site Environmental Supervisor (see also the Incident Report Form, **Appendix D**). Where an incident has resulted from operator negligence, disciplinary action may be considered.

## 3.5.3.4 Project-Related Mortality – Hunting by Baker Lake Residents

If harvest rates are determined to be increasing significantly (as determined by the GN) as a result of Project infrastructure, Agnico Eagle, will request the Baker Lake HTO and GN investigate additional access control measures.

## 3.6 Predatory Mammals

#### 3.6.1 Objectives

The primary objective of the Predatory Mammal monitoring program in the Project area will be to evaluate the success of preventative programs designed to proactively avoid the occurrence of problem animals and detect thresholds, as opposed to reactively trying to manage them by relocation or destruction.

## 3.6.2 Monitoring Approach

**Table 18** describes the framework that has been established for monitoring effects to Predatory Mammals.

**Table 18:** Monitoring Approach for Predatory Mammals at the Meadowbank, Whale Tail Project and proposed Whale Tail Expansion

Potential Effect	Impact Prediction	Quantitative Monitoring Variable	Thresholds	Monitoring Activity	Frequency
Project- related mortality	Predatory Mammals will not be killed as a result of Project activities	Number of grizzly bears, wolves and wolverines killed	Two individuals of the same species in a year	Pits and mine site ground surveys	Weekly, at least. Includes inspections of waste streams to ensure no attractants for Predatory Mammals
				Road surveys	Weekly, at least
				Incident and vehicle encounter reports	Ongoing (when incidents with wildlife occur)
				Baker Lake Hunter Harvest Study (for wolverines)	Initiated in 2007, stopped in 2015 and scheduled for re- implementation in 2017 Quarterly data collection; Yearly reporting
Disturbance of Den Sites	Active Predatory Mammal dens will not be destroyed or disturbed to the point of den abandonment	Number of active grizzly bear, wolf or wolverine dens destroyed or abandoned due to sensory disturbances	One active den	Den-specific management plan, active den site surveys	Initiated by the detection of an active Predatory Mammal den (grizzly bear, wolf or wolverine) within the active footprint or vicinity of Project facilities. See Figure 12. Frequency of den monitoring will be determined by season, species and location. See Appendix J

## 3.6.2.1 Project-Related Mortality

Methods: Methods are the same as those described for Ungulates (**Section 3.5.2**). The threshold level of mortality beyond which further mitigation will be required is two individuals per year (see **Table 14**). The pits and mine site ground surveys will include inspections of waste streams to ensure no attractants for Predatory Mammals. In addition, the hunter harvest study (see **Section 3.3.2**) will investigate potential increases in wolverine mortality related to the road.

Frequency: The number of grizzly bear, wolf, and wolverine mortalities will be analyzed on an annual basis with findings presented in the annual Wildlife Monitoring Summary Report (see **Table 18**).

#### 3.6.2.2 Disturbance of Den Sites

Methods: For existing operations, data will be collected on Arctic wolf abundance and behaviour during ground surveys, vehicle surveys, and HOL surveys. Should the wildlife technician suspect or confirm that a den is present within the active footprint and vicinity of Project facilities or roads, a den management plan will be prepared (see **Appendix J** for required components of den management plans). For new development sites, suitable habitat within 1 km of new development site will be investigated on foot for active wolf dens. In the event that wolverine or grizzly bear dens are discovered, den management strategies with appropriate timing windows will be developed for these species. The thresholds beyond which further mitigation will be required is discovery of one active den (see **Figure 13** and **Table 18**).

Frequency: See **Table 14** for frequency of ground, road, and HOL surveys, see **Figure 13**, **Section 3.5.3** for further mitigation strategy to be undertaken upon discovery of an active Predatory Mammal den.

#### 3.6.3 Thresholds

Should the thresholds outlined in **Table 18** be exceeded, the following actions will be undertaken.

#### 3.6.3.1 Project-Related Mortality

The basic course of action is to contact the appropriate conservation officer with the Hamlet of Baker Lake and the GN, and to discuss additional mitigation options. At the discretion of the Agnico Eagle Environment Supervisor, GN conservation officer and the KivlA land inspector, if grizzly bears, wolverines, or wolves become problems and need to be dispatched or get killed in vehicle collisions (i.e., thus exceeding the threshold mortality of two despite efforts to avoid habituation and/or food conditioning), alternative mitigation action may be required. Regular inspections of waste streams will identify possible attractants and respond immediately with improved waste management approaches. Detailed reports for dealing with problem wildlife will be issued and are provided as an example in **Appendix C**.

#### 3.6.3.2 Disturbance of Den Sites

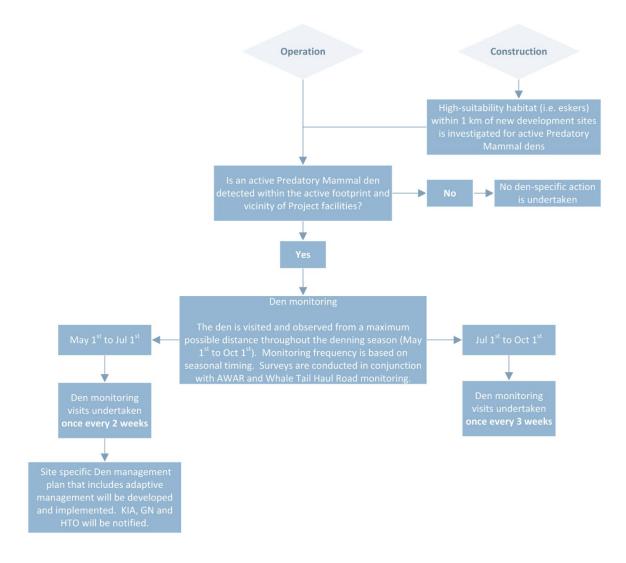
If an active Predatory Mammal den is detected within the active footprint or in the vicinity of Project facilities, a den management plan will be developed (see **Figure 13** and **Appendix J** for details). The plan will include consultation with the GN with respect to obligations under *The Wildlife Act*, SNU 2003, c. 26. Ground personnel and vehicle access will be restricted in the vicinity of the den as needed to minimize disturbances at the den. The den management plan outlines a monitoring schedule (dependent on seasonal timing) and will inform further mitigation strategies as required. See **Appendix J** for Den Management and Protection Plan components.

Based on the findings from den monitoring, disturbance mitigation may be required, including increased frequency of den site monitoring, vehicle access restrictions, alterations to Project operation, or work stoppage in the vicinity of the den. Dens will be observed from a distance of at least 300 m with a spotting scope, and information on location, behaviour and number of juveniles will be determined, where possible. **Figure 13** below outlines the steps to be taken if a den is found during monitoring activities.

Example of mitigation and monitoring in action: if construction is proposed within 1 km of high-suitability denning habitat (i.e., eskers), these areas will be investigated for signs of denning (wolf pack, defensive behaviour, pups). If a den is confirmed within the active footprint or in the vicinity of Project facilities, monitoring will be undertaken from the maximum possible distance to determine if Project activities are inducing stress responses. See **Figure 13** for monitoring frequencies. If Wolves are showing signs of stress, further restrictions on vehicle access or other adaptive mitigation options may need to be considered.

See **Appendix J** for recommended Den Management and Protection Plan components.

Figure 13: Thresholds for Monitoring and Mitigation of Predatory Mammal Dens in Proximity to the Project



## 3.7 RAPTORS

## 3.7.1 Objectives

The primary objective of ongoing monitoring surveys for nesting Raptors evaluate the success of mitigation to prevent disturbance to raptors or raptor nests, to test for thresholds, and to determine the level of Project-related effects. Nest-specific management plans for nesting birds will reduce the potential for birds to abandon nests due to high noise or activity levels.

## 3.7.2 Monitoring Approach

**Table 19:** describes the framework that has been established for monitoring effects to Raptors.

**Table 19:** Monitoring Approach for Raptors at the Meadowbank, Whale Tail Project and proposed Whale Tail Expansion

Potential Effect	Impact Prediction	Quantitative Monitoring Variable	Thresholds	Monitoring Activity	Frequency
Disturbance of Nesting Raptors	Nest failures are not Project- related	Nest success	Failure of nest monitored through a Nest Protection Plan	Active Raptor nest monitoring	Daily during nesting season (May 1 to September 15) if active nest on Project facilities or within 500 m of activity Weekly if not within area of concern (see Figure 13)
	Raptors will not			Pits and mine site ground surveys	Weekly, at least
Project-related Mortality		Number of raptors killed	1 individual	Road surveys	Weekly, at least
				Incident and vehicle	Ongoing (when incidents
				encounter	with wildlife occur)
				reports	

## 3.7.2.1 Nest Monitoring

Methods: For existing operations, data will be collected on Raptor abundance and behaviour during ground, road, and height-of-land surveys. For active nests within the active footprint and within 1.5 km (AANDC 2011) of Project facilities, daily surveys will be conducted for nests within area of concern while weekly surveys will be conducted for nests outside the area of concern. For nests within the area of concern, a site-specific raptor response plan will be developed and implemented.

In accordance with Project Certificate No.008, Condition 36, Agnico Eagle will consult and review the raptor mitigation plan with the GN, prior to undertaking discouragement and in accordance with obligations under the *Wildlife Act* (SNU 2003, c. 26). Furthermore, the GN will be contacted prior to removal or deterrence of raptors to obtain a permit if required. To discourage raptors from nesting on pit walls and Project facilities, protocols outlined in the 'Peregrine Falcon Management and Protection Plan on the Meadowbank Gold Project Site' will be followed (see **Appendix E**). The plan also outlines management and mitigation around nests that have become established on Project facilities.

For new development sites, suitable habitat within 1.5 km of the sites will surveyed on foot for active Raptor nests. Active nests will be monitored from a distance of at least 100 m with a spotting scope, and information on location, behaviour, number of eggs, number of chicks, and number of fledged young will be determined, if possible. A raptor researcher or subject matter expert will be consulted as needed. The threshold beyond which further mitigation will be required is disturbance of one active Raptor nest (**Table 19**).

Frequency: During the nesting season (May 1 to September 15), if an active nest is within the active footprint and vicinity of Project facilities and within an area of concern, surveys will be conducted as per **Figure 14**. If disturbance to an active raptor nest is detected, mitigation and monitoring will be initiated (see **Figure 14**).

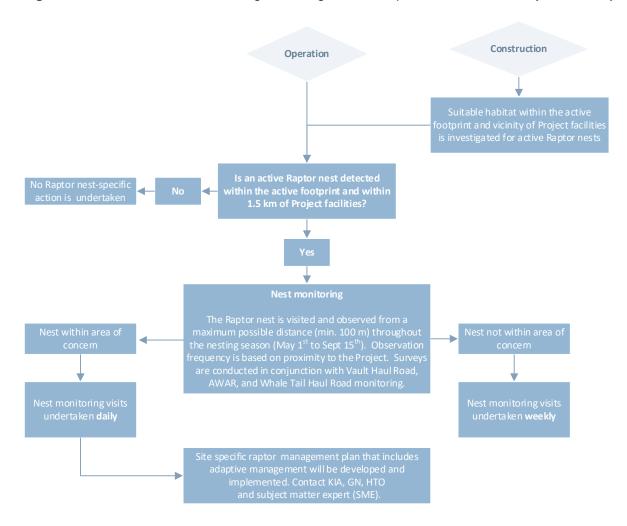


Figure 14: Thresholds for Monitoring and Mitigation of Raptor Nests in Proximity to the Project

#### 3.7.2.2 Project-Related Mortality

Methods: Methods are the same as for the ground surveys, road surveys, and Incident reports described for Ungulates (**Section 3.5.2**). The threshold level of mortality beyond which further mitigation will be required is one (1) Raptor per year (see **Table 19** and **Appendix E** for details).

Frequency: Incident reports are filed when a Raptor mortality occurs. The number of Raptor mortalities will be analyzed on an annual basis with findings presented in the annual Wildlife Monitoring Summary Report.

#### 3.7.3 Thresholds

Should the thresholds outlined in **Table 19** be exceeded, the following actions will be undertaken.

#### 3.7.3.1 Nesting Monitoring

In consultation with the subject matter expert, a nest management plan will be developed for active nests established within an area of concern (e.g., within active footprint or in close vicinity of Project facilities) and will include a monitoring schedule based on the proximity of the nest to the Project. The management plan will also review disturbance levels at the nest to inform active management requirements (see **Figure 14**). Where recommended mitigation are not considered adequate for reducing disturbance to nesting raptors (determined through the nest management plan monitoring), more stringent mitigation, such work stoppage for nearby operations, may be implemented.

## 3.7.3.2 Project-Related Mortality

If the threshold mortality level for Raptors is exceeded, further mitigation will be implemented as described for Ungulates (Section 3.5.3).

## 3.8 Waterbirds

## 3.8.1 Objectives

The primary objective will be to determine the effectiveness of mitigation efforts to prevent or reduce effects from the Project, to test for thresholds, and to describe Project-related effects to Waterbirds.

## 3.8.2 Monitoring Approach

**Table 20** describes the framework that has been established for monitoring effects to Waterbirds.

**Table 20:** Monitoring Approach for Waterbirds at the Meadowbank, Whale Tail Project and proposed Whale Tail Expansion

	l				
Potential Effect	Impact Prediction	Quantitative Monitoring Variable	Thresholds	Monitoring Activity	Frequency
Habitat Loss and Degradation Meadowbank Mine and Vault Site	Loss <eia prediction<br="">and subsequent approvals (see Gebauer et al., 2015)</eia>	Area of altered habitat	10% above predicted EIA High suitability values.  Meadowbank Mine and Vault – 518 ha	Habitat monitoring	Every three years post-construction
Habitat Loss and Degradation Meadowbank AWAR	Loss <eia prediction<br="">and subsequent approvals (see Gebauer et al., 2015)</eia>	Area of altered habitat	10% above predicted EIA High suitability values.  Meadowbank AWAR – 22 ha	Habitat monitoring	Every three years post-construction
Habitat Loss and Degradation Whale Tail Pit and Haul Road	Given the minimal effects associated with the Meadowbank project, habitat loss effects or Waterbird were not considered an issue and were screened out during the EA (Golder 20)				
Loss of nests due to flooding Whale Tail Pit	Nests will be lost due to flooding during nesting season	See the Migratory Bird Protection Plan ( <b>Appendix F</b> )			
				Pits and mine site ground surveys	Weekly, at least
Project-related	Waterbird will not be killed at the Project	Number of Waterbird killed	1 individual	Road surveys	Weekly, at least
Mortality				Incident and vehicle encounter reports	Ongoing (when incidents with wildlife occur)

## 3.8.2.1 Habitat Loss & Degradation

Methods: Habitat loss and degradation will be monitored and assessed through the Wildlife Habitat monitoring program (see **Section 3.3.2** for details). An analysis of the loss of High suitability habitats will be conducted and compared to thresholds (see **Table 20 and Appendix F**).

Frequency: See Section 3.3.2.

## 3.8.2.2 Project-Related Mortality

Methods: Methods are the same as for the ground and road surveys, and Incident reports described for Ungulates (**Section 3.5**). The threshold level of mortality beyond which further mitigation will be required is one (1) Waterbird per year (see **Table 20**).

*Frequency:* See **Table 20**. The number of Waterbird mortalities will be analyzed on an annual basis with findings presented in the annual Wildlife Monitoring Summary Report.

#### 3.8.3 Thresholds

Should the thresholds outlined in **Table 20** be exceeded, the following actions will be undertaken.

## 3.8.3.1 Habitat Loss & Degradation

See Section 3.3.2.

#### 3.8.3.2 Disturbance of Nesting Waterbird

Where disturbances to nesting Waterbirds are observed beyond the acceptable threshold (see **Table 20**), further mitigation will be implemented to minimize effects. As per Project Certificate No.008, Condition 34, Agnico Eagle will maintain a Migratory Bird Protection Plan (**Appendix F**), which will be updated as needed in consultation with Environment and Climate Change Canada (ECCC). Studies will be undertaken in collaboration with Trent University beginning in 2018 and through the flooding phases of the Whale Tail Pit and proposed Expansion Project. As per condition 34, results will be presented to NIRB on an annual basis.

## 3.8.3.3 Project-Related Mortality

If the threshold mortality level for Waterbirds is exceeded, further mitigation will be implemented (e.g., slower vehicle speeds, driver education).

#### 3.9 UPLAND BREEDING BIRDS

## 3.9.1 Objectives

The primary objective of the monitoring program for ptarmigan, shorebirds, passerines, and other upland breeding birds is to collect information that contributes to national monitoring databases by undertaking the Protocol for Regional and International Shorebird Monitoring (PRISM) and complete a North American Breeding Bird Survey Route every three years, or as agreed upon by ECCC, for contribution to this program. While these protocols will contribute data to national databases, they will be unsuited to detecting Project-related effects. Previous studies at other similar developments have found that effects to upland birds are either undetectable or not biologically significant (see **Section 2.3.6**).

## 3.9.2 Monitoring Approach

The PRISM and North American BBS surveys are intended to contribute to national databases administered by ECCC (2012), and are not linked to an impact prediction or threshold. PRISM plots and North American BBS surveys will be conducted every three years; stations locations and methods will be developed in consultation with ECCC.

## 3.9.2.1 Habitat Loss & Degradation (monitored via habitat monitoring)

Methods: Habitat loss and degradation will be monitored and assessed through the Wildlife Habitat monitoring program (see **Section 3.3.2** for details). An analysis of the loss of High suitability habitats will be conducted and compared to thresholds (see **Table 20**).

Frequency: See Section 3.3.2.

## 4. REPORTING

A Wildlife Monitoring Summary Report will be provided annually summarizing the terrestrial ecosystem monitoring activities and results of the previous calendar year. The summary report will discuss the accuracy of predictions of the effect of the Project on the various wildlife VECs, the success of mitigation (i.e., whether any thresholds are exceeded), briefly describe new measures taken through the adaptive management approach, visually present results of all monitoring activities, and recommendations for mitigation and monitoring activities in the current year. An attempt will be made to distinguish between Project-related changes and natural variations in wildlife populations.

The annual Wildlife Monitoring Summary Report will allow regulators and other stakeholders to review and contribute insight, expertise, and suggestions for improving wildlife management activities within the Project area. To ensure the reported information is accessible for all stakeholders, the summary report will be concise, visual and simple in format.

As per Project Certificate No.008, Condition 33, Agnico will provide wildlife incident reports to the appropriate authorities in a timely fashion. These reports will provide the following information: location coordinates (i.e., latitude and longitude or UTM), species, number of animals, sex, age class (if possible), and a description of the animal activity.

Further, a comprehensive data analysis report will be prepared at three-year intervals (in addition to the annual Wildlife Monitoring Summary Report). The comprehensive report will consider questions such as the ZOI, deflection of caribou by the road, the efficacy of mitigation, or other such questions depending on the availability of data. The comprehensive reports should focus on specific areas of concern and specific VCs, as the Wildlife Monitoring Summary Report provides this overview.

Agnico Eagle will have the full responsibility for all aspects of the monitoring program (implementation, monitoring, reporting) and the plan will be reviewed and updated as deemed necessary.

## 4.1 MITIGATION AUDIT

The mitigation described in this document stems from current practices at existing mines, or was suggested during the environmental assessment process. However, an auditing system is required to evaluate the use and effectiveness of the mitigation, following the principals of adaptive management. In other words, it should be confirmed that the mitigation proposed here is used and that it works. Further, new mitigation should be documented. As an example, per Project Certificate No.008, Condition 32, Agnico Eagle will engage with the Baker Lake Hunters and Trappers Organization and other relevant parties to ensure that safety barriers, berms, and designed crossings associated with project infrastructure, including the haul road are constructed and operated as necessary to allow for the safe passage of caribou and other terrestrial wildlife. The audit will be undertaken annually, specific to audit the mitigation listed in Section 2, which requires Agnico Eagle to evaluate:

- if all mitigation has been implemented
- which mitigation is perceived to be or shown to be successful
- if new mitigation has been implemented in response to new issues
- if some mitigation is redundant

This audit is implemented annually, as part of the annual report.

#### 4.2 TERRESTRIAL ADVISORY GROUP

As per Project Certificate No.008, Condition 27 Agnico Eagle is committed to the establishment of a TAG consisting of representatives, at a minimum, from the following organizations:

- Agnico Eagle
- the Government of Nunavut Department of Environment (GN-DoE)
- the Kivalliq Inuit Association (KivIA)
- the Hunters and Trappers Organization (HTO) of Baker Lake

Other organizations that may participate in the TAG include ECCC, Nunavut Tunngavik Inc (NTI), and others.

The terms of reference for this TAG will be discussed and completed by Q4 2018. Items that will be identified as part of the TAG terms of reference will include the following:

- Reporting frequency for annual and comprehensive analysis (e.g., every 3 years)
- Monitoring outcomes
- Mitigation summary (i.e., operation cessation, shutdowns, etc.)
- Mitigation improvements
- Learnings from other mines
- Opportunity for all parties to contribute for continuous improvement of the TEMP

Agnico Eagle will provide a summary of the outcomes from the TAG meetings to the NIRB on an annual basis in the annual report.

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Version 6, December 2018
APPENDIX A
ALL ENDIX A
Screening Level Risk Assessment Plan

Terrestrial Ecosystem Management Plan



# **MEADOWBANK DIVISION**

# Wildlife Screening Level Risk Assessment Plan

In Accordance with NIRB Project Certificate No.004

Version 2 June, 2018

## **IMPLEMENTATION SCHEDULE**

This Plan will be implemented immediately subject to any modifications proposed by the NIRB as a result of the review and approval process.

## **DISTRIBUTION LIST**

AEM – Environment Superintendent

AEM – Environmental Coordinator

AEM – Environmental Technician

## **DOCUMENT CONTROL**

Version	Date (YMD)	Section	Revision
1	2016-06- 01	All	Comprehensive plan for Meadowbank Mine
2	2018-06- 01	2.5	ROC based on a commitment made during the Whale Tail Final Hearing through discussions with Environment and Climate Change Canada

Prepared By: Meadowbank Environment Department

Approved by:

Ryan Vanengen

Environmental Superintendent – Permitting and Regulatory Affairs

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#### 1 INTRODUCTION

## 1.1 BACKGROUND

In 2006, Azimuth Consulting Group Inc. conducted a pre-construction wildlife screening level risk assessment (WSLRA) for the Meadowbank site to assess potential risks to wildlife via dietary uptake of mine-related contaminants (Azimuth, 2006). Specifically, the pre-construction SLRA focused on determining the contaminants of potential concern (COPCs) from predicted minesite activities, evaluating potential risks to wildlife from exposure to contaminants under baseline conditions, and determining the magnitude of increase in contaminant exposure required to cause concern for wildlife populations. Preliminary estimates of post-development contaminant concentrations were then obtained from models, and based on those potential future changes, expected potential risks to local wildlife were evaluated.

Under baseline conditions, negligible risks were found for all COPCs except chromium, which was determined to pose an improbable but potential risk for songbirds at baseline concentrations. COPC exposure concentrations were not expected to increase during operation, so potential risks were not expected to change from baseline conditions.

As required under the Nunavut Impact Review Board Project Certificate - Condition 67, the WSLRA is completed every 3 years during mine operation. Results to date indicate that the Meadowbank mine does not appear to be contributing significant incremental risk to wildlife from consumption of chemical contaminants.

In 2016, AEM submitted an Environmental Impact Statement (EIS) to NIRB for the Whale Tail Pit satellite deposit, located approximately 50 km north of the main Meadowbank mine site. The EIS includes an assessment of risk for wildlife in the Whale Tail Pit area under baseline conditions and the post-development scenario. Results indicated that:

"All concentrations in soil met their respective screening values and/or baseline plus 10%; as a result, no COPCs were retained in soil and no residual impacts due to changes to soil quality were identified. Furthermore, given that no COPCs were identified for soil, no residual impacts to vegetation quality were identified. This result is consistent with the results of the conclusions of the previous risk assessments conducted at the Meadowbank Mine."

"Given that no COPCs were identified in soil (Section 4.3), concentrations of chemicals in prey items (i.e., plants and animals consumed as prey) were not anticipated to change. As a result, prey items were not assessed further with respect to potential wildlife health effects and no residual health impacts due to changes to prey item quality were identified."

Nevertheless, due to stakeholder concerns with contaminant loadings due to dust, this plan presents the assessment approach and methodology that will continue to be used to assess potential risk to wildlife from chemical contaminants as a result of operations at the Meadowbank site as well as the Whale Tail Pit satellite deposit.

## 1.2 GENERAL APPROACH

The goal of the WSLRA is to determine whether there are potential risks to wildlife from the identified contaminants of potential concern (COPCs) under operational conditions. The general approach includes the common risk assessment components of problem formulation, exposure assessment, hazard assessment and risk characterization. In particular, assessments will aim to distinguish risk

due to operation of the mine from risk due to background conditions by taking soil and vegetation samples at on-site, near-site, AWAR, Whale Tail site, Whale Tail haul road, and reference locations.

Risk assessments will follow a hazard quotient approach, and are based on food-chain modeling developed by Azimuth Consulting Group Inc. for the baseline wildlife screening level risk assessment at the Meadowbank site (Azimuth, 2006). The risk assessment framework used by Azimuth was taken from various Canadian and American sources (Environment Canada, 1994; CCME, 1996; BCE, 1998; US EPA, 1992, 1998). The exposure assessment stage will be updated with field data collected in each assessment year. Toxicity reference values (TRVs) will be continually compared to those used in similar risk assessments in the Kiggavik region and published databases.

## 2 PROBLEM FORMULATION

#### 2.1 LOCATION DESCRIPTION

The main Meadowbank site is located 70 km north of the hamlet of Baker Lake, Nunavut, near the border of the Northern and Southern Arctic ecozones. Terrain in the Meadowbank area is typical barren-ground subarctic, with low-growing vegetation in poorly developed soil with continuous permafrost. The landscape is dominated by many interconnected lakes and isolated ponds with indistinct drainage patterns. Topography consists of rolling hills, boulder fields and bedrock outcrops. The main mine site is located at the headwaters of the Quioch River system, which flows southeast through Chesterfield Inlet into Hudson Bay. Lakes in this region are ultra-oligotrophic, with low productivity levels. This region supports few terrestrial mammals (15 species) and birds (62 species) (Azimuth, 2006). Migratory species (primarily caribou and Canada geese) are present.

#### 2.2 SITE FACILITIES

The Meadowbank project consists of several gold-bearing open-pit deposits (Portage, Goose, Vault, and Whale Tail). Much of the infrastructure is located in close proximity to the mill and mine facilities, with the exception for the Vault Pit which is approximately 10 km northeast of the site, and the Whale Tail Pit which is approximately 50 km northwest of the site.

Waste rock from the pits are stored in the Portage Waste Rock Storage Facility, Vault Waste Rock Storage Facility, and Whale Tail Waste Rock Storage Facility (RSFs). Rock Storage Facilities are constructed to minimize the disturbed area and will be capped with a layer of non-potentially acid-generating rock (NPAG). During the construction period, NPAG is also used for construction of dikes and roads. Mined ore is either processed in the mill or stockpiled for eventual processing.

Tailings are stored in the Tailings Storage Facility (TFS) adjacent to the main minesite. The TSF is defined by the series of dikes built around and across the basin of the dewatered northwest arm of Second Portage Lake. Tailings water is reclaimed for use in ore processing.

An onsite airstrip supports transportation of goods and personnel to and from the Meadowbank site by jet. A 110-km All Weather Access Road (AWAR) runs between the main minesite and the hamlet of Baker Lake, where AEM maintains a bulk fuel storage and barge facility. The Vault Pit is connected to the main minesite by a 10-km haul road, and the Whale Tail Pit satellite deposit will be connected by a 62-km haul road.

#### 2.3 SOURCES OF CONTAMINANTS

Major mine site operations and their potential to contribute to COPCs (based on Azimuth, 2006) are summarized here.

Open pits – Along with ore, pits produce waste rock, which may contribute to COPCs through dust emissions.

Rock storage facilities – Waste rock (not containing ore) is moved to these areas. Dust may be blown from the rock piles during dumping and vehicle traffic during transport of material. Seepage from rock storage facilities is controlled in sumps and pumped back to attenuation ponds or the TSF.

Borrow pits and quarries – Borrow pits and quarries are used as necessary for the construction of mine site roads and the airstrip. The COPCs for borrow pits and quarries are similar to open pits.

Tailings Storage Facilities (TSF) – The northwest arm of Second Portage Lake was partitioned off by the East Dike and de-watered from 2009 to 2012. The northwestern portion of this area was further partitioned by the Stormwater Dike to create the North and South Cell TSF. Although permafrost is expected to freeze the tailings, the material is fine-grained and could be a source of dust emissions during dry periods.

Roads and airstrip – Frequently used gravel haul roads run throughout the mine site to connect pits, waste rock storage and processing facilities. An airstrip, receiving approximately 4 planes per week, was built at the mine site to receive deliveries and personnel. Dust from these sources could be a potential source of contaminants. A 110 km long all weather access road (AWAR) was constructed between the mine and the Hamlet of Baker Lake, using gravel from quarries along the road.

Effluent discharge – De-watering of lakes for pit development or TSF construction is considered effluent discharge and is regulated under the current NWB Water License. Lake water is treated for suspended solids removal before discharge, and since it is an existing surface water source, it is not likely to be a source of contaminants in the receiving water. Effluent is also periodically discharged from attenuation ponds into adjacent lakes, under NWB Water License and MMER requirements. As a result, metals regulated under MMER are considered as COPCs.

Diesel generating plant, mine mill plant and associated facilities – Three diesel generating plants provide power for the mine. The Air Quality Impact Assessment (2005) determined emission of PAHs was "very low" and did not require modeling. The milling of rock in the processing plant takes place under wet conditions, and is not a source of particulate emissions. All health and safety-related requirements to reduce particulate emissions during handling of the ore at the mine plant before processing are met, so these are not expected to be a significant source of contaminants.

Overall, roads, waste rock and tailings were determined to be the main sources potentially contributing to COPCs through dust emissions. Dewatering effluent discharge may potentially contribute to COPCs in water sources.

## 2.4 CONTAMINANTS OF POTENTIAL CONCERN (COPCS)

In the baseline WSLRA, Azimuth (2006) identified COPCs for the main minesite area based on the chemical composition of the identified dust sources, the predicted effects of effluent on water quality in Third Portage Lake (from Golder, 2005), and a review of metals regulated under MMER (see Azimuth, 2006, Section 2.5 for details). No terrestrial wildlife COPCs were identified in the Whale Tail Pit FEIS (Golder, 2016).

Projected concentrations of metals in four dust sources (roads, waste rock and tailings) that exceeded the 90<sup>th</sup> centile of baseline soil concentrations or the CCME guidelines (CCME 1999, 2001) were included as COPCs for the main minesite. Five metals regulated under MMER (arsenic, copper, lead, nickel and zinc) were also included in the assessment. Although mercury was not predicted to exceed baseline soil concentrations or CCME criteria, it was included because it was found to be of concern to the general public in the Arctic.

Methods for Whale Tail COPC determination

The COPCs for this assessment are therefore comprised of:

Antimony Lead Tin

Arsenic Manganese Uranium

Barium Mercury Vanadium

Beryllium Molybdenum Zinc

Cadmium Nickel

Chromium Selenium

Cobalt Strontium\*

Copper Thallium

Certain chemicals which are controlled through best management practices and which were not addressed in the baseline SLRA include petroleum hydrocarbons, process chemicals, dioxins, nitrates, ammonia and PAHs. For each source of these chemicals, best management practices are in place and environmental exposures are not expected to occur.

#### 2.5 RECEPTORS OF CONCERN

The WSLRA considers four Receptors of Concern (ROCs): ungulates, small mammals, waterfowl and songbirds. These choices were determined from the project's initial EIA, which included discussions with stakeholders, public meetings, traditional knowledge and experience from other mines. In addition, semi-palmated sandpiper has been added as a ROC based on a commitment made during the Whale Tail Final Hearing through discussions with Environment and Climate Change Canada (ECCC). Specifically, the WSLRA focuses on caribou, Canada goose, Lapland longspur, semi-palmated sandpiper and northern red-backed vole as representative species. An ecological description of the area and detailed descriptions of the biology of each of these receptors can be found in Azimuth (2006). Receptor-specific values such as dietary preferences that are used in this assessment are further discussed in Section 3.1 (Table 3-1).

Separate characterizations are conducted for the main minesite, near-site, AWAR, Whale Tail pit, Whale Tail haul road, and external reference locations for northern red-backed vole, Lapland longspur and Canada goose because these species have small territories when not migrating and would not be expected to move between the sampling areas. Main minesite and near-site samples are combined for the caribou risk characterization, because it is assumed that when caribou are present they can readily move between these sampling locations. See Section 3.4 for a discussion of how residence time in each area is handled as a dose-adjustment factor.

#### 2.6 PROTECTION GOALS AND ENDPOINTS

Since the ROCs identified are not rare or endangered species, protection at the population level was determined to be appropriate (Azimuth, 2006). The assessment endpoint is no adverse effect of COPCs on populations of caribou, Canada goose, Lapland longspur and northern red-backed vole.

The measurement endpoints will be calculated as exposure to the COPCs through ingestion of soil, water and food items. Ingested concentrations will be compared to literature-based ecotoxicological benchmarks equivalent to maximum acceptable exposure levels for each ROC. Specifically, the ecotoxicological benchmarks will be lowest observable adverse effect levels (LOAELs), which are generally considered to be appropriate for determining risk at the population level (Azimuth, 2006). Sample et al. (1996) provided TRVs for most of the COPCs, but values for antimony, cobalt, and thallium were obtained from other sources (see Appendix B).

#### 2.7 EXPOSURE PATHWAYS

The following exposure pathways will be investigated:

Small mammals – ingestion of plants, insects, water, soil

Ungulates – ingestion of plants, water, soil

Songbirds – ingestion of plants, insects, water, soil

Waterfowl - ingestion of plants, insects, water, soil

Inhalation and dermal absorption of metals are generally considered to be insignificant in comparison to exposures through ingestion (USEPA, 2005), so they are not considered here.

#### 3 EXPOSURE ASSESSMENT

Exposure assessment is used to calculate the dose of each COPC received by each ROC. The exposure assessment uses the food chain model developed by Azimuth (2006), and provided in Excel format. The model was developed to include the influence of COPC concentrations in exposure pathways, dietary preferences, ingestion rates and dose-adjustment factors. Estimated daily intake of each COPCs is calculated for each study area (main minesite, near-site, AWAR, Whale Tail site, Whale Tail haul road, external reference) as:

$$EDI = \left[\sum (I_{w,s,f} \times C_{w,s,f}) \times BF \times T\right]_{study} + \left[\sum (I_{w,s,f} \times C_{w,s,f}) \times BF \times T\right]_{ext \text{ ref}}$$

Where:

EDI = estimated daily intake (mg/kg body weight/day)

 $I_{w,s,f}$  = intake of water, soil and food items (L/kg ww/d; kg dw/kg ww/d; kg dw/kg ww/d)

 $C_{w,s,f}$  = concentration of COPC in water, soil and food items (L/kg ww/d; kg dw/kg ww/d; kg dw/kg ww/d)

BF = biotransfer factor (absorption factor)

T = proportion of time in area

Each component is described below, and an example calculation is provided in Appendix A.

#### 3.1 INTAKE OF WATER, SOIL AND FOOD

Water, food and soil ingestion rates used in the assessments are shown in Table 3-1. All intake parameters are considered to be conservative. Water and food ingestion rates were derived from USEPA (1993). Soil ingestion rates for Canada goose and Northern red-backed vole are also from USEPA (1993). Although Beyer et al. (1994) was referenced as the source of most soil ingestion rates in the Meadowbank baseline assessment, the species chosen to represent caribou and Lapland longspur were not indicated. The soil consumption rate for caribou was increased in subsequent Meadowbank assessments and here from 2% of dry food consumption to 5%, which is the general rate for mammals in Beyer et al. (1994), as used in (Senes, 2008). The soil ingestion rate for Lapland longspur was increased from 2% to 7%, based on Hansen et al. (2011). This study identified a rate of 0.7% for Swainson's thrush, a ground-dwelling songbird that primarily feeds on flying insects and berries. A 10x safety factor was applied because Swainson's thrush is a foliage-gleaner, while Lapland longspur is considered a ground-forager (Cornell University, 2011). This factor is considered to be conservative however, because Lapland longspur does not scratch the ground to uncover food items as other ground foragers do (Harrison 1967, Greenslaw 1977).

Table 3-1. Body weight (BW), water intake ( $I_{water}$ ), soil intake ( $I_{soil}$ ), and wet and dry ( $I_{food}$ ; FI) food intake for the identified ROCs.

Parameter	Units	Value	Reference	Notes
Northern Re	d-backed Vole			
BW	kg wet	0.02	Nagorsen (2005)	Smallest body weight used
<b>I</b> <sub>water</sub>	L/kg wet/day	0.253	USEPA (1993)	Species profile data for the Prairie Vole
I <sub>soil</sub>	kg dry/kg wet/day	0.0008	USEPA (1993)	Assumed 2.4% of dry food ingestion rate (similar to Meadow Vole)
$I_{food}$	kg wet/kg wet/day	0.135	USEPA (1993)	Species profile data for the Prairie Vole
FI	kg dry/kg wet/day	0.049	Not available	Moisture in food assumed to be 64% as per diet moisture calculation
Caribou				
BW	kg wet	75	Dauphine (1976)	Smallest body weight used
l <sub>water</sub>	L/kg wet/day	0.064	USEPA (1993)	Based on allometric equation for all mammals (L/day) (0.099*(BW) <sup>0.90</sup> )
I <sub>soil</sub>	kg dry/kg wet/day	0.0013	Beyer et al. (1994)	Assumed 5% of dry food ingestion rate (general rate for mammals)
$I_{food}$	kg wet/kg wet/day	0.047	Not available	Moisture in food assumed to be 43% as per diet moisture calculation
FI	kg dry/kg wet/day	0.027	USEPA (1993)	Based on total dry food intake for herbivorous mammals (g/day) (0.577*(BW) <sup>0.727</sup> )
Lapland Lon	gspur			
BW	kg wet	0.023	Cornell University (2011)	Smallest body weight used
l <sub>water</sub>	L/kg wet/day	0.205	USEPA (1993)	Based on allometric equation for all birds (L/day) (0.059*(BW) <sup>0.67</sup> )
I <sub>soil</sub>	kg dry/kg wet/day	0.0174	Hansen et al. (2011)	Assumed 7% of dry food ingestion rate (rate of Swainson's thrush +10x safety factor)
I <sub>food</sub>	kg wet/kg wet/day	0.656	USEPA (1993)	Moisture in food of insectivorous birds; assumed 62% as per diet moisture calculation
FI	kg dry/kg wet/day	0.249	USEPA (1993)	Based on total dry food intake for passerine birds (g/day) (0.398*(BW) <sup>0.850</sup> )
Canada Goo	ose			
BW	kg wet	2.000	Mowbray et al. (2002)	Smallest body weight used
<b>I</b> <sub>water</sub>	L/kg wet/day	0.044	USEPA (1993)	Species profile data for Canada Goose
I <sub>soil</sub>	kg dry/kg wet/day	0.0006	USEPA (1993)	Assumed 8.2% of dry food ingestion rate
$I_{food}$	kg wet/kg wet/day	0.032	USEPA (1993)	Species profile data for Canada Goose
FI	kg dry/kg wet/day	0.011	Not available	Moisture in food assumed to be 66% as per diet moisture calculation

### 3.2 DIETARY CONCENTRATIONS OF COPCS

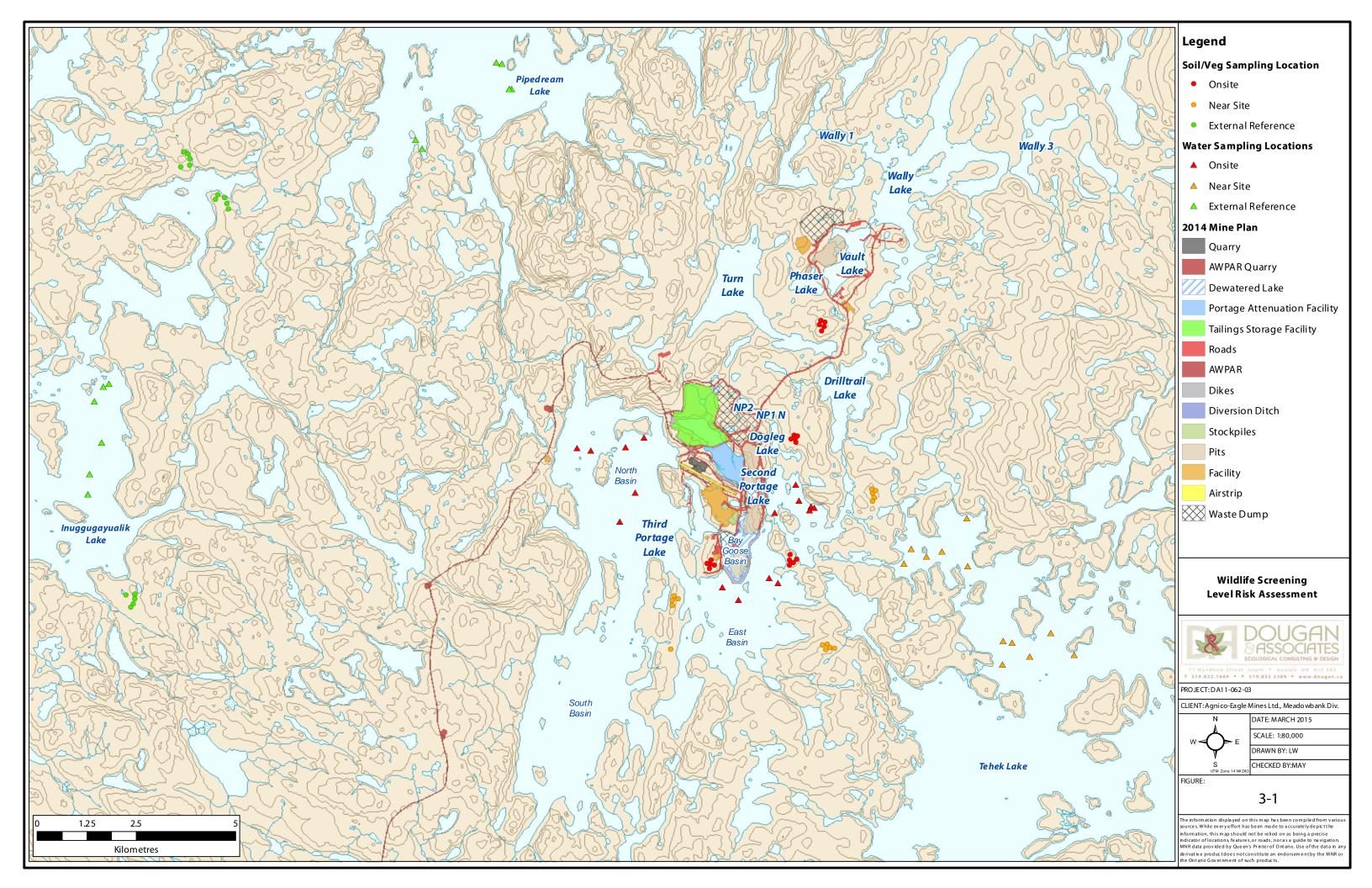
Concentrations of COPCs will be measured in and around the Meadowbank site in water, soil and plant tissue (food items: sedges, lichens, berries) in assessment years. This includes five samples of each media type from four onsite locations, three near-site locations, one AWAR location, two Whale Tail Pit locations, one Whale Tail Haul Road location, and three external reference locations. An SOP for methods of collection along with UTM coordinates is provided in Appendix C.

Water samples from the Core Receiving Environment Monitoring Program (CREMP) data collection will be used in the WSLRA analyses. Main minesite concentrations will be from samples collected in Second Portage Lake (SPL) and the east and north basins of Third Portage Lake (TPE, TPN). Near-site concentrations will be from samples collected in Tehek Lake (TE). Whale Tail concentrations will be from samples collected in Whale Tail Lake (South basin) and Mammoth Lake. External reference samples are from Inuggugayualik Lake (INUG) and Pipedream Lake (PDL). Exact coordinates are subject to slight changes each year – see CREMP Plan (Azimuth, 2015) for details.

All locations for the main Meadowbank site are shown on Figure 3-1 and coordinates for soil and vegetation samples are provided in Appendix C. Specific locations for the Whale Tail site and along the haul road will be determined following ground-truthing, but will target locations up to 5 km downwind (to the south/southeast) of site activity, and will include one location on the downwind side of the haul road. The general approach for selecting these sites will be consistent with a near-field/far-field approach used for the main Meadowbank Mine site since 2008 and illustrated in Figure 3-1.

Concentrations in soil and plant tissue used for food chain modeling will be the upper 95% confidence limit of the mean (UCLM). If values are below the detection limit, a value of  $\frac{1}{2}$  the detection limit will be used. Based on published literature, methyl mercury is assumed to comprise 1% of total mercury in water and soil, and 34% of total mercury in plant tissue, and inorganic mercury = total – methyl mercury (Azimuth, 2006).

Concentrations of COPCs in insects are not planned to be measured, but will be modeled from soil concentrations using published bioaccumulation models (see Azimuth, 2006). This method is particularly conservative, because the modeled factors are for ground insects whereas the songbird population in this assessment consumes primarily flying insects.



### 3.2.1 Dietary Preferences

The proportions of food items (sedge, lichen, berries, insects) that comprise each diet were determined by Azimuth (2006) using the literature reviews referred to in Section 2.6. Similar values have been used in another recent risk assessment (Senes, 2008) and all dietary preferences presented in Azimuth (2006) will be used in subsequent assessments (Table 3-2). Consistent with Azimuth (2006), sedges, lichens and berries will be considered surrogates for all plant matter ingested by the ROCs.

Table 3-2. Estimated dietary preferences for the receptors of concern at the Meadowbank site. From Azimuth, 2006.

Dietary Item	Northern red-backed vole	Caribou	Lapland longspur	Canada goose
Sedges	55%	30%	25%	50%
Lichens	0%	65%	0%	0%
Berries	40%	5%	5%	45%
Insects	5%	0%	70%	5%
Total	100%	100%	100%	100%

### 3.3 BIOTRANSFER FACTOR

The uptake efficiency factor (biotransfer or absorption factor) describes the proportion of the COPC that is absorbed into the animal from any ingested sources. Uptake efficiency was conservatively assumed to be 100% for all COPC/receptor combinations. This is likely an extremely conservative assumption; for example, chromium compounds were found to have a maximum absorption efficiency of 10% in the GI tract (Outridge and Scheuhammer, 1993).

### 3.4 TIME IN AREA

Territory size (foraging range) affects the proportion of an animal's diet that could be affected by mine-related contaminants. In the baseline assessment for Meadowbank (Azimuth, 2006), an adjustment factor for foraging range was not applied (animals were assumed to spend 100% of time in the study area). For subsequent assessments, the only ROC assumed to spend 100% of its time in any study area will be the northern red-backed vole, because of its small territory size. Caribou, Canada geese and Lapland longspur are migratory species, and the fraction of time spent in each study area (main minesite, near-site, AWAR, Whale Tail site, Whale Tail Haul Road) is estimated at 33%, based on a recent risk assessment completed in the Kivalliq region (Senes, 2008). The remaining fraction of exposure dose (67%) will be calculated based on external reference samples. An examination of collared caribou from the Meadowbank region found that any one animal spent no more than a maximum of 12% of the year within 25 km of the minesite (Martin Gebauer and Jason Shaw, personal communication, March 2012), so the assumption of 33% is expected to be conservative. Risk will be characterized for small-territory ROCs Northern red-backed vole, Canada

geese and Lapland longspur for main minesite, near-site, AWAR, Whale Tail Pit, Whale Tail Haul Road, and external reference locations separately, in order to determine whether those animals choosing territories on the mine-site are at increased risk compared to those choosing territories at nearby locations. Exposure data for main minesite and near-site locations will be combined for caribou because caribou can readily roam between the onsite and near-site locations in the course of a day.

### 4 TOXICITY ASSESSMENT

The toxicity reference values (TRVs) used in the Meadowbank assessments were collated from a review of the literature; mainly from Sample et al. (1996). This represents one of the most comprehensive and commonly used sources available for wildlife toxicity reference values and has been used in other recent similar assessments (e.g. Senes, 2008). In order to ensure the selected TRVs were relevant to the Meadowbank site and the conditions of that risk assessment, several criteria were used in the baseline assessment in screening toxicity studies. These included selecting values from studies conducted on species of similar phylogeny (i.e. bird or mammal), and selecting studies that examined individual or population-level effects over chronic time periods. The following describes TRV selection, as performed by Azimuth (2006):

The TRVs chosen for use in the risk characterization include both no observable adverse effect levels (NOAELs) and lowest observable adverse effect levels (LOAELs) when available. If effects concentrations were reported in terms of food concentrations, these were converted to dose. If a LOAEL was reported but no NOAEL could be determined, it was estimated as 1% of the LOAEL (as in Sample et al. 1996, Chapman et al. 1998). LOAELs cannot be estimated if only a NOAEL is available. Since the protection goal of this risk assessment no adverse effect of COPCs on populations of the ROCs, LOAELs are the most relevant TRV, and are used in the final risk estimate.

Instead of species-to-species uncertainty factors, the baseline assessment used allometric scaling factors (Sample et al. 1996) to adjust mammalian TRVs from the test species (typically mouse or rat) to the ROC. A scaling factor of 1 was used for birds (Mineau et al. 1996).

Where toxicity information was found for multiple forms of a contaminant, the one with the greatest toxic potency was chosen. TRVs for chromium-VI were available for mammals, but only chromium-III was available for birds. No NOAELs or LOAELs were available for total mercury. Mammalian LOAELs were not available for inorganic mercury or beryllium. Avian LOAELs were not available for uranium or vanadium. Avian NOAELs were not available for antimony and beryllium and were extrapolated from the mammalian values. The avian LOAEL for antimony was extrapolated from the mammalian value.

### 5 RISK CHARACTERIZATION

### 5.1 HAZARD QUOTIENTS

Risk characterization compares predicted exposure concentrations with the toxicity reference values from the literature, using the hazard quotient approach. Hazard quotients for all locations (main minesite, near-site, AWAR, Whale Tail Pit, Whale Tail Haul Road, and external reference) will be calculated as:

HQ = EDI / TRV

Where:

EDI = estimated daily intake (ug/kg body weight/day)

TRV = toxicity reference value (ug/kg body weight/day)

See Appendix A for an example calculation and Appendix B for all TRVs to be used in assessments for Meadowbank. As discussed above, the TRV to be used is represented by the LOAEL, unless only a NOAEL was available (indicated).

Because of the conservative assumptions included at this level of assessment, there is generally considered to be a high degree of certainty associated with results indicating negligible risk. A hazard quotient > 1 indicates the possible need for more in-depth assessment, including analysis of assumptions used. However, when HQ values exceed 1 for both the baseline (or external reference) and the study areas, and are of similar magnitude, it may be assumed that the receptor is adapted to the measured exposure level, or that the assumptions used in calculating the HQ have resulted in an over-estimation of risk (Dominion Diamond, 2015).

HQ values and a characterization of risk for each ROC will be provided in the assessment report.

### 5.2 UNCERTAINTY ASSESSMENT

The assumptions included in each section of the assessment are discussed here, along with implications for over- or under-estimating risk.

### 5.2.1 Uncertainty in Exposure Assessment

ROCs used in the assessment are assumed to represent categories of species (e.g. ungulates, small mammals, waterfowl, song birds) that are found around the Meadowbank site. Exposure is assumed to be similar for other species in these categories. Compared to other Arctic animals, the exposure for the species chosen is expected to be realistic to conservative, because they all are assumed to forage in or on the soil.

Exposure concentrations in environmental media are assumed to be represented by the 95% UCLM of the measured concentrations. Since animals would be more likely to ingest food sources with a range of COPC concentrations, this is a conservative assumption.

Ingestion rates are applied using published values for similar but not identical species. Based on biological factors, these rates were chosen to be conservative.

Dietary preferences are from studies on the same or similar species, but are not from populations specifically inhabiting the study region.

It is assumed that flying insects accumulate the same proportion of metals from soil as ground-dwelling insects, because no flying insect BAFs were available. This assumption likely results in an over-estimation of risk for ROCs who primarily consume flying insects (Lapland longspur).

Absorption of COPCs in the gastrointestinal tract was assumed to be 100%. This assumption likely results in an over-estimation of risk for all COPCs/ROC combinations.

Methyl mercury proportions of total mercury concentrations are estimated from the available literature using the UCLM from two studies (Azimuth, 2006). While there is an unknown degree of uncertainty in the extrapolation of this data for use at the Meadowbank site, the fractions chosen were at the highest end of the published range, and are therefore designed to be conservative. Furthermore, mercury was included as a COPC because it was found to be of concern to the general public in the Arctic, and no source of elevated mercury was identified at the mine.

Ingestion of COPCs was the only route of exposure considered in this assessment. While this assumption may slightly under-estimate actual exposure, inhalation and dermal absorption of metals are generally considered to be insignificant in comparison to exposures through ingestion (USEPA, 2005).

### 5.2.2 Uncertainty in Toxicity Assessment

TRVs are not available for the ROCs considered in this assessment and species-to-species extrapolations are necessary. This includes allometric scaling for mammals, 1:1 scaling for birds, and the application of uncertainty factors in mammal-to-avian extrapolation. Food intake-to-body weight ratios are well studied and uncertainty factors are designed to be protective, so these extrapolations are likely to be realistic or conservative.

As is common in screening level risk assessments, the estimation of risk is for each COPC in isolation, and does not consider potential additive, synergistic or antagonistic reactions. Models for determining mixture toxicity of a large suite of metals are not yet widely available, and guideline values are for single compounds only. This factor may lead to under-estimation of actual risk from metals overall, but the otherwise conservative nature of an SLRA is assumed to compensate for this issue.

### 6 REPORTING AND ADAPTIVE MANAGEMENT

The SLRA for the Meadowbank Mine (including the Whale Tail Pit) will evaluate risks to wildlife from contaminant exposure in and around the mine site every three years during operation, and results will be reported to NIRB in the context of AEM's Annual Report for the Meadowbank site.

Because of the conservative assumptions included at this level of assessment, there is generally considered to be a high degree of certainty associated with results indicating negligible risk (HQ <1). In the case that hazard quotients exceed 1 and differ substantially (generally, by more than an order of magnitude) between mine-related and reference and/or baseline sites for a certain COPC, incremental risk due to mine operation will be classified as potentially unacceptable and more detailed investigations will be initiated. This may include a desk-top review and refining of the assessment parameters, and/or additional sampling in the subsequent year to confirm results. In the case that results of refined assessments continue to indicate unacceptable risk, adaptive management may include such interventions as capping of dust sources, increased road watering, delineation of contaminated areas, and deterrence methods pending reclamation.

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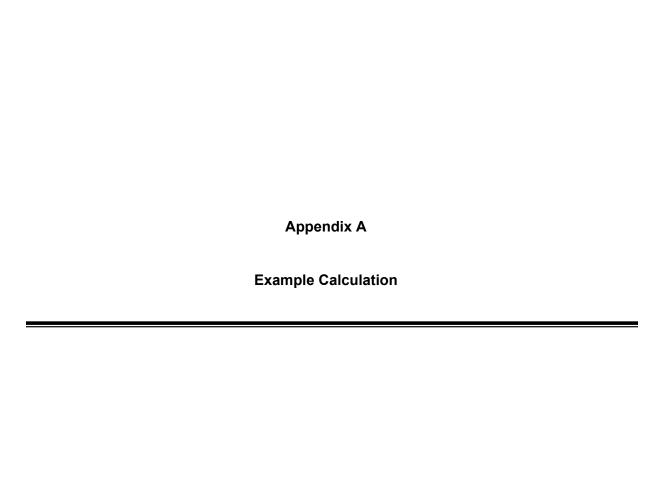
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### **Exposure of Lapland longspur to Pb (main minesite area)**

### **Exposure Assessment**

EDI = 
$$T_{onsite}(DS_{onsite} + DW_{onsite} + DF_{onsite}) + T_{ref}(DS_{ref} + DW_{ref} + DF_{ref})$$

Where:

EDI = estimated daily intake of COPC

T<sub>onsite</sub> = fraction of time in study area (i.e. onsite) = 33%

 $T_{ref}$  = remaining fraction of time = 67% (remainder of exposure based on external reference concentrations)

DS = dose from incidental soil ingestion

I<sub>soil</sub> = intake of soil

DW = dose from drinking water

 $I_{water}$  = intake of water

DF = dose from food

I<sub>food</sub> = intake of food

 $Pb_{(media)}$  = measured concentration of lead in media (95% UCLM of onsite or external reference values, accordingly)

### Example:

$$DS_{onsite}$$
 (mg/kg ww/d) =  $Pb_{soil}^*$  (mg/kg dw) \*  $I_{soil}$  (mg dw/kg ww/d)  
= 11.23 \* 0.0174  
= 0.195

$$DW_{onsite} (mg/kg ww/d) = Pb_{water} (mg/L) * I_{water} (L/kg ww/d)$$
$$= 0.00 * 0.205$$

= 0.00

$$DF_{onsite} \ (mg/kg \ ww/d) = Pb_{sedge} \ (mg/kg \ ww)^*25\% + Pb_{lichen} \ (mg/kg \ ww)^*0\% + Pb_{berries} \ (mg/kg \ ww)^*5\% + Pb_{insects} \ (mg/kg \ ww)^*70\% * I_{food} \ (kg \ ww/kg \ ww/d)$$

$$DS_{ref}$$
 (mg/kg ww/d) =  $Pb_{soil}$  (mg/kg dw) \*  $I_{soil}$  (mg dw/kg ww/d)  
=  $8.757 * 0.0174$   
=  $0.152$ 

```
\begin{split} DW_{ref} & (mg/kg \ ww/d) = Pb_{water} \ (mg/L) \ ^* \ I_{water} \ (L/kg \ ww/d) \\ & = 0.00 \ ^* \ 0.205 \\ & = 0.00 \\ DF_{ref} & (mg/kg \ ww/d) = Pb_{sedge} \ (mg/kg \ ww)^*25\% + Pb_{lichen} \ (mg/kg \ ww)^*0\% + Pb_{berries} \ (mg/kg \ ww)^*5\% + Pb_{insects} \ (mg/kg \ ww)^*70\% \ ^* \ I_{food} \ (kg \ ww/kg \ ww/d) \\ & = 1.01^*25\% + 2.85^*0\% + 0.02^*5\% + 0.31^*70\% \ ^* \ 0.656 \\ & = 0.309 \end{split}
```

 $EDI_{Pb}$  (mg/kg ww/d) = 33%(0.195 + 0.00 + 0.228) + 67%(0.152 + 0.00 + 0.309)

### **Risk Characterization**

HQ = EDI (mg/kg ww/d) / LOAEL-based TRV (mg/kg ww/d)\*\*
= 0.45 / 11.30
= 0.04

= 0.45

<sup>\*\*</sup>see values in Appendix B

# Appendix B

# Toxicity Reference Values From Azimuth (2006)

Parameter				Antimony <sup>2,3,4</sup>	Arsenic <sup>1</sup>	Barium <sup>1</sup>	Beryllium <sup>1,2</sup>	Cadmium <sup>1</sup>	Chromium <sup>1,5</sup>	Cobalt <sup>7</sup>	Copper <sup>1</sup>	Lead <sup>1</sup>	Manganese <sup>1</sup>
TRVs for Mammals	(see allometric scaling equation in	footnotes)											
	NOAEL-based TRV:	Test Species BW <sub>NOAEL</sub> (kg wet)		Mouse 0.03	Mouse 0.03	Rat 0.435	Rat 0.35	Rat 0.303	Rat 0.35	Rat 0.15	Mink 1	Rat 0.35	Rat 0.35
		NOAEL (mg/kg wet/day)		98.0	0.126	5.1	0.66	1	3.28	0.2	11.7	8	88
	LOAEL-based TRV:	Test Species		Rat	Mouse	Rat	na	Rat	Rat	Rabbit	Mink	Rat	Rat
		BW <sub>LOAEL</sub> (kg wet)		0.27	0.03	0.35	na	0.303	0.35	3	1	0.35	0.35
		LOAEL (mg/kg wet/day)		112.9	1.26	19.8	na	10	13.14	2	15.14	80	284
TRVs for Birds (allo	ometric scaling factor of 1 was assu	imed; see footnotes)											
					Brown-headed							Japanese	
	NOAEL-based TRV:	Test Species		Rat (see above)	cowbird	Chicken	Rat (see above)	Mallard	Black duck	Pek. Duckling	Chicken	quail	Japanese quail
		NOAEL (mg/kg wet/day)		9.8	2.5	21	0.066	1.5	1	2.37	47	1.13	977
					Brown-headed							Japanese	
	LOAEL-based TRV:	Test Species		Rat (see above)	cowbird	Chicken	na	Mallard	Black duck	Pek. Duckling	Chicken	quail	na
		LOAEL (mg/kg wet/day)		11.29	7.4	42	na	20	5	4.74	62	11.3	na
	Wildlife Species	Body Weight (kg wet)											
Mammals	Northern Red-backed Vole	0.02	NOAEL	108.5	0.1	11.0	1.3	2.0	6.7	0.3	31.1	16.4	180.0
	Northern Red-backed Vole	0.02	LOAEL	216.4	1.4	40.5	na	19.7	26.9	7.0	40.3	163.6	580.9
	Caribou	75	NOAEL	13.9	0.0	1.4	0.2	0.3	0.9	0.0	4.0	2.1	23.0
	Caribou	75	LOAEL	27.7	0.2	5.2	na	2.5	3.4	0.9	5.1	20.9	74.2
Birds	Lapland Longspur	0.023	NOAEL	9.8	2.5	21.0	0.1	1.5	1.0	2.4	47.0	1.1	977.0
	Lapland Longspur	0.023	LOAEL	11.3	7.4	42.0	na	20.0	5.0	4.7	61.7	11.3	na
	Canada Goose	2	NOAEL	9.8	2.5	21.0	0.1	1.5	1.0	2.4	47.0	1.1	977.0
	Canada Goose	2	LOAEL	11.3	7.4	42.0	na	20.0	5.0	4.7	61.7	11.3	na

### Notes:

Based on Sample et al. (1996), the following allometric equation was used for interspecies extrapolations among mammals: NOAEL<sub>w</sub> = NOAEL<sub>ts</sub> \*

(BW<sub>ts</sub>/BW<sub>w</sub>)^0.25; the equation also applies to the LOAEL

Based on Sample et al. (1996), an allometric scaling factor of 1 was considered appropriate for interspecies extrapolations among birds underline corresponds to an unbounded LOAEL (10X safety factor used to derive the NOAEL) (see text for details)

na indicates that there was no TRV (NOAEL or LOAEL) available

<sup>&</sup>lt;sup>1</sup> Sample et al. (1996)

<sup>2</sup> Sainple et al. (1990)

Bird TRVs calculated by multiplying the mammal TRVs with a safety factor of 0.1 (see text for discussion)

NOAEL from Dieter et al. (1991) as quoted in Lynch et al. (1999)

LOAEL from Rossi et al. (1987)

Mammals TRV based on chromium VI; bird TRV based on chromium III

<sup>&</sup>lt;sup>6</sup> Ueberschar et al. (1986)

<sup>&</sup>lt;sup>7</sup>Chetty et al. (1979) for mammal NOAEL TRV, Szakmary et al. (2001) for mammal LOAEL TRV, Van Vleet (1982) for bird TRVs.

Parameter			То	tal Hg	Inorg-Hg <sup>1</sup>	MeHg <sup>1</sup>	Molybdenum <sup>1</sup>	Nickel <sup>1</sup>	Selenium <sup>1</sup>	Strontium <sup>1,2</sup>	Thallium <sup>1,6</sup>	Tin <sup>1</sup>	Uranium <sup>1</sup>	Vanadium <sup>1</sup>	Zinc <sup>1</sup>
TRVs for Mammals (s	see allometric scaling equation in	footnotes)													
	NOAEL-based TRV:	Test Species		na	Mink	Mink	Mouse	Rat	Rat	Rat	Rat	Mouse	Mouse	Rat	Rat
		BW <sub>NOAEL</sub> (kg wet)		na	1	1	0.03	0.35	0.35	0.35	0.365	0.03	0.028	0.26	0.35
		NOAEL (mg/kg wet/day)		na	1	0.015	<u>0.26</u>	40	0.2	263	0.0074	23.4	3.07	0.21	160
	LOAEL-based TRV:	Test Species		na	Mink	Mink	Mouse	Rat	Rat	na	Rat	Mouse	Mouse	Rat	Rat
		BW <sub>LOAEL</sub> (kg wet)		na	1	1	0.03	0.35	0.35	na	0.365	0.03	0.028	0.26	0.35
		LOAEL (mg/kg wet/day)		na	na	0.025	2.6	80	0.33	na	0.074	35	6.13	2.1	320
TRVs for Birds (allon	metric scaling factor of 1 was assi	umed; see footnotes)													
					Japanese							Japanese			White leghorn
	NOAEL-based TRV:	Test Species		na	quail	Mallard	Chicken	Mallard	Mallard	Rat (see above)	Chicken	quail	Black duck	Mallard	hen
		NOAEL (mg/kg wet/day)		na	0.45	0.0064	3.53	77.4	0.4	26.3	0.202	6.8	16	11.4	14.5
					Japanese							Japanese			White leghorn
	LOAEL-based TRV:	Test Species		na	quail	Mallard	Chicken	Mallard	Mallard	na	Chicken	quail	Black duck	Mallard	hen
		LOAEL (mg/kg wet/day)		na	0.9	0.064	35.3	107	8.0	na	0.757	16.9	na	na	131
	Wildlife Species	Body Weight (kg wet)													
Mammals	Northern Red-backed Vole	0.02	NOAEL	na	2.7	0.0	0.3	81.8	0.4	537.9	0.0	25.9	3.3	0.4	327.2
	Northern Red-backed Vole	0.02		na	na	0.1	2.9	163.6	0.7	na	0.2	38.7	6.7	4.0	654.5
	Caribou	75	NOAEL	na	0.3	0.0	0.0	10.5	0.1	68.7	0.0	3.3	0.4	0.1	41.8
	Caribou	75		na	na	0.0	0.4	20.9	0.1	na	0.0	4.9	0.9	0.5	83.6
Birds	Lapland Longspur	0.023		na	0.5	0.0	3.5	77.4	0.4	26.3	0.2	6.8	16.0	11.4	14.5
	Lapland Longspur	0.023	LOAEL	na	0.9	0.1	35.3	107.0	8.0	na	0.8	16.9	na	na	130.9
	Canada Goose	2	NOAEL	na	0.5	0.0	3.5	77.4	0.4	26.3	0.2	6.8	16.0	11.4	14.5
	Canada Goose	2	LOAEL	na	0.9	0.1	35.3	107.0	0.8	na	0.8	16.9	na	na	130.9

#### Notes:

Based on Sample et al. (1996), the following allometric equation was used for interspecies extrapolations among mammals: NOAEL<sub>w</sub> = NOAEL<sub>w</sub> = NOAEL<sub>s</sub> \* (BW<sub>s</sub>/BW<sub>w</sub>)^0.25; the equation also

Based on Sample et al. (1996), an allometric scaling factor of 1 was considered appropriate for interspecies extrapolations among birds underline corresponds to an unbounded LOAEL (10X safety factor used to derive the NOAEL) (see text for details) na indicates that there was no TRV (NOAEL or LOAEL) available

<sup>&</sup>lt;sup>1</sup> Sample et al. (1996)
<sup>2</sup> Bird TRVs calculated by multiplying the mammal TRVs with a safety factor of 0.1 (see text for discussion)
<sup>3</sup> NOAEL from Dieter et al. (1991) as quoted in Lynch et al. (1999)

<sup>&</sup>lt;sup>4</sup> LOAEL from Rossi et al. (1987)

<sup>&</sup>lt;sup>5</sup> Mammals TRV based on chromium VI; bird TRV based on chromium III

<sup>&</sup>lt;sup>6</sup> Ueberschar et al. (1986)

Chetty et al. (1979) for mammal NOAEL TRV, Szakmary et al. (2001) for mammal LOAEL TRV, Van Vleet (1982) for bird TRVs.

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# Appendix C

Standard Operation Procedure for Soil and Vegetation Sampling

Based on Azimuth (2006)

### Meadowbank Project - Standard Operating Procedure

Collection of soil and vegetation samples for the Screening Level Risk Assessment program (from Azimuth, 2006)

March, 2016

### 1. Sample Locations

Three external reference (control) areas and eleven treatment areas are to be sampled. Control areas were selected northwest and west of the project area, upwind from mine related activities (C-1 to C-3). Treatment areas (main minesite, near-field, AWAR, Whale Tail Pit, Whale Tail Haul Road) were selected to represent wind distribution of contaminants from mining related activities (T-1 to T-11). Within each control and treatment area, five sample sites (S1 to S5) were selected within a 200 to 300 m radius, at least 150 m apart from one another. Within each sample site, composite tissue and soil samples are collected within a 10 to 30 m radius, depending on tissue (particularly berry) availability. UTM coordinates for each sample site are presented in Table 1.

Table 1. UTM coordinates for soil and vegetation sampling locations (NAD 83).

Sampling Area	Site #1	Site #2	Site #3	Site #4	Site #5
T1 – Main minesite	14W 0639238	14W 0639137	14W 0639061	14W 0639109	14W 0639010
	7215692	7215734	7215668	7215569	7215459
T2 – Near-site	15W 0359410	15W 0359403	15W 0359507	15W 0359459	15W 0359391
	7214020	7214128	7214072	7213912	7213816
T3 – Main minesite	14W 0640069	14W 0640146	14W 0639967	14W 0639976	14W 0639991
	7212342	7212421	7212281	7212409	7212541
T4 – Near-site	14W 0640916	14W 0640994	14W 0641112	14W 0640890	14W 0640802
	7210294	7210201	7210194	7210137	7210271
T5 – Near-site	14W 0637020	14W 0636978	14W 0637013	14W 0637162	14W 0637057
	7211270	7211160	7211394	7211419	7211513
T6 – Main minesite	14W 0638559	14W 0638651	14W 0638780	14W 0638515	14W 0638400
	7213995	7213953	7214028	7214226	7214038
T7 – Near-site	14W 0640847	14W 0640872	14W 0640755	14W 0640719	14W 0640788
	7218280	7218395	7218444	7218338	7218177
T8 - AWAR	14W 0626884	14W 0626837	14W 0626806	14W 0626746	14W 0626675
	7200614	7200520	7200427	7200306	7200224
T9 – Whale Tail Pit	TBD	TBD	TBD	TBD	TBD
T10 – Whale Tail Pit	TBD	TBD	TBD	TBD	TBD
T11 – Whale Tail Haul Road	TBD	TBD	TBD	TBD	TBD
C1 – External	14W 0623453	14W 0623450	14W 0623416	14W 0623339	14W 0623217
Reference	7211586	7211467	7211345	7211252	7211558
C2 – External	14W 06255518	14W 0625569	14W 0625743	14W 0625790	14W 0625825
Reference	7221488	7221607	7221542	7221388	7221244
C3 – External	14W 0624717	14W 0624818	14W 0624850	14W 0624861	14W 0624636
Reference	7222685	7222623	7222504	7222349	7222313

### 2. Soil Sample Collection

Soil samples will be collected using a composite sampling method at each sample site. Representative grab samples will be collected from five separate test pits per sample site (generally no greater than a 5.0 m² area) using a stainless steel ladle. First, the organic layer (which ranges from 0 to 5 cm below the surface) will be removed and discarded. Second, two small scoops of soil, approximately 5-10 cm below surface, will be placed in a pre-labeled Ziploc bag and homogenized. Decontamination (i.e., cleaning to prevent cross-contamination) of soil sampling equipment (i.e. stainless steel spoons) will be conducted at the beginning of each day, between treatment and control areas and between sample site locations. The cleaning procedures will include:

- Rinsing with site water to remove any remaining sediment or organic matter
- Scrubbing with brushes using Liquinox detergent
- A final rinse with site water

### 3. Tissue Sample Collection

Sedges and lichen samples will be collected in close proximity to the composite soil samples. Sedges will be collected from an approximate 5.0 m² area, near the center of the sample site, by randomly selecting and simply grabbing/ pulling representative sedge, periodically including the roots. Samples will be placed in a pre-labeled Ziploc bag. Similarly, lichen tissue samples will be collected by hand and placed in a pre-labeled Ziploc bag. Collection of lichen and sedge should continue until the Ziploc bag is full. Berry collection sites were selected along moderately dry, rolling hills where berries are the most abundant. Approximately 2 cups of berries should be collected per site. No species of berries, sedges and lichen should be sampled preferentially, as each treatment and control area has a different variety and abundance of vegetation.

- 4. Sample Handling, Documentation and Analyses
- 4.1 Field Book

During the field-sampling program a field book will be used to maintain a record of sample collection and observations, including:

- field staff
- · descriptions of photos taken
- date and time
- weather conditions
- sample identifications
- tissue and soil sample characteristics
- # of samples taken
- sample locations, including GPS coordinates
- sample time
- notes and general observations

The field logbook is intended to provide sufficient information such that personnel may reconstruct events that occurred during the sampling period, without having to rely on field personnel or memory of the individuals.

### 4.2 Containers and Labeling

Samples will be collected in Ziploc bags for ease of sample collection and prevention of sample destruction and mixing during shipping:

- Soil samples one (1) 950 mL (18cm x 20cm) Ziploc® bag per soil composite
- Tissue samples one (1) 950 mL (18cm x 20cm) Ziploc® bag, per berries, sedge, and lichen sample
- Samples will be labeled with the following:
  - o Site ID
  - o Sample Date and Time
  - o Sample ID
  - o GPS Coordinates
  - o Sample Type
  - Initials of Field Staff

Sample Identification (ID) will be coordinated to accommodate ease of organization and interpretation of analytical results. As an example, the ID for a Treatment Area 1, Site No. 2, Lichen tissue sample could be: T1 S2 Li.

### 4.3 Tracking, Preservation, Storage and Transportation

Tissue and soil samples will be recorded in the field book following sample collection at each sample site within each area. Chain-of-custody forms will be filled out for transport. Care will be taken to ensure that the sample identification is clearly marked on each bag. A small piece of paper with the sample ID, date and sample type may be placed in the sample bag. Samples will be placed on ice in coolers and shipped, along with the chain of custody records, to an accredited laboratory (typically ALS Laboratories in Vancouver, BC).

## 4.4 Laboratory Analysis

All soil and tissue analyses will be conducted by a CALA-accredited laboratory (typically ALS Environmental Laboratories in Vancouver, BC). The following laboratory analyses will be requested:

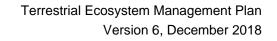
Soil – soil pH and total metals; and

Plant Tissue – Moisture content and total metals.

### 5. Quality Assurance/Quality Control (QA/QC)

The following recommended sample collection and handling techniques will be employed during collection of vegetation tissue and soil samples:

- Sampling by qualified personnel
- Prevention of foreign material in samples or loss of sample material
- Minimization of sample handling and use of new nitrile or latex gloves during sample collection
- Use of appropriate clean containers and proper storage of samples
- Collection of sufficient sample volumes as specified by the data quality objectives
- Adequate decontamination
- Use of appropriate packaging, ice and shipping methods to ensure that holding times and storage conditions are met.



# **APPENDIX B**

Meadowbank Mine Project Certificate No.004, Whale Tail Pit Project Certificate No.008 Terms and Conditions, and Government of Nunavut Commitments

P.C.	T&C No.	Term or Condition	Location in TEMP Document
Meado	wbank P	Project Certificate	
No. 004	32	AEM shall operate the all-weather road as a private access road, and implement all such measures necessary to limit non-mine use of the road to authorized, safe and controlled use by all-terrain-vehicles for the purpose of carrying out traditional Inuit activities. The measures AEM shall undertake include, but are not limited to:  a. Maintaining a gate and manned gatehouse at kilometre 5 of the Private Access Road;  b. In consultation with the Hamlet of Baker Lake, the local HTO, and the KivIA, update the All-weather Private Access Road Management Plan to set out the criteria and processes to authorize and ensure safe and controlled non-mine use of the road by all-terrain vehicles for the purpose of carrying out traditional Inuit activities, and measure to limit all other non-mine use of the road. The updated Plan is to be submitted to the GN, INAC, and KivIA for approval no later than one (1) month after the approval of revised Condition 32.  c. The posting of signs in English and Inuktitut at the gate, each major bridge crossing, and each 10 kilometres of road, stating that unauthorized public use of the road is prohibited;  d. The posting of signs in English and Inuktitut along the road route to identify when entering or leaving crown land;  e. Prior to opening of the road, and annually thereafter, advertise and hold at least one community meeting in the Hamlet of Baker Lake to explain to the community that the road is a private road with non-mine use of the road limited to approved, safe and controlled use by all-terrain-vehicles for the purpose of carrying out traditional Inuit activities.  f. Place notices at least quarterly on the radio and television to explain to the community that the road is a private road with non-mine use of the road, and require all mine personnel using the road to monitor and report unauthorized non-mine use of the road, and collect and report this data to NIRB one (1) year after the road is opened and annually thereafter; and h. Report all accidents or other safety incidents on	Section 2; Table 3; Annual Reporting
No. 004	51	Cumberland shall engage the HTOs in the development, implementation and reporting of creel surveys within waterbodies affected by the Project to the GN, DFO and local HTO.	Section 3.5.2.8
No. 004	54	Cumberland shall provide an updated Terrestrial Ecosystem Management Plan, to the GN, EC and INAC, within three (3) months of the issuance of the Project Certificate including: a. Updated terrestrial ecosystem baseline data; b. Details of the method and rationale for conducting monitoring surveys prior to the commencement of construction; c. Statistical validation to support the conclusions drawn from monitoring impacts of the mine and infrastructure on wildlife; d. A detailed analysis of the method of distinguishing between cow/calf groups from other caribou group observations; e. Details of a comprehensive hunter harvest survey to determine the effect on ungulate populations resulting from increased human access caused by the all-weather private access road, including establishing preconstruction baseline harvesting data, to be developed in consultation with local HTOs, the GN-DOE and the Nunavut Wildlife Management Board; f. Details of annual aerial surveys to be conducted to assess waterfowl densities in the regional study area during the construction phase and for at least the first three (3) years of operation, with the data analyzed and compared to baseline data to determine if significant effects are occurring and require mitigation. g. Details of an annual breeding bird plot surveys and transects along the all-weather road to be conducted during the construction phase and for at least the first three (3) years of operation. h. Details of a monitoring program, including recording the locations and frequency of observing caribou and carnivores and any actions taken to avoid contact with or disturbance, and a specific mitigation plan for Shortearred owls and any other species of special concern pursuant to Schedule 3 of the Species at Risk Act located in the local study area or along the all-weather private access road	Section 2.2 (methods of analysis); Section 3 (monitoring and impact prediction); Section 4 (TEMP annual report)
No. 004	55	Cumberland shall provide the following analysis in the March 2007 Wildlife Summary Monitoring Report: a. Further review and analysis of the size of the regional study area; b. A summary of the involvement of Inuit in the monitoring program; c. A detailed report of the natural variability of VECs in the region; d. A detailed analysis on distribution and abundance of cows, bulls, and calves; e. Results of the 2006 monitoring program, including field methodologies and statistical approaches used to support conclusions drawn;	TEMP Annual Report

P.C.	T&C No.	Term or Condition	Location in TEMP Document
		f. Any proposed changes to the TEMP survey methodologies, statistical approaches or proposed adaptive management stemming from the results of the monitoring program.	
No. 004	56	Cumberland shall plan, construct, and operate the mine in such a way that caribou migration paths through the Project, including in the narrows west of Helicopter Island, are protected. Maps of caribou migration corridors shall be developed in consultation with Elders and local HTOs, including Chesterfield Inlet and placed in site offices and upgraded as new information on corridors becomes available. Information on caribou migration corridors shall be reported to the GN, KivIA and NIRB's Monitoring Officer annually.	TEMP Annual Report
No. 004	57	Cumberland shall participate in a caribou collaring program as directed by the GN-DOE.	TEMP Annual Report
Whale	Tail Pit I	Project	
No. 008	27	The Proponent shall participate in a Terrestrial Advisory Group with the Government of Nunavut, the Baker Lake Hunters and Trappers Organization, the Kivalliq Inuit Association, and other parties as appropriate to continually review and refine mitigation and monitoring details within the Terrestrial Ecosystem Management Plan. Additional caribou collar data, results from associated studies, and other monitoring data as available should be considered for incorporation as appropriate.	Section 4.2
No. 008	28	The Proponent shall maintain a Terrestrial Ecosystem Management Plan (TEMP) throughout all phases of the Project. The Plan shall include detailed monitoring, mitigation, and adaptive management measures for wildlife, with consideration for each Project activity predicted to affect wildlife, and with inclusion of specific triggers for mitigation and adaptive management intervention. The TEMP shall demonstrate consideration for all relevant commitments made by the Proponent throughout the Nunavut Impact Review Board's review of the Project.  Updates to the TEMP may be required when there are significant changes in project development plans, monitoring results indicating biologically-meaningful changes, significant updates to the scientific understanding of management methods relevant to wildlife at the project site, Inuit Qaujimajatuqangit, Traditional Knowledge, changes in climatic conditions that might subject wildlife to unexpected impacts, or as otherwise necessary.	Entire Document
No. 008	29	The Proponent shall, in collaboration with the Government of Nunavut, collect additional caribou collar data and conduct analyses of this data to quantify the zone of influence and associated effects of project components on caribou movement for a study area that includes the Whale Tail mine site, the haul road, the Meadowbank Gold Mine and its All-Weather Access Road	Outside of TEMP, but related
No. 008	30	The Proponent shall collect additional data on caribou group sizes in proximity to the Project, and shall work with the Terrestrial Advisory Group to refine appropriate caribou group size thresholds that trigger additional mitigation. Initially, the group size thresholds should be set at 110 (fall), 25 (winter and summer), and 12 (spring).	Section 3.5
No. 008	31	The Proponent shall develop and implement a Road Access Management Plan and maintain traffic monitoring logs along the haul road between the Whale Tail Pit project and the Meadowbank mine. Where traffic exceeds levels predicted within the Environmental Impact Statement, the Proponent shall develop and implement appropriate modifications to its wildlife protection measures.	Outside of TEMP, but will be reported within annual TEMP reports
No. 008	32	The Proponent shall engage with the Baker Lake Hunters and Trappers Organization and other relevant parties to ensure that safety barriers, berms, and designed crossings associated with project infrastructure, including the haul road, are constructed and operated as necessary to allow for the safe passage of caribou and other terrestrial wildlife.	TEMP Annual Report
No. 008	33	The Proponent shall provide wildlife incident reports to the appropriate authorities in a timely fashion. Wildlife incident reports should include the following information:  a) Locations (i.e., latitude and longitude), species, number of animals, a description of the animal activity, and a description of the gender and age of animals if possible; b) Prior to conducting project activities, the Proponent should map the location of any sensitive wildlife sites such as denning sites, calving areas, caribou crossing sites, and raptor nests in the project area, and identify the timing of critical life history events (i.e., calving, mating, denning and nesting); and c) Additionally, the Proponent should indicate potential impacts from the project, and ensure that operational activities are managed and modified to avoid impacts on wildlife and sensitive sites	TEMP Annual Report
		Commentary: Items (b) and (c) are not typically included in the wildlife incidents reports, but rather are expected to be included in the Terrestrial Ecosystem Management Plan and will be provided in accordance with the requirements of term and condition #28.	

P.C.	T&C No.	Term or Condition	Location in TEMP Document
No. 008	34	The Proponent will maintain a Migratory Birds Protection Plan for the Project in consultation with Environment and Climate Change Canada and other interested parties. The plan should include and/or demonstrate that the Proponent give consideration to the following:  Information obtained from baseline characterization of migratory bird and vegetation communities within the predicted flood area;  Results of field tests and/or the thorough literature review of the effectiveness of preferred deterrence prior to actual flooding; and  Details regarding monitoring the effectiveness of mitigation measures during flooding.	Appendix I and TEMP Annual Report
No. 008	35	The Proponent shall ensure that the mitigation and monitoring strategies developed for Species at Risk are updated as necessary to maintain consistency with any applicable status reports, recovery strategies, action plans, and management plans that may become available through the duration of the Project.	TEMP Annual Report
No. 008	36	Prior to removal or deterrence of raptors, the Proponent will contact the Government of Nunavut – Department of Environment to discuss proposed mitigation options and, if required, will obtain the necessary permits.	Section 3.7 and Appendix G

No.	Subject	Commitment	Issue Raised by (Date of Commitment)	Project Phase/Timing	Location in TEMP
Terre	estrial Environment C	Commitments			
1	Caribou Protection Measures	The Proponent shall conduct an evaluation of caribou protection measures employed by the Project. The components of this evaluation shall include the following: (a) Tests of the monitoring methods that are used to detect caribou near the Project in order to quantify: (i) the probability of detecting groups; (ii) the effective range of detection; and (iii) the spatial extent of detection capacity relative to the mitigation distance buffers; (b) The collection of additional data on caribou group sizes to confirm the relevance of group size thresholds used in mitigation; (c) Collection and analyses of collar data to quantify the Zone-of-Influence (ZOI) associated with the Whale Tail Project, its haul road and the existing Meadowbank mine (and all-weather-access-road [AWAR]); (d) Collection and analyses of collar data to quantify the effects of the Whale Tail Project, its haul road and the existing Meadowbank mine (and AWAR) on the movements of caribou, in particular during migratory periods; (e) Collection of accurate records documenting the detection of caribou and the subsequent implementation of mitigation measures; and (f) Analyses of collar data comparing the movements of individuals that were and were not subject to the implementation of mitigation measures.  The scope of this evaluation shall include the following: (a) A study area or areas that encompass the Whale Tail mine site, haul road, Meadowbank mine and all-weather-access-road (including all activities utilizing this infrastructure including on-going exploration), all of which are integral components of the Project; (b) The use of accepted scientific methods and experimental designs to provide quantitative information; (c) The engagement of recognized subject matter experts in each area of the evaluation; (d) Collection of data with sufficient statistical power to detect potential impacts; (e) Guidance on study designs, analyses and interpretation from the Project's Terrestrial Advisory Group (TAG); (f) The collection of data during both the constru	Government of Nunavut (September 21, 2017)	■ Construction and Active Phases ■ To be completed within 5 years of commencement ■ If active mining life span extended, the evaluation should be updated every 5 years	
2	Seasonal Windows	The Proponent shall revise the Terrestrial Ecosystem Management Plan (TEMP) to define the fall caribou migration season as the period from September 22 to December 15 for the purposes of applying caribou protection measures, as detailed in the Project's TEMP. All caribou protection measures that are applied to the period from September 22 to November 7 in the current version of the TEMP (figures 6 to 9 of version 4) shall be applied to this revised period.	Government of Nunavut (September 21, 2017)	September 22 –     December 15 for the     duration of the     Terrestrial     Ecosystem     Management Plan	■ Table 17 ■ Figures 6-9
4	Caribou Group	The Proponent shall collect additional data on caribou group-sizes in proximity to the	Government of	■ Within five years of	■ Ongoing from May

No.	Subject	Commitment	Issue Raised by (Date of Commitment)	Project Phase/Timing	Location in TEMP
	Size Thresholds  – data collection	Project (including the haul road) to assess the relevance of the proposed group size thresholds. These data shall be collected using the same definition of caribou 'group' used to trigger caribou protection measures in the TEMP. The TAG shall be directly involved in this assessment. This shall occur within five years of the Project's start.	Nunavut (September 21, 2017)	the project's start	2018 and Section 3.5.2.2
5	Monitoring for CPM - Frequencies	Within 1 year of Project certification, the Proponent shall revise the TEMP to increase the frequencies of height-of-land, road and ground surveys for caribou compared to the current levels in the TEMP (v.4.0). Thereafter, further revisions may be made annually within the TEMP, taking into account ongoing project monitoring. The revisions shall adhere to advice provided by the TAG, as per the terms of reference.	Government of Nunavut (September 21, 2017)	<ul><li>Within 1 year of project certification</li><li>Annually thereafter</li></ul>	■ In development /ongoing assessment and adaptation of monitoring methods
6	Monitoring for CPM – Height of Land and Road Surveys coverage	Within 1 year of Project certification, the Proponent shall revise the number of proposed height-of-land and road-side survey points to provide sufficient line-of-sight coverage to detect caribou within 4 km of the Project (including haul road and pit) with greatest coverage at known road crossing points (as determined from IQ, collar data and other observations, and reviewed by the TAG). Thereafter, further revisions may be made annually within the TEMP, taking into account ongoing project monitoring. The revisions shall adhere to advice provided by the TAG, as per the terms of reference.	Government of Nunavut (September 21, 2017)	<ul><li>Within 1 year of project certification</li><li>Annually thereafter</li></ul>	■ Section 3.5.2.6 – HOL and ideal observation locations to be further refined
7	Monitoring for CPM – Caribou GST	Within 1 year of Project certification, the Proponent shall revise caribou group-size thresholds for adaptive management, taking into account the frequency of monitoring effort, spatial coverage of monitoring and likelihood of detecting groups of caribou, in order to ensure a majority (75%) of caribou are subject to enhanced mitigation (i.e. levels 1 through 3 of mitigation and monitoring as illustrated in figures 6 through 9 of the Terrestrial Ecosystem Monitoring Plan (TEMP), v4.0). Thereafter, further revisions may be made annually within the TEMP, taking into account ongoing project monitoring. The revisions shall adhere to advice provided by the TAG, as per the terms of reference.	Government of Nunavut (September 21, 2017)	<ul><li>Within 1 year of project certification</li><li>Annually thereafter</li></ul>	■ Section 3.5.2.2 ■ Table 16
8	Monitoring for CPM – alternatives research	The Proponent shall actively engage in research to develop alternative monitoring methods that may revise monitoring range, spatial coverage, frequency and detection probabilities.	Government of Nunavut (September 21, 2017)	■ All phases	<ul> <li>Ongoing – to be included in General monitoring section</li> </ul>
9	Caribou Monitor  – Level 2	The Project's TEMP shall be revised to clarify that the definition of "non-essential vehicles and heavy equipment", as referenced in caribou mitigation procedures, includes vehicles and equipment used to continue mining operations or hauling of ore. "Essential vehicles" includes vehicles operated for the purpose of maintaining the safety of personnel, Emergency Response Team (ERT), security and wildlife monitoring.	Government of Nunavut (September 21, 2017)	■ All phases	<ul><li>Section 3.5.2</li><li>Figure 6, 7 8 Footnote</li></ul>
10	Caribou Monitor  – Level 2	Within 1 year of Project certification, the Project's TEMP shall be revised to reduce reliance on the use of discretionary mitigation measures at level 2 of caribou adaptive management and shall include the addition of specific automatic measures intended to prepare for an operational shutdown if caribou move closer to mine operations or roads. Thereafter, further revisions may be made annually within the	Government of Nunavut (September 21, 2017)	<ul><li>Within 1 year of project certification</li><li>Annually thereafter</li></ul>	■ Figures 6, 7, 8 updated based on operational implementation

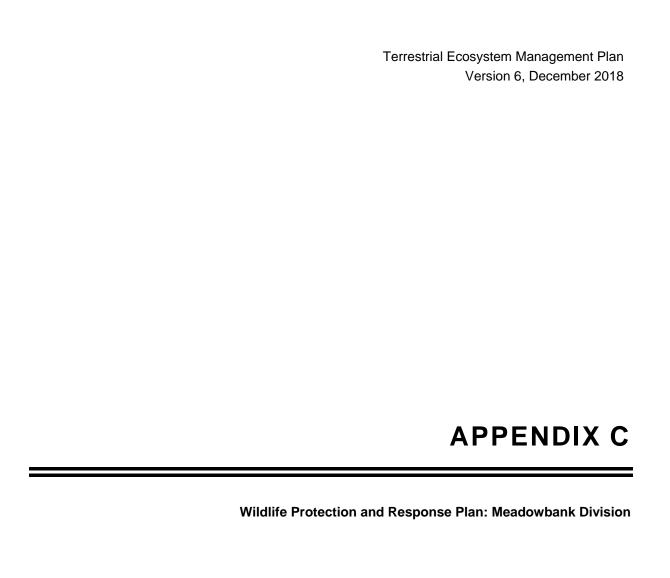
No.	Subject	Commitment	Issue Raised by (Date of Commitment)	Project Phase/Timing	Location in TEMP
		TEMP, taking into account ongoing project monitoring. The revisions shall be consistent with advice provided by the TAG, as per the terms of reference.			
11	Caribou Monitor  – suspension of vehicles, Heavy Equip.	With respect to monitoring and mitigation of caribou in proximity to mine operations, the Project's TEMP shall be revised such that the provision for suspension of non-essential vehicles and heavy equipment operation (Level 3 in Figure 6, TEMP, v.4.0), when seasonal caribou group size thresholds are exceeded within a 500 m radius of the vehicle, is applied year-round and increased to 1 km during the calving and post-calving periods. This distance buffer may be revised periodically throughout the life of the Project whenever relevant information becomes available. The revisions shall be consistent with advice provided by the TAG, as per the terms of reference.	Government of Nunavut (September 21, 2017)	<ul><li>All phases</li><li>Year-round</li></ul>	■ Figure 6
12	Caribou Monitor  – non essential vehicle	The Project's TEMP shall be revised to clarify that the definition of "non-essential vehicles and heavy equipment", as referenced in caribou mitigation procedures, includes vehicles and equipment used to continue mining operations or hauling of ore. "Essential vehicles" includes vehicles operated for the purpose of maintaining the safety of personnel, Emergency Response Team (ERT), security and wildlife monitoring.	Government of Nunavut (September 21, 2017)	■ All phases	<ul><li>Section 3.5.2</li><li>Figure 6, 7 8 Footnote</li></ul>
13	Caribou Monitor  – Level 2	Within 1 year of Project certification (and again thereafter whenever relevant information becomes available), the Project's TEMP shall be revised to reduce reliance on the use of discretionary mitigation measures at level 2 of caribou adaptive management and shall include the addition of specific automatic measures intended to prepare for an operational shutdown if caribou move closer to mine operations or roads. Thereafter, further revisions may be made annually within the TEMP, taking into account ongoing project monitoring. The revisions shall be consistent with advice provided by the TAG, as per the terms of reference.	Government of Nunavut (September 21, 2017)	<ul><li>Within 1 year of project certification</li><li>Annually thereafter</li></ul>	Refine decision trees based on implementation
14	Caribou Monitor – Level 3	Within 1 year of Project certification, the Project's TEMP shall be revised to further specify the provision for limitation of non- essential vehicles on the Whale tail haul and Meadowbank all- weather access roads when caribou are in proximity to these roads (i.e. level 3 responses, Figs. 7 & 8, TEMP v4.0) outside sensitive seasons. Thereafter, further revisions may be made annually within the TEMP, taking into account ongoing project monitoring. The revisions shall be consistent with advice provided by the TAG, as per the terms of reference.	Government of Nunavut (September 21, 2017)	<ul><li>Within 1 year of project certification</li><li>Annually thereafter</li></ul>	■ Figure 7 ■ Figure 8

No.	Subject	Commitment	Issue Raised by (Date of Commitment)	Project Phase/Timing	Location in TEMP
15	4km and 5km Buffer	The TEMP shall be revised such that blasting activities at the Whale Tail site are suspended when caribou above the specified seasonal group size threshold are present within 4 km of the blast site. This provision shall apply year-round except during calving season when the buffer shall be increased to 5 km when cows with calves are present. These buffer thresholds are preliminary pending the results of further studies. These no-blasting buffers may be reviewed periodically throughout the life of the Project whenever relevant information becomes available taking into account ongoing project monitoring. Any revisions shall adhere to advice provided by the TAG, as per the terms of reference.	Government of Nunavut (September 21, 2017)	■ All Phases	■ Section 3.5.2.4
16	Blasting - Study	A noise, vibration and visual cues study shall be conducted that: (1) will validate blasting noise and vibration predictions in the Project's EIS; (2) will document the scale and range of visual cues generated by blasting activities (i.e. the distance and duration over which dust plumes can be observed by the naked eye); and (3) may be used to revise the Project's no-blasting buffers for caribou. Notwithstanding the no blasting buffers, Agnico Eagle may conduct studies on caribou within the buffer distance for the purposes of determining whether the buffer distance can be modified. The design and conduct of the study shall be consistent with advice provided by the TAG, as per the terms of reference.	Government of Nunavut (September 21, 2017)	■ No timeline provided	■ Section 3.5.2.4
17	Blasting – Surveys	Prior to each blast, surveys shall be conducted to detect caribou and other wildlife within the no-blasting buffers specified in the Terrestrial Ecosystem Monitoring Plan (TEMP).	Government of Nunavut (September 21, 2017)	■ All Phases	■ Section 3.5.2.4
18	Helicopter – Distance buffers for caribou	The Proponent shall apply mandatory, minimum distance buffers of 300m vertically and 1000m horizontally for the operation of all helicopters and fixed winged aircraft in proximity to caribou, subject to exception for safety considerations or the fulfillment of regulatory compliance activities only.	Government of Nunavut (September 21, 2017)	■ All Phases	■ Table 7, + general monitoring section
19	Helicopter – Distance buffers for landing and take-offs	The Proponent shall apply the mandatory, minimum distance buffers to landings and take-offs of helicopters, such that engine starts and takeoffs are suspended when caribou are observed within the buffer distance.	Government of Nunavut (September 21, 2017)	■ All Phases	■ To be addressed to in General monitoring section
20	Helicopter –Monitor traffic	The Proponent shall revise the Project's TEMP to include a program to monitor and report helicopter traffic associated with the Whale Tail project (including existing Meadowbank infrastructure) and all associated exploration activities so that the spatial scale and intensity of this activity can be documented. This should include the collection and analysis of GPS track logs for all helicopter flights contracted by the Proponent.	Government of Nunavut (September 21, 2017)	■ All Phases	■ To be addressed to in General monitoring section
21	Traffic Monitoring – Program through TAG	Prior to Project commencement, the Proponent shall develop a traffic-monitoring program. This program shall be designed to collect data on vehicle type, time, date, location (i.e. specific road segment utilized), point of origin and destination for all vehicles (Proponent-owned or contracted) using the Project's roads including the Whale Tail haul road and Meadowbank all-weather-access road. The design of this	Government of Nunavut (September 21, 2017)	Prior to Project Commencement	■ To be developed – will be included in General monitoring section

No.	Subject	Commitment	Issue Raised by (Date of Commitment)	Project Phase/Timing	Location in TEMP
		program shall be consistent with advice provided by the TAG, as per the terms of reference.			
22	Traffic Monitoring – Traffic Data Accuracy	The Proponent shall verify annually traffic data to ensure its accuracy and shall summarize traffic data for each road segment including the Whale Tail haul road and Meadowbank all-weather- access road. In addition to daily rates, any seasonal or monthly variation in traffic shall be reported. The observed rates and composition of traffic shall be compared to predictions in the EIS.	Government of Nunavut (September 21, 2017)	■ Annually	■ Traffic/road monitoring plan to be included in general monitoring section or as Appendix
23	Traffic Monitoring Exceed traffic predictions	Where traffic rates or composition exceed predictions in the EIS, based on a 3-year average, the Proponent shall produce a revised assessment to examine the potential impacts of this excess traffic on wildlife. This revised assessment shall be submitted to NIRB for consideration.	Government of Nunavut (September 21, 2017)	■ All phases	■ Traffic/road monitoring plan to be included in general monitoring section or as Appendix
24	Traffic Monitoring – Recording use	The Proponent shall expand monitoring efforts for recording public use of roads to include the collection of data by staff conducting wildlife road surveys.	Government of Nunavut (September 21, 2017)	■ All phases	■ Traffic/road monitoring plan to be included in general monitoring section or as Appendix
25	Project tolerant animals - definition	Within 1 year of Project certification, the Project's TEMP shall be revised to further define 'Project tolerant' animals as applied to wildlife mitigation and monitoring activities. Thereafter, further revisions may be made annually within the TEMP, taking into account ongoing project monitoring. The revisions shall be consistent with advice provided by the TAG, as per the terms of reference	Government of Nunavut (September 21, 2017)	<ul><li>Within 1 year of Project certification</li><li>Annually thereafter</li></ul>	■ Section 3.5.2.1
26	Project tolerant animals – consulting	Where mitigation measures are to be relaxed for project tolerant animals, the Proponent shall consult with the TAG prior to reducing/removing mitigation.	Government of Nunavut (September 21, 2017)	■ All phases	■ Section 3.5.2.1
27	Project tolerant animals - reporting	The Proponent shall document all cases where mitigation measures are relaxed for project tolerant animals and shall report these cases in the annual project monitoring report.	Government of Nunavut (September 21, 2017)	■ All phases	■ Figures 6 and 7 (definition included 3.5.2)
28	Muskox - Group size thresholds	Within 1 year of Project certification, the Project's TEMP shall be revised to specify and justify the group-size threshold for triggering adaptive management for muskox. Justification of the group-size threshold should be based on available muskox group size data. Thereafter, further revisions may be made annually within the TEMP, taking into account ongoing project monitoring. The revisions shall be consistent with advice provided by the TAG, as per the terms of reference.	Government of Nunavut (September 21, 2017)	<ul><li>Within 1 year of Project certification</li><li>Annually thereafter</li></ul>	■ To be developed
29	Muskox - Blasting Suspension	The Project's TEMP shall be revised to include a provision for mandatory suspension of blasting when groups of muskox above the specified group size threshold are observed within 1km of blasting activities. The suspension of blasting shall be maintained until the animals have moved away. The no-blasting buffer may be reviewed periodically throughout the life of the Project whenever relevant information becomes available. The revisions shall be completed annually within the	Government of Nunavut (September 21, 2017)	■ Annually	■ Section 3.5.2.4

No.	Subject	Commitment	Issue Raised by (Date of Commitment)	Project Phase/Timing	Location in TEMP
		TEMP, taking into account ongoing project monitoring, and will be consistent with advice provided by the TAG, as per the term of reference.			
30	Muskox - Roads, vehicle speeds	The Project's TEMP shall be revised to include a requirement for vehicles to slow to 30 km/hr when passing within 500m of a group of muskox above a specified group size threshold. This mitigation measure may be reviewed periodically throughout the life of the Project taking into account ongoing project monitoring. The revisions shall be consistent with advice provided by the TAG, as per the terms of reference.	Government of Nunavut (September 21, 2017)	■ All phases	Section 3.5
31	Muskox- Aircraft Buffers	The Project's TEMP shall be revised to include a mandatory requirement for aircraft to maintain a distance of at least 300 m vertically and 1000 m horizontally from groups of muskox; subject to exception for flight safety purposes. This mitigation measure may be reviewed periodically throughout the life of the Project taking into account ongoing project monitoring. The revisions shall be consistent with advice provided by the TAG, as per the terms of reference.	Government of Nunavut (September 21, 2017)	■ All phases	■ Table 7
32	Raptor Nests – Buffers	The proponent shall establish automatic minimum no-disturbance buffers around all raptor nests located in proximity to the Project. Project activities, including the operation of vehicles, heavy equipment, aircraft and blasting, shall be prohibited within these buffers unless an exception is specified within a nest-specific management plan that has been reviewed and approved by the GN, subject matter experts and other relevant parties. The size of minimum, no-disturbance buffers shall be based on the BC Guidelines for Raptor Conservation or similar guidelines as recommended by the Project's TAG.	Government of Nunavut (September 21, 2017)	■ All phases	■ Section 3.7.2.1
33	Uncertainty in caribou responses to Whale Tail haul road	Within 1 year of Project certification, Proponent shall:  a. Complete movement analyses for collared caribou to measure behavioral responses to the All Weather Access Road including the annual rate of deflections to north of Meadowbank. The analyses should use all available information including harvesting patterns along the All Weather Access Road and annual variation in weather;  b. Integrate caribou collar movements with Height of Land and All Weather Access Road survey monitoring data to describe the current representation of the collared caribou relative to the herds; and  c. Revise thresholds using the results of the analyses of caribou speed, turning rates and direction of travel from the movement analyses for mitigation along the Whale Tail haul road in the TEMP.	Kivalliq Inuit Association (Sept. 21, 2017)	Within 1 year of project certification	■ Section 3.5.2
34	Terrestrial Ecosystem Management Plan	Within 1 year of Project certification, the Proponent shall revise the TEMP to include details on:  a. Thresholds for when to implement convoying and duration of the gaps in traffic for all three project segments (mine operations, haul road and All Weather Access Road);  b. How convoying will be tested for effectiveness (e.g., cameras, track surveys); and	Kivalliq Inuit Association Sept. 21, 2017	■ Within 1 year of project certification	<ul> <li>Convoying included as part of decision trees (Figures, and Table 7)</li> <li>Update section 3.5.2-3.5.3 linking field observations to</li> </ul>

No	. Subject	Commitment	Issue Raised by (Date of Commitment)	Project Phase/Timing	Location in TEMP
		c. Information on the effectiveness of convoying as mitigation shall be presented in annual reporting with the TAG.			convoy effectiveness
37	Uncertainty in effects of Whale Tail pit and haul road activities on caribou disturbance	Within 1 year of Project certification, the Proponent shall complete a review of statistical design, statistical power and sample size for caribou collaring applicable for environmental assessment and adaptive monitoring.	Kivalliq Inuit Association Sept. 21, 2017	■ Within 1 year of project certification	■ ongoing



## 1. SECTION 1 - INTRODUCTION

As part of this Terrestrial Ecosystem Management Plan (TEMP; 2017), mitigation measures and monitoring initiatives have been proposed to lessen the likelihood that wildlife will become habituated to the Meadowbank Mine, which includes Vault Pit, the All-Weather Access Road, Whale Tail Pit, and the Whale Tail Haul Road, and all associated infrastructure. The TEMP identified measures to deter wildlife from obtaining food rewards, finding shelter around the Project site, gaining access to harmful substances present on the site, being injured as a result of vehicle collisions, and damaging mine property.

Despite these mitigation measures, personnel may occasionally come into contact with wildlife that inhabits the Project area. To manage these incidents, a specific Wildlife Protection and Response Plan has been developed. Incidents must be managed to keep both humans and wildlife safe, using only humane control methods.

Furthermore, all staff must be familiar with the standard operating procedures and best practices aimed at ensuring human-wildlife conflicts are minimized during the life of the Project. All personnel, including contractors, on site have a role to play in ensuring human safety, conservation of wildlife and documenting wildlife activities in the Project area.

The following Wildlife Protection and Response Plan provides information on general humanwildlife conflicts policies and regulations, species-specific response plans for Ungulates and Predatory Mammals, and wildlife awareness.

## 2. SECTION 2 – HUMAN-WILDLIFE CONFLICTS

#### 2.1 OVERVIEW

Wildlife encounters can take many forms. A conflict occurs when either human or wildlife health, and/or safety are put at risk. Human health and safety can be affected by contact or conflict with wildlife in several ways, including direct or indirect physical injury, and exposure to animal diseases that can infect humans (i.e., known as zoonotic diseases).

The most common conflict faced by wildlife is the increased risk of mortality from human encounters, which most often occurs when wildlife become habituated to human activity and lose their natural fear of people. The most serious form of habituation is directly correlated to the animal obtaining food, which is known as food conditioning. Food-conditioned animals become dependent on humans as sources of food. Because these human-induced habits become engrained in the animal, attempts to deter the habituated behavior generally fail with the end result usually the death of the animal. Loss of habitat effectiveness (how the animal uses its available habitat), and effects to wildlife movement (how the animal travels through its available habitat) can also result from wildlife in conflict with human development. Ultimately, this will affect both the health and safety of the wildlife species involved. While it is impossible to remove all risk to human and wildlife health and safety, approaches to minimize the risk do exist. Reactive measures do have their place in stopping the conflicts when they occur, but proactive strategies are the most effective means of preventing potential conflicts.

## 2.2 MINE POLICIES AND REGULATIONS

The following summarizes the general rules regarding wildlife on the site and will form the basis of the Wildlife Awareness Orientation and Courses (see below).

Employees and contractors are advised to report all incidents of unauthorized activities on or in the vicinity of the mine site to the Environment Department.

#### 2.2.1 General Restrictions for Wildlife Protection

The following are general restrictions for Project workers and contractors, intended to minimize the potential for negative Project-related effects (e.g., increased mortality risk) on wildlife in and around the site.

- Wildlife shall have the right-of-way except where it is judged to be unsafe to do so. All species of wildlife (i.e., from small mammals to large carnivores, songbirds to raptors) when encountered by personnel on foot or in vehicles will be given the right-of way.
- Non-mine-registered firearms are not permitted on site (i.e., carrying of firearms in private vehicles to and from the project site on workdays).
- Feeding wildlife is prohibited at all times on or in the vicinity of the Project, including during travel to and from the site.

- Harassment (defined as to kill, injure, seize, capture or trap, pursue and includes to stalk, track, search for, lie in wait for, or shoot at - for any of those purposes not authorized by the Environment Department) of wildlife is prohibited at all times on or in the vicinity of the Project, including during travel to and from the site.
- The deliberate destruction or disruption of wildlife nests, eggs, dens, burrows, and the like, is prohibited at all times on or in the vicinity of the Project, including during travel to and from the site.
- Hunting and fishing is prohibited at all times on or in the vicinity of the Project, including during travel to and from the site on workdays.
- Pets are prohibited at all times on or in the vicinity of the Project, including during travel to and from the site on workdays.
- Maximum speed limit on all access roads is 50 km/h (30 mph).
- Traffic (including ATVs and snowmobiles) is restricted to designated access roads and trails.

The mine site refers to any mine facility present during the operations phase of the Project, including but not limited to, outbuildings (e.g., machine shop, offices), pits, parking areas, tailings storage facilities, and waste piles.

#### 2.2.2 Wildlife Attractants

A list of potential wildlife attractants is provided below. The list is intended as a general summary of attractants but may not be comprehensive of all potential attractants.

- Food wastes and garbage.
- Chemicals (e.g., road salt) and their refuse (e.g., empty fuel containers).
- Wildlife carcasses (e.g., road kills, hunter kills).
- Movement and human activity (e.g., movement of people and equipment outdoors).
- Roads, which may create preferential travel corridors for wildlife, can lead to vehicle collisions and increased exposure to wildlife encounters at the Project site.

General recommendations directed at minimizing wildlife concerns related to food wastes and garbage is presented under **Section 2.2.3** (Garbage Management).

Protocols for dealing with chemical storage, disposal, and spills are presented in Meadowbank's Hazardous Materials Management Plan and Spill Contingency Plan. These protocols will minimize the potential for adverse wildlife effects, and are referenced under **Section 2.2.3** (Garbage Management) and **Section 2.2.4** (Wildlife Health).

Requirements related to the reporting and removal of wildlife carcasses are presented under **Section 2.2.7** (Reporting Wildlife Observations and Incidents).

## 2.2.3 Garbage Management

General recommendations directed at minimizing wildlife concerns related to food wastes and garbage are provided below.

- Littering is prohibited on and in the vicinity of the Project site, which includes all access roads. All garbage (e.g., lunch bags) must be returned to temporary storage containers. Note: organic wastes (e.g., orange peels, apple cores) are included.
- Food-related waste (including packaging) will be incinerated on a daily basis and general waste will be sent to the landfill and then buried.
- Wastes associated with mechanical maintenance and repairs (e.g., motor oil and antifreeze) will be disposed of as per the Hazardous Materials Management Plan.
- All temporary (small) storage containers for food waste garbage (yellow bin) will be wildlife protective (i.e., have bear proof lids).
- No open top buckets or anything similar will be tolerated outside buildings.
- Feeding wildlife is prohibited at all times on or in the vicinity of the Project, including during travel to and from the site on workdays.
- Wildlife incidents related to garbage or human food attractants will be reported as soon as possible. See Section 2.2.7 (Reporting Wildlife Observations and Incidents) for more information.
- Improperly disposed of garbage, particularly food wastes will be reported as soon as possible.

See **Section 2.2.7** (Reporting Wildlife Observations and Incidents) for more information.

While Arctic Fox tend to be the greatest concern with respect to access to garbage, other animals (e.g., Wolverines, Wolves and Grizzly Bears) may be attracted to uncontained garbage sources. Problem wildlife data at the Meadowbank Mine to date indicate that Arctic Fox and Wolves are the most likely species to be attracted to the site.

#### 2.2.4 Wildlife Health

The following recommendations are intended to reduce potential Project-related effects on wildlife health (including non-vehicle related accidents and consumption of toxic substances).

- Feeding wildlife is prohibited at all times on or in the vicinity of the Project, including during travel to and from the site. If caught feeding wildlife, an employee can be suspended and/or dismissed.
- Company procedures on the safe and prompt clean-up of any chemical spills will be followed. See Spill Contingency Plan for a more detailed protocol.
- Any observations of wildlife in and around potential sources of contaminants (e.g., fuelling sites) will be reported. See **Section 2.2.7** (Reporting Wildlife Observations and Incidents) for details.

## 2.2.5 Wildlife and Vehicles

The following recommendations are intended to reduce the incidence of wildlife-vehicle collisions and near misses.

- Wildlife has the right-of-way except where it is judged to be unsafe to do so.
- Obey all traffics signs.
- Maximum speed limit on all access roads is 50 km/h (30 mph).
- Verbally report wildlife carcasses observed on and in the vicinity of the Project, including along all access roads, as soon as possible. See **Section 2.2.7** (Reporting Wildlife Observations and Incidents) for more information.
- Restrict traffic (including ATVs and snowmobiles) to designated access roads and trails.
- Push and spread out the snow with a dozer when clearing the road to avoid build-up snow banks on the side of the road.
- Report all wildlife-vehicle collisions that results in the death or injury of wildlife as soon as possible. See Section 2.2.7 (Reporting Wildlife Observations and Incidents) for details.
- A near miss between a vehicle and an animal should be reported as a wildlife 'incident'. See **Section 2.2.7** (Reporting Wildlife Observations and Incidents) for details.

## 2.2.6 Wildlife and Buildings

The following recommendations are intended to reduce the risk of close encountering situations between wildlife and people.

- Skirting will be added around the building to avoid having wildlife under the buildings.
- Under building access ways must be closed at all time.
- Keep c-can doors close at all time to avoid wildlife using them as shelter.
- Open top bins and containers for food waste will not be permitted outside buildings. If needs be, a bear-resistant container shall be used.

## 2.2.7 Reporting Wildlife Observations and Incidents

## 2.2.7.1 Reporting Requirements of Project Workers and Contractors

Project workers and contractors are required to verbally notify the Environment Department of the following wildlife observations or incidents as soon as possible.

- Signs of animal presence (e.g., tracks, scat, nests, burrows) in close proximity (visible to the eye from within the mine site footprint) to site facilities, vehicles, equipment, or areas frequented by workers.
- Sightings of animals in close proximity (visible to the eye from within the mine site

footprint) to site facilities, vehicles, equipment, or areas frequented by workers.

- Aggressive or unusual wildlife behavior in and around Project facilities.
- Instances of workers feeding wildlife.
- Instances of improper disposal of garbage or other waste materials.
- Observed maintenance issues (e.g., improper placement or maintenance of garbage containers).
- Instances of workers not following vehicle use guidelines (e.g., speed limits).
- Vehicle collisions with wildlife or near misses.
- Observations and locations of dead (e.g., road kill) or injured animals.

Following the verbal report of a wildlife incident or observation, completion of a Wildlife Incident Report Form may be requested at the discretion of the Environmental Coordinator or designate (s).

#### 2.2.7.2 Reporting Requirements of Wildlife Occurrences

Wildlife Incident Reports (found in Appendix B to the TEMP) provide essential information that may identify: 1) potentially dangerous situations requiring intervention (e.g., problem wildlife); 2) situations that require notification of the Department of Environment; 3) weaknesses in garbage-handling and problem wildlife prevention measures; and 4) areas that may require warning signs (e.g., poor visibility road corners). The Environmental Coordinator or designate(s) should ensure that records of wildlife observations and incidents are thoroughly documented. Reports should attempt to include the following information wherever possible.

- Identification and number of wildlife observed.
- Specific timing and location of the observation(s).
- Details regarding the animal behavior, including direction of approach and departure, what it was doing, any aggressive behavior, etc.
- Assessment of local attractants, such as garbage, odors, movement of people, other wildlife, etc.
- If local attractants are identified as a factor, determination of what steps were or will be taken to address/remove potential attractants.
- Identification of any potential mitigation measures available to deter wildlife or limit access and how they will be implemented (refer to **Section 2.2.7** for additional information on dealing with problem wildlife).
- If an animal is destroyed, a description of the lethal measures deployed (e.g., rifle), statement of the rationale for use of lethal measures (e.g., proximity to workers, repeated incidents, observed condition of the animal, etc.), and indication of what previous non-lethal measures were employed (e.g., deterrents, hazing, trapping, and relocating [with permission from GN] etc.).

## 2.2.8 Protocols for Dealing with Problem Wildlife

A problem wildlife situation may arise where animal acts in an aggressive manner and/or is a repetitive nuisance or threat to worker safety. The following protocols should be used to deal with problem wildlife.

- Immediately notify the Environmental Coordinator or designate(s) of any problem wildlife issue. Reporting wildlife incidents as they occur will ensure that proactive rather than reactive measures can be taken to prevent a serious outcome (e.g., human injury, destruction of the problem animal). See Section 2.2.7 (Reporting Wildlife Observations and Incidents) for details.
- If deemed necessary by the Environmental Coordinator, notify the Conservation Officer
  in the Hamlet of Baker Lake or other designated Government of Nunavut representative,
  inform them of the problem wildlife encountered on site, discuss appropriate aversive
  and mitigation actions, and determine timing when lethal methods should be
  implemented, if necessary.
- The Environmental Coordinator or designate(s) will initiate the appropriate actions in response to a problem wildlife issue, Recommended actions include:
  - Assess potential local attractants and address or remove all those identified, where practical;
  - Utilize non-lethal deterrents (e.g., aversive conditioning, hazing, trapping and relocating), projectiles (e.g., rubber bullets) or consider trapping and relocation of animals (e.g., Arctic Fox), where it is considered appropriate and safe to do so (refer to **Sections 3 and 4** for species-specific deterrents); and
  - Use lethal measures. Lethal measures should only be considered as a last resort in the event of aggressive animal behavior and/or repeated nuisance animals that pose a threat to worker safety and/or site facilities.
- Only authorized personnel (Environment Department) are permitted to use lethal and non-lethal projectiles (e.g., rubber bullets) or deploy traps for problem wildlife interventions.
- Do not attempt to deal with a problem wildlife issue on your own. Problem wildlife can be dangerous.
- Conform to recommendations regarding predator safety. All staff should have received a predatory mammal (i.e., Grizzly Bear, Wolverine, Wolf, and Arctic Fox) awareness training orientation. See **Section 5**.

## 3. SECTION 3 – SPECIES-SPECIFIC RESPONSE PLANS

#### 3.1 PURPOSE

Response plans specific to species groups (i.e., ungulates and predatory mammals) are required to ensure that all personnel working for the Project are provided guidance on how to respond in a manner that is safe to both humans and wildlife should they encounter wildlife on or around the Project site.

#### 3.2 SPECIES GROUPS ADDRESSED

Ungulates (Caribou and Muskoxen) and predatory mammals (Grizzly Bear, Wolverine, Wolf, and Arctic Fox) have the highest potential for interactions with humans during the life of the Project, and thus require specific response plans. If other wildlife are encountered, adaptive management strategies will be implemented if mitigation techniques and the policies and regulations mentioned in this document are not effective for these species. The proposed wildlife monitoring program will be the preferred measure of identifying potential areas in need of new mitigation strategies, or changes in policies or regulations.

For each of the species groups described below, the seasonal activity in the Project area is discussed, as well as the protocol in the event of an encounter.

## 3.2.1 Ungulates (Caribou and Muskoxen)

## 3.2.1.1 Seasonal Activity in the Project Area

Results from baseline surveys indicate that Caribou and Muskoxen are present in the Project area in all four seasons, but are observed in greatest abundance in the fall (e.g., October) when thousands of animals may be present in the vicinity of the Project, and in lowest abundance in the summer (see the baseline reports for Meadowbank [Cumberland Resources 2005a] and Whale Tail [Dougan and Nunavut Environmental 2015], and annual Wildlife Monitoring Reports for more details). Calving or post-calving aggregations or movements of Caribou have not been observed within the Project study areas since baseline studies were initiated in 1999.

#### 3.2.1.2 Response to Encounters

Humans rarely have physical altercations with Caribou. Caribou do rut in the fall when they are at relatively high numbers on the Project site and the levels of aggression displayed, particularly by males, increases substantially. There is some anecdotal information suggesting that a bull Caribou may attack a person or vehicle during the rut; therefore, a close encounter with Caribou (during the fall) could be dangerous. Although considered rare, Muskoxen will charge humans if they are threatened (especially lone bulls). Being a sedentary species, Muskoxen will have the tendency to stand their ground when threatened, defending their territory or their young.

If you encounter a single or herds of Caribou or Muskoxen, the following actions should be taken.

- Back away slowly.
- Ensure animal(s) have an escape route.
- Do not make sudden movements.
- Do not make loud noises or attempt to scare the animal(s).
- Use radio/satellite phone to report presence of the animal(s) to the Environment Department.
- Stay in radio/phone contact until the animal(s) moves away or you have returned to a safe area (e.g., inside vehicle or building).
- Wait for the animal(s) to pass before continuing work in the area.

## 3.2.2 Predatory Mammals

#### 3.2.2.1 Seasonal Activity in the Project Area

## Grizzly Bear

Baseline surveys indicated limited use of the Project area by Grizzly Bears, which is consistent with what would be expected for Grizzly Bears in the north, given their wide-ranging habits and low densities. In the fall, when Caribou (a prey item) are more abundant, the Project area may have higher value for Grizzly Bears (see annual Wildlife Monitoring Reports, and Meadowbank and Whale Tail baseline reports for more details). Furthermore, increasing hunting and food caches along the Meadowbank access road in all seasons may also attract Grizzly Bears to the area.

## Wolverine

Wolverines occur in the Project area on a year-round basis. Records of Wolverine sightings or their sign were infrequent in the Project area during baseline and monitoring studies beginning in 1999. Similar to Grizzly Bears, the limited evidence for Wolverine in the area is not surprising given their wide-ranging movements and characteristically low population densities (see annual Wildlife Monitoring Reports, and Meadowbank and Whale Tail baseline reports for more details). Only two occurrences (i.e., in 2011 and 2014) of a habituated Wolverine has reported at the Project site since baseline studies began in 1999.

#### Wolf

Although they do occur year-round in the Project area, Wolves were observed infrequently during all survey sessions, but were most common in the fall, perhaps in response to the increased Caribou abundance at that time of the year (see annual Wildlife Monitoring Reports, and Meadowbank and Whale Tail baseline reports for more details). Wolves have been one of the most frequent problem wildlife species encountered since the Meadowbank Mine became operational in 2009. Most problem Wolves were single and emaciated.

## **Arctic Fox**

Camp personnel have regularly observed Arctic Foxes close to camp and in and around camp buildings during most months of operation, including winter (see annual Wildlife Monitoring

Reports, and Meadowbank and Whale Tail baseline reports for more details). Arctic Foxes are the most common predatory mammal species to be encountered at the Project site.

## 3.2.2.2 Responses to Different Levels of Encounters

Predatory mammals (such as Wolves, Wolverine, Arctic Fox, and Grizzly Bears) rarely attack people; however, they are extremely strong and vicious, and should be given respect. Members of the dog family (such as wolves and foxes) are more at risk of carrying rabies, and other zoonotic diseases, and therefore should be avoided. Arctic Fox in particular is easily tamed, quickly losing their fear of humans, and often approaching very close. Sick or injured animals may no longer be able to feed themselves and could be in a state of starvation. Often they show few physical signs that something may be wrong, but typically act more aggressively or even 'friendly' towards humans; therefore, a close encounter with a predatory mammal could be dangerous. All bites and scratches from wildlife should be reported immediately to Health & Safety department since animals can be vectors for rabies.

If you encounter a predatory mammal, your response will depend on the situation at hand. There are different levels of sightings and predatory wildlife alerts that will affect the immediate decisions you make in the field (i.e. General Sighting, or a Green, Yellow, and Red Wildlife Alert). This system allows for workers to quickly determine if predatory wildlife on or near the Project footprint/personnel needs to be left alone to pass through the size, or moved away from hazards or if the animal presents a risk to humans.

## General Wildlife Sighting

**Definition:** When a bear or other predatory mammal is sighted >1000 m away from human activity and/or Project footprint.

## Action:

- Immediately inform the Environment Department of situation using a radio/phone. A
  general notice will be broadcasted by the Environment Coordinator via radio to all other
  departments;
- Workers on the ground or helicopters in the vicinity will monitor the wildlife's trajectory non-invasively;
- Follow up notifications will be issued if the sighting changes to an Alert status, which will be dependent on the worker's location and exposure; and
- Stay in radio/phone contact until the animal(s) moves away or you have returned to a safe area (e.g., inside vehicle or building).

#### Green Wildlife Alert

**Definition:** When a bear or other predatory mammal is sighted <1000 m away from human activity and/or Project footprint.

#### Action:

Immediately inform the Environment Department of situation using a radio/phone. A
Green Wildlife Alert will be broadcasted by the Environment Coordinator via radio to all
other departments;

- Workers on the ground or helicopters in the vicinity will monitor the wildlife's trajectory non-invasively and report the animals location regularly so that a trajectory of movement can be estimated;
- Follow up notifications will be issued if the sighting changes to a higher Alert status, which will be dependent on the worker's location and exposure;
- Workers in the affected area should be ready in case the situation escalates to a Yellow Alert Status by having a safe area (e.g., inside a building or vehicle) in the immediate vicinity that they can access quickly; and
- Stay in radio/phone contact until the animal(s) moves away or you have returned to a safe area (e.g., inside vehicle or building).

#### Yellow Wildlife Alert

**Definition:** When a bear or other predatory mammal is sighted <500 m away from human activity or Project footprint where an encounter, near miss, incident, or injury to a person or animal may be possible. If the wildlife's trajectory is aimed at human activity and/or Project footprint, or if the wildlife demonstrates abnormal behavior (such as interest or fixation), the following actions must be taken.

#### Action:

- Avoidance and distancing measures between workers and the animal should take place
  first by moving all workers away from the predicted trajectory of the animal, which may
  lead to a temporary closure of activities in that area. Preparation of personal deterrents
  should take place. Actively move personnel away from the work area, cease activities in
  the area and the predicted trajectory of the animal and go to a safe place (e.g., inside a
  building or vehicle);
- Immediately inform the Environment Department of the situation using a radio/phone. A
  Yellow Wildlife Alert will be broadcasted by the Environment Coordinator via radio to all
  other departments;
- Should avoidance and distancing measures not be possible for wildlife deterrence, possible mobilization of helicopters and the Environment Department Response Team may occur; and
- Stay in radio/phone contact until the animal(s) moves away or you have returned to a safe area (e.g., inside vehicle or building).

#### Red Wildlife Alert

**Definition:** When a bear or other predatory mammal is sighted <250 m away from human activity and/or Project footprint where an encounter, near miss, incident, or injury to a person or animal may be imminent if the animal does not change their trajectory. Wildlife deterrence must be placed into action immediately by trained wildlife responders and the following actions must be taken.

#### Action:

 Sound air horn with two long blasts. This will help deter the bear/predatory animal and inform all other workers of dangerous wildlife in close proximity;

- Avoidance and distancing measures between workers and the animal should take place
  first by moving all workers away from the predicted trajectory of the animal, which will
  lead to a temporary closure of activities in that area. Preparation of personal deterrents
  should take place. Actively move personnel away from the work area and cease
  activities in the immediate area of the animal and the predicted trajectory of the animal
  and go to a safe place (e.g., inside a building or vehicle);
- Immediately inform the Environment Department of the situation using a radio/phone. A
  Red Wildlife Alert will be broadcasted by the Environment Coordinator via radio to all
  other departments;
- If the predatory mammal does not back away, or shows interest in you:
  - Continue to back away slowly and ensure a 10 m distance between yourself and the animal;
  - Make sure the animal has a safe route of escape;
  - Make noise to alert the animal of your presence or to scare it off;
  - Avoid provoking it;
  - o Return to a safe area as soon as possible (e.g., inside a building or vehicle);
  - o Keep the Environment Department informed of situation using the radio/phone;
- Immediate mobilization of helicopters (if available) and the Environment Department Response Team will occur to remove personnel from the area and/or deter the animal; and
- Stay in radio/phone contact until the animal(s) moves away or you have returned to a safe area (e.g., inside vehicle or building).

## Table A-1 Summary of Predatory Wildlife Sightings and Alerts

## General Wildlife Sighting If wildlife is more than 1 km away:

- 1. Inform Environment Department of location, distance, and number of animals.
- 2. Continue to monitor the bear and notify is sighting changes to Alert status.
- 3. Stay in radio/phone contact
- 4. Helicopters and Environment Department Team prepared to remove personnel or deter bear if needed.

## **Green Wildlife Alert**

## If wildlife is less than 1 km away:

- 1. Inform Environment Department of location, distance, and number of animals.
- 2. Continue to monitor the bear and notify if Alert status changes.
- 3. Stay in radio/phone contact.
- 4. Workers are ready to go to safe area if needed.
- 5. Helicopters and Environment Department Response Team prepared to remove personnel or deter bear if needed.

## **Yellow Wildlife Alert**

## If wildlife if less than 500 m away:

- 1. Inform Environment Department of location, distance, and number of animals.
- 2. Temporary work area closures for areas in vicinity of the animal and along its trajectory. Workers to prepare their personal deterrents and to go to a safe area immediately.
- 3. Stay in radio/phone contact.
- 4. Helicopter and Environment Department Response Team may be deployed to remove personnel or deter bear.
- 5. All personnel to stay in safe area until an all clear is given.

## Red Wildlife Alert

## If wildlife is less than 250 m away:

- 1. Sound air horn with two long blasts.
- 2. Temporary work area closures for areas in vicinity of the animal and along its trajectory. Workers to immediately go to a safe area and use personal deterrents if needed.
- 3. Inform Environment Department of location, distance, and number of animals.
- 4. Stay in radio/phone contact.
- 5. Helicopter and armed Environment Department Response Team are deployed immediately to remove personnel or deter bear.
- 6. All personnel to stay in safe area until an all clear is given.

The Environment Department is to treat all predatory mammals that are threatening or aggressive as they would treat a Grizzly Bear, which is perceived to be the most dangerous. All predatory mammals that are showing interest in a person or Project facilities must be aggressively deterred to prevent habituation to the Project site. Detailed response recommendations are provided in **Section 3.2.2.3** below. If an animal is not of an immediate safety concern, the Wildlife Response team should discuss options to deter or remove the animal with Government of Nunavut Department of Environment (DOE) conservation personnel.

## 3.2.2.3 Environment Department Protocols for Managing Problem Predatory Mammals

As part of the detailed response plan, the Environment Department will follow the procedures included here when responding to predatory mammal sightings and encounters. It is assumed that the reporting person(s) has followed procedures for predatory mammal incidents, and has requested the Environment Department Response Team to be dispatched due to the failure of human presence to deter the predatory mammal. If an animal is not of an immediate safety concern, the Environment Department should discuss options to deter or remove the animal with Government of Nunavut DOE conservation personnel. All wildlife problems are to be recorded in the wildlife database.

# In case of a General Wildlife Sighting or a Green Wildlife Alert, the Environment Department will:

 Conduct on-going monitoring and radio communication will continue in case the situation escalates and Alert status increases.

#### In the case of a Yellow Wildlife Alert:

- Environmental Coordinator or delegate will respond to the initial radio/call to confirm they
  have received the Alert message and that action is being taken;
- Environmental Coordinator or delegate will commence temporary area closures and collect all deterrent equipment and give a briefing to the Environment Department Response Team on location and circumstance of the call;
- The Environmental Coordinator will contact the helicopter dispatch and request immediate deployment (if required). Helicopter will prepare for deployment of Environment Department Response Team in to the field for emergency pick-up of field crews or a bear deterrence using the helicopter; and
- The Environmental Coordinator (or designate) should proceed to the security office to provision a firearm if needed and the site Medic should be on alert and monitor Alert updates.

#### In the case of a Red Wildlife Alert:

- The Environmental Coordinator or delegate will respond to the initial radio/call to confirm they have received the Alert message and that action is being taken;
- Environmental Coordinator or delegate will commence temporary area closures and collect all deterrent equipment and give a briefing to the Environment Department Response Team on location and circumstance of the call;
- The Environmental Coordinator will contact the helicopter dispatch and request immediate deployment (if required). Helicopter will prepare for deployment of Environment Department Response Team in to the field for emergency pick-up of field crews, or a bear deterrence using the helicopter;
- The Environmental Coordinator (or designate) should proceed to the security office to provision a firearm if needed and the site Medic and ERT should be on standby in the

- unlikely event of a wildlife attack; and
- Updates on the situation will be broadcast if the situation or affected areas change, the Alert status changes, or when the hazard no longer exists and work may resume.

## Once the Environment Department Response Team is deployed in the field:

- Prior to implementing any deterrence measures ensure the bear has a clear avenue of escape, and all workers have vacated the area;
- Depending on location, slowly drive or walk towards the animal staying a safe distance from the animal (minimum of 10 m);
- No firearms or deterrents should be discharged in a work area until all personnel are removed or are safely inside structures;
- When firearms are to be used there will always be two individuals, one person with a
  firearm (12 gauge) for deterrent use, the other as back up with lethal force. No lethal
  force will be taken without consent from the Environmental Superintendent / Coordinator
  in conjunction with the consultation of the Government of Nunavut DOE Wildlife Officer
  unless the situation is deemed to be life threatening;
- The appropriate less than lethal deterrent will be chosen and used in an effort to scare the predatory mammal away; and
- If the deterrent is successful, the incident will be recorded in the wildlife database and will detail the type and level of deterrent used, information on the predatory mammal involved, and all information on the circumstances leading up to the incident.

If the deterrent is not effective and the predatory mammal continues to approach or doesn't move away from the area of human activity or Project footprint.

- Increase deterrent efforts to less than lethal projectile (rubber bullet) if not already being employed;
- Ensure the animal has an open escape route; and
- Continue aggressive use of less than lethal projectile deterrents to try and chase the animal away.

All but the most aggressive animals should have been deterred at this point. The situation is now extremely dangerous and the Environment Department must be ready to use lethal force.

The risk to human life or property is imminent since the predatory mammal has not responded to non-lethal deterrent options and the safety of the team or mine property is now compromised.

- Shoot with the intention of stopping the threat, using the buckshot or 1-ounce lead slugs, as appropriate, to kill the animal;
- Shots should be aimed at the chest area, not the head or hind quarters;
- If lethal force has been used, the Environment Department must complete a full report

detailing the event immediately;

- The Government of Nunavut DOE conservation officers will be notified by phone. Direction will then be given to properly dispose of the carcass; and
- Any wildlife showing signs of rabies will be killed (never shot in the head) and reported.

## **Helicopter Deterrence:**

- This method of deterrence is to be considered as a last resort depending on the circumstances (i.e., location of work);
- At least one member of the Environment Department must be onboard the helicopter to monitor the deterrence. The helicopter pilot is in charge of the safety of the aircraft and the passengers. The pilot will have the final say regarding where and how the aircraft is flown with regards to safety;
- To reduce stress on the animal, the helicopter must stay at least 100 m back and 30 m up from the animal during a helicopter deterrence;
- Animals cannot be pushed for more than ten minutes or 3 km (2.2 miles);
- The Environment Department passenger will notify the helicopter pilot once they are satisfied that the animal has been pushed a sufficient distance and that it is moving away from the site. They will then instruct the pilot to go up in altitude to continue monitoring the location of the animal and ensure that it is not returning;
- In the event that a firearm will need to be transported to a site via helicopter for deterrence (e.g., remote drill site), the firearm must be placed in a secure gun case and be unloaded; and
- A detailed record of all bear/wildlife activities and deterrence actions must be presented to the Environment Coordinator in a timely manner. This forms part of the reporting requirements for Wildlife Incident Tracking for regulatory authorities.

# 4. SECTION 4 – WILDLIFE AWARENESS INFORMATION AND ENCOUNTER STRATEGIES

This section deals with general predatory mammal (i.e., Wolves, Wolverines, and Grizzly Bears) awareness information and encounter strategies. It does not replace the need for all personnel to take a recognized wildlife awareness course.

#### 4.1 FACTORS THAT INFLUENCE A PREDATORY MAMMAL'S REACTION

Wolverines, Wolves, and Grizzly Bears will react differently to chance encounters with humans, depending upon many factors, including each animal's past experience with humans. Their reaction is difficult to predict because of the variability of factors with each encounter.

- Female mammals may aggressively defend her young ones (for example: Female bears with cubs are more likely to attack than to flee).
- Wolverines or bears may defend a food cache (for example: a bear's main objective is
  to eat from the time it leaves its den to the time it returns to a winter den. Hunting bears
  will cache food after eating part of it by covering the food with dirt, branches or leaves.
  They will often establish a daybed nearby and return later for another meal). Animals will
  aggressively defend their food cache.
- Individual Space: All predatory mammals have a minimum distance surrounding them
  within which any intrusion is considered a threat. A cornered or surprised predatory
  mammal may be dangerous. If there is no cover to retreat to, their usual response to
  danger is to attack or to stand its ground.
- Old, wounded or predatory mammals with teeth malformations can be dangerous because they are very hungry or starving (e.g., Wolves observed on-site in 2009).
- Wolverines, Wolves, Arctic Fox, and Grizzly Bears are easily attracted to human food sources and may become aggressive to obtain it. Predatory mammals that have obtained food from humans become "human food habituated". These mammals are accustomed to humans and link people as sources for obtaining food.
- Young animals which are inexperienced hunters and/or recently weaned are also at a greater risk to take advantage of human food source opportunities.

## 4.2 ANIMAL ENCOUNTERS

Most of animal safety is prevention – avoiding an encounter is the best way to stay safe while working in the home ranges of Wolverines, Wolves, Arctic Fox, and Grizzly Bears.

## 4.3. HOW TO REACT TO ANIMAL ENCOUNTERS

Your reaction should depend on circumstances and the behavior of the mammal.

• Stop and assess the situation before you act.

- Does the predatory mammal know you are there?
- How is the animal reacting to the nearby activity?
- Remain calm.
- Do not turn your back on the animal.

**DO NOT RUN** – You will trigger the animal's natural response to chase you. Wolverines, Wolves and Grizzly Bears are extremely fast and you cannot outrun them.

## Some Simple Rules

- Respect them they can kill you.
- Be alert at all times.
- Watch for sign.
- Make noise don't surprise animals.
- Travel in groups when possible.
- Be cautious in noisy areas (streams).
- Know the types of areas animals use during the year.
- Do not approach them.
- Never feed them.
- Get trained and carry deterrents.
- Remember carcass equals danger look for ravens, strong odours.
- Mentally rehearse encounters.

## 4.3.1 Specific Situations: Animal Encounters

## Wolverine, wolf, or bear is not aware of you.

- Leave the area quietly in the same direction that you came from.
- Move while the predatory mammal is not aware of you and stop moving when the mammal lifts its head to check its surroundings.
- Stay downwind so the predatory mammal will not pick up your scent.
- When you have moved a safe distance away and preferably to your truck or shop where you can watch and wait until the predatory mammal leaves.
- Report event to Environment Department immediately.

## If the wolverine, wolf or bear is unaware of you and approaching.

Allow the mammal the right-of-way. Make sure there is a safe escape route and that you

are not in the way.

- Return to vehicle or building when available or allow animal a wide birth.
- Report event to Environment Department immediately.

## If you cannot leave undetected

- Move upwind so animal can pick up your scent; this will help them identify you as human.
- If it is possible, try to keep the predatory mammal in your sight.
- Watch to see if the predatory mammal leaves when it smells that a person is nearby.
- Report event to Environment Department immediately.

## If the wolverine, wolf or bear is aware of you but in the distance.

- Continue walking at the same general pace and towards a safe area (vehicle or building).
- DO NOT RUN.

## The wolverine, wolf or bear is aware of you and close.

- A predatory mammal will feel threatened in a close confrontation. Generally their natural tendency will be to reduce or to remove the threat. Assist the animal by acting as nonthreatening as possible.
- Do not make direct eye contact.
- Do not make any sudden moves.
- DO NOT RUN.
- In the case of a bear, they need to identify you as a person, so talk in low tones and slowly wave your arms over your head.
- Attempt to give the predatory mammal an opportunity to leave. Be sure they have an open escape route.
- Try to back away slowly.
  - If the predatory mammal begins to follow you, drop your jacket, or pack or some other article (not food) to distract it. This may distract the animal long enough for you to escape.
  - Report to Environment Department immediately.

## The wolverine, wolf or bear is close and threatening.

• If you have a deterrent such as a bear banger or bear spray, be prepared to use it depending on how close the predatory mammal is.

- If you do not have a deterrent, or if using the deterrent is not successful, act as non-threatening as possible.
- Talk to the predatory mammal in a calm authoritative tone of voice.
- Do not startle or provoke the predatory mammal by making sudden moves.
- Back slowly away from the animal and drop a pack, jacket, or some other article in order to distract it momentarily.
- Remember that the predatory mammals may be defending their cubs that you have not yet seen or they may have a food cache nearby. Attempt to look as non-threatening as possible.
- Report to Environment Department immediately.

## The wolverine, wolf or bear is very close and approaching.

A distance of less than 50 m in an open area is considered very close.

- If the predatory mammal continues to approach, use your deterrent when in range.
- If the predatory mammal does not respond to the deterrent you must now STAND YOUR GROUND!
- Report to Environment Department immediately.

## The wolverine, wolf or bear charges.

In this case you have done something that has provoked the Wolverine, Wolf or Grizzly Bear into showing signs of aggression towards you. It is often not clear to the person what they have done to provoke the mammal until after the attack. It is important that you act passively, humble your posture, and do not look directly at the animal. Always keep the animal in sight. Never yell or throw things as these are obvious signs of aggression

When faced with a charging wolverine, wolf or bear.

- First use your deterrent, either a banger or pepper spray. If authorized (only Environment Department representatives or local security personnel) to carry a firearm, shoot the predatory mammal.
- DO NOT PLAY DEAD IF THE PREDATORY MAMMAL CONSIDERS YOU FOOD.
- You must defend yourself with whatever means are available, act aggressively towards the bear.
- Stand up on something high and try to make yourself look bigger. Try to appear dominant. Try to frighten it. Yell, scream, shout, and wave your arms. Jump up and down and fight back.
- Hold your jacket or backpack over your head to make yourself look bigger.
- If being aggressively attacked in a predatory attack, fight back. Concentrate your efforts on the face, eyes, and nose of the bear. Use whatever means you have, rocks, sticks,

tools, hardhat, or simply kick and punch with all the strength you can muster.

• Report to Environment Department immediately.

## 4.3.2 Types of Bear Attacks

## **Provoked Attacks**

- You have done something that has provoked the bear into showing signs of aggression towards you. It is often not clear to the person what they have done to provoke the bear until after the attack.
- It is important that you act passively, humble your posture and do not look directly at the bear. Always keep the bear in sight.
- Lie down on the ground in the prone position (i.e., play dead as this is a sign of submission to the bear and shows the bear that you are no longer a threat to them).
- Never yell at the bear or throw things at the bear, these are obvious signs of aggression towards the bear.
- Report to Environment Department immediately.

## **Predatory Attacks**

- The bear is hunting or stalking you! You are being treated as potential food. DO NOT PLAY DEAD IF THE BEAR CONSIDERS YOU FOOD.
- You must defend yourself with whatever means are available, act aggressively towards the bear. Stand up on something high and try to make yourself look bigger.
- Try to appear dominant. Try to frighten the bear. Yell, scream, shout and wave your arms. Jump up and down and fight back. Hold your jacket or backpack over your head to make yourself look bigger.
- Use your deterrent; either a banger or pepper spray. If authorized to carry a firearm, shoot the bear.
- Report to Environment Department immediately.

## 4.4 WILDLIFE DETERRENTS

## 4.4.1 Noise

- Pencil Flare Guns are highly portable but many people have received injuries from this
  type of deterrent as the pen explodes while they are holding it. This deterrent is still sold
  and is not recommended. Canadian Conservation Officers no longer using pencil flares.
- Pyrotechnics, including bangers, screamers, whistlers, and flares. Requires a magazine launcher. These launchers look like a small handgun. There are different types available, some carry only a single shot, and some will carry multiple cartridges. The bangers, screamers and whistlers are charges that will explode and emit a variety of different noises. The name of the device indicates the noise it will make.

## 4.4.2 Wildlife Chemical Deterrents

Bear Sprays are highly effective but they must be used correctly to be effective. As with all deterrents they have their good points and their bad points.

- The main ingredient in bear spray is Capsicum an extract from hot peppers.
- Capsicum needs to strike the eyes, nose or mouth of the mammal, (open membranes) to be effective.
- These sprays can only be used at very close range, 3 to 8 m or 10 to 25 ft.
- You cannot discharge the bear spray too early or it will be completely ineffective.
- If the predatory mammal comes within the range of the bear spray aim directly into their face and spray.
- You must be aware of the wind direction. If you the wind is blowing towards you, the spray will be carried by the wind into your face.
- Bear spray may not be effective in sub-zero weather (Spray cans do not fire well in very cold temperatures.) In colder weather, you need to keep the can of bear spray warm in order for it to fire effectively.
- Bear spray will not be effective in the rain. When you fire a can of bear spray, the spray
  will create a billowing cloud of capsicum and propellant. Rain can/will wash the spray
  right out of the air before it strikes the bear in the face.
- If you have used your can of bear spray to deter a mammal, wash the nozzle off with soap and water to remove the scent. Replace your can of spray as soon as possible. You do not want to have another bear encounter with a half a can of spray left.
- Bear sprays have a shelf life. Always replace your bear spray when you are nearing the
  end of the shelf life. The Capsicum does not deteriorate over time; it is the canister seals
  that deteriorate over time.
- Do not test your can of spray before going out into the field. You need to take a full can of spray into the field, not a partially used one.
- Wildlife chemical deterrents are only to be used for the purpose they are intended for.
   Misuse of wildlife deterrents such as chemical sprays, bangers, and pyrotechnics is considered a criminal offence.

## 5. SECTION 5 – TRAINING PROTOCOL

#### 5.1 SCOPE

The Wildlife Training Protocol outlines recommended levels of training that specific groups of people at the Project site should receive. It is important that human activity at the site does not result in wildlife encounters that put people or wildlife at risk. All personnel on site have a role to play in ensuring human safety, conservation of wildlife, and documenting wildlife activities in the Project area.

#### 5.2 ASSUMPTIONS AND KEY CONSIDERATIONS

Agnico Eagle, Meadowbank Division must assign overall accountability, recording and reporting responsibility to the Environmental Coordinator or designate(s) if the various wildlife response plans and training initiatives are to be effective.

The Environmental Coordinator or designates(s) will be responsible for ensuring that all employees, contractors, and visitors at the Project site receive wildlife training appropriate to their roles and responsibilities.

The Environment Department will be responsible for all deterrent action whenever it is necessary to deter wildlife from mine infrastructure or personnel. All members of the Environment Department will receive specialized training in various levels of deterrent use. Security personnel and the Environment Department will be the only onsite personnel to have access to a firearm.

## 5.3 TRAINING

Mandatory wildlife awareness orientation for all staff will include the following components.

#### 5.3.1 Wildlife-Human Conflict

- General restrictions for wildlife protection.
- Wildlife Attractants.
- Garbage Management.
- Wildlife Health.
- Wildlife and Vehicles.
- Preventing Problem Wildlife.
- Dealing with Problem Wildlife.
- Reporting Wildlife Observations and Incidents.

#### 5.3.2 Wildlife Awareness

The Wildlife Awareness and Working in the Wild brochure has been developed to provide Agnico Eagle staff and contractors with awareness of potential wildlife encounters that may occur at the Project site. This brochure discusses the following:

- Wildlife that commonly occur near the Project site;
- Behavior of wildlife that may be encountered near the Project site;
- Wildlife encounters; and
- Wildlife Deterrents.

## **5.3.3** Environment Department

In addition to the required Project site orientation, the Environment Department may require additional training. The following training is recommended, especially for those without experience in situations where wildlife occurrences are common.

## Bear Safety Training

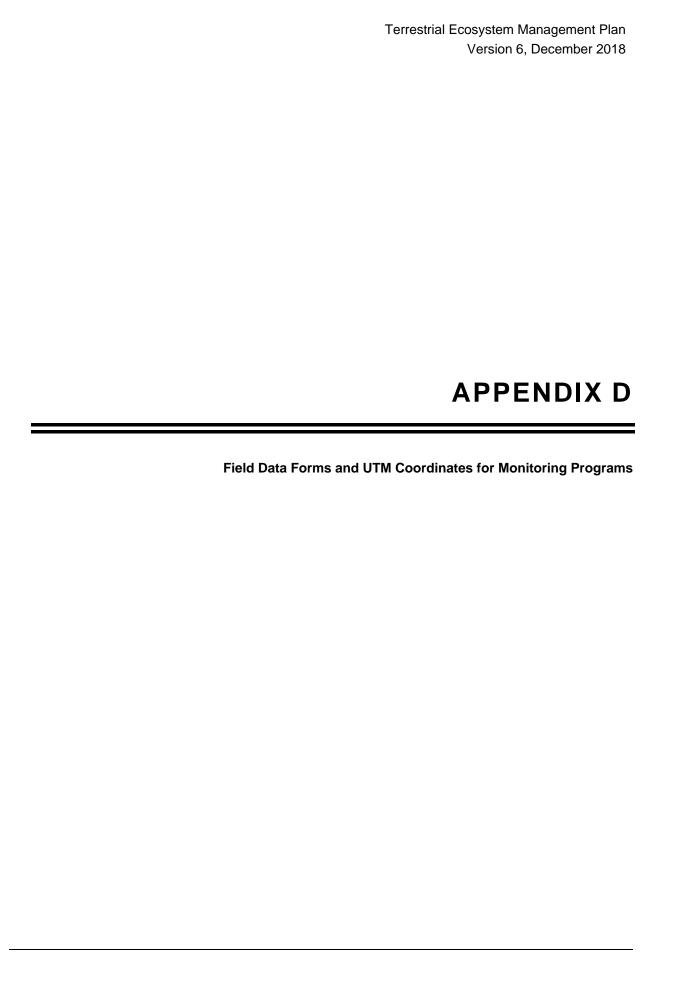
Provided by qualified contractor or territorial, provincial or federal Wildlife Officer, this course will provide:

- Instruction on the use of lethal and non-lethal deterrents for emergency response to bear incidents;
- Techniques for euthanizing bears during an emergency response;
- Other types of deterrent options available in non-emergency situations;
- In depth aversive conditioning techniques;
- Live trapping techniques and protocols;
- Necropsy techniques, and biological sampling; and
- Practicum.

## Carnivore Safety Training

Provided by qualified contractor or territorial, provincial or federal Wildlife Officer to include:

- Biology, ecology, and behavior of Wolverine, Wolf, Arctic Fox, and Grizzly Bear;
- Rabies and other zoonotic diseases;
- Detailed deterrent and aversive conditioning techniques;
- Live trapping techniques;
- Instruction on the use of lethal and non-lethal deterrents for emergency response to incidents involving large carnivores;
- Necropsy techniques and biological sampling; and
- Practicum.



#### MEADOWBANK WILDLIFE INCIDENT PROCEDURES

Wildlife incidents refer to a range of possible occurrences at the Mine, including:

- human-wildlife interactions that present a risk to either people or animals
- wildlife-caused damage to property or delay in operations
- wildlife deterrent actions
- wildlife injury or mortality

The objective of wildlife incident reporting is to document and mitigate impacts to wildlife, reduce risks to people, and identify new mitigation.

Natural processes should be left alone, unless intervention is required to reduce risk to either wildlife or staff from Project activities. Each incident requires unique responses, but each incident should be assessed to reduce or eliminate the chance that it will recur.

GN should be contacted in the case of problem wildlife, and prior to disturbing nests. Detailed wildlife incident reporting is critical for implementing adaptive management. As part of the TEMP, all wildlife incidents are reported and reviewed to determine patterns in incident occurrences and to develop management procedures.

All wildlife incidents should be documented by Meadowbank Environment Department staff using the attached form, and reported immediately to the Environmental Superintendent. The report should include photographs and conversations with the individuals involved. Please attached additional pages or information that may be useful to understand what occurred and what can be learnt from the incident.

## Wildlife Incident Report Form

Date:		Time:	
Individuals involved:			
Species:			
Number, gender, age:			
Location (description):			
Location (UTM):			
Digital photo numbers:			
Describe the incident or a What was the situation the		Was there a threat to	wildlife or human safety?
Describe any use of wildli	ife deterrents: Describe	any wildlife mortality	<b>':</b>
·		•	
Describe any communica	tion with GN-DOE:		
·			
What immediate measure	s were taken to reduce	risk or harm?	
What measures are recon	nmended to prevent futu	re occurrences?	
Report prepared by:		Reviewed by:	
· · · · · ·		· · · · · · · · · · · · · · · · · · ·	

# UTM Coordinates (NAD 83) of PRISM plots Used for Long-term Monitoring At Meadowbank and Whale Tail Study Areas

MEA	MEADOWBANK STUDY SITE						
	UTM Coordinates of PRISM Plot Corners						
#	Southwest	Northwest	Northeast	Southeast			
2	14W 0637020 7216090	14W 0637020 7216490	14W 0637420 7216490	14W 0637420 7216090			
3	14W 0637800 7216700	14W 0637800 7217100	14W 0638200 7217100	14W 0638200 7216700			
6	15W 0359400 7212500	15W 0359400 7212900	15W 0359800 7212900	15W 0359800 7212500			
8	14W 0637700 7214200	14W 0637700 7214600	14W 0638100 7214600	14W 0638100 7214200			
9	14W 0637300 7214800	14W 0637300 7215200	14W 0637700 7215200	14W 0637700 7214800			
11	14W 0639000 7215800	14W 0639000 7216200	14W 0639400 7216200	14W 0639400 7215800			
12	14W 0639700 7215600	14W 0639700 7216000	14W 0640100 7216000	14W 0640100 7215600			
14	14W 0639000 7216900	14W 0639000 7217300	14W 0639400 7217300	14W 0639400 7216900			
15	14W 0639000 7217800	14W 0639000 7218200	14W 0639400 7218200	14W 0639400 7217800			
19	14W 0635500 7217300	14W 0635500 7217700	14W 0635900 7217700	14W 0635900 7217300			
20	14W 0636000 7216600	14W 0636000 7217000	14W 0636400 7217000	14W 0636400 7216600			
22	14W 0636800 7217400	14W 0636800 7217800	14W 0637200 7217800	14W 0637200 7217400			
24	14W 0636300 7218000	14W 0636300 7218400	14W 0636700 7218400	14W 0636700 7218000			
28	14W 0640200 7221000	14W 0640200 7221400	14W 0640600 7221400	14W 0640600 7221000			
29	14W 0641100 7220000	14W 0640100 7220400	14W 0640500 7220400	14W 0640500 7220000			
31	14W 0636600 7208000	14W 0636600 7208400	14W 0637000 7208400	14W 0637000 7208000			
32	14W 0636000 7208500	14W 0636000 7208900	14W 0636400 7208900	14W 0636400 7208500			
33	14W 0636700 7209800	14W 0636700 7210200	14W 0637100 7210200	14W 0637100 7209800			
34	14W 0640000 7218800	14W 0640000 7219200	14W 0640400 7219200	14W 0640400 7218800			
36	14W 0633300 7212100	14W 0633300 7212500	14W 0633700 7212500	14W 0633700 7212100			
37	14W 0634000 7212700	14W 0634000 7213100	14W 0634400 7213100	14W 0634400 7212700			
38	14W 0632700 7212800	14W 0632700 7213200	14W 0633100 7213200	14W 0633100 7212800			
42	15W 0359400 7219000	15W 0359400 7219400	15W 0359800 7219400	15W 0359800 7219000			
43	15W 0359200 7218300	15W 0359200 7218700	15W 0359600 7218700	15W 0359600 7218300			
45	14W 0640600 7210400	14W 0640600 7210800	14W 0641000 7210800	14W 0641000 7210400			
VVII	ALE TAIL STUDY SITE	UTM Coordinates of P	RISM Plot Corners				
#	Southwest	Northwest	Northeast	Southeast			
1	14N 0605500 7251900	14N 0605500 7272300	14N 0605900 7252300	14N 0605900 7241900			
2	14N 0606300 7252300	14N 0606300 7252700	14N 0606700 7252700	14N 0606700 7252300			
3	14N 0607900 7252300	14N 0607900 7252700	14N 0608300 7252700	14N 0608300 7252300			
4	14N 0605500 7253100	14N 0605500 7253500	14N 0605900 7253500	14N 0605900 7253100			
5	14N 0607500 7253100	14N 0607500 7253500	14N 0607900 7253500	14N 0607900 7253100			
6	14N 0608700 7252300	14N 0608700 7252700	14N 0609100 7252700	14N 0609100 7252300			
7	14N 0611500 7253100	14N 0611500 7253500	14N 0611900 7253500	14N 0611900 7253100			
8	14N 0609100 7253500	14N 0609100 7253900	14N 0609500 7253900	14N 0609500 7253500			
9	14N 0609100 7254300	14N 0609100 7254700	14N 0609500 7254700	14N 0609500 7254300			
10	14N 0610700 7251500	14N 0610700 7251900	14N 0611100 7251900	14N 0611100 7251500			
11	14N 0609900 7254700	14N 0609900 7255100	14N 0610300 7255100	14N 0610300 7254700			
12	14N 0603900 7255500	14N 0603900 7255900	14N 0604300 7255900	14N 0604300 7255500			
13	14N 0609500 7255900	14N 0609500 7256300	14N 0609900 7256300	14N 0609900 7255900			
14	14N 0603500 7256300	14N 0603500 7256700	14N 0603900 7256700	14N 0603900 7256300			
15	14N 0610300 7256300	14N 0610300 7256700	14N 0610700 7256700	14N 0610700 7256300			
16	14N 0611500 7256300	14N 0611500 7256700	14N 0611900 7256700	14N 0611900 7256300			
17	14N 0611900 7251500	14N 0611900 7251900	14N 0612300 7251900	14N 0612300 7251500			
18	14N 0605500 7257100	14N 0605500 7257500	14N 0605900 7257500	14N 0605900 7257100			
19	14N 0606700 7257900	14N 0606700 7258300	14N 0607100 7258300	14N 0607100 7257900			
20	14N 0605500 7258300	14N 0605500 7258700	14n 0605900 7258700	14N 0605900 7258300			

CON	CONTROL OR REFERENCE SITE					
	UTM Coordinates of PRISM Plot Corners					
#	Southwest	Northwest	Northeast	Southeast		
1	14W 0623000 7218000	14W 0623000 7218400	14W 0623400 7218400	14W 0623400 7218000		
2	14W 0623600 7217600	14W 0623600 7218000	14W 0624000 7218000	14W 0624000 7217600		
3	14W 0622600 7217000	14W 0622600 7217400	14W 0623000 7217400	14W 0623000 7217000		
4	14W 0624600 7217000	14W 0624600 7217400	14W 0625000 7217400	14W 0625000 7217000		
5	14W 0625000 7217600	14W 0625000 7218000	14W 0625400 7218000	14W 0625400 7217600		
6	14W 0623600 7216000	14W 0623600 7216400	14W 0624000 7216400	14W 0624000 7216000		
7	14W 0624600 7216400	14W 0624600 7216800	14W 0625000 7216800	14W 0625000 7216400		
8	14W 0624600 7215600	14W 0624600 7216000	14W 0625000 7216000	14W 0625000 7215600		
9	14W 0625600 7215000	14W 0625600 7215400	14W 0626000 7215400	14W 0626000 7215000		
10	14W 0626200 7215000	14W 0626200 7215400	14W 0626600 7215400	14W 0626600 7215000		
11	14W 0624500 7214000	14W 0624500 7214400	14W 0624900 7214400	14W 0624900 7214000		
12	14W 0625000 7214000	14W 0625000 7214400	14W 0625400 7214400	14W 0625400 7214000		
13	14W 0626200 7214400	14W 0626200 7214800	14W 0626600 7214800	14W 0626600 7214400		
14	14W 0624600 7213300	14W 0624600 7213700	14W 0625000 7213700	14W 0625000 7213300		
15	14W 0625200 7213000	14W 0625200 7213400	14W 0625600 7213400	14W 0625600 7213000		
16	14W 0626100 7213000	14W 0626100 7213400	14W 0626500 7213400	14W 0626500 7213000		
17	14W 0627000 7213600	14W 0627000 7214000	14W 0627400 7214000	14W 0627400 7213600		
18	14W 0624600 7212800	14W 0624600 7213200	14W 0625000 7213200	14W 0625000 7212800		
19	14W 0625600 7212600	14W 0625600 7213000	14W 0626000 7213000	14W 0626000 7212600		
20	14W 0626000 7212000	14W 0626000 7212400	14W 0626400 7212400	14W 0626400 7212000		

# UTM Coordinates of Breeding Bird Transects along the Meadowbank AWAR and Whale Tail Haul Road

Meadowbank AWAR					
Transect	NAD	Start Coordinate	End Coordinate	Coordinate on AWAR	
1	27	14W 0644200 7138000	V 0644200 7138000		
2	27	14W 0639450 7152000	14W 0642450 7152000	14W 0640226 7152000	
3	27	14W 0634800 7158000	14W 0637800 7158000	14W 0636319 7158000	
4	27	14W 0631900 7163000	14W 0634900 7163000	14W 0633968 7163000	
5	27	14W 0629000 7167000	14W 0632000 7167000	14W 0630098 7167000	
6	27	14W 0624500 7178000	14W 0627500 7178000	14W 0625081 7178000	
7	27	14W 0624000 7182000	14W 0627000 7182000	14W 0625872 7182000	
8	27	14W 0625500 7189000	14W 0628500 7189000	14W 0626421 7189000	
9	27	14W 0626500 7193000	14W 0629500 7193000	14W 0627284 7193000	
10	27	14W 0626200 7203000	14W 0629200 7203000	14W 0627472 7203000	
11	27	14W 0630000 7209000	14W 0633000 7209000	14W 0631031 7209000	
12	27	14W 0633000 7217000	14W 0636000 7217000	14W 0634284 7217000	
Whale Tail	Haul Roa	d			
Transect	NAD	Start Coordinate	End Coordinate	Coordinate on Proposed Haul Road	
1	83	14N 0635400 7223500	14N 0638400 7223500	14N 0636853 7223500	
2	83	14N 0633000 7229100	14N 0636000 7229100 14N 0634445 72291		
3	83	14N 0622300 7234600	14N 0622300 7237600	14N 0622300 7236106	
4	83	14N 0616600 7238600	14N 0619600 7238600	14N 0618155 7238600	
5	83	14N 0619100 7242800	14N 0622100 7242800	14N 0620588 7242800	
6	6 83 14N 0610000 7250600 14N 0613000 7250600 14N 0611531 7250600				

Version 6, December 2018
APPENDIX E
AFFENDIA
Peregrine Falcon Management and Protection Plan

Terrestrial Ecosystem Management Plan



## **Peregrine Falcon Management**

## and Protection Plan on the Meadowbank Gold Project Site

Version 2 - Updated June 18, 2012

## **Background and Purpose:**

Since 2009, peregrine falcons have been observed along the All Weather Access Road occurring in three to five quarries. In June 2012, for the first time, falcon activity was observed in the Portage Pit. Subsequently a falcon nest site was observed in the South Portage Pit. In response a general mine site peregrine falcon management and protection plan was developed in accordance with the Terrestrial Ecosystem Management Plan (TEMP).

The purpose of this plan is to protect peregrine falcons from mine activities by firstly preventing them from nesting within the perimeter of active mining Pits (Portage, Goose, or Vault pits) during operation. If falcons nest in the mine pits, operations will be adapted according to the management plan and monitoring will increase to ensure protection of the falcons and their nest(s). The peregrine falcon is listed as "may be at risk" by the Canadian Endangered Species Conservation Council (2001) and the Nunavut Government (Government of Nunavut, 2001). Falco peregrinus tundrius, the subspecies that breeds north of the treeline, is listed as being of special concern in Canada (COSEWIC, 2002). Therefore we must ensure all activities protect these species.

Throughout the year Meadowbank environment department staffs routinely monitor the pit and other areas on site for birds to ensure their protection and that the management plan is being implemented. The following document outlines specific management and mitigative measures to protect peregrine falcons in accordance with the Meadowbank TEMP.

## Deterrence and Protection Plan Prior to Nesting in Portage. Goose and Vault Pit:

**Level 1)** Prior to and during nesting season (May 25 – July 1) an inspection of the pit walls will be conducted daily. These inspections will include a visual assessment from the bottom of the pit looking up at the wall faces, and also from the top looking down the wall faces. Records shall be kept of the dates, times, and which individual(s) carried out the inspection.

**Level 2)** If falcons are reported to have been seen in the vicinity of the pit or are observed by environment department staff, inspections will increase to 3 times daily; once in early morning, once at mid-day, and once again in the later evening. All sightings shall be documented as to the date, time, location, and individual(s) spotting the falcons. Owl decoys will be erected in the

area where the falcons have been seen to attempt to deter the falcons from nesting in the pit areas. Noise cannons may also be utilized.

**Level 3)** If sightings become regular, inspections will increase to every 3 hours including incorporating a night shift to perform inspections.

**Level 4)** If perching is observed or if nests are being created within the pit, the following management measures will be under taken.

- A. Shoot off a pistol banger (non-pyro technique) to ease them away from their location of perching. At no time will a banger be shot in the direction of the falcon, all bangers will be shot from a safe distance away to avoid any physical harm to the bird, i.e. hearing impairment.
- B. When the bird flies away it will be observed. The reason for this is that Agnico-Eagle does not want any falcon to leave one active pit, ie., South Portage and move to North Portage or from either Portage pit to Bay Goose Pit. We must ensure the falcon is deterred from the active pit areas. If the falcon re-lands within one of the pit perimeters repeat step A.
- C. If a nest is being constructed, each nest will be treated on a case by case basis depending on its location. One option at this level would be to roll or place wire mesh fencing over the nesting area to prevent the return of the falcon to the nesting area.

With protective measures in place, our goal is to never have to get beyond Level 4:A.

## Portage. Goose and Vault Pit Nest Monitoring and Protection Plan

If a nest is established and/or eggs are observed blasts will be minimized within a protective zone of the nest. It is likely that the nest will occur near the top of the pit wall. Blast vibration and noise has not appeared to have deterred the falcons from nesting near pits at this time; therefore the greatest risk to the eggs and young would be from blast fly rock. To prevent falcon disruption, the frequency of blasts will be reduced, vehicle traffic and most importantly human traffic will be reduced within a radius of ~150m from the nest. Fly rock will be monitored by video to ensure no impacts. Through controlled blasts and video monitoring of fly rock in June and July AEM will ensure that fly rock is kept to a minimum height that does not exceed the height of the nests.

In accordance with the TEMP, daily monitoring by environmental staff will be conducted with binoculars or a scope from the west side of the pit and recorded. After all blasts, environmental staff will check on the nests and record observations. Portable motion sensor automatic cameras may also be installed to record movements in the nest on regular intervals.

Based on past monitoring results of the nests along the All Weather Road (2009-2011), there is no pattern that has indicated that some young have survived while others have not due to road or quarry operations. The activities in the pit need to continue to be protective of the nests and the environmental staff will continue to monitor the activity and nests daily between June and September if a nest is observed.

## Portage. Goose and Vault Pit Mine Operation Mitigation

## Blasting

As a protective measure, blasting in the south pit east wall will become less frequent with smaller controlled blasts. Over the past 6 months, blasting has been optimized to reduce dilution and control fly rock by modifying blast material density, timing and patterns.

Blasts should occur less frequently and should be minimized within 150m of the nest in June and July, operations will prevent blast fly rock from disturbing the nests and video record all blasts within a 150m radius. The blast vibration and noise does not appear to have deterred the falcons from nesting nearby. Through controlled blasts and video monitoring, fly rock will be monitored to ensure it has not flown towards the nests. If blasts occur within the radius, fly rock will not exceed 60m or the height of the nest in June and July.

## Mine Operations and Reduced Vehicle Traffic

Traffic should be reduced within 150m radius of the nest to protect it from dust; if traffic cannot be reduced, dust suppressant should be used.

If all above mentioned measures have failed and AEM environment are not able to conform to the TEMP, the Government of Nunavut Department of Environment will be contacted by the Environment Superintendent, Environment Biologist, or Environment Coordinator.

Version 6, December 2018
APPENDIX F
APPENDIX F
Migratory Bird Mitigation Plan

Terrestrial Ecosystem Management Plan



## **TECHNICAL MEMORANDUM**

**DATE** June 2018 **PROJECT No.** 1658927.3100\_Rev2

**TO** Ryan Vanengen Agnico Eagle Mines Limited

CC Lasha Young, Jen Range, Dionne Filiatrault

FROM Corey De La Mare, Damian Panayi EMAIL corey delamare@golder.com

**MIGRATORY BIRDS PROTECTION PLAN** 

## 1.0 INTRODUCTION

Agnico Eagle has planned two water diversions as part of water management activities for the proposed Whale Tail Project (the Project) and the proposed Whale Tail Expansion Project (Expansion Project). The purpose of this Plan is to present the anticipated flooding area and schedule during the Whale Tail Lake (South Basin) and Northeast diversions and present appropriate mitigation measures to reduce impacts to nesting migratory birds.

The Whale Tail Lake (South Basin) diversion consists of construction of the Whale Tail Dike, from June 2018 to February 2019, to divert Whale Tail Lake (South Basin) and tributary lakes through Lake A45, just south of Lake A16 (Mammoth Lake). Flooded tributary lakes (light blue shading in Figure 1) include Lake A18, Lake A19, Lake A20, Lake A21, Lake A22, Lake A55, Lake A62, Lake A63, Lake A65, Pond A-P1, and Pond A-P53 (Figure 1). Active flooding from elevation 152.5 to 156.00 masl of the area will occur from 2019 until 2020 causing approximately 157 ha of flooding; this will active require migratory bird mitigation. The flooded area will remain at elevation 156.00 masl from July 2020 until 2023, during operations.

The Northeast diversion consists of construction of the Northeast dike, from February to March 2019, to divert Lake A46 and tributary lakes through Lake C44 in the Lake C38 (Nemo Lake) watershed. Flooded tributary lakes (light blue shading in Figure 2) include Lake A47, Lake A48, Lake A113, Pond A-P38, and Pond A-P68 (Figure 2). Flooding of this area will occur between February 2019 to July 2020, and during operations (July 2020 to 2023).

The flooding has the potential for incidental disturbance and destruction of migratory birds and their nests. As per Nunavut Impact Review Board (NIRB) Project Certificate No.008 Condition 34, this Migratory Bird Nest Mitigation Plan (the Plan) describes how these impacts will be mitigated; the mitigation will be focused between 2018 to July 2020, or until water levels reach their maximum flood plain.

The Migratory Birds Convention Act (1994) (MBCA) prohibits the harm of migratory birds and the disturbance or destruction of nests and eggs. The original aim of this legislation in the early 1900s was to conserve migratory bird populations from overharvest (CWS 2007). Inadvertent disturbance or destruction of migratory birds has been termed "Incidental Take" and Environment and Climate Change Canada (ECCC) currently lacks legal mechanisms to regulate Incidental Take (CWS 2007).

This Plan describes the likely effects pathways that may harm migratory birds (based on the Whale Tail FEIS, Agnico Eagle 2016), the mitigation options to reduce these impacts, and Agnico Eagle's preferred option for proceeding.



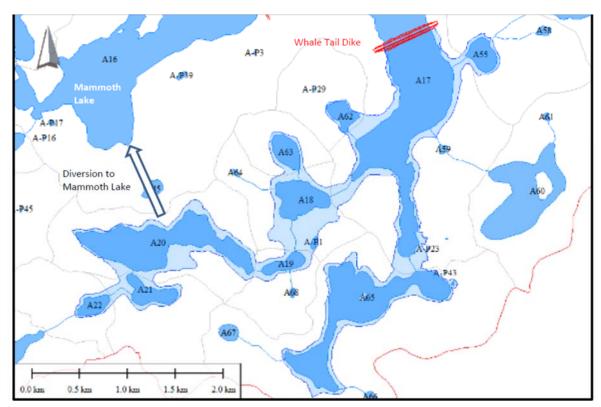


Figure 1: Whale Tail Lake (South Basin) Diversion Flooding occurring between February 2019 to July 2020, and during operation (July 2020 to 2023)

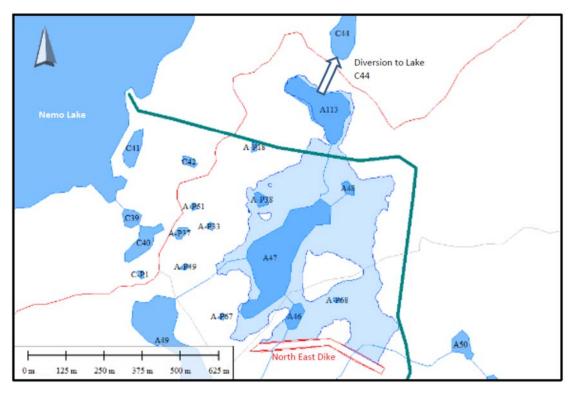


Figure 2: Northeast Diversion Flooding occurring between June 2019 to July 2020, and during operation (July 2020 to 2023)



#### 2.0 EFFECTS PATHWAYS AND MITIGATION

The flooding resulting from the Whale Tail Project and proposed Whale Tail Expansion Project water diversions will lead to incidental disturbance and destruction of migratory birds and their nests.

## 2.1 Effects Pathway

Flooding at the Project and proposed Expansion Project site is anticipated due to the construction of new dikes in Whale Tail Lake (South Basin) and downstream of Lake A46 and Lake A50. Some of the flooding will occur during the nesting season and may lead to the loss of nests near the shoreline of the lake.

Shoreline surveys during the Project baseline field work examined 62.8 km of shoreline along lakes and streams (Agnico Eagle 2016, Volume 5, Appendix 5-C). In total, 24 species of birds and eight nests were observed including three semipalmated sandpiper nests, two semipalmated plover nests, one dunlin nest, one herring gull nest, and one cackling goose nest. Assuming that observers recorded nests that were observed within a 20 m swath surveyed by two people, the nest density for the Project is 0.06 nests per ha. Given the area of flooding expected to occur at the Project and proposed Expansion Project, and assuming densities are the same as that observed during baseline studies, approximately seven nests in 2019 and three nests in 2020 of the shorebirds, gulls and waterfowl groups may be displaced by flooding if no mitigation is undertaken (Table 1).

Upland birds have been surveyed at Meadowbank from 2003 to 2015 using PRISM protocols. PRISM surveys found 3.8 pairs of breeding birds per plot during 2015. As PRISM plots are 16 ha in size this indicates a density of 0.24 pairs per ha. The average nests observed per PRISM plot was 0.6 nests, or 0.04 nests per ha. It is assumed that not all the nests or breeding pairs were detected during the 2015 baseline studies so a nest density of 0.5 nests per ha was used to calculate the number of nests displaced due to flooding. It is predicted that approximately 61 upland bird nests will be displaced in 2019 and approximately 27 nests in 2020 if no mitigation is undertaken at the Project and proposed Expansion Project (Table 1).

Table 1: Predicted Number of Bird Nests Displaced from Flooding

Nesting Period Year <sup>a</sup>	Whale Tail Lake (South Basin) Diversion			Northeast Diversion		
	Change in Flooded	Predicted Number of Nests Displaced		Change in Flooded	Predicted Number of Nests Displaced	
	Terrestrial Area (ha)	Shoreline Survey	PRISM Survey	Terrestrial Area (ha)	Shoreline Survey	PRISM Survey
2018	0.21	0.01	0.10	0	0	0
2019	115.96	6.96	57.98	6.58	0.42	3.29
2020	41.38	2.48	20.69	11.86	0.75	5.93
2021	0	0	0	0	0	0
2022	-64.94 <sup>b</sup>	0	0	-18.45 <sup>b</sup>	0	0

<sup>&</sup>lt;sup>a</sup> The nesting period used included the months of May, June, July, and August.

## 2.2 Mitigation

The following options have been considered to reduce the risk that flooding poses to migratory birds. The options fall under the general categories of deterrents, and habitat modification or exclusion.

Deploying visual and audio bird deterrents



<sup>&</sup>lt;sup>b</sup> Between May and August 2020 the total flooded habitat area and the flooded terrestrial area is expected to decrease in size. PRISM = Program for Regional and International Shorebird Monitoring; ha = hectare.

- Reducing habitat quality
- Covering key nesting habitat within the flood zones of tributary lakes
- Disturbing the soil and vegetation

Each of these mitigation options is discuss in greater detail below. Field studies planned for the summer of 2017 will provide information on the species and densities found in the flooded area to further develop and refine the mitigation proposed below. Results will be reported in the annual Terrestrial Ecosystem Monitoring Report, and evaluation of mitigation options will be completed in consultation with ECCC in early 2018.

#### 2.2.1 Bird Deterrents

Agnico Eagle would consider hiring additional local staff from May to August 2019 and 2020 to actively deter by use of walking, rope drags, ATVs or boats in nesting areas.

Additionally, will investigate commercially available visual deterrents and noise makers, deployed parallel to and facing the shoreline of tributary lakes prior to nesting season and remain operational during the nesting season. A variety of predator type calls could be broadcast to prevent habituation for a variety of upland bird species. Noise makers can be equipped with a solar panel to provide power for continuous operation. Visual deterrents may include scare balloons, human, and predator effigies and other visual deterrents. Scare balloons have large predator eye designs that look threatening to the birds and reflective flash tape rustles in the breeze, preventing habituation in the area. Snow melt, ice melt and arrival of migratory birds will be documented in 2017 and 2018, prior to the flooding activities, to inform mitigation. The location and distribution of visual deterrents will be rearranged occasionally to maintain their effectiveness, and will be deployed prior to migratory bird nesting period (i.e., the beginning of May, or prior to 50% snow melt).

A list of possible deterrents and their effectiveness relevant to marine oil spills is under development by ECCC, to be considered prior to final selection of bird deterrents. In addition to deterrents, Agnico Eagle staff should regularly survey the flooding area to provide further disturbance and to maintain and relocate the deterrents.

Surveys to investigate the effectiveness of fox effigies used at the Gahcho Kué Project (De Beers 2016) where inconclusive. Transects terminating in a fox effigy were surveyed for bird activity in May 2015. The surveys indicated Sparrows were more commonly observed in the control transects (11 individuals on control transects versus 3 on deterrent transects). Statistical analysis could not be conducted due to study design and low sample size.

## 2.2.2 Reducing Habitat Quality

Efforts could be made to reduce habitat quality, either through standing vegetation removal or a controlled burn during construction in 2018 and 2019 to remove disturbed vegetation and reduce the quality of nesting habitat in specific areas scheduled for flooding. The areas subject to flooding are primarily tundra and exposed rock, with little standing vegetation. However, standing vegetation (including a few willows) provide preferred nesting habitat for migratory birds, and can be cleared by ground crews using hand tools. Additionally, low lying vegetation could also be removed through a controlled burn along the shores of tributary lakes could be undertaken prior to flooding in high priority nesting areas identified in 2016 and 2017. A controlled burn would be carried out by fire experts under specified weather conditions with appropriate permits and regulations. Although the existing tundra is not particularly flammable this could be considered a suitable option, as burns could be controlled in designated areas.



# 2.2.3 Covering

If vegetation removal and/or burning of potential nesting areas were unsuccessful in 2018, key habitats with high potential for nesting birds within the flood zones could be covered with tarps or other material to reduce access by birds in 2019. Although this will be logistically challenging as the total area of predicted flooding in 2019 is over 120 ha, and most of this area is without access for vehicles or heavy equipment to deploy the cover material. If cover material could be deployed by hand, Agnico Eagle will prioritize areas identified in 2017 as high nesting suitable areas to be candidate target sites for covering. This mitigation technique will require frequent maintenance to prevent the cover from blowing away and continual adjustments will be required as water levels rise.

# 2.2.4 Disturbing Vegetation and Soil

Disturbing vegetation and soil (grubbing) could be conducted to reduce the attractiveness of the area to ground nesting birds in the areas adjacent to the tributary lakes. This option is not considered to be feasible due to a lack of access for the required earth moving equipment. The area will not have the required road access for heavy equipment and support vehicles (e.g., fuel and lubricant trucks). Winter grubbing is not feasible as the ground would be too frozen to disturb. Further, grubbing would lead to soil erosion when flooding begins, likely triggering the *Fisheries Act* for the deposition of deleterious substances.

### 3.0 PREFERRED OPTIONS

The following section describes Agnico Eagle's preferred mitigation for the two pathways described.

# 3.1 Preferred Mitigation for Loss of Migratory Bird Nests during Flooding

Upon review of the available mitigation options, Agnico Eagle has selected the following list of mitigation options for implementation, contingent upon field investigations in 2017.

- Deploying visual and audio bird deterrents
- Regular sweeps by Agnico Eagle staff to discourage nesting through human activity, and to move the visual and audio deterrents

Furthermore, the feasibility of the following option will be considered in consultation with ECCC and academic institutions, and completion of a thorough literature review, field tests of the deterrents, and monitoring the effectiveness of mitigation measures. If deemed appropriate Agnico Eagle will also implement the following options:

■ Habitat modification or exclusion the habitat in the flood zone, which may include vegetation removal, controlled burn, or covering key nesting habitat

As per Project Certificate No.008 Condition 34, Agnico Eagle will report the results of the Migratory Birds Protection Plan to NIRB on an annual basis.



## 4.0 REFERENCES

- Agnico Eagle (Agnico Eagle Mines Limited). 2016. Whale Tail Pit Final Environmental Impact Statement. Submitted to Nunavut Impact Review Board and Nunavut Water Board. June 2016.
- CWS (Canadian Wildlife Service). 2007. Environment Canada Background Document on the Management of Incidental Take of Migratory Birds: Towards and updated Regulatory Approach. Available at: https://www.ec.gc.ca/. Accessed May 2017.
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- Environment Canada. 2013. Planning ahead to Reduce the Risk of detrimental effects to migratory Birds, and their nests and eggs. Available at: http://www.ec.gc.ca/paom-itmb/. Accessed May 2015.
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- Environment and Climate Change Canada (ECCC). Unpublished. Guidelines for deterrence and bird dispersal techniques used during pollution and non-pollution incidents in Canada. Appendix 1. Technical Overview of Recommended Hazing Devices.

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Terrestrial Ecosystem Management Plan Version 6, December 2018
Version 6, Becchiber 2010
APPENDIX G
Viewshed Analysis



**TO** Ryan Vanengen, Agnico Eagle Mines Ltd.

**DATE** July 14, 2017

**CC** Dionne Filiatrault, Jen Range, Damian Panayi

FROM Corey De La Mare, P.Biol.

PROJECT No. Doc 110-1658927.3200 Rev1

#### WHALE TAIL VIEWSHED ANALYSIS

#### Introduction

During the development and revisions of the Terrestrial Ecosystem Management Plan (TEMP) for the Whale Tail Project (the Project), which is an expansion of the existing Meadowbank Mine, several discussions revolved around caribou detection within and around the mine site, along the All Weather Access Road (AWAR) and the associated triggering mitigation actions. It became apparent that although caribou are regularly observed from roadside surveys along the existing Meadowbank AWAR, the sightability limit (i.e., maximum distance at which caribou could be observed based on topography) is largely unknown. This sightability distance is required to understand how much time Agnico Eagle Mines Limited (Agnico Eagle) may have to respond to caribou encountering the Project based on receiving GPS collar data and the lag time between receiving that data and caribou approaching the Project. The notion is that a greater distance of visible detection will allow for better caribou mitigation preparedness by Agnico Eagle.

The proposed Whale Tail Haul Road is a 65 km all weather haul road between the existing Meadowbank Operations (i.e., Vault Pit) and Whale Tail Pit. As part of the caribou monitoring component for this haul road, five height of land (HOL) survey locations are proposed in areas where caribou have been observed based on collar data, presence of caribou trails, caribou sign, and where topographic relief is greatest. The main methods for collecting caribou observation data are through roadside surveys along the existing Meadowbank AWAR and the proposed Whale Tail Haul Road, and at the five HOL survey locations.

To determine the extent of visibility from these locations, a viewshed analysis was completed within a GIS platform. The results of this memo are intended to validate the distance of visible detection using road surveys and HOLs will provide adequate caribou mitigation preparedness by Agnico Eagle.

## **Methods**

The viewshed analysis shows the area where there is a line of sight based evaluation from elevations within the landscape, the observer height and the height of the target, in this case caribou. Visual aids, such as binoculars and spotting scopes, aid the observer to see at the extreme ends of the lines of sight so that caribou can be detected but the line of sight is not changed based on visual aids. The following assumptions were included in this viewshed analysis:

- An observer height of 2.0 m was added to each of the HOL locations, it is recognized that observers may not actually be 2.0 m but this is a standard observer measurement for viewshed analysis.
- A surface offset to simulate the height of caribou was added at 1.5 m.
- The observer height is set as: 2 m for the points and 1 m (default value) for the road; however, for the Whale Tail Haul Road the proposed road elevations based on the CAD profile was used.





The viewshed was required for the Regional Study Area; however, the availability of datasets was not consistent for the entire Regional Study Area in terms of data format and data resolution. Consequently, the datasets used and methods for harmonization are as follows:

- Road centerlines: Whale Tail Haul Road centerline and elevations (profile) provided by CAD, all weather road centerline generated semi-automatically using its footprint and linking its northern extremity to the Whale Tail Haul Road.
- 2016 HOL survey locations are only general and may have a high error range in their location precision, more specific coordinates will be acquired in 2017.
- Digital Elevation Model (DEM) for the haul road and the HOL survey points used a high resolution DEM (1 m). The DEM was down-sampled to 3 m resolution and merged with CDEM that has a 20 m resolution and then re-sampled back to 3 m resolution, but this is only to keep the 3 m precision where it exists and id does not make the CDEM more precise. Using a merging process avoiding edge effects and creates a smooth transition from one DEM source to the other.
- The high resolution DEM only covers the haul road (approximatively 500 m on each side) and a large portion of the Whale Tail Pit and development area.
- For the AWAR, no high resolution DEM coverage exists, consequently we only used the CDEM (20 m resolution) for this.

The viewshed analysis was run on an ESRI ArcGIS 10.4.1 platform using the 3D analyst tool – Viewshed. The visibility analysis does not take into account any potential vegetation or any other obstructions (natural/human) that are not part of the bare ground. A viewshed was developed for the existing Meadowbank AWAR, the proposed Whale Tail Haul Road, and the five HOL survey locations.

#### Results

The results of the viewshed analysis can be found in Figures 1 to 3, which each show the viewshed from the five HOL survey locations (Figure 1), the proposed Whale Tail Haul Road (Figure 2), and the existing Meadowbank AWAR (Figure 3). All three figures illustrate that with the naked eye, the sightlines from all three sources (HOL, Whale Tail Haul Road, AWAR) range from less than 1 km to greater than 8 km with a range of 3 to 5 km in several different directions from each location. When HOL locations are combined with the Whale Tail Haul Road as a point of observation, the visibility in general for all locations is around 5 km, with several vantage points of greater than 5 km.

A summary of field confirmation details regarding the viewscape analysis at HOL locations includes the following (M. Young, Dougan Associates, 2017, pers. comm.):





HOL Survey Point	Average Maximum Observable Distance	Comments
1	9.2 km	This site was slightly relocated to improve the visibility of the road. Small blind spots (50 to 100 m wide) facing S and NW
2	7.2 km	Small blind spots facing S, SW, and W
3	9.1 km	Small blind spots facing S, SE, NW, and E
4	8.9 km	Lars Qaqqaq identified this location as a movement corridor for Barren Ground Caribou Small blind spots facing SE, W
5	5.5 km	Road at this section is not currently built.  Small blind spots facing SW, NW, NE. SW, and NE blinds spots to be opened up when eskers removed for road construction.

The viewshed analysis is an important component of the overall monitoring program as it provides direction for monitoring locations that best capture caribou movements through the Project area during the spring and fall migration periods. Consequently, the survey locations chosen based on the results of the viewshed analysis will be continually reviewed and updated with the Terrestrial Advisory Group. Additional tasks remaining prior to construction of the Whale Tail Pit and Haul Road include the following:

- Field crews are identifying ideal HOL survey locations and maximum line of sight distances during the summer of 2017, some of this information is incorporated in the table above and some will be compiled into this document at the end of the field season.
- Additional HOL survey location to be added on the west side of the Whale Tail Pit to capture areas not currently covered by survey locations as revealed in the viewshed analysis.
- Selected points along the road may fill in monitoring gaps in the viewshed, these sites have not yet been selected.
- Determine the amount of the landscape covered by height of land survey locations and roadside surveys within an area that buffers the height of land locations by 4 km and the road by 1.5 km to determine if there is sufficient monitoring coverage from the existing surveys.





# Closure

We trust this meets your needs, if you have any questions or concerns, feel free to contact the undersigned.

Regards,

**GOLDER ASSOCIATES LTD.** 

Corey De La Mare, P.Biol.

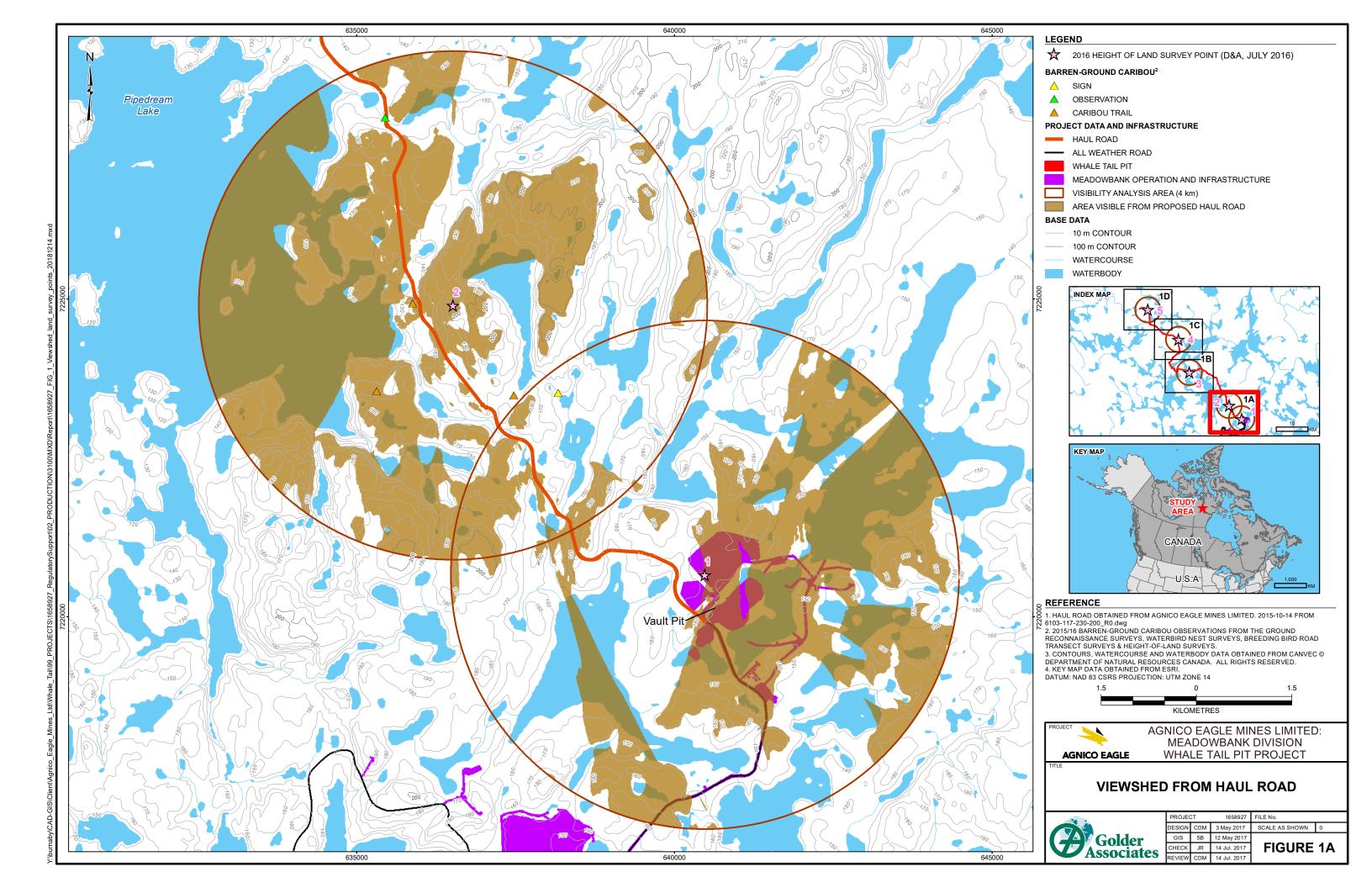
Principal, Senior Wildlife Ecologist

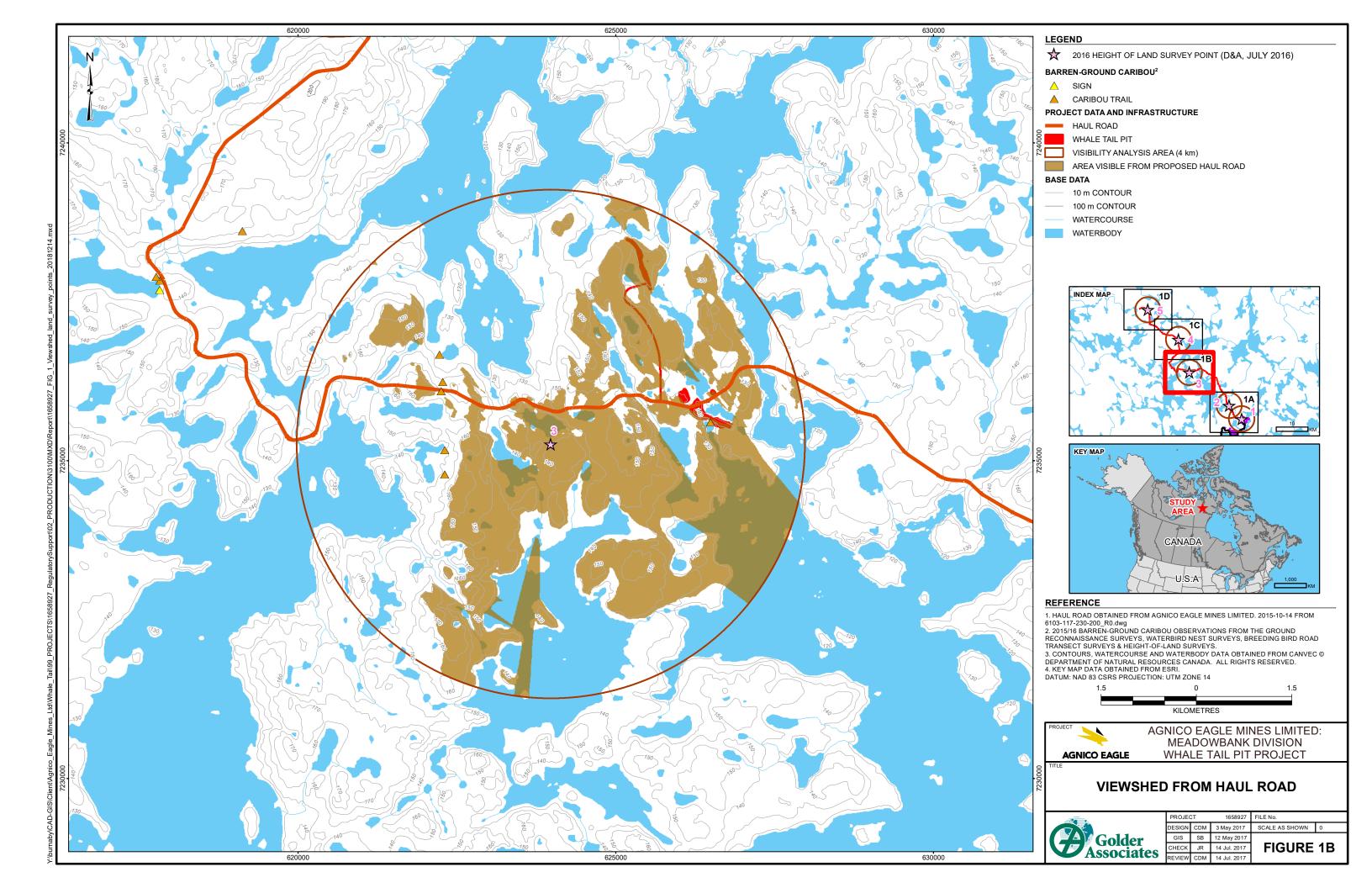
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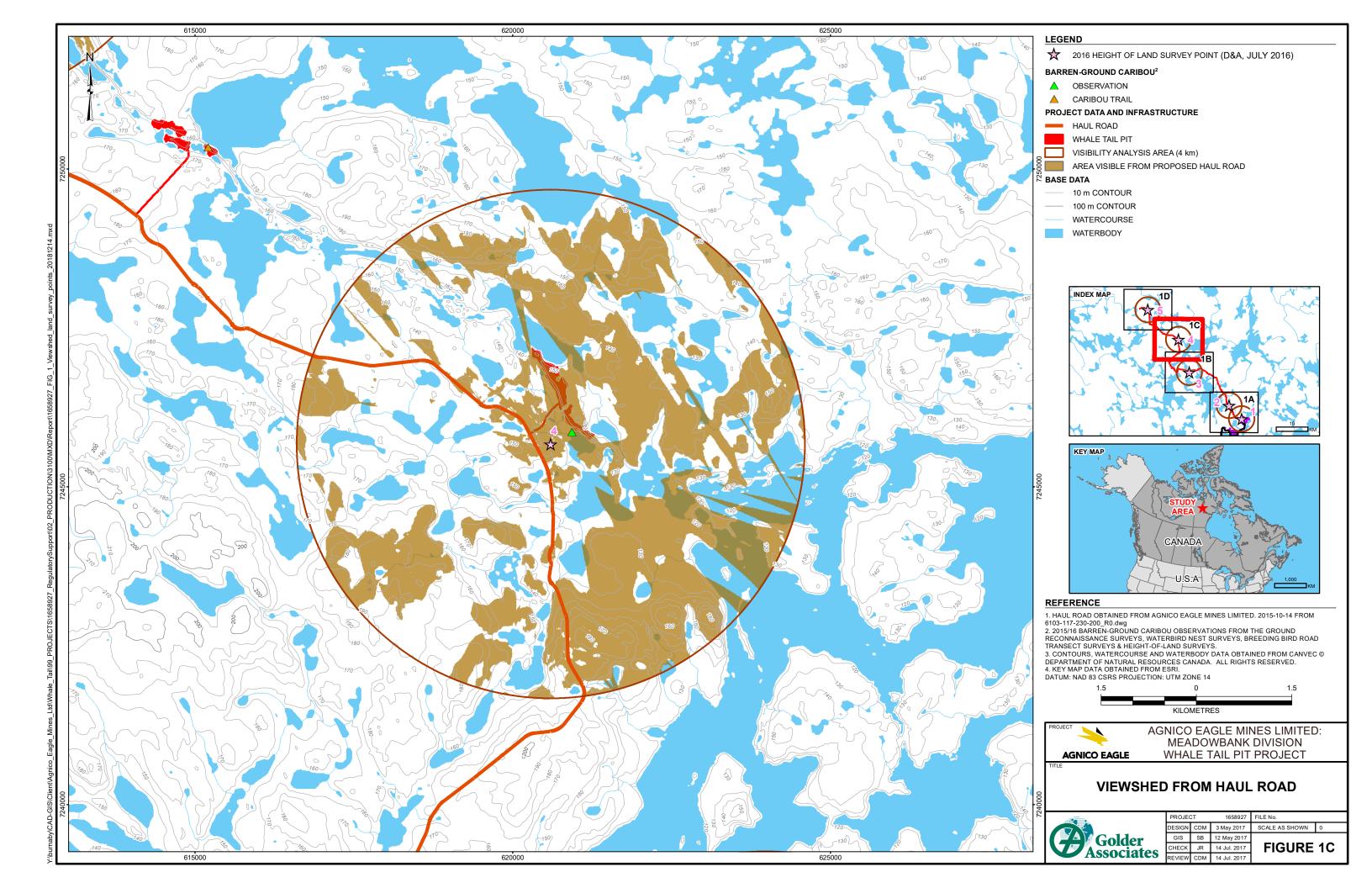
Young, M.Y. 2017. Landscape Architect, Ecologist. Dougan & Associates – Ecological Consulting & Design, Guelph, ON. E-mail with R. Vanengen (Agnico Eagle). July 2017.

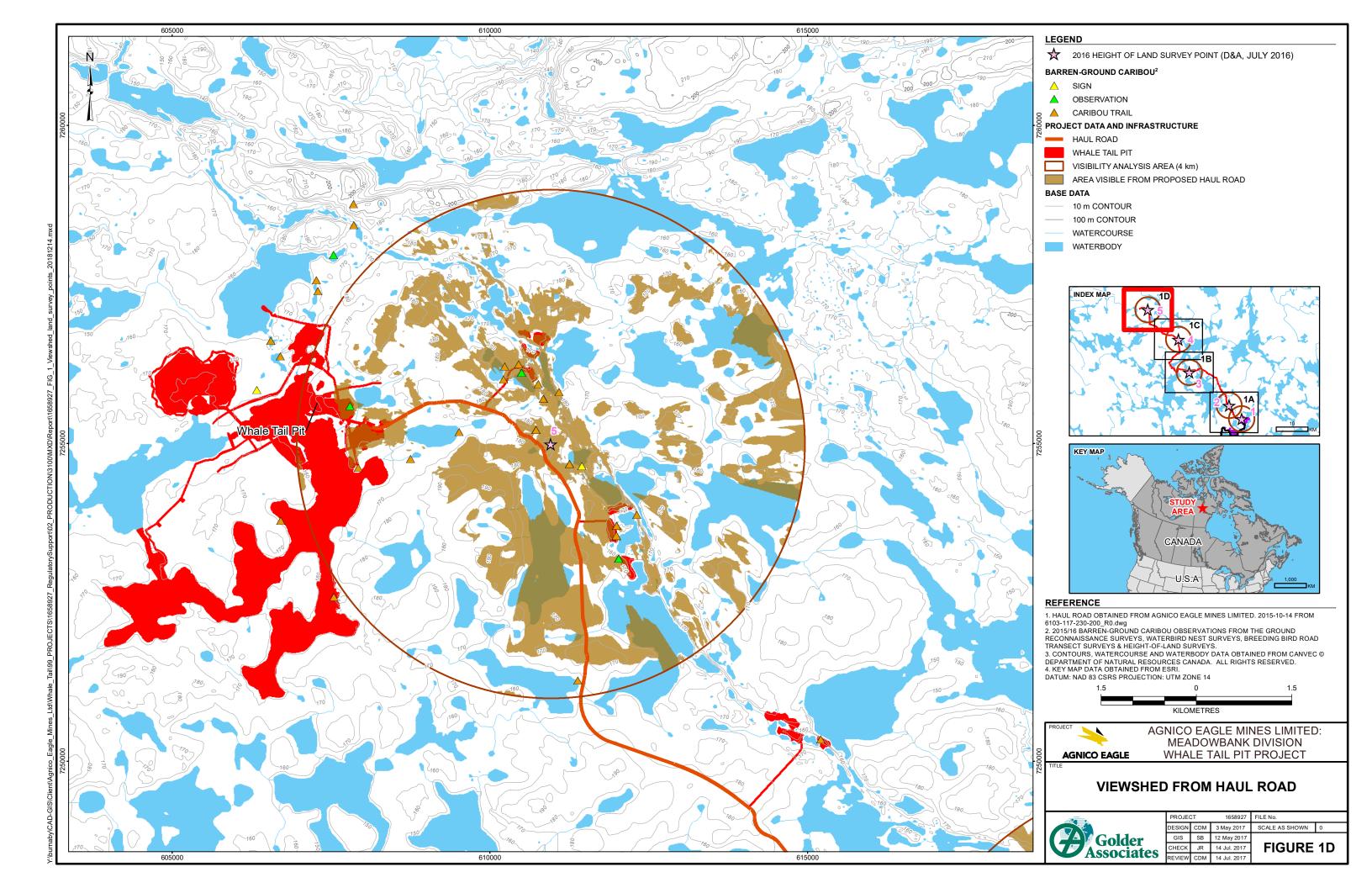
https://capws.golder.com/sites/1658927RegulatoryAffairs/p3100\_TEMP\_and\_Workshops/TEMP/02\_Appendices/Appendix H\_Viewshed/Appendix H\_Viewshed\_Analysis\_June5.docx

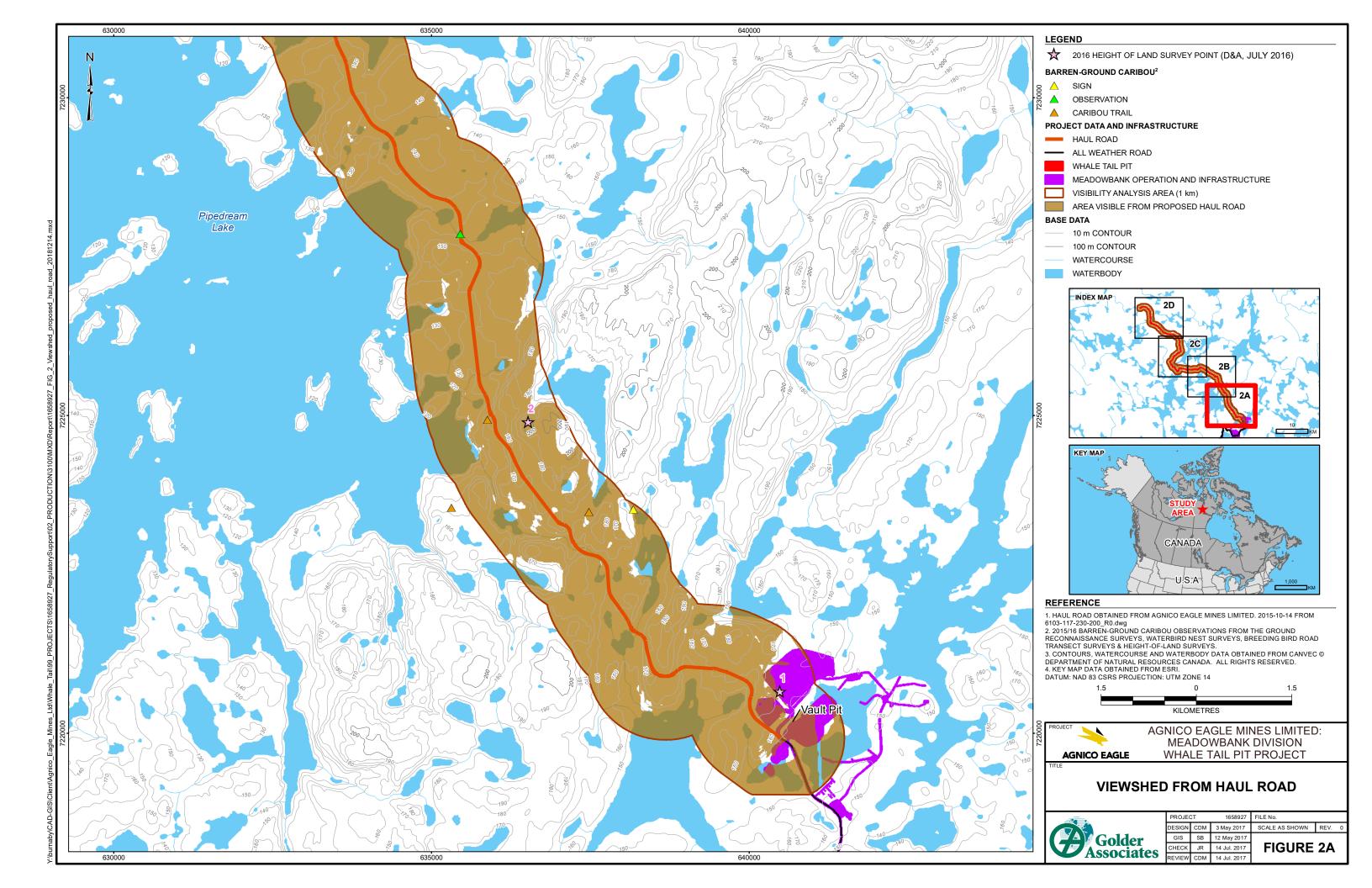


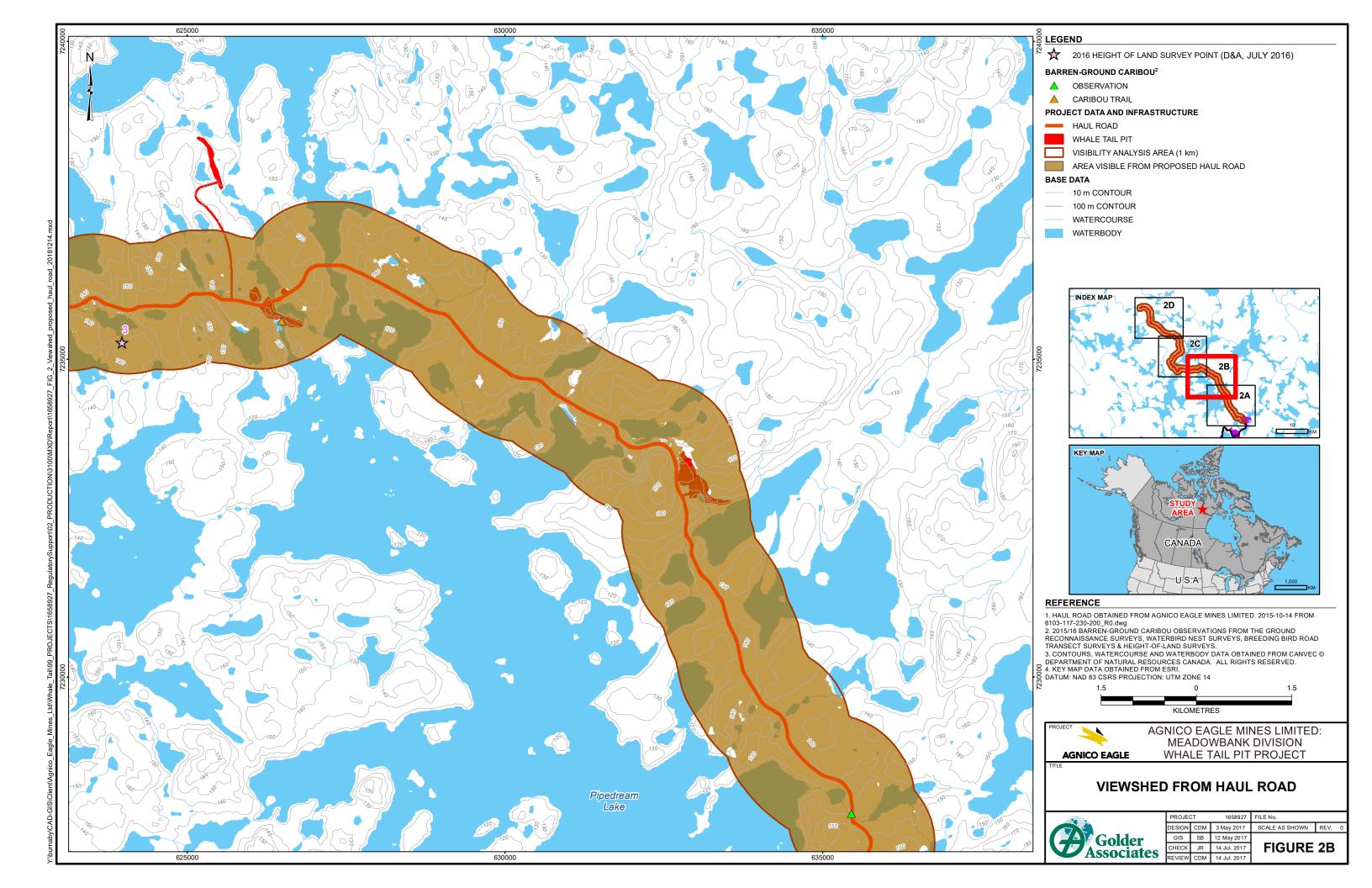


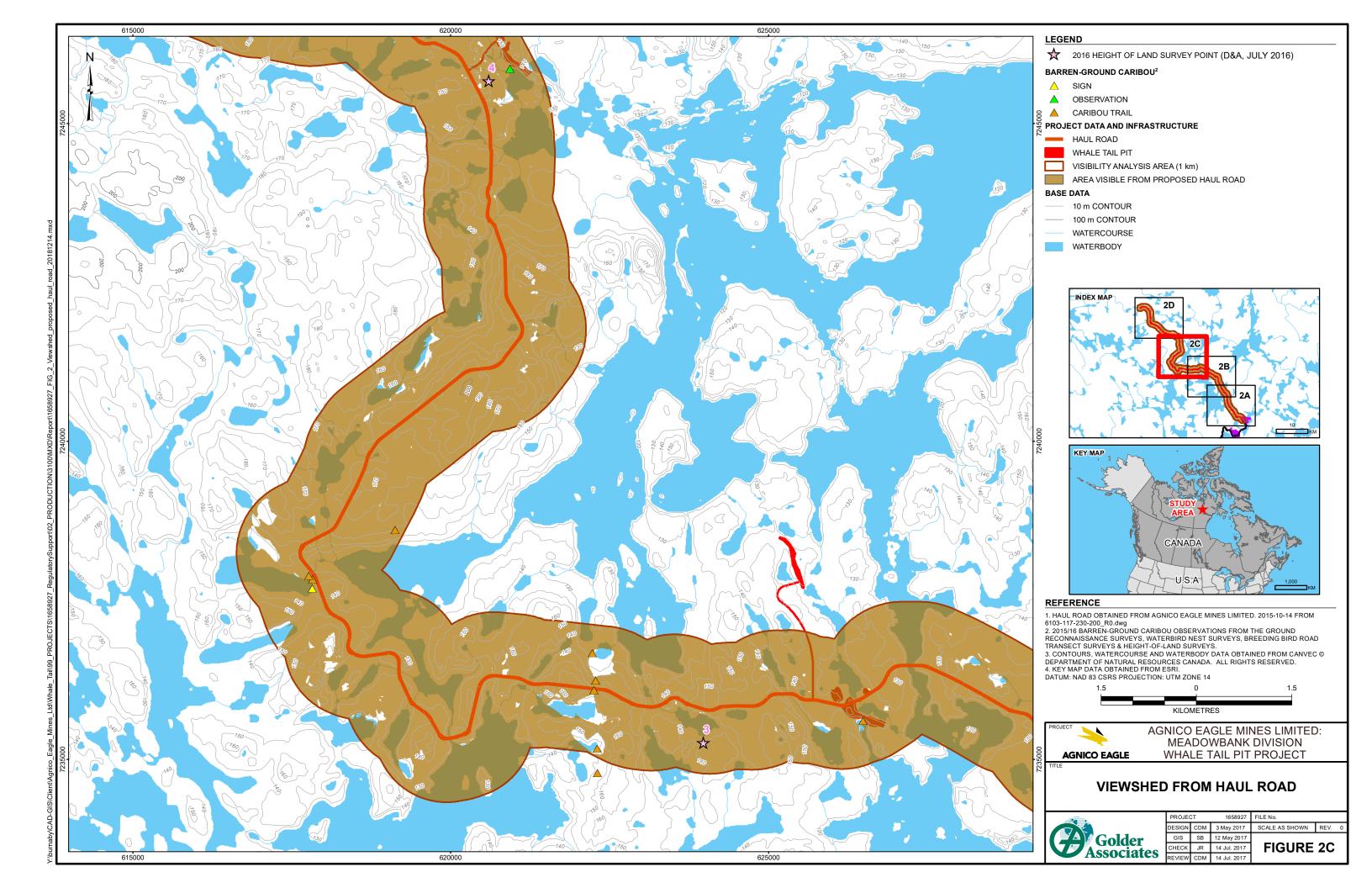


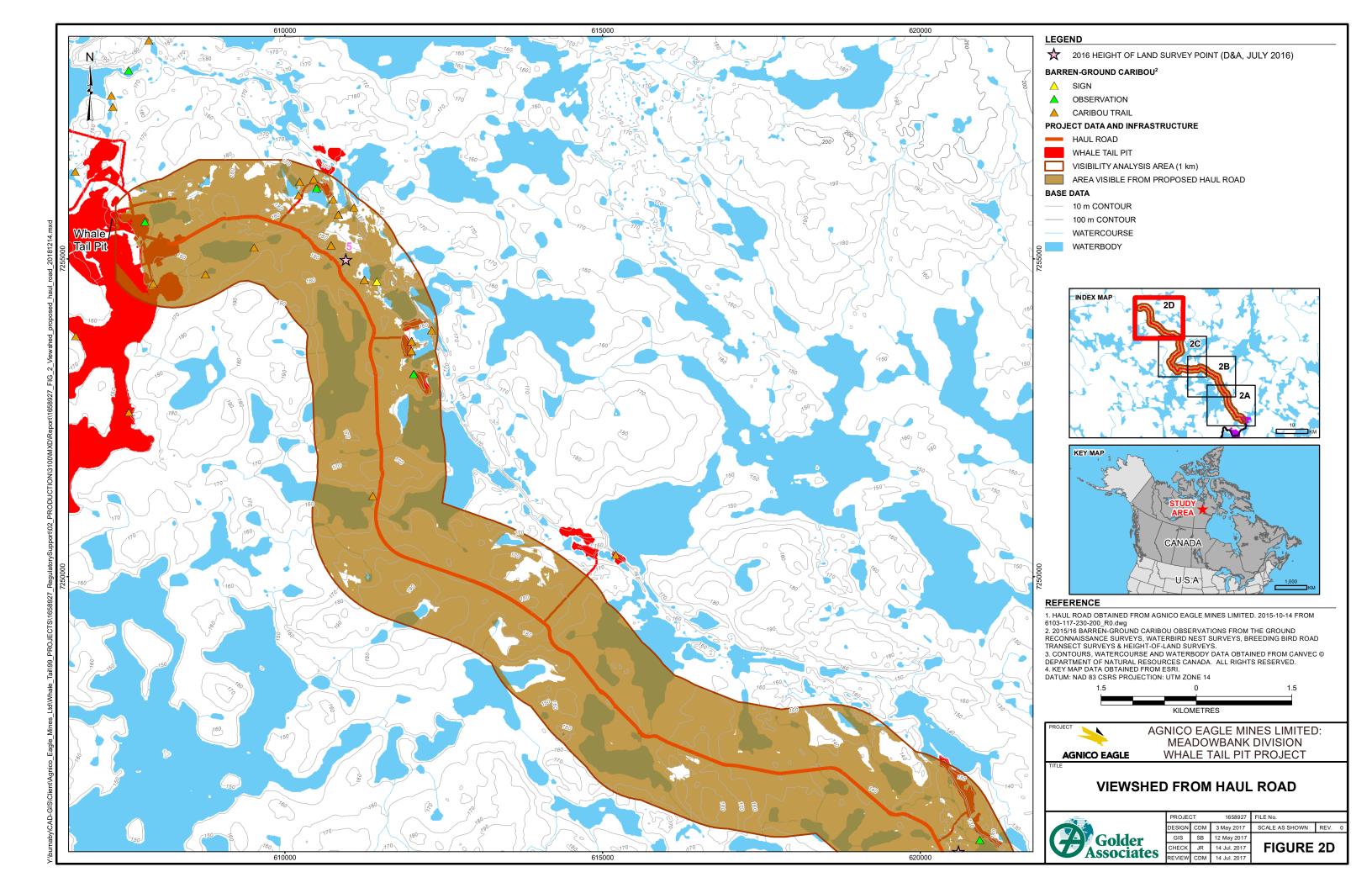












4. INSET MAP DATA OBTAINED FROM ESRI.
DATUM: NAD 83 CSRS PROJECTION: UTM ZONE 14 **Associates**