

## **Appendix 51**

---

### **Meadowbank and Whale Tail Air Quality and Dustfall Management Plan Version 6**

---

---



MEADOWBANK COMPLEX

**Air Quality and Dustfall Monitoring Plan**

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

Prepared by:  
Agnico Eagle Mines Limited – Meadowbank Complex

Version 6  
Mars 2022

## **EXECUTIVE SUMMARY**

In accordance with conditions of NIRB Project Certificates No.004 and No.008, the Air Quality and Dustfall Monitoring Plan (AQDMP, or the plan) describes the design features and operational procedures for the monitoring of air quality and dustfall at the Meadowbank Complex.

The objective of this program is to measure ambient outdoor air quality (suspended particulates, NO<sub>2</sub>, dustfall) around the Meadowbank and Whale Tail sites. Dustfall is also monitored along the Meadowbank All-Weather Access Road (AWAR) and Whale Tail Haul Road (WTHR) as a component of this plan.

For the measured parameters, results are primarily compared to Government of Nunavut (GN) Environmental Guidelines for Ambient Air Quality and/or Canadian Ambient Air Quality Standards (CAAQS) for TSP, PM<sub>2.5</sub> and NO<sub>2</sub>; BC Ambient Air Quality Objectives for PM<sub>10</sub>; and Alberta Ambient Air Quality Guidelines for passive dustfall.

## **IMPLEMENTATION SCHEDULE**

The proposed implementation schedule for this Plan is effective immediately (March 2022) subject to any modifications proposed by the Nunavut Impact Review Board (NIRB) as a result of the review and approval process.

## **DISTRIBUTION LIST**

Agnico Eagle - Environment and Critical Infrastructures Superintendent

Agnico Eagle – Environmental General Supervisor

Agnico Eagle – Environmental Coordinators

Agnico Eagle – Environmental Technicians

### 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_NIRB	12/2018	All		Air Quality and Dustfall Monitoring Plan as Supporting Document submitted to the Nunavut Impact Review Board for review and approval as part of Whale Tail Pit – Expansion Project
4	03/2019	All		Included recommendation from ECCC
4.1_NIRB	05/2019	Section 1.2, Table 1, Fig 1&2 3.1, 5.0 and Tables 2 and 3  Table 3		Updated to reflect changes in monitoring to be conducted at DF-5 and DF-6 to address ECCC-TC-4  Updated to include dustfall guidelines (Table 2) and dustfall numerical thresholds for dust mitigation and adaptive management (Table 3) to address ECCC-TC-5  Updated to explain how data from active PM sampling will be used to inform dust management practices
5	03/2020	All		Update following WT Expansion Project Approval. Add DF-7 station for NO <sub>2</sub> continuous monitoring
6	03/2022	Section 1.2.9 1.2.10 Table 1 Figure 2 Section 2.3	3,4,6  8	Added DF-8 and DF-9 station for NO <sub>2</sub> monitoring  Added the Passive NO <sub>2</sub> section

**Prepared by:**

Agnico Eagle Mines Limited - Meadowbank Division - Environmental Department

**Approved by:**



Alexandre Lavallee

Environmental & Critical Infrastructures Superintendent

## TABLE OF CONTENTS

<b>EXECUTIVE SUMMARY</b> .....	<b>i</b>
<b>IMPLEMENTATION SCHEDULE</b> .....	<b>ii</b>
<b>DISTRIBUTION LIST</b> .....	<b>ii</b>
<b>DOCUMENT CONTROL</b> .....	<b>iii</b>
<b>LIST OF TABLES</b> .....	<b>v</b>
<b>LIST OF FIGURES</b> .....	<b>v</b>
<b>1 INTRODUCTION</b> .....	<b>1</b>
1.1 OBJECTIVES .....	1
1.2 MONITORING LOCATIONS .....	1
1.2.1 DF-1.....	1
1.2.2 DF-2.....	1
1.2.3 DF-3.....	2
1.2.4 DF-4.....	2
1.2.5 AWAR: KM-18 and KM-78 .....	2
1.2.6 DF-5.....	2
1.2.7 DF-6.....	3
1.2.8 DF-7.....	3
1.2.9 DF-8.....	3
1.2.10 DF-9.....	3
1.2.11 WTHR: KM-133, KM-151 and KM-169.....	3
<b>2 METHODS</b> .....	<b>7</b>
2.1 TSP, PM <sub>10</sub> , PM <sub>2.5</sub> .....	7
2.2 DUSTFALL .....	8
2.3 Passive NO <sub>2</sub> .....	8
2.4 NO <sub>2</sub> .....	8
2.5 WEATHER DATA .....	9
2.6 GREENHOUSE GAS EMISSIONS .....	9
2.7 QUALITY ASSURANCE/QUALITY CONTROL PROCEDURES .....	9
<b>3 DATA ANALYSIS</b> .....	<b>10</b>
3.1 REGULATORY STANDARDS.....	10
3.2 ANNUAL TRENDS .....	11
3.3 REPORTING .....	11
<b>4 OPERATION AND MAINTENANCE</b> .....	<b>12</b>

4.1	MANAGEMENT RESPONSIBILITY .....	12
4.2	OPERATION.....	12
4.3	MAINTENANCE .....	12
<b>5</b>	<b>DUST AND NITROGEN OXIDE MANAGEMENT .....</b>	<b>13</b>
5.1	Dust .....	13
5.2	Nitrogen Oxides.....	14
<b>6</b>	<b>PLAN REVIEW.....</b>	<b>16</b>
<b>7</b>	<b>REFERENCE.....</b>	<b>17</b>

### LIST OF TABLES

Table 1:	UTM Coordinates for the Meadowbank and Whale Tail Air Quality and Dustfall Monitoring Locations.....	4
Table 2:	Standards for Ambient Air Quality for the Parameters of Concern at Meadowbank and Whale Tail	10
Table 3:	AWAR dust suppression location.....	13
Table 4:	Thresholds and Mitigation Measures .....	15

### LIST OF FIGURES

Figure 1:	Meadowbank and Whale Tail Air Quality and Dustfall Monitoring Locations .....	5
Figure 2:	Whale Tail Expansion Project Air Quality and Dustfall Monitoring Locations .....	6

## 1 INTRODUCTION

---

### 1.1 OBJECTIVES

In accordance with Nunavut Impact Review Board (NIRB) 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 (now Environment and Climate Change 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 was only from January to May 2019. The Whale Tail onsite air quality monitoring station was then switched to DF-6 as a result of discussions with regulators during permitting for the Whale Tail Expansion Project. Dustfall transects at approximately kilometers 133, 151, and 169 along the Whale Tail Haul Road (WTHR) were 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.

Station DF-7 (WTHR KM-132) were added in 2021 to provide continuous monitoring of NO<sub>2</sub> to meet Condition 1.c of the NIRB Project Certificate No.008.

Stations DF-8 (WTHR KM132) and DF-9 (WTHR KM 152) were added in 2021 in response to suggestions by Environment and Climate Change Canada (ECCC).

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 AWAR. TSP, PM<sub>10</sub>, PM<sub>2.5</sub>, NO<sub>2</sub> and dustfall are monitored at this location year-round.

#### 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<sub>10</sub>, PM<sub>2.5</sub>, NO<sub>2</sub> and dustfall are monitored at this location year-round.



### **1.2.3 DF-3**

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

### **1.2.4 DF-4**

Station DF-4 was located 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 is monitored at this location year-round.

### **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-July 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). These distances were chosen to bracket the smallest predicted zone of influence (ZOI) of 100 m. The zone of maximum dustfall had previously been reported to be within 300 m of roads under heavier use than the Meadowbank AWAR (Auerbach et al. 1997). Samples at the 1000 m mark on the upwind side are considered reference locations. The purpose of these temporary monitoring stations was 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).

Between 2017 and 2019, transects have also been monitored in five locations where dust suppressant is applied (Km 11, 25, 50, 69, 80). The purpose of these temporary monitoring stations is to evaluate dust mitigation measures in comparison to the reference sites at km 18 and 78. Given the result from 2017 to 2019 have demonstrated the suppression mitigation lower the emission compared to non-suppression areas, Agnico continue to apply the suppressant, but stopped doing the monitoring in these transects starting in 2020.

In 2019 and 2020, Agnico conducted a study to put in application the recommendation from ECCC stating that the installation of canisters at ground level and not on 1.5-2m poles was not a common practice. Detailed methodology and results are provided in the 2019 and 2020 Air Quality and Dust Monitoring Report. Although comparative studies conducted in 2019 and 2020 support Agnico's assumptions that ground-level sampling results in conservatively high estimates of dustfall. All sample collection canisters were moved to stands beginning in 2021 based on comments received from regulators.

### **1.2.6 DF-5**

Station DF-5 (Figure 2) was located 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 included passive NO<sub>2</sub> and dustfall. Monitoring at this station occurred for dustfall and NO<sub>2</sub> from January – May, 2019. The Whale Tail onsite air quality monitoring station was then switched to DF-6a as a result of discussions with regulators during permitting for the Whale Tail Expansion Project. This station is permanently dismantled.

### **1.2.7 DF-6**

Station DF-6a (Figure 2) is located approximately 800 to 1000 m southeast of the Whale Tail Camp in a representative area for dustfall and NO<sub>2</sub>. Station DF-6b (Figure 2) is located on the southern edge of the main camp in an area identified as significant for determination of particulate matter (TSP, PM10 and PM2.5) relative to concentrations predicted further from the project footprint. Monitoring at DF-6a started in May 2019 for dustfall and NO<sub>2</sub>. As continuous monitoring is being conducted at DF-7, no more NO<sub>2</sub> monitoring is conducted since 2020 at this station, while dustfall monitoring continues year-round. Suspended particulates samplers at monitoring station DF-6b was installed in November 2019. Monitoring included TSP, PM10, PM2.5 year-round.

### **1.2.8 DF-7**

Station DF-7 (Figure 2), is located near the communication tower at kilometer 132 along the Whale Tail Haul Road. This location was chosen as there was readily available AC power from a diesel generator used to provide power to the communications tower. Station DF-7 is located approximately 200 m upwind of the generator to minimize the impacts of NO<sub>2</sub> emissions from the generator influencing measurements at the station. This monitoring location was also chosen as it will provide an accurate assessment of regional NO<sub>2</sub> concentrations that are not unduly influenced by a single facility but are still able to account for the impacts of developments at Whale Tail and Meadowbank. The station is downwind of Whale Tail based on the predominant wind directions in the area, which is also a requirement of Project Certificate 008 Condition 1.c. Results from this station are obtained since July 2021.

### **1.2.9 DF-8**

Station DF-8 (Figure 2) is located near the communication tower at kilometer 132 along the Whale Tail Haul Road. The station is located on top of the sea-container used for DF-7 Station. The NO<sub>2</sub> is monitored at this location year-round (Installed in May 2021).

### **1.2.10 DF-9**

Station DF-9 (Figure 2) is located at kilometer 152 along the Whale Tail Haul Road. Approximately 110 meters, east of the road. The NO<sub>2</sub> is monitored at this location year-round (Installed in May 2021).

### **1.2.11 WTHR: KM-133, KM-151 and KM-169**

Dustfall transects are established between kilometers 133 & 134, 151 & 152, and 169 & 170 along the WTHR. Dustfall samples are collected annually from mid-July 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**

<b>Monitoring Locations</b>	<b>Measured Preferences</b>	<b>UTM Zone</b>	<b>Easting</b>	<b>Northing</b>
DF-1	TSP, PM <sub>10</sub> , PM <sub>2.5</sub> , NO <sub>2</sub> , dustfall	14W	636850	7217663
DF-2	TSP, PM <sub>10</sub> , PM <sub>2.5</sub> , NO <sub>2</sub> , dustfall	14W	637895	7213049
DF-3	Dustfall	14W	639599	7213198
DF-4	Dustfall	14W	639233	7217074
AWAR KM-18	Dustfall	14W	640208	7152082
AWAR KM-78	Dustfall	14W	626155	7199739
DF-5	Not active since 2019	14W	608301	7255973
DF-6a	Dustfall	14W	608842	7254348
DF-6b	TSP, PM <sub>10</sub> , PM <sub>2.5</sub> ,	14W	608361	7254974
DF-7	Continuous NO <sub>2</sub>	14W	632414	7233318
DF-8	NO <sub>2</sub>	14W	632407	7233254
DF-9	NO <sub>2</sub>	14W	618033	7238670
WTHR KM-134	Dustfall	14W	630941	7234375
WTHR KM-151	Dustfall	14W	618132	7238621
WTHR KM-169	Dustfall	14W	613782	7249508

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

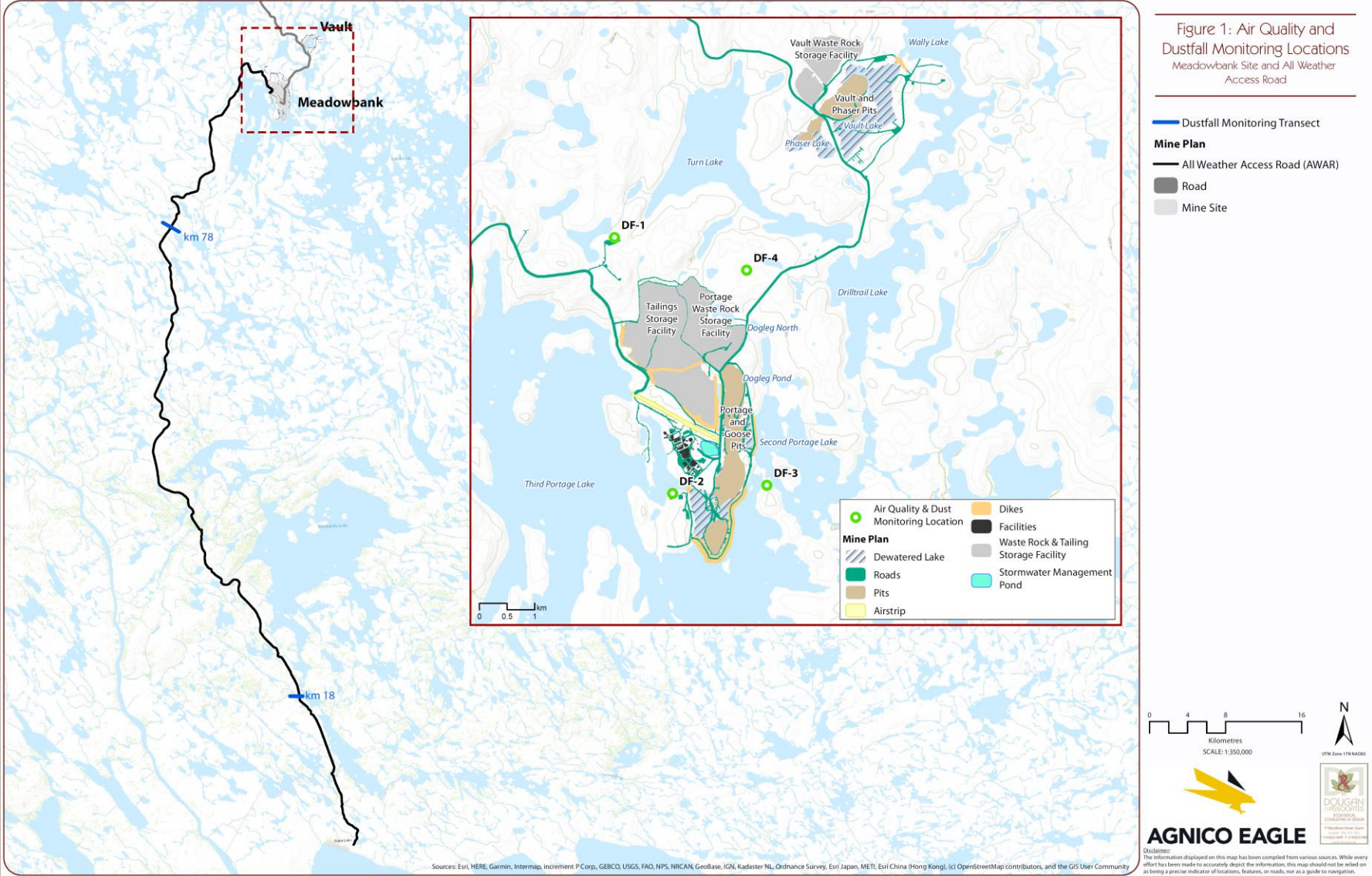
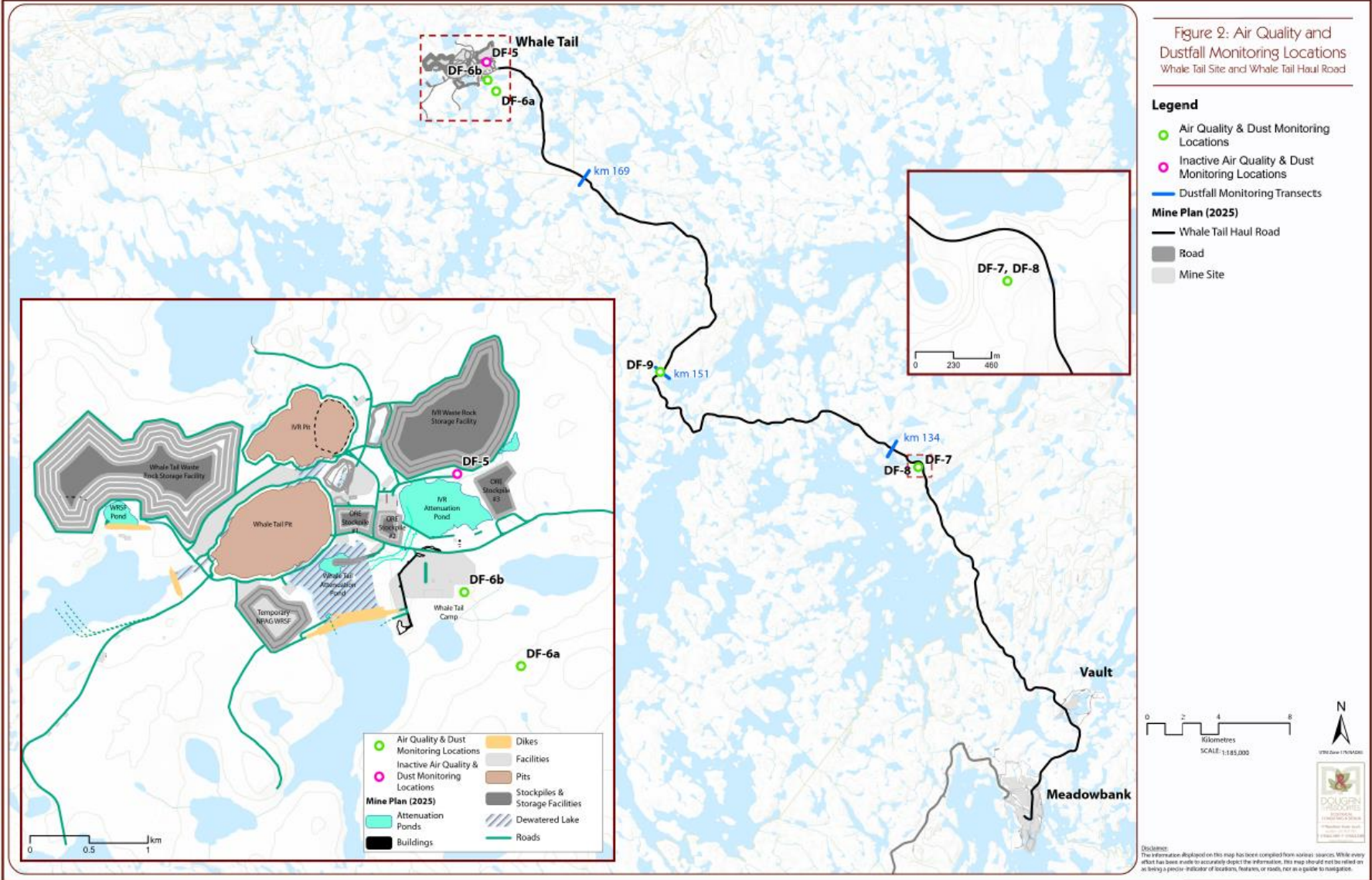




Figure 2: Whale Tail Expansion Project Air Quality and Dustfall Monitoring Locations



## 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<sub>2.5</sub> and PM<sub>10</sub> (fine and coarse particulates) are regulated based on health-related concerns. TSP and PM<sub>2.5</sub> are subject to GN ambient air quality standards (GN, 2011). No standard is provided for PM<sub>10</sub> 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:

$$C = M/V_{STD}$$

Where:

C = mass concentration of particulates ( $\mu\text{g}/\text{m}^3$ )

M = final mass of filter – initial mass of filter ( $\mu\text{g}$ )

$V_{STD}$  = 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  $V_{STD}$  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 ( $\text{mg}/\text{cm}^2/30$  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 Passive $\text{NO}_2$

Ambient concentrations of  $\text{NO}_2$  by volume (ppb) are analyzed over one-month periods (approximately 30 days) using a passive sampling device provided by the accredited laboratory. The annual average  $\text{NO}_2$  concentration by volume was calculated from the monthly data for comparison against the relevant GN guideline.

## 2.4 $\text{NO}_2$

$\text{NO}_2$  is produced primarily through the combustion of hydrocarbons in powerplants/vehicles and other mining equipment and during blasting. Ambient Concentrations of  $\text{NO}_2$  by volume (ppb) will be measured at one location (DF-7) on a continuous basis to be able to compare ambient concentrations with CAAQS.  $\text{NO}_2$  will be monitored using a specific unit adapted to measure ambient concentrations of  $\text{NO}$ ,  $\text{NO}_2$  and  $\text{NO}_x$ .

The  $\text{NO}_2$  analyzer will be housed in a temperature-controlled environmental enclosure where calibration equipment and gases will also be located. All data from the  $\text{NO}_2$  analyzer will be recorded on a datalogger and transmitted remotely to Agnico Eagle servers for review.

## **2.5 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).

In addition, a wind monitor was installed along with the NO<sub>x</sub> analyser at DF-7, with hourly average wind speed and wind direction recorded. Wind monitoring can be used to help identify sources of pollutants as needed, based on wind direction.

## **2.6 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 Complex Greenhouse Gas Reduction Plan.

## **2.7 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.

As there are no monitoring guidelines in Nunavut, the Alberta *Air Monitoring Directive* (AEP 2016) will be used as the main reference for the quality assurance and quality control procedures on the NO<sub>2</sub> analyzer. Automatic zero and span verifications will be performed on a daily basis and will be checked remotely three times per week for abnormal deviations. Monthly site visits will be conducted to perform preventative maintenance and examine manifold lines, as well as verification of temperature, pressure and flow. Multipoint calibrations will be performed on a quarterly basis or following span drifts of greater than  $\pm 10\%$ , and/or maintenance activity whichever comes first. Time between a failed span/zero verification and the next verification that passes is not considered valid, and instrumentation must be operational 90% of the time according to the guideline. Standard Operating Procedures (SOPs) will be developed for the NO<sub>2</sub> analyzer and calibrator to ensure operators are aware of all the detailed information and follow the correct installation, operation and detailed calibration and maintenance procedures for the instruments.



### 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). Continuous NO<sub>2</sub> monitoring data will be compared to CAAQS for 2020. Standards for the measured parameters are provided in Table 2.

**Table 2: Standards for Ambient Air Quality for the Parameters of Concern at Meadowbank and Whale Tail**

Parameter	Time Frame	Nunavut Standard		CAAQS (2020)	
		µg/m <sup>3</sup>	ppb	µg/m <sup>3</sup>	ppb
Fine Particulate Matter (PM <sub>2.5</sub> )	24-h average	30		27	
	Annual arithmetic average			8.8	
Total Suspended Particulate (TSP)	24-h average	120			
	Annual geometric mean	60			
Nitrogen Dioxide (NO <sub>2</sub> )	1-h average	400	213	32	60
	24-h average	200	106		
	Annual arithmetic mean	60	32	9.1	17.0
Dustfall (mg/cm <sup>2</sup> /30-days)	30-day	0.53 <sup>1</sup>	-		
	30-day	1.58 <sup>2</sup>	-		

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

<sup>1</sup>Based on the Alberta Ambient Air Quality Guideline value for residential and recreational areas.

<sup>2</sup>Based on the Alberta Ambient Air Quality Guideline value for commercial and industrial areas.

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 µg/m<sup>3</sup>.

Comparison to Canadian Ambient Air Quality Standards (CAAQS) for Fine Particulate Matter (PM<sub>2.5</sub>) is also done (27 µg/m<sup>3</sup> for the 24-h)

Likewise, no standards for dustfall are available for Nunavut. Results of the dustfall analysis for transects along the AWAR and the WTHR will be compared to the Alberta Ambient Air Quality Guideline<sup>1,2</sup> for

<sup>1</sup> As stated in the Alberta Ambient Air Quality Objectives (i.e., standards), objectives are used:

- to determine adequacy of facility design
- to establish required stack heights and other release conditions
- to assess compliance and evaluate facility performance

<sup>2</sup> As stated in the Alberta Ambient Air Quality Guidelines, guidelines may be used:

- for airshed planning and management
- as a general performance indicator
- to assess local concerns

residential and recreational areas of  $0.53 \text{ mg/cm}^2/30\text{-days}$ . Results of dustfall analysis at Stations DF-1 to DF-6 will be compared to the Alberta guideline for commercial and industrial areas of  $1.58 \text{ mg/cm}^2/30\text{-day}$ .

### **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;
- Community concerns surrounding the haul road dust and the effectiveness of mitigation strategies will be reported and evaluated. If these concerns warrant additional measures, Agnico will consider enhanced monitoring of haul road dust; and
- Mitigation measures for reducing non-compliance incidents in the future.

## **4 OPERATION AND MAINTENANCE**

---

### **4.1 MANAGEMENT RESPONSIBILITY**

Agnico Eagle is 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 is responsible to ensure that the Partisol samplers and specific unit for continuous NO<sub>2</sub> monitoring are operated in accordance with the equipment operating manuals and Partisol 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). SOPs will be kept up to date and communicated to personnel. The SOPs will also ensure that proper QAQC practices are followed.

### **4.3 MAINTENANCE**

Annual calibration of the Partisol samplers and continuous NO<sub>2</sub> unit monitoring will be performed by qualified experts to ensure results are in compliance with good practices. Regular maintenance and care of the air samplers will allow, among other, flow values and temperature compensation to be constant with time.

Annual training sessions will be held with qualified experts to maintain and refresh technical skillset on these units.

## 5 DUST AND NITROGEN OXIDE MANAGEMENT

### 5.1 Dust

Road watering, application dust suppressants, speed limit reduction, grade road surface, add new granular material are all mitigation measures that 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.

Numeric thresholds (Table 4) based on the Alberta Ambient Air Quality Guidelines for dustfall 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.

As per previous year, 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. If the first dust suppression application continued to be effective throughout the season, the need for the second application will be based on visual observations. Locations are described in Table 3.

**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). No concern from community were received to date for the WTHR.

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 7.3; WTHR Management Plan; Agnico Eagle 2020). 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 Plan; Agnico Eagle; 2021).

Additional dust suppressing measures could be implemented along the AWAR and WTHR depending on additional overall community concerns and traditional knowledge information given during regular consultations. As well, overall safety concerns towards increased traffic and wildlife interactions, including but not limited to, visibility, could increase dust mitigation implementations through the WTHR and AWAR. These assessments would be done by the road supervisors and the Environmental department.

Dust suppression on Meadowbank and Whale Tail mine sites will consist of water applied during dry days and/or dust suppressants (e.g. Tetraflake), as needed.

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

Furthermore, the NIRB requested Agnico to provide an action plan for the development of a community-based monitoring program for dust. In response to the NIRB's Recommendations, Agnico Eagle met with Hamlet Council on February 16, 2022 and the Baker Lake HTO on February 17, 2022 to discuss the development of the Baker Lake Dust Advisory Group. This meeting was scheduled earlier in 2021 but postponed due to COVID restrictions. The role of this Dust Advisory Group will mainly be to articulate concerns and identify areas that need special attention and involve the community of Baker Lake in a dust sampling information session with the Environmental Department in 2022. The exact roles and responsibility and sampling program will be defined in the first inaugural meeting schedule to be held in Q2 2022.

The first meeting (February 2022) was to identify the impacted groups by dust generated by Agnico operation, the Baker Lake HTO identified the berry pickers as one of them and a list of participants will be provided to Agnico. Additional details will be provided annually as part of the Meadowbank Complex annual report.

## **5.2 Nitrogen Oxides**

Nitrogen oxides are emitted throughout the site through the combustion of diesel and gasoline and from blasting. Nitrogen oxides emissions will be controlled by the following means:

1. A preventive maintenance program will be employed that encompasses all pollution control equipment and diesel-fired engines;
2. Emission reductions achieved through the use of current equipment that complies with Transport Canada's off-road engine emission criteria; and
3. Limit vehicle idling whenever possible.

**Table 4: Thresholds and Mitigation Measures**

<b>Location</b>	<b>Frequency</b>	<b>Indicator</b>	<b>Threshold</b>	<b>Mitigation Measure</b>
Haul road and site access roads	Regular weekly or more frequency inspection by road supervisor during the late spring and summer periods	<ul style="list-style-type: none"> <li>• Measured dustfall</li> <li>• Deterioration of visibility along road</li> </ul>	<ul style="list-style-type: none"> <li>• Deterioration of visibility</li> <li>• Safety concern</li> <li>• High dust levels evident near significant waterbodies</li> <li>• Dustfall exceeding 0.53 mg/cm<sup>2</sup>/30-day at 500 m from the AWAR or WTHR</li> </ul>	<ul style="list-style-type: none"> <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.	<ul style="list-style-type: none"> <li>• Measured dustfall</li> <li>• Measured PM</li> </ul>	<ul style="list-style-type: none"> <li>• Deterioration of visibility</li> <li>• Safety concern</li> <li>• Dust reaching Whale Tail Lake or Mammoth Lake</li> <li>• Dustfall exceeding 1.58 mg/cm<sup>2</sup>/30-day at stations DF-1 to DF-6</li> <li>• Active PM results exceeding FEIS predictions at DF-6</li> </ul>	<ul style="list-style-type: none"> <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	<ul style="list-style-type: none"> <li>• Deterioration of visibility</li> </ul>	<ul style="list-style-type: none"> <li>• Deterioration of visibility</li> <li>• Safety concern</li> </ul>	<ul style="list-style-type: none"> <li>• Use water as a dust suppressant</li> </ul>

## **6 PLAN REVIEW**

---

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

## 7 REFERENCE

---

- AEP (Alberta Environment and Parks). 2016. Air Monitoring Directive.
- 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.
- Agnico Eagle. 2017. 2016 All-Weather Access Road Dust Monitoring Report.
- Agnico Eagle. 2018. Whale Tail Pit Expansion Project FEIS. November 2018.
- BC 2013. British Columbia Ambient Air Quality Objectives. Provincial Air Quality Objective Information Sheet. August 12, 2013.
- CCME (Canadian Council of Ministers of the Environment) 2019. Guidance Document on Air Zone Management.
- Cumberland Resources Ltd. 2005. Meadowbank Gold Project Air Quality Impact Assessment Report.
- GN (Government of Nunavut) 2011. Environmental Guideline for Ambient Air Quality. Department of Environment, Government of Nunavut. October, 2011.
- GN, Department of Environment. 2014. Guideline: Dust Suppression on Unpaved Roads.
- Golder (Golder Associates Ltd.) 2005 Air Quality and Noise Management. Meadowbank Gold Project.
- Golder 2008. Technical Memorandum. Addendum Report: Air Quality Monitoring Meadowbank Gold Project. Prepared for Agnico-Eagle Mines Ltd. May 16, 2008.