Appendix 50

Meadowbank and Whale Tail 2021 Air Quality and Dust Monitoring Report

AGNICO EAGLE

MEADOWBANK COMPLEX

2021 Air Quality and Dustfall Monitoring Report

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

Prepared by:
Agnico Eagle Mines Limited – Meadowbank Complex

March, 2022

EXECUTIVE SUMMARY

The 2021 air quality and dustfall monitoring program at the Meadowbank Complex was conducted according to the Air Quality and Dustfall Monitoring Plan, Version 5 (March, 2020). The objective of this program is to measure dustfall, NO_2, and suspended particulates (TSP, PM_{10}, $PM_{2.5}$) at various monitoring locations around the Meadowbank and Whale Tail sites, Meadowbank All-Weather Access Road (AWAR), and Whale Tail Haul Road (WTHR).

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, $PM_{2.5}$ and NO_2; BC Ambient Air Quality Objectives for PM_{10}; and Alberta Ambient Air Quality Guidelines for passive dustfall. Results are also compared to model predictions from the Project's Final Environmental Impact Statement, where available.

For all monitoring stations and parameters, the vast majority of results were well within these criteria. Occasional single sample exceedances of short-term standards for suspended particulates and dustfall occurred, as described below. No exceedances of annual average standards occurred (GN guidelines, CAAQS for particulate matter and NO_2), and no exceedances of available FEIS model predictions occurred.

In total, 454 of 458 results for suspended particulates met applicable standards for the 24-h average. Exceedances included three TSP samples and one PM_{10} sample. Three of these cases occurred at DF-6b where exceedances were predicted in the FEIS Addendum. All $PM_{2.5}$ results met applicable standards.

Of 59 dustfall samples collected at onsite locations DF-1 – DF-6, one exceeded the relevant Alberta guideline for industrial/commercial areas. This sample was collected at station DF-1. All other results at this monitoring station were well below the guideline. This sample is therefore considered an isolated event, potentially due to sample jar contamination, and no change in mitigation is planned based on this result. For dustfall along the five AWAR and WTHR transects, no relevant exceedances of the established dust management threshold occurred (0.53 mg/cm^2/30d at 500 m). Total dustfall in one sample exceeded the threshold at 1000 m downwind (km 78), but the result for fixed dustfall was well below the guideline, so results are considered unrelated to road activity.

Annual average NO_2 as measured using passive samplers met the GN guideline of 32 ppb and the CAAQS of 17 ppb for all stations (DF-1, DF-2, DF-6b, DF-8, DF-9). All results for continuous NO_2 monitoring at DF-7 were also well below the relevant 1-h, 24-h, and annual standards (GN and/or CAAQS).

Estimated greenhouse gas emissions for the Meadowbank Complex as calculated for reporting to Environment Canada's Greenhouse Gas Emissions Reporting Program in 2021 were 243,752 tonnes CO_2 equivalent, which is slightly higher than values reported in recent years but still less than FEIS predictions.

Meadowbank incinerator stack testing was performed in 2021. The complete report is provided in an Appendix of the 2021 Meadowbank Complex Annual Report. The average result for mercury in 2021 was less than the GN limit, but the dioxin and furan result showed an exceedance of the regulatory limit of 80 pg/m^3. The next test will be conducted in 2022. No incinerator was in operation at Whale Tail site in 2021.

Overall, there are no apparent trends towards increasing or unpredicted air quality concerns at the Meadowbank Complex in 2021, and mitigation measures in place to control air emissions are therefore considered to be effective.

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1.1 BACKGROUND AND OBJECTIVES

In accordance with conditions of NIRB Project Certificates No.004 and No.008, air quality and dustfall monitoring was conducted at the Meadowbank Complex in 2021, as described in the Air Quality and Dustfall Monitoring Plan - Version 5 (March, 2020). The objective of this program is to measure ambient outdoor air quality (suspended particulates, NO_2, 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.

This report provides results of current year air quality monitoring (Section 4), historical trends (Section 5), onsite weather data (Section 6), greenhouse gas emissions data as required by Environment Canada's Greenhouse Gas Emissions Reporting Program (GHGRP) (Section 7), and a summary of incinerator stack testing as conducted under Meadowbank's Incinerator Waste Management Plan (Agnico Eagle, 2018a) (Section 8).

1.2 DUST MITIGATION

In 2021, road dust management was carried out in accordance with the Air Quality and Dustfall Monitoring Plan (Version 5, March 2020), and the Whale Tail Haul Road Management Plan (Version 3, April 2020). Road dust mitigation options consist primarily of:

- Enforcing or temporarily lowering speed limits
- Grading road surfaces
- Placement of new coarser material on the road surface
- Road watering or application of dust suppressants

Dust management actions are planned according to pre-determined monitoring thresholds (Table 1). Both visual indicators and numeric thresholds are used to determine when specified mitigation measures need to be initiated.

Table 1. Thresholds and mitigation measures (Air Quality and Dustfall Monitoring Plan, Version 5 – March 2020).

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 Visibility	Deterioration of visibility Safety concern High dust levels evident near significant waterbodies	Use of water and/or dust suppressant in areas requiring attention Grade the road surface

Location	Frequency	Indicator	Threshold	Mitigation Measure
			Dustfall exceeding 0.53 mg/cm^2/30-day at 500 m from the AWAR or WTHR	Add new granular material to the road surface Temporarily lower the speed limit on the road
Mine site, including travel areas	Regular weekly or more frequent inspection by the site supervisor during the late spring and summer periods.	Measured dustfall Measured PM	Deterioration of visibility Safety concern Dust reaching Whale Tail Lake or Mammoth Lake Dustfall exceeding 1.58 mg/cm^2/30-day at stations DF-1 to DF-6 Active PM results exceeding FEIS predictions at DF-6	Use of water and/or dust suppressant on exposed surfaces such as parking areas, pads, haul, access and service roads Review mitigation measures in place Add new granular material to surface If applicable, grade the surface Temporarily lower the speed limit on site
Ramps in the open pits	Regular inspection by pit supervisor during summer period	Visibility	Deterioration of visibility Safety concern	Use water as a dust suppressant

The following sections discuss the application of dust suppressant or watering for each location identified in Table 1 in 2021. Records are not specifically maintained on the implementation of other mitigation actions (e.g. grading, new material additions) in response to dustfall thresholds. Rather, the effectiveness of the mitigation overall is determined based on results of dustfall and suspended particulate monitoring for the current year (Section 4.5).

1.2.1 AWAR and Whale Tail Haul Road Dust Suppression

1.2.1.1 AWAR

According to the Air Quality and Dustfall Monitoring Plan (Version 5, March 2020), a calcium chloride dust suppressant was planned to be applied twice during the summer season on five sections of the AWAR, two locations in Baker Lake, and one onsite location. Between July 9 – 16, 2021, dust

suppressant in the form of calcium chloride (dry flake product) was applied to ten sections of the AWAR, as well as two locations on the edge of the hamlet of Baker Lake, and one area on the Meadowbank site. Locations are described in Table 2, and have been generally consistent since this program began in 2017. Changes to dust suppression locations in 2021 compared to the Air Quality and Dustfall Monitoring Plan are indicated in Table 2. Some changes occurred due to restrictions related to COVID-19, and some based on field observations. As in 2020, no additional applications of dust suppressant were conducted along the AWAR, because the first application continued to be effective throughout the season, based on visual observations. Section 4.5 provides a discussion on the effectiveness of the mitigation using quantitative dustfall monitoring thresholds.

Table 2. Dust suppressant locations along the Meadowbank AWAR in 2021. Strikethrough indicates location where dust suppressant application was identified in the Air Quality Monitoring Plan (Version 5), but no application was completed in 2021. Italics indicate supplemental dust suppression locations.

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~~ (not applied in 2021 due to COVID restrictions)
AWAR	*km 6 – Baker Lake*	*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 39 - 40*	*New 2021 (road design and surface stability; safety)*
AWAR	km 48 - 50	Area of concern to HTO – water crossing
AWAR	km 68 - 70	Location identified by Agnico Eagle – water crossing
AWAR	*km 72.5 – 73.5*	*New since 2020 (safety considerations)*
AWAR	km 80 - 84	Location identified by Agnico Eagle – proximity to water & crossing
AWAR	*km 85 - 86*	*New since 2020 (safety considerations)*
AWAR	*km 91 - 94*	*New since 2020 (safety considerations)*
AWAR	*km 97 - 98*	High traffic area near site
Onsite	Emulsion plant turn off to Meadowbank site (km 103 – 110)	High traffic area onsite

1.2.1.2 Whale Tail Haul Road

For the Whale Tail Haul Road, management primarily consists of enforcing speed limits, grading, placement of new material, and if necessary, road watering or application of dust suppressants. The implementation of dust mitigation measures is determined by the Road Supervisor and Environment Department based on visibility concerns, or where dust deposition is potentially impacting traditional land uses, fish habitat, and/or water quality.

In 2021, dust suppressant in the form of calcium chloride (dry flake product) was applied to the entire length of the WTHR between May 30 and September 2 (generally, two applications along the whole

road). In addition, road watering was conducted along the entire WTHR throughout the summer season, as needed.

1.2.2 Mine Site

Road watering was conducted regularly for roads and pits on the Whale Tail and Meadowbank sites in the summer season.

As in previous years, watering was also conducted regularly throughout the summer months for the Meadowbank onsite roads and airstrip, as needed.

1.3 COMMUNITY CONCERNS

As described in the Air Quality and Dustfall Monitoring Plan (Version 5, March 2020), Agnico records community concerns that are raised with regards to dust generated by traffic on the AWAR and Whale Tail Haul Road.

In 2021, no specific comments or complaints were received on this topic by the Meadowbank Environment Department.

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 (BLDAG). 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 scheduled to be held in Q2 2022.

The first meeting in February 2022 was to identify the groups impacted by dust generated by Agnico operations. The Baker Lake HTO identified the berry pickers as one of them and a list of participants will be provided to Agnico.

Also, in April 2022, Agnico will organize a site visit of the Meadowbank Complex and participants will be asked to identify some areas of concern. These areas will be further discussed during the first BLDAG meeting. In the past, consultation with the Hamlet was conducted to identify major areas of concern along the AWAR. Five areas were identified, and Tetraflake ($CaCl_2$) is applied during the summer to mitigate dust in those areas.

Additional dust suppression methods could be implemented along the AWAR and WTHR depending on 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 along the WTHR and AWAR.

1.4 MONITORING LOCATIONS

Air quality and dustfall monitoring is conducted at eight locations around the Meadowbank and Whale Tail sites. Dustfall is monitored at five transects along the AWAR and Whale Tail Haul Road. NO_2 is monitored at two locations along the WTHR (two passive monitors and one co-located continuous gas analyzer). For all locations, UTM coordinates are provided in Table 3, and locations are shown in relation to minesite features in Figures 1 and 2. Stations DF-8 and DF-9 were added in 2021 in response to suggestions by Environment and Climate Change Canada (ECCC).

Table 3. UTM coordinates for the Meadowbank air quality and dustfall monitoring locations (all zone 14W). ^DF-6 replaced DF-5 in May 2019.

Monitoring Location	Measured Parameters	Easting	Northing
DF-1	TSP, PM_{10}, $PM_{2.5}$, passive NO_2, dustfall	636850	7217663
DF-2	TSP, PM_{10}, $PM_{2.5}$, passive NO_2, dustfall	637895	7213049
DF-3	Dustfall	639599	7213198
DF-4	Dustfall	639233	7217074
DF-6a^	Passive NO_2 and dustfall	608842	7254348
DF-6b^	TSP, PM_{10}, $PM_{2.5,}$	608361	7254974
DF-7	Continuous NO_2	632414	7233318
DF-8	Passive NO_2	632414	7233318
DF-9	Passive NO_2	618033	7238670
AWAR km 18	Dustfall	640208	7152082
AWAR km 78	Dustfall	626155	7199739
WTHR km 134	Dustfall	630941	7234375
WTHR km 151	Dustfall	618132	7238621
WTHR km 169	Dustfall	613782	7249508

PROJECT: DA11-062-08

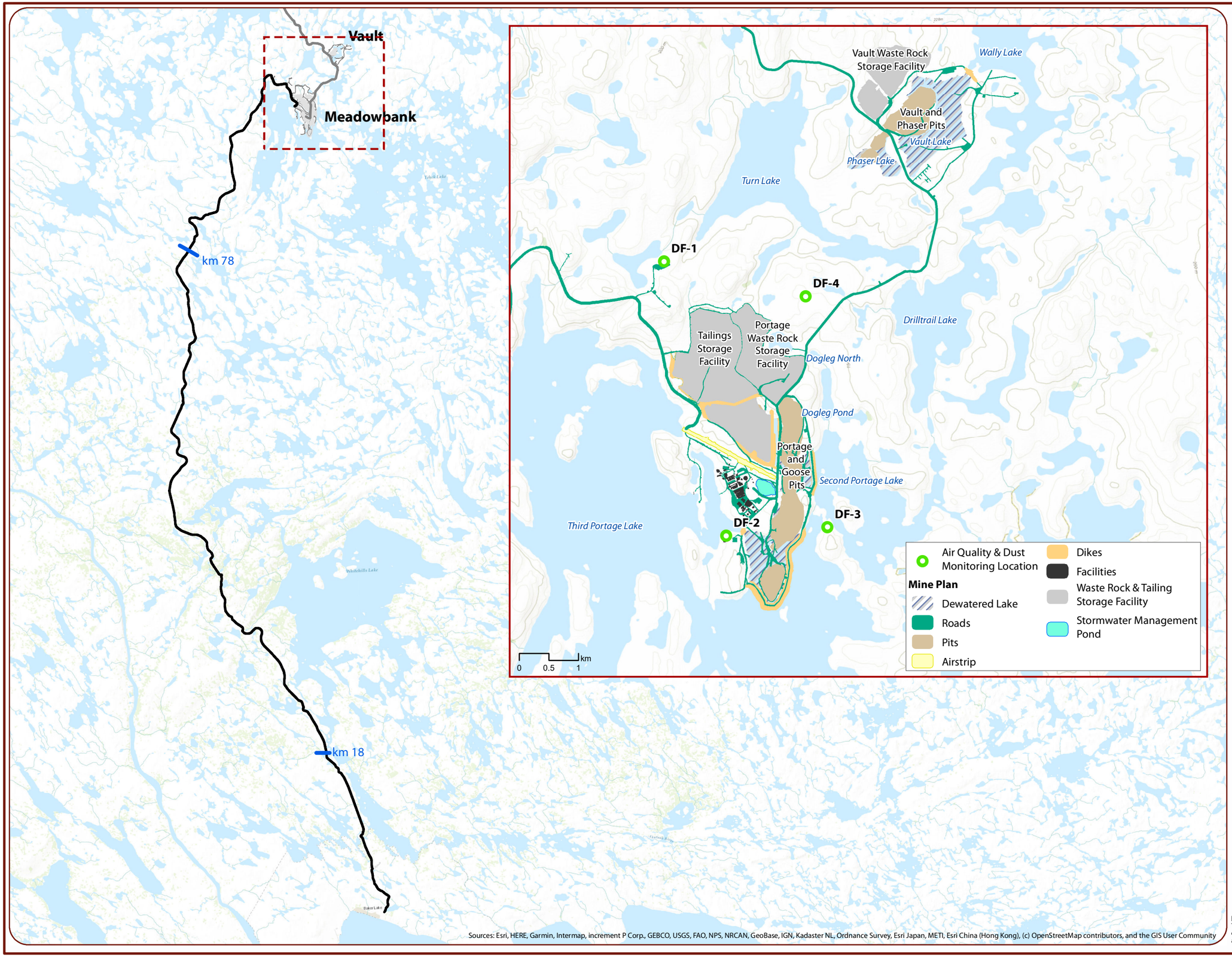
CLIENT: Agnico-Eagle Mines Ltd. Meadowbank Division

DATE: 12, March 2020

DRAWN BY: Janel Sauder

Figure 1: Air Quality and Dustfall Monitoring Locations

Meadowbank Site and All Weather Access Road



Sources: Esri, HERE, Garmin, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), (c) OpenStreetMap contributors, and the GIS User Community

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CLIENT: Agnico-Eagle Mines Ltd. Meadowbank Division

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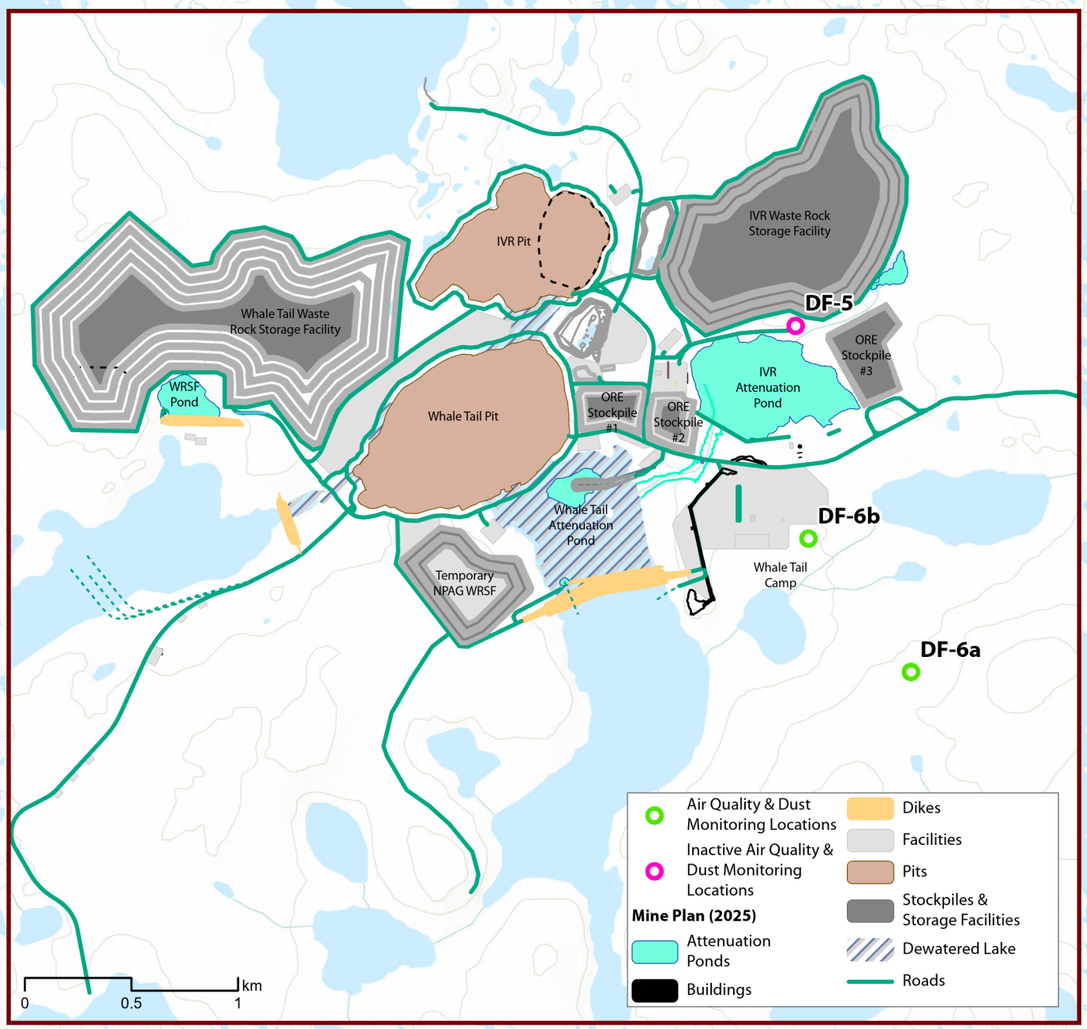
DRAWN BY: Janel Sauder/Nicole White

Figure 2: Air Quality and Dustfall Monitoring Locations

Whale Tail Site and Whale Tail Haul Road



Legend

- Air Quality & Dust Monitoring Locations
- Inactive Air Quality & Dust Monitoring Locations
- Dustfall Monitoring Transects

Mine Plan (2025)

- Whale Tail Haul Road
- Road
- Mine Site

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1.4.1 Meadowbank Onsite Locations DF-1 – DF-4

Monitoring locations for the Meadowbank site were determined in consultation with Environment Canada in 2011. One station was moved in 2012 due to changes in the location of the Vault haul road (see 2012 Annual Report – Air Quality and Dust Monitoring Report).

Station DF-1 is located next to the explosive storage area (emulsion plant), and approximately 500 m north of the all-weather access road. PM_{10} and $PM_{2.5}$, NO_2 and dustfall are monitored at this location year-round.

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

Station DF-3 is approximately 1,800 m east of the East Dike. According to the Plan, dustfall only is monitored at this location year-round.

Station DF-4 is approximately 1,500 m southwest of Vault Pit. The original location of this monitoring station was chosen before the beginning of the construction of the Vault Road. Realignment of the road during construction placed the station within 10 feet of the road. Therefore, Agnico 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. According to the Plan, dustfall only is monitored at this location year-round.

1.4.2 Whale Tail Onsite Location DF-6 a & b

Station DF-6 replaced DF-5 in May 2019 to accommodate the Whale Tail Expansion Project after only 4 months of monitoring for dustfall and NO_2 at that station.

Station DF-6a (Figure 2) is sited approximately 800 to 1000 m southeast of the Whale Tail Camp in a representative area for dustfall and NO_2. 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, PM_{10} and $PM_{2.5}$) relative to concentrations predicted further from the project footprint. Monitoring at DF-6a started in May 2019 for dustfall and NO_2. Suspended particulate monitoring (TSP, PM_{10}, $PM_{2.5}$) began at station DF-6b in April 2020[1].

1.4.3 Whale Tail Haul Road Locations DF-7, DF-8, and DF-9

In 2021, a continuous NO_2 analyzer was installed at station DF-7 (Figure 2), along with a co-located passive monitoring station (DF-8). This station is sited near the communications tower at kilometer 132 along the Whale Tail Haul Road. This location was chosen in consultation with ECCC, and primarily because there is readily available AC power from a diesel generator used to provide power to the communications tower. Stations DF-7 and DF-8 are located approximately 200 m upwind of the generator to minimize the impacts of NO_2 emissions from the generator. This monitoring location was also chosen to provide an assessment of regional NO_2 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 the Whale Tail site based on the predominant wind directions in the area, which is also a requirement of Project Certificate No.008 Condition 1.c.

Station DF-9 was added in 2021 at WTHR km 151, within approximately 100 m of the road (west side).

[1] Although the Partisol instruments were installed at this station in November 2019, a permanent power supply was not available until April 2020.

1.4.4 Meadowbank AWAR Dustfall Transects

Dustfall transects were established beginning in 2012 at kilometers 18 and 78 along the AWAR from Baker Lake to Meadowbank (Figure 1). Dustfall samples are collected annually during the summer season over 1-month averaging periods. Transects include monitoring stations at 25 m, 100 m, and 300 m from the road on both sides (east/downwind and west/upwind). Stations are also located at 1000 m for the km 78 transect only (presence of waterbodies has precluded sampling at this distance for km 18). These distances were chosen to bracket the smallest FEIS-predicted zone of influence (ZOI) for wildlife of 100 m. The zone of maximum dustfall has previously been reported to be within 300 m of roads under heavier use than the Meadowbank AWAR (Auerbach et al. 1997).

In recent years (from 2017-2019), 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 was to evaluate the effectiveness of dust mitigation measures in comparison to the reference sites at km 18 and 78. This assessment was complete in 2019, and indicated that the application of dust suppressant effectively reduced roadside dustfall levels. Agnico will continue to apply dust suppressant in these locations (Section 1.2.1), but monitoring is conducted only in areas without suppressant.

1.4.5 Whale Tail Haul Road Dustfall Transects

In 2019, dustfall transects were established between kilometers 18 & 19, 36 & 37, and 54 & 55 along the Whale Tail Haul Road. In 2019, the WTHR km markers were re-named as a continuation of the AWAR. The WTHR thus begins at km 115, and the sampling locations were renamed as km 134, 151, and 169, respectively (Figure 2).

Dustfall samples are collected during the summer season over two one-month averaging periods. Each transect includes stations at 25 m, 100 m, 300 m and 1000 m upwind, (east/north) and downwind (west/south) of the haul road. The 1000 m sample at location km 151 east was historically (2018 – 2020) collected at approximately 800 m, due to the presence of a waterbody, but in 2021 it was moved along the shoreline to 1000 m.

SECTION 2 • MONITORING METHODS

2.1 TSP, PM_{10}, $PM_{2.5}$ (DF-1, DF-2, DF-6B)

Suspended particulate matter is 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 utilizes Partisol Model 2025 sequential air samplers (single and dichotomous units) installed at three locations to measure:

- Total suspended particulates (TSP) – particulate matter less than 100 µm;
- PM_{10} – particulate matter less than 10 µm; and
- $PM_{2.5}$ – particulate matter less than 2.5 µm.

In 2021, suspended particulate monitoring (TSP, PM_{10}, $PM_{2.5}$) was scheduled for 24-h periods every six days using Partisol Plus Model 2025 Sequential Air Samplers (TSP) and Partisol Plus Model 2025-D Dichotomous Sequential Air Samplers ($PM_{2.5}$ and PM_{coarse}). Partisol samplers draw in a stream of ambient air at a controlled flow rate, and particulates are collected on a pre-weighed filter supplied by an accredited laboratory. The exposed filter is then shipped back to the laboratory and re-weighed to measure the total accumulated particulates. Calculations for TSP, PM_{10} and $PM_{2.5}$ were performed according to the Partisol operating manual, as follows.

TSP is calculated as:

$$TSP = M_{TSP}/V$$

Where: TSP = mass concentration of particulates (µg/m^3)

M_{TSP} = final mass of TSP filter – initial mass of filter (µg/filter)

V = volume of air drawn in during the sampling period (~24 m^3)

Since the dichotomous unit splits the intake air stream to determine $PM_{2.5}$ and PM_{coarse} ($PM_{10\text{-}2.5}$), the volume of air is different for each filter. Calculations are performed as follows:

$PM_{2.5}$ is calculated as:

$$PM_{2.5} = M_{2.5}/V_{2.5}$$

Where: $PM_{2.5}$ = mass concentration of particulates (µg/m^3)

$M_{2.5}$ = final mass of $PM_{2.5}$ filter – initial mass of filter (µg/filter)

$V_{2.5}$ = volume of air drawn through the $PM_{2.5}$ filter during the sampling period (~21.7 m^3)

And PM_{coarse} is calculated as:

$$PM_{coarse} = M_{coarse}/V_{total} – PM_{2.5}(V_{coarse}/V_{total})$$

Where: PM_{coarse} = mass concentration of particulates (µg/m^3)

M_{coarse} = final mass of PM_{coarse} filter – initial mass of filter (µg/filter)

V_{total} = total volume of air drawn into unit during sampling (~24m^3)

V_{coarse} = volume of air drawn through the PM_{coarse} filter during the sampling period (~2.4 m^3)

Concentration of PM_{10} is then calculated as PM_{coarse} + $PM_{2.5}$.

For comparison to regulatory guidelines, concentrations of particulates need to be calculated using air volumes normalized to 25°C and 101.3kPA (standard temperature and pressure; STP). Depending on system settings, standardized volumes were either recorded by the Partisol unit, or were calculated from average temperature and pressure values recorded by the Partisol unit during the sampling period.

2.2 DUSTFALL (DF-1 – DF-6; AWAR AND WTHR TRANSECTS)

Dustfall collection 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.

In accordance with ASTM methods for dustfall measurement (ASTM, 2004), dustfall samples were collected in open vessels containing a purified liquid matrix provided by an accredited laboratory. Particles are deposited and retained in the liquid, which is then filtered to remove large particles (e.g. leaves, twigs) and analyzed by the accredited laboratory for total and fixed (non-combustible) dustfall. Sampling containers are deployed in the field over one-month periods, and calculated dustfall rates are normalized to 30 days (mg/cm^2/30 days per ASTM 1739-98). This sampling method is widely used in air quality studies in Nunavut and elsewhere for dustfall monitoring.

ASTM methods suggest collection of the dustfall sample at 2-3 m height on a utility pole to prevent re-entrainment of particulates from the ground, and to reduce vandalism and potential for wildlife interaction. For locations DF-1 – DF-6, samples have always been collected in this manner. However, due to the difficulty of constructing and deploying stands to hold the large number of sample containers used for roadside dustfall transects, all road-side sampling canisters were deployed at ground level from 2013 - 2019. Although comparative studies conducted in 2012, 2019, and 2020 indicated that samples collected at ground level provide a conservative (high) estimate of dustfall, all sample collection canisters were moved to stands beginning in 2020 based on comments received from regulators.

2.3 NO_2

NO_2 is produced primarily through the combustion of hydrocarbons in powerplants, vehicles and other mining equipment, and during blasting.

2.3.1 Passive NO_2 (DF-1, DF-2, DF-6a, DF-8, DF-9)

Ambient concentrations of 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 NO_2 concentration by volume was calculated from the monthly data for comparison against the relevant GN guideline.

2.3.2 Continuous NO_2 (DF-7)

In July, 2021, a continuous NOx analyser (ThermoScientific 42iQ NO-NO_2-NOx Analyzer) was installed at one location (DF-7), and ambient concentrations of NO_2 by volume (ppb; 1-min averaging time) have

been measured since that time for comparison with CAAQS and GN guidelines for 1-h, 24-h, and annual averaging times.

The recorded dataset was screened according to ECCC (2019) to identify valid data for reporting purposes. Briefly, data was reviewed and corrected as feasible for flags, outliers, and instrument drift. Full details for data manipulations in the current monitoring year are provided in Section 4.3.2.

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.

In addition, a wind sensor was installed along with the NOx 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. This sensor was found damaged and was removed for repairs in February, 2022.

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. Full details of the program are provided in the Meadowbank and Whale Tail Greenhouse Gas Reduction Plan.

SECTION 3 • DATA ANALYSIS

3.1 REGULATORY STANDARDS

Regulatory standards for the air quality parameters of concern are provided in Table 4.

Data collected from the onsite air quality monitoring stations are compared primarily to the applicable Government of Nunavut Environmental Guidelines for Ambient Air Quality (October, 2011). These standards are available for TSP, $PM_{2.5}$, and NO_2.

No PM_{10} standard is available in Nunavut, so results are compared to the BC Ambient Air Quality Objective (current to February, 2022).

Likewise, no standards for dustfall are available for Nunavut. Results of the dustfall analysis for transects along the AWAR and the WTHR are compared to the Alberta Ambient Air Quality Guideline (January, 2019) for residential and recreational areas according to thresholds for dust management described in the Air Quality and Dustfall Monitoring Plan (March, 2020). Results of dustfall analysis at onsite stations DF-1 to DF-6 are compared to the Alberta Ambient Air Quality Guideline for commercial and industrial areas. As stated in the guideline, these dustfall guidelines may be used for airshed planning and management, as a general performance indicator, and to assess local concerns.

Continuous NO_2 monitoring results and $PM_{2.5}$ data are also compared to Canadian Ambient Air Quality Standards (CAAQS). CAAQS represent voluntary objectives for an individual site, and are typically used at a regional scale for airshed planning purposes.

Table 4. Standards for ambient air quality for the parameters of concern at Meadowbank and Whale Tail.

Parameter	Averaging Period	GN Guideline		CAAQS (2020)		Other Standard
		µg/m³	ppb	µg/m³	ppb	
TSP	24-h average	120	-	-	-	-
	Annual geometric mean	60	-	-	-	-
PM_{10}	24-h average	-	-	-	-	50 µg/m³*
$PM_{2.5}$	24-h average	30	-	27**	-	-
	Annual arithmetic mean	-	-	8.8***	-	-
NO_2	1-h average	400	213	32‡	60‡	-
	24-h average	200	106	-	-	-
	Annual arithmetic mean	60	32	9.1‡‡	17.0‡‡	-
Total Dustfall	30-d average	-	-	-	-	0.53 mg/cm²^ 1.58 mg/cm²^^

* BC Air Quality Objective (August, 2013)
** The 3-year average of the annual 98th percentile of the daily 24-hour average concentrations
***The 3-year average of the annual average of all 1-hour concentrations
‡The 3-year average of the annual 98th percentile of the daily maximum 1-hour average concentrations
‡‡The average over a single calendar year of all 1-hour average concentrations
^ Alberta Ambient Air Quality Guideline for recreational/residential areas (August, 2013) – applied to AWAR & WTHR transects (500+ m).
^^ Alberta Ambient Air Quality Guideline for commercial/industrial areas (August, 2013) – applied to DF-1 – DF-6 onsite locations.

3.2 FEIS PREDICTIONS

3.2.1 Meadowbank Site

In order to estimate potential impacts of the Project on air quality, modeling exercises were conducted as a component of the original project FEIS to determine emission rates and dispersion of various criteria air contaminants from different sources (Air Quality Impact Assessment, Cumberland, 2005)[2].

This included modeling emissions of three size fractions of suspended particulates ($PM_{2.5}$, PM_{10} and TSP) originating from the TSF, WRSF, and ore stockpile, for 24h and annual averaging times. Deposition rates for dust from these sources were also calculated (g/m²/30d). While maximum ground level concentrations were described in the FEIS document for all size fractions, contour plots were only provided for TSP and deposition rates (Air Quality Impact Assessment, Cumberland, 2005). In addition, modeling was conducted for criteria pollutants (CO, NO_2, SO_2, PM_{10}, and $PM_{2.5}$) emitted from the power plant and mobile sources for 1h, 24h and annual averaging times, and concentration contour plots were provided for these analyses.

[2] As part of the FEIS for the Whale Tail Project (Agnico Eagle, 2016), qualitative assessments were performed for ongoing use of the Meadowbank mill and AWAR, but no quantitative changes to original FEIS predictions were included.

Predicted values of NO_2 (annual average), $PM_{2.5}$, and PM_{10} (24-h and annual average) are available for comparison to measured values. It is noted however that these model predictions only include emissions from mobile and power plant sources. FEIS predictions for TSP and dust deposition were considered less suitable for comparison to field measurements (i.e. monitoring results) since only emissions from three specific point sources were required to be modeled (TSF, WRSF, ore stockpile).

While field monitoring captures emissions from all mine-related sources, as well as background sources, the FEIS presents modeled outputs from combinations of specific sources as described above. Therefore, accuracy of these quantitative predictions cannot specifically be assessed through field monitoring. However, if measured concentrations are lower than predicted values, it can be concluded that FEIS predictions are not being exceeded. In some cases, as described below, measured or estimated background concentrations were able to be added to predicted values to improve the comparison.

The following specific methods were used:

- Modeled values for suspended particulates ($PM_{2.5}$ and PM_{10}) were obtained for the two monitoring locations (DF-1 and DF-2) from the FEIS Air Quality Impact Assessment Figures 6.2 – 6.24. PM_{10} values were derived from Figures 6.7 and 6.8, based on references in the text (Table 6.1), although these figures are labelled as SP. Model values for a TSF size of 960x560m were used in the comparison.

- The 2016 impact assessment for the Whale Tail Pit project at Meadowbank calculated background values for $PM_{2.5}$ of 6.7 and 3.6 $\mu g/m^3$ for 24-h and annual averaging times, respectively (Agnico Eagle, 2016 - Whale Tail Pit FEIS, Appendix 4-A). No background data was available for other size classes of suspended particulates, but these $PM_{2.5}$ values were added to predicted concentrations of $PM_{2.5}$ and PM_{10} for the comparison, since $PM_{2.5}$ forms a subset of PM_{10}.

- For NO_2, modeling results were only provided in the FEIS for the maximum predicted ground-level concentration, which occurred adjacent to the power plant. The closest NO_2 monitoring station (DF-2) is at a distance of approximately 1 km southwest (cross-wind) from this location.

Table 5 summarizes the FEIS model predictions for these parameters.

No quantitative predictions were made in the Meadowbank FEIS for the AWAR.

Table 5. Model-predicted maximum concentrations of measured criteria air contaminants for location DF-1 and DF-2 at the Meadowbank site (from Cumberland, 2005).

Parameter	Location	Averaging Time	Concentration
Coarse Particulate Matter (PM_{10})	DF-1	24-h	26.7 µg/m^3
	DF-2	24-h	46.7 µg/m^3
Fine Particulate Matter ($PM_{2.5}$)	DF-1	24-h	26.7 µg/m^3
		Annual	4.6 µg/m^3
	DF-2	24-h	16.7 µg/m^3
		Annual	4.1 µg/m^3
Nitrogen Dioxide (NO_2)	DF-2	Annual	4.97 ppb

3.2.2 Whale Tail Site

For the Whale Tail site, measured values at DF-6 are also compared to FEIS-modeled maximum concentrations for this location to ensure modeling adequately captured the worst-case scenario. Maximum predicted values for the DF-6 locations on the Whale Tail site are shown in Table 6.

Dust deposition rates were predicted for the haul road (see Section 3.2) but not for the Whale Tail site.

Table 6. Model-predicted maximum concentrations of measured criteria air contaminants for location DF-6a or b (as applicable) the Whale Tail site (FEIS Addendum, Appendix 4C – Agnico Eagle, 2018b).

Parameter	Location	Averaging Time	Concentration
Total Suspended Particulate (TSP)	DF-6b	24-h	>120 µg/m^3
		Annual	30 - 45 µg/m^3
Coarse Particulate Matter (PM_{10})	DF-6b	24-h	>50 µg/m^3
Fine Particulate Matter ($PM_{2.5}$)	DF-6b	24-h	21 - 28 µg/m^3
		Annual	5 – 7.5 µg/m^3
Nitrogen Dioxide (NO_2)	DF-6a	Annual	8 - 16 ppb

3.2.3 Whale Tail Haul Road

3.2.3.1 NO_2

FEIS Addendum modelling (Agnico Eagle, 2018b) indicated that low level emissions of NO_2 will be produced by vehicles using the haul road. The model predicted ground level concentrations of NO_2 due to haul road vehicle emissions represent a very small increase compared to background concentrations and are well below their relevant ambient air quality standards. No quantitative predictions are available for comparison to measured values at DF-7.

3.2.3.2 Dustfall

The primary goal of Whale Tail Haul Road dustfall monitoring is to track trends in dustfall generated by haul road traffic, and verify predictions made during the FEIS process. However, due to differences in particle sizes collected by static dustfall monitors and those assessed through air quality emissions and dispersion modelling, these are considered conservative, screening-level comparisons only. Since dustfall canisters collect particles across a much wider range of sizes than included in standard modeling, they are very likely to measure higher rates of total dustfall than those specified in the FEIS. However, if measured dustfall is lower than predicted dustfall, model results can be verified as conservative.

Table 7 shows FEIS Addendum-predicted maximum monthly dust deposition from haul-road generated dust as a function of distance from the road. Results of the Whale Tail Haul Road monitoring program (total dustfall) are compared to these values plus background concentrations of total dustfall. A background dustfall value of 0.27 mg/cm^2/30d is assumed, based on the maximum dustfall rate measured in this area (km 37, now km 152) during baseline studies for this area in 2015.

In general, FEIS Addendum predictions indicated that maximum monthly dust deposition rates will be below the Alberta guideline for residential and recreational areas within 500 m of the haul road (0.53 mg/cm^2/30d). This value was also set as the threshold for supplemental dust mitigation measures (Section 1.2).

Table 7. Predicted maximum monthly dust deposition rate as a function of distance from the Whale Tail Haul Road (FEIS Addendum, Appendix 4C, Table 4-C-24 – Agnico Eagle, 2018b).

Distance (m)	Predicted Dust Deposition (mg/cm^2/30d)	Measured Maximum Background Dust Deposition (mg/cm^2/30d)	Predicted + Background Dust Deposition (mg/cm^2/30d)
25	3.4	0.27	3.67
100	1.9	0.27	2.17
300	0.59	0.27	0.86
1000	0.11	0.27	0.38

SECTION 4 • 2021 MONITORING RESULTS

4.1 TSP, PM_{10}, $PM_{2.5}$

Sampling dates and 24-h average concentrations of TSP, PM_{10} and $PM_{2.5}$ are shown in Figures 3 - 5. For five of the six Partisol units, minimal data loss occurred in 2021 (results are available for most targeted sampling dates). For the TSP unit at DF-1, results are only available through March 23. At that point, the unit was removed from the field for repairs and was not re-installed by the end of the year (replacement parts were not yet received). Data loss and operational difficulties for the Partisol samplers are discussed further in Section 4.4.

As in previous years, TSP concentrations were generally well below regulatory standards. Across all three monitoring stations (129 samples), 3 samples exceeded the GN 24-h standard of 120 µg/m^3, with a maximum measured value of 370 µg/m^3 occurring at DF-2. This maximum continues to be within the historically recorded high value of 459 µg/m^3 (Section 5.1). For the Whale Tail site location (DF-6b), FEIS Addendum predictions (Section 3.2.1) indicated that maximum 24-h TSP concentrations would exceed the GN 24-h standard of 120 µg/m^3, which occurred on just two occasions in 2021.

For PM_{10}, one sample across all three stations (164 samples) exceeded the BC Air Quality Objective of 50 µg/m^3 for the 24-h average (87 µg/m^3 at DF-6a on June 9). FEIS Addendum predictions for the Whale Tail site (Section 3.2.1) indicated that maximum PM_{10} concentrations at DF-6b would exceed the BC 24-h standard of 50 µg/m^3 at DF-6b, which occurred on just one occasion in 2021. For the Meadowbank site, no samples exceeded the FEIS predictions of 26.7 µg/m^3 and 46.7 µg/m^3 for DF-1 and DF-2, respectively.

For $PM_{2.5}$, all results (166 samples) were less than the GN guideline of 30 µg/m^3 for the 24-h average, the 2020 Canadian Ambient Air Quality Standard of 27 µg/m^3 for the 24-h average, the FEIS Addendum maximum model prediction of 21 - 28 µg/m^3 for the Whale Tail site (DF-6b) location, and the FEIS maximum model predictions of 16.7 µg/m^3 and 26.7 µg/m^3 for the Meadowbank site locations DF-1 and DF-2, respectively.

Aside from a possible seasonal influence in concentrations of suspended particulates (generally higher concentrations during summer months), no major trends throughout the year are evident in 2021.

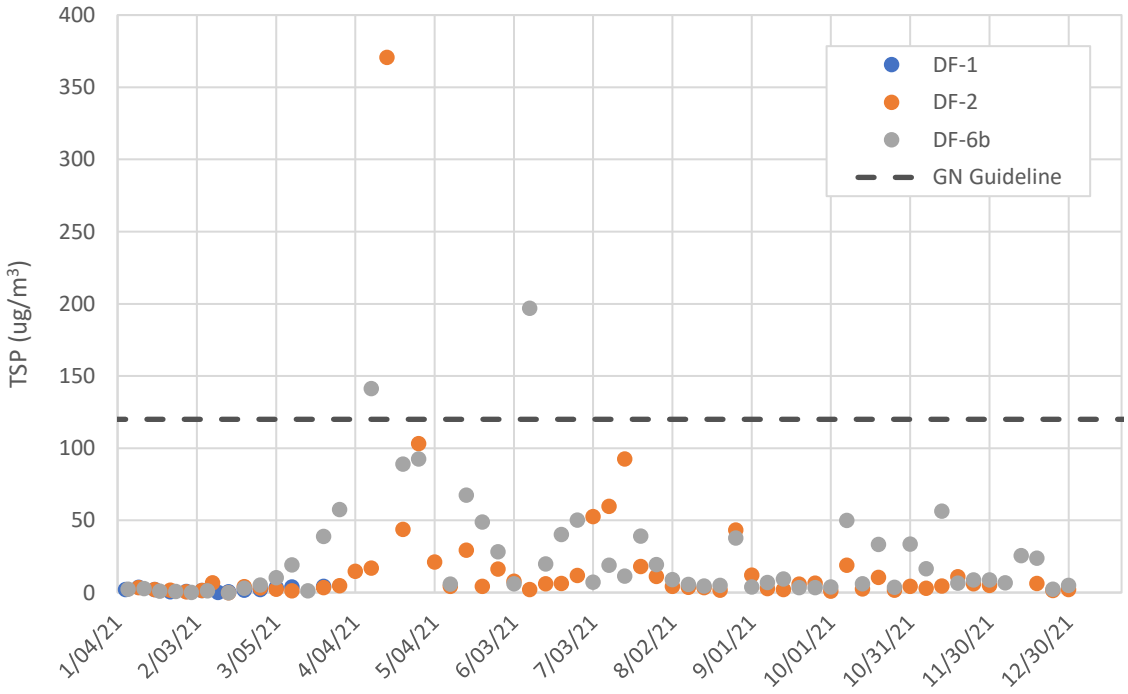

Figure 3. 24-h average concentrations of total suspended particulates (TSP) at Meadowbank stations DF-1, DF-2, and DF-6b. Dashed line indicates the 24-hr average GN guideline for ambient air quality.

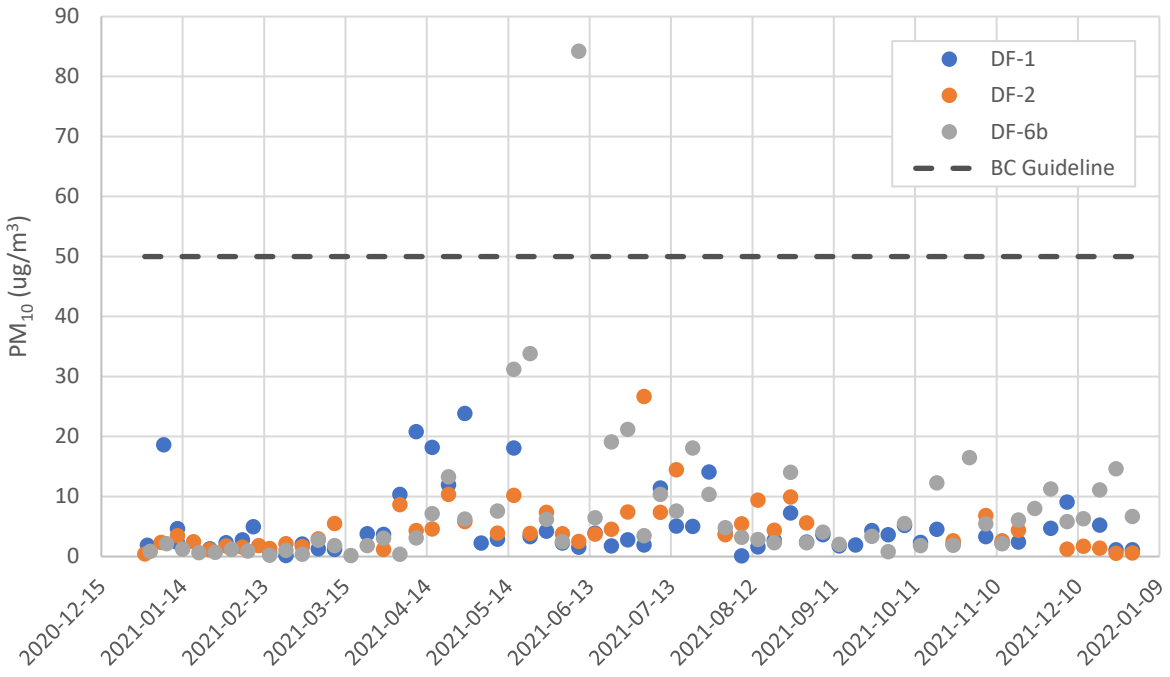

Figure 4. 24-h average concentration of airborne particulate matter less than 10 microns (PM_{10}) at Meadowbank stations DF-1, DF-2, DF-6b. Dashed line indicates the BC Air Quality Objective for this parameter.

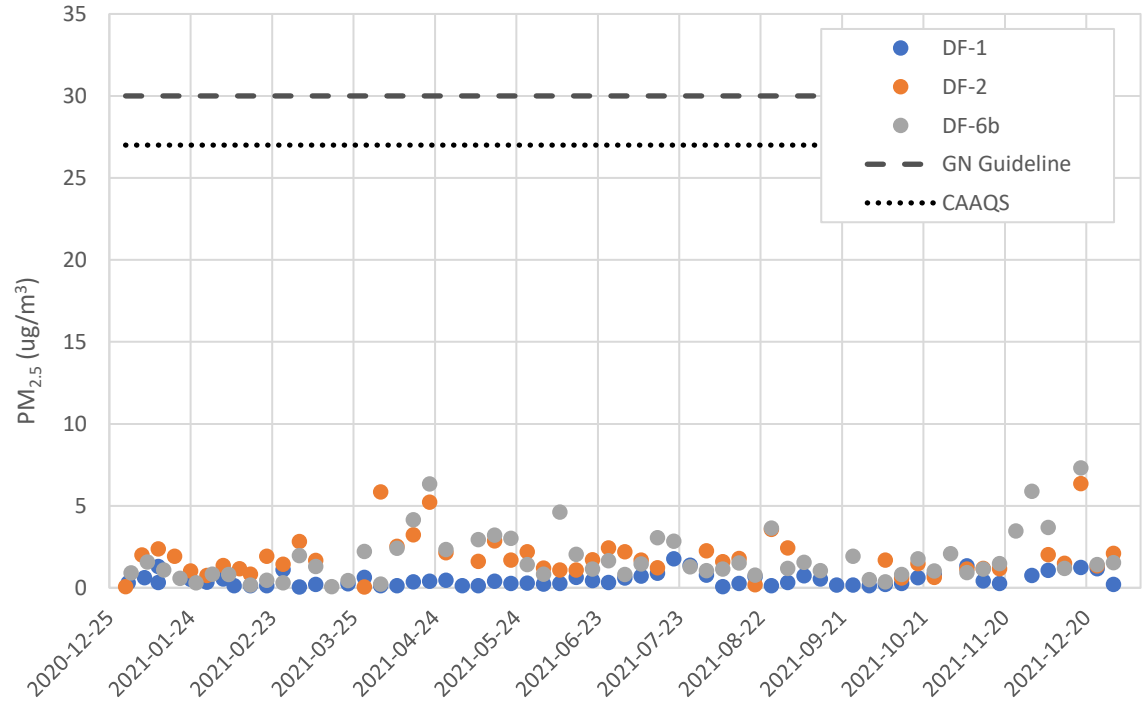

Figure 5. 24-h average concentration of airborne particulate matter less than 2.5 microns ($PM_{2.5}$) at Meadowbank stations DF-1, DF-2, and DF-6b. Dashed line indicates the GN guideline for ambient air quality, and the dotted line represents the Canadian Ambient Air Quality Standard (2020).

Annual geometric mean concentrations of TSP at DF-1, DF-2, and DF-6b were 1.6, 6.2, and 9.4 µg/m^3, respectively. These estimates are well below the annual GN guideline of 60 µg/m^3, and are similar to values observed in previous years (Table 8). Annual arithmetic mean concentrations of $PM_{2.5}$ were 0.5, 1.9 and 1.8 µg/m^3 at DF-1, DF-2, and DF-6b respectively, which are well below the 2020 Canadian Ambient Air Quality Standard for annual average $PM_{2.5}$ of 8.8 µg/m^3 (Table 8). It is noted that the CAAQS for $PM_{2.5}$ is based on the 3-year average of 1-hr concentrations. Comparisons to annual averages are considered conservative, and 3-year results will be reviewed if any exceedances occur in annual data.

The annual arithmetic mean TSP concentration was also calculated from measured 24-h samples and compared along with the $PM_{2.5}$ annual arithmetic mean to the Meadowbank FEIS and Whale Tail FEIS Addendum model-predicted maximum annual concentrations. These values are shown in Table 9. Both TSP and $PM_{2.5}$ annual averages were less than maximum model predictions for all locations.

Table 8. Annual geometric mean concentrations of TSP and arithmetic mean concentrations of $PM_{2.5}$ at DF-1, DF-2, and DF-6b for comparison with the GN guideline and CAAQS. "-" indicates not available or not required to be calculated.

Year	TSP (µg/m^3)				$PM_{2.5}$ (µg/m^3)			
	DF-1	DF-2	DF-6b	GN Guideline	DF-1	DF-2	DF-6b	CAAQS
2012	8	12	-	60	-	-	-	-
2013	4.6	14.0	-	60	-	-	-	-
2014	6.5	12.8	-	60	-	-	-	-
2015	5.1	9.8	-	60	-	-	-	10
2016	3.8	6.4	-	60	-	-	-	10
2017	2.1	10.5	-	60	-	-	-	10
2018	4.9	9.8	-	60	0.2	1.4	-	10
2019	7.0	6.6	-	60	0.5	1.5	-	10
2020	3.8	7.1	14.1	60	0.6	1.9	1.5	8.8
2021	1.6	6.2	9.4	60	0.5	1.9	1.8	8.8

Table 9. Arithmetic mean of the measured 24-h concentrations and FEIS-modeled maximum annual concentrations of TSP and $PM_{2.5}$ for monitoring stations DF-1, DF-2, and DF-6b at the Meadowbank Complex (Cumberland, 2005; Agnico Eagle, 2018b - Appendix 4C).

Year	DF-1		DF-2		DF-6b			
	$PM_{2.5}$ (µg/m^3)		$PM_{2.5}$ (µg/m^3)		TSP (µg/m^3)		$PM_{2.5}$ (µg/m^3)	
	Measured	FEIS	Measured	FEIS	Measured	FEIS	Measured	FEIS
2020	0.5	4.6	1.5	4.1	35.0	30 - 45	1.44	5 – 7.5
2021	0.5		1.9		24.3		1.82	

4.2 DUSTFALL

4.2.1 Onsite Locations DF-1 – DF-6

Results of the 2021 onsite dustfall sampling program (30-day normalized rates of total and fixed dustfall) are provided in Figures 6 - 10. Samples are plotted by the collection start date. To provide context, the

Alberta Ambient Air Quality Guideline for industrial/commercial areas for total dustfall (AB-Ind) is indicated (1.58 mg/cm^2/30-d). This guideline is based on aesthetic or nuisance concerns and is to be used for airshed planning and management, as a general performance indicator, and to assess local concerns. The established threshold for dust mitigation actions for these onsite stations is equivalent to this guideline.

During the data review process, one outlier was identified at station DF-2 (March 5), where the fixed dustfall result (22.11 mg/cm^2/30d) was significantly greater than the total dustfall result (0.11 mg/cm^2/30d). Since fixed dustfall is a subset of total dustfall, this result is assumed to be in error and the fixed dustfall result was removed from subsequent analyses.

Of the 59 onsite dustfall samples collected in 2021, one exceedance of the AB-Ind guideline occurred for total dustfall, in the October 3 sample at DF-1. Since all other results for this location were well below guidelines, this is considered an isolated incident, potentially due to a localized event or sample contamination. While the use of these guidelines is not well defined, there are no recreational or residential users within vicinity of the minesite and exceedance of occasional samples is not expected to result in significant aesthetic or nuisance concerns. Mitigation actions are planned to be implemented if regular exceedances or trends towards regular exceedances occur.

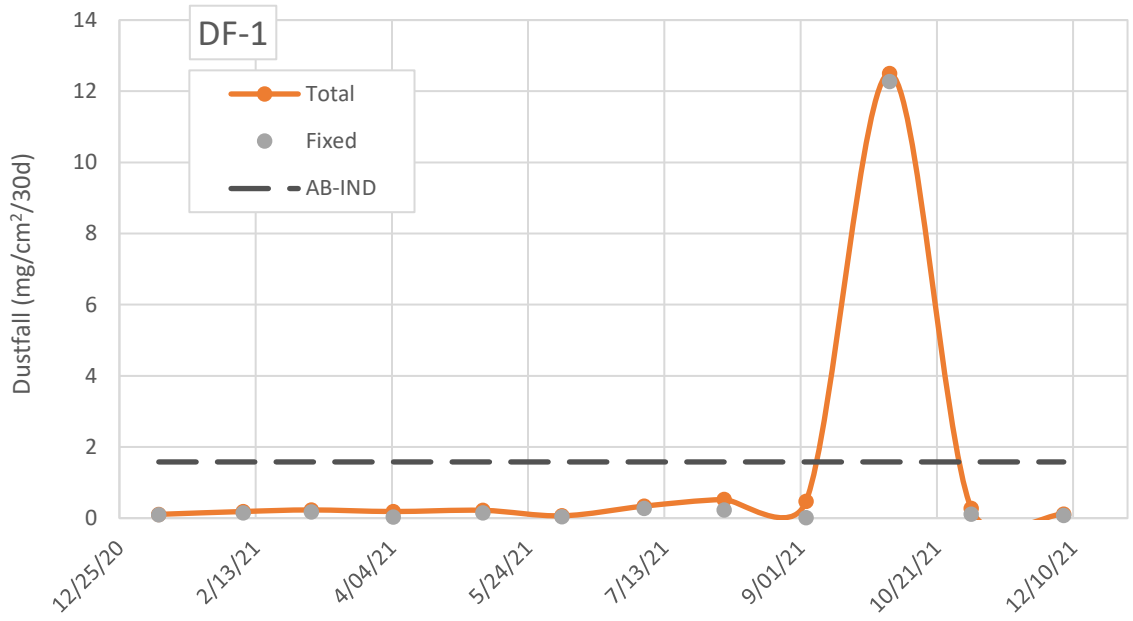

Figure 6. 30-day-normalized rates of total and fixed dustfall at DF-1 at the Meadowbank site. Points represent start date of sample collection. AB-IND indicates the Alberta guideline for industrial/commercial areas, which is equivalent to the management threshold for this station.

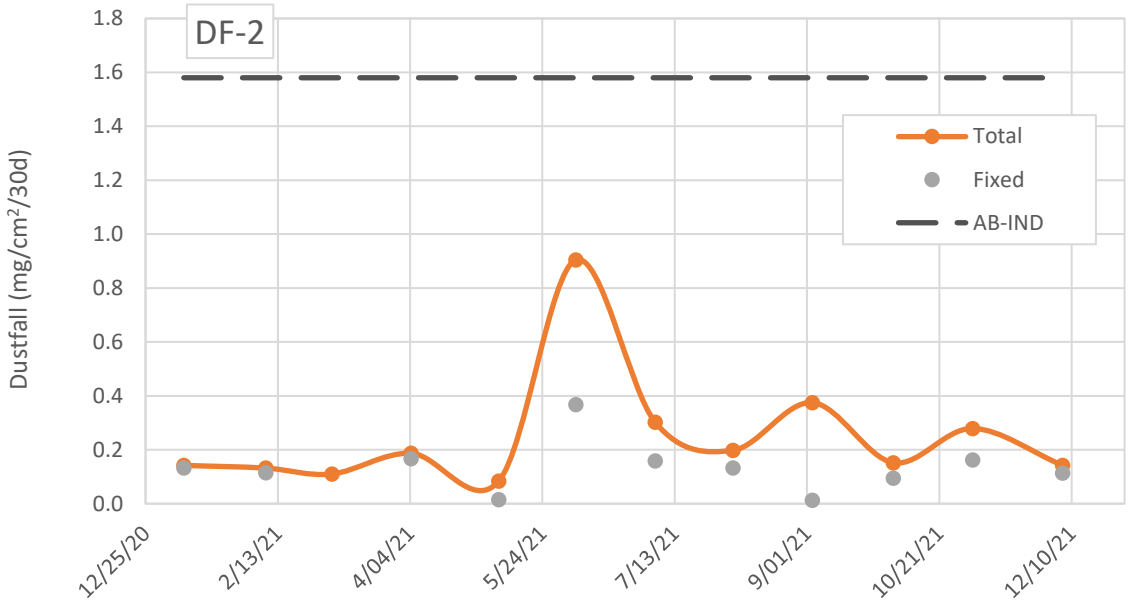

Figure 7. 30-day-normalized rates of total and fixed dustfall at DF-2 at the Meadowbank site. Points represent start date of sample collection. AB-IND indicates the Alberta guideline for industrial/commercial areas, which is equivalent to the management threshold for this station.

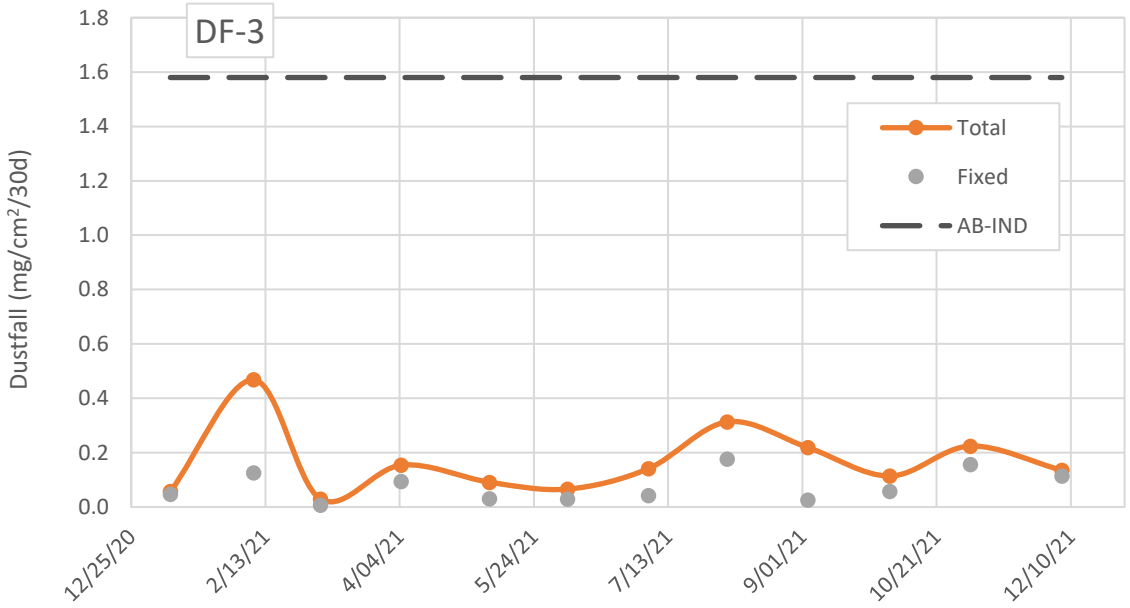

Figure 8. 30-day-normalized rates of total and fixed dustfall at DF-3 at the Meadowbank site. Points represent start date of sample collection. AB-IND indicates the Alberta guideline for industrial/commercial areas, which is equivalent to the management threshold for this station.

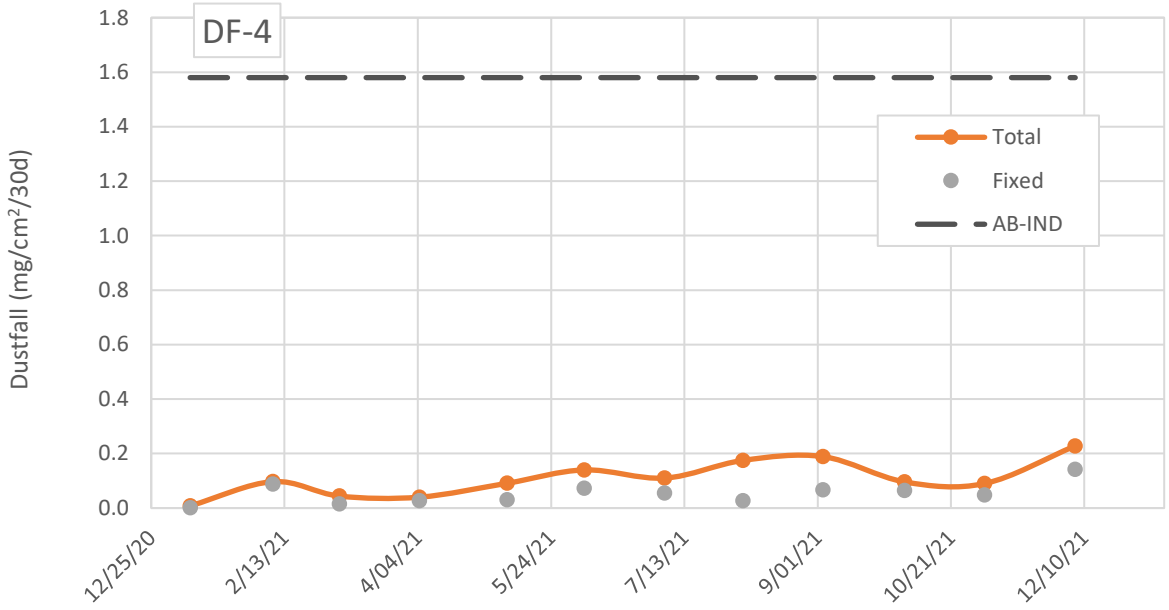

Figure 9. 30-day-normalized rates of total and fixed dustfall at DF-4 at the Meadowbank site. Points represent start date of sample collection. AB-IND indicates the Alberta guideline for industrial/commercial areas, which is equivalent to the management threshold for this station.

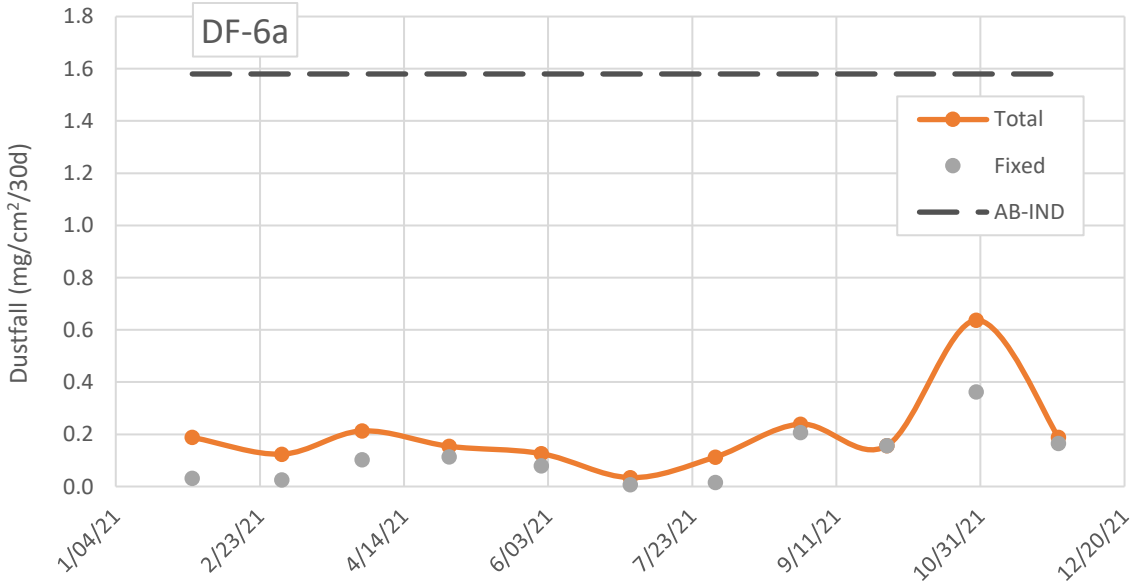

Figure 10. 30-day-normalized rates of total and fixed dustfall at DF-6a at the Whale Tail site. Points represent start date of sample collection. AB-IND indicates the Alberta guideline for industrial/commercial areas, which is equivalent to the management threshold for this station.

4.2.2 Meadowbank AWAR Dustfall Transects

As described in Section 1.4.4, dustfall sampling was conducted for two transects along the AWAR in 2021, in areas where dust suppressant was not applied. Results are presented in Figures 11 and 12, and are compared to the Alberta Ambient Air Quality Guideline for recreational/residential areas (AB-Rec). This guideline is applied to samples collected at and beyond 500 m, according to the management threshold established in the Air Quality and Dustfall Monitoring Plan (March, 2020). It should be noted that this guideline is based on nuisance and aesthetic concerns, and not necessarily impacts to vegetation or wildlife. It is also generally considered to apply to a specific dust source, over and above background values. Therefore, this is considered a conservative, screening-level comparison, and any significant, ongoing exceedances will be further investigated.

For all four transects, trends indicated the AB-Rec threshold was met or would be met for total dustfall at 500 m. One sample for total dustfall marginally exceeded the guideline at 1000 m, but the result for fixed dustfall (non-organic) which is more representative of road material was well below the guideline for this sample. For AWAR transect km 18, samples are not collected at the 1000 m location, due to presence of a waterbody at approximately 800 m from the road, so 300 m is the furthest sample collection point. For one sample, the total dustfall result at 300 m was greater than the guideline which applies at 500 m, but again the fixed dustfall result was well below the guideline.

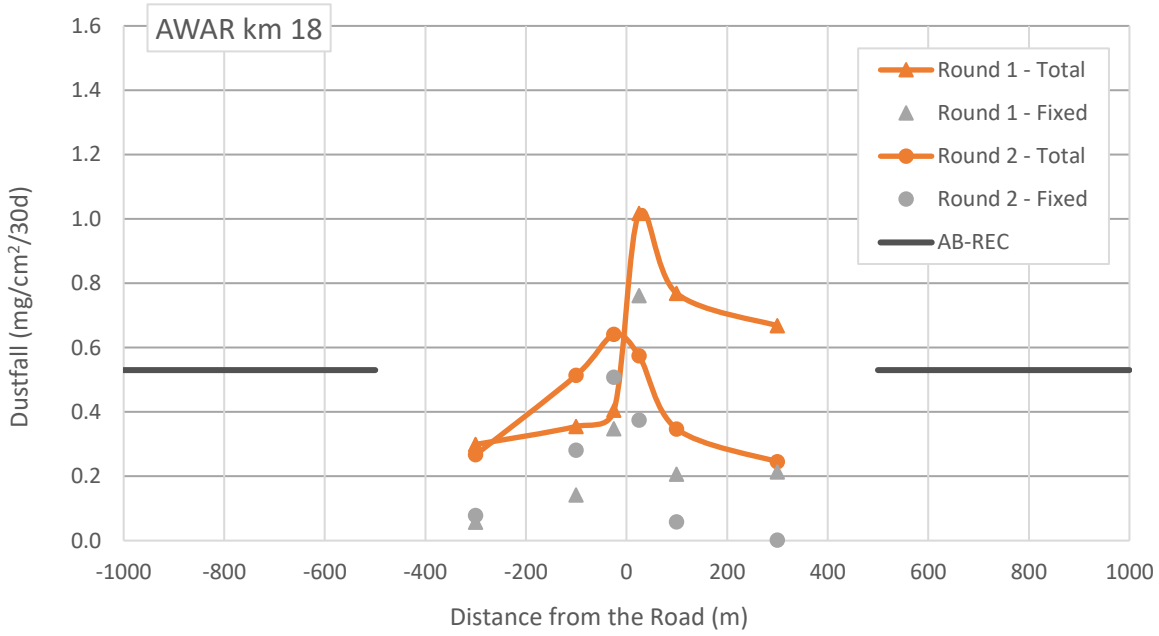

Figure 11. 30-day-normalized rates of total and fixed dustfall at km 18 along the Meadowbank AWAR in 2021. Points represent start date of sample collection. Monitoring Round 1 began July 1, and Round 2 began August 1. Positive distances represent the upwind/west side of the road, and negative distances represent the downwind/east side.

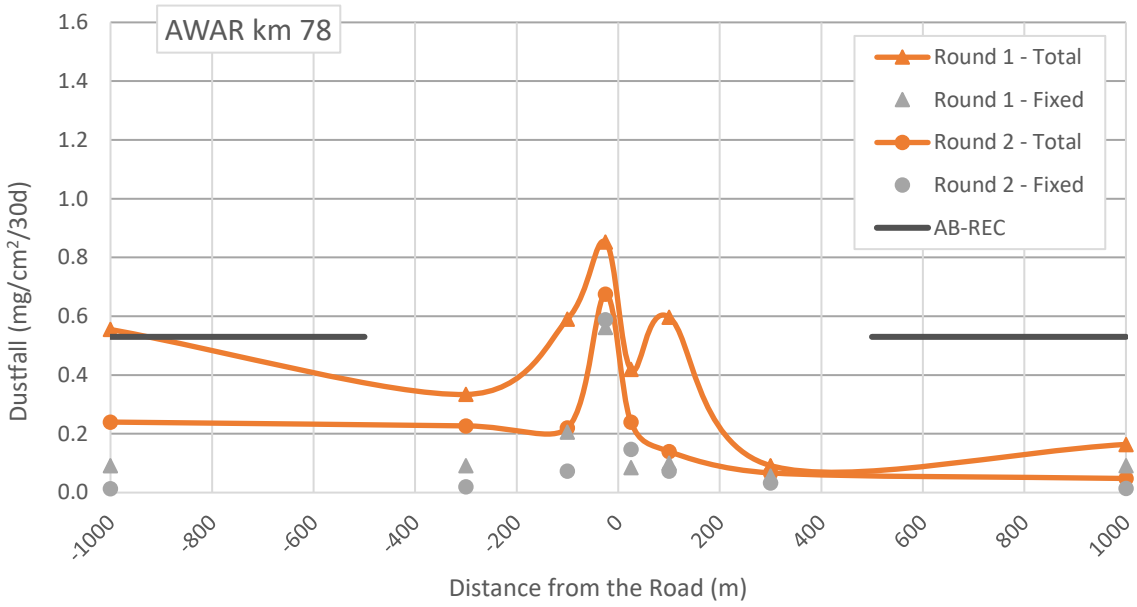

Figure 12. 30-day-normalized rates of total and fixed dustfall at km 78 along the Meadowbank AWAR in 2021. Points represent start date of sample collection. Monitoring Round 1 began July 1, and Round 2 began August 1. Positive distances represent the upwind/west side of the road, and negative distances represent the downwind/east side.

4.2.3 Whale Tail Haul Road Dustfall Transects

Results for all samples collected in 2021 for monitoring rounds 1 (started July 2) and 2 (started July 31) are provided in Figures 13 - 15.

Some specific FEIS Addendum model predictions were exceeded, but only for the 25 m downwind location at km 151. The overarching FEIS prediction that maximum deposition rates along the AWAR would decline below the AB-Rec guideline within 500 m of the road was met in all cases. This prediction is equivalent to the management threshold.

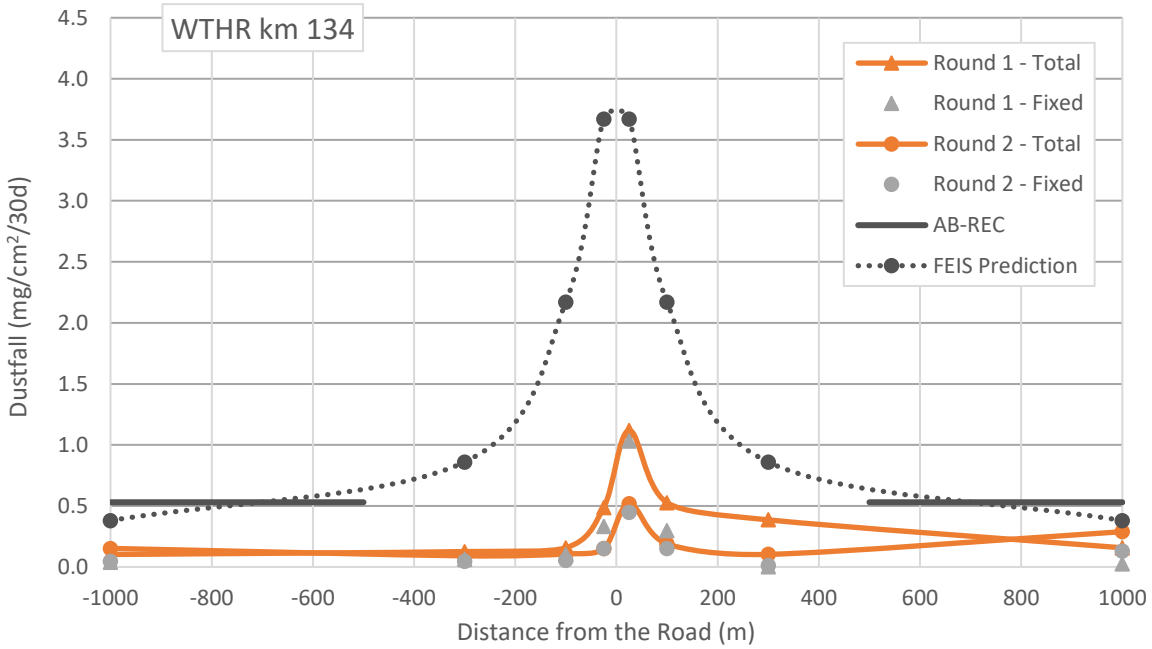

Figure 13. 30-day-normalized rates of total and fixed dustfall at km 134 along the Meadowbank WTHR in 2021. Points represent start date of sample collection. Monitoring Round 1 began July 2, and Round 2 began July 30. Positive distances represent the upwind/west side of the road, and negative distances represent the downwind/east side.

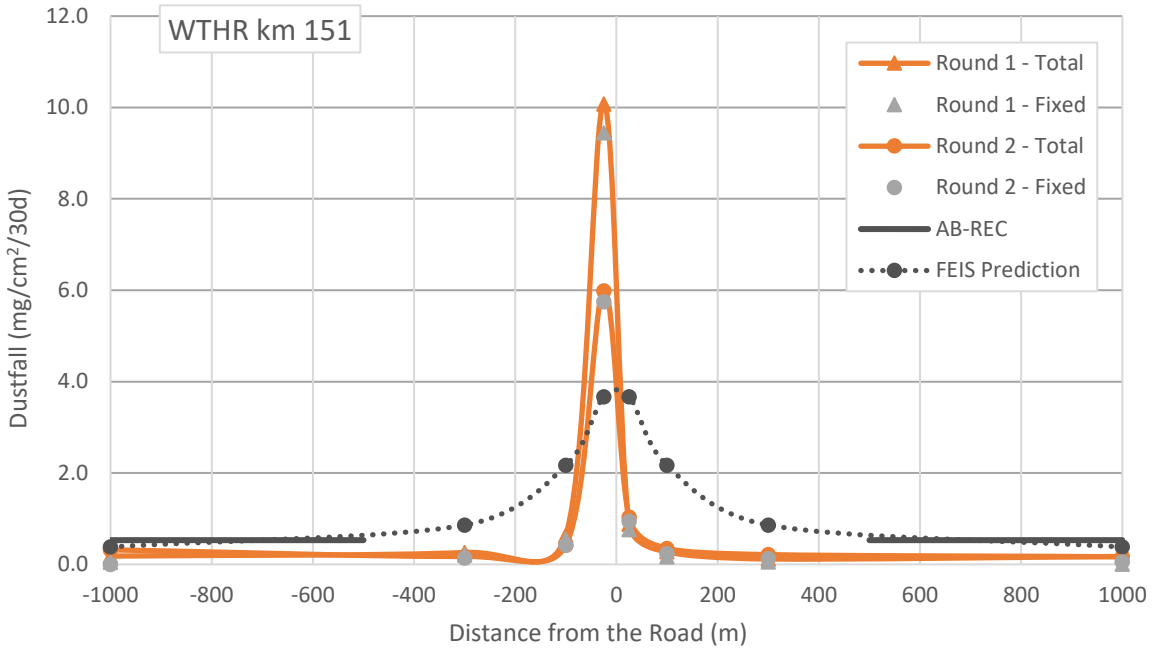

Figure 14. 30-day-normalized rates of total and fixed dustfall at km 151 along the Meadowbank WTHR in 2021. Points represent start date of sample collection. Monitoring Round 1 began July 2, and Round 2 began July 30. Positive distances represent the upwind/west side of the road, and negative distances represent the downwind/east side.

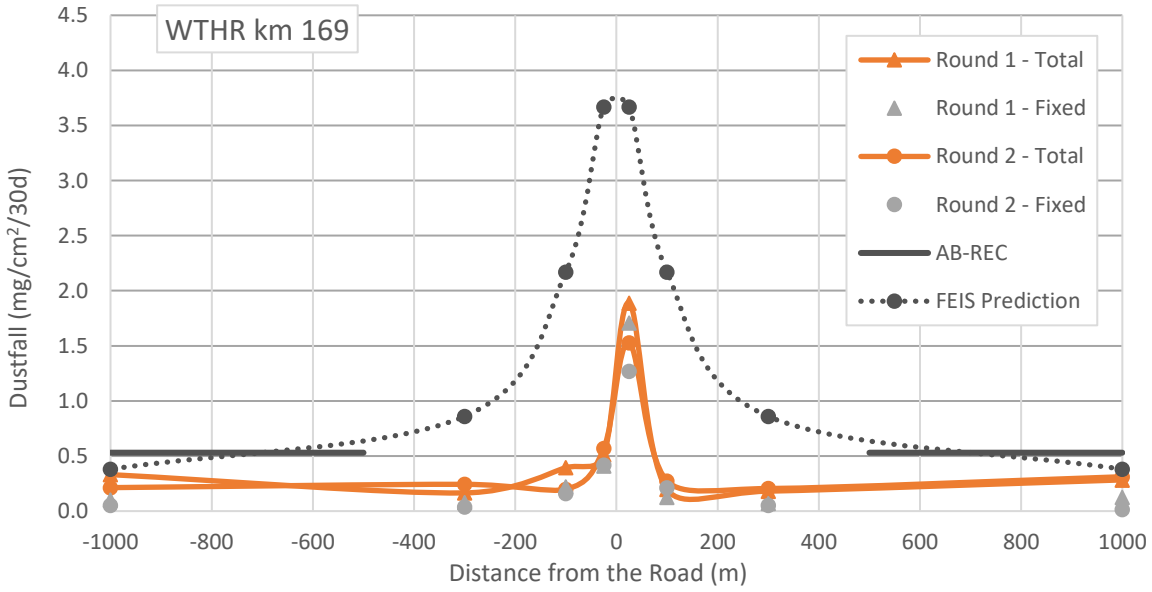

Figure 15. 30-day-normalized rates of total and fixed dustfall at km 169 along the Meadowbank WTHR in 2021. Points represent start date of sample collection. Monitoring Round 1 began July 2, and Round 2 began July 30. Positive distances represent the upwind/west side of the road, and negative distances represent the downwind/east side.

4.3 NO_2

4.3.1 Passive NO_2

Monthly-average NO_2 trends in 2021 as measured by passive sampling devices are provided in Figure 17. Samples are plotted by the collection start date. For samples below detection limits (0.1 ppb), half the limit is used in calculations and figures. In 2021, concentrations of NO_2 varied between non-detect (<0.1) and 5.8 ppb. This maximum value is similar to those observed previously for the Meadowbank site (Section 5.3).

Annual arithmetic mean concentrations were calculated for each station from the monthly-average values (Table 10). These are all well below the Government of Nunavut Ambient Air Quality Standard of 32 ppb for the annual average and the current (2020) CAAQS for the annual average concentration of NO_2 (17.0 ppb). Results for DF-2 and DF-6a were also below the maximum FEIS model-predicted annual averages.

Table 10. Arithmetic mean of the measured 1-month passive sampler NO_2 concentrations, along with the GN guideline, Canadian Ambient Air Quality Standard, and FEIS maximum model prediction (Cumberland, 2005; Agnico Eagle, 2018b - Appendix 4C).

Year	*Guidelines*		FEIS		Measured Values				
	GN	***CAAQS***	**DF-2**	**DF-6b**	**DF-1**	**DF-2**	**DF-6b**	**DF-8**	**DF-9**
	ppb	*ppb*	*ppb*	*ppb*	ppb	ppb	ppb	ppb	ppb
2021	*32*	*17*	*4.97*	*8 – 16*	0.30	1.27	1.66	0.25	0.21

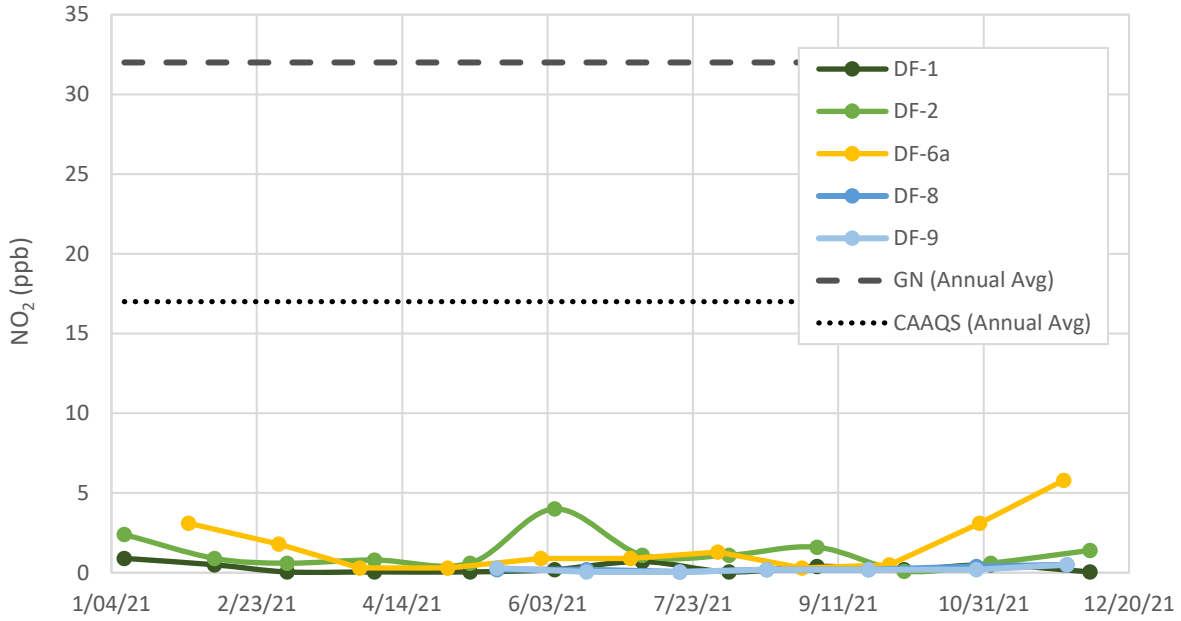

Figure 16. Monthly average concentration of NO_2 at Meadowbank Complex monitoring stations DF-1, DF-2, DF-6a, DF-8, and DF-9. Points represent start date of sample collection. Dashed line indicates GN standard for the annual average and dotted lines represents the Canadian Ambient Air Quality Standard for the annual average.

4.3.2 Continuous NO_2

As described in Section 2.3, a continuous NO_2 analyzer was installed at location DF-7 in July, 2021. To identify valid data for reporting purposes, the recorded dataset was screened according to ECCC (2019) as described below.

For data collected in 2021 (from the instrument commissioning date of July 19), daily calibration checks were reviewed (zero and span check) to identify data recorded outside of acceptable targets (+/- 2ppb for zero check, +/- 10% for span check). Beginning September 27, span checks were out of tolerance (>10% deviation from 400 ppb). According to a pre-determined schedule, as-found multi-point verification and calibration was performed by a contracted consultant brought onsite in February, 2022. During this assessment, as-found multi-point verification results were 13 – 16% of targets. Since these results bracketed the National Air Pollution Surveillance Program data acceptance criteria of 15% (ECCC, 2019) and since overall results are well below compliance criteria for the site, NO_2 data collected from September 27 through the end of the reporting year (December 31) are presented here without a data correction, but for clarity, are distinguished from data collected within quality control targets.

A single failure of the zero check occurred on November 12, after the door to the seacan housing the monitoring equipment was left open for several days. November 12 data was removed prior to analysis.

Following review of instrument quality control data, one-minute values were plotted by time series and screened for outliers (elevated concentrations, generally >100 ppb, likely caused by an idling vehicle

in close proximity). One such situation was identified and data removed (July 22 – around 12:07pm). Data collected during calibration (midnight – 1am) was also removed.

The valid one-minute data was processed to calculate hourly and 24-h averages for NO_2, for comparison to regulatory guidelines. No quantitative FEIS predictions are available for the DF-7 location. Annual averages were calculated for the valid dataset (July 19 – September 26) and the full dataset (July 19 – December 31).

All hourly and 24-h averages were well below the GN guideline and CAAQS (Figures 17 and 18).

The annual average based on valid data collected from July 19 – September 26 was 0.27 ppb, and the annual average based on the full dataset (July 19 – December 31) was 0.30 ppb. Both of these are well below the GN standard (32 ppb) and CAAQS (17 ppb).

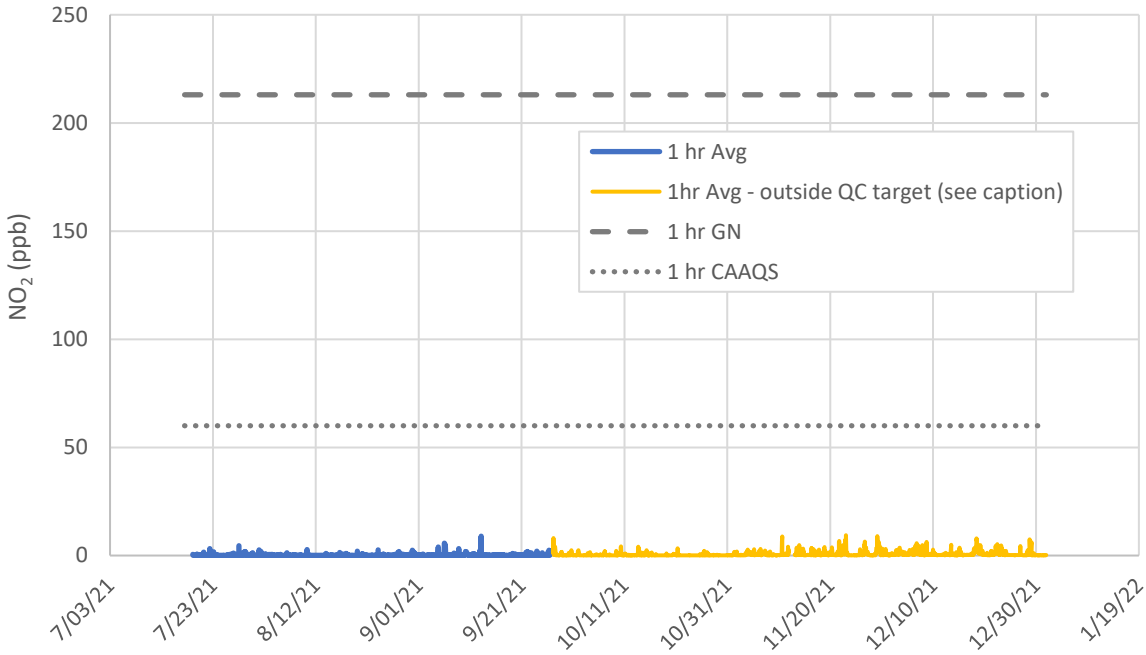

Figure 17. Calculated 1-h average concentrations of NO_2 at station DF-7 in 2021, along with the Government of Nunavut (GN) guideline and Canadian Ambient Air Quality Standard (CAAQS). Data collected from September 27 was outside of National Air Pollution Surveillance Program (NAPS) span check tolerance criteria but within data acceptance criteria. See text for details.

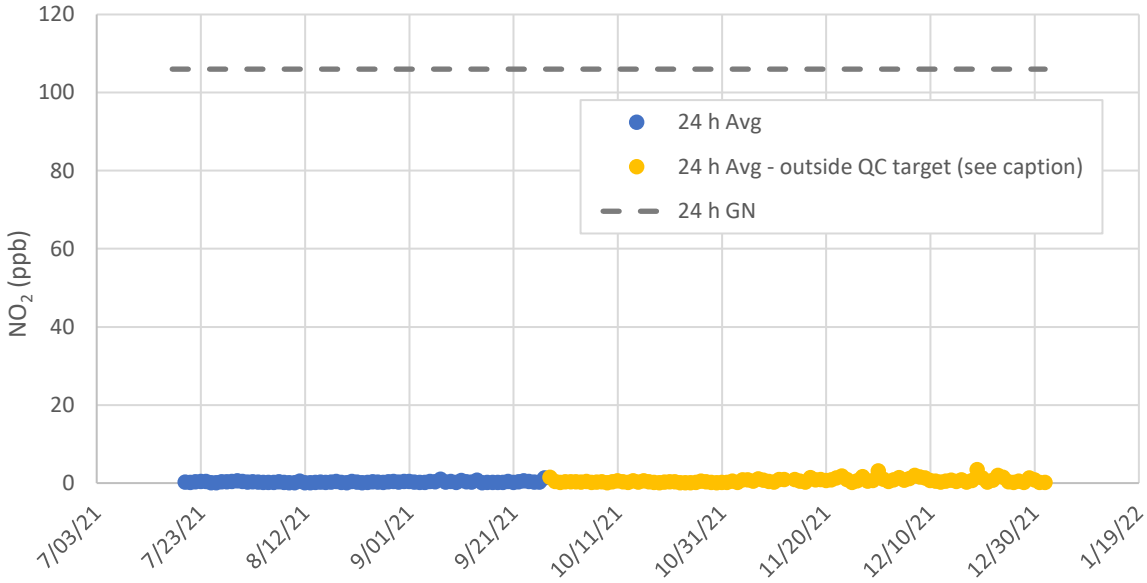

Figure 18. Calculated 24-h average concentrations of NO_2 at station DF-7 in 2021, along with the Government of Nunavut (GN) guideline. Data collected from September 27 is outside of National Air Pollution Surveillance Program (NAPS) span check tolerance criteria but within data acceptance criteria. See text for details.

4.4 QA/QC

QA/QC procedures in 2021 included the use of an accredited lab for sample preparation and analysis, sample collection by appropriate personnel (trained by a professional air quality specialist), use of travel blanks for suspended particulate and NO_2 samples, and use of field duplicates for road-side dustfall samples.

Maintenance and replacement schedules for the Partisol instruments are also discussed here, along with any data loss due to operational downtime or sampling errors.

4.4.1 Partisol Operations and Maintenance

Due to ongoing difficulties in maintaining the Partisol instruments, repairs continue to be performed or parts replaced as necessary on all units. Agnico brought the Partisol supplier onsite in December 2020 and again in March 2022 to complete a full audit of the six instruments in use, and provide supplemental training to Environment Department personnel. During these visits, the supplier provided maintenance, along with recommendations for improved performance and reduction of downtime, a list of parts needed for some units repairs/maintenance, and a list of spares parts.

In March 2021 the TSP unit at DF-1 began failing, and after troubleshooting by both Environment Department Technicians and a consultant brought onsite in July 2021, it was removed from the field for maintenance. New parts have not yet been received.

For the other five of the six Partisol units, limited data loss occurred in 2021. For each sampler, Table 11 shows the monitoring period for 2021 reporting along with available and actual number of 24-h samples collected. For these five units, sporadic data loss occurred throughout the year due to

instrument error (e.g. significantly reduced air intake volume, possibly due to cold weather limitations), technician error (e.g. improper settings), or operational difficulties such as torn filters.

Table 11. Available and actual number of 24-h samples collected in 2021 for suspended particulates.

Location	Monitoring Period	# Available Sampling Dates	# Sampled Dates		
			$PM_{2.5}$	PM_{10}	TSP
DF-1	January 1 – December 30	61	59	58	14
DF-2	January 1 – December 30	61	49	46	57
DF-6b	January 2 – December 30	61	59	59	58

As part of QA procedures and data processing, Partisol operational data files are downloaded from each instrument and reviewed to ensure sampling occurred without error, and confirm intake volumes for use in volumetric calculations. As discussed in Section 2.1, concentrations of particulates need to be calculated using air volumes normalized to 25°C and 101.3kPA (standard temperature and pressure; STP). In 2021, depending on system settings, standardized volumes were either recorded by the Partisol unit (DF-1 TSP, DF-2 $PM_{2.5}$/PM_{10}, DF-6b), or were calculated from average temperature and pressure values recorded by the Partisol unit during the sampling period (DF-1 $PM_{2.5}$/PM_{10}, DF-2 TSP). Moving forward, all Partisol instruments will be set to record standardized volumes.

4.4.2 Travel Blanks and Field Duplicates

Travel blanks were used in one suspended particulate sample submission, with a result of 8 µg/filter (MDL = 3 µg/filter), which is similar to previous years. Detections in travel blanks have been relatively common, with up to 8 contaminated blanks occurring yearly from 2014 - 2020, with concentrations up to 14 µg/filter. In the majority of cases, blanks marginally exceeded the detection limit (e.g. 4 or 5 µg/filter) and never exceeded 5x the MDL. Since there were few exceedances of regulatory guidelines, interpretation of field results was not modified based on this analysis.

Travel blanks were also analyzed for each NO_2 sampling event. Unopened canisters were shipped to the Meadowbank Complex by the laboratory, stored in the Meadowbank and Whale Tail field offices, and shipped back to the laboratory with each monthly NO_2 analysis (one for Meadowbank samples, and one for Whale Tail samples). Detections occurred in all but one sample, from 0.1 to 0.9 ppb, which is similar to previous years. Since NO_2 concentrations are well below regulatory guidelines, interpretation of field results was not modified based on this analysis.

Field duplicate dustfall canisters are collected in the immediate vicinity of regular transect samples. The relative percent difference (RPD) values calculated for total dustfall for duplicate canisters are shown in Table 12. Relative to other media, RPDs in dustfall samples have tended to be very high, which is understandable given the potential for debris to be entrained by passing vehicles and land in adjacent dustfall canisters. This variability is taken into consideration when interpreting the results of the dustfall studies. Since variation in dusfall duplicates is now well characterized and is not expected to vary significantly year-over-year, the rate of field duplicates will be reduced to one per transect per year, moving forward.

Table 12. RPD values for total dustfall in duplicate dustfall canisters on the east (E) or west (W) side of the Whale Tail Haul Road (WTHR) and All Weather Access Road (AWAR) in 2021.

Sampling Event	Location	Sample	Duplicate	RPD
		(mg/cm^2/30d)	(mg/cm^2/30d)	(%)
Event 1	AWAR km 18; 100 m E	0.355	0.306	14
	AWAR km 18; 300 m W	0.668	1.429	114
	AWAR km 78; 25 m E	0.853	1.145	34
	AWAR km 78; 300 m W	0.092	0.142	54
	WTHR km 134; 25 m E	0.488	0.425	13
	WTHR km 151; 25 m E	10.08	9.48	6
	WTHR km 169; 25 m E	0.512	0.630	23
Event 2	AWAR km 18; 100 m E	0.514	0.414	19
	AWAR km 18; 300 m W	0.245	0.391	60
	AWAR km 78; 25 m E	0.675	0.381	44
	WTHR km 134; 25 m E	0.152	0.182	20
	WTHR km 151; 25 m E	5.98	5.65	6
	WTHR km 169; 25 m E	0.57	0.524	8

4.5 EFFECTIVENESS OF MITIGATION

The effectiveness of mitigation measures discussed in Section 1.2 to reduce the generation of road dust is determined here through comparison of monitoring results with numeric thresholds identified in the Air Quality and Dustfall Monitoring Plan (Version 5; March, 2021). These thresholds and results for 2021 are summarized below with a commentary on effectiveness of the mitigation.

Threshold 1: *Dustfall exceeding 0.53 mg/cm^2/30-day at 500 m from the AWAR or WTHR.*

- A single total dustfall sample exceeded this threshold (1000 m downwind, km 78), but since the fixed dustfall result was well below the threshold, the exceedance is considered unrelated to road activity.
- Mitigation activities related to road dust along the AWAR and WTHR are therefore considered to have been effective in 2021.

Threshold 2: *Dustfall exceeding 1.58 mg/cm^2/30-day at stations DF-1 to DF-6.*

- The threshold was exceeded in one of 59 samples from these stations (DF-1). All other samples at the monitoring station (DF-1) were well below the threshold. This sample is therefore considered an isolated event and no change in mitigation is planned based on this result.
- Mitigation activities related to dust deposition for onsite locations are therefore considered to have been effective in 2021.

Threshold 3: *Active PM results exceeding FEIS predictions at DF-6.*

- No PM results exceeded the relevant FEIS predictions for DF-6. See Section 4.1 for full details.

- Mitigation activities related to generation of suspended particulates at the Whale Tail site are therefore considered to have been effective in 2021.

Based on these results, the mitigation measures implemented in 2021 are considered to have been effective in maintaining particulate emissions below the established threshold values.

SECTION 5 • HISTORICAL COMPARISON

5.1 TSP, PM_{10}, $PM_{2.5}$

In order to understand trends of suspended particulate concentrations at the Meadowbank Complex over time, measured values of TSP, PM_{10}, and $PM_{2.5}$ at DF-1, DF-2, and DF-6b were plotted since monitoring began in 2012 (DF-1, DF-2) and 2020 (DF-6b) (Figures 19 - 21). These results indicate that concentrations of suspended particulates are relatively stable and have not been increasing over time.

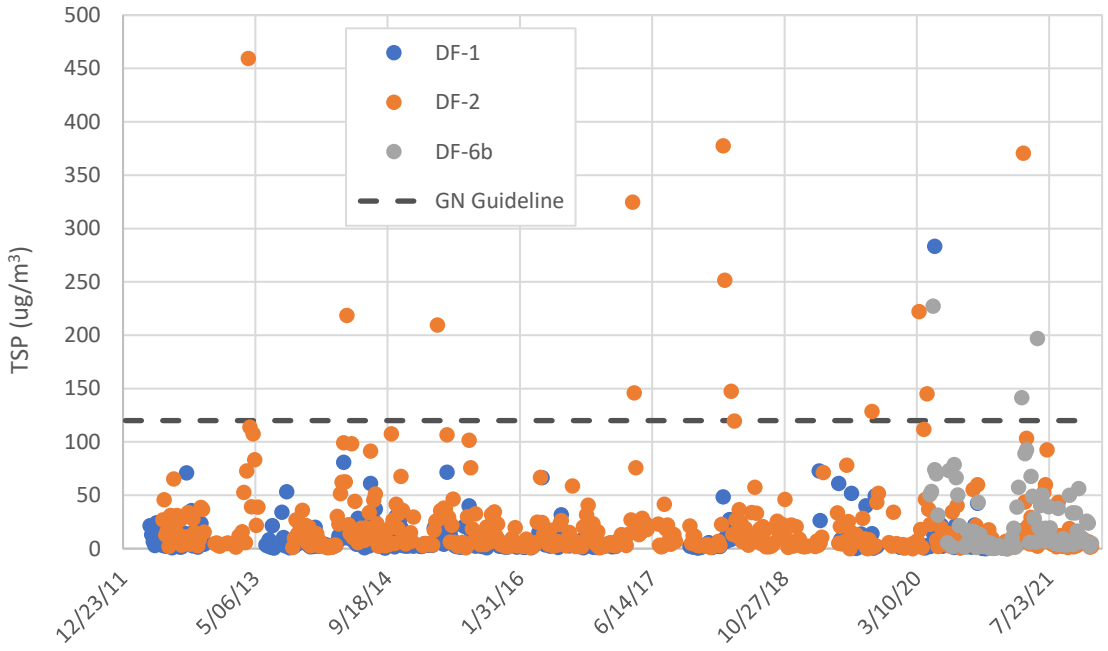

Figure 19. 24-h average concentrations of total suspended particulates (TSP) at Meadowbank Complex stations DF-1, DF-2, and DF-6b. Dashed line indicates the 24-hr average GN guideline for ambient air quality.

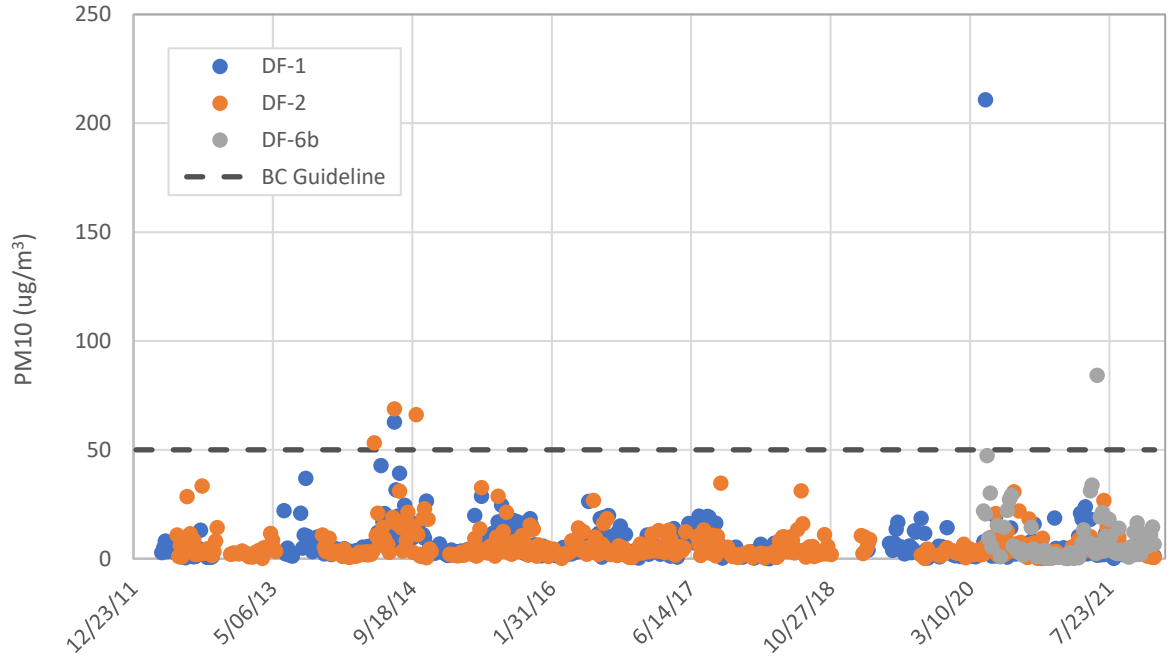

Figure 20. 24-h average concentration of airborne particulate matter less than 10 microns (PM_{10}) at Meadowbank stations DF-1, DF-2, and DF-6b. Dashed line indicates the BC Air Quality Objective for this parameter.

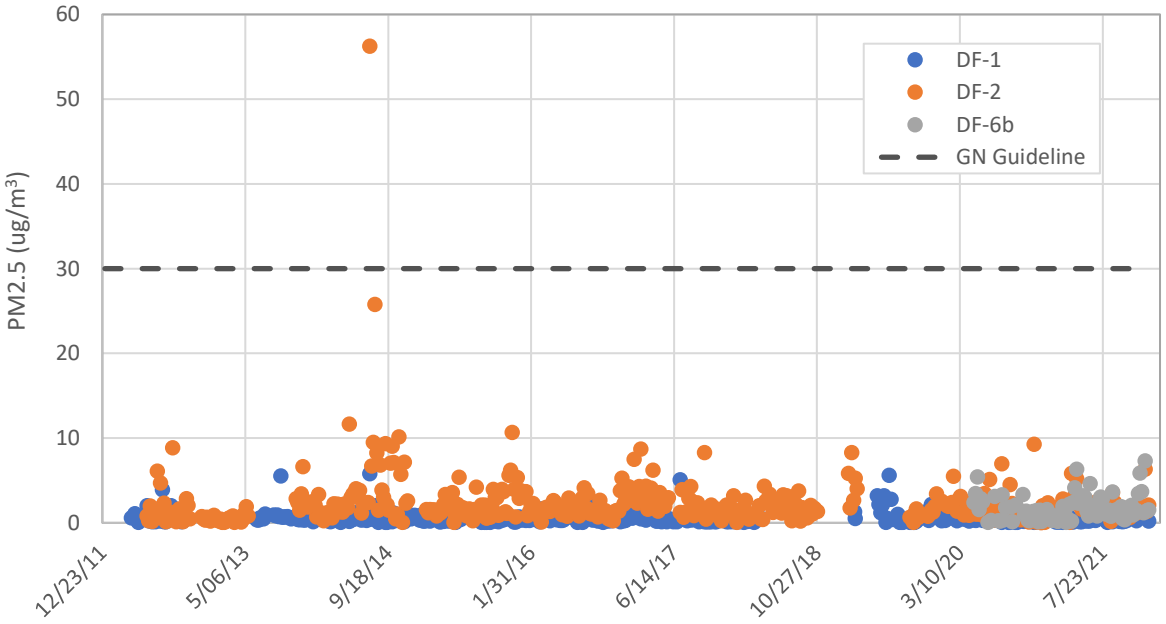

Figure 21. 24-h average concentration of airborne particulate matter less than 2.5 microns ($PM_{2.5}$) at Meadowbank stations DF-1, DF-2, and DF-6b. Dashed line indicates the 24-hr average GN guideline for ambient air quality.

5.2 DUSTFALL

5.2.1 Onsite Locations DF-1 – DF-6

In order to understand trends in generation of deposited particulate matter at the Meadowbank Complex over time, measured values of dustfall at DF-1, DF-2, DF-3, DF-4, and DF-6a were plotted since monitoring began in 2012 and 2020 (Figure 22). Although the single highest measured rate of total dustfall for one timepoint was observed in 2021, this was an isolated incident and these results indicate that overall, dustfall has not been increasing over time.

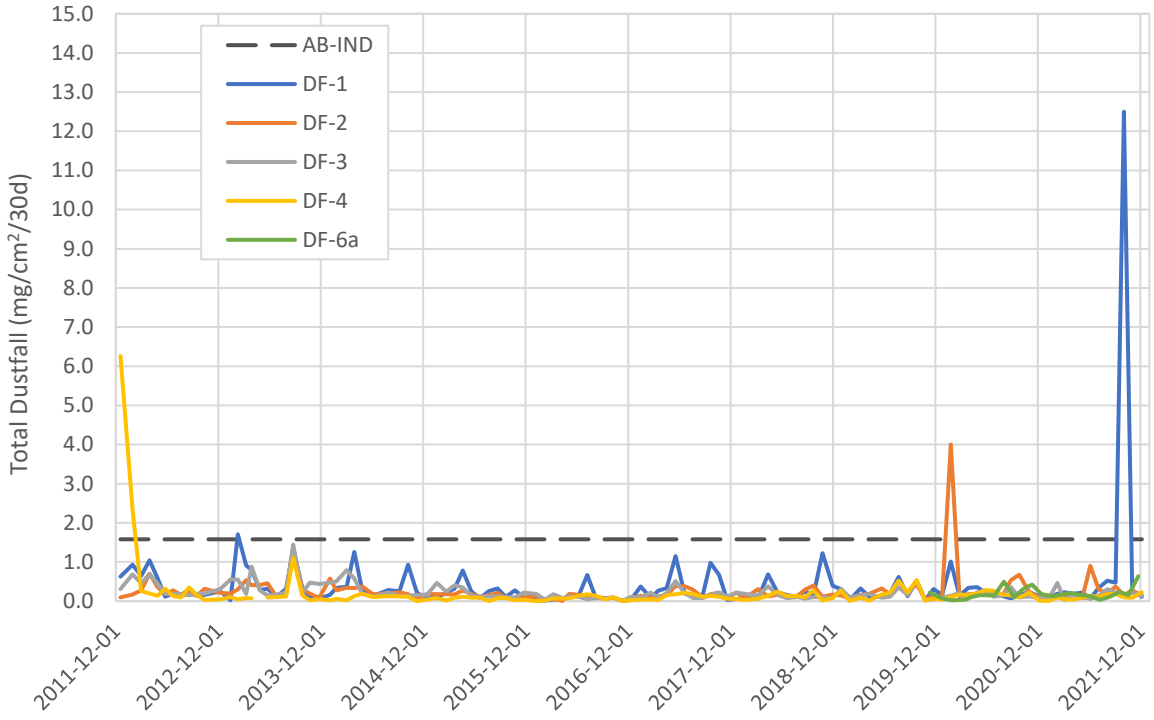

Figure 22. Total 30-day-normalized dustfall at DF-1 – DF-6 at the Meadowbank Complex. Points represent start date of sample collection.

5.2.2 Meadowbank AWAR Dustfall Transects

All results collected along the Meadowbank AWAR to date (since 2012) in locations without dust suppression are presented in Figure 23 in relation to AB-Rec. Results are compared here only for samples collected mainly in August, since historically sampling was only performed during this month, when the highest traffic rates and driest weather occurs. In 2020, sampling on stands at approximately 1.8 m height began, while previously sampling was conducted at ground level.

The range of background concentrations was determined from a total of 34 samples collected from four reference locations in 2014 – 2019, including: an established external reference site near Inuggugayualik Lake, baseline samples for the proposed Whale Tail Haul Road, and samples collected 1000 m upwind of the AWAR at km 18 and 78.

Overall, results demonstrate that measured concentrations of dustfall are not increasing over time. In 2021, similar to 2020, results tended to be lower than those observed historically, especially in close proximity to the road. This is likely a result of the switch to sampling on stands, which reduces the influence of re-entrainment on dustfall results. Historically and regardless of sampling method, the current threshold for supplemental mitigation of dustfall (0.53 mg/cm^2/30d at 500 m) has never been exceeded among these August samples, with all but one sample at 300 m and beyond falling below this threshold.

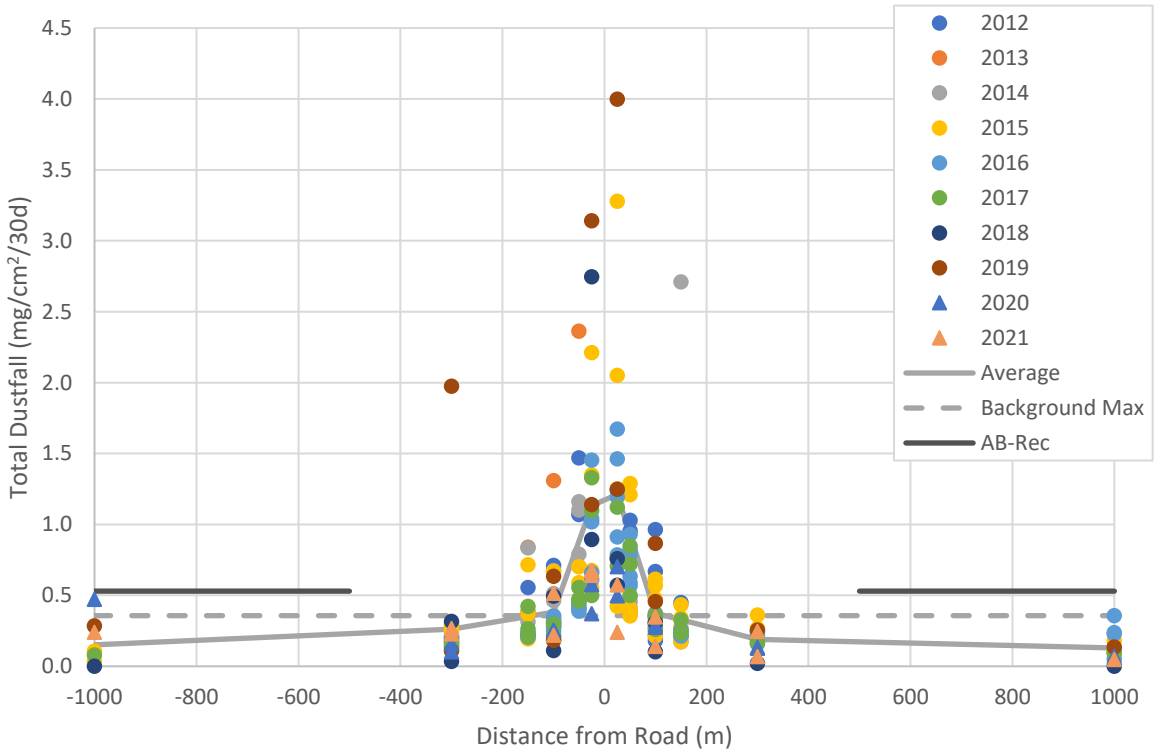

Figure 23. Total dustfall rates (mg/cm^2/30d) for all samples collected since 2012 (August sampling events) along the Meadowbank AWAR in areas without dust suppression. Negative distances represent the downwind (east) side of the road, and positive distances represent the upwind (west) side.

5.2.3 Whale Tail Haul Road Dustfall Transects

All results collected to date in August along the Whale Tail Haul Road (2018 - 2021) are shown in Figure 24. This month was chosen for comparative purposes to align with AWAR methods (see above) and because it generally represents the worst-case dustfall scenario (driest conditions and highest rates of traffic). In 2020, sampling on stands began, while sampling in 2018 and 2019 was at ground level.

Generally, rates of dustfall in 2021 were similar to those observed in 2020 and lower than those observed previously, which may be a result of both increased dust suppression efforts and the switch to samplers at the 1.8 m height, which reduces the potential for introduction of dust re-entrained from the ground.

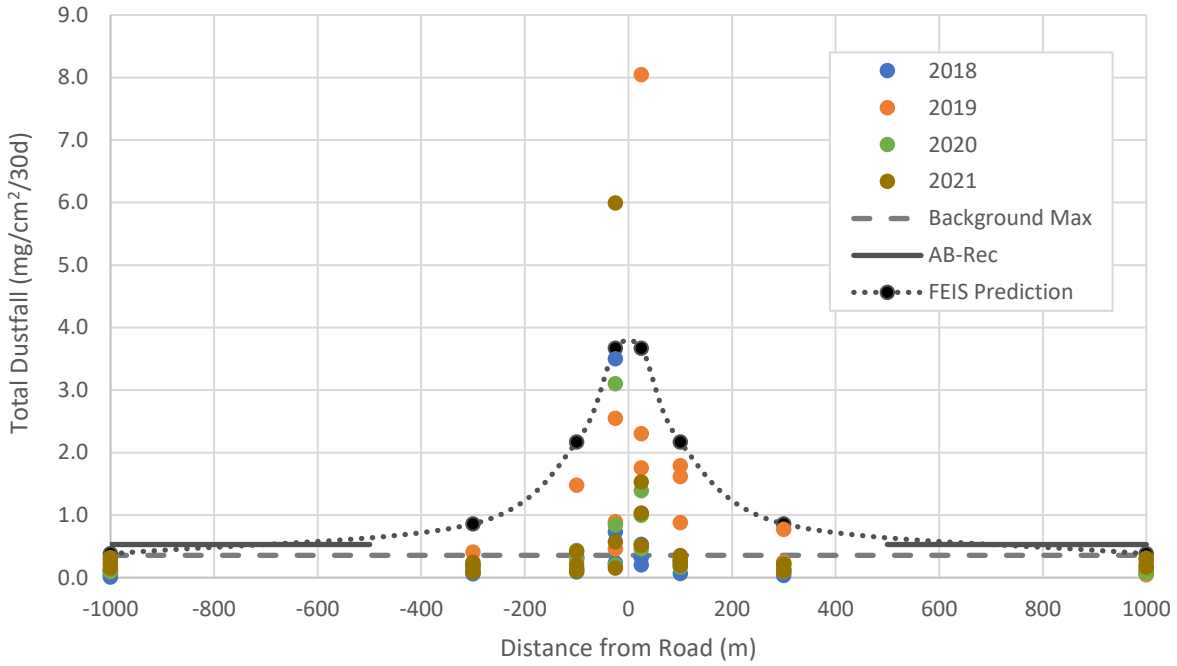

Figure 24. Total dustfall rates (mg/cm²/30d) for all samples collected in August along the Whale Tail Haul Road to date. 2018 and 2019 data was collected at ground level, while 2020+ samples were collected on stands. Negative distances represent the east (downwind) side of the road, and positive distances represent the west (upwind) side. FEIS Prediction values are from the FEIS Addendum Appendix 4C, Table 4-C-24 (Agnico Eagle, 2018b).

5.3 NO_2

In order to understand trends in concentrations of gaseous pollutants at the Meadowbank Complex over time, measured values of NO_2 collected using passive samplers at DF-1, DF-2, and DF-6a were plotted since monitoring began in 2012 (DF-1, DF-2) and 2018 (DF-6a) (Figure 25). These results indicate that concentrations of NO_2 in the area have remained very low relative to guidelines for the annual average, and are not increasing over time.

Historical results are not yet analyzed for continuous NO_2, since only two months of data are available at this time.

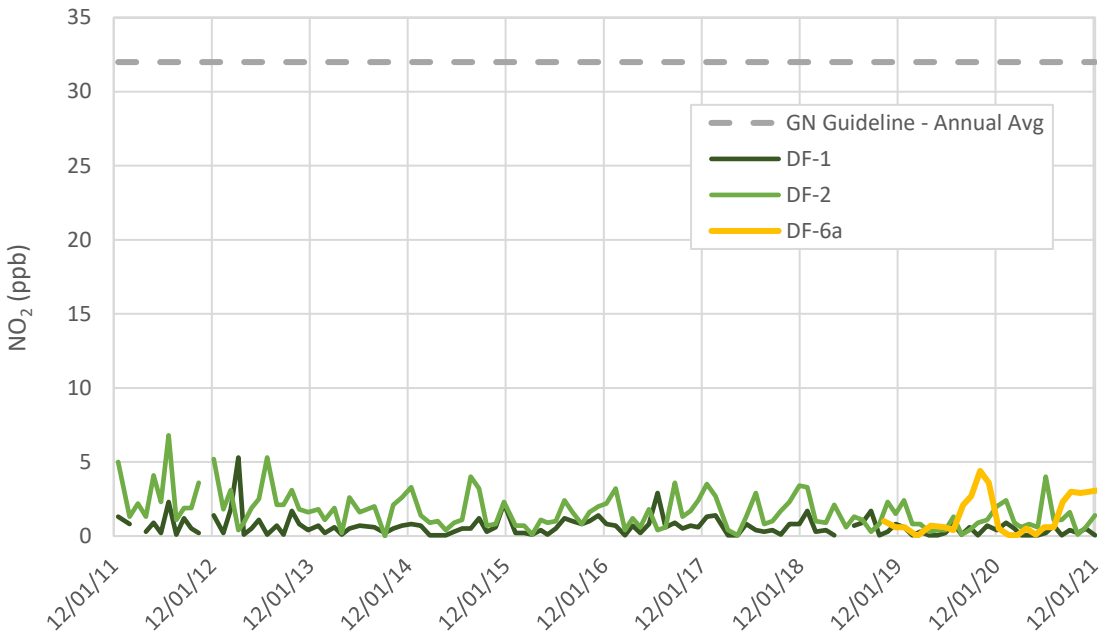

Figure 25. Monthly average concentration of NO_2 at DF-1, DF-2, and DF-6a. Points represent start date of sample collection. Dashed line indicates the GN standard for the annual average.

SECTION 6 • WEATHER DATA

Weather data is collected using the mine site's permanent weather stations at the Meadowbank and Whale Tail sites, and the wind monitoring station installed at DF-7. Daily averages for wind speed, wind direction and temperature are provided from the Meadowbank permanent station in Appendix A. Wind data from the DF-7 location is not specifically reported but is reviewed and reported as necessary in interpretation of NO2 analyzer results.

SECTION 7 • GREENHOUSE GAS EMISSIONS

Agnico is required by Environment Canada's 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.

Estimated greenhouse gas emissions for the Meadowbank Complex are reported to Environment Canada's Greenhouse Gas Emissions Reporting Program by June 1, annually, for the preceding calendar year. Results calculated to date are shown in Table 13.

Results to date are below the FEIS Addendum (Agnico Eagle, 2018) prediction for the Meadowbank Complex of 344,200 tonnes CO_2e.

Table 13. Estimated greenhouse gas emissions for the Meadowbank site as reported to Environment Canada's Greenhouse Gas Emissions Reporting Program. 2018+ includes Meadowbank and Whale Tail sites. *Re-calculated in 2020.

Reporting Year	Calculated CO_2 Emissions (tonnes CO_2 equivalent)
2012	202,201
2013	195,686
2014	179,889
2015	187,280
2016	184,223
2017	194,440
2018	186,122
2019	195,564*
2020	225,435
2021	243,752

SECTION 8 • INCINERATOR STACK TESTING

Incinerator stack testing is conducted under Agnico Eagle's Incinerator Waste Management Plan (AEM, 2018), and results are summarized here.

As per discussions with Environment and Climate Change Canada, the frequency of stack testing has been every other year since 2012. Results from the 2014 test indicated that the average mercury level exceeded the Environment Canada guideline in that year (Refer to 2014 and 2015 Annual Reports for more information). An investigation was performed to determine the potential sources of this exceedance. Although Agnico had an alkaline battery recycling program, the investigation revealed the possibility of batteries disposed of along with regular solid waste destined for the onsite incinerator. As a result, Agnico conducted annual stack testing from 2015-2019 and implemented a comprehensive site wide communication program to reinforce the requirements of the battery recycling program and proper waste segregation.

Based on the five previous years' results, Agnico consulted ECCC on June 30th, 2020 to request the authorization to return to biennial testing. ECCC response indicated that they do not regulate air quality emission but does provide guidance to NIRB when expert advise is requested. As ECCC does not have the authority to permit Agnico to move to biannual stack testing, a communication was send to NIRB on August 19th to request the authorization. On December 3rd, 2020, Agnico received the 2019-2020 Board Recommendation recommending that the stack testing continue to be conducted annually based on the guidance provided by ECCC, the Canada Wide Standards for dioxins and furans, the Canada Wide Standards for mercury, and the requirements of Term and Condition 72 of the Meadowbank Project Certificate. Agnico was confident that all the regulations and criteria were met, and having followed the approved Incinerator Waste Management Plan requirements to reduce the stack testing frequency to biennial following five year of compliance, stack testing was not completed in 2020.

Meadowbank incinerator stack testing was performed in 2021 from September 16 to 21 and from November 20 to 28 (full details provided in the 2021 Meadowbank Complex Annual Report). The results of the stack testing indicated no exceedance of the mercury limit. However, two of the three tests for dioxin and furan and the overall average of this analysis exceeded the regulatory limit of 80 pg/m3 @ 11% O2. An investigation process is currently ongoing to determine the cause of this exceedance and results of this process will be communicated to NIRB and also included in future annual reports. The next stack testing at Meadowbank site is scheduled for 2022.

No incinerator was used at the Whale Tail Site in 2021.

Results of annual stack tests to date are provided in Table 14. Since 2015, concentrations of mercury have been below the GN standard of 20 µg/ Rm^3 @ 11 % v/v O_2, suggesting that efforts to reduce improper disposal of batteries were effective. Concentrations of dioxins and furans have also met the GN standard (80 pg TEQ / Rm^3 @ 11 % v/v O_2) except for 2021.

Table 14. Historical stack testing results for mercury and dioxins and furans at the Meadowbank site. *The GN standard is for the average of three tests, as reported here.

Year	Mercury (µg/Rm^3 @ 11% v/v O_2)		Dioxins and Furans (pg/Rm^3 @ 11% v/v O_2)	
	GN Standard	Stack Testing Results (Average*)	GN Standard	Stack Testing Results (Average*)
2014	20	64.09	80	53.6
2015		<0.22		21.0
2016		<0.46		33
2017		3.8		22
2018		<0.19		10
2019		0.453		27
2021		1.33		286

SECTION 9 • SUMMARY

9.1 SUSPENDED PARTICULATES (TSP, PM_{10}, $PM_{2.5}$)

For TSP, three of 129 samples across all three stations exceeded the GN 24-h guideline of 120 µg/m^3 in 2021. This includes two samples at the Whale Tail site location (DF-6b), where exceedances were predicted in the FEIS Addendum (Section 3.2). The GN guideline for the annual average was not exceeded for any station. The FEIS Addendum prediction for the maximum annual average at DF-6b was also not exceeded.

For PM_{10} a single sample across all three stations (163 samples) exceeded the BC guideline for the 24-h average. The exceedance occurred at station DF-6b, where exceedances were predicted in the FEIS Addendum (Section 3.2).

All results for $PM_{2.5}$ (166 samples) were less than the relevant air quality criteria for 24-h and annual averaging times (GN guideline, CAAQS, and FEIS predictions.

9.2 DUSTFALL

One dustfall sample of 59 collected at onsite locations DF-1 – DF-6 exceeded the relevant Alberta Ambient Air Quality Guideline for industrial/commercial areas. All other samples at the monitoring station (DF-1) were well below the threshold. This sample is therefore considered an isolated event and no change in mitigation is planned based on this result.

For samples collected along the AWAR and WTHR transects, no relevant exceedances of the established dust management threshold occurred (0.53 mg/cm^2/30d at 500 m). Total dustfall in one sample exceeded the threshold at 1000 m downwind (km 78), but the result for fixed dustfall was well below the guideline, so results are considered unrelated to road activity.

9.3 NO_2

Measured using passive samplers, annual average NO_2 were less than the GN guideline of 32 ppb, the CAAQS of 17 ppb, and FEIS predictions for all stations at the Meadowbank Complex.

Results for continuous NO_2 monitoring indicated all measured concentrations were less than the relevant 1-h, 24-h, and annual average standards (GN and/or CAAQS).

9.4 GHG EMISSIONS

Estimated greenhouse gas emissions for the Meadowbank Complex in 2020 for reporting to Environment Canada's Greenhouse Gas Emissions Reporting Program were 243,4752 tonnes CO_2 equivalent.

9.5 INCINERATOR EMISSIONS

Incinerator stack testing results in 2021 indicated an exceedance of the GN limit for dioxins and furans. An investigation is underway. Stack testing will be performed again in 2022.

9.6 CONCLUSION

In 2021, few exceedances of short-term air quality standards occurred and no exceedances of standards for annual averages occurred. Furthermore, no exceedances of FEIS predictions occurred for the applicable stations. Overall, there are no apparent trends towards increasing or unpredicted air quality concerns at the Meadowbank Complex in 2021.

Numerical thresholds for dust management were not exceeded along the AWAR or WTHR, and were only exceeded in a single dustfall sample for onsite locations. Based on these results, dust mitigation is considered to have been effective at maintaining levels of particulates below the established thresholds in 2021.

SECTION 10 • ACTIONS

No actions were identified in the 2020 Air Quality and Dust Monitoring Report for completion in 2021.

Along with stack testing in 2022 according to the Incinerator Waste Management Plan and an investigation of the dioxin and furan exceedance, the following actions related to minor modifications of the monitoring program are planned. In 2022, Agnico will aim to:

- Reduce the frequency of dustfall field duplicates to one per transect.
- Set the remaining Partisol units to record STP-standardized intake volume.

SECTION 11 • REFERENCES

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

Agnico Eagle Mines Ltd. (Agnico Eagle), 2018a. Meadowbank Gold Project Incinerator Waste Management Plan – Version 6. July, 2018.

Agnico Eagle Mines Ltd. (Agnico Eagle) 2018b. FEIS Addendum for the Whale Tail Pit – Expansion Project – Volume 4: Atmospheric Environment. December, 2018.

ECCC, 2019. CCME NAPS Ambient Air Monitoring and Quality Assurance/Quality Control Guidelines. PN 1599 ISBN 978-1-77202-056-4 PDF. Available online: https://ccme.ca/en/res/ambientairmonitoringandqa-qcguidelines_ensecure.pdf

Appendix A

Weather Data

Table A- 1. Daily temperature, wind speed and wind direction in 2021 at the Meadowbank site. Wind speed data was not available from January 1- March 17.

Date	Average Temperature (°C)	Maximum Temperature (°C)	Minimum Temperature (°C)	Average Wind Speed (m/s)	Average Wind Direction (deg.)
1/01/21	-28.2	-22.2	-32.9	-	-
1/02/21	-33.0	-30.6	-36.0	-	-
1/03/21	-35.0	-32.0	-37.7	-	-
1/04/21	-38.3	-37.1	-39.4	-	-
1/05/21	-36.1	-31.4	-39.8	-	-
1/06/21	-34.6	-33.6	-35.5	-	-
1/07/21	-25.3	-20.7	-34.3	-	-
1/08/21	-15.3	-9.0	-21.2	-	-
1/09/21	-19.2	-15.1	-25.9	-	-
1/10/21	-24.8	-22.6	-26.6	-	-
1/11/21	-25.5	-23.0	-27.2	-	-
1/12/21	-21.3	-18.7	-24.7	-	-
1/13/21	-16.5	-16.1	-16.7	-	-
1/14/21	-18.3	-12.5	-24.5	-	-
1/15/21	-23.9	-19.3	-28.2	-	-
1/16/21	-25.4	-21.0	-29.4	-	-
1/17/21	-22.7	-20.7	-25.9	-	-
1/18/21	-25.4	-23.9	-26.8	-	-
1/19/21	-28.3	-25.6	-31.1	-	-
1/20/21	-30.0	-28.4	-32.0	-	-
1/21/21	-23.9	-22.6	-30.6	-	-
1/22/21	-23.6	-21.6	-28.5	-	-
1/23/21	-28.7	-25.9	-32.2	-	-
1/24/21	-28.1	-24.5	-31.4	-	-
1/25/21	-24.3	-23.3	-25.1	-	-
1/26/21	-22.5	-20.3	-25.1	-	-
1/27/21	-19.8	-17.6	-22.7	-	-
1/28/21	-20.7	-16.8	-25.4	-	-
1/29/21	-23.8	-21.4	-26.2	-	-
1/30/21	-20.8	-19.4	-23.6	-	-
1/31/21	-22.5	-19.0	-29.3	-	-
2/01/21	-28.9	-26.8	-31.8	-	-
2/02/21	-30.9	-29.9	-31.9	-	-
2/03/21	-32.3	-28.7	-35.4	-	-
2/04/21	-33.3	-32.0	-34.8	-	-
2/05/21	-35.1	-33.3	-36.7	-	-

Date	Average Temperature (°C)	Maximum Temperature (°C)	Minimum Temperature (°C)	Average Wind Speed (m/s)	Average Wind Direction (deg.)
2/06/21	-38.2	-36.4	-40.1	-	-
2/07/21	-37.6	-34.3	-39.0	-	-
2/08/21	-24.0	-12.9	-34.4	-	-
2/09/21	-11.4	-7.2	-23.5	-	-
2/10/21	-24.1	-18.0	-28.2	-	-
2/11/21	-23.5	-19.3	-28.4	-	-
2/12/21	-26.1	-22.8	-27.6	-	-
2/13/21	-31.0	-27.2	-32.8	-	-
2/14/21	-28.0	-24.7	-32.7	-	-
2/15/21	-25.6	-23.2	-27.5	-	-
2/16/21	-26.6	-24.3	-31.7	-	-
2/17/21	-30.6	-26.7	-35.9	-	-
2/18/21	-34.8	-31.8	-37.8	-	-
2/19/21	-31.2	-29.2	-33.1	-	-
2/20/21	-28.1	-24.3	-33.5	-	-
2/21/21	-20.9	-18.2	-26.8	-	-
2/22/21	-27.4	-26.4	-29.0	-	-
2/23/21	-29.5	-27.2	-31.1	-	-
2/24/21	-33.3	-30.9	-35.2	-	-
2/25/21	-33.8	-32.2	-35.9	-	-
2/26/21	-37.4	-30.0	-41.7	-	-
2/27/21	-40.1	-37.0	-42.5	-	-
2/28/21	-34.7	-32.6	-35.6	-	-
3/01/21	-29.3	-25.9	-32.6	-	-
3/02/21	-28.8	-25.3	-36.8	-	-
3/03/21	-37.4	-33.7	-40.5	-	-
3/04/21	-27.2	-19.1	-37.1	-	-
3/05/21	-33.0	-27.6	-35.6	-	-
3/06/21	-33.1	-28.0	-37.3	-	-
3/07/21	-19.9	-14.5	-28.2	-	-
3/08/21	-13.7	-7.9	-19.3	-	-
3/09/21	-22.3	-18.0	-28.2	-	-
3/10/21	-27.2	-24.3	-29.7	-	-
3/11/21	-30.5	-27.6	-34.1	-	-
3/12/21	-31.5	-28.7	-34.0	-	-
3/13/21	-31.4	-27.5	-35.2	-	-
3/14/21	-29.8	-26.1	-33.4	-	-

Date	Average Temperature (°C)	Maximum Temperature (°C)	Minimum Temperature (°C)	Average Wind Speed (m/s)	Average Wind Direction (deg.)
3/16/21	-24.6	-19.9	-28.5	-	-
3/17/21	-20.5	-18.3	-26.7	2.6	359
3/18/21	-26.6	-21.9	-30.4	3.8	274
3/19/21	-24.6	-18.1	-31.9	4.7	114
3/20/21	-20.9	-17.1	-26.7	1.6	57
3/21/21	-19.6	-14.5	-24.7	6.0	76
3/22/21	-19.7	-14.5	-26.6	8.6	22
3/23/21	-29.4	-26.4	-32.2	9.5	352
3/24/21	-30.6	-26.7	-33.7	6.6	296
3/25/21	-30.9	-24.4	-35.3	2.8	290
3/26/21	-30.7	-25.9	-36.6	3.0	116
3/27/21	-21.4	-17.2	-27.1	7.3	143
3/28/21	-25.3	-22.6	-28.3	4.9	320
3/29/21	-29.4	-26.6	-31.8	5.5	318
3/30/21	-30.7	-27.2	-34.3	3.9	294
3/31/21	-32.1	-27.8	-36.8	2.6	261
4/01/21	-32.4	-26.4	-38.0	0.9	1
4/02/21	-32.9	-27.6	-38.9	2.4	74
4/03/21	-24.3	-18.3	-32.2	10.0	60
4/04/21	-14.3	-8.5	-18.9	10.1	54
4/05/21	-20.6	-16.2	-27.5	4.2	320
4/06/21	-22.5	-18.3	-27.6	0.5	108
4/07/21	-20.7	-13.1	-31.2	2.7	11
4/08/21	-19.1	-15.1	-24.9	7.7	338
4/09/21	-18.2	-7.5	-26.4	7.3	88
4/10/21	-12.6	-2.6	-23.7	6.9	265
4/11/21	-21.2	-15.7	-25.2	9.5	323
4/12/21	-22.5	-19.9	-26.3	7.9	315
4/13/21	-25.2	-20.1	-30.2	3.5	299
4/14/21	-20.9	-13.6	-28.7	4.4	159
4/15/21	-10.2	-6.8	-14.0	6.4	134
4/16/21	-8.6	-7.2	-10.1	2.4	43
4/17/21	-8.0	-2.5	-10.2	2.1	355
4/18/21	-16.0	-10.0	-19.3	7.1	321
4/19/21	-16.5	-12.4	-19.7	9.6	324
4/20/21	-14.9	-10.1	-20.9	5.4	309
4/21/21	-8.5	-7.0	-10.8	3.1	291
4/22/21	-9.2	-6.4	-14.3	5.1	271

Date	Average Temperature (°C)	Maximum Temperature (°C)	Minimum Temperature (°C)	Average Wind Speed (m/s)	Average Wind Direction (deg.)
4/23/21	-16.3	-14.3	-19.5	4.7	277
4/24/21	-17.2	-15.2	-19.1	3.1	289
4/25/21	-19.6	-17.2	-24.6	2.8	199
4/26/21	-20.1	-14.0	-26.0	5.1	97
4/27/21	-18.7	-15.2	-21.8	4.4	40
4/28/21	-13.0	-1.9	-21.0	8.3	38
4/29/21	-14.7	-9.7	-16.6	11.3	94
4/30/21	-11.7	-7.6	-16.3	6.3	63
5/01/21	-12.4	-9.4	-16.6	5.0	39
5/02/21	-11.3	-7.4	-17.5	9.2	353
5/03/21	-0.3	0.8	-3.9	4.7	9
5/04/21	-0.2	1.4	-2.1	4.5	57
5/05/21	0.3	1.5	-0.8	3.6	78
5/06/21	-1.1	0.8	-2.8	4.1	23
5/07/21	-3.3	-0.9	-6.4	5.8	349
5/08/21	-3.2	-1.6	-5.4	4.0	346
5/09/21	-5.0	-2.5	-7.4	2.7	205
5/10/21	-4.2	-0.2	-7.8	4.0	160
5/11/21	-1.4	1.6	-5.6	3.2	175
5/12/21	-6.8	0.6	-13.0	11.7	327
5/13/21	-10.5	-5.9	-14.7	4.9	255
5/14/21	-12.0	-7.0	-17.2	9.1	316
5/15/21	-15.0	-11.5	-19.0	9.3	300
5/16/21	-13.4	-10.9	-15.5	6.1	296
5/17/21	-11.6	-8.7	-13.7	2.6	284
5/18/21	-10.1	-6.4	-12.8	5.9	248
5/19/21	-11.8	-8.3	-15.3	6.7	328
5/20/21	-12.1	-7.8	-15.9	4.4	271
5/21/21	-9.2	-4.7	-14.6	6.7	257
5/22/21	-6.9	-3.9	-12.4	8.3	289
5/23/21	-8.4	-3.6	-14.6	5.1	254
5/24/21	-4.8	-3.8	-6.9	6.5	103
5/25/21	-7.1	-5.5	-8.6	5.6	21
5/26/21	-6.7	-4.0	-8.8	5.7	330
5/27/21	-4.7	0.3	-11.3	6.9	304
5/28/21	-3.8	1.0	-9.3	2.6	180
5/29/21	-0.1	1.9	-1.5	5.8	141
5/30/21	-0.3	1.1	-3.1	8.1	342

Date	Average Temperature (°C)	Maximum Temperature (°C)	Minimum Temperature (°C)	Average Wind Speed (m/s)	Average Wind Direction (deg.)
5/31/21	-3.3	-1.5	-5.2	4.1	355
6/01/21	-2.5	0.4	-6.8	8.0	321
6/02/21	-0.3	1.1	-1.6	4.6	157
6/03/21	0.5	1.5	-0.5	4.3	340
6/04/21	-0.6	1.4	-3.6	3.2	352
6/05/21	-1.7	2.2	-4.3	2.1	50
6/06/21	0.0	3.1	-4.2	4.4	123
6/07/21	-0.3	1.0	-1.3	6.2	77
6/08/21	1.2	4.2	-0.9	3.7	11
6/09/21	0.9	3.2	-0.8	6.4	339
6/10/21	2.3	4.6	0.3	4.7	282
6/11/21	3.1	7.0	-1.5	2.5	241
6/12/21	6.5	13.5	0.3	2.4	171
6/13/21	8.6	12.3	3.8	1.7	98
6/14/21	10.3	15.2	2.6	1.4	82
6/15/21	9.2	14.6	3.8	3.4	126
6/16/21	9.3	15.0	4.3	4.3	163
6/17/21	8.1	12.2	4.3	6.2	4
6/18/21	7.4	12.4	3.0	5.2	318
6/19/21	4.9	8.5	1.5	6.6	303
6/20/21	3.6	7.5	0.4	7.8	354
6/21/21	4.5	8.0	1.4	7.8	328
6/22/21	5.0	7.6	1.9	6.2	334
6/23/21	6.5	13.9	2.6	4.0	234
6/24/21	3.0	6.1	1.2	7.9	294
6/25/21	2.8	6.5	0.6	11.7	326
6/26/21	3.9	6.8	1.5	8.3	321
6/27/21	7.6	12.5	1.2	2.6	43
6/28/21	8.0	11.1	3.6	3.4	347
6/29/21	9.3	13.5	4.8	1.6	279
6/30/21	12.0	18.6	4.6	1.9	226
7/01/21	10.3	15.9	6.3	5.6	153
7/02/21	12.8	18.3	8.2	5.3	29
7/03/21	13.7	19.5	6.9	3.2	205
7/04/21	9.2	14.5	5.6	6.7	19
7/05/21	6.4	10.7	2.8	5.9	6
7/06/21	12.3	16.0	6.8	5.3	268
7/07/21	10.8	18.1	6.2	5.0	222

Date	Average Temperature (°C)	Maximum Temperature (°C)	Minimum Temperature (°C)	Average Wind Speed (m/s)	Average Wind Direction (deg.)
7/08/21	11.6	16.7	5.9	5.9	327
7/09/21	12.6	18.4	5.3	2.9	321
7/10/21	14.3	19.6	6.4	2.6	172
7/11/21	14.6	21.4	6.8	3.3	185
7/12/21	13.6	16.6	10.5	5.1	343
7/13/21	11.9	17.5	8.1	9.4	345
7/14/21	8.4	12.1	5.7	5.2	267
7/15/21	16.5	24.1	8.9	6.8	220
7/16/21	10.5	16.2	5.1	6.2	341
7/17/21	6.0	9.1	3.5	6.3	358
7/18/21	9.2	13.7	5.5	5.3	301
7/19/21	10.7	14.8	5.7	4.6	274
7/20/21	16.4	23.0	9.2	3.9	282
7/21/21	12.2	14.8	9.9	4.7	324
7/22/21	13.3	19.7	8.2	4.2	270
7/23/21	16.0	22.2	9.2	5.3	185
7/24/21	13.6	16.5	12.4	4.9	76
7/25/21	5.9	13.5	3.6	14.1	330
7/26/21	5.8	9.5	3.1	14.8	315
7/27/21	5.4	8.3	3.2	8.9	300
7/28/21	7.3	11.1	4.3	5.4	300
7/29/21	7.7	9.4	6.2	6.3	301
7/30/21	9.8	14.0	6.4	3.9	124
7/31/21	9.3	12.1	7.8	4.7	114
8/01/21	9.4	13.1	6.2	6.1	276
8/02/21	10.1	12.5	7.6	7.3	319
8/03/21	10.5	20.3	5.3	7.1	254
8/04/21	7.9	10.3	6.5	7.9	302
8/05/21	5.8	8.7	2.6	12.4	315
8/06/21	5.9	8.8	3.0	10.8	312
8/07/21	7.7	11.5	3.0	5.0	276
8/08/21	12.5	17.4	9.6	5.5	180
8/09/21	7.5	10.4	5.5	9.4	313
8/10/21	7.5	10.5	5.5	10.7	279
8/11/21	8.2	9.5	5.7	5.3	83
8/12/21	6.6	8.1	4.9	10.0	7
8/13/21	5.2	6.8	3.5	12.6	333
8/14/21	6.8	9.6	5.4	10.6	319

Date	Average Temperature (°C)	Maximum Temperature (°C)	Minimum Temperature (°C)	Average Wind Speed (m/s)	Average Wind Direction (deg.)
8/15/21	7.0	10.5	4.2	4.4	337
8/16/21	8.4	12.7	3.2	5.2	359
8/17/21	6.5	9.1	3.4	4.4	1
8/18/21	7.7	10.0	5.6	3.8	92
8/19/21	9.1	13.5	5.6	2.0	219
8/20/21	9.6	13.9	5.7	4.2	181
8/21/21	9.0	10.8	7.8	4.5	132
8/22/21	8.0	9.7	6.4	4.2	68
8/23/21	6.3	8.0	4.8	10.5	350
8/24/21	6.8	11.2	3.5	8.8	319
8/25/21	10.2	16.6	4.5	3.7	277
8/26/21	11.4	17.1	5.9	4.0	195
8/27/21	15.7	21.8	9.6	3.8	234
8/28/21	15.8	21.7	11.3	3.3	110
8/29/21	12.8	14.7	10.5	3.1	75
8/30/21	11.0	14.1	8.5	6.2	98
8/31/21	10.9	14.0	7.7	5.9	135
9/01/21	10.4	11.6	9.6	2.8	72
9/02/21	10.7	12.1	9.6	2.0	353
9/03/21	11.1	13.6	8.8	5.3	23
9/04/21	9.8	11.9	7.4	6.4	40
9/05/21	8.0	12.8	5.0	2.4	40
9/06/21	10.2	14.7	6.6	2.6	168
9/07/21	9.6	12.0	8.0	6.8	141
9/08/21	9.0	10.8	8.0	5.1	121
9/09/21	7.9	8.9	6.4	4.5	140
9/10/21	7.0	8.6	5.7	2.8	225
9/11/21	6.9	8.9	4.7	3.0	94
9/12/21	6.1	7.6	4.7	3.8	94
9/13/21	7.0	10.0	4.6	3.1	202
9/14/21	5.3	6.2	3.9	7.1	128
9/15/21	5.8	7.4	4.9	4.0	17
9/16/21	5.9	7.7	4.7	5.2	41
9/17/21	5.0	6.9	3.4	7.0	47
9/18/21	3.3	5.1	1.1	4.7	6
9/19/21	-0.3	1.2	-1.4	3.6	4
9/20/21	1.2	4.3	-1.5	4.5	86
9/21/21	1.8	5.1	-0.5	5.1	13

Date	Average Temperature (°C)	Maximum Temperature (°C)	Minimum Temperature (°C)	Average Wind Speed (m/s)	Average Wind Direction (deg.)
9/22/21	0.6	3.3	-1.7	3.1	354
9/23/21	1.8	4.7	-1.0	5.0	104
9/24/21	1.9	3.2	0.4	7.9	110
9/25/21	1.5	3.5	-0.2	7.5	74
9/26/21	3.6	4.5	2.6	6.9	116
9/27/21	2.0	3.2	0.7	3.2	107
9/28/21	4.2	5.5	2.7	1.8	61
9/29/21	1.1	3.1	-1.3	3.3	68
9/30/21	3.2	5.7	0.1	9.9	133
10/01/21	4.6	6.3	3.0	5.5	160
10/02/21	5.6	7.9	3.4	7.5	132
10/03/21	6.2	10.9	3.2	2.8	171
10/04/21	4.7	6.1	3.1	0.0	137
10/05/21	4.6	6.1	3.2	0.0	330
10/06/21	1.9	3.4	0.4	6.4	302
10/07/21	0.5	1.9	-0.9	4.9	303
10/08/21	-0.2	1.4	-1.2	8.5	109
10/09/21	2.1	2.8	1.1	7.1	199
10/10/21	2.3	4.1	0.8	4.3	179
10/11/21	3.6	6.5	0.3	6.4	180
10/12/21	-1.8	0.4	-3.1	4.3	1
10/13/21	-1.3	0.0	-2.7	4.6	4
10/14/21	-0.1	2.7	-2.6	5.1	157
10/15/21	0.9	1.8	-0.2	8.7	156
10/16/21	0.0	1.4	-1.0	6.7	76
10/17/21	1.9	3.0	0.7	7.2	96
10/18/21	0.3	2.4	-1.5	5.2	211
10/19/21	0.1	1.5	-1.5	8.8	217
10/20/21	-2.4	-0.8	-3.7	7.2	315
10/21/21	-4.8	-3.5	-5.8	1.9	25
10/22/21	-4.8	-3.2	-6.3	4.4	153
10/23/21	-3.0	0.7	-5.6	6.2	186
10/24/21	-2.1	1.2	-5.2	4.4	176
10/25/21	-1.2	1.1	-3.3	4.4	188
10/26/21	-1.9	0.8	-4.9	4.8	171
10/27/21	0.2	1.4	-1.0	6.8	156
10/28/21	1.2	1.8	0.1	4.2	165
10/29/21	1.2	1.9	0.1	1.9	201

Date	Average Temperature (°C)	Maximum Temperature (°C)	Minimum Temperature (°C)	Average Wind Speed (m/s)	Average Wind Direction (deg.)
10/30/21	-0.6	0.8	-2.9	4.0	2
10/31/21	-3.1	-0.3	-6.1	8.2	335
11/01/21	-6.4	-4.9	-7.6	5.5	329
11/02/21	-8.3	-7.0	-10.0	1.9	333
11/03/21	-7.3	-5.6	-8.9	2.8	182
11/04/21	-7.3	-5.9	-8.1	1.0	183
11/05/21	-5.2	-3.9	-6.4	3.5	147
11/06/21	-4.3	-3.5	-5.0	4.1	202
11/07/21	-4.2	-3.3	-5.0	2.0	317
11/08/21	-3.4	-1.2	-5.4	3.4	85
11/09/21	-5.0	-2.1	-6.2	6.2	69
11/10/21	-10.3	-5.3	-15.8	5.7	358
11/11/21	-16.1	-12.6	-20.2	5.0	351
11/12/21	-21.0	-19.4	-22.1	1.9	328
11/13/21	-17.8	-14.3	-21.8	2.1	144
11/14/21	-12.2	-8.4	-16.8	1.3	140
11/15/21	-7.8	-5.9	-9.4	6.4	139
11/16/21	-9.1	-4.4	-12.7	4.7	194
11/17/21	-11.3	-9.3	-14.1	2.8	306
11/18/21	-14.8	-11.4	-17.6	4.2	311
11/19/21	-19.4	-15.5	-23.6	2.0	23
11/20/21	-19.2	-17.2	-21.9	2.9	108
11/21/21	-15.3	-13.2	-19.3	3.8	20
11/22/21	-25.7	-19.3	-29.1	4.7	312
11/23/21	-31.6	-28.3	-33.3	2.4	293
11/24/21	-18.2	-6.4	-32.5	10.5	319
11/25/21	-10.9	-5.9	-17.5	9.7	344
11/26/21	-17.5	-13.1	-23.6	8.2	314
11/27/21	-24.4	-22.9	-25.7	1.9	28
11/28/21	-14.7	-9.7	-24.5	7.3	104
11/29/21	-20.6	-9.3	-28.6	3.4	278
11/30/21	-25.7	-19.8	-28.7	2.8	97
12/01/21	-21.6	-18.6	-26.1	3.5	278
12/02/21	-26.1	-24.9	-26.8	7.7	308
12/03/21	-27.0	-24.8	-29.0	8.9	308
12/04/21	-30.7	-28.7	-32.0	8.8	303
12/05/21	-30.6	-29.9	-31.3	6.4	287
12/06/21	-30.4	-28.6	-31.3	7.6	294

Date	Average Temperature (°C)	Maximum Temperature (°C)	Minimum Temperature (°C)	Average Wind Speed (m/s)	Average Wind Direction (deg.)
12/07/21	-26.3	-24.1	-30.2	5.6	302
12/08/21	-24.6	-22.0	-26.2	3.5	303
12/09/21	-25.6	-23.8	-27.2	3.0	161
12/10/21	-20.2	-13.6	-25.2	6.7	111
12/11/21	-13.2	-11.8	-15.1	7.6	70
12/12/21	-14.0	-12.3	-15.7	7.7	49
12/13/21	-17.5	-14.1	-21.2	4.6	48
12/14/21	-19.8	-17.0	-24.7	5.2	301
12/15/21	-20.3	-17.1	-23.3	3.0	268
12/16/21	-20.9	-20.2	-22.4	2.7	29
12/17/21	-25.7	-22.0	-28.0	6.7	343
12/18/21	-30.0	-27.8	-32.0	6.9	311
12/19/21	-31.8	-31.4	-32.4	5.5	302
12/20/21	-31.9	-31.2	-32.9	5.7	288
12/21/21	-31.0	-29.4	-31.8	7.0	230
12/22/21	-33.5	-30.5	-35.3	3.7	119
12/23/21	-34.5	-33.5	-35.7	1.1	137
12/24/21	-33.1	-31.8	-35.4	1.7	127
12/25/21	-25.8	-21.4	-33.1	3.5	56
12/26/21	-21.7	-20.1	-24.2	7.8	47
12/27/21	-16.7	-15.2	-21.4	4.3	67
12/28/21	-24.4	-15.7	-29.8	3.1	238
12/29/21	-28.5	-24.5	-31.6	1.9	94
12/30/21	-26.9	-22.3	-29.9	1.8	58
12/31/21	-25.5	-21.8	-29.0	3.7	0