

Date: January 17, 2023

To: Julie Anderson (Health Canada)

From: Leilan Baxter, Colleen Prather (Agnico Eagle Mines Limited)

Re: Technical Meeting Commitment No. 23 (Response to HC-AQ-4) – *Historical summary of air quality monitoring results*

1.1 INTRODUCTION

During the Technical Meeting held November 22-23, 2022 for the Meliadine Extension Proposal, Health Canada and Agnico Eagle discussed Technical Comment HC-AQ-4, in particular, existing air quality data. As an outcome of the Technical Meeting, Agnico Eagle made the following commitment:

Commitment 23: Agnico Eagle will provide compiled air quality annual report results compared to the 2014 FEIS and include statistical analysis

This technical memorandum was developed in fulfillment of Commitment No. 23, and includes:

- **Section 1.2** - A summary of the scope of available monitoring data (parameters, date ranges, locations).
- **Section 1.3** - Methods of data collection and analysis for each parameter.
- **Section 1.4** - Results for each parameter since 2014, including time series figures and tables of descriptive statistics (sample size (n), minimum, mean, and maximum measured values) by station and year, with comparisons to 2014 FEIS predictions and regulatory guidelines.

1.2 AVAILABLE DATA

A summary of the scope of available data is provided in Table 1, with monitoring locations indicated in Figure 1. This technical memorandum synthesizes all data collected from January 2014 through December 2021 under the Meliadine Gold Project Air Quality Monitoring Plan (Version 1 – November 2015; and Version 2 – April 2020), as reported annually in the Meliadine Site's Annual Report to the NIRB.

Table 1. Data summary.

Parameter	Monitoring Method	Locations	Date Range*
Suspended particulates (TSP, PM ₁₀ and PM _{2.5})	Partisol instruments (24-h sample, 6-d cycle)	DF-5 and DF-7	Dec 2018 – Mar 2019 [‡] Oct 2020 – Dec 2021
Metals (Cd and Fe) in TSP	Partisol instruments (24-h sample, 6-d cycle)	DF-5 and DF-7	Oct 2020 – Dec 2021
Nitrogen dioxide (NO ₂) and sulphur dioxide (SO ₂)	Passive sampler (30-d samples)	DF-5 and DF-7	2017 – 2021
Dustfall	Passive sampler (30-d samples, individual stations)	DF-1, DF-2, DF-3, DF-4, DF-5, DF-6, DF-7	2014 - 2021
		DF-8 [^]	2020 & 2021
	Passive sampler (30-d samples, transects)	AWAR transects at DF-1, DF-2, DF-3	2019 – 2021
		By-pass Road transect DF-WT	2019, 2021

*Data available since 2014. Excludes temporary gaps due to occasional data loss.

‡A sub-set of the location/parameter combinations was monitored during this date range.

[^]Rotating reference station more than 2 km upwind of site activity. Location not shown in Figure 1. See 2021 Air Quality Monitoring Report for UTM coordinates.

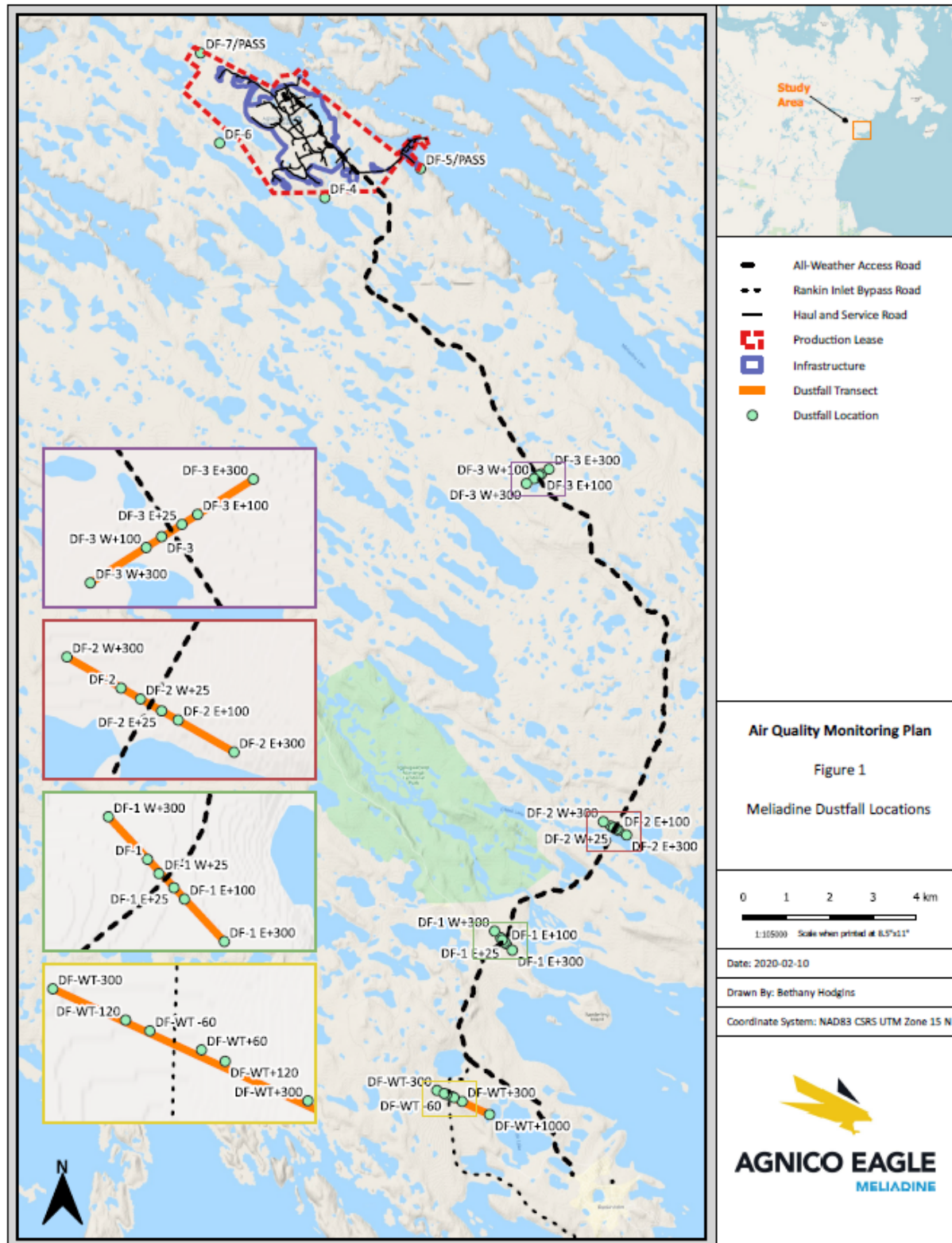


Figure 1. Meliadine air quality monitoring stations.

1.3 METHODS

1.3.1 Suspended Particulates

Suspended particulates (TSP, PM₁₀, PM_{2.5}) are scheduled to be sampled over 24-h averaging periods every six days using Partisol Plus Model 2025i Sequential Air Samplers and Partisol Plus Model 2025-D Dichotomous Sequential Air Samplers at monitoring locations DF-5 and DF-7. 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. TSP filters are also analyzed by the laboratory for cadmium and iron. Both suspended particulates and metals are reported as mass concentrations (µg/m³ air), with recorded air intake volumes normalized to standard temperature and pressure (STP).

In accordance with the Air Quality Monitoring Plan, results of suspended particulate monitoring are compared primarily to Government of Nunavut (GN) Environmental Guidelines for Ambient Air Quality (October 2011). Where GN Guidelines are not available (i.e., for PM₁₀) results are compared to the BC Air Quality Objective Guidelines (February 2020). Results are additionally compared to 2014 FEIS predictions for maximum concentrations of suspended particulates for the site study area (SSA; represented by DF-5) and local study area (LSA; represented by DF-7).

Table 2. Government of Nunavut Environmental Guidelines for Ambient Air Quality (October 2011), BC Ambient Air Quality Objectives (February 2020) and 2014 FEIS predictions for suspended particulate matter at Meliadine.

Parameter	Averaging Time	Regulatory Guideline		2014 FEIS Prediction* (µg/m ³)	
		Jurisdiction	Guideline (µg/m ³)	SSA (represented by DF-5)	LSA (represented by DF-7)
PM _{2.5}	24-h	GN	30	55.2	19.6
PM ₁₀	24-h	BC	50	104.0	58.2
Total Suspended Particulate (TSP)	24-h	GN	120	213.7	122.3
	Annual	GN	60	16.8	17.0

*Maximum predicted values anywhere within the SSA/LSA according to Table 5.2-15 in Golder (2014).

In accordance with Term and Condition 1b of the Project Certificate, concentrations of particulate-bound metals of relevance to the Project (iron and cadmium) are also measured in TSP samples to understand implications for human health, as predicted in the Human Health Risk Assessment (2014 FEIS Volume 10). Results are compared to the 2014 FEIS-selected health-based screening values (Golder 2014, Volume 10, Appendix 10-2), as shown in Table 3, as well as 2014 FEIS-predicted maximum concentrations of contaminants for monitoring-site locations Camp (DF-5) and Receptor 1 (DF-7) (Golder 2014; Volume 10).

Table 3. 2014 FEIS-selected health-based screening values for chronic inhalation (24-h) from the Project's Human Health Risk Assessment (Golder 2014, Volume 10), and 2014 FEIS-predicted maximum concentrations of contaminants for monitoring-site locations Receptor 1 and Camp (Golder 2014, Volume 10).

Contaminant	2014 FEIS Values		
	Selected Health-Based Screening Value ($\mu\text{g}/\text{m}^3$)	Prediction – Camp (DF-5) ($\mu\text{g}/\text{m}^3$)	Prediction – Receptor 1 (DF-7) ($\mu\text{g}/\text{m}^3$)
Cadmium	0.025	0.0180	0.0030
Iron	4	8.7300	3.7000

1.3.2 NO₂ and SO₂

Concentrations of NO₂ and SO₂ are analyzed over 30-d averaging periods using a passive sampling device provided by an accredited commercial laboratory and deployed by Agnico Eagle technicians according to laboratory-specified procedures. After each sampling period, the device is retrieved and shipped to the supplying laboratory for analysis. Results are reported by volume (ppb).

NO₂ and SO₂ sampling results are compared to the GN Environmental Guidelines for Ambient Air Quality (October 2011). Concentrations measured on a monthly basis are averaged and compared to the annual average guidelines for NO₂ (60 $\mu\text{g}/\text{m}^3$ or 32 ppb) and SO₂ (30 $\mu\text{g}/\text{m}^3$ or 11 ppb).

A comparison to 2014 FEIS maximum model predictions plus 2014 FEIS-assumed background concentrations for NO₂ and SO₂ is also included (Table 4).

Table 4. GN guidelines and 2014 FEIS predictions (plus assumed background concentrations) for annual average concentrations of NO₂ and SO₂.

Compound	GN Guideline (Annual Average)	2014 FEIS Prediction + Background (Annual Average)	
		SSA (DF-5)	LSA (DF-7)
NO ₂	32 ppb	23.3 + 0.05 ppb	12.1 + 0.05 ppb
SO ₂	11 ppb	0.1 + 0.2 ppb	0.0 + 0.2 ppb

1.3.3 Dustfall

Dustfall is collected in open canisters containing a purified liquid matrix (de-ionized water and isopropanol), and supplied by a commercial analytical laboratory. Canisters are placed on a stand at 2-m height, with an open bucket-style holder fitted with wires around the rim to deter birds. Dustfall vessels are deployed for one-month periods (approx.) at each sampling location, retrieved, re-sealed, and shipped back to the laboratory for analysis of total and fixed (non-combustible) dustfall. Calculated dustfall rates are normalized to 30 days ($\text{mg}/\text{cm}^2/30$ days) for comparison to regulatory guidelines.

No regulatory guidelines for dustfall are available for Nunavut. Results are therefore compared to Alberta's Ambient Air Quality Guideline for recreational areas for total dustfall (January 2019) of 0.53 mg/cm²/30d and commercial/industrial guideline of 1.58 mg/cm²/30d, to provide context. These guidelines are based on aesthetic or nuisance concerns, and are to be used for airshed planning and management, as a general performance indicator, and to assess local concerns.

1.4 RESULTS

All monitoring results presented in annual reports for the time period of 2014 – 2021 are summarized below. Occasional loss of data within the collection date ranges presented in Table 1 has occurred as a result of various issues such as: intermittent Partisol instrument malfunction, torn filters, samples lost in transit, Covid-related disruptions, or availability of sampling equipment. Specific reasons for occasional data loss are fully described in annual monitoring reports and not reviewed here.

1.4.1 Suspended Particulates

Monitoring for suspended particulates first began in December 2018, though consistent monitoring for all three size fractions at both monitoring stations did not commence until October 2020. All historical data (24-h averaging time) is provided in Figures 2, 3, and 4, with comparison to regulatory guidelines and 2014 FEIS predictions. Where laboratory-reported results (µg/filter) were below the detection limit, ½ the limit was used in calculations. Among all TSP, PM₁₀, and PM_{2.5} results collected through 2021 (376 samples), just one TSP sample has exceeded the regulatory guideline and/or 2014 FEIS prediction (Figure 2). The single exceedance of the 24-h guideline and prediction occurred on April 10, 2021 at DF-7. The DF-7 station is located on the upwind edge of the Meliadine site, and the single exceedance is considered to be an isolated incident, potentially due to a localized event, and not indicative of typical onsite conditions or any trends towards elevated air quality concerns.

Descriptive statistics (sample size (n), minimum, mean, and maximum measured concentration) for each site on an annual basis are provided in Table 2. Annual averages calculated as the arithmetic mean of the available 24-h samples are provided for each year. However, datasets are extremely limited for 2018 – 2020, so comparison to the 2014 FEIS prediction is only specified for 2021. Similarly, geometric mean concentrations for comparison to the regulatory guideline for the annual average are only provided for 2021.

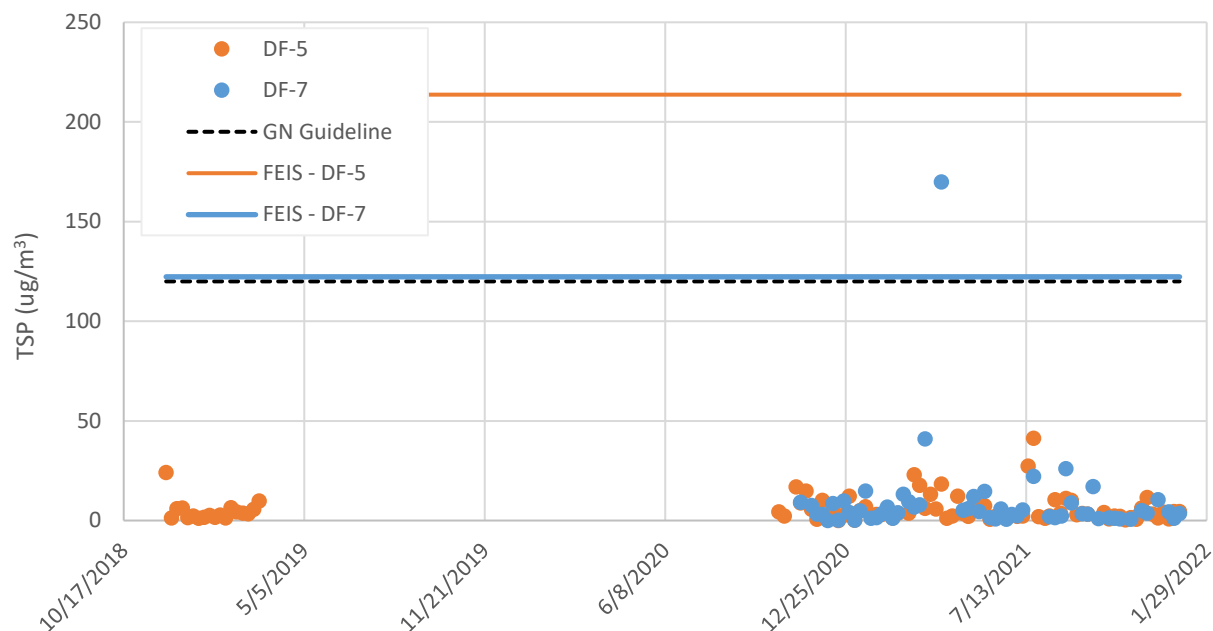


Figure 2. Measured concentrations of total suspended particulates (TSP; 24-h) at monitoring stations DF-5 and DF-7 at the Meliadine site (points) in comparison to the Government of Nunavut guideline and the 2014 FEIS maximum model predictions for each station (Golder 2014).

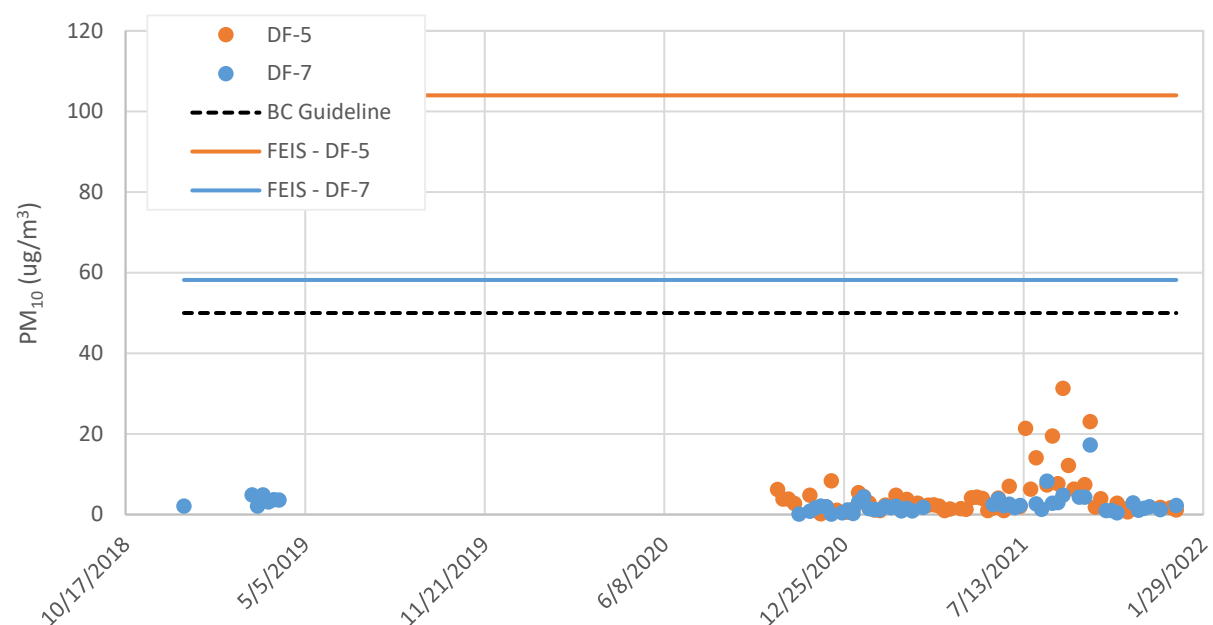


Figure 3. Measured concentrations of PM_{10} (24-h) at monitoring stations DF-5 and DF-7 at the Meliadine site (points) in comparison to the BC guideline and 2014 FEIS maximum model predictions for each station (Golder 2014).

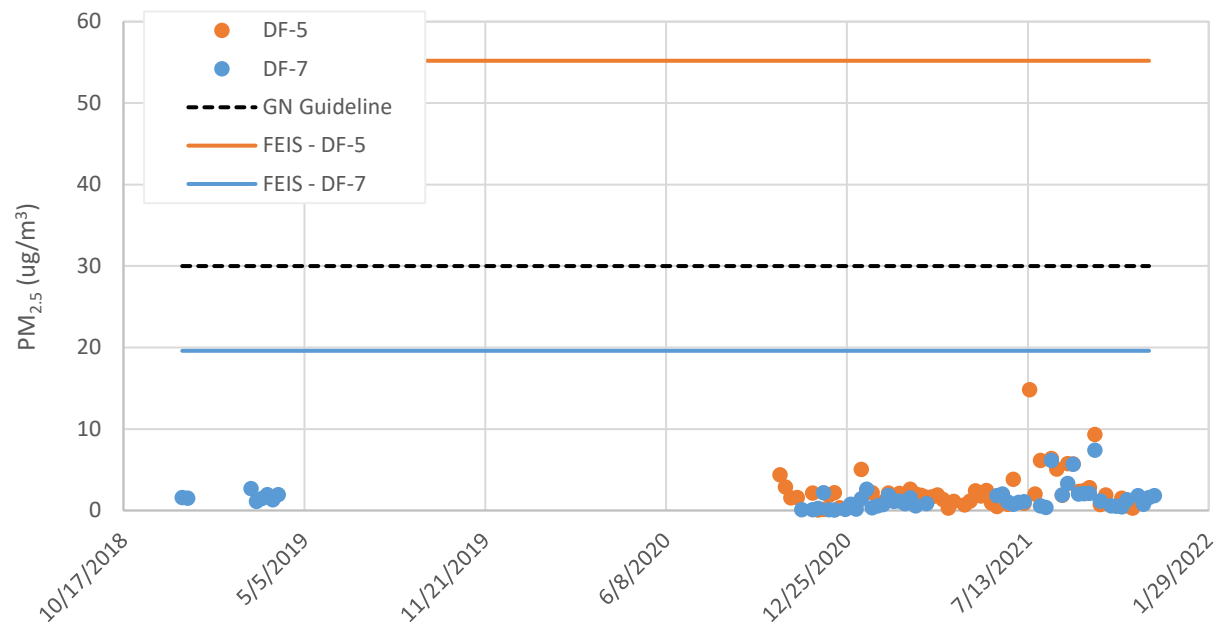


Figure 4. Measured concentrations of PM_{2.5} (24-h) at monitoring stations DF-5 and DF-7 at the Meliadine site (points) in comparison to the Government of Nunavut guideline and 2014 FEIS maximum model predictions for each station (Golder 2014).

Table 5. Descriptive statistics (sample size (n), and minimum, mean, and maximum concentration) by year and station for each measured size fraction of suspended particulates (24-h averaging time).

Size Fraction	Station	Year	Reg. Guideline		2014 FEIS Prediction		n	Concentration (µg/m³)			
			24-h	Annual*	24-h	Annual^		Minimum (24-h)	Annual Geometric Mean [‡]	Annual Arithmetic Mean [‡]	Maximum (24-h)
TSP	DF-5	2018	120	-	213.7	-	5	1.20	-	7.78	24.00
	DF-5	2019	120	-	213.7	-	13	1.10	-	3.58	9.80
	DF-5	2020	120	-	213.7	-	13	0.06	-	6.67	16.82
	DF-5	2021	120	60	213.7	16.8	58	0.20	3.48	5.94	41.21
	DF-7	2018	120	-	122.3	-	0	-	-	-	-
	DF-7	2019	120	-	122.3	-	0	-	-	-	-
	DF-7	2020	120	-	122.3	-	9	0.07	-	5.04	9.75
	DF-7	2021	120	60	122.3	17.0	47	0.17	3.85	9.90	169.92
PM ₁₀	DF-5	2018	50	-	104	-	0	-	-	-	-
	DF-5	2019	50	-	104	-	0	-	-	-	-
	DF-5	2020	50	-	104	-	11	0.18	-	3.17	8.39
	DF-5	2021	50	-	104	-	49	0.68	-	5.19	31.32
	DF-7	2018	50	-	58.2	-	1	2.10	-	2.10	2.10
	DF-7	2019	50	-	58.2	-	6	2.11	-	3.74	4.92
	DF-7	2020	50	-	58.2	-	9	0.12	-	0.97	2.16
	DF-7	2021	50	-	58.2	-	35	0.47	-	2.74	17.29
PM _{2.5}	DF-5	2018	30	-	55.2	-	0	-	-	-	-
	DF-5	2019	30	-	55.2	-	0	-	-	-	-
	DF-5	2020	30	-	55.2	-	11	0.07	-	1.59	4.36
	DF-5	2021	30	-	55.2	-	49	0.28	-	2.51	14.81
	DF-7	2018	30	-	19.6	-	2	1.50	-	1.55	1.60
	DF-7	2019	30	-	19.6	-	6	1.12	-	1.74	2.67
	DF-7	2020	30	-	19.6	-	8	0.07	-	0.45	2.17
	DF-7	2021	30	-	19.6	-	40	0.32	-	1.67	7.39

Referenced regulatory guidelines for TSP and PM_{2.5} are the GN Environmental Guidelines for Ambient Air Quality (October 2011), while the guideline for PM₁₀ is the BC Ambient Air Quality Objective (February, 2020).[‡]For the geometric mean. [^]For the arithmetic mean. ^{*}Where reported results were below the laboratory detection limit, ½ the limit was used in calculating means.

Concentrations of cadmium and iron measured in TSP samples are shown in Figures 5 and 6 along with the 2014 FEIS-selected health-based screening value and maximum model prediction. Where laboratory-reported results ($\mu\text{g}/\text{filter}$) were below the detection limit, $\frac{1}{2}$ the limit was used in volumetric calculations which were performed using Partisol-recorded STP-corrected intake volumes (m^3). For station DF-7, the 2014 FEIS maximum model prediction for cadmium ($0.003 \mu\text{g}/\text{m}^3$) is less than the volumetric concentration calculated using $\frac{1}{2}$ the laboratory detection limit ($0.004 \mu\text{g}/\text{m}^3$). As a result, the prediction is not plotted on Figure 5, and a comparison to this value would be discussed for sample exceeding the prediction.

For both metals analyses, the majority of results to date have been below the laboratory detection limit, and no exceedances of the 2014 FEIS-selected health-based screening values or model predictions have occurred.

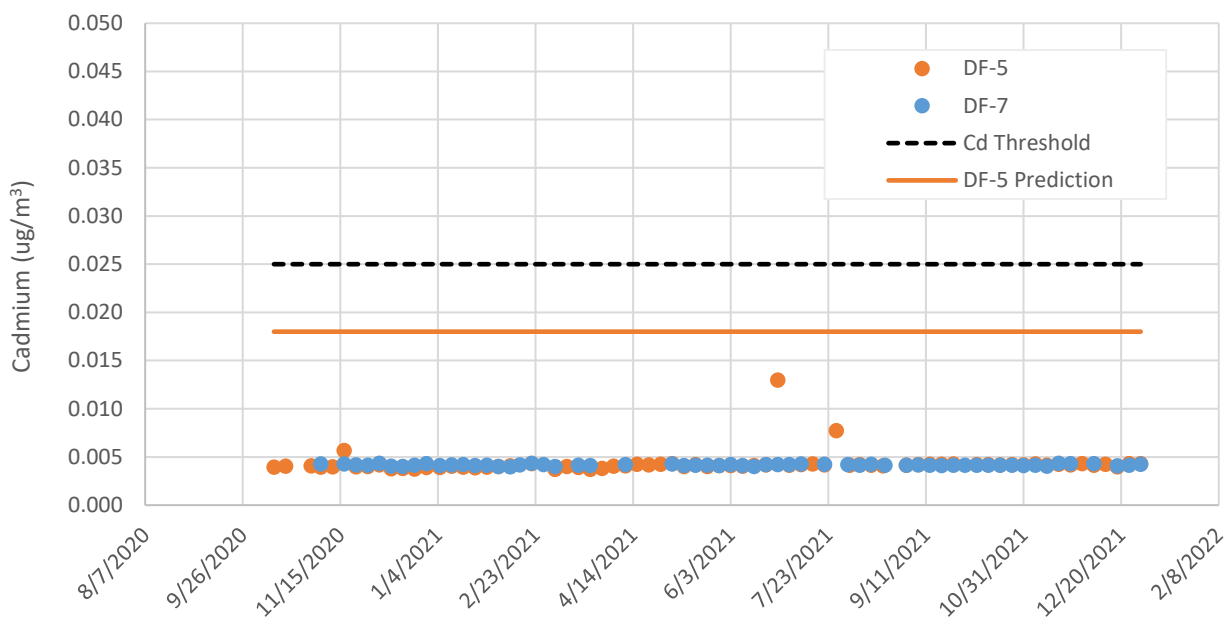


Figure 5. Measured concentrations of cadmium in 24-h TSP samples collected from stations DF-5 and DF-7 at the Meliadine site with comparison to the 2014 FEIS-selected health-based screening value (Cd Threshold), and the 2014 FEIS maximum model-predicted value for station DF-5 (DF-5 Prediction; see text discussion for DF-7).

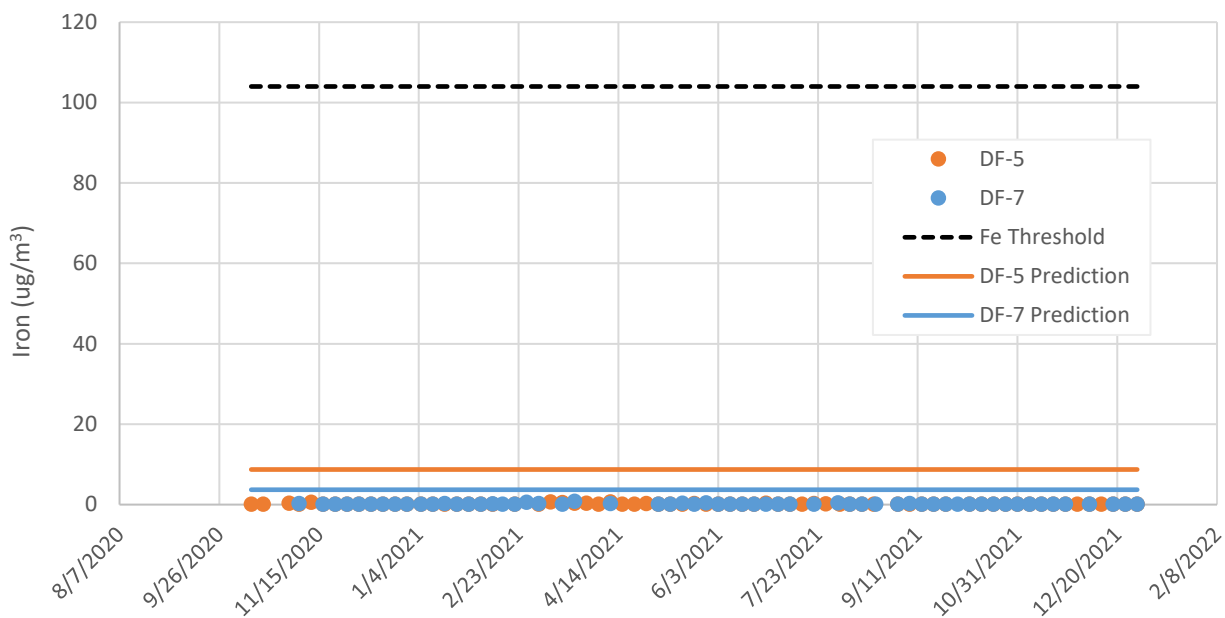


Figure 6. Measured concentrations of iron in 24-h TSP samples collected from stations DF-5 and DF-7 at the Meliadine site with comparison to the FEIS-selected health-based screening value (Fe Threshold), and the 2014 FEIS maximum model-predicted value for each station.

1.4.2 NO₂ and SO₂

Monitoring for NO₂ and SO₂ using passive samplers began in January 2017 and has continued largely without interruption since that time. Historical results are presented in Figure 7, and descriptive statistics are provided in Table 4. All results to date have remained well below maximum predicted values and regulatory guidelines.

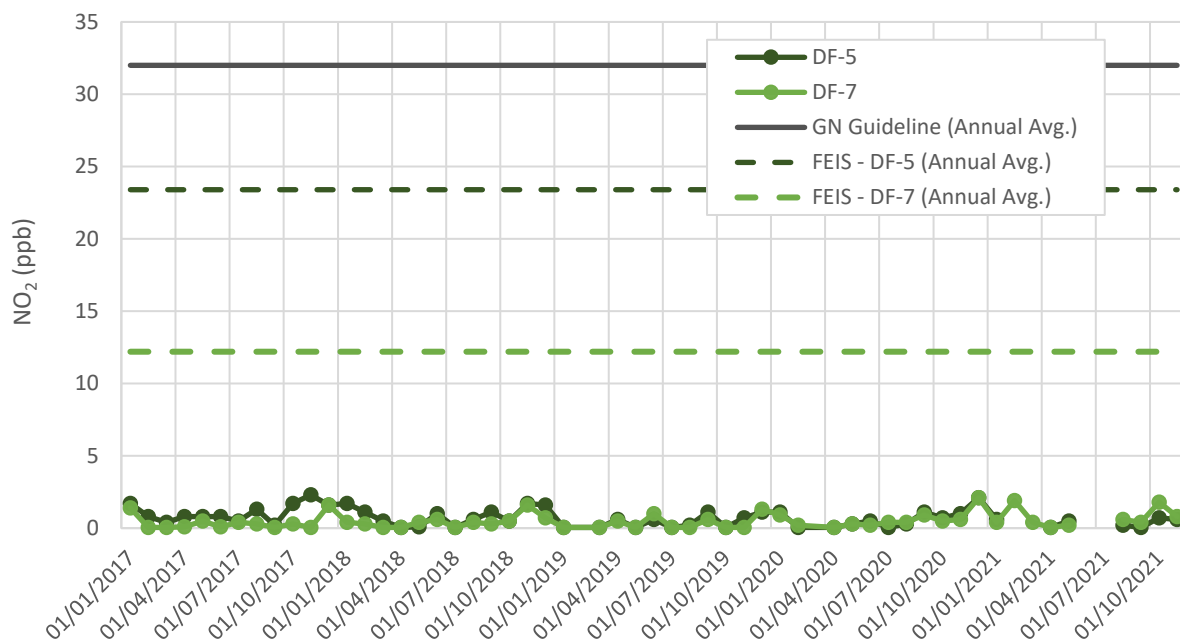


Figure 7. Historical measured monthly average concentration of NO₂ at DF-5 and DF-7. The GN guideline and 2014 FEIS predictions for the annual average are indicated for reference but do not apply to individual monthly samples.

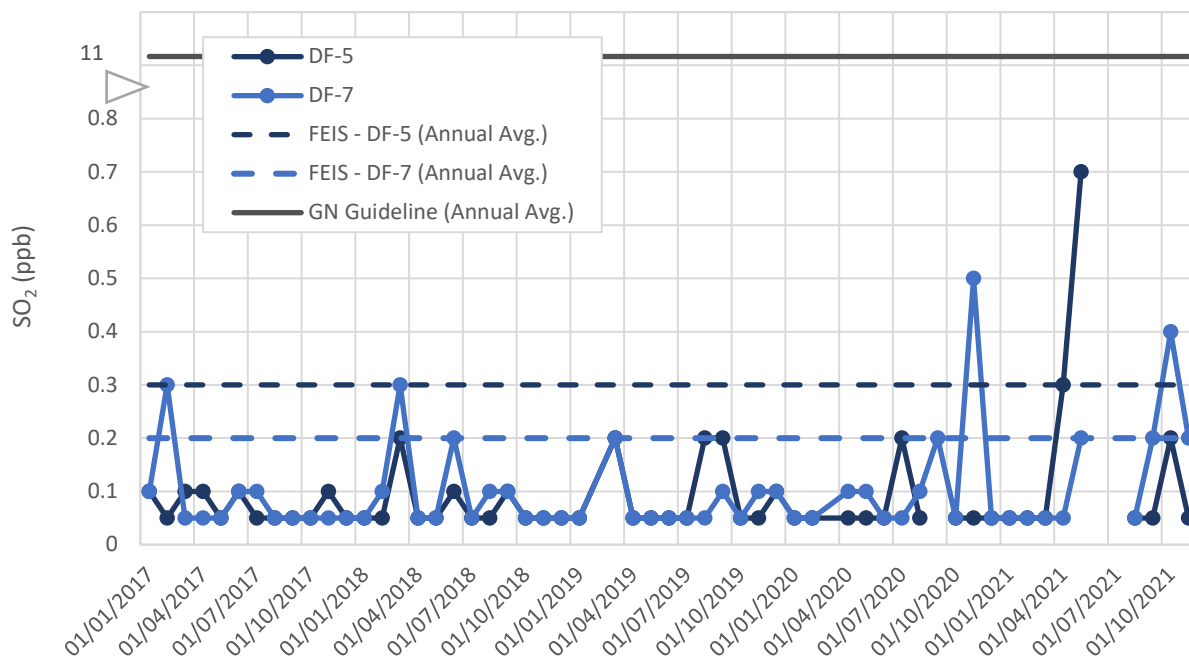


Figure 8. Historical measured monthly average concentration of SO₂ at DF-5 and DF-7. Dashed line indicates GN standard for the annual average, for reference but do not apply to individual monthly samples.

Table 6. Descriptive statistics (sample size (n), and minimum, mean, and maximum concentration) by year and station for NO₂ and SO₂ measurements collected over 1-month averaging times at the Meliadine site.

Parameter	Station	Date	Reg. Guideline	2014 FEIS Prediction	n	Measured Concentration (ppb)		
			(Annual Average)			Min.^	Mean* (Annual Average)	Max.
NO ₂	DF-5	2017	32	23.4	11	0.20	1.03	2.30
	DF-5	2018	32	23.4	12	<0.10	0.83	1.70
	DF-5	2019	32	23.4	11	<0.10	0.46	1.60
	DF-5	2020	32	23.4	11	<0.10	0.66	2.10
	DF-5	2021	32	23.4	7	<0.10	0.39	0.70
	DF-7	2017	32	12.2	11	<0.10	0.30	1.40
	DF-7	2018	32	12.2	12	<0.10	0.52	1.60
	DF-7	2019	32	12.2	11	<0.10	0.29	1.00
	DF-7	2020	32	12.2	11	<0.10	0.60	2.10
	DF-7	2021	32	12.2	9	<0.10	0.73	1.90
SO ₂	DF-5	2017	11	0.3	11	<0.10	0.07	0.10
	DF-5	2018	11	0.3	12	<0.10	0.07	0.20
	DF-5	2019	11	0.3	11	<0.10	0.09	0.20
	DF-5	2020	11	0.3	10	<0.10	0.07	0.20
	DF-5	2021	11	0.3	9	<0.10	0.17	0.70
	DF-7	2017	11	0.2	11	<0.10	0.09	0.30
	DF-7	2018	11	0.2	12	<0.10	0.10	0.30
	DF-7	2019	11	0.2	11	<0.10	0.07	0.20
	DF-7	2020	11	0.2	11	<0.10	0.12	0.50
	DF-7	2021	11	0.2	9	<0.10	0.14	0.40

The referenced regulatory guideline is from the GN Environmental Guidelines for Ambient Air Quality (October 2011). ^Laboratory detection limit is 0.10 ppb. *Where reported results were below the laboratory detection limit, ½ the limit was used in calculating the annual average.

1.4.3 Dustfall

For the purposes of this report, results for total dustfall are presented primarily, because available regulatory guidelines relate to this size fraction. However, the non-combustible fraction (fixed dustfall) is considered to be more representative of mine-related activity such as road dust, because it excludes organic components (e.g., pollen, plants, animal particles). These data are used to facilitate interpretation of individual sample results, and are provided in annual reports.

1.4.3.1 Individual Sampling Locations

Dustfall sampling has occurred at some onsite stations since 2012, and all data since 2014 is presented here, in accordance with Commitment No. 23. In 2014, summer-only sampling occurred at stations DF-1 through DF-6. Year-round sampling across all seven stations began in

summer 2015, and has continued with minor interruptions since that time. Beginning in 2020, summer-only sampling was planned for AWAR stations DF-1 through DF-3, and supplemental canisters were added to create transects at these locations (Section 1.4.3.2). However, opportunistic year-round sampling at DF-1, DF-2, and/or DF-3 has continued to occur, and results are included here.

Historical results for total dustfall at stations DF-1 through DF-7 are provided in Figure 9 and descriptive statistics are provided in Table 7, along with regulatory guidelines, and maximum measured background concentrations (DF-8; sampled in summer only, 2020 and 2021). No 2014 FEIS predictions for dustfall are available.

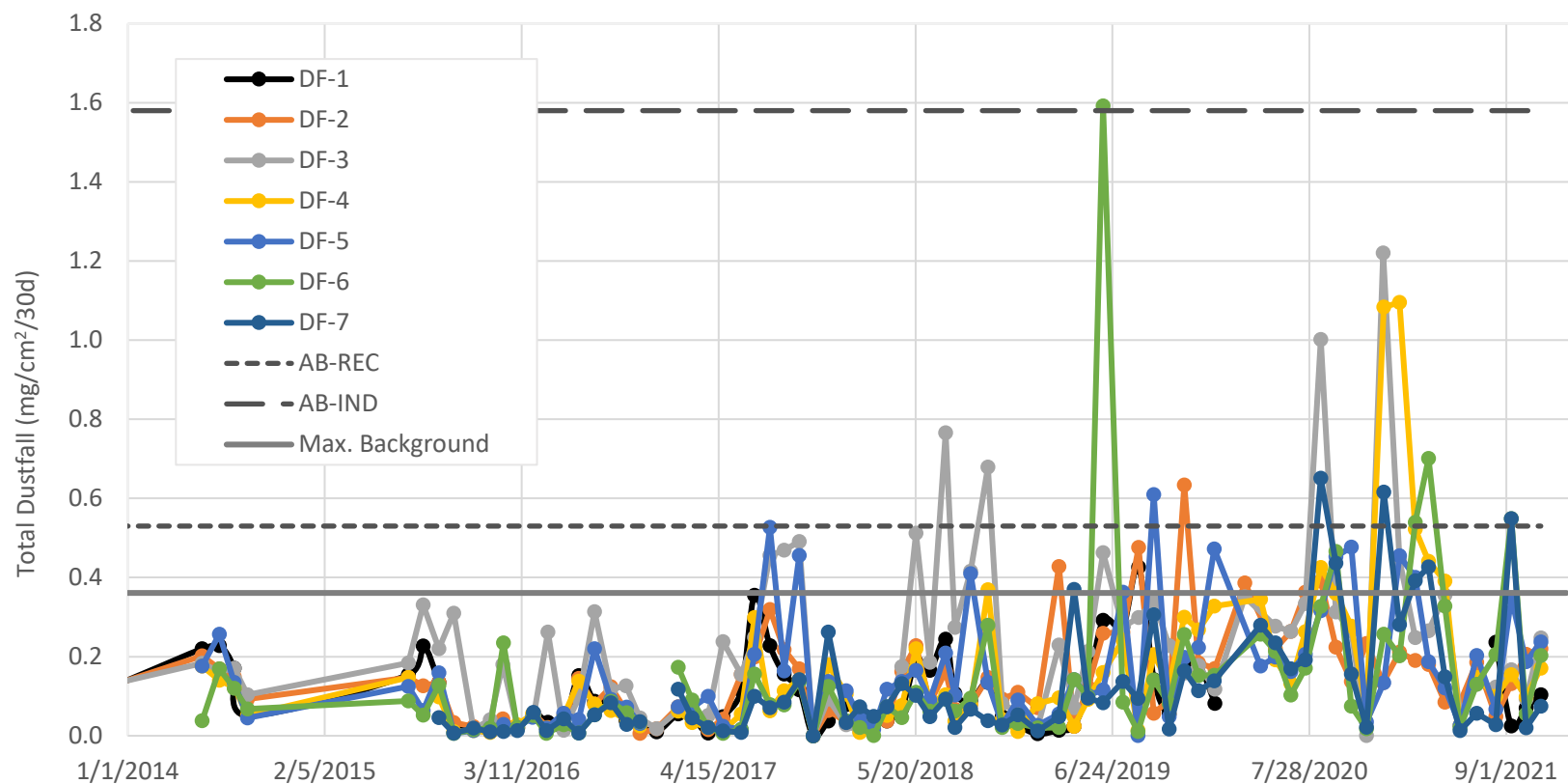


Figure 9. Historical 30-day-normalized rates of total dustfall at the Meliadine site. Symbols represent start date of sample collection. Dashed lines indicate the Alberta Ambient Air Quality Guideline (January 1999) for recreational and industrial areas. Max. background is from samples at DF-8 (0.36 mg/cm²/30d in 2021).

Table 7. Descriptive statistics (sample size (n), and minimum, mean, and maximum concentration) by year and station for total dustfall measurements at the Meliadine site.

Station	Date	Reg. Guideline (mg/cm ² /30d)		n	Measured Dustfall (mg/cm ² /30d)		
		Recreational	Industrial		Minimum ^A	Mean [*]	Maximum
DF-1	2014	0.53	1.58	4	0.051	0.168	0.228
	2015			5	0.015	0.112	0.227
	2016			12	0.010	0.047	0.152
	2017			11	0.007	0.113	0.355
	2018			12	0.025	0.098	0.244
	2019			11	0.005	0.155	0.426
	2020			1	0.082	0.082	0.082
	2021			4	0.025	0.109	0.236
DF-2	2014	0.53	1.58	4	0.093	0.154	0.202
	2015			5	0.023	0.093	0.147
	2016			12	0.006	0.053	0.145
	2017			11	0.015	0.124	0.319
	2018			12	0.021	0.102	0.228
	2019			11	0.024	0.237	0.634
	2020			10	0.134	0.252	0.391
	2021			10	0.049	0.154	0.220
DF-3	2014	0.53	1.58	4	0.104	0.155	0.183
	2015			5	0.017	0.212	0.331
	2016			12	0.014	0.107	0.314
	2017			11	0.028	0.214	0.491
	2018			12	0.010	0.271	0.766
	2019			11	0.021	0.225	0.463
	2020			10	<0.001	0.414	1.220
	2021			10	0.058	0.213	0.445
DF-4	2014	0.53	1.58	4	0.051	0.122	0.176
	2015			4	0.011	0.067	0.147
	2016			11	0.008	0.048	0.138
	2017			11	0.012	0.099	0.299
	2018			12	0.008	0.093	0.369
	2019			11	0.014	0.147	0.300
	2020			10	0.064	0.347	1.084
	2021			10	0.026	0.315	1.095
DF-5	2014	0.53	1.58	4	0.045	0.153	0.257
	2015			5	0.006	0.073	0.159
	2016			11	0.019	0.059	0.220
	2017			11	0.016	0.172	0.527
	2018			12	0.016	0.129	0.410

Station	Date	Reg. Guideline (mg/cm ² /30d)		n	Measured Dustfall (mg/cm ² /30d)		
		Recreational	Industrial		Minimum [^]	Mean [*]	Maximum
	2019			11	0.001	0.171	0.610
	2020			10	0.035	0.263	0.477
	2021			10	0.026	0.223	0.455
DF-6	2014	0.53	1.58	4	0.038	0.099	0.169
	2015			5	0.006	0.058	0.128
	2016			11	0.006	0.054	0.235
	2017			11	0.006	0.084	0.173
	2018			12	0.001	0.074	0.279
	2019			11	0.011	0.236	1.592
	2020			10	0.018	0.204	0.466
	2021			10	0.019	0.293	0.701
DF-7	2014	0.53	1.58	0	-	-	-
	2015			3	0.007	0.024	0.046
	2016			11	0.007	0.032	0.083
	2017			11	0.008	0.082	0.262
	2018			12	0.021	0.065	0.132
	2019			11	0.012	0.131	0.370
	2020			10	0.022	0.290	0.651
	2021			10	0.013	0.199	0.549

The referenced regulatory guideline is Alberta's Ambient Air Quality Guideline (January 2019) for recreational and industrial areas.
[^]Laboratory detection limit is 0.001 mg/cm²/30d. ^{*}Where reported results were below the laboratory detection limit, ½ the limit was used in calculating the annual average.

1.4.3.2 Dustfall Transects

Since 2019, dustfall has been measured at three cross-sectional transects along the AWAR (corresponding to locations DF-1, DF-2, and DF-3) and one transect along the Rankin Inlet By-Pass road (DF-WT; 2019 and 2021). Transect sampling occurs during the summer season only, over two to three consecutive 1-month sampling periods in July through September.

Results to date for AWAR transects (yearly average across all transects and sampling dates) are presented in Figure 10, with comparison to the Alberta Environment regulatory guidelines. Descriptive statistics for AWAR transect data are provided in Table 8.

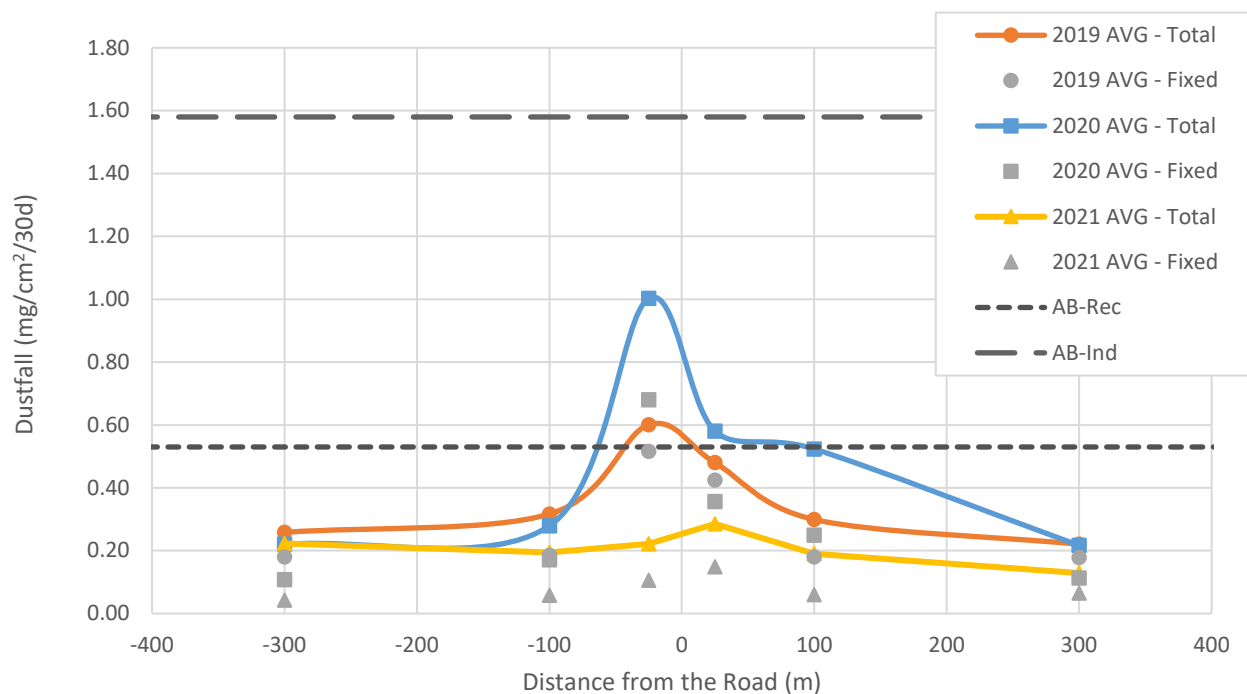


Figure 10. Average 30-day rates of total and fixed dustfall across summertime sampling transects DF-1, DF-2, and DF-3 along the Meliadine Awar. Symbols represent average measured dustfall across transects and sampling dates (2-3 consecutive 30-d periods) within each year. Negative values represent the west (upwind) side of the road. Dashed lines indicate the Alberta Ambient Air Quality Guideline for recreational and industrial areas.

Table 8. Descriptive statistics (sample size (n), and minimum, mean, and maximum concentration) by year and location for total dustfall measurements at transects along the Meliadine AWAR (minimum, mean, and maximum value across 2 - 3 transects and 2 – 3 consecutive summertime sampling rounds per year).

Year	Transects	# Sampling Events per Transect	Station**		Reg. Guideline (mg/cm ² /30d)		n	Measured Dustfall (mg/cm ² /30d)		
					Recreational	Industrial		Minimum^	Mean*	Maximum
2019	DF-1, DF-2, DF-3	2	West	300 m	0.53	1.58	6	0.117	0.258	0.450
				100 m			6	0.179	0.317	0.476
				25 m			6	0.275	0.600	0.916
			East	25 m			6	0.226	0.480	1.188
				100 m			6	0.128	0.299	0.480
				300 m			6	0.117	0.221	0.348
2020	DF-2, DF-3 [‡]	3	West	300 m	0.53	1.58	6	0.174	0.221	0.291
				100 m			6	0.154	0.279	0.391
				25 m			6	0.264	1.002	1.711
			East	25 m			6	0.279	0.581	1.256
				100 m			6	0.184	0.524	1.175
				300 m			6	0.107	0.217	0.353
2021	DF-1, DF-2, DF-3	DF-1: 2 DF-2 & DF-3: 3	West	300 m	0.53	1.58	8	0.039	0.223	0.546
				100 m			8	0.049	0.194	0.364
				25 m			8	0.123	0.222	0.512
			East	25 m			8	0.088	0.285	0.595
				100 m			8	0.059	0.190	0.355
				300 m			8	0.017	0.129	0.250

The referenced regulatory guideline is Alberta's Ambient Air Quality Guideline (January 2019) for recreational and industrial areas. **Side of the road and distance from the road. ^Laboratory detection limit is 0.001 mg/cm²/30d. *Where reported results were below the laboratory detection limit, ½ the limit was used in calculating the mean. ‡DF-1 not sampled in 2020 due to Covid-related restrictions on access.

Results to date for the Rankin Inlet By-Pass Road transect (yearly average across sampling dates) are presented in Figure 11, with comparison to the Alberta Environment regulatory guidelines and maximum recorded dustfall rates prior to By-Pass Road construction for available stations. This baseline sampling was conducted for east-side stations only in July and August 2017 and 2018. Descriptive statistics for the By-Pass Road transect data are provided in Table 9.

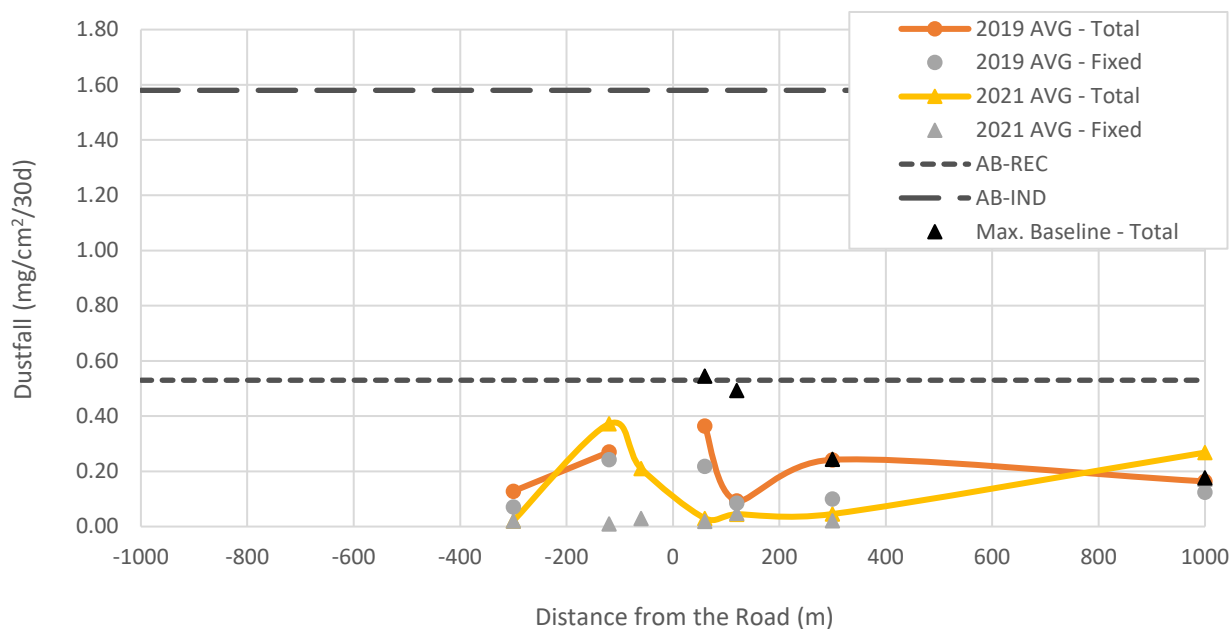


Figure 11. Average 30-day rates of total and fixed dustfall for transect DF-WT along the Rankin Inlet By-Pass Road. Symbols represent average measured dustfall across summertime sampling dates (2-3 consecutive 30-d periods) within each year. Negative values represent the west (upwind) side of the road. Dashed lines indicate the Alberta Ambient Air Quality Guideline for recreational and industrial areas. Baseline values are maximum recorded total dustfall rates observed in July and August 2017 and 2018, pre-construction.

Table 9. Descriptive statistics (sample size (n), and minimum, mean, and maximum concentration) by year for total dustfall measurements at transects along the Rankin Inlet By-Pass Road (minimum, mean, and maximum value across two consecutive summertime sampling rounds per year).

Year	Location		Reg. Guideline (mg/cm²/30d)		n	Measured Dustfall (mg/cm²/30d)		
			Recreational	Industrial		Minimum^	Mean*	Maximum
2019	West	300 m	0.53	1.58	1	0.128	0.128	0.128
		120 m			1	0.270	0.270	0.270
		60 m			0	-	-	-
	East	60 m			2	0.082	0.365	0.647
		120 m			2	0.058	0.094	0.129
		300 m			2	0.088	0.242	0.396
		1000 m			2	0.099	0.164	0.228
	2020	*Not sampled due to Covid-related restrictions on access						
2021	West	300 m	0.53	1.58	2	0.018	0.021	0.023
		120 m			2	0.039	0.372	0.705
		60 m			2	0.110	0.211	0.311
	East	60 m			2	0.018	0.030	0.042
		120 m			2	0.017	0.045	0.072
		300 m			2	0.018	0.046	0.073
		1000 m			2	0.021	0.268	0.515

The referenced regulatory guideline is Alberta's Ambient Air Quality Guideline (January 2019) for recreational and industrial areas. [^]Laboratory detection limit is 0.001 mg/cm²/30d. ^{*}Where reported results were below the laboratory detection limit, ½ the limit was used in calculating the mean.

1.5 SUMMARY

In accordance with the site's Air Quality Monitoring Plan (Version 1 – November 2015; and Version 2 – April 2020), Agnico Eagle conducts air quality monitoring at the Meliadine site. Beginning at various time points, parameters monitored to date include suspended particulates (TSP, PM₁₀, PM_{2.5}), NO₂, SO₂, and dustfall.

Monitoring results are compared to various regulatory guidelines, and relevant predictions from the 2014 FEIS.

Suspended Particulates: Among all 376 suspended particulate samples collected to date from approximately December 2018 – March 2019 and October 2020 – December 2021, just one TSP sample has exceeded the relevant regulatory guideline and 2014 FEIS prediction. No clear trends between sampling stations or over time are evident, though just one full year of data is available. Concentrations of metals of concern measured in TSP (cadmium and iron) were also less than 2014 FEIS-selected health-based screening values and 2014 FEIS maximum model predictions in all samples.

NO₂ and SO₂: Monitoring for NO₂ and SO₂ using passive samplers has continued relatively uninterrupted since 2017. All results to date remain well below regulatory guidelines and maximum 2014 FEIS-predicted values, and no clear trends between sampling stations or over time are evident.

Dustfall: An increase in measured dustfall rates for onsite perimeter monitoring stations DF-4 – DF-7 has occurred since mid-2017 when the construction period began, as anticipated, but exceedances of even the recreational area guideline continue to be relatively uncommon, occurring in <12% of total dustfall samples each year during the operations period. A single marginal exceedance of the industrial area guideline has been recorded to date across these stations. For transects along the AWAR and By-Pass Road, average rates of dustfall have declined below the recreational area guideline within a maximum of 100 m of the road in each year of monitoring.

1.6 REFERENCES

Golder (Golder Associates), 2014. Final Environmental Impact Statement – Meliadine Gold Project, Nunavut. Volume 5.0 Atmospheric Environment and Impact Assessment. April 2014.