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Charlie Catholique, Chair
Environmental Monitoring Advisory Board
PO Box 2577
Yellowknife, NT X1A 2P9
Canada

13 July 2021

Dear Mr. Catholique:

Subject: 2020 Environmental Air Quality Monitoring Report

Please find enclosed the Diavik Diamond Mines (2012) Inc.'s (DDMI) Environmental Air Quality Monitoring Report (EAQMP) for 2020. The monitoring program was based on the Environmental Air Quality Monitoring and Management Plan Version 2, which was updated in January 2019. This report summarizes air quality observations from the following programs conducted at DDMI throughout 2020.

- Dustfall Monitoring as part of the Aquatic Effects Monitoring Program (AEMP);
- Snow Core Program as part of the AEMP; and
- Greenhouse Gas Monitoring and Reporting to Environment and Climate Change (ECCC).

DDMI notes that Environment and Climate Change Canada's (ECCC) National Pollutant Release Inventory (NPRI) emissions data is excluded from this submission due changes to ECCC's NPRI 2020 reporting submission timeline from June to September. As such, DDMI will be submitting a report on the NPRI emissions data as an addendum to the 2020 EAQMP by October 31, 2021.

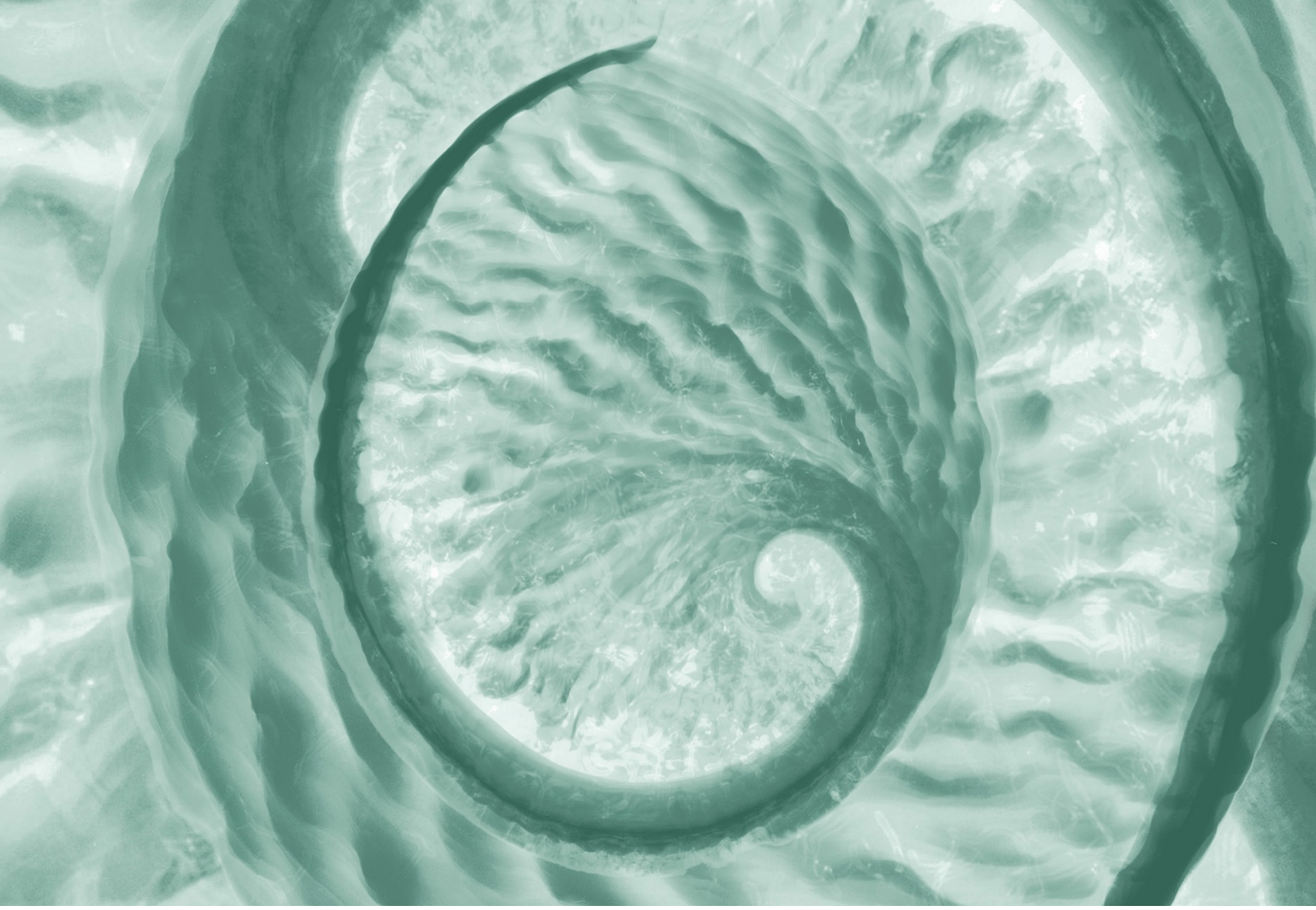
Please do not hesitate to contact the undersigned or Kyla Gray (kyla.gray@riotinto.com) if you have any questions related to this submission.

Yours sincerely,

Kofi Boa-Antwi
Superintendent, Environment

cc: John McCullum, EMAB
Aileen Stevens, GNWT

Attachment 1: DDMI 2020 Environmental Air Quality Monitoring Report



Diavik Diamond Mine

2020 Environmental Air Quality Monitoring Report – Dustfall

July 2021

Project No.: 0573434-0001

The business of sustainability

ERM

July 2021

Diavik Diamond Mine

2020 Environmental Air Quality Monitoring Report – Dustfall

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EXECUTIVE SUMMARY

Diavik Diamond Mines (2012) Inc. has been collecting and reporting air quality related data since initial site construction in 2001. In June of 2013, Diavik Diamond Mines submitted an Environmental Air Quality Monitoring Plan (EAQMP) to the Environmental Monitoring Advisory Board. The components of the EAQMP include dust deposition (dustfall) monitoring (as part of the Aquatic Effects Monitoring Program (AEMP)), a snow core program (as part of the AEMP), reporting to the National Pollutant Release Inventory (NPRI), and reporting to the national greenhouse gas reporting program (GHGRP). This report presents an updated Environmental Air Quality Monitoring Report for the Diavik Diamond Mine for the calendar year 2020.

In 2020, dustfall was monitored at 14 dustfall gauges and 27 snow survey stations located at varying distances and directions from the mine. Snow water chemistry was measured at 24 of the snow survey stations and compared to effluent quality criteria (EQC) set out in the Wek'èezhìi Land and Water Board (WLWB) Water Licence W2015L2-0001. The comparison between snow water chemistry and the EQC is made only as a general performance indicator; the EQC apply to effluent water quality and not to snow water.

Annual dustfall estimated from each of the 14 dustfall gauges ranged from 78 to 757 mg/dm^2/y in 2020. The annualized dustfall rates estimated from the 2020 snow survey data ranged from 5 to 1,463 mg/dm^2/y. All of the annualized dustfall rates estimated from dustfall gauges and snow surveys were less than 5.27 mg/dm^2/day (1,928 mg/dm^2/y in a leap year), the non-residential Alberta Ambient Air Quality Guideline for dustfall (Alberta Environment and Parks 2019). Observed dustfall rates at the Dust 10, SS1-1, SS5-1, and SS5-3 stations were higher than 1.77 mg/dm^2/day (647 mg/dm^2/y in a leap year), the residential Alberta Ambient Air Quality Guideline for dustfall. This Guideline is used only as a general performance indicator. Dustfall rates in 2020 were generally within the range of historical data collected for the Mine.

Because the dustfall gauges continuously collect dust throughout the year, and the snow surveys are only representative of dustfall accumulated over the snow cover period, the reported annual dustfall results from the dustfall gauges are expected to provide a better estimate of annual dustfall compared to snow survey results for similar geographic areas. However, results obtained from both methods showed similar spatial patterns, with dustfall generally decreasing with distance away from the Mine.

Snow water chemistry analysis of interest included those variables with effluent quality criteria (EQC; i.e., aluminum, ammonia, arsenic, cadmium, chromium, copper, lead, nickel, nitrite, and zinc). All 2020 sample concentrations were less than their associated reference levels as specified by the "maximum concentration of any grab sample" in Water Licence W2015L2-0001.

The Mine reported greenhouse gas (GHG) emissions as part of the annual national Greenhouse Gas Emissions Reporting Program (GHGRP) submission, and carbon dioxide equivalent (CO_2e) emissions were estimated using published emission factors and 100-year global warming potential (GWP) ratios. Starting for 2017 reporting, the GHGRP was changed to require all facilities to report if they emit the equivalent of 10,000 tonnes of CO_2e (tCO_2e) or more per year, compared to the previous 50,000 tCO_2e per year threshold.

Mine GHG emissions of carbon dioxide (CO_2), methane (CH_4) and nitrous oxide (N_2O) totaled 192,741 tCO_2e in 2020, a 4.1% decrease from 2019 due to Environment and Climate Change Canada (ECCC) updates to some parts of the calculation methodology. GHG emissions at the Mine in 2020 were from stationary equipment fuel combustion (81%) and mobile equipment fuel combustion (19%). In 2020, the Mine's 9.2 megawatt wind farm helped to reduce the Mine's GHG footprint by generating 19.7 gigawatt-hours of electricity which saved 4.8 million litres of diesel fuel and thereby prevented the direct release of 12,898 tCO_2e.

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ACRONYMS AND ABBREVIATIONS

Terminology used in this document is defined where it is first used. The following list will assist readers who may choose to review only portions of the document.

AEMP	Aquatic Effects Monitoring Program
BC	British Columbia
BC ENV	British Columbia Ministry of Environment and Climate Change
CB	Communications Building
CEPA	*Canadian Environmental Protection Act*
CH_4	Methane
cm	Centimetre
CO_2	Carbon dioxide
CO_2e	Carbon dioxide equivalent
d	Day
DDMI	Diavik Diamond Mines (2012) Inc.
dm^2	Square decimetre
Dustfall	Dust deposition
EA	Environmental Agreement
EAQMP	Environmental Air Quality Monitoring Plan
ECCC	Environment and Climate Change Canada
EMAB	Environmental Monitoring Advisory Board
EMS	Environmental Management System
ENR	Department of Environment and Natural Resources
EQC	Effluent quality criteria
ERM	ERM Consultants Canada Ltd.
GHG	Greenhouse gas
GHGRP	Greenhouse Gas Emissions Reporting Program
GNWT	Government of the Northwest Territories
GWP	Global warming potentials
L	Litre
m	Metre
mg	Milligram
N_2O	Nitrous oxide

NPRI	National Pollutant Release Inventory
$PM_{2.5}$	Particulate matter ≤ 2.5 µm in diameter
QA/QC	Quality assurance and quality control
SOP	Standard operating procedure
t	Tonne (1,000 kg)
tCO_2e	Tonne of carbon dioxide equivalent
the Mine	Diavik Diamond Mine
WLWB	Wek'èezhìi Land and Water Board
µg	Microgram
y	Year

1. INTRODUCTION

Diavik Diamond Mines (2012) Inc. (DDMI) has been collecting and reporting air quality related data since initial site construction in 2001. In June of 2013, DDMI submitted an Environmental Air Quality Monitoring Plan (EAQMP) to the Environmental Monitoring Advisory Board (EMAB). The EAQMP was developed to address Article 7.2 (a) of the Environmental Agreement (EA; DDMI 2000). The EAQMP and its results are not part of a Regulatory Instrument but are subject to review by EMAB and the Parties identified under EA Article 7.5.

The purpose of this report is to provide a summary of the 2020 air quality monitoring and emissions data in relation to the Diavik Diamond Mine's (hereafter referred to as the Mine) operational activities. This *2020 Environmental Air Quality Monitoring Report* summarizes air quality observations from the following programs conducted at the Mine:

- Dustfall Monitoring as part of the Aquatic Effects Monitoring Program (AEMP);
- Snow Core Program as part of the AEMP; and
- Greenhouse Gas (GHG) Monitoring and Reporting to Environment and Climate Change Canada (ECCC).

In 2020, the primary sources of fugitive dust were associated with unpaved road and airstrip usage, and construction and mining activities at the A21 open pit. Major material transfers in 2020 included the use of haul roads to move waste rock and till (9,405,420 tonnes) and to move kimberlite ore to the processing plant (2,518,441 tonnes). Another source of fugitive dust was truck traffic along the ice road to the Mine. To suppress dust generation, roads, parking areas and the plant site were watered during the summer as needed. The Underground Mine production in 2020 continued at A154 and A418, as well as stripping and production at the A21 open pit. Fugitive dust generation is expected to be greatest during snow-free periods where and when there is site activity. It was expected that the highest fugitive dust generation and resulting dustfall occurred in areas closest to the roads, the airstrip, and mine footprint such as near A21 between May and September, although in 2020 the variations in dustfall rates from summer to winter were generally minor.

In 2020, the predominant winds at the site were from the east, southeast, and northwest, although winds in general at the site can be described as omnidirectional. Therefore, the expectation is that airborne material will be deposited in all directions around the mine, possibly with higher amounts to the west, northwest, and southeast of the mine.

2. DUSTFALL MONITORING

Community interest in the possible effects of dust deposition (dustfall) on wildlife and aquatic environments is the basis of the focus of DDMI's EAQMP on dustfall. Dustfall is the deposition of airborne particulate matter on vegetation, snow and water, and it is monitored using dustfall collection gauges and snow cores.

In accordance with the EA and the requirement associated with the Aquatic Effects Monitoring Program (AEMP), a dust monitoring program was initiated in 2001 and has gone through various changes since then. The program was designed to achieve the following objectives:

- determine dustfall rates at various distance from the Mine footprint; and
- determine the chemical characteristics of dustfall that may be deposited onto, and subsequently into, Lac de Gras as a result on mining activities, in support of the AEMP.

In 2020, the dustfall program incorporated three monitoring components, with sampling conducted at varying distances from the Mine infrastructure (13 m to 4,802 m):

- dustfall gauges (12 monitoring and two control stations);
- dustfall from snow surveys (24 monitoring and three control locations); and
- snow water chemistry from snow surveys (16 monitoring and three control locations).

Additional information, data and figures can be found in the full *Diavik Diamond Mine: 2020 Dust Deposition Report* (Appendix A; ERM 2021).

2.1 Dustfall Gauges

Dustfall gauges were placed at 14 stations (including two control stations) around the Mine at distances ranging from approximately 13 m to 4,646 m from mining operations (Table 2.1-1 and Figure 2.1-1). Each gauge collected dustfall year-round, with samples collected approximately every three months. The average total sampling period for the 12 year-round locations was 376 days.

Dustfall gauge stations consisted of a hollow brass cylinder (52 centimeter (cm) length, 12.5 cm inner diameter) housed in a Nipher snow gauge (Photo 2.1-1). The cylinder collected dustfall, while the Nipher snow gauge reduced air turbulence around the gauge to increase dustfall gauge efficiency. At the end of each sampling period, the cylinder was exchanged with an empty, clean cylinder and content of the retrieved cylinder was processed in the DDMI environment laboratory to determine the mass of collected dustfall. This processing involved filtration, drying and weighing of samples as specified in the standard operating procedures (SOPs) ENVI-908-0119 and ENVI-902-0119 (see Appendices E and G of the *Diavik Diamond Mine: 2020 Dust Deposition Report*).

Once the mass of collected dustfall at a station was measured, the mean daily dustfall rate over the collection period was calculated as:

$$D = \frac{M}{A * T} \qquad \text{[Equation 1]}$$

where:

D = mean daily dustfall rate (mg/dm^2/d) during time period T
M = mass of dustfall collected (mg) during time period T
A = surface area of dustfall gauge collection cylinder orifice (dm^2; approximately 1.227 dm^2)
T = number of days of dustfall collection (d)

Table 2.1-1: Dustfall and Snow Water Chemistry Sampling Locations, Diavik Diamond Mine, 2020

Station ID	2020 Sampling Dates	Total Sample Exposure Duration (days)	UTM Coordinates[1] (m)		Approx. Distance from Mining Operations (m)	Surface Description	Snow Water Chemistry Sampled[2]
			Easting	Northing			
Dustfall Gauges							
Dust 1	Dec 26 (2019; start), Mar 29, Jul 18, Oct 22, Jan 4 (2021; end)	375	533964	7154321	70	Land	n/a
Dust 2A	Dec 28 (2019; start), Mar 27, Jul 18, Oct 20, Jan 8 (2021; end)	377	535678	7151339	425	Land	n/a
Dust 3	Dec 26 (2019; start), Mar 29, Jul 17, Oct 22, Jan 3 (2021; end)	374	535024	7151872	22	Land	n/a
Dust 4	Dec 26 (2019; start), Mar 29, Jul 17, Oct 23, Jan 3 (2021; end)	374	531397	7152127	173	Land	n/a
Dust 5	Dec 27 (2019; start), Mar 27, Jul 18, Oct 20, Jan 8 (2021; end)	378	535696	7155138	1183	Land	n/a
Dust 6	Dec 26 (2019; start), Mar 29, Jul 18, Oct 22, Jan 3 (2021; end)	374	537502	7152934	13	Land	n/a
Dust 7	Dec 27 (2019; start), Mar 27, Jul 18, Oct 20, Jan 8 (2021; end)	378	536819	7150510	1147	Land	n/a
Dust 8	Dec 27 (2019; start), Mar 27, Jul 19, Oct 20, Jan 8 (2021; end)	378	531401	7154146	1213	Land	n/a
Dust 9	Dec 27 (2019; start), Mar 27, Jul 18, Oct 20, Jan 8 (2021; end)	378	541204	7152154	3796	Land	n/a
Dust 10	Dec 26 (2019; start), Mar 29, Jul 17, Oct 22, Jan 3 (2021; end)	374	532908	7148924	46	Land	n/a
Dust 11	Dec 26 (2019; start), Mar 27, Jul 17, Oct 20, Jan 8 (2021; end)	379	531493	7150156	747	Land	n/a
Dust 12	Dec 28 (2019; start), Mar 27, Jul 19, Oct 20, Jan 8 (2021; end)	377	529323	7151191	2326	Land	n/a

Station ID	2020 Sampling Dates	Total Sample Exposure Duration (days)	UTM Coordinates[1] (m)		Approx. Distance from Mining Operations (m)	Surface Description	Snow Water Chemistry Sampled[2]
			Easting	Northing			
Dust C1	Dec 27 (2019; start), Mar 27, Jul 18, Oct 20, Jan 8 (2021; end)	378	534979	7144270	4646	Land	n/a
Dust C2	Dec 28 (2019; start), Mar 27, Jul 19, Oct 20, Jan 8 (2021; end)	377	528714	7153276	3031	Land	n/a
Snow Surveys							
SS1-1	Apr 12	197	533915	7154292	30	Land	
SS1-2	Apr 12	197	533909	7154382	115	Land	
SS1-3	Apr 12	197	533967	7154517	260	Land	
SS1-4[3]	Apr 12	167	534483	7155096	899	Ice	✓
SS1-5	Apr 12	167	535098	7156275	2175	Ice	✓
SS2-1	Apr 12	167	537553	7153474	145	Ice	✓
SS2-2	Apr 12	167	537760	7153435	427	Ice	✓
SS2-3[4]	Apr 12	167	538485	7153933	1194	Ice	✓
SS2-4	Apr 12	167	539142	7154686	2164	Ice	✓
SS3-4	Apr 13	168	536593	7150996	585	Ice	✓
SS3-5	Apr 13	168	537693	7150790	1325	Ice	✓
SS3-6[5]	Apr 13	168	536302	7151563	35	Ice	✓
SS3-7	Apr 13	168	536346	7151364	239	Ice	✓
SS3-8	Apr 13	168	536635	7150873	826	Ice	✓
SS4-1[6]	Apr 14	199	531485	7152217	61	Land	
SS4-2	Apr 14	199	531353	7152263	196	Land	
SS4-3	Apr 14	199	531328	7152476	335	Land	
SS4-4	Apr 14	169	531140	7153172	1022	Ice	✓
SS4-5[6]	Apr 14	169	531410	7154120	1214	Ice	✓

Station ID	2020 Sampling Dates	Total Sample Exposure Duration (days)	UTM Coordinates[1] (m)		Approx. Distance from Mining Operations (m)	Surface Description	Snow Water Chemistry Sampled[2]
			Easting	Northing			
SS5-1	Apr 13	198	533150	7148927	26	Land	
SS5-2	Apr 13	198	533149	7148871	55	Land	
SS5-3	Apr 13	168	533149	7148700	259	Ice	✓
SS5-4	Apr 13	168	533153	7147948	941	Ice	✓
SS5-5	Apr 13	168	533148	7146953	1894	Ice	✓
Control-1	Apr 13	198	534989	7144273	4802	Land	✓[8]
Control-2[7]	Apr 14	199	528714	7153273	3042	Land	✓[8]
Control-3	Apr 3	198	538649	7148747	3550	Land	✓[8]

Notes:

[1] UTM Zone 12W, NAD83.

[2] n/a = not applicable.

[3] Duplicate sample for snow water chemistry was collected at station SS1-4 (SS1-4-4 & SS1-4-5).

[4] Duplicate samples for dustfall snow surveys and snow water chemistry were collected at station SS2-3 (SS2-3-4 & SS2-3-5).

[5] Duplicate sample for snow water chemistry was collected at station SS3-6 (SS3-6-4 & SS3-6-5).

[6] Duplicate sample for dustfall snow surveys was collected at station SS4-5 (SS4-5-4 & SS4-5-5).

[7] Duplicate sample for dustfall snow surveys was collected at Control-2 station (Control-2-4 & Control-2-5).

[8] Snow water chemistry was sampled over ice, adjacent to the on-land control station; see Section 2.3 for further details.

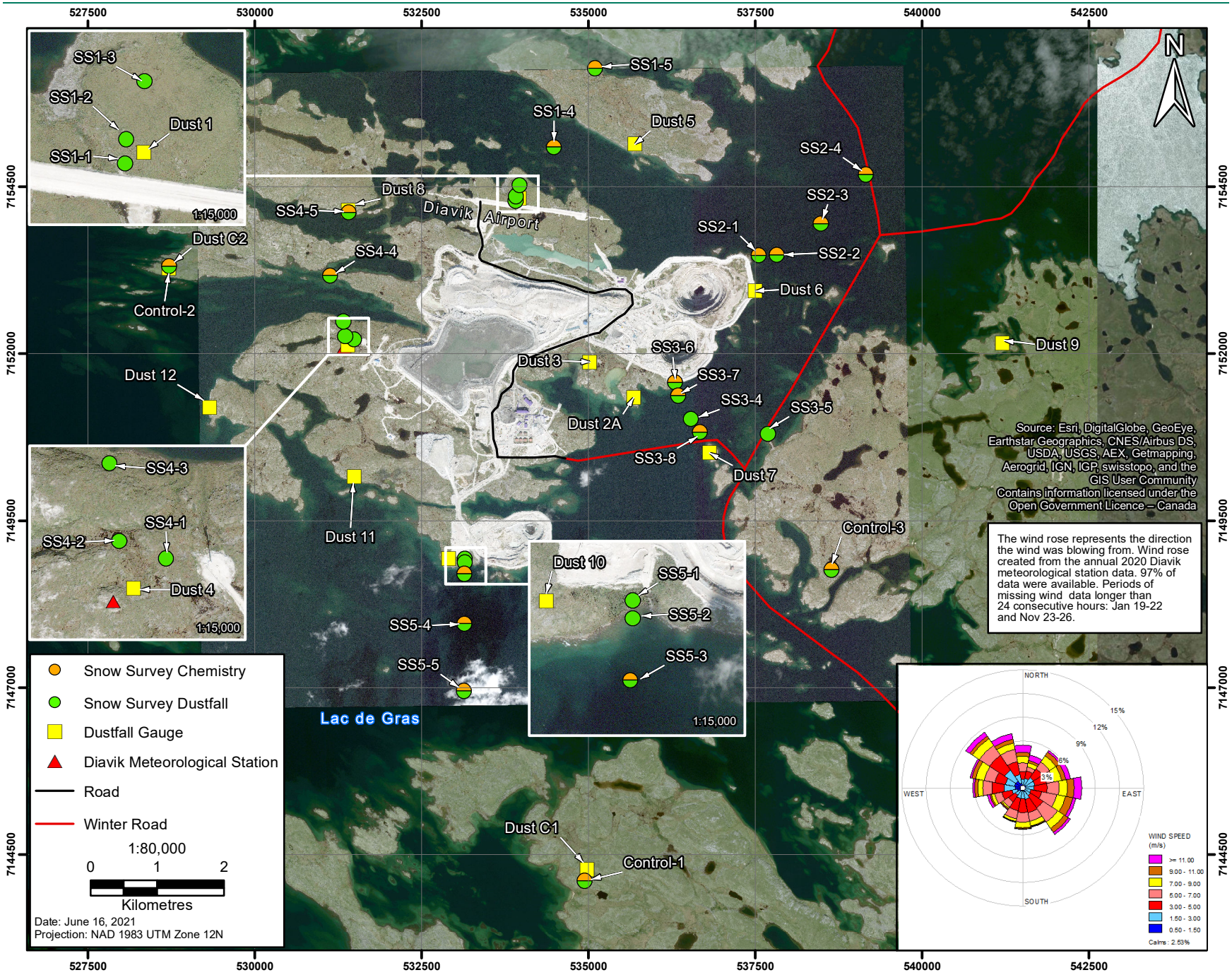

Figure 2.1-1: Dustfall Gauge and Snow Survey Locations, Diavik Diamond Mine, 2020

Photo 2.1-1: Dustfall gauge during sample collection. The dustfall gauge consisted of a hollow brass cylinder (centre) housed inside a Nipher snow gauge (right).

The mean daily dustfall rate (mg/dm^2/d) was then multiplied by 366 days to estimate the mean annual dustfall rate (mg/dm^2/y).

The Northwest Territories has no guidelines or objectives for dustfall deposition. The estimated dustfall rates are compared to the Alberta Ambient Air Quality Guidelines for dustfall (Table 2.1-2; Alberta Environment and Parks 2019), which are used only as general performance indicators and are not a regulatory requirement in compliance evaluation. The Alberta Ambient Air Quality Guidelines for dustfall include a guideline for residential and recreation areas (53 mg/dm^2 per 30 days) and a guideline for commercial and industrial areas where higher dustfall rates are expected (158 mg/dm^2 per 30 days). To compare against the Alberta Ambient Air Quality Guidelines, the daily and annual thresholds are calculated based on the 30-day objectives. The daily threshold ranged from 1.77 mg/dm^2/d to 5.27 mg/dm^2/d, while the annual threshold ranged from 647 to 1,928 mg/dm^2/day. Snow water chemistry data were compared to effluent quality criteria (EQC) set out in Wek'èezhìi Land and Water Board (WLWB) Water Licence W2015L2-0001 (formerly W2007L2-0003). DDMI compares the snow water chemistry data to the EQC only as a general performance indicator. There is no intention or requirement that these samples must meet the EQC.

Table 2.1-2: Dustfall and Snow Water Chemistry Reference Values

Parameter	Value	Unit	Comment	Source
Dustfall Rate	53-158	mg/dm^2/ 30 day	Alberta Ambient Air Quality Guidelines for dustfall	Alberta Environment and Parks, 2019
Aluminum-Total	3,000	µg/L	Max. grab sample concentration	W2015L2-0001
Ammonia-N	12,000	µg/L	Max. grab sample concentration	W2015L2-0001
Arsenic-Total	100	µg/L	Max. grab sample concentration	W2015L2-0001
Cadmium-Total	3	µg/L	Max. grab sample concentration	W2015L2-0001
Chromium-Total	40	µg/L	Max. grab sample concentration	W2015L2-0001

Parameter	Value	Unit	Comment	Source
Copper-Total	40	µg/L	Max. grab sample concentration	W2015L2-0001
Lead-Total	20	µg/L	Max. grab sample concentration	W2015L2-0001
Nickel-Total	100	µg/L	Max. grab sample concentration	W2015L2-0001
Nitrite-N	2,000	µg/L	Max. grab sample concentration	W2015L2-0001
Zinc-Total	20	µg/L	Max. grab sample concentration	W2015L2-0001

2.2 Dustfall Snow Surveys

Dustfall snow surveys were performed at 24 monitoring stations, and three control stations along five transects around the Mine (Table 2.1-1 and Figure 2.1-1). The distance from mining operations ranged from approximately 26 m to 2,175 m for the monitoring stations, and from 3,042 m to 4,802 m for the control stations. In 2020, the average total sampling period for the monitoring stations was 198 days for the land-based stations and 168 days for the ice-based stations (control stations not included). The start dates correspond to the first snowfall for the land-based stations (September 28, 2019), and shortly after ice freeze up for the ice-based stations (October 28, 2019).

At each snow survey station, a snow corer was used to drill into the snow pack to retrieve a cylindrical snow core (6.1 cm inner diameter; Photo 2.2-1). Cores were extracted at each station and composited in the field to ensure a representative snow sample was obtained for the station. A minimum of three snow cores were collected at each (land and ice) of the snow sampling stations, as outlined in the Snow Core Survey SOP (ENVI-909-0119); see Appendix F of the *Diavik Diamond Mine: 2020 Dust Deposition Report*). Composited samples were bagged and brought to the DDMI environment lab for processing as specified in the Snow Core Survey SOP (ENVI-909-0119) and the Quality Assurance/Quality Control SOP (ENVI-902-0119); see Appendix G of the *Diavik Diamond Mine: 2020 Dust Deposition Report*). Processing of snow cores involved filtration, drying in a high heat oven, and weighing. For quality assurance and control (QA/QC), duplicate samples were collected at stations SS2-3, SS4-5 and Control-2 station.

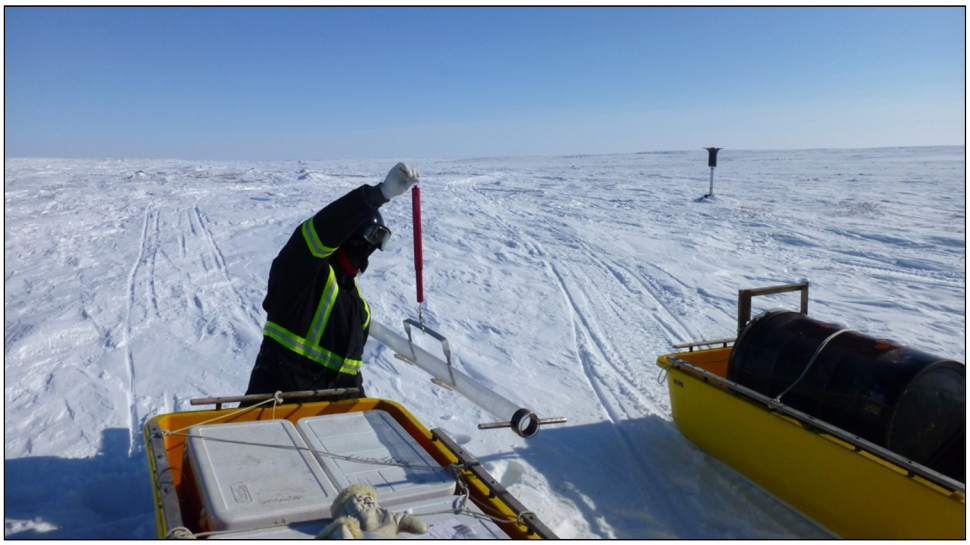

Photo 2.2-1: Snow core sample being weighed, with dustfall gauge in background.

The mean daily dustfall rate (mg/dm^2/d) was then calculated over the collection period using Equation 1, with surface area (A) equal to the surface area of the snow corer tube orifice (0.2922 dm^2) multiplied by the number of snow cores used for the composited sample at the station. The mean annual dustfall rate (mg/dm^2/y) was estimated by multiplying the mean daily dustfall rate by 366 days.

Dustfall rates were compared to the Alberta Ambient Air Quality Guidelines for dustfall (Table 2.1-2), which served as general performance indicators only.

2.3 Snow Water Chemistry

Snow water chemistry analysis was performed on snow cores extracted from 19 locations, including 16 dustfall snow survey stations located on ice, three samples taken on ice adjacent to the three control locations (Table 2.1-1 and Figure 2.1-1). In 2020, the distance from mining operations to the snow survey stations ranged from approximately 26 m to 2,175 m, while this distanced ranged from 3,042 m to 4,802 m for the control stations. The average total sampling period in 2020 for the snow survey stations was 168 days (control stations not included). At each station located over water, cores were collected for chemistry analysis immediately after the dustfall snow cores were extracted.

Snow water chemistry cores were extracted using a snow corer in accordance with the method for dustfall snow survey core extraction. A minimum of three cores at each site were extracted and composited to obtain the 3 L of snow water required for the laboratory chemical analysis. Snow cores were then processed and prepared for shipment to Bureau Veritas (BV) where the chemical analysis was performed. For QA/QC purposes, duplicate samples were collected at stations SS1-4, SS2-3, and SS3-6, in addition to an equipment blank sample (SS Bag). The methodology for snow water chemistry sampling is detailed in SOP ENVI-909-0119 (see Appendix F of the *Diavik Diamond Mine: 2020 Dust Deposition Report*).

Effluent Quality Criteria (EQC), including “maximum average concentration” and “maximum concentration of any grab sample,” are stipulated in DDMI’s Water Licence (W2015L2-0001) for aluminum, ammonia, arsenic, cadmium, chromium, copper, lead, nickel, nitrite, and zinc (Table 2.1-2). Snow water chemistry results for these variables were compared to the “maximum concentration of any grab sample.” These results are also presented as part of DDMI’s AEMP report.

2.4 Results

Dustfall and snow water chemistry results were grouped into zones based on their relative distance from the mine footprint (Table 2.4-1). Although station groupings were first established at the outset of the program, these groupings were re-established in 2013 using satellite imagery of the site.

Table 2.4-1: Dustfall Results, Diavik Diamond Mine, 2020

Zone ID (m)	Number of Stations in Zone	2020 Dustfall (mg/dm^2/y) from Dustfall Gauges and Dustfall Snow Surveys			
		Median	Mean	Maximum	Minimum
0 - 100	9	539	572	1,463	119
101 - 250	5	257	211	315	44
251 - 1,000	10	124	232	795	26
1,001 - 2,500	11	75	100	226	5
> 2,500	1	78	-	-	-
Control	5	94	71	118	8

In 2020, the primary sources of fugitive dust were associated with unpaved road and airstrip usage and construction and mining activities at the A21 open pit. Due to construction and mining activities at A21, the distance to mining operations were recalculated in 2019. The revised distances to mining operations are shown in Table 2.1-1.

Major material transfers in 2020 included the use of haul roads to move waste rock and till (9,405,420 tonnes) and the transfer of kimberlite ore to the processing plant (2,518,441 tonnes). Another source of fugitive dust was truck traffic along the ice road to the Mine. However, the consistency in the dust deposition rate near the ice road alignment sites between winter and summer, in addition to the generally lower deposition rates at these sites (e.g., Dust 7, SS2-4, SS3-5 and SS3-8) indicated that the contributions of dust from the ice road were modest relative to other sources. To suppress dust generation, roads, parking areas and the plant site were watered during the summer as needed. Between June and September 2020, approximately 3,472 m^3 of water was applied to the plant site and 26,820 m^3 of water was applied to haul roads. The exact impact of dust suppression could not be determined from the data collected in 2020; however, it is likely that road watering reduced the amount of dust generated at the mine. In 2020, Underground Mine production continued at A154 and A418, as well as stripping and production at the A21 open pit. Fugitive dust generation is expected to be greatest during snow-free periods where and when there is site activity. It was expected that the highest fugitive dust generation and resulting dustfall occurred in areas closest to the roads, the airstrip, and mine footprint such as near A21 between May and September. The difference between the summer and winter dustfall rate was generally minor with the summer rate being higher at most sites (e.g., the Dust 1 rate was 596 $mg/dm^2/y$ in the summer and 164 $mg/dm^2/y$ in the winter), while some sites recorded a higher winter dustfall rate (e.g., the Dust 2A rate was 298 $mg/dm^2/y$ in the summer and 322 $mg/dm^2/y$ in the winter).

The predominant winds at the site in 2020 were from the east, southeast and northwest, although winds in general at the site can be described as omnidirectional. Therefore, the expectation is that airborne material will be deposited in all directions around the mine, possibly with higher amounts to the west, northwest and southeast of the mine. The results show that proximity to mine activity is a stronger indicator of dust deposition than wind direction. This is supported by the fact that the stations with the three highest dust deposition rates in 2020 (Dust 3, 10, and 11) are located south or southwest of the mine footprint where wind speeds were relatively weak compared to other directions. Dust 3 and Dust 10, which are located only 22 and 46 m away from the mine, respectively, had the highest observed dustfall rates of the dustfall gauges in 2020.

Results from the dustfall gauges, dustfall snow surveys, and the snow water chemistry analyses are presented below.

2.4.1 Dustfall Gauges

For each station, total dustfall collected throughout the year is summarized by zone in Table 2.4-1. The following list describes tables or figures that are included in the *Diavik Diamond Mine: 2020 Dust Deposition Report* (Appendix A; ERM 2021):

- 2020 annual dustfall collected at each station, relative to the Mine;
- historical records of annual dustfall for each station from 2002 to 2020;
- a comparison of dustfall versus distance from the Mine footprint for 2020 and historical 2002 to 2020 datasets; and
- boxplots summarizing the dustfall magnitude distribution from all stations during each year from 2002 to 2020.

The three highest estimated dustfall rates in 2020 measured using gauges occurred at Dust 10 (757 mg/dm^2/y; 46 m from the Mine), followed by Dust 3 (599 mg/dm^2/y; 22m from the Mine) and Dust 11 (446 mg/dm^2/y; 747 m from the Mine). This is similar to 2019, when Dust 3 recorded the highest rate followed by Dust 10 and Dust 11. The elevated rates at the Dust 10 site are explained by its location adjacent to the A21 open pit, while Dust 11 is located west of the South Country Rock Pile – Waste Rock Storage Area (SCRP-WRSA; Figure 2.1-1). The lowest dustfall rate was recorded at Dust 9 (78 mg/dm^2/y), lower than the control stations Dust C1 (118 mg/dm^2/y; 4,646 m to the south) and Dust C2 (103 mg/dm^2/y; 3,031 m to the west). This is explained by the distance of Dust 9 from the Mine footprint (3,796 m to the east), which places it within the control stations' zone.

The dustfall rates estimated from dustfall gauges in 2020 were lower but comparable to 2019 rates. Out of 12 sites, seven locations recorded lower deposition rates in 2020 than 2019, with an average rate of 319 mg/dm^2/y and 372 mg/dm^2/y in 2020 and 2019, respectively. The higher dustfall values that have been recorded since 2018 compared to previous years suggest that dustfall rates from 2018 to 2020 were likely influenced by the surface activity at the mine, particularly at the A21 open pit, which began in December 2017, while the dustfall rates in 2017 were related mainly to the airstrip.

The annualized dustfall rates estimated from gauges at all stations were less than the upper limit of the Alberta Ambient Air Quality Objectives and Guidelines for dustfall (1,922 mg/dm^2/y), which is applied to industrial locations. The lower limit of these objectives (646 mg/dm^2/y) that is applied to residential and recreational areas was exceeded at only one site in 2020 (Dust 10). The Alberta Ambient Air Quality Objectives and Guidelines recommends that dustfall objectives be used as general performance indicators only with no compliance requirement, thus these objectives are used here for comparison purposes only, particularly as there are currently no standards or objectives for the Northwest Territories.

2.4.2 Dustfall Snow Surveys

Annual dustfall rates estimated from each snow survey station in 2020 are included in the combined dustfall gauge and snow survey results in Table 2.4-1. Historical records of annual dustfall rates for each station, the relationship between annual dustfall rates and distance from the Mine footprint, boxplots summarizing dustfall rates measured in each year, and the data quality assurance and quality control are presented in the annual dust deposition report (Appendix A).

Annualized dustfall rates estimated from 2020 snow survey data ranged from 5 to 1,463 mg/dm^2/y (Table 2.4-1). The maximum dust deposition rate was recorded at SS5-1 (1,463 mg/dm^2/y) followed by SS1-1 (1,017 mg/dm^2/y). The higher dustfall rates at SS5-1 are associated with the mine activity at the A21 open pit (Figure 2.1-1). SS1-1 is located due north of the airstrip, which explains the higher levels of dustfall found there. This site recorded the highest rates from 2017 to 2019.

Dustfall rates from the snow survey generally decreased with increasing distance from the Mine. Mean dustfall rates estimated using both dustfall gauges and snow surveys within the 0 m to 100 m, 101 m to 250 m, 251 m to 1,000 m, 1,001 m to 2,500 m, and control zones were 572, 211, 232, 100, and 71 mg/dm^2/y, respectively (Table 2.4-1). Dustfall rates at stations SS1-1, SS5-1, Dust 11, SS5-3, Dust 7, and Dust 12 were greater than the upper limit of the 95% confidence interval (CI) for their respective zones in 2020. A sample that exceeds the 95% CI has a probability of occurrence of 5% or less, which indicates a particularly high dust deposition rate. The 95% CI was exceeded at two sites in each of the 0 m to 100 m zone (SS1-1 and SS5-1) and the 251 m to 1,000 m zone (Dust 11 and SS5-3), and at three sites in the 1,001 m to 2,500 m zone (Dust 7, Dust 8, and Dust 12).

In the 0 m to 100 m zone, the exceedances can be explained by the close proximity to the airstrip for SS1-1 and to the A21 open pit for SS5-1, while the exceedances at the 251 m to 1,000 m zone are likely explained by the proximity to the A21 open pit for both sites. The exceedance of the 95% CI in the 1,001 m to 2,500 m zone is associated with dust from the ice road for Dust 7 and likely with the airstrip for

Dust 8. The low rate at some sites of this zone (e.g., SS1-5 and SS2-4) resulted in a relatively low value of the 95% CI, which led to the three exceedances in this zone.

Annualized dustfall rates estimated from snow survey stations in 2020 were generally comparable to 2019 dustfall estimates, with few stations recording higher rates in 2020 than 2019. The annualized dustfall rates estimated from snow surveys in 2020 never exceeded the upper limit (applied to industrial locations) of the Alberta Ambient Air Quality Objectives and Guidelines at any station, while only SS1-1, SS5-1, and SS5-3 exceeded the lower limit of these guidelines, which applies to residential and recreational areas.

2.4.3 Snow Water Chemistry

The maximum snow water chemistry results for 2020 are presented in Table 2.4-2. All analytical results for snow water chemistry and data quality assurance and quality control analysis are included in *the Diavik Diamond Mine: 2020 Dust Deposition Report* (Appendix A; ERM 2021).

Table 2.4-2: Snow Water Chemistry Results, Diavik Diamond Mine, 2020

Zone ID (m)	Number of Stations in Zone	2019 Maximum Snow Water Chemistry Results (µg/L)										
		Aluminum	Ammonia	Arsenic	Cadmium	Chromium	Copper	Lead	Nickel	Nitrite	Phosphorous	Zinc
0 - 100	1	53.6	72.5	0.0	0.0	0.3	0.1	0.1	1.1	5.8	80.0	1.0
101 - 250	2	65.0	88.0	0.1	0.0	0.4	0.3	0.1	1.3	5.1	141.0	1.2
251 - 1,000	6	75.6	140.0	0.1	0.0	0.3	0.4	0.4	1.7	5.1	318.0	2.8
1,001 - 2,500	7	18.1	70.0	0.0	0.0	0.1	0.2	0.0	1.5	6.9	57.4	1.2
Control	3	21.8	79.0	0.0	0.0	0.1	0.1	0.0	0.5	7.1	46.0	1.5

All 2020 sample concentrations were less than their associated reference levels as specified by the “maximum concentration of any grab sample” in Water Licence W2015L2-0001 (Table 2.1-2).

In general, average concentrations of snow water chemistry variables of interest decreased with increasing distance from the Mine. Concentrations of all parameters except nitrite were lower in 2020 than in recent years.

3. GREENHOUSE GAS REPORTING

3.1 Program Overview

While there is no territorial regulatory requirement or standard for GHG release in the Northwest Territories, the national Greenhouse Gas Emissions Reporting Program (GHGRP) is Canada's legislated, publicly accessible inventory of facility-reported GHG data and information. The program is administrated by ECCC and is a requirement of the CEPA 1999 for owners or operators of facilities that emit GHGs above a certain threshold. Starting for 2017 reporting, the GHGRP requirement applied to all facilities that emit the equivalent of 10,000 tonnes of carbon dioxide equivalent units (tCO_2e) or more, per year (ECCC 2019a, ECCC 2021a). The previous threshold was 50,000 tCO_2e per year. GHG reports are to be submitted prior to June 1 each year.

GHG emissions were derived by DDMI using emission factor calculations in the Guidance Manual for Estimating Greenhouse Gas Emissions (Environment Canada 2004). Operational values such as fuel usage and mobile equipment hours were recorded at the Mine throughout the year.

Three GHG emissions are calculated for the Mine: CO_2, methane (CH_4) and nitrous oxide (N_2O). To calculate CO_2e, 100-year Global Warming Potentials (GWP) are used to convert CH_4 and N_2O from tonnes to tCO_2e. The CH_4 and N_2O GWP multipliers used were 25 and 298, respectively (ECCC 2019b).

3.2 Results

Table 3.2-1 compares 2019 and 2020 GHG emissions results for the Mine. The 2020 GHG emission reporting information was filed with ECCC on May 31, 2021. GHG reports for previous years (2001 to 2019) are published by ECCC and available from the open government website (ECCC 2021b).

Table 3.2-1: GHG Equivalents for the Diavik Diamond Mine, 2019 and 2020

Constituent	2019 (t)	2019 (tCO_2e)	2020 (t)	2020 (tCO_2e)
CO_2	192,103	192,103	192,171	192,171
CH_4	10	238	6	141
N_2O	29	8,541	1	430

GHG emissions results for the previous year are typically released by ECCC in April, ten months following submission on June 1 of each year (e.g., 2020 data reported by June 1, 2021 are expected to be released by ECCC in April of 2022).

CO_2e emissions decreased from 2019 to 2020 at the Mine (Table 3.2-1) due to ECCC updates to some parts of the calculation methodology. GHG emissions at the Mine are from stationary equipment fuel combustion and mobile equipment fuel combustion (81% and 19% of GHG emissions, respectively).

In 2020, the Mine's 9.2 megawatt wind farm (consisting of four turbines; Photo 3.2-1) generated 19.7 gigawatt-hours of electricity (10.0% energy penetration) and saved 4.8 million litres of diesel fuel needed for power, thereby reducing the Mine's CO_2e by 12.9 kilotonnes.

Photo 3.2-1: The Diavik 9.2 megawatt wind farm. The wind farm consists of four wind turbines.

4. SUMMARY

In 2020, dustfall was monitored at 14 dustfall gauges and 27 snow survey stations located at varying distances and directions from the mine. Snow water chemistry was measured at 24 of the snow survey stations and compared to EQC set out in the WLWB Water Licence W2015L2-0001.

Annual dustfall estimated from each of the 14 dustfall gauges ranged from 78 to 757 mg/dm^2/y in 2020. The annualized dustfall rates estimated from the 2020 snow survey data ranged from 5 to 1,463 mg/dm^2/y. All of the annualized dustfall rates estimated from dustfall gauges and snow surveys were less than 5.27 mg/dm^2/day (1,928 mg/dm^2/y in a leap year), the non-residential Alberta Ambient Air Quality Guideline for dustfall (Alberta Environment and Parks 2019). Observed dustfall rates at the Dust 10, SS1-1, SS5-1, and SS5-3 stations were higher than 1.77 mg/dm^2/day (647 mg/dm^2/y in a leap year), the residential Alberta Ambient Air Quality Guideline for dustfall. This Guideline is used only as a general performance indicator. Dustfall rates in 2020 were generally within the range of historical data collected for the Mine.

Because the dustfall gauges continuously collect dust throughout the year, and the snow surveys are only representative of dustfall accumulated over the snow cover period, the reported annual dustfall results from the dustfall gauges are expected to provide a better estimate of annual dustfall compared to snow survey results for similar geographic areas. However, results obtained from both methods showed similar spatial patterns, with dustfall generally decreasing with distance away from the Mine.

Snow water chemistry analysis of interest included those variables with effluent quality criteria (EQC; i.e., aluminum, ammonia, arsenic, cadmium, chromium, copper, lead, nickel, nitrite, and zinc). All 2020 sample concentrations were less than their associated reference levels as specified by the “maximum concentration of any grab sample” in Water Licence W2015L2-0001.

The Mine reported GHG emissions as part of the annual national GHGRP submission, and CO_2e emissions were estimated using published emission factors and 100-year GWP ratios. Starting for 2017 reporting, the GHGRP was changed to require all facilities to report if they emit the equivalent of 10,000 tCO_2e or more per year, compared to the previous 50,000 tCO_2e per year threshold.

Mine GHG emissions of CO_2, CH_4 and N_2O totalled 192,741 tCO_2e in 2020, a 4.1% decrease from 2019 due to ECCC updates to some parts of the calculation methodology. GHG emissions at the Mine in 2020 were from stationary equipment fuel combustion (81%) and mobile equipment fuel combustion (19%). In 2020, the Mine’s 9.2 megawatt wind farm helped to reduce the Mine’s GHG footprint by generating 19.7 gigawatt-hours of electricity which saved 4.8 million litres of diesel fuel and thereby prevented the direct release of 12,898 tCO_2e.

5. REFERENCES

Definitions of the acronyms and abbreviations used in this reference list can be found in the Glossary and Abbreviations section.

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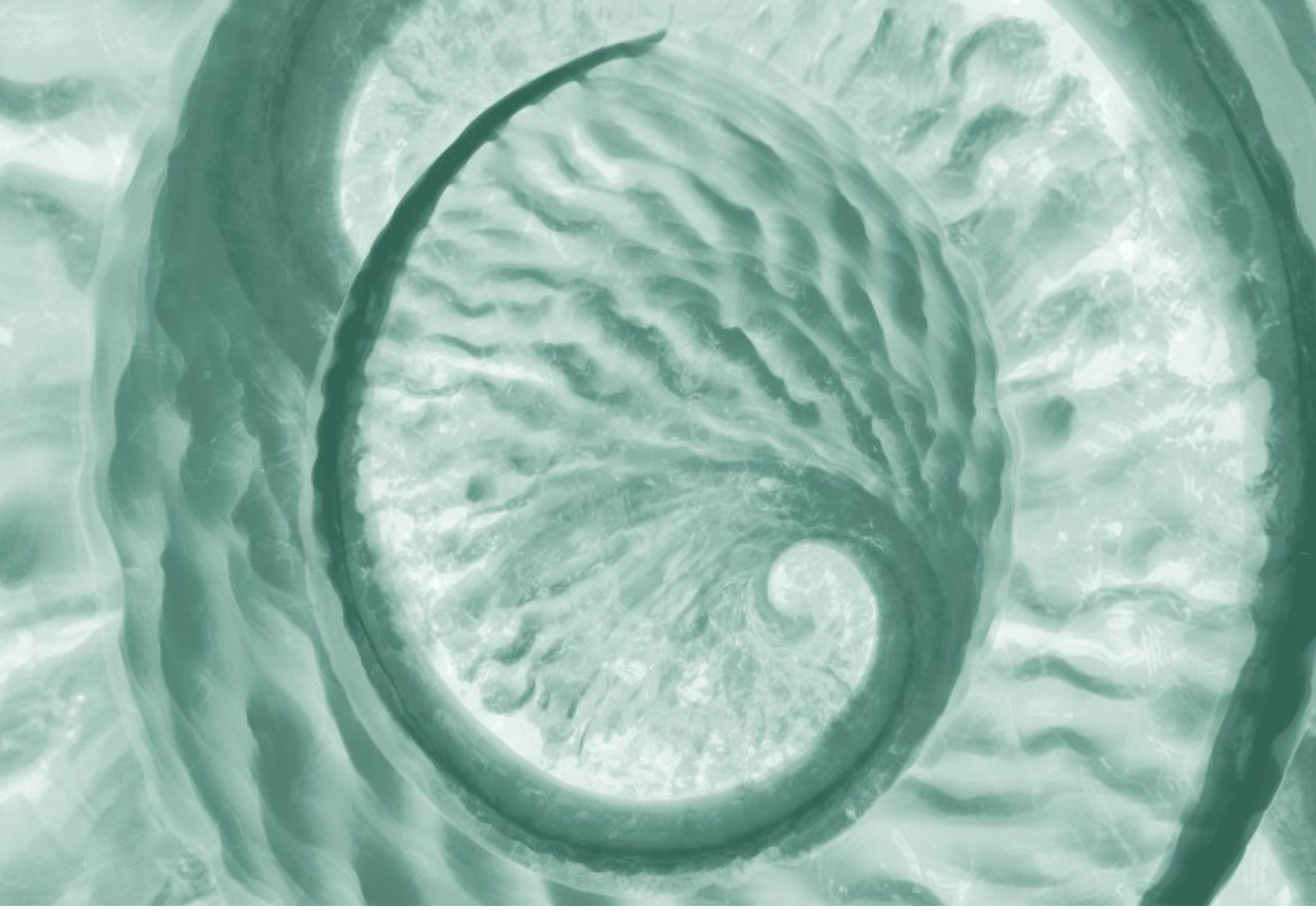
APPENDIX A DIAVIK DIAMOND MINE: 2020 DUST DEPOSITION REPORT (DATED MARCH 2021)



Diavik Diamond Mine

2020 Dust Deposition Report

March 2021

Project No.: 0573452-0001

The business of sustainability

ERM

March 2021

Diavik Diamond Mine

2020 Dust Deposition Report

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EXECUTIVE SUMMARY

Potential air and water quality concerns associated with airborne fugitive dust, which may result from Diavik Diamond Mine (the Project) mining activities, were identified in the Diavik Diamond Mine *Environmental Assessment Report* (DDMI 1998). In accordance with the Environmental Assessment and requirements associated with the Aquatic Effects Monitoring Program (AEMP), a dust monitoring program was initiated in 2001. The program was designed to achieve the following objectives:

- determine dust deposition (dustfall) rates at various distances from the mine project footprint; and
- determine the chemical characteristics of dustfall that may be deposited onto, and subsequently into, Lac de Gras as a result of mining activities, in support of the AEMP.

In 2020, dustfall monitoring included three components, with sampling conducted at varying distances around the mine from 13 to 4,802 metres (m) away from infrastructure:

- Dustfall gauges (12 monitoring and 2 control locations);
- Dustfall from snow surveys (24 monitoring and 3 control locations); and
- Snow water chemistry from snow surveys (16 monitoring and 3 control locations).

Overall, as expected, dustfall rates decreased with distance from the Project. The proximity to mine activity was the strongest indicator of dustfall deposition. In 2020, the annual dustfall estimated from each of the 14 dustfall gauges ranged from 78 to 757 mg/dm^2/y. Dust 10 (46 m from the Project) had the highest recorded dustfall followed by Dust 3 (22 m from the Project). Although it is expected that fugitive dust generation is higher during snow-free periods because of exposed road surfaces, the difference between the summer and winter dustfall rate was generally minor with the summer rate being higher at most sites (e.g., Dust 1 rate was 596 mg/dm^2/y in the summer and 164 mg/dm^2/y in the winter), while some sites recorded a higher winter dustfall rate (e.g., Dust 2A rate was 298 mg/dm^2/y in the summer and 322 mg/dm^2/y in the winter).

The annualized dustfall rates estimated from the 2020 snow survey data ranged from 5 to 1,463 mg/dm^2/y. Although there are no dustfall standards for the Northwest Territories, dustfall rates at all stations in 2020 were lower than the non-residential objective of 5.27 mg/dm^2/d (1,922 mg/dm^2/y) documented in the Alberta Ambient Air Quality Objectives and Guidelines (Alberta Environment and Parks 2019), and only SS1-1, SS5-1, and SS5-3 dustfall stations exceeded the lower limit (646 mg/dm^2/y) of these guidelines, which applies to residential and recreational areas. These objectives are used as general performance indicators only.

Snow water chemistry analytes of interest included those variables with effluent quality criteria (EQC; i.e., aluminum, ammonia, arsenic, cadmium, chromium, copper, lead, nickel, nitrite, and zinc) or a load limit (i.e., phosphorus) specified in the Type A Water Licence (W2015L2-0001, formerly W2007L2 0003). All 2020 sample concentrations were well below their associated reference levels as specified by the “maximum concentration of any grab sample” in Water Licence W2015L2 0001. Concentrations in 2020 were similar to 2019 and generally lower than recent years for all parameters except nitrite. Typically, concentrations decreased with distance from the Project. The highest concentrations for all variables were less than their corresponding EQC.

ACKNOWLEDGEMENTS

This report was prepared for Diavik Diamond Mines (2012) Inc. (DDMI) by ERM Consultants Canada Ltd. (ERM). Fieldwork and on site sample analyses were completed by DDMI, and other sample analyses were completed by Bureau Veritas (BV). Data analyses and reporting were completed by Talaat Bakri (M.Sc.) and reviewed by Andres Soux (M.Sc.). The project was managed by Carol Adly (M.Sc., R.P.Bio.), and Marc Wen (M.Sc., R.P.Bio.) was the Partner in Charge.

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ACRONYMS AND ABBREVIATIONS

AEMP	Aquatic effects monitoring program
BC	British Columbia
BC MOE	British Columbia Ministry of Environment
CI	Confidence interval
DDMI	Diavik Diamond Mines (2012) Inc.
DL	Detection limit
Dustfall	Dust deposition
EQC	Effluent quality criteria
ERM	ERM Consultants Canada Ltd.
Fugitive Dust	Atmospheric dust arises from mechanical disturbance of granular material exposed to the air and is not discharged to the atmosphere in a confined flow stream.
IQR	The interquartile range of the box plot. In box plots, the middle 50% of data occurs within the limits of the interquartile range.
Q1	The lower quartile of the box plot. In box plots, 25% of data lie below than this value.
Q3	The upper quartile of the box plot. In box plots, 25% of data lie above than this value.
QA/QC	Quality assurance and quality control
the Project	Diavik Diamond Mine
RPD	Relative percent difference
SCRP	South Country Rock Pile
SOP	Standard operating procedure
WLWB	Wek'èezhìi Land and Water Board
WRSA	Waste Rock Storage Area: an elevated surface constructed from dumping waste rock.

1. INTRODUCTION

Potential air and water quality concerns associated with airborne fugitive dust, which may result from Diavik Diamond Mine (the Project) mining activities, were identified in the Diavik Diamond Mine *Environmental Assessment Report* (DDMI 1998). In accordance with the Environmental Assessment and requirement associated with the Aquatic Effects Monitoring Program (AEMP), a dust monitoring program was initiated in 2001. The program was designed to achieve the following objectives:

- determine dust deposition (dustfall) rates at various distances from the mine project footprint; and
- determine the chemical characteristics of dustfall that may be deposited onto, and subsequently into, Lac de Gras as a result of mining activities, in support of the AEMP.

Since 2001, the dustfall monitoring program has gone through various changes, including an increase in the number of sampling locations, the relocation of some sampling stations, and improvements to the dustfall sampling methodology. A description of annual changes is provided in Appendix A. This report includes a comparison between the 2020 observations of dustfall to all site-specific data collected between 2002 and 2020. Appendix A of the Dust Deposition Report summarizes the amendments and additions to the dustfall monitoring program since 2001. Historical dustfall monitoring results have been presented each year in the Diavik Diamond Mine Dust Deposition reports from 2001 to 2019 (DDMI 2002, 2003, 2004, 2005, 2006, 2007, 2008, 2009, 2010, 2011, 2012, 2013, 2014, 2015, 2016, 2017, 2018, 2019, and 2020). The historical data presented are not considered to represent baseline conditions because construction of the mine began in 2001.

2. METHODOLOGY

The 2020 dustfall monitoring program incorporated three monitoring components:

1. Dustfall gauges (12 monitoring and 2 control locations);
2. Dustfall from snow surveys (24 monitoring and 3 control); and
3. Snow water chemistry from snow surveys (16 monitoring and 3 control).

Sampling was completed at varying distances around the mine along five transects, including three control locations (Table 2-1, Figure 2-1).

2.1 Dustfall Gauges

Dustfall gauges were placed at 14 stations (including two control stations) around the Project at distances ranging from approximately 13 m to 4,646 m from mining operations (Table 2-1; Figure 2-1). The 12 stations (plus 2 control stations) collected dustfall year-round, with samples collected approximately every three months. The average total sampling period for the 12 year-round locations was 376 days, starting from late 2019 to early 2021.

Dustfall gauges consisted of a hollow brass cylinder (52 cm length, 12.5 cm inner diameter) housed in a Nipher snow gauge (Photo 2.1-1). The cylinder collected dustfall, while the Nipher snow gauge reduced air turbulence around the gauge to increase dustfall catch efficiency. The cylinder was exchanged with an empty, clean cylinder at the end of each sampling period, and the content of the cylinder that was retrieved was processed in the Diavik Diamond Mines (2012) Inc. (DDMI) environment lab to determine the mass of collected dustfall. This processing involved filtration, drying in a high heat oven, and weighing of samples as specified in the Dust Gauge Collection Standard Operating Procedure (SOP; ENVI-908-0119; Appendix E) and the Quality Assurance/Quality Control SOP (ENVI-902-0119; Appendix G).

Photo 2.1-1: Dustfall gauge during sample collection. The dustfall gauge consisted of a hollow brass cylinder (centre) housed inside a Nipher snow gauge (right).

Table 2-1: Dustfall and Snow Chemistry Sampling Locations, Diavik Diamond Mine, 2020

Station ID	2020 Sampling Dates	Total Sample Exposure Duration (days)	UTM Coordinates[1]		Approx. Distance from Mining Operations (m)	Surface Description	Snow Water Chemistry Sampled[2]
			Easting (m)	Northing (m)			
Dustfall Gauges							
Dust 1	Dec 26 (2019; start), Mar 29, Jul 18, Oct 22, Jan 4 (2021; end)	375	533964	7154321	70	Land	n/a
Dust 2A	Dec 28 (2019; start), Mar 27, Jul 18, Oct 20, Jan 8 (2021; end)	377	535678	7151339	425	Land	n/a
Dust 3	Dec 26 (2019; start), Mar 29, Jul 17, Oct 22, Jan 3 (2021; end)	374	535024	7151872	22	Land	n/a
Dust 4	Dec 26 (2019; start), Mar 29, Jul 17, Oct 23, Jan 3 (2021; end)	374	531397	7152127	173	Land	n/a
Dust 5	Dec 27 (2019; start), Mar 27, Jul 18, Oct 20, Jan 8 (2021; end)	378	535696	7155138	1183	Land	n/a
Dust 6	Dec 26 (2019; start), Mar 29, Jul 18, Oct 22, Jan 3 (2021; end)	374	537502	7152934	13	Land	n/a
Dust 7	Dec 27 (2019; start), Mar 27, Jul 18, Oct 20, Jan 8 (2021; end)	378	536819	7150510	1147	Land	n/a
Dust 8	Dec 27 (2019; start), Mar 27, Jul 19, Oct 20, Jan 8 (2021; end)	378	531401	7154146	1213	Land	n/a
Dust 9	Dec 27 (2019; start), Mar 27, Jul 18, Oct 20, Jan 8 (2021; end)	378	541204	7152154	3796	Land	n/a
Dust 10	Dec 26 (2019; start), Mar 29, Jul 17, Oct 22, Jan 3 (2021; end)	374	532908	7148924	46	Land	n/a
Dust 11	Dec 26 (2019; start), Mar 27, Jul 17, Oct 20, Jan 8 (2021; end)	379	531493	7150156	747	Land	n/a
Dust 12	Dec 28 (2019; start), Mar 27, Jul 19, Oct 20, Jan 8 (2021; end)	377	529323	7151191	2326	Land	n/a

Station ID	2020 Sampling Dates	Total Sample Exposure Duration (days)	UTM Coordinates[1]		Approx. Distance from Mining Operations (m)	Surface Description	Snow Water Chemistry Sampled[2]
			Easting (m)	Northing (m)			
Dust C1	Dec 27 (2019; start), Mar 27, Jul 18, Oct 20, Jan 8 (2021; end)	378	534979	7144270	4646	Land	n/a
Dust C2	Dec 28 (2019; start), Mar 27, Jul 19, Oct 20, Jan 8 (2021; end)	377	528714	7153276	3031	Land	n/a
Snow Surveys							
SS1-1	Apr 12	197	533915	7154292	30	Land	
SS1-2	Apr 12	197	533909	7154382	115	Land	
SS1-3	Apr 12	197	533967	7154517	260	Land	
SS1-4[3]	Apr 12	167	534483	7155096	899	Ice	✓
SS1-5	Apr 12	167	535098	7156275	2175	Ice	✓
SS2-1	Apr 12	167	537553	7153474	145	Ice	✓
SS2-2	Apr 12	167	537760	7153435	427	Ice	✓
SS2-3[4]	Apr 12	167	538485	7153933	1194	Ice	✓
SS2-4	Apr 12	167	539142	7154686	2164	Ice	✓
SS3-4	Apr 13	168	536593	7150996	585	Ice	✓
SS3-5	Apr 13	168	537693	7150790	1325	Ice	✓
SS3-6[5]	Apr 13	168	536302	7151563	35	Ice	✓
SS3-7	Apr 13	168	536346	7151364	239	Ice	✓
SS3-8	Apr 13	168	536635	7150873	826	Ice	✓
SS4-1[6]	Apr 14	199	531485	7152217	61	Land	
SS4-2	Apr 14	199	531353	7152263	196	Land	
SS4-3	Apr 14	199	531328	7152476	335	Land	
SS4-4	Apr 14	169	531140	7153172	1022	Ice	✓
SS4-5[6]	Apr 14	169	531410	7154120	1214	Ice	✓

Station ID	2020 Sampling Dates	Total Sample Exposure Duration (days)	UTM Coordinates[1]		Approx. Distance from Mining Operations (m)	Surface Description	Snow Water Chemistry Sampled[2]
			Easting (m)	Northing (m)			
SS5-1	Apr 13	198	533150	7148927	26	Land	
SS5-2	Apr 13	198	533149	7148871	55	Land	
SS5-3	Apr 13	168	533149	7148700	259	Ice	✓
SS5-4	Apr 13	168	533153	7147948	941	Ice	✓
SS5-5	Apr 13	168	533148	7146953	1894	Ice	✓
Control-1	Apr 13	198	534989	7144273	4802	Land	✓[8]
Control-2[7]	Apr 14	199	528714	7153273	3042	Land	✓[8]
Control-3	Apr 3	198	538649	7148747	3550	Land	✓[8]

Notes:

[1] UTM Zone 12W, NAD83.

[2] n/a = not applicable.

[3] Duplicate sample for snow water chemistry was collected at station SS1-4 (SS1-4-4 & SS1-4-5).

[4] Duplicate samples for dustfall snow surveys and snow water chemistry were collected at station SS2-3 (SS2-3-4 & SS2-3-5).

[5] Duplicate sample for snow water chemistry was collected at station SS3-6 (SS3-6-4 & SS3-6-5).

[6] Duplicate sample for dustfall snow surveys was collected at station SS4-5 (SS4-5-4 & SS4-5-5).

[7] Duplicate sample for dustfall snow surveys was collected at Control-2 station (Control-2-4 & Control-2-5).

[8] Snow water chemistry was sampled over ice, adjacent to the on-land control station; see Section 2.3 for further details.

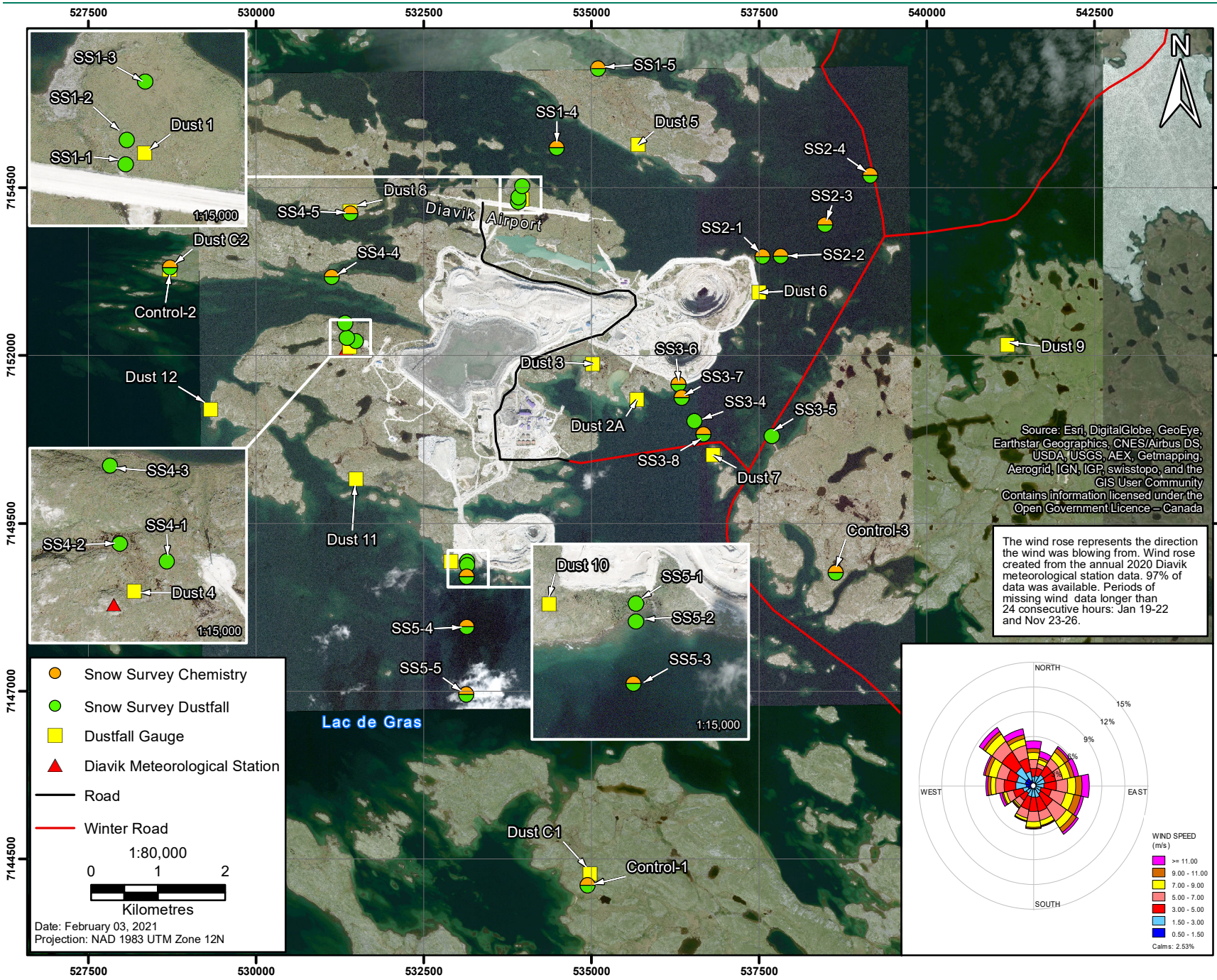


Figure 2-1: Dustfall Gauge and Snow Survey Locations, Diavik Diamond Mine, 2020

Once the mass of collected dustfall at a station was measured, the mean daily dustfall rate over the collection period was calculated as:

$$D = \frac{M}{A*T} \quad \text{[Equation 1]}$$

where:

D = mean daily dustfall rate (mg/dm^2/d) during time period T
M = mass of dustfall collected (mg) during time period T
A = surface area of dustfall gauge collection cylinder orifice (dm^2; approximately 1.227 dm^2)
T = number of days of dustfall collection (d)

The mean daily dustfall rate (mg/dm^2/d) was then multiplied by 365 days to estimate the mean annual dustfall rate (mg/dm^2/y).

The Northwest Territories has no guidelines or objectives for dustfall deposition. The estimated dustfall rates are compared to the Alberta Ambient Air Quality Objectives and Guidelines for dustfall (Alberta Environment and Parks, 2019), which are used only as general performance indicators and are not a regulatory requirement in compliance evaluation. The Alberta Ambient Air Quality Guidelines for dustfall include a guideline for residential and recreation areas (53 mg/dm^2 per 30 days) and a guideline for commercial and industrial areas where higher dustfall rates are expected (158 mg/dm^2 per 30 days). To compare against the Alberta Ambient Air Quality Guidelines, the daily and annual thresholds are calculated based on the 30 days objectives. The daily threshold ranged from 1.77 mg/dm^2/d to 5.27 mg/dm^2/d, while the annual threshold ranged from 646 to 1,922 mg/dm^2/y. Snow water chemistry data were compared to effluent quality criteria (EQC) set out in Wek'èezhìi Land and Water Board (WLWB) Water Licence W2015L2-0001 (formerly W2007L2-0003).

In previous years, dustfall was compared to guidelines from the Province of British Columbia. However, these guidelines were rescinded by the Province of BC because the guidelines were pollution control objectives and had no basis in assessing health effects. The former guidelines were solely used as a "soiling index" and to assess nuisance dusting, and were not health related. For this reason, using the former BC guidelines to evaluate effects on human or environmental health is not considered to be appropriate.

2.2 Dustfall Snow Surveys

Dustfall snow surveys were performed at 24 monitoring and three control sites along five transects around the Project (Table 2-1 and Figure 2-1). Across stations, the distance from mining operations ranged from approximately 13 m to 3,796 m for the monitoring stations and from 3,031 m to 4,646 m for the control stations. The average total sampling period for the monitoring stations in 2020 was 198 and 168 days for the land and ice stations, respectively (control stations not included). The start dates correspond to the first snowfall for land stations (September 28, 2019), and shortly after freeze up of ice stations (October 28, 2019).

At each snow survey station, a snow corer was used to drill into the snow pack to retrieve a cylindrical snow core (6.1 cm inner diameter; Photo 2.2-1). Cores were extracted at each station and composited in the field to ensure a representative snow sample was obtained for the station. A minimum of three snow cores were collected at each (land and ice) of the snow sampling stations, as outlined in the Snow Core Survey SOP (ENVI-909-0119; Appendix F). Composited samples were bagged and brought to the DDMI environment lab for processing as specified in the Snow Core Survey SOP (ENVI-909-0119; Appendix F) and the Quality Assurance/Quality Control SOP (ENVI-902-0119; Appendix G). Processing of snow cores involved filtration, drying in a high heat oven, and weighing. For quality assurance and control (QA/QC), duplicate samples were collected at stations SS2-3, SS4-5 and Control-2 station.

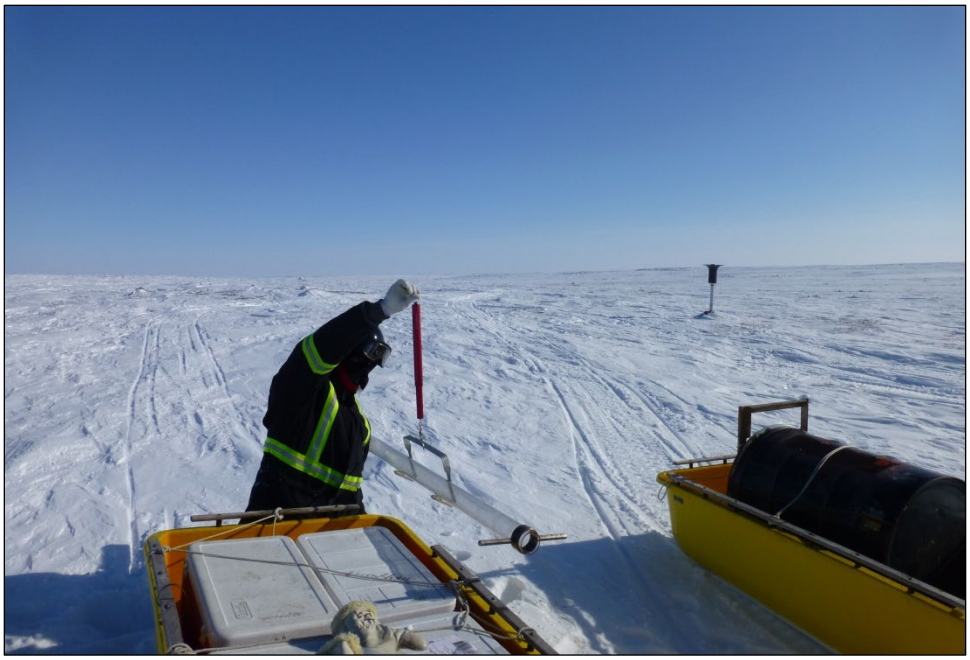


Photo 2.2-1: Snow core sample being weighed, with dustfall gauge in background.

Mean daily dustfall rate (mg/dm^2/d) was then calculated over the collection period using Equation 1, with surface area (A) equal to the surface area of the snow corer tube orifice (0.2922 dm^2) multiplied by the number of snow cores used for the composited sample at the station. The mean annual dustfall rate (mg/dm^2/y) was estimated by multiplying the mean daily dustfall rate by 365 days.

Dustfall rates were compared to the Alberta Ambient Air Quality Objectives and Guidelines for dustfall (Table 2.2-1), which served as general performance indicators only.

Table 2.2-1: Dustfall and Snow Water Chemistry Reference Values

Parameter	Value	Unit	Comment	Source
Dustfall Rate	53–158	mg/dm^2/ 30 day	Alberta Ambient Air Quality Guidelines for dustfall	(Alberta Environment and Parks, 2019).
Aluminum-Total	3,000	µg/L	Max. grab sample concentration	W2015L2-0001
Ammonia-N	12,000	µg/L	Max. grab sample concentration	W2015L2-0001
Arsenic-Total	100	µg/L	Max. grab sample concentration	W2015L2-0001
Cadmium-Total	3	µg/L	Max. grab sample concentration	W2015L2-0001
Chromium-Total	40	µg/L	Max. grab sample concentration	W2015L2-0001
Copper-Total	40	µg/L	Max. grab sample concentration	W2015L2-0001
Lead-Total	20	µg/L	Max. grab sample concentration	W2015L2-0001
Nickel-Total	100	µg/L	Max. grab sample concentration	W2015L2-0001
Nitrite-N	2,000	µg/L	Max. grab sample concentration	W2015L2-0001
Zinc-Total	20	µg/L	Max. grab sample concentration	W2015L2-0001

2.3 Snow Water Chemistry

Snow water chemistry analysis was performed on snow cores extracted from 19 locations, including 16 dustfall snow survey stations located on ice and three samples taken on ice adjacent to the three control locations (Table 2-1 and Figure 2-1). The distance of the snow survey stations from mining operations in 2020 ranged approximately 35 m to 2,175 m, while this distance ranged from 3,042 m to 4,802 m for the control locations. The average total sampling period in 2020 for the snow survey stations was 168 days (control stations not included). At each station located over water, cores were collected for chemistry analysis immediately after the dustfall snow cores were extracted.

Snow water chemistry cores were extracted using a snow corer in accordance with the dustfall snow survey core extraction. A minimum of three cores at each site were extracted and composited to obtain the necessary 3 L of snow water required for the laboratory chemical analysis as required (see Appendix F). Snow cores were then processed and prepared for shipment to Bureau Veritas (BV) where the chemical analysis was performed. For QA/QC purposes, duplicate samples were collected at stations SS1-4, SS2-3 and SS3-6, in addition to an equipment blank sample (SS Bag). Snow water chemistry sampling methodology is detailed in SOP ENVI-909-0119 (see Appendix F).

EQC, including “maximum average concentration” and “maximum concentration of any grab sample,” are stipulated in DDMI’s Water Licence (W2015L2-0001) for aluminum, ammonia, arsenic, cadmium, chromium, copper, lead, nickel, nitrite, and zinc (Table 2.2-1). Snow water chemistry results for these variables were compared to the “maximum concentration of any grab sample.” These results are also presented as part of DDMI’s AEMP report.

DDMI measures the chemistry of snow samples as this assists with characterizing the chemical content of the particulate material deposited over time. This is measured as the total metals and nutrients concentrations of the melted snow sample and makes direct comparison to maximum grab sample concentrations for EQCs difficult.

DDMI compares the measured total metals levels for dust with EQC only because these criteria provide concentrations that can serve as general performance indicators, in a similar way that dustfall rates are compared with the Alberta Ambient Air Quality Objectives and Guidelines for dustfall (Alberta Environment and Parks, 2019). There is no intention or requirement that snow samples must meet the EQC or Alberta dustfall objectives.

3. RESULTS

Dustfall and snow water chemistry results were grouped into zones based on their relative distance from the mine footprint (Table 3-1). Station groupings into zones were first established at the outset of the program; however, these groupings were re-established in 2013 using satellite imagery of the site.

In 2020, the primary sources of fugitive dust were associated with unpaved road and airstrip usage and construction and mining activities at the A21 open pit. Due to construction and mining activities at A21, the distance to mining operations were recalculated in 2019. The revised distances to mining operations are shown in Tables 2-1 and 3-1.

Major waste rock material transfers in 2020 included the use of haul roads (8,210,763 tonnes) and the transfer of kimberlite ore to the crusher (2,478,575 tonnes). Another source of fugitive dust was truck traffic along the ice road to the Project. However, the consistency in the dust deposition rate near the ice road alignment sites between winter and summer, in addition to the generally lower deposition rates at these sites (e.g., Dust 7, SS2-4, SS3-5 and SS3-8) indicated that the contributions of dust from the ice road were modest relative to other sources. To suppress dust generation, roads, parking areas and the plant site were watered during the summer as needed. Between June and September 2020, approximately 3,472 m^3 of water was applied to the plant site and 26,820 m^3 of water was applied to haul roads. The exact impact of dust suppression could not be determined from the data collected in 2020; however, it is likely that road watering reduced the amount of dust generated at the mine. In 2020, Underground Mine production continued at A154 and A418, as well as stripping and production at the A21 open pit. Fugitive dust generation is expected to be greatest during snow-free periods where and when there is site activity. It was expected that the highest fugitive dust generation and resulting dustfall occurred in areas closest to the roads, the airstrip, and mine footprint such as near A21 between May and September. The difference between the summer and winter dustfall rate was generally minor with the summer rate being higher at most sites (e.g., Dust 1 rate was 596 mg/dm^2/y in the summer and 164 mg/dm^2/y in the winter), while some sites recorded a higher winter dustfall rate (e.g., Dust 2A rate was 298 mg/dm^2/y in the summer and 322 mg/dm^2/y in the winter).

The predominant wind directions at the site in 2020 were from east, southeast and northwest although winds in general can be described as omnidirectional. Therefore, the expectation is that airborne material will be deposited in all directions around the mine with a west, northwest and southeast emphasis (Figures 2-1 and 3.1-1). Similar to previous years, the results show that the proximity to the mine activity is a stronger indicator of dust deposition than wind direction. This is supported by the fact that the three highest dust deposition rates in 2020 (Dust 10, 3, and 11) are located south or southwest of the mine footprint where wind speeds were relatively weak compared to other directions. Dust 10 and Dust 3, which are located only 46 and 22 m from the mine, respectively, recorded the highest dustfall rate of the dustfall gauges in 2020.

Results from the dustfall gauges, dustfall snow surveys, and the snow water chemistry analyses are presented below.

Snow water chemistry results that were below analytical detection limits were assumed to be at half the detection limit for the calculation of statistics and displaying in figures.

3.1 Dustfall Gauges

For each station, total dustfall collected throughout the year is summarized in Table 3-1. Annual 2020 dustfall and the station location relative to the Project is presented in Figure 3.1-1, and the historical records of annual dustfall are presented in Figures 3.1-2 and 3.1-3. A comparison of 2020 dustfall versus distance from the mine footprint is presented in Figure 3.1-4. Boxplots summarizing the dustfall magnitude distribution measured annually are presented in Figure 3.1-5. Detailed information on 2020 measurements and calculations for each station are included in Appendix B.

Table 3-1: Dustfall and Snow Water Chemistry Results, Diavik Diamond Mine, 2020

Zone	Station	Approx. Distance from Mining (m)	Dustfall ($mg/dm^2/y$)	Snow Water Chemistry (µg/L)										
				Aluminum	Ammonia	Arsenic	Cadmium[1]	Chromium	Copper	Lead	Nickel	Nitrite	Phosphorus	Zinc
0-100 m	Dust 1	70	403	-	-	-	-	-	-	-	-	-	-	-
	Dust 3	22	599	-	-	-	-	-	-	-	-	-	-	-
	Dust 6	13	131	-	-	-	-	-	-	-	-	-	-	-
	Dust 10	46	757	-	-	-	-	-	-	-	-	-	-	-
	SS1-1	30	1,017	-	-	-	-	-	-	-	-	-	-	-
	SS3-6	35	122	53.55	72.50	0.05	*< 0.005*	0.27	0.11	0.07	1.11	5.75	80.00	0.99
	SS4-1	61	119	-	-	-	-	-	-	-	-	-	-	-
	SS5-1	26	1,463	-	-	-	-	-	-	-	-	-	-	-
	SS5-2	55	539	-	-	-	-	-	-	-	-	-	-	-
Mean			**572**	**53.55**	**72.50**	**0.05**	***< 0.005***	**0.27**	**0.11**	**0.07**	**1.11**	**5.75**	**80.00**	**0.99**
Median			**539**	**53.55**	**72.50**	**0.05**	***< 0.005***	**0.27**	**0.11**	**0.07**	**1.11**	**5.75**	**80.00**	**0.99**
Standard Deviation			**455**	**n/a**	**n/a**	**n/a**	**n/a**	**n/a**	**n/a**	**n/a**	**n/a**	**n/a**	**n/a**	**n/a**
95% Confidence Interval (Mean +/-)			**350**	**n/a**	**n/a**	**n/a**	**n/a**	**n/a**	**n/a**	**n/a**	**n/a**	**n/a**	**n/a**	**n/a**
Upper Limit of 95% Confidence Interval			**922**	**n/a**	**n/a**	**n/a**	**n/a**	**n/a**	**n/a**	**n/a**	**n/a**	**n/a**	**n/a**	**n/a**
Lower Limit of 95% Confidence Interval			**222**	**n/a**	**n/a**	**n/a**	**n/a**	**n/a**	**n/a**	**n/a**	**n/a**	**n/a**	**n/a**	**n/a**

Zone	Station	Approx. Distance from Mining (m)	Dustfall (mg/dm²/y)	Snow Water Chemistry (µg/L)										
				Aluminum	Ammonia	Arsenic	Cadmium[1]	Chromium	Copper	Lead	Nickel	Nitrite	Phosphorus	Zinc
101-250 m	Dust 4	173	315	-	-	-	-	-	-	-	-	-	-	-
	SS1-2	115	280	-	-	-	-	-	-	-	-	-	-	-
	SS2-1	145	44	7.16	49.00	0.04	*< 0.005*	0.03	0.32	0.04	0.43	4.60	21.70	1.00
	SS3-7	239	257	65.00	88.00	0.09	*< 0.005*	0.39	0.18	0.13	1.30	5.10	141.00	1.23
	SS4-2	196	160	-	-	-	-	-	-	-	-	-	-	-
Mean			**211**	**36.08**	**68.50**	**0.06**	***< 0.005***	**0.21**	**0.25**	**0.08**	**0.86**	**4.85**	**81.35**	**1.12**
Median			**257**	**36.08**	**68.50**	**0.06**	***< 0.005***	**0.21**	**0.25**	**0.08**	**0.86**	**4.85**	**81.35**	**1.12**
Standard Deviation			**110**	**40.90**	**27.58**	**0.04**	***< 0.005***	**0.25**	**0.10**	**0.06**	**0.62**	**0.35**	**84.36**	**0.16**
95% Confidence Interval (Mean +/-)			**136**	**367.46**	**247.77**	**0.32**	***< 0.005***	**2.29**	**0.86**	**0.57**	**5.56**	**3.18**	**757.93**	**1.46**
Upper Limit of 95% Confidence Interval			**347**	**403.54**	**316.27**	**0.39**	***< 0.005***	**2.49**	**1.11**	**0.65**	**6.42**	**8.03**	**839.28**	**2.58**
Lower Limit of 95% Confidence Interval			**75**	**0.00**	**0.00**	**0.00**	***< 0.005***	**0.00**	**0.00**	**0.00**	**0.00**	**1.67**	**0.00**	**0.00**

Zone	Station	Approx. Distance from Mining (m)	Dustfall (mg/dm²/y)	Snow Water Chemistry (µg/L)										
				Aluminum	Ammonia	Arsenic	Cadmium[1]	Chromium	Copper	Lead	Nickel	Nitrite	Phosphorus	Zinc
251-1,000 m	Dust 2	425	309	-	-	-	-	-	-	-	-	-	-	-
	Dust 11	747	446	-	-	-	-	-	-	-	-	-	-	-
	SS1-3	260	66	-	-	-	-	-	-	-	-	-	-	-
	SS1-4	899	61	13.95	48.00	0.05	*< 0.005*	0.08	0.16	0.03	0.59	4.35	17.40	1.46
	SS2-2	427	26	11.90	53.00	0.04	*< 0.005*	0.06	0.12	0.03	0.42	4.10	40.50	2.75
	SS3-4	585	109	26.40	69.00	0.04	*< 0.005*	0.17	0.13	0.06	1.44	5.10	64.40	0.71
	SS3-8	826	139	48.30	130.00	0.06	*< 0.005*	0.30	0.22	0.16	1.72	3.40	92.30	1.14
	SS4-3	335	269	-	-	-	-	-	-	-	-	-	-	-
	SS5-3	259	795	75.60	140.00	0.14	*< 0.005*	0.21	0.45	0.35	0.89	5.10	318.00	1.21
	SS5-4	941	98	17.90	63.00	0.03	*< 0.005*	0.05	0.14	0.03	0.50	4.70	54.10	1.13
Mean			**232**	**32.34**	**83.83**	**0.06**	***< 0.005***	**0.14**	**0.20**	**0.11**	**0.93**	**4.46**	**97.78**	**1.40**
Median			**124**	**22.15**	**66.00**	**0.05**	***< 0.005***	**0.13**	**0.15**	**0.05**	**0.74**	**4.53**	**59.25**	**1.18**
Standard Deviation			**238**	**25.00**	**40.43**	**0.04**	***< 0.005***	**0.10**	**0.13**	**0.13**	**0.54**	**0.65**	**110.72**	**0.70**
95% Confidence Interval (Mean +/-)			**170**	**26.24**	**42.43**	**0.04**	***< 0.005***	**0.10**	**0.13**	**0.14**	**0.56**	**0.69**	**116.19**	**0.74**
Upper Limit of 95% Confidence Interval			**402**	**58.58**	**126.27**	**0.10**	***< 0.005***	**0.25**	**0.33**	**0.25**	**1.49**	**5.15**	**213.97**	**2.14**
Lower Limit of 95% Confidence Interval			**61**	**6.10**	**41.40**	**0.02**	***< 0.005***	**0.04**	**0.07**	**0.00**	**0.36**	**3.77**	**0.00**	**0.66**

Zone	Station	Approx. Distance from Mining (m)	Dustfall (mg/dm²/y)	Snow Water Chemistry (µg/L)										
				Aluminum	Ammonia	Arsenic	Cadmium[1]	Chromium	Copper	Lead	Nickel	Nitrite	Phosphorus	Zinc
1,001-2,500 m	Dust 5	1,183	148	-	-	-	-	-	-	-	-	-	-	-
	Dust 7	1,147	224	-	-	-	-	-	-	-	-	-	-	-
	Dust 8	1,213	226	-	-	-	-	-	-	-	-	-	-	-
	Dust 12	2,326	197	-	-	-	-	-	-	-	-	-	-	-
	SS1-5	2,175	8	4.71	36.00	0.02	*< 0.005*	0.03	0.19	0.02	0.19	4.60	10.00	1.18
	SS2-3	1,194	18	8.56	50.00	0.01	*< 0.005*	0.06	0.07	0.02	0.31	3.05	17.90	0.88
	SS2-4	2,164	5	4.61	36.00	0.01	*< 0.005*	0.03	0.14	0.02	0.16	4.50	1.00	0.95
	SS3-5	1,325	27	10.70	64.00	0.04	*< 0.005*	0.07	0.07	0.02	0.50	5.70	37.60	0.68
	SS4-4	1,022	147	3.86	70.00	0.02	*< 0.005*	0.03	0.13	0.01	1.50	4.80	57.40	0.94
	SS4-5	1,214	56	18.10	56.00	0.01	*< 0.005*	0.06	0.09	0.04	0.37	3.70	36.30	0.05
	SS5-5	1,894	71	17.50	36.00	0.03	*< 0.005*	0.09	0.10	0.03	0.52	6.90	24.20	1.13
+2,500 m	Dust 9	3,796	78	-	-	-	-	-	-	-	-	-	-	-
Mean			**100**	**9.72**	**49.71**	**0.02**	***< 0.005***	**0.05**	**0.11**	**0.02**	**0.51**	**4.75**	**26.34**	**0.83**
Median			**75**	**8.56**	**50.00**	**0.02**	***< 0.005***	**0.06**	**0.10**	**0.02**	**0.37**	**4.60**	**24.20**	**0.94**
Standard Deviation			**84**	**6.04**	**14.26**	**0.01**	***< 0.005***	**0.03**	**0.05**	**0.01**	**0.46**	**1.27**	**19.04**	**0.38**
95% Confidence Interval (Mean +/-)			**53**	**5.58**	**13.18**	**0.01**	***< 0.005***	**0.02**	**0.04**	**0.01**	**0.43**	**1.17**	**17.61**	**0.35**
Upper Limit of 95% Confidence Interval			**154**	**15.30**	**62.90**	**0.03**	***< 0.005***	**0.07**	**0.15**	**0.03**	**0.93**	**5.92**	**43.95**	**1.18**
Lower Limit of 95% Confidence Interval			**47**	**4.14**	**36.53**	**0.01**	***< 0.005***	**0.03**	**0.07**	**0.01**	**0.08**	**3.58**	**8.73**	**0.48**

Zone	Station	Approx. Distance from Mining (m)	Dustfall (mg/dm²/y)	Snow Water Chemistry (µg/L)										
				Aluminum	Ammonia	Arsenic	Cadmium[1]	Chromium	Copper	Lead	Nickel	Nitrite	Phosphorus	Zinc
Control	Dust C1	4,646	118	-	-	-	-	-	-	-	-	-	-	-
	Dust C2	3,031	103	-	-	-	-	-	-	-	-	-	-	-
	Control 1	4,802	8	10.70	67.00	0.03	*< 0.005*	0.05	0.07	0.02	0.17	5.20	35.90	1.12
	Control 2	3,042	33	11.50	79.00	0.05	*< 0.005*	0.07	0.10	0.04	0.46	4.40	7.60	1.46
	Control 3	3,550	94	21.80	55.00	0.04	*< 0.005*	0.10	0.11	0.04	0.46	7.10	46.00	1.34
Mean			**71**	**14.67**	**67.00**	**0.04**	***< 0.005***	**0.08**	**0.09**	**0.04**	**0.36**	**5.57**	**29.83**	**1.31**
Median			**94**	**11.50**	**67.00**	**0.04**	***< 0.005***	**0.07**	**0.10**	**0.04**	**0.46**	**5.20**	**35.90**	**1.34**
Standard Deviation			**48**	**6.19**	**12.00**	**0.01**	***< 0.005***	**0.03**	**0.02**	**0.01**	**0.17**	**1.39**	**19.91**	**0.17**
95% Confidence Interval (Mean +/-)			**59**	**15.38**	**29.81**	**0.02**	***< 0.005***	**0.07**	**0.05**	**0.03**	**0.42**	**3.45**	**49.45**	**0.43**
Upper Limit of 95% Confidence Interval			**130**	**30.04**	**96.81**	**0.06**	***< 0.005***	**0.14**	**0.14**	**0.06**	**0.78**	**9.01**	**79.28**	**1.74**
Lower Limit of 95% Confidence Interval			**12**	**0.00**	**37.19**	**0.01**	***< 0.005***	**0.01**	**0.05**	**0.01**	**0.00**	**2.12**	**0.00**	**0.88**

Notes:

Dash (-) = not available (snow water chemistry not sampled)

n/a = not applicable

[1] For measurements that were less than the detection limit, half the detection limit was used for calculations and are italicized

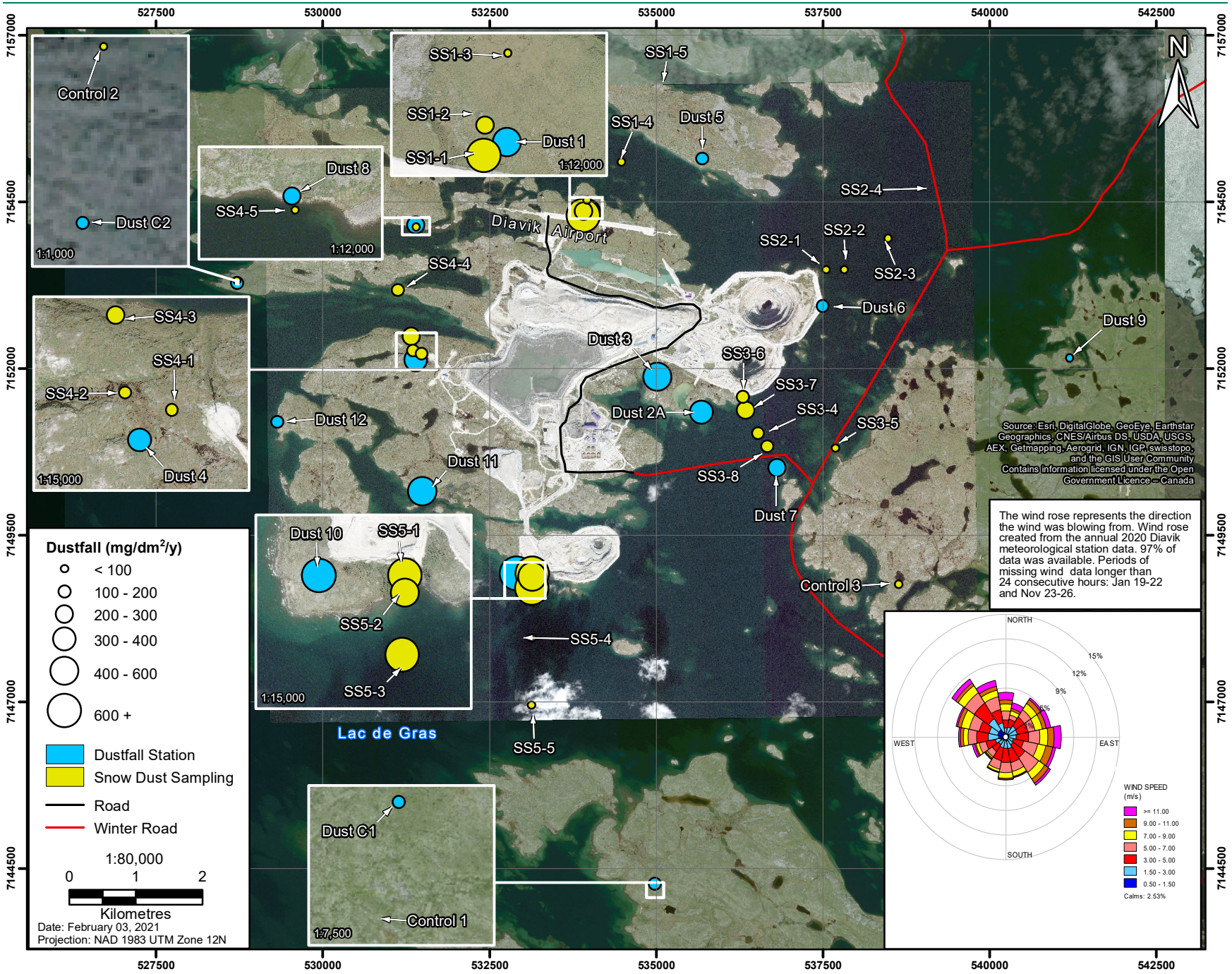
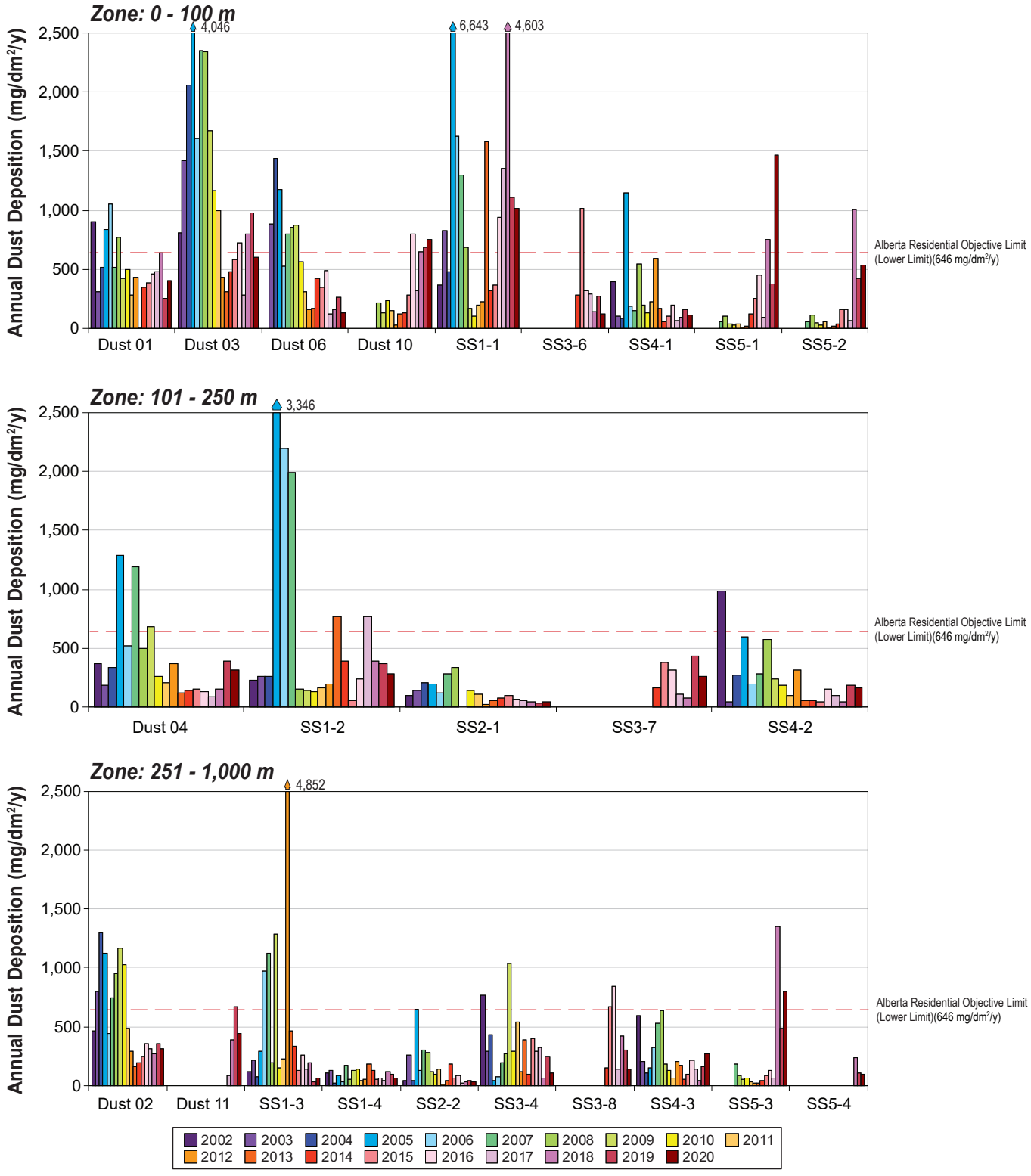
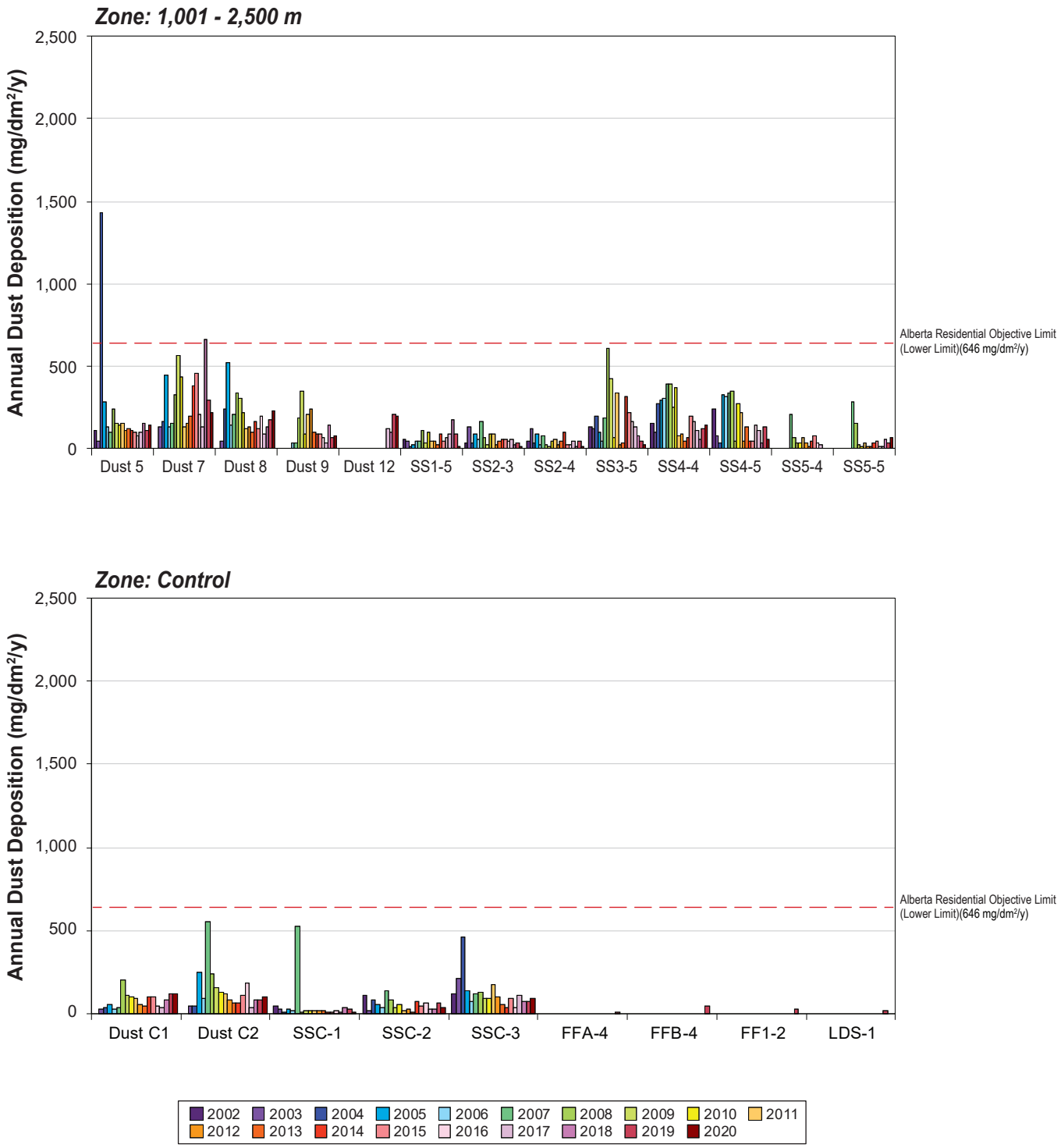


Figure 3.1-1: Dustfall Results, Diavik Diamond Mine, 2020



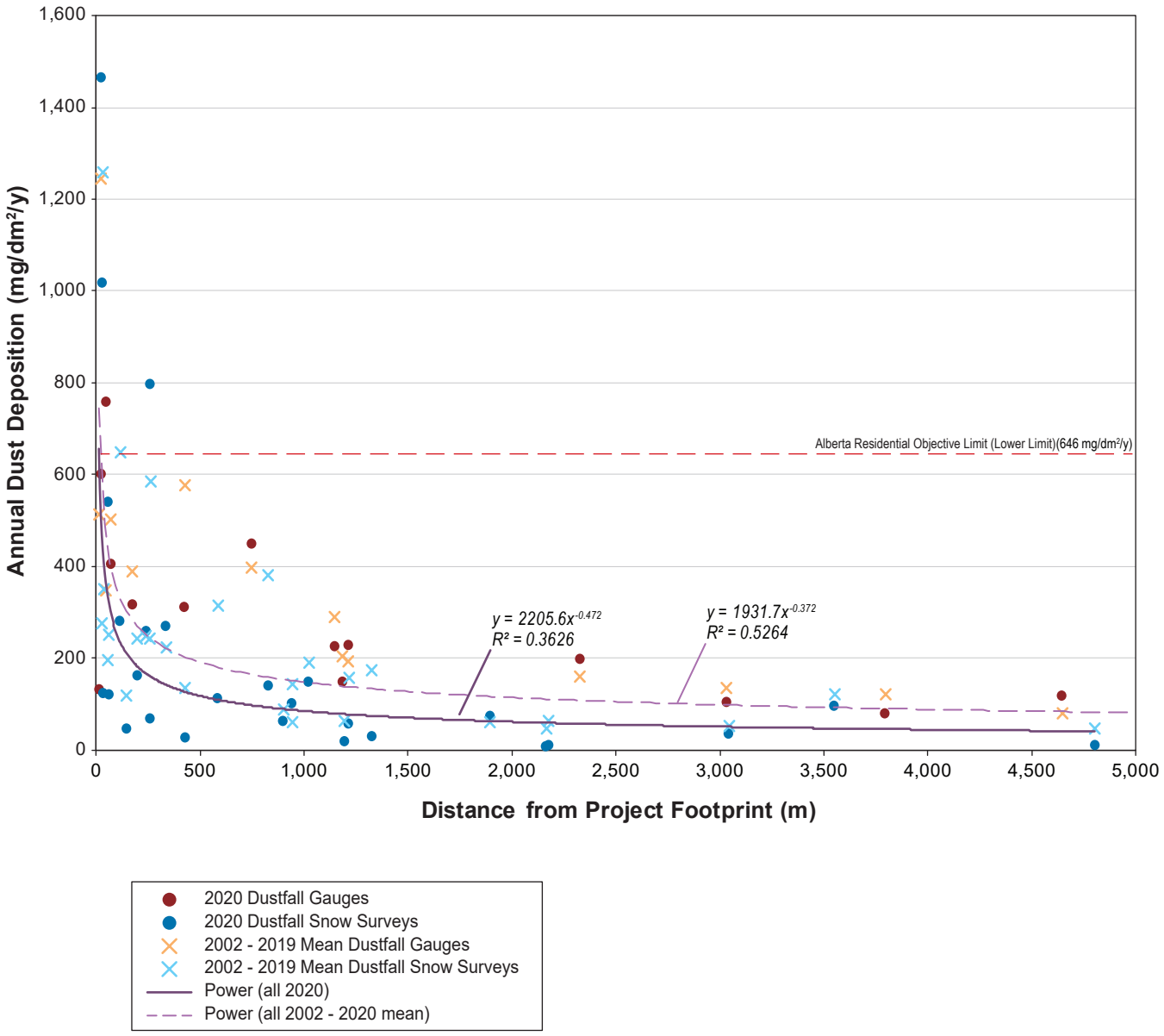
Notes: *Annual deposition was calculated using the methodology described in Section 2.*
See Table 2-1 for actual 2020 sample exposure times.
Station locations have been grouped into zones based on their distance from the 2019 Project footprint (see Section 3 for further details).
SS5-4 moved to 251-1,000 m zone in 2018

Figure 3.1-2: Calculated Annual Dust Deposition Rates at Dustfall Gauges and Snow Survey Locations up to 1,000 m from the Project Footprint, Diavik Diamond Mine, 2002 to 2020



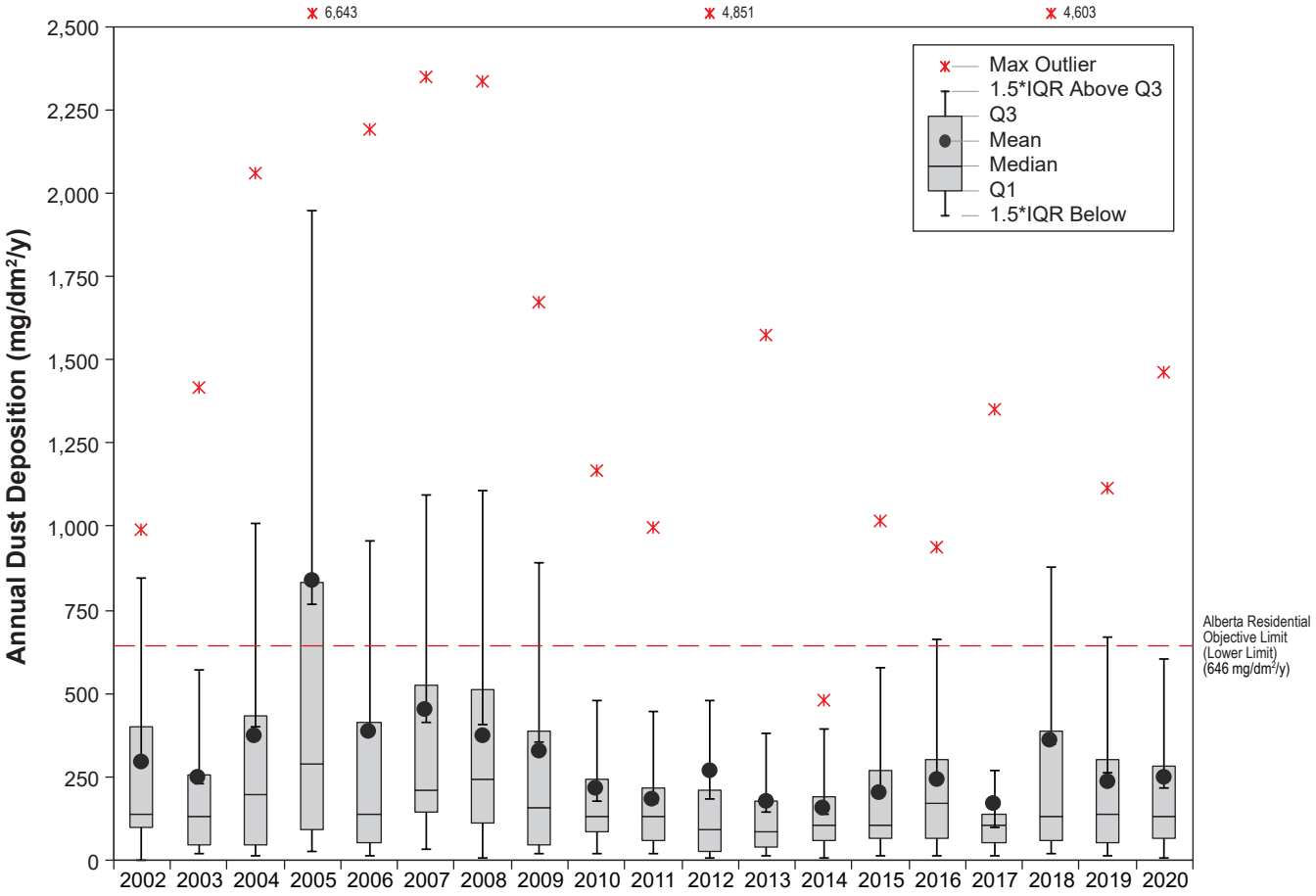
Notes: *Annual deposition was calculated using the methodology described in Section 2.*
See Table 2-1 for actual 2020 sample exposure times.
Station locations have been grouped into zones based on their distance from the 2019 Project footprint (see Section 3 for further details).
New locations added in 2019 include FFA-4, FFB-4, FF1-2 and LDS-1
SS5-4 moved to 251-1,000 m zone in 2018

Figure 3.1-3: Calculated Annual Dust Deposition Rates at Dustfall Gauges and Snow Survey Locations greater than 1,000 m from the Project Footprint, Diavik Diamond Mine, 2002 to 2020



Notes: Annual deposition was calculated using the methodology described in Section 2.
See Table 2-1 for actual 2020 sample exposure times.

Figure 3.1-4: Dust Deposition Versus Distance from Project Footprint, Diavik Diamond Mine, 2020



Notes: Annual deposition is calculated using the methodology described in Section 2.
See Table 2-1 for actual 2020 sample exposure times.
Q1: Lower quartile (25% of data are less than this value) ,
Q3: Upper quartile (25% of data are greater than this value),
IQR = Q3 – Q1 (the interquartile range).

Figure 3.1-5: Dust Deposition Box Plot, Diavik Diamond Mine, 2002 to 2020

The three highest estimated dustfall rates in 2020 measured using gauges occurred at Dust 10 (757 mg/dm^2/y; 46 m from the Project), followed by Dust 3 (599 mg/dm^2/y; 22m from the Project) and Dust 11 (446 mg/dm^2/y; 747 m from the Project). This is similar to 2019 as Dust 3 recorded the highest rate followed by Dust 10 and Dust 11. The elevated rates at Dust 10 site is explained by its location adjacent to the A21 open pit, while Dust 11 is located west of the South Country Rock Pile – Waste Rock Storage Area (SCRP-WRSA; Figure 2-1). The lowest dustfall rate was recorded at Dust 9 (78 mg/dm^2/y), lower than the control stations Dust C1 (118 mg/dm^2/y; 4,646 m to the south) and Dust C2 (103 mg/dm^2/y; 3,031 m to the west; Table 3-1; Figures 3.1-3 and 3.1-4). This is explained by the distance of Dust 9 from the Project footprint (3,796 m to the east), which places it within the control stations zone.

The dustfall rates estimated from dustfall gauges in 2020 were slightly lower but comparable to 2019 rates. Out of 12 sites, seven locations recorded lower deposition rates in 2020 than 2019, with an average rate of 319 mg/dm^2/y and 372 mg/dm^2/y in 2020 and 2019, respectively (Figures 3.1-2 to 3.1-4). The higher dustfall values that have been recorded since 2018 compared to previous years suggest that dustfall rates from 2018 to 2020 were likely influenced by the surface activity at the mine, particularly at the A21 open pit, which began in December 2017, while the dustfall rates in 2017 were related mainly to the airstrip (DDMI 2018, 2019).

The annualized dustfall rates estimated from gauges at all stations were less than the upper limit of the Alberta Ambient Air Quality Objectives and Guidelines for dustfall (1,922 mg/dm^2/y), which is applied to industrial locations. The lower limit of these objectives (646 mg/dm^2/y) that is applied to residential and recreational areas was exceeded at only one site that recorded the highest dustfall rates in 2020 (Dust 10). The Alberta Ambient Air Quality Objectives and Guidelines recommends that dustfall objectives be used as general performance indicators only with no compliance requirement; thus, these objectives are used here for comparison purposes only, particularly as there are currently no standards or objectives for the Northwest Territories.

3.2 Dustfall Snow Surveys

Annual dustfall rates estimated from each snow survey station in 2020 are summarized in Table 3-1. Historical records of annual snow survey dustfall rates for each station are presented in Figures 3.1-2 and 3.1-3. The relationships between annual snow survey dustfall rates and distance from the mine footprint are shown in Figures 3.1-1 and 3.1-4. Boxplots summarizing dustfall rates measured annually are presented in Figure 3.1-5. 2020 snow survey field datasheets and laboratory results are included in Appendix B. Duplicate samples collected at stations SS2-3, SS4-5, and Control-2 for QA/QC purposes are discussed in Section 3.4.

Annualized dustfall rates estimated from 2020 snow survey data ranged from 5 to 1,463 mg/dm^2/y (Table 3-1; Figures 3.1-2 and 3.1-3). The maximum dust deposition rate was recorded at SS5-1 followed by SS1-1 (1,017 mg/dm^2/y). The higher levels of dustfall rates at SS5-1 is associated with the mine activity at A21 open pit (Figure 3.1-1). SS1-1 is located due north of the airstrip, which explains the higher levels of dustfall found here. This site recorded the highest rates from 2017 to 2019.

In general, snow survey dustfall rates decreased with increasing distance from the Project. Mean dustfall rates estimated using both dustfall gauges and snow surveys within the 0 m to 100 m, 101 m to 250 m, 251 m to 1,000 m, 1,001 m to 2,500 m, and control zones were 572, 211, 232, 100, and 71 mg/dm^2/y, respectively (Table 3-1). Dustfall rates at stations SS1-1, SS5-1, Dust 11, SS5-3, Dust 7, and Dust 12 were greater than the upper limit of the 95% confidence interval (CI) for their respective zones in 2020. A sample that exceeds the 95% CI has a probability of occurrence of 5% or less, which indicates a particularly high dust deposition rate. The 95% CI was exceeded at two sites in each of the 0 m to 100 m zone (SS1-1 and SS5-1) and the 251 m to 1,000 m zone (Dust 11 and SS5-3), and at three sites in the 1,001 m to 2,500 m zone (Dust 7, Dust 8, and Dust 12). In the 0 m to 100 m zone, the exceedance can

be explained by the adjacent location to the air strip for SS1-1 and the A21 open pit for SS5-1, while the exceedance at the 251 m to 1,000 m zone is likely explained by the proximity to the A21 open pit for both sites. The exceedance of the 95% CI in the 1,001 m to 2,500 m zone is associated with dust from the ice road for Dust 7 and likely with the air strip for Dust 8. The low rate at some sites of this zone (e.g., SS1-5 and SS2-4; Table 3-1) resulted in a relatively low value of the 95% CI, which led to the three exceedance at this zone.

Annualized dustfall estimated from snow survey stations in 2020 were generally comparable to 2019 dustfall estimates (Figure 3.1-5), with few stations recording higher rates in 2020 than 2019 (Figures 3.1-2 and 3.1-3). The annualized dustfall rates estimated from snow surveys in 2020 never exceeded the upper limit (applied to industrial locations) of the Alberta Ambient Air Quality Objectives and Guidelines at any station, while only SS1-1, SS5-1, and SS5-3 exceeded the lower limit of these guidelines, which applies to residential and recreational areas.

3.3 Snow Water Chemistry

A summary of the snow water chemistry results for each variable of interest (i.e., variables with EQC and phosphorus) is provided below. The full suite of analytical results for snow water chemistry is included in Appendix D. For QA/QC purposes, duplicate samples were collected at stations SS1-4, SS2-3 and SS3-6 station. An equipment blank sample was also collected. Results of QA/QC samples are discussed in Section 3.4.

All 2020 sample concentrations were less than their associated reference levels as specified by the “maximum concentration of any grab sample” in Water Licence W2015L2-0001.

In general, average concentrations of snow water chemistry variables of interest decreased with increasing distance from the Project (Figures 3.3-1 to 3.3-4). Concentrations of all parameters except nitrite were lower in 2020 compared to recent years.

3.3.1 Aluminum

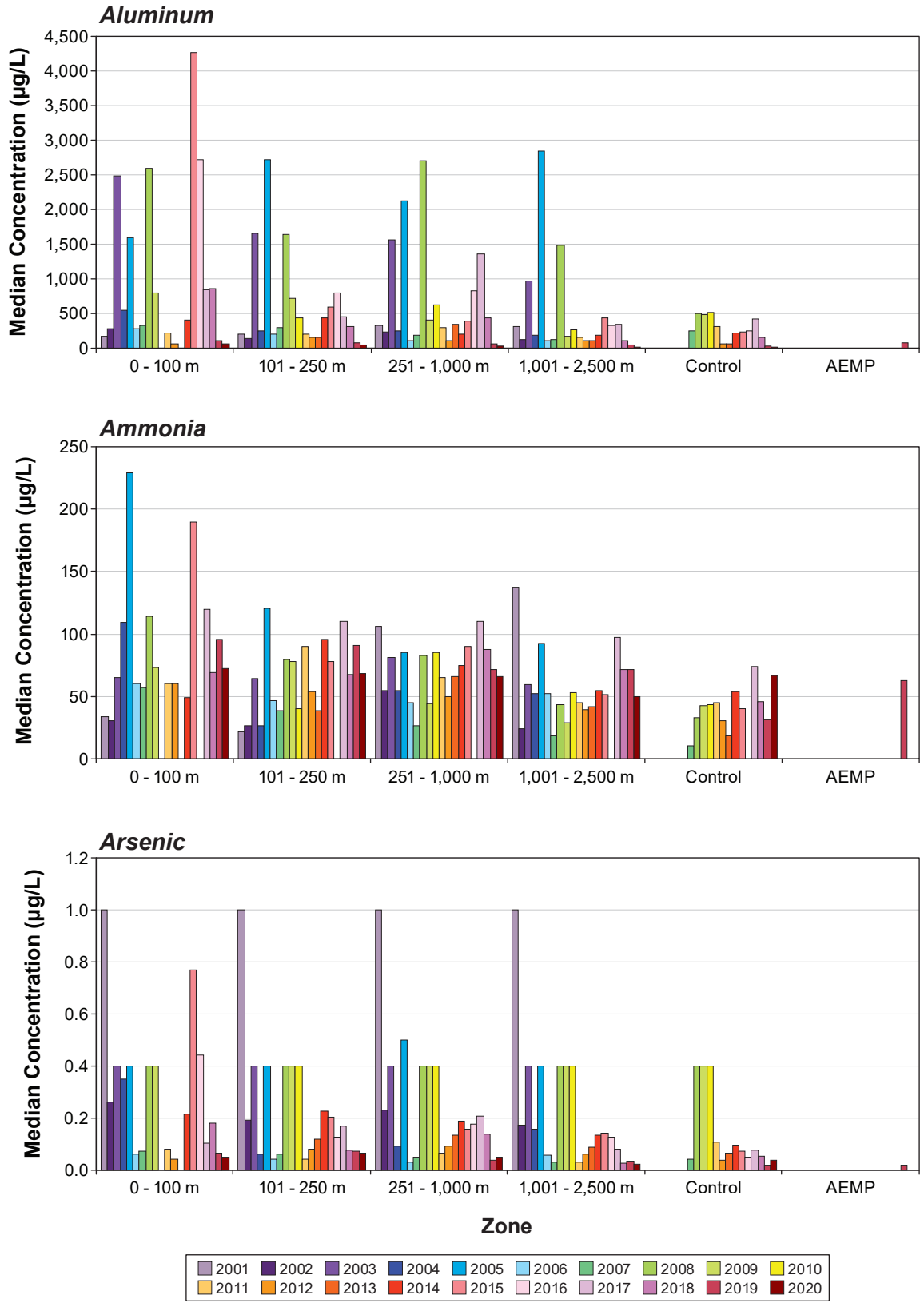
Aluminum concentrations measured in 2020 ranged from 3.9 µg/L at SS4-4 station to 75.6 µg/L at station SS5-3 in the 251 m to 1,000 m zone (Table 3-1). Aluminum concentrations in 2020 were slightly higher in the 0 m to 100 m zone than other zones, where only one sample is available (Figure 3.3-1). The median concentrations in all other zones were much lower in 2020 compared to historical records (2001 to 2019). All the locations were well below the EQC concentration of 3,000 µg/L specified in the Water Licence (Table 3-1; Figure 3.3-1).

3.3.2 Ammonia

Ammonia concentrations measured in 2020 ranged from 36 µg/L at SS1-5, SS2-4, and SS5-5 stations to 140 µg/L at SS5-3 Control-assessment station (Table 3-1). The 2020 median concentrations in all zones were generally similar to historical data. All 2020 and historical ammonia measurements were well below the EQC of 12,000 µg/L specified in the Water Licence for grab sample concentrations.

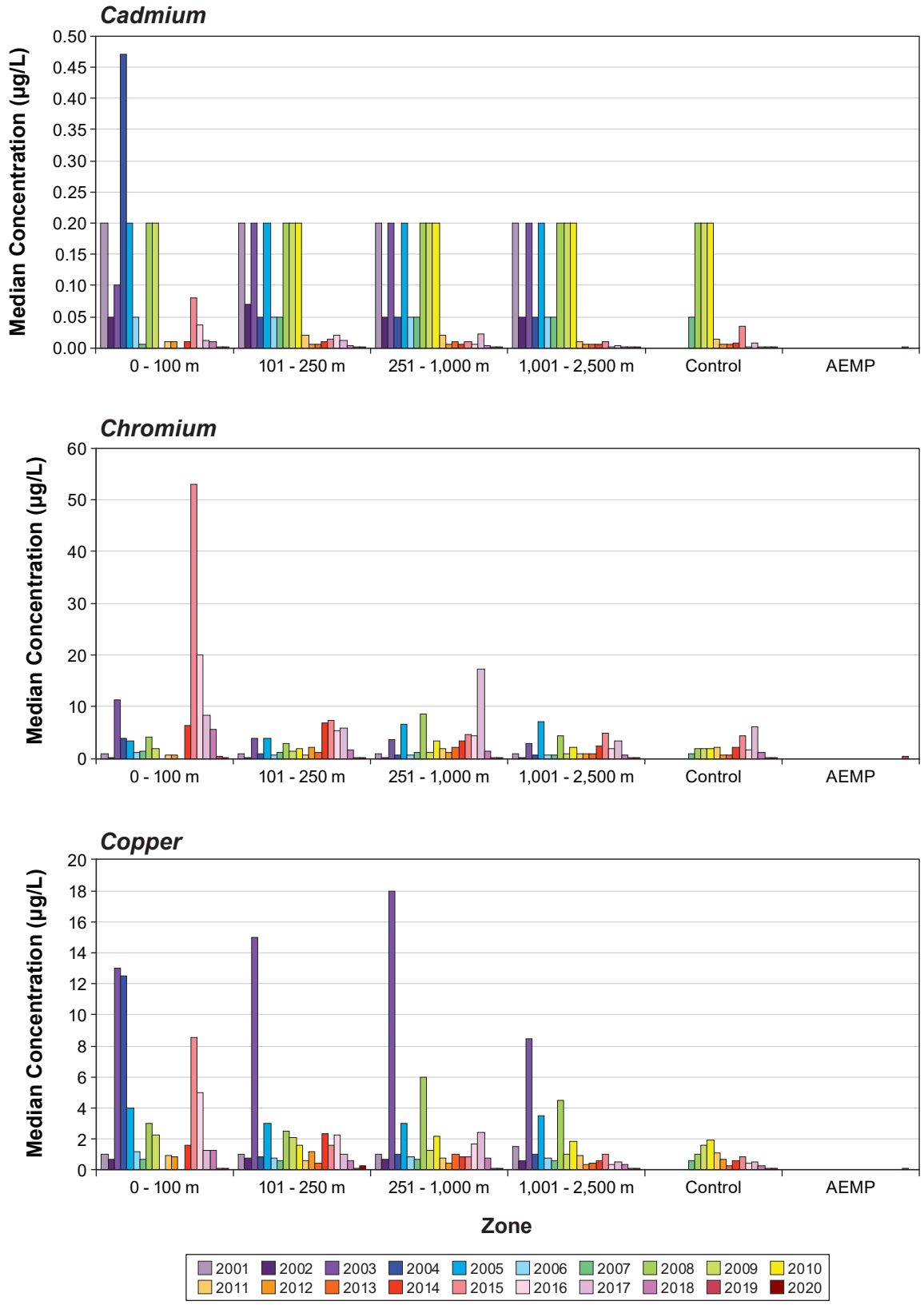
3.3.3 Arsenic

Arsenic concentrations measured in 2019 ranged from 0.01 µg/L at SS2-3 and SS4-5 to 0.14 µg/L at SS5-3 (Table 3-1). Median 2020 arsenic concentrations were similar at all distances from the Project (Figure 3.3-1). 2020 median concentrations were generally lower than historical median concentrations in all zones (Figure 3.3-1). All measurements were well below the EQC of 100 µg/L specified in the Water Licence for grab sample concentrations.



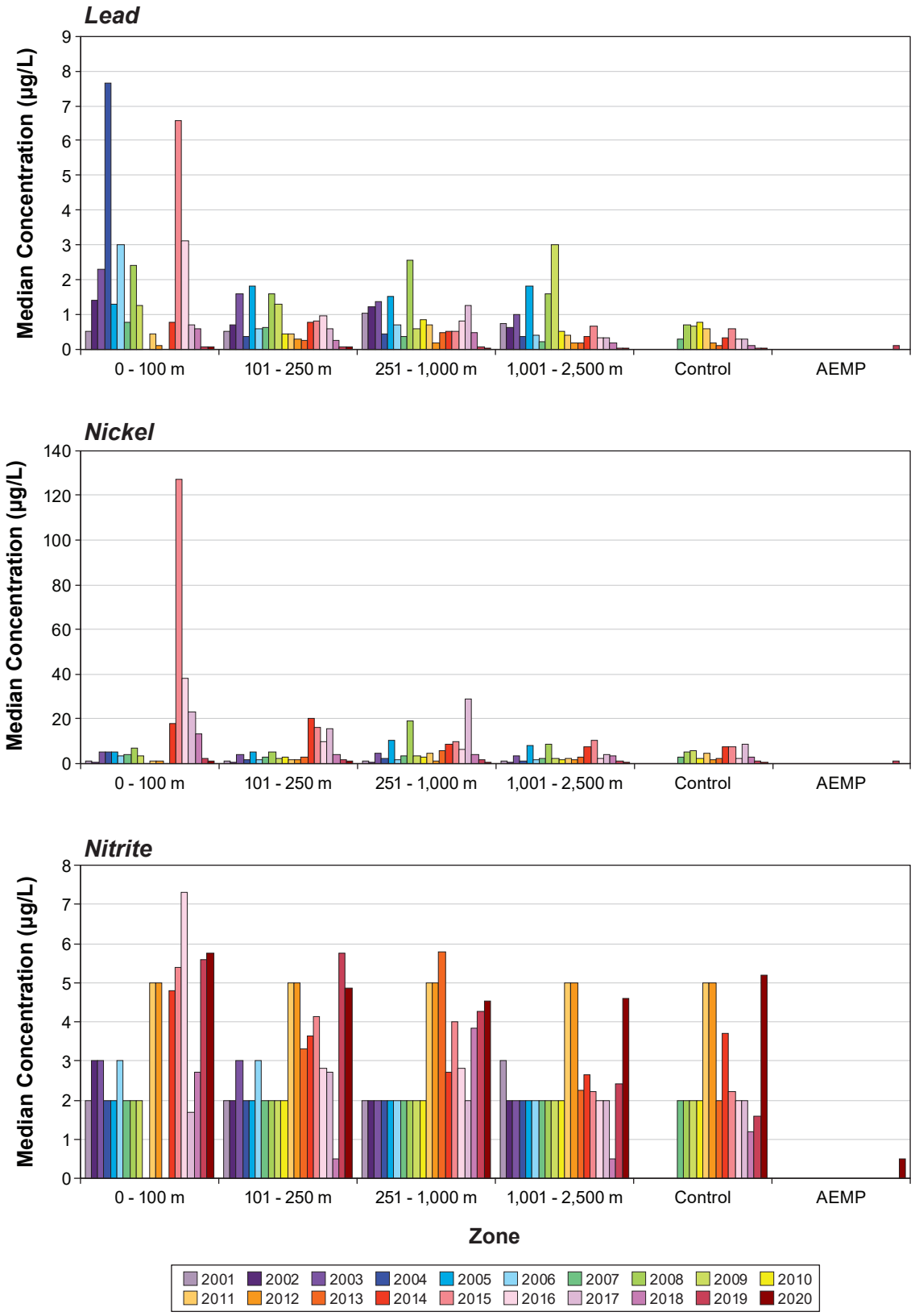
Notes: *Values used for the 0-100 m zone represent one sample rather than the median.*
EQC (µg/L) = 3000 for Aluminum, 12000 for Ammonia, and 100 for Arsenic
AEMP locations added in 2019 only

Figure 3.3-1: Snow Water Chemistry Results: Aluminum, Ammonia and Arsenic, 2001 to 2020



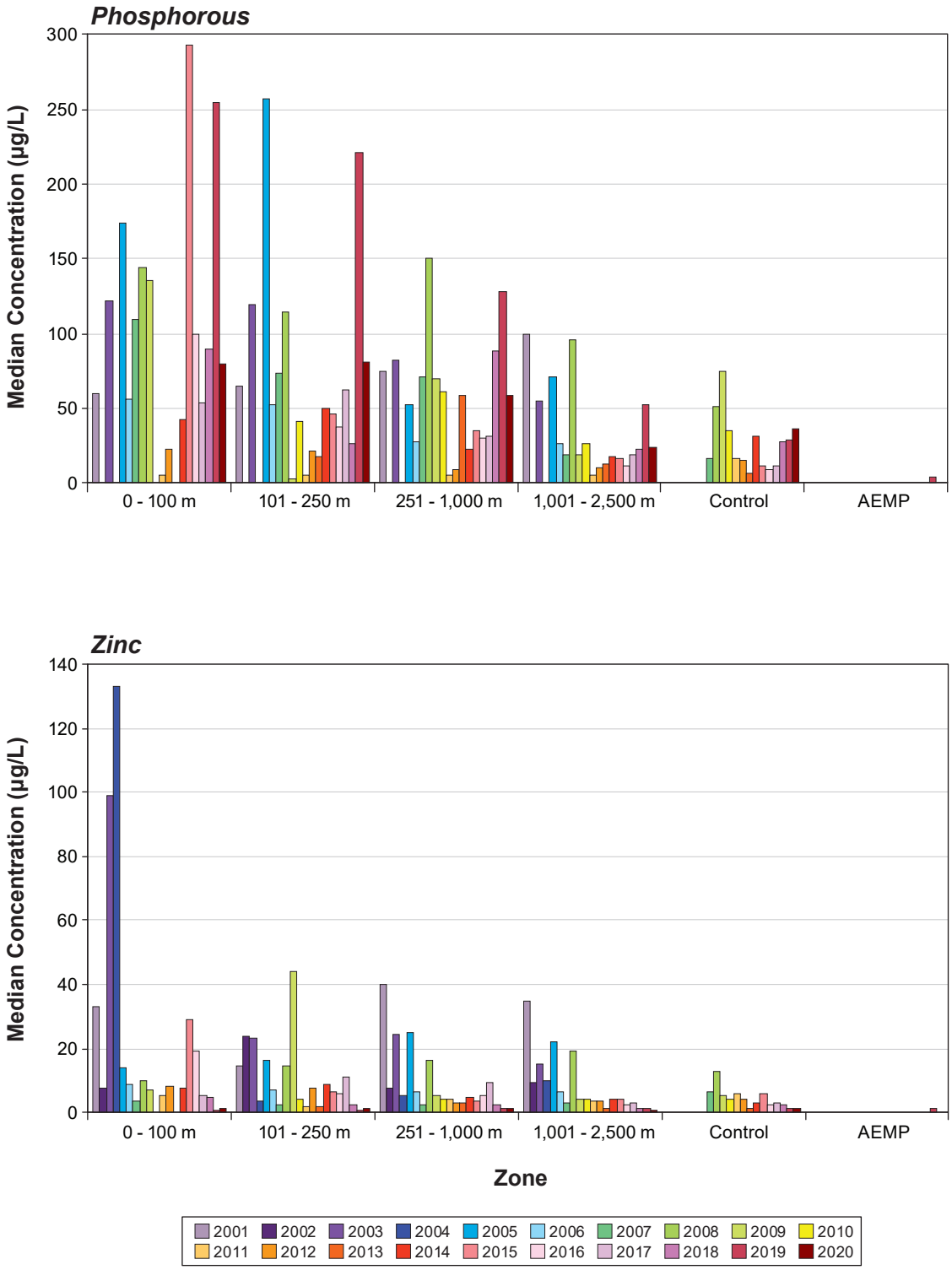
Notes: *Values used for the 0-100 m zone represent one sample rather than the median.*
EQC (µg/L) = 3 for Cadmium, 40 for Chromium, and 40 for Copper
AEMP locations added in 2019 only

Figure 3.3-2: Snow Water Chemistry Results: Cadmium, Chromium and Copper, 2002 to 2020



Notes: *Values used for the 0-100 m zone represent one sample rather than the median.*
EQC (µg/L) = 20 for Lead, 100 for Nickel, and 2000 for Nitrite
AEMP locations added in 2019 only for Lead and Nickel

Figure 3.3-3: Snow Water Chemistry Results: Lead, Nickel and Nitrite, 2002 to 2020



Notes: *AEMP locations added in 2019 only*
EQC (µg/L) = 20 for Zinc, no EQC specified for Phosphorus
AEMP locations added in 2019 only

Figure 3.3-4: Snow Water Chemistry Results: Phosphorous and Zinc, 2002 to 2020

3.3.4 Cadmium

Cadmium concentrations measured in 2020 were less than the analytical detection limit (< 0.005 µg/L) (Table 3-1) at all stations. Overall cadmium concentrations in 2020 were less than historical medians and concentrations. (Figure 3.3-2). All measurements were well below than the EQC of 3 µg/L specified in the Water Licence for grab sample concentrations.

3.3.5 Chromium

Chromium concentrations measured in 2020 ranged from less than the analytical detection limit (< 0.05 µg/L) at multiple stations to 0.39 µg/L at SS3-7 (Table 3-1). The 2020 median concentration in each zone was generally lower than historical concentrations and well below 2015 to 2018 median concentrations (Figure 3.3-2). None of the measurements exceeded the EQC of 40 µg/L specified in the Water Licence for grab sample concentrations.

3.3.6 Copper

Copper concentrations measured in 2020 ranged from 0.066 µg/L at SS2-3 to 0.45 µg/L at SS5-3 (Table 3-1). Median 2020 copper concentrations were similar to 2019 and near to the lowest in the record (2001-2020; Figure 3.3-2), with very little variance between zones. All measurements were less than the EQC of 40 µg/L specified in the Water Licence for grab sample concentrations.

3.3.7 Lead

Lead concentrations measured in 2020 ranged from 0.01 µg/L at SS4-4 station in the 1001 – 2500 m zone to 0.4 µg/L at station SS5-3 in the 251-1,000 m zone (Table 3-1). Similar to copper, the 2020 lead median concentrations in all zones were below all historical medians (2001-2019) with very little variance between zones (Figure 3.3-3). All measurements were well below than the EQC of 20 µg/L specified in the Water Licence for grab sample concentrations.

3.3.8 Nickel

Nickel concentrations measured in 2020 ranged from 0.2 µg/L at SS2-4 station to 1.7 µg/L at SS3-8 station (Table 3-1). Median 2020 nickel concentrations were the lowest on record (2002-2019) with only a small variance between the zones. All measurements were well below than the EQC of 100 µg/L specified in the Water Licence for grab sample concentrations.

3.3.9 Nitrite

Nitrite concentrations measured in 2020 ranged 3.1 µg/L at SS2-3 station to 7.1 µg/L at the Control 3 station (Table 3-1). Median 2020 nitrite concentrations were relatively constant with increasing distance (Figure 3.3-3). The 2020 median concentrations were higher overall than concentrations in all other years although, only slightly (Figure 3.3-3). All measurements were well below the EQC of 2,000 µg/L specified in the Water Licence for grab sample concentrations.

3.3.10 Phosphorus

Phosphorus concentrations measured in 2020 ranged from below the analytical detection limit (<2.0 µg/L) at SS2-4 station to 318 µg/L at station SS5-3 in the 251-1,000 m zone (Table 3-1). Median 2020 phosphorus concentrations decreased with increasing distance from the Project (Figure 3.3-4) and were lower than 2019 concentrations in all zones but in line with historical averages (Figure 3.3-4). Although the Water Licence has a load limit for phosphorus, there is no EQC specified for this parameter.

3.3.11 Zinc

Zinc concentrations measured in 2020 ranged from below the analytical detection limit at SS4-5 station in the 1,001-2,500 m zone to 2.8 µg/L at SS2-2 station in the 1,001-2,500 m zone (Table 3-1). Median 2020 zinc concentrations were generally less than historical records (2001-2018) but similar to concentrations in 2019 with little variance between all zones (Figure 3.3-4). All measurements were well below the EQC of 20 µg/L specified in the Water Licence for grab sample concentrations.

3.4 Evaluation of Existing Control Sites

The lowest dustfall rate in 2020 was at station SS2-4 which is 2,164 m from mining activity. The second lowest dustfall rate was at Control station SSC-1 4,802 m from mining operations. In addition, the mean dustfall rate in the control zone was the lowest of all the zones. The SS2 transect stations (SS2-1, SS2-2, SS2-3 and SS2-4), in addition to station SS1-5 all recorded low dustfall rates. Stations SS2-4, SS1-5 and SS3-5 recorded lower dustfall rates than the control sites SSC-2 and SSC-3, indicating that the rates at these two control sites may not be representative of background values, suggesting that dustfall rates at the control sites are potentially affected by the Project. However, the potential effects of the Project on the dustfall in the control zone have marginal impacts on the dustfall monitoring program since dustfall rates at the control zone are lower than rates within zones closer to the Project area (e.g., zones 0 m to 100 m, 101 m to 250 m, 251 m to 1000 m). Concentrations of several snow water chemistry variables were generally consistent with distance from mining activity (zinc, nitrite, copper, ammonia, arsenic, cadmium) indicating that snow chemistry concentrations for these variables are likely not related to the Project activity.

3.5 Quality Assurance and Control

Dustfall gauge, dustfall snow survey and snow water chemistry sampling and analysis were conducted by experienced technicians following SOPs ENVI-908-0119, ENVI-909-0119, and ENVI-902-0119 to ensure proper field sampling and laboratory analysis. As part of SOP ENVI-909-0119, duplicate and blank samples were taken for some snow survey and snow water chemistry sample sites (Table 2-1). The results from these samples are summarized in Tables 3.5-1 and 3.5-2.

The relative percent difference (RPD) of duplicate samples from a site represents the amount of variation between duplicates. According to the Project AEMP, the data quality objective for duplicate water quality samples is a RPD of 40% when concentrations are ≥ 5 times the detection limit (DL; AEMP 2017). RPD values are only calculated when concentrations are ≥ 5 times the DL (BC MOE 2013). The calculated RPD values exceeded 40% on one occasion.

The results of the QA/QC duplicates indicate that snow chemistry is spatially variable on the scale of metres within which the duplicates are collected. The data quality objective from the AEMP (i.e., RPD less than 40%) is designed for surface *liquid* water samples. Surface water in a stream or lake will mix more readily than snow, particularly once snow has settled and has been compacted by wind. Site-specific differences between snow core sampling replicates may not be visible to the sampling team, but may result in differences in the chemical composition of the snow. RPD exceeded 40% once at SS2-3 station. The absolute difference between observations was small in magnitude. The similarity in the magnitude of the variability is consistent with small-scale spatial variation, rather than data quality issues. The results of the sampling network of 23 sites has been demonstrated to detect and quantify Project effects on snow water chemistry (Section 3.3), and these results are concluded to be reliable despite the small-scale variation identified in the QA/QC program.

Table 3.5-1: Sample Duplicates

Parameter	Duplicate Analytical Results (DUPW1/DUPW2; mg/dm²/y; µg/L)					Analytical Detection Limit (µg/L)	Relative Percent Difference [a] (%)				
	SS4-5	SSC-2	SS1-4	SS2-3	SS3-6		SS4-5	SSC-2	SS1-4	SS2-3	SS3-6
Dustfall	53.8/58.5	45.5/21.2	n/a	20.5/15.2	n/a	0.1	8%	73%	n/a	29%	n/a
Aluminum	n/a	n/a	13/14.9	9.1/8	49.6/57.5	0.2	n/a	n/a	14%	13%	15%
Ammonia	n/a	n/a	50/46	50/50	71/74	5	n/a	n/a	8%	0%	4%
Arsenic	n/a	n/a	0.048/0.061	*0.01/0.01*	0.045/0.053	0.02	n/a	n/a	24%	0%	16%
Cadmium	n/a	n/a	*0.0025/0.0025*	*0.0025/0.0025*	*0.0025/0.0025*	0.005	n/a	n/a	0%	0%	0%
Chromium	n/a	n/a	0.083/0.074	0.062/0.062	0.251/0.282	0.05	n/a	n/a	11%	0%	12%
Copper	n/a	n/a	0.149/0.163	0.067/0.064	0.095/0.119	0.05	n/a	n/a	9%	5%	22%
Lead	n/a	n/a	0.0365/0.0318	0.02/0.0208	0.0594/0.0718	0.005	n/a	n/a	14%	4%	19%
Nickel	n/a	n/a	0.564/0.618	0.326/0.302	1.1/1.11	0.02	n/a	n/a	9%	8%	1%
Nitrite	n/a	n/a	4.1/4.6	3.8/2.3	5/6.5	1	n/a	n/a	11%	49%	26%
Phosphorus	n/a	n/a	17.5/17.3	20.1/15.7	84.2/75.8	2	n/a	n/a	1%	25%	11%
Zinc	n/a	n/a	1.41/1.5	0.91/0.84	0.94/1.03	0.1	n/a	n/a	6%	8%	9%

Notes:

n/a = RPD is not applicable since concentration is less than 5 times the detection limit.

"-" = parameter is not measured.

For measurements that were less than the detection limit, half the detection limit was used for calculations and are italicized.

[a] Relative difference between duplicates, with respect to their mean: RPD = 100 × |rep1 − rep2| / [(rep1 + rep2)/2].

Table 3.5-2: Analytical Blanks for QA/QC Program

Parameter	SS Equipment Blank Sample (µg/L)	Percent of Equipment Blank Sample Below SS Sample	Detection Limit (µg/L)
Aluminum	0.46	-360%	0.2
Ammonia	8.6	80%	5
Arsenic	*0.01*	69%	0.02
Cadmium	*0.003*	0%	0.005
Chromium	*0.03*	0%	0.05
Copper	*0.09*	-256%	0.05
Lead	0.021	-748%	0.005
Nickel	*0.05*	-380%	0.02
Nitrite	1.90	30%	1
Phosphorus	1.00	0%	2
Zinc	0.94	-104%	0.1

Note: For measurements that were less than the detection limit, half the detection limit was used for calculations and are italicized.

Dustfall RPD at SS4-5 was 8%, SSC-2 was 79%, and SS2-3 was 29% which shows that small scale variation for dustfall and snow water chemistry measures may have been slightly higher for dustfall, although the number of duplicates is small. There is no similar data quality objective for RPD related to dustfall, although spatial variability in dustfall rates similar to snow chemistry is expected.

The equipment blank sample was compared against a bag sample. Many of the blank parameters were higher than those from the bag sample, suggesting there was an issue with either the blank or bag sample. The cause of the blank sample having higher concentrations is unknown and has not been seen in previous years.

4. SUMMARY

Median dustfall rates from dustfall gauges measured in 2020 were slightly lower than 2019 results, with most dustfall gauges recording higher rates in 2019, while 2020 rates from snow surveys were comparable to 2019 results. Similar to historical results, dustfall rates in 2020 decreased with distance from the Project. Annual dustfall estimated from each of the 14 dustfall gauges ranged from 78 to 757 mg/dm^2/y. The annualized dustfall rates estimated from the 2020 snow survey data ranged from 5 to 1,463 mg/dm^2/y. Because dustfall gauges continuously collect dust throughout the year, and the snow surveys are only representative of dustfall accumulated over the snow-covered period, the reported annual dustfall results from the dustfall gauges are expected to provide a better estimate of annual dustfall compared to snow survey results for similar geographic areas. However, results obtained from both methods showed similar overall patterns. It is unknown why the maximum dustfall rate from the snow surveys was roughly double the highest value from the dustfall gauges, although the highest rates were all very close to mining activity. Dustfall rates in 2020 were generally within the historical data range collected for the Project. Annualized dustfall rates estimated from each snow survey station in 2020 were comparable to historical dustfall estimates.

Overall, as expected, dustfall rates generally decreased with distance from the Project with the lowest dustfall rate recorded at station SS2-4. The SS2 transect stations (SS2-1, SS2-2, SS2-3, and SS2-4), in addition to station SS1-5 all recorded low dustfall rates. Stations SS2-4, SS1-5, and SS3-5 recorded lower dustfall rates than the control sites SSC-2 and SSC-3, indicating that the rates at these two control sites may not be representative of background values, suggesting that dustfall rates at the control sites are potentially affected by the Project. However, the potential effects of the Project on the dustfall in the control zone have marginal impacts on the dustfall monitoring program since dustfall rates at the control zone are lower than rates within zones closer to the Project area (e.g., zones 0 m to 100 m, 101 m to 250 m, 251 m to 1000 m). Concentrations of several snow water chemistry variables were consistent or decreased with distance from mining activity (zinc, nitrite, copper, ammonia, arsenic, cadmium) indicating that snow chemistry concentrations for these variables are likely not related to the Project activity.

Areas that were closer to the Project, roads, and airstrip received more dustfall than other areas. Mean dustfall rates estimated using both dustfall gauges and snow surveys within the 0 m to 100 m, 101 m to 250 m, 251 m to 1,000 m, 1,001 m to 2,500 m and control zones were 572, 211, 232, 100, and 71 mg/dm^2/y, respectively. Although there are no dustfall standards for the Northwest Territories, all the 2020 dustfall rates were well below the non-residential 5.26 mg/dm^2/d (1,922 mg/dm^2/y) Alberta Ambient Air Quality Objective for dustfall (Alberta Environment and Parks 2019). Dust 10 station was higher than the residential limit of the Alberta Ambient air Quality Objective for dustfall (1.76 mg/dm2/d; 646 mg/dm^2/y). This objective is used only as a general performance indicator.

Snow water chemistry analytes of interest included those variables with EQC (i.e., aluminum, ammonia, arsenic, cadmium, chromium, copper, lead, nickel, nitrite, and zinc) or a load limit (i.e., phosphorus) specified in the Type “A” Water Licence (W2015L2-0001, formerly W2007L2 0003). All 2020 sample concentrations were well below their associated reference levels as specified by the “maximum concentration of any grab sample” specified in Water Licence W2015L2 0001. Concentrations in 2020 were similar to 2019 and generally lower than recent years for all parameters except nitrite. Typically, concentrations decreased with distance from the Project. The highest concentrations for all variables were less than their corresponding EQC.

5. REFERENCES

Definitions of the acronyms and abbreviations used in this reference list can be found in the Glossary and Abbreviations section.

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APPENDIX A ANNUAL CHANGES TO DUSTFALL PROGRAM

Appendix A: Annual Changes to Dustfall Program

2001

The 2001 dust monitoring program was based entirely upon snow survey samples collected along four radial transects emanating from the project footprint outward to a distance of approximately 1,000 metres. All sample locations were analyzed for dust deposition, while only those locations on Lac de Gras were analyzed for snow water chemistry.

2002

DDMI amended the dust monitoring program, in response to recommendations made by the Mackenzie Valley Land and Water Board, to include two snow survey control locations. In addition, five dust gauges (passive dust collectors) were deployed, one along each of the snow survey transects and one at a control location, in efforts to enhance the monitoring program.

2003

In response to further recommendations, the dust monitoring program was modified. All four snow survey transects were extended in length to a distance of approximately 2,000 metres from the project footprint. An additional five dust gauges, including a second control, were deployed.

2004

Increased construction activity necessitated further changes to the dust monitoring program. One dust gauge (Dust 02) was removed from its location to accommodate project footprint expansion, and subsequently relocated and redeployed (Dust 2A).

2005

Dust deposition monitoring was carried out with no modifications to either the snow survey or the dust gauge portion of the program.

2006

An additional dust gauge was deployed bringing the total to eleven (including two controls). Testing of Mini-Vol portable air samplers were conducted to determine feasibility of incorporation into the dust monitoring program. Preliminary findings proved the inclusion of the Mini-Vol samplers would be impractical.

2007

The snow survey portion of the program was amended with an additional snow survey transect being incorporated bringing the total number of transects to five. As well, snow water chemistry samples were collected adjacent to the pre-existing control locations as background references.

Two additional dust gauges (temporary) were deployed adjacent to two pre-existing dust gauges. The intent of the temporary gauges was to compare results from the same location when sample collection frequency is altered.

DDMI initiated contact with Environment Canada and Golder Associates with regards to remodeling dust deposition with the intent of revising predictions made in the 1998 environmental effects report.

In light of dust deposition monitoring results from previous years, several control measures were adopted to reduce dust generation on site, including the utilization of EK-35 (suppressant) on the airport apron, taxiway and helipad, and fitting a second 830E haul truck with tank for haul road watering.

2008

All of the dust gauges were modified to accommodate the replacement of the polyacrylic dust gauge inserts with brass Nipher gauge inserts, to minimize loss associated with damage during the collection and handling of the dust gauges.

An additional dust gauge was added to the program bringing the total to twelve permanently deployed (including two control), and two temporary (reference) dust gauges.

Three snow survey sample points were not sampled as they had become overtaken by construction activity and expansion of the project footprint.

Additional preparations for dust deposition modelling were completed including data collection, identification of point source inputs, selection of a modelling program and inputs (with regulator input) and discussion of cumulative effects.

2009

The two temporary dust gauges deployed in 2007 were decommissioned. All twelve permanent gauges were collected quarterly. An error in collection/deployment resulted in “No Data” being collected for Dust 3 between July 11 and September.

Snow survey sampling was conducted in April. An error in collection/analysis resulted in the Dust Deposition sample for SS2-1 being compromised; as such “No Dust Deposition Data” was available for this location.

2010

All twelve permanent dust gauges were collected quarterly during 2010. Overall, there was a reduction of observed dustfall deposition from 2009 to 2010, with the exception of Dust 1 and Dust 10.

Snow survey sampling was conducted throughout the month of April. An error in collection/processing resulted in two missing stations for the water quality analysis. SS2-1 field results were collected; however, the sample was compromised during processing in the lab. An error also resulted with the collection of SS5-2; data collection for water quality analysis was missed in the field. No data for these two stations resulted in Zone 1 having no data for the various water chemistry results and SS5-2 was not represented in Zone 3 data for 2010.

2011

All twelve permanent dust gauges were collected quarterly during 2011. During collection and repair to Station Dust 5 in September, the sample was compromised and therefore not processed, which resulted in data loss.

Snow survey sampling was conducted throughout the month of April. Due to an internal error shipping samples, water quality samples for stations SS1-4, SS1-5, SS2-1, SS2-2, SS2-3, SS2-4, and SSC-3 arrived at the Maxxam laboratory past the recommended holding time.

2012

All twelve permanent dust gauges were collected quarterly during 2012. During collection in June, repairs were conducted on Station Dust 9 as it was found on its side, the sample was compromised, which resulted in data loss. Overall in 2012, 8 of the 12 dust gauges reported lower deposition rates compared to 2011.

Snow survey sampling was conducted on April 30, and on May 4 and 5.

2013

All twelve permanent dust gauges were collected quarterly during 2013. Station Dust 5 was dismantled upon arrival in September and the sample was compromised, which resulted in data loss for that quarter.

Snow survey sampling was conducted at 24 locations from April 26 to 28.

2014

All twelve permanent dust gauges were collected quarterly during 2014.

Snow survey sampling was conducted at 24 locations from April 7 to May 12. Three additional sites, SS3-6, SS3-7, SS3-8, were installed.

2015

No changes were made to the dustfall program in 2015.

All twelve permanent dust gauges were collected quarterly during 2015.

Snow survey sampling was conducted at 24 locations from March 31 to April 10.

2016

Due to construction activities at A21, the distance to mining operations decreased for dustfall stations Dust 10, SS5-1, SS5-2, SS5-3, SS5-4, SS5-5, Dust C1, and Control 1. The new distances to mining operations are shown in Table 2-1. Dust 10 station was 670 m from mining operations and now is 46 metres from mining operations.

All twelve permanent dust gauges were collected quarterly during 2016.

Snow survey sampling was conducted at 27 locations from March 3 to April 7.

2017

All twelve permanent dust gauges were collected quarterly during 2017.

During collection of Stations Dust 3 Dust 4, Dust 8 and Dust 10 in July were compromised and an indeterminate amount of sample was lost.

Two new permanent dust gauges (Dust 11 and Dust 12) were deployed on 2017-Oct-05.

Dust 11 and 12 are 0.805 km and 2.58 km respectively from mining operations.

Snow survey sampling was conducted at 27 locations from April 1 to April 10.

2018

No changes to the dustfall program were made in 2018. All fourteen permanent dust gauges were collected quarterly during 2018.

2019

Four new stations are added to the snow survey monitoring network to help assessing the efficiency of the existing control stations. The stations added include FF1-2, FFA-4, FFB-4 and LDS-1. All 14 permanent dust gauges were collected quarterly during 2019.

Snow survey sampling was conducted at 31 locations from April 4 to May 8.

2020

Four stations were removed in 2020. The removed stations include FF1-2, FFA-4, FFB-4 and LDS-1. All 14 permanent dust gauges were collected quarterly during 2020.

Snow survey sampling was conducted at 24 locations from April 3 to April 17.

One lab blank and one equipment blank were run every quarter. Equipment blanks commenced July 20, 2020 (Q2), lab blanks commenced January 5, 2021 (Q4).

APPENDIX B DUSTFALL GAUGE ANALYTICAL RESULTS

Appendix B: Dustfall Gauge Analytical Results

Sample Date	Dust Gauge ID	Filter #	Weight of Filter (mg)	Filter + Residue (mg)	Cumulative Weight of Residue (mg)	Dust Deposition (mg/dm^2)	Days Deployed	Dust Deposition ($mg/dm^2/d$)	Dust Deposition ($mg/dm^2/y$)
Initial deployment date: 26-Dec-2019									
29-Mar-20	Dust 1	1	113.1	148.2					
		2	114.5	138.6	59.2		94	0.5	
18-Jul-20		1	120.3	193.2					
		2	113.4	173.4					
		3	113.7	164.2					
		4	113.2	145.4	215.6		111	1.6	
22-Oct-20		1	118.4	158.9					
		2	120.8	279.4	199.1		96	1.7	
4-Jan-21		1	123.7	157.1	33.4		74	0.4	
					TOTALS	**413.6**	**375**	**1.0**	**402.6**
Initial deployment date: 28-Dec-2019									
27-Mar-20	Dust 2A	1	116.8	235					
		2	114.5	138.1	141.8		90	1.3	
18-Jul-20		1	121.7	255.9					
		2	120.5	121.4	135.1		113	1.0	
20-Oct-20		1	116.7	148.3					
		2	118.2	158.6	72		94	0.6	
8-Jan-21		1	120.1	162.4	42.3		80	0.4	
					TOTALS	**318.9**	**377**	**0.8**	**308.8**
Initial deployment date: 26-Dec-2019									
29-Mar-20	Dust 3	1	117.7	154.5					
		2	115.8	146					
		3	119.4	202	149.6		94	1.3	
17-Jul-20		1	114.3	192.5					
		2	118.1	189.1					
		3	114.5	157.7					
		4	118.6	146.1	219.9		110	1.6	
22-Oct-20		1	127.1	403.5	276.4		97	2.3	
3-Jan-21		1	116.5	223.8	107.3		73	1.2	
					TOTALS	**614.1**	**374**	**1.6**	**599.3**
Initial deployment date: 26-Dec-2019									
29-Mar-20	Dust 4	1	115.7	175.8	60.1		94	0.5	
17-Jul-20		1	119.5	272					
		2	116.9	228.1	263.7		110	2.0	
23-Oct-20		1	125.5	177.4	51.9		98	0.4	
3-Jan-21		1	127.1	147.5	20.4		72	0.2	
					TOTALS	**322.9**	**374**	**0.8**	**315.2**

Appendix B: Dustfall Gauge Analytical Results

Sample Date	Dust Gauge ID	Filter #	Weight of Filter (mg)	Filter + Residue (mg)	Cumulative Weight of Residue (mg)	Dust Deposition (mg/dm^2)	Days Deployed	Dust Deposition ($mg/dm^2/d$)	Dust Deposition ($mg/dm^2/y$)
Initial deployment date: 27-Dec-2019									
27-Mar-20	Dust 5	1	115.7	198.5	82.8		91	0.7	
18-Jul-20		1	115.9	133					
		2	112	141.8	46.9		113	0.3	
20-Oct-20		1	124.7	165.2	40.5		94	0.4	
8-Jan-21		1	125.2	142.5	17.3		80	0.2	
					TOTALS	**152.9**	**378**	**0.4**	**147.6**
Initial deployment date: 26-Dec-2019									
29-Mar-20	Dust 6	1	116.4	185.8	69.4		94	0.6	
18-Jul-20		1	120.8	139.9					
		2	120.2	134.9	33.8		111	0.2	
22-Oct-20		1	125.7	129.9					
		2	112.7	114.8					
		3	118.9	156.6	44		96	0.4	
3-Jan-21		1	126.8	144.5	17.7		73	0.2	
					TOTALS	**134.4**	**374**	**0.4**	**131.2**
Initial deployment date: 27-Dec-2019									
27-Mar-20	Dust 7	1	114.5	183.3	68.8		91	0.6	
18-Jul-20		1	112.5	155.6					
		2	117.1	153					
		3	118.8	118.9	79.1		113	0.6	
20-Oct-20		1	118.5	192.9					
		2	115.4	150.6	109.6		94	1.0	
8-Jan-21		1	126.9	153.4	26.5		80	0.3	
					TOTALS	**231.5**	**378**	**0.6**	**223.6**
Initial deployment date: 27-Dec-2019									
27-Mar-20	**Dust 8**	1	115.8	219.7	103.9		91	0.9	
19-Jul-20		1	119.8	122					
		2	119.9	133.7					
		3	119.1	141.1					
		4	119.5	165.3					
		5	119.9	125.5	89.4		114	0.6	
20-Oct-20		1	119.1	120.1					
		2	116.9	149.7					
		3	117.7	132.8					
		4	125.4	134.6					
		5	125.9	126					
		6	120.4	136.9	74.7		93	0.7	
8-Jan-21		1	125.8	145.3	19.5		80	0.2	
					TOTALS	**234.4**	**378**	**0.6**	**226.3**

Appendix B: Dustfall Gauge Analytical Results

Sample Date	Dust Gauge ID	Filter #	Weight of Filter (mg)	Filter + Residue (mg)	Cumulative Weight of Residue (mg)	Dust Deposition (mg/dm^2)	Days Deployed	Dust Deposition ($mg/dm^2/d$)	Dust Deposition ($mg/dm^2/y$)
Initial deployment date: 27-Dec-2019									
27-Mar-20	Dust 9	1	117.5	142.4	24.9		91	0.2	
18-Jul-20		1	118.7	124.2					
		2	118.6	120.4					
		3	118.2	120.2					
		4	120.6	121.8					
		5	119.7	122.6					
		6	119.4	122.2					
		7	120.1	123.4					
		8	119.7	124.4					
		9	113.8	119.8					
		10	114	129.4					
		11	120.8	121.4	46.2		113	0.3	
20-Oct-20		1	112.8	130.2	17.4		94	0.2	
8-Jan-21		1	114.1	124.4	10.3		80	0.1	
					TOTALS	**80.6**	**378**	**0.4**	**77.8**
Initial deployment date: 26-Dec-2019									
29-Mar-20	Dust 10	1	114.1	284.1					
		2	112.9	282.9	340		94	2.9	
17-Jul-20		1	113.3	137.1					
		2	122	241.6					
		3	121.9	149.5					
		4	119.7	320.1					
		5	118.9	122.7	375.2		110	2.8	
22-Oct-20		1	127.3	177.7					
		2	127.2	214.7	137.9		97	1.2	
3-Jan-21		1	116.5	214.2	97.7		73	1.1	
					TOTALS	**775.2**	**374**	**2.0**	**756.5**
Initial deployment date: 26-Dec-2019									
27-Mar-20	Dust 11	1	120.4	201.2					
		2	114.7	193.2	159.3		92	1.4	
17-Jul-20		1	120.2	145.7					
		2	121	210.5					
		3	119.2	212.3					
		4	120	245.1					
		5	120	121	334.2		112	2.4	
20-Oct-20		1	123.4	136.1	12.7		95	0.1	
8-Jan-21		1	120.30	182.60	62.3		80	0.6	
					TOTALS	**463.5**	**379**	**1.1**	**446.4**

Appendix B: Dustfall Gauge Analytical Results

Sample Date	Dust Gauge ID	Filter #	Weight of Filter (mg)	Filter + Residue (mg)	Cumulative Weight of Residue (mg)	Dust Deposition (mg/dm^2)	Days Deployed	Dust Deposition ($mg/dm^2/d$)	Dust Deposition ($mg/dm^2/y$)
Initial deployment date: 28-Dec-2019									
27-Mar-20	Dust 12	1	119.7	175.9	56.2		90	0.5	
19-Jul-20		1	115.4	158.3					
		2	114.4	164	92.5		114	0.7	
20-Oct-20		1	117.7	157.8					
		2	116.5	137.7	61.3		93	0.5	
8-Jan-21		1	119.00	158.70	39.7		80	0.4	
					TOTALS	**203.6**	**377**	**0.5**	**197.1**
Initial deployment date: 27-Dec-2019									
27-Mar-20	Dust C1	1	114.2	131.1	16.9		91	0.2	
18-Jul-20		1	114.6	176	61.4		113	0.4	
20-Oct-20		1	125.4	186.5	61.1		94	0.5	
8-Jan-21		1	117.40	127.30	9.9		80	0.1	
					TOTALS	**121.7**	**378**	**0.3**	**117.5**
Initial deployment date: 28-Dec-2019									
27-Mar-20	Dust C2	1	118	153.6	35.6		90	0.3	
19-Jul-20		1	114.3	148.4					
		2	119.5	119.5	34.1		114	0.2	
20-Oct-20		1	118	140.9					
		2	118.4	129.2	33.7		93	0.3	
8-Jan-21		1	123	149.6	26.6		80	0.3	
					TOTALS	**106.0**	**377**	**0.3**	**102.6**

APPENDIX C DUSTFALL SNOW SURVEY FIELD SHEETS AND ANALYTICAL RESULTS

Rio Tinto

Dust Gauge Collection Field Sheet

		No:	ENVI-178-0312
Area:	8000	Revision:	R0
Effective Date:	26-Mar-2012	By:	Dianne Dul
Task:	Dust Gauge Collection Field Sheet		
		Page:	1 of 2

GENERAL

LOCATION NAME: Dust 1 **DATE (dd-mmm-yyyy):** 2020-03-29 **TIME (24:00):** 0935

SAMPLED BY: NG **TYPE OF SAMPLE:** (Dust) **Other**

GPS COORDINATES (UTM): 533964 **E** 7154321 **N (Zone)** 12

DESCRIPTION: Q1 Dust

CLIMATE CONDITIONS (if sampling outside)

Air Temp: -33 °C **Wind Direction:** W **Wind Speed (knots):** 5

Precipitation: rain / mist / snow (N/A)

Cloud Cover: 0%, 10%, 25%, 50%, 75%, (100)

Snow Cover: 0%, 10%, 25%, 50%, 75%, (100%)

Dust in area: Visible, (Not Visible)

COLLECTION COMMENTS: (i.e. damage to station, bugs - twigs in sample, hole in vestibule, etc.)

Date Sample Collected was Deployed 2019-12-26 NG AH

clear liquid, white colour
Floating + settled dust

Analyzed 2020-03-29

Total Volume of Water After Melting: 375 (mL)

Filter #	Weight of Filter	Filter + Residue	Residue Weight	Comments
1	113.1	148.2	35.1	
2	114.5	138.6	24.1	
3				
4				
5				
6				
7				
8				
9				
10				
11				
Totals	227.6	286.8	59.2	

RIO TINTO

Dust Gauge Collection Field Sheet

		No:	ENVI-178-0312
Area:	8000	Revision:	R0
Effective Date:	26-Mar-2012	By:	Dianne Dul
Task:	Dust Gauge Collection Field Sheet		
		Page:	1 of 2

GENERAL

LOCATION NAME: Dust 2A DATE (dd-mmm-yyyy): 2020-03-27 TIME (24:00): 1453

SAMPLED BY: NG TYPE OF SAMPLE: (Dust) Other

GPS COORDINATES (UTM): 535678 E 7151339 N (Zone) 12

DESCRIPTION: Q1 Dust

CLIMATE CONDITIONS (if sampling outside)

Air Temp: -26 °C Wind Direction: N Wind Speed (knots): 4

Precipitation: rain / mist / snow (N/A) Cloud Cover: (0%), 10%, 25%, 50%, 75%, 100

Snow Cover: 0%, 10%, 25%, 50%, 75%, (100%) Dust in area: Visible (Not Visible)

COLLECTION COMMENTS: (i.e. damage to station, bugs - twigs in sample, hole in vestibule, etc.)

Date Sample Collected was Deployed 2019-12-28 AH NG

Opaque liquid - white colour

lots of visible dust floating + settled

very close to winter road, sampled during road operations

analyzed 2020-03-28

Total Volume of Water After Melting: 425 (mL)

Filter #	Weight of Filter	Filter + Residue	Residue Weight	Comments
1	116.8	235.0	118.2	
2	114.5	138.1	23.6	
3				
4				
5				
6				
7				
8				
9				
10				
11				
Totals	231.3	373.1	141.8	

Rio Tinto

Dust Gauge Collection Field Sheet

		No:	ENVI-178-0312
Area:	8000	Revision:	R0
Effective Date:	26-Mar-2012	By:	Dianne Dul
Task:	Dust Gauge Collection Field Sheet		
		Page:	1 of 2

GENERAL

LOCATION NAME: Dust 3 DATE (dd-mmm-yyyy): 2020-03-29 TIME (24:00): 1016

SAMPLED BY: NG TYPE OF SAMPLE: (Dust) Other

GPS COORDINATES (UTM): 535024 E 7151872 N (Zone) 12

DESCRIPTION: Q1 Dust

CLIMATE CONDITIONS (if sampling outside)

Air Temp: -33 °C Wind Direction: W Wind Speed (knots): 5

Precipitation: rain / mist / snow (N/A) Cloud Cover: (0%) 10%, 25%, 50%, 75%, 100

Snow Cover: 0%, 10%, 25%, 50%, 75%, (100%) Dust in area: Visible (Not Visible)

COLLECTION COMMENTS: (i.e. damage to station, bugs - twigs in sample, hole in vestibule, etc.)

Date Sample Collected was Deployed 2019-12-26 NG AH

Opaque liquid

Floating + settled dust + organic matter

analyzed 2020-03-29

Total Volume of Water After Melting : 375 (mL)

Filter #	Weight of Filter	Filter + Residue	Residue Weight	Comments
1	117.7	154.5	36.8	
2	115.8	146.0	30.2	
3	119.4	202.0	82.6	
4				
5				
6				
7				
8				
9				
10				
11				
Totals	352.9	502.5	149.6	

RIO TINTO

Dust Gauge Collection Field Sheet

		No:	ENVI-178-0312
Area:	8000	Revision:	R0
Effective Date:	26-Mar-2012	By:	Dianne Dul
Task:	Dust Gauge Collection Field Sheet		
		Page:	1 of 2

GENERAL

LOCATION NAME: Dust 4 DATE (dd-mmm-yyyy): 2020-03-29 TIME (24:00): 1130

SAMPLED BY: NG TYPE OF SAMPLE: Dust Other

GPS COORDINATES (UTM): 531397 E 7152127 N (Zone) 12

DESCRIPTION: Q1 Dust

CLIMATE CONDITIONS (if sampling outside)

Air Temp: -29 °C Wind Direction: W Wind Speed (knots): 8

Precipitation: rain / mist / snow / (N/A) Cloud Cover: (0%), 10%, 25%, 50%, 75%, 100

Snow Cover: 0%, 10%, 25%, 50%, 75%, (100%) Dust in area: Visible, (Not Visible)

COLLECTION COMMENTS: (i.e. damage to station, bugs - twigs in sample, hole in vestibule, etc.)

Date Sample Collected was Deployed 2019-12-26 NG AH

clear liquid
floating + settled dust
2 insects

analyzed 2020-03-29

Total Volume of Water After Melting: 450 (mL)

Filter #	Weight of Filter	Filter + Residue	Residue Weight	Comments
1	115.7	175.8	60.1	
2				
3				
4				
5				
6				
7				
8				
9				
10				
11				
Totals	115.7	175.8	60.1	

RIO TINTO

Dust Gauge Collection Field Sheet

		No:	ENVI-178-0312
Area:	8000	Revision:	R0
Effective Date:	26-Mar-2012	By:	Dianne Dul
Task:	Dust Gauge Collection Field Sheet		
		Page:	1 of 2

GENERAL

LOCATION NAME: Dust 5 DATE (dd-mmm-yyyy): 2020-03-27 TIME (24:00): 1423

SAMPLED BY: N/A TYPE OF SAMPLE: (Dust) Other

GPS COORDINATES (UTM): 535696 E 7155138 N (Zone) 12

DESCRIPTION: Q1 Dust

CLIMATE CONDITIONS (if sampling outside)

Air Temp: 28 °C Wind Direction: W Wind Speed (knots): 4

Precipitation: rain / mist / snow (N/A) Cloud Cover: (0%), 10%, ~~25%~~, 50%, 75%, 100

Snow Cover: 0%, 10%, 25%, 50%, 75%, (100%) Dust in area: Visible, (Not Visible)

COLLECTION COMMENTS: (i.e. damage to station, bugs - twigs in sample, hole in vestibule, etc.)

Date Sample Collected was Deployed 2019-12-27 AH GE

clear liquid - white colour

visible dust floating + settled

analyzed 2020-03-28

Total Volume of Water After Melting: 375 (mL)

Filter #	Weight of Filter	Filter + Residue	Residue Weight	Comments
1	115.7	198.5	82.8	
2				
3				
4				
5				
6				
7				
8				
9				
10				
11				
Totals	115.7	198.5	82.8	

RIOTinto

Dust Gauge Collection Field Sheet

		No:	ENVI-178-0312
Area:	8000	Revision:	R0
Effective Date:	26-Mar-2012	By:	Dianne Dul
Task:	Dust Gauge Collection Field Sheet		
		Page:	1 of 2

GENERAL

LOCATION NAME: Dust 6 **DATE (dd-mmm-yyyy):** 2020-03-29 **TIME (24:00):** 0957

SAMPLED BY: NG **TYPE OF SAMPLE:** (Dust) **Other** _____

GPS COORDINATES (UTM): 537502 **E** 7152934 **N (Zone)** 12

DESCRIPTION: Q1 Dust

CLIMATE CONDITIONS (if sampling outside)

Air Temp: -33 °C **Wind Direction:** W **Wind Speed (knots):** 5

Precipitation: rain / mist / snow (N/A) **Cloud Cover:** (0%) 10%, 25%, 50%, 75%, 100

Snow Cover: 0%, 10%, 25%, 50%, 75%, (100%) **Dust in area:** Visible (Not Visible)

COLLECTION COMMENTS: (i.e. damage to station, bugs - twigs in sample, hole in vestibule, etc.)

Date Sample Collected was Deployed 2019-12-26 NG AH

clear liquid, white colours

Floating + settled dust

Analyzed 2020-03-29

Total Volume of Water After Melting : 250 (mL)

Filter #	Weight of Filter	Filter + Residue	Residue Weight	Comments
1	116.4	185.8	69.4	
2				
3				
4				
5				
6				
7				
8				
9				
10				
11				
Totals	116.4	185.8	69.4	

Rio Tinto

Dust Gauge Collection Field Sheet

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GENERAL

LOCATION NAME: Dust 7 DATE (dd-mmm-yyyy): 2020-03-27 TIME (24:00): 1458

SAMPLED BY: NG TYPE OF SAMPLE: Dust Other

GPS COORDINATES (UTM): 536819 E 7150510 N (Zone) 12

DESCRIPTION: Q1 Dust

CLIMATE CONDITIONS (if sampling outside)

Air Temp: -26 °C Wind Direction: NW Wind Speed (knots): 4

Precipitation: rain / mist / snow (N/A)

Cloud Cover: (0%), 10%, 25%, 50%, 75%, 100

Snow Cover: 0%, 10%, 25%, 50%, 75%, (100%)

Dust in area: Visible, (Not Visible)

COLLECTION COMMENTS: (i.e. damage to station, bugs - twigs in sample, hole in vestibule, etc.)

Date Sample Collected was Deployed ~~2020~~ 2019-12-27 AH GC

clear liquid, white colour

some dust visible floating + settled

3 dead insects

analyzed 2020-03-28

Total Volume of Water After Melting: 400 (mL)

Filter #	Weight of Filter	Filter + Residue	Residue Weight	Comments
1	114.5	183.3	68.8	
2				
3				
4				
5				
6				
7				
8				
9				
10				
11				
Totals	114.5	183.3	68.8	

Rio Tinto

Dust Gauge Collection Field Sheet

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GENERAL

LOCATION NAME: Dust 8 DATE (dd-mmm-yyyy): 2020-03-27 TIME (24:00): 1523

SAMPLED BY: NG TYPE OF SAMPLE: Dust Other

GPS COORDINATES (UTM): 531401 E 7154146 N (Zone) 12

DESCRIPTION: Q1 Dust

CLIMATE CONDITIONS (if sampling outside)

Air Temp: -26 °C Wind Direction: NW Wind Speed (knots): 4

Precipitation: rain / mist / snow (N/A)

Cloud Cover: (0%), 10%, ~~25%~~, 50%, 75%, 100

Snow Cover: 0%, 10%, 25%, 50%, 75%, (100%)

Dust in area: Visible (Not Visible)

COLLECTION COMMENTS: (i.e. damage to station, bugs - twigs in sample, hole in vestibule, etc.)

Date Sample Collected was Deployed 2019-12-27 AH GC

clear liquid, white colour

some dust visible floating + ~~suspended~~ settled

a few pieces of floating organic matter

sample analyzed 2020-03-28

Total Volume of Water After Melting: 675 (mL)

Filter #	Weight of Filter	Filter + Residue	Residue Weight	Comments
1	115.8	219.7	103.9	
2				
3				
4				
5				
6				
7				
8				
9				
10				
11				
Totals	115.8	219.7	103.9	

RIO TINTO

Dust Gauge Collection Field Sheet

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GENERAL

LOCATION NAME: Dust 9 DATE (dd-mmm-yyyy): 2020-03-27 TIME (24:00): 1433

SAMPLED BY: NG TYPE OF SAMPLE: (Dust) Other

GPS COORDINATES (UTM): 541204 E 7152154 N (Zone) 12

DESCRIPTION: Q1 Dust

CLIMATE CONDITIONS (if sampling outside)

Air Temp: -26 °C Wind Direction: NW Wind Speed (knots): 4

Precipitation: rain / mist / snow (N/A) Cloud Cover: (0%), 10%, ~~25%~~, 50%, 75%, 100

Snow Cover: 0%, 10%, 25%, 50%, 75%, (100%) Dust in area: Visible (Not Visible)

COLLECTION COMMENTS: (i.e. damage to station, bugs - twigs in sample, hole in vestibule, etc.)

Date Sample Collected was Deployed 2019-12-27 AM GC

Tube found not quite upright in shelf - leaning against side

clear liquid brownish tinge

floating + settled dust

2 insects

analyzed 2020-03-28

Drill rig located @ 540670, 7153260 - staged but not yet operational @ time of sampling

Total Volume of Water After Melting: 250 (mL)

Filter #	Weight of Filter	Filter + Residue	Residue Weight	Comments
1	117.5	142.4	24.9	
2				
3				
4				
5				
6				
7				
8				
9				
10				
11				
Totals	117.5	142.4	24.9	

RIOTINTO

Dust Gauge Collection Field Sheet

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GENERAL

LOCATION NAME: Dust 10 DATE (dd-mmm-yyyy): 2020-03-29 TIME (24:00): 1116

SAMPLED BY: NG TYPE OF SAMPLE: (Dust) Other

GPS COORDINATES (UTM): 532908 E 7148924 N (Zone) 12

DESCRIPTION: Q1 Dust

CLIMATE CONDITIONS (if sampling outside)

Air Temp: -29 °C Wind Direction: SE Wind Speed (knots): 8

Precipitation: rain / mist / snow / (N/A)

Cloud Cover: (0%) 10%, 25%, 50%, 75%, 100

Snow Cover: 0%, 10%, 25%, 50%, 75%, (100%)

Dust in area: (Visible), Not Visible

COLLECTION COMMENTS: (i.e. damage to station, bugs - twigs in sample, hole in vestibule, etc.)

Date Sample Collected was Deployed 2019-12-26 NG AH

Opaque liquid, whitish brown colour

floating + settled dust

a few small pieces of organic matter

analyzed 2020-03-29

Total Volume of Water After Melting : 460 (mL)

Filter #	Weight of Filter	Filter + Residue	Residue Weight	Comments
1	114.1	284.1	170	
2	112.9	282.9	170	
3				
4				
5				
6				
7				
8				
9				
10				
11				
Totals	227	567	340	

R.iO.Tinto

Dust Gauge Collection Field Sheet

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GENERAL

LOCATION NAME: Dust 11 DATE (dd-mmm-yyyy): 2020-03-27 TIME (24:00): 1512

SAMPLED BY: NG TYPE OF SAMPLE: Dust Other

GPS COORDINATES (UTM): 531493 E 7150156 N (Zone) 12

DESCRIPTION: Q1 Dust

CLIMATE CONDITIONS (if sampling outside)

Air Temp: -26 °C Wind Direction: NW Wind Speed (knots): 4

Precipitation: rain / mist / snow (N/A)

Cloud Cover: (0%), 10%, 25%, 50%, 75%, 100

Snow Cover: 0%, 10%, 25%, 50%, 75%, (100%)

Dust in area: Visible, (Not Visible)

COLLECTION COMMENTS: (i.e. damage to station, bugs - twigs in sample, hole in vestibule, etc.)

Date Sample Collected was Deployed

clear liquid - white colour

visible dust floating + settled

analyzed 2020-03-28

Total Volume of Water After Melting : 625 (mL)

Filter #	Weight of Filter	Filter + Residue	Residue Weight	Comments
1	120.4	201.2	80.8	
2	114.7	193.2	78.5	
3				
4				
5				
6				
7				
8				
9				
10				
11				
Totals	235.1	394.4	159.3	

RIOTinto

Dust Gauge Collection Field Sheet

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GENERAL

LOCATION NAME: Dust 12 DATE (dd-mmm-yyyy): 2020-03-27 TIME (24:00): 1518

SAMPLED BY: NG TYPE OF SAMPLE: (Dust) Other

GPS COORDINATES (UTM): 529323 E 7151191 N (Zone)

DESCRIPTION: Q1 Dust

CLIMATE CONDITIONS (if sampling outside)

Air Temp: -26 °C Wind Direction: NW Wind Speed (knots): 4

Precipitation: rain / mist / snow (N/A) Cloud Cover: (0%), 10%, 25%, 50%, 75%, 100

Snow Cover: 0%, 10%, 25%, 50%, 75%, (100%) Dust in area: Visible (Not Visible)

COLLECTION COMMENTS: (i.e. damage to station, bugs - twigs in sample, hole in vestibule, etc.)

Date Sample Collected was Deployed 2019-12-28 AH GC

clear liquid, white colour

some dust visible floating + ~~suspended~~ settled

sample analyzed 2020-03-28

Total Volume of Water After Melting: 575 (mL)

Filter #	Weight of Filter	Filter + Residue	Residue Weight	Comments
1	119.7	175.9	56.2	
2				
3				
4				
5				
6				
7				
8				
9				
10				
11				
Totals	119.7	175.9	56.2	

R.O.T.I.M.O

Dust Gauge Collection Field Sheet

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GENERAL

LOCATION NAME: Dust C1 DATE (dd-mmm-yyyy): 2020-03-27 TIME (24:00): 1501

SAMPLED BY: NG TYPE OF SAMPLE: (Dust) Other

GPS COORDINATES (UTM): 534979 E 7144270 N (Zone) 12

DESCRIPTION: C1 Dust

CLIMATE CONDITIONS (if sampling outside)

Air Temp: -26 °C Wind Direction: NW Wind Speed (knots): 4

Precipitation: rain / mist / snow (N/A) Cloud Cover: (0%), 10%, 25%, 50%, 75%, 100

Snow Cover: 0%, 10%, 25%, 50%, 75%, (100%) Dust in area: Visible, Not Visible

COLLECTION COMMENTS: (i.e. damage to station, bugs - twigs in sample, hole in vestibule, etc.)

Date Sample Collected was Deployed 2019-12-27 AH GE

clear liquid

~~minimal~~ dust visible (floating + settled

small amount of

analyzed 2020-03-28

Total Volume of Water After Melting: 610 (mL)

Filter #	Weight of Filter mg	Filter + Residue mg	Residue Weight	Comments
1	114.2	131.1	16.9	
2				
3				
4				
5				
6				
7				
8				
9				
10				
11				
Totals	114.2	131.1	16.9	

Rio Tinto

Dust Gauge Collection Field Sheet

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GENERAL

LOCATION NAME: Dust C2 DATE (dd-mmm-yyyy): 2020-03-27 TIME (24:00): 1521

SAMPLED BY: NG TYPE OF SAMPLE: Dust Other

GPS COORDINATES (UTM): 5287 14 E 715327 6 N (Zone) 12

DESCRIPTION: Q1 Dust

CLIMATE CONDITIONS (if sampling outside)

Air Temp: -26 °C Wind Direction: NW Wind Speed (knots): 4

Precipitation: rain / mist / snow (N/A) Cloud Cover: (0%) 10%, 25%, 50%, 75%, 100

Snow Cover: 0%, 10%, 25%, 50%, 75%, (100%) Dust in area: Visible (Not Visible)

COLLECTION COMMENTS: (i.e. damage to station, bugs - twigs in sample, hole in vestibule, etc.)

Date Sample Collected was Deployed 2019-12-28 AH GC

Clear liquid

small amount of dust visible (floating + settled)

6 pieces floating org. matter (vegetation)

analyzed 2020-03-28

Total Volume of Water After Melting: 500 (mL)

Filter #	Weight of Filter	Filter + Residue	Residue Weight	Comments
1	118.0	153.6	35.6	
2				
3				
4				
5				
6				
7				
8				
9				
10				
11				
Totals	118.0	153.6	35.6	

Rio Tinto

Dust Gauge Collection Field Sheet

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GENERAL

LOCATION NAME: DUST 1 DATE (dd-mmm-yyyy): 17-07-2020 TIME (24:00): 0830

SAMPLED BY: NG BP TYPE OF SAMPLE: Dust Other

GPS COORDINATES (UTM): 533964 E 7154321 N (Zone) 12

DESCRIPTION: Q2

CLIMATE CONDITIONS (if sampling outside)

Air Temp: 14 °C Wind Direction: W Wind Speed (knots): S

Precipitation: rain / mist / snow / N/A Cloud Cover: 0%, 10%, 25%, 50%, 75%, 100

Snow Cover: 0%, 10%, 25%, 50%, 75%, 100% Dust in area: Visible, Not Visible

COLLECTION COMMENTS: (i.e. damage to station, bugs - twigs in sample, hole in vestibule, etc.)

Date Sample Collected was Deployed 2020-03-29

Visible dust + organic matter

12 insects

dust whitish brown in colour

Total Volume of Water After Melting: 1060 (mL)

Filter #	Weight of Filter (mg)	Filter + Residue (mg)	Residue Weight (mg)	Comments
1	120.3	193.2	72.9	
2	113.4	173.4	60.0	
3	113.7	164.2	50.5	
4	113.2	145.4	32.2	
5				
6				
7				
8				
9				
10				
11				
Totals	460.6	676.2	215.6	

Rio Tinto

Dust Gauge Collection Field Sheet

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GENERAL

LOCATION NAME: DUST 2A **DATE (dd-mmm-yyyy):** 18-Jul-2020 **TIME (24:00):** 1504

SAMPLED BY: SS2 BP **TYPE OF SAMPLE:** Dust **Other**

GPS COORDINATES (UTM): 535678 **E** 7151339 **N (Zone)** 12

DESCRIPTION: Q2

CLIMATE CONDITIONS (if sampling outside)

Air Temp: 21 °C **Wind Direction:** W **Wind Speed (knots):** 9

Precipitation: rain / mist / snow / (N/A) **Cloud Cover:** 0%, 10%, (25%) 50%, 75%, 100

Snow Cover: (0%), 10%, 25%, 50%, 75%, 100% **Dust in area:** Visible, (Not Visible)

COLLECTION COMMENTS: (i.e. damage to station, bugs - twigs in sample, hole in vestibule, etc.)

Date Sample Collected was Deployed 2020-03-27

- bugs in sample
- visible dust
- mostly clear water

Total Volume of Water After Melting : 1385 (mL)

Filter #	Weight of Filter (mg)	Filter + Residue (mg)	Residue Weight (mg)	Comments
1	121.7	255.9	134.2	some organic material still present
2	120.5	121.4	0.9	
3				
4				
5				
6				
7				
8				
9				
10				
11				
Totals	242.2	377.3	135.1	

Rio Tinto

Dust Gauge Collection Field Sheet

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GENERAL

LOCATION NAME: Dust 3 **DATE (dd-mmm-yyyy):** 17-07-2020 **TIME (24:00):** 0842

SAMPLED BY: SP NG **TYPE OF SAMPLE:** Dust **Other**

GPS COORDINATES (UTM): 535024 **E** 7151872 **N (Zone)** 12

DESCRIPTION: Q2

CLIMATE CONDITIONS (if sampling outside)

Air Temp: 14 °C **Wind Direction:** W **Wind Speed (knots):** 5

Precipitation: rain / mist / snow / (N/A)

Cloud Cover: 0%, 10%, (25%), 50%, 75%, 100

Snow Cover: (0%), 10%, 25%, 50%, 75%, 100%

Dust in area: Visible, (Not Visible)

COLLECTION COMMENTS: (i.e. damage to station, bugs - twigs in sample, hole in vestibule, etc.)

Date Sample Collected was Deployed 2020-03-29

Visible dust, white/brown in colour, + organic matter, + 9 insects

Total Volume of Water After Melting: 1130 (mL)

Filter #	Weight of Filter (mg)	Filter + Residue (mg)	Residue Weight (mg)	Comments
1	114.3	192.5	78.2	
2	118.1	189.1	71.0	
3	114.5	157.7	43.2	
4	118.6	146.1	27.5	
5				
6				
7				
8				
9				
10				
11				
Totals	465.5	685.4	219.9	

Rio Tinto

Dust Gauge Collection Field Sheet

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GENERAL

LOCATION NAME: ~~Dust 4~~ DATE (dd-mmm-yyyy): 17-07-2020 TIME (24:00): 0854

SAMPLED BY: NG BP TYPE OF SAMPLE: Dust Other

GPS COORDINATES (UTM): 531397 E 7152127 N (Zone) 12

DESCRIPTION: Q2

CLIMATE CONDITIONS (if sampling outside)

Air Temp: 14 °C Wind Direction: W Wind Speed (knots): 5

Precipitation: rain / mist / snow / N/A Cloud Cover: 0%, 10%, 25%, 50%, 75%, 100

Snow Cover: 0%, 10%, 25%, 50%, 75%, 100% Dust in area: Visible, Not Visible

COLLECTION COMMENTS: (i.e. damage to station, bugs - twigs in sample, hole in vestibule, etc.)

Date Sample Collected was Deployed 2020-03-29

Bolt missing from plastic shield.
Sample visibly dusty around lips

Total Volume of Water After Melting: 1430 (mL)

Filter #	Weight of Filter (mg)	Filter + Residue (mg)	Residue Weight (mg)	Comments
1	119.5	272.0	152.5	
2	116.9	228.1	111.2	
3				
4				
5				
6				
7				
8				
9				
10				
11				
Totals	236.4	500.1	263.7	

Rio Tinto

Dust Gauge Collection Field Sheet

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GENERAL

LOCATION NAME: DUST 5 **DATE (dd-mmm-yyyy):** 18 27-Jul-2020 **TIME (24:00):** 1430

SAMPLED BY: SS2 BP **TYPE OF SAMPLE:** Dust **Other**

GPS COORDINATES (UTM): 535696 **E** 7155138 **N (Zone)** 12

DESCRIPTION: Q2

CLIMATE CONDITIONS (if sampling outside)

Air Temp: 20 °C **Wind Direction:** SW **Wind Speed (knots):** 9/10

Precipitation: rain / mist / snow / (N/A) **Cloud Cover:** 0%, 10%, (25%) 50%, 75%, 100

Snow Cover: (0%) 10%, 25%, 50%, 75%, 100% **Dust in area:** Visible, (Not Visible)

COLLECTION COMMENTS: (i.e. damage to station, bugs - twigs in sample, hole in vestibule, etc.)

Date Sample Collected was Deployed 2020-03-27

- eagle sitting on tube when arived @ site
- visible bugs + dust

Total Volume of Water After Melting: 856 (mL)

Filter #	Weight of Filter (mg)	Filter + Residue (mg)	Residue Weight (mg)	Comments
1	115.9	133.0	17.1	
2	112.0	141.8	29.8	
3				
4				
5				
6				
7				
8				
9				
10				
11				
Totals	227.9	274.8	46.9	

Rio Tinto

Dust Gauge Collection Field Sheet

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Effective Date:	26-Mar-2012	**By:**	Dianne Dul
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GENERAL

LOCATION NAME: Dust 6 **DATE (dd-mmm-yyyy):** 17-07-2020 **TIME (24:00):** 0707

SAMPLED BY: BP NG **TYPE OF SAMPLE:** Dust **Other**

GPS COORDINATES (UTM): 537502 **E** 7152934 **N (Zone)** 12

DESCRIPTION: Q2

CLIMATE CONDITIONS (if sampling outside)

Air Temp: _____ °C **Wind Direction:** _____ **Wind Speed (knots):** _____

Precipitation: rain / mist / snow (N/A) **Cloud Cover:** 0%, 10%, (25%), 50%, 75%, 100

Snow Cover: (0%), 10%, 25%, 50%, 75%, 100% **Dust in area:** Visible, (Not Visible)

COLLECTION COMMENTS: (i.e. damage to station, bugs - twigs in sample, hole in vestibule, etc.)

Date Sample Collected was Deployed 2020-03-29

Some visible dust, whitish brown in colour
visible organic matter
~12 bugs

Total Volume of Water After Melting : 1180 (mL)

Filter #	Weight of Filter (m1)	Filter + Residue (m2)	Residue Weight (m1)	Comments
1	120.8	~~134.9~~ 139.9	19.1	
2	120.2	134.9	14.7	
3				
4				
5				
6				
7				
8				
9				
10				
11				
Totals	241.0	274.8	33.8	

Rio Tinto

Dust Gauge Collection Field Sheet

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GENERAL

LOCATION NAME: DUST 7 DATE (dd-mmm-yyyy): 18-Jul-2020 TIME (24:00): 1449

SAMPLED BY: SS2 BP TYPE OF SAMPLE: Dust Other

GPS COORDINATES (UTM): 536819 E 7150510 N (Zone) 12

DESCRIPTION: Q2

CLIMATE CONDITIONS (if sampling outside)

Air Temp: 20 °C Wind Direction: SW Wind Speed (knots): 10

Precipitation: rain / mist / snow / (N/A) Cloud Cover: 0%, 10%, (25%), 50%, 75%, 100

Snow Cover: (0%) 10%, 25%, 50%, 75%, 100% Dust in area: Visible, (Not Visible)

COLLECTION COMMENTS: (i.e. damage to station, bugs - twigs in sample, hole in vestibule, etc.)

Date Sample Collected was Deployed 2020-03-27

- tube tilted
- lichen, bugs, and hair in sample

Total Volume of Water After Melting: 1400 (mL)

Filter #	Weight of Filter	Filter + Residue	Residue Weight	Comments
1	112.5	155.6	43.1	some organics remain on filter
2	117.1	153.0	35.9	some organics remain on filter
3	118.8	118.9	0.1	
4				
5				
6				
7				
8				
9				
10				
11				
Totals	348.4	427.5	79.1	

Rio Tinto

Dust Gauge Collection Field Sheet

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Area:	8000	Revision:	R0
Effective Date:	26-Mar-2012	By:	Dianne Dul
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GENERAL

LOCATION NAME: DUST B DATE (dd-mmm-yyyy): 19-Jul-2020 TIME (24:00): 1020

SAMPLED BY: BP TYPE OF SAMPLE: Dust Other

GPS COORDINATES (UTM): 531401 E 7154146 N (Zone) 12

DESCRIPTION: Q2

CLIMATE CONDITIONS (if sampling outside)

Air Temp: 19 °C Wind Direction: S Wind Speed (knots): 6

Precipitation: rain / mist / snow / N/A Cloud Cover: 0%, 10%, 25%, 50%, 75%, 100

Snow Cover: 0%, 10%, 25%, 50%, 75%, 100% Dust in area: Visible, Not Visible

COLLECTION COMMENTS: (i.e. damage to station, bugs - twigs in sample, hole in vestibule, etc.)

Date Sample Collected was Deployed 2020-03-27

- visible dust
- bugs in sample

Total Volume of Water After Melting: 1225 (mL)

Filter #	Weight of Filter	Filter + Residue	Residue Weight	Comments
1	119.8	122.0	2.2	
2	119.9	133.7	13.8	
3	119.1	141.1	22.3	
4	119.5	165.3	45.8	
5	119.9	125.5	5.6	
6				
7				
8				
9				
10				
11				
Totals	598.2	687.6	89.4	

RioTinto

Dust Gauge Collection Field Sheet

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Area:	8000	**Revision:**	R0
Effective Date:	26-Mar-2012	**By:**	Dianne Dui
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GENERAL

LOCATION NAME: DUST 9 **DATE (dd-mmm-yyyy):** 18-JUL-2020 **TIME (24:00):** 1437

SAMPLED BY: SS2 BP **TYPE OF SAMPLE:** Dust **Other**

GPS COORDINATES (UTM): 541204 **E** 7152154 **N (Zone)** 12

DESCRIPTION: Q2

CLIMATE CONDITIONS (if sampling outside)

Air Temp: 20 °C **Wind Direction:** SW **Wind Speed (knots):** 10

Precipitation: rain / mist / snow (N/A) **Cloud Cover:** 0%, 10%, (25%), 50%, 75%, 100

Snow Cover: (0%), 10%, 25%, 50%, 75%, 100% **Dust in area:** Visible, ~~Not Visible~~

COLLECTION COMMENTS: (i.e. damage to station, bugs - twigs in sample, hole in vestibule, etc.)

Date Sample Collected was Deployed 2020-03-27

- bugs + bird poop in sample
- dark brown coloured water (iced tea colour)
- very thick liquid, takes many filters

Total Volume of Water After Melting: 1000 (mL)

Filter #	Weight of Filter	Filter + Residue	Residue Weight	Comments
1	118.7	124.2	5.5	
2	118.6	120.4	1.8	
3	118.2	120.2	2.0	
4	120.6	121.8	1.2	
5	119.7	122.6	2.9	
6	119.4	122.2	2.8	
7	120.1	123.4	3.3	
8	119.7	124.4	4.7	
9	113.8	119.8	6.0	
10	114.0	129.4	15.4	
11	120.8	121.4	0.6	
Totals	1303.6	1349.8	46.2	

Rio Tinto

Dust Gauge Collection Field Sheet

		No:	ENVI-178-0312
Area:	8000	Revision:	R0
Effective Date:	26-Mar-2012	By:	Dianne Dul
Task:	Dust Gauge Collection Field Sheet		
		Page:	1 of 2

GENERAL

LOCATION NAME: Dust 10 DATE (dd-mmm-yyyy): 17-07-2020 TIME (24:00): 0917

SAMPLED BY: RP TYPE OF SAMPLE: Dust Other

GPS COORDINATES (UTM): 532908 E 7148924 N (Zone) 12

DESCRIPTION: Q2

CLIMATE CONDITIONS (if sampling outside)

Air Temp: 14 °C Wind Direction: L/ Wind Speed (knots): 5

Precipitation: rain / mist / snow / (N/A)

Cloud Cover: 0%, 10%, (25%), 50%, 75%, 100

Snow Cover: (0%), 10%, 25%, 50%, 75%, 100%

Dust in area: Visible, (Not Visible)

COLLECTION COMMENTS: (i.e. damage to station, bugs - twigs in sample, hole in vestibule, etc.)

Date Sample Collected was Deployed 2020-03-29

Several bugs visible, abundant dust.
Approx. 5mL spilled.

Total Volume of Water After Melting: 1025 (mL)

Filter #	Weight of Filter	Filter + Residue	Residue Weight	Comments
1	113.3	137.1	23.8	
2	122.0	241.6	119.6	
3	121.9	149.5	27.6	
4	119.7	320.1	200.4	Some white ash = burnt organics
5	118.9	122.7	3.8	
6				
7				
8				
9				
10				
11				
Totals	595.8	971.0	375.2	