Appendix G11

2016 AWAR Dustfall Study

MEADOWBANK GOLD PROJECT

2016 All-Weather Access Road Dust Monitoring Report

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EXECUTIVE SUMMARY

In response to community concerns of dust generation, Agnico Eagle has conducted studies of dustfall along the Meadowbank AWAR since 2012. These studies characterize dust deposition rates to help determine the potential for impacts to wildlife in excess of those predicted in the Final Environmental Impact Statement (FEIS).

In 2016, Agnico Eagle initiated a dust suppression pilot study along the AWAR, in addition to the regular dustfall monitoring program. This study aimed to compare the effectiveness of three dust suppression techniques (Dust Stop™, TETRA Flake, speed limit reductions) in several test locations.

Cumulative results to date indicate that without dust suppressant application, average rates of dustfall decline below Alberta Environment's guideline for recreational areas within 100 m of the AWAR, and meet the range of background rates within 200 m. Based on these results, it is unlikely that impacts to VECs (vegetation community productivity and wildlife) due to dust are occurring beyond FEIS assumptions. As described in past reports (2015 AWAR Dustfall Monitoring Report), these conclusions are supported by wildlife monitoring conducted under the Terrestrial Ecosystem Management Plan, including the 2015 Breeding Bird Study and the most recent (2014) Wildlife Screening Level Risk Assessment.

Nevertheless, Agnico Eagle plans to apply a dust suppressant in a number of locations along the AWAR in 2017, based on results of the 2016 dust suppression pilot study. Results of the visual assessment and dust sampling program indicated that TETRA Flake is the optimal product for use in this program. Agnico Eagle plans to apply TETRA Flake to the three areas of concern along the AWAR identified by the HTO, as well as to the locations treated annually in the hamlet of Baker Lake and near the Meadowbank site. One application of TETRA Flake is planned for the summer 2017. Agnico Eagle also identified two additional potential areas of concern between km 50 – 89 (the northern limit for public use), where dust suppressant will be applied. The planned locations and rationale are as follows:

Table 1. Planned locations for dust suppressant application in 2017.

AWAR Location	Rationale
Agnico Eagle spud barge area	High traffic area near hamlet
Agnico Eagle tank farm to Arctic Fuel site	High traffic area near hamlet
km 0 - 5	High traffic area near hamlet
km 10 - 12	Area of concern to HTO – proximity to lake
km 24 - 26	Area of concern to HTO – proximity to lake
km 48 - 50	Area of concern to HTO – water crossing
km 68 - 70	Location identified by Agnico Eagle – water crossing
km 80 - 84	Location identified by Agnico Eagle – proximity to water & crossing
Emulsion plant turn off to Meadowbank site (km 103 – 110)	High traffic area

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SECTION 1 • INTRODUCTION

1.1 BACKGROUND

Since 2012, Agnico Eagle Mines Ltd. (Agnico Eagle) has conducted annual dustfall monitoring studies along the 110-km All Weather Access Road (AWAR) between the Meadowbank minesite and the hamlet of Baker Lake, NU.

Through these studies, Agnico Eagle has aimed to quantify dustfall with respect to distance from the AWAR, and compare results to background levels, regulatory guidelines, and FEIS predictions. While predicted dustfall rates were not specified, the FEIS indicated that the majority of dustfall was anticipated to occur within 100 m of the road. The smallest zone of influence (ZOI; area where habitat is assumed lost due to sensory disturbance and other factors) for any wildlife valued ecosystem component (VEC) was also 100 m, and impacts to VECs outside this zone were not expected to be significant. Therefore, AWAR dustfall studies have focused around the 100 m distance, and particularly on the downwind (most impacted) side of the road.

Results through 2015 indicated that FEIS predictions regarding AWAR dust are not being exceeded, so excess impacts to wildlife VECs as a result of road dust are not anticipated. These conclusions are supported by wildlife monitoring conducted under the Terrestrial Ecosystem Management Plan, which indicated no significant effect of the road on breeding bird abundance or risk to wildlife from consumption of chemical contaminants.

Nevertheless, Agnico Eagle recognizes the concerns raised by the hamlet of Baker Lake, the Nunavut Impact Review Board (NIRB) and the Government of Nunavut (GN) regarding dust generated by AWAR traffic, and is working with these groups to identify an optimal solution. In 2016, Agnico Eagle hosted meetings and a tour with the Baker Lake Hunter's and Trapper's Organization (HTO) to determine specific areas of concern along the AWAR, and, in addition to the regular monitoring program, conducted a trial study with three types of dust suppression - Dust Stop™ (Cypher Environmental), TETRA Flake (Tetra Technologies Inc.), and speed limit reductions.

1.2 DUST SUPPRESSION TO DATE

Beginning in 2012, Agnico Eagle has provided calcium chloride to be applied annually between km 1 and km 5 of the AWAR. Agnico Eagle also applies chemical dust suppressants on minesite roads and on the most heavily-travelled section of the AWAR, between the main minesite and the former Meadowbank Exploration Camp site. Dust suppression for the airstrip and some minesite roads is also accomplished through continuous watering during summer months.

1.3 PAST STUDY DESIGN

The initial dustfall study was conducted along the AWAR in 2012, and included sampling of two single transects along the road (km 76 and 78) to a 100 or 150 m distance, and two clusters on the minesite. This initial study was used to assess methods, and assist in the design of the larger scale study to be completed in 2013. In 2013 an expanded study was conducted to more fully characterize dustfall rates in relation to distance from the AWAR. Two duplicated transects of samplers were deployed at km 18 and 78, up to 300 m from the AWAR, as well as a number of single canisters at 50 m (km 1, 103, Vault haul road) and two background samples at 1000 m upwind. However, due to disruption by extreme winds, only 7 of 35 samplers could be analyzed. This study was conducted again in 2014 after establishing more robust sampling methods. Locations were the same as 2013, except background samplers were moved to an established reference site on the east side of Inuggugayualik Lake, which is approximately 10 km northwest (upwind) of the mine site. The 2015 study design was nearly identical, with the addition of samplers at 25 m, as well as reference samples along the proposed Amaruq AWAR route.

1.4 2016 STUDY OBJECTIVES

In 2016, two dustfall studies were conducted. As in previous years, the regular monitoring program aimed to characterize dust deposition rates with respect to distance from the Meadowbank AWAR in two locations (km 18 and 78). In addition, a dust suppression pilot study was conducted to compare the effectiveness of three dust suppression techniques (Dust Stop™ (Cypher Environmental), TETRA Flake (Tetra Technologies Inc.), and speed limit reductions). Moving forward, Agnico Eagle plans to apply a dust suppressant in areas of concern as identified by the HTO and Agnico Eagle (see Section 2.1 and 5.2). The 2016 study was conducted to determine which product or technique would be optimal, based on effectiveness, ease of application, cost, and operational considerations.

SECTION 2 • METHODS

2.1 DUST SUPPRESSION PILOT STUDY

2.1.1 Community Consultations

In 2016, Agnico Eagle conducted an initial meeting with the Baker Lake Community Liaison Committee (including an HTO member) on March 18 to discuss the planned dust suppression pilot study. A field visit with HTO members was planned to identify specific areas of concern related to dust along the AWAR. The field visit by members of the HTO and the Meadowbank Environment Department was conducted May 11th 2016, and examined AWAR km 1 – km 50. Three areas of concern (Figure 1) were identified, generally due to proximity of Whitehills Lake and water crossings:

- km 7, 10, and 11
- km 22, 24, and 25
- km 49

Based on this assessment, one of three dust suppression methods was tested in each area during the summer months, as described below. Following conclusion of the pilot study, preliminary results were presented to the community at a meeting on February 10th 2017.

Minutes of the community meetings and report on the May 11, 2016 field visit are provided in Appendix A.

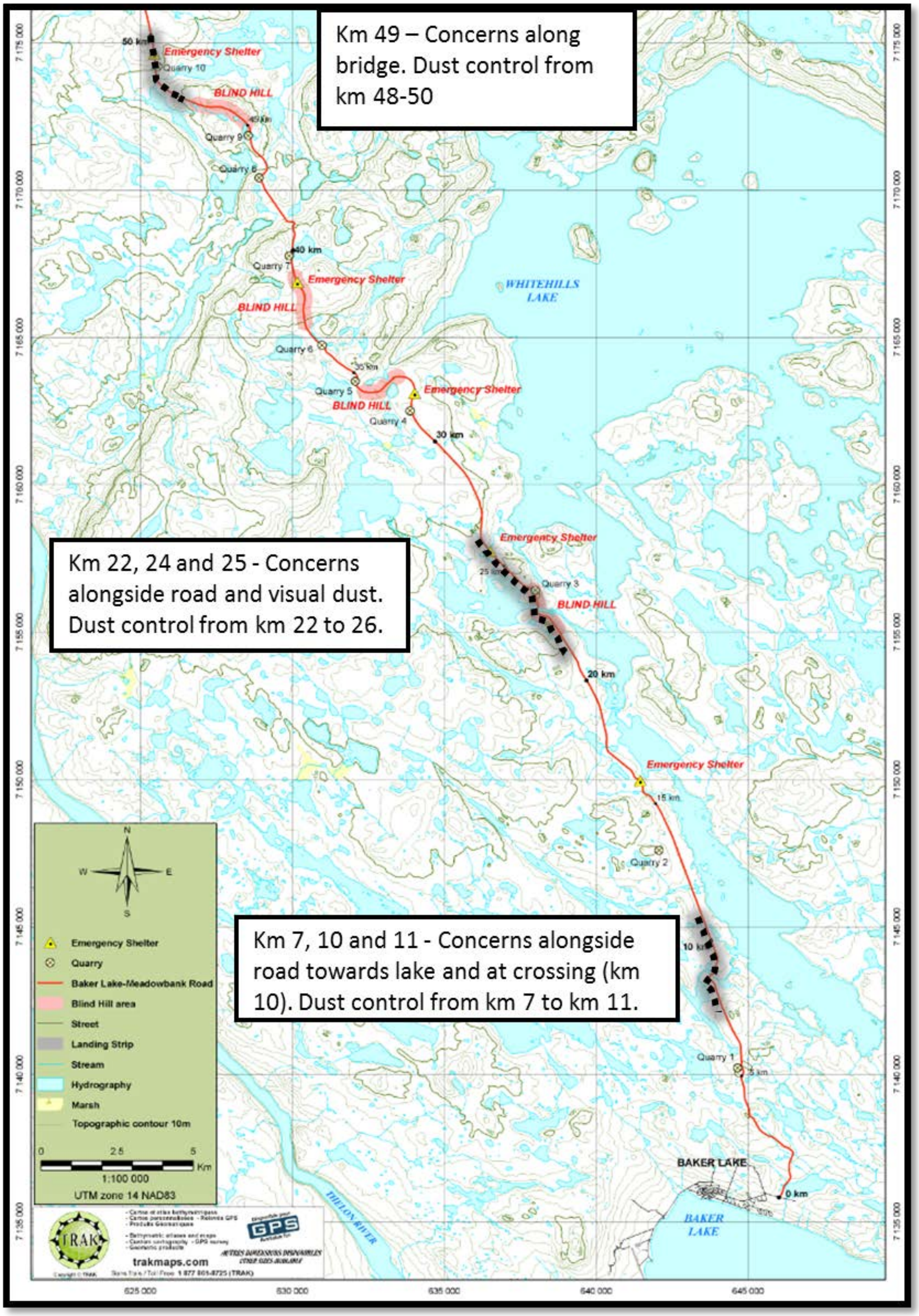

Figure 1. Areas of concern for dustfall along the Meadowbank AWAR identified by the HTO in 2016.

2.1.2 Dust Suppressant Selection

The choice of tested products was based primarily on acceptability under Government of Nunavut regulations (Environmental Guideline for Dust Suppression, 2002) and product availability. Due to time constraints with the shipping season, test products for 2016 were limited to those already onsite. Therefore, the following two products were chosen for the pilot study, along with speed limit reductions:

- Dust Stop™ (Cypher Environmental); polymer with dry or liquid applications

- TETRA Flake (Tetra Technologies Inc.); dry calcium chloride

While Dust Stop™ is not listed in the GN's Environmental Guideline for Dust Suppression (2002) as an approved product, Agnico Eagle has previously sought and received approval from the GN Department of Environment for its use.

Data sheets for both products are included as Appendix B.

2.1.3 Trial Locations

Based on the identified areas of concern, dust suppression methods forming part of the pilot study were applied as described in Table 2.

Table 2. Dust suppressant locations and application dates.

AWAR Location	Method	Application Date
km 10 - 12	TETRA Flake	July 11,2016
km 18	None – reference location	N/A
km 24 - 26	Speed limit reduction to 20 or 40 km/h	July 11, 2016 (signs posted)
km 48 - 50	Dust Stop™ (dry application)	July 15, 2016

As in previous years, Agnico Eagle also applied TETRA Flake to assist in dust suppression near the hamlet of Baker Lake. On July 7, the product was applied from km 3 – 5, in the area of the spud barge, and between Arctic Fuel and the Baker Lake Tank Farm. It was not applied from km 0 – 3, since new material was being added to the road. In addition, Agnico Eagle applied Dust Stop™ on the most heavily travelled segment of the AWAR, between the minesite (km 110) and the emulsion plant (km 103). This application of Dust Stop™, using the wet application method, took place from July 9-12.

2.1.4 Visual Observations

Visual inspections of the road surface and photographs of dust generated by passing vehicles were conducted before and during the pilot study (July 7, July 30, August 8) for each location. Observations were also recorded on July 22, but rain the day before resulted in low dust at all locations.

2.1.5 Dustfall Sampling

2.1.5.1 Locations

For the purposes of comparing dust suppressants, two sets of dustfall samples were collected in 2016. The first round of sampling was conducted immediately after dust suppressant application, from July 10 – August 11 (32 days). The second set of samplers were installed from August 11 – September 10 (29 days). Both rounds of sampling included a single transect at the three locations with dust suppressants (km 11, 25, 49), as well as a reference transect (km 18). Sample jars were located at 25 m, 50 m, 100 m, 150 m, 300 m and 1000 m from the road on both sides (east/downwind and west/upwind).

2.1.5.2 Methods

In accordance with ASTM methods for dustfall measurement (ASTM, 2004), dustfall samples were collected in open vessels containing a purified liquid matrix provided by an accredited laboratory (Maxxam Analytics). Particles are deposited and retained in the liquid, which is then filtered to remove large particles (e.g. leaves, twigs) and analyzed by the accredited laboratory for total and fixed (non-combustible) dustfall. This sampling method is widely used in air quality studies in Nunavut and elsewhere for dustfall monitoring (e.g. Baffinland, 2014; Sabina, 2012; Pretium, 2013; Taseko, 2011).

ASTM and Ontario MOE methods suggest collection of the dustfall sample at 2-3 m height on a utility pole to prevent re-entrainment of particulates from the ground, and to reduce vandalism and potential for wildlife interaction. Due to the difficulty of constructing and deploying stands to hold the large number of sample containers used for AWAR dustfall sampling, and the remote location, the 2012 study compared dustfall at ground level and at 2 m height to inform future sampling method decisions. Based on these results and the assumption that any re-entrainment would result in conservatively high estimates of dustfall, all sampling canisters have been deployed at ground level in since 2013.

Difficulty with maintaining canisters upright in 2013 during strong winds resulted in the use of heavy plastic pipe pieces to surround and support canisters starting in 2014. These supports were maintained at a height lower than the canister opening so that dust deposition was not impeded. These supports have proven very effective, maintaining canisters upright even during high wind events.

Dustfall samplers were placed open in the field for approximately one month, and all calculated dustfall rates were normalized to 30 days (mg/cm^2/30 days, per ASTM 1739-98).

2.2 REGULAR MONITORING PROGRAM

As part of the regular AWAR monitoring program, dustfall samples were collected from August 12 – September 10 (28 days) in the same locations as previous years (km 18 and 78). These samples included a duplicated transect at each location, with sample jars 20 m apart. For each transect, jars were placed at 25 m, 50 m, 100 m, 150 m, 300 m and 1000 m from the road on both sides (east/downwind and west/upwind). These distances were chosen to bracket the smallest predicted zone of influence (ZOI) of 100 m. The zone of maximum dustfall has previously been reported to be within 300 m of roads under heavier use than the Meadowbank AWAR (Auerbach et al. 1997). Sampling transects were located perpendicular to road segments that are relatively straight with few notable topographical features, in order to limit confounding factors that alter prevailing winds and create different micro-climates.

2.3 QA/QC

2.3.1 Sample Handling

Sample canisters and analytical services were provided by an accredited laboratory (Maxxam Analytics Inc.). Canisters were received and deployed by appropriately trained personnel. Sample collection containers remained sealed until they were installed at the specified sampling points. Once containers were installed, container lids were removed and sampling commenced. All sample collection containers were labeled with time, date and sampling location. To avoid contamination or sample loss, no material was removed from the containers and lids were stored in a clean, sealed bag. All efforts were made to ensure canisters remained upright throughout transport. Only canisters that were upright at the time of collection were used in data analyses. By following these sample handling techniques, Agnico Eagle is confident that any controllable external contamination of dustfall jars is minimized. Discussions with the analytical laboratory have identified the following additional recommended measures, which will be implemented in subsequent studies:

- Seal the dustfall jar lid with electrical tape when retrieving samples.
- Ensure coolers being used for shipment are clean and in good shape for transport.

2.3.2 Field Duplicates

Field duplicates are separate samples of environmental media collected in the same location at the same time. Field duplicates are collected, stored, and analyzed independently, and are used to help assess the combined precision of the analytical and sampling methodology. Field duplicates do not assess accuracy (i.e. differences between measured results and “true” values), nor do they contribute to understanding contamination due to transport, which is assessed through travel blanks (see Section 2.4.2).

Precision of the study results was assessed by calculating the relative percent difference (RPD) between duplicate measurements. For samples that are > 5x the method detection limit, RPD can be calculated as:

$$RPD = \frac{(A - B)}{((A + B)/2)} \times 100$$

where: A = analytical result

B = duplicate result

A total of six canisters were duplicated to determine precision of the measurements. These duplicates consisted of two canisters within approximately 30 cm proximity. One duplicate was not recovered (km 11, 1000 m west, July event), likely due to animal interference.

No specific regulatory guidance on field duplicate RPDs is available for total or fixed dustfall, and recommendations of the analytical laboratory are limited to samples of soil and water media. Therefore, results of the field duplicate analysis are presented for reference only, to help understand the potential for variability in dustfall samples, and assist in providing context to field measurements. Given the inability to homogenize samples during collection, and the inherently variable nature of dustfall, relatively large RPDs may be anticipated and have been observed in previous years (up to 45%). Variability of this magnitude does not appear to be uncommon; an average difference between

12 duplicate samples of 25% was previously reported in a study assessing passive dustfall collector design, with individual duplicates varying by up to 99.5% (Sanderson et al. 1963).

2.3.3 Travel Blanks

Travel blanks (unopened dustfall jars) are supplied by the analytical laboratory to assess the potential for contamination due to transit. One travel blank was deployed during the dustfall study in 2016. Laboratory guidance indicates that the impact on results should be investigated when travel blank results exceed 5x the RDL.

2.4 DATA ANALYSIS

2.4.1 Regular Monitoring Program

Cumulative results to date for AWAR dustfall sampling in areas without dust suppressant application are presented.

No regulatory standards for dustfall are available for the territory of Nunavut, and those available elsewhere are based on aesthetic or nuisance concerns. On this basis, Alberta Environment has published a guideline for total dustfall in recreational/residential areas of 0.53 $mg/cm^2/30d$, and a guideline for commercial/industrial areas of 1.58 $mg/cm^2/30d$. Total dustfall results are compared to these guidelines to provide context.

Results are also compared to the range of background dustfall rates (samples collected at the Inuggugayualik Lake reference site in 2014, proposed Amaruq road location in 2015, and 1000 m upwind samples in 2016).

Trends over time (year-over-year, and July vs. August sampling in 2016) are identified.

2.4.2 Dust Suppression Pilot Study

Unlike the regular monitoring program, the objective of the dust suppression pilot study in 2016 was to collect data on the effectiveness of three different dust suppression methods. Therefore, the primary analysis consisted of a qualitative comparison of fixed dustfall rates between transects at km 11, 18, 25, and 49 for each of the July and August sampling periods. Fixed (non-combustible) dustfall was primarily considered in this assessment, since it was determined to be more representative of road material than total dustfall, which includes organic components (e.g. pollen, plants, animal particles). Results of the visual assessment of dust generation were also considered in forming conclusions regarding the optimal dust suppression technique.

SECTION 3 • 2016 RESULTS

3.1 VISUAL ASSESSMENT

Observation records indicate that the greatest reduction in visible dust occurred in the area treated with TETRA Flake. On both July 30 and August 5, no dust was visible when trucks passed through this area (Figure 2).

Visible dust was also reduced in the zone where Dust Stop™ was applied, but more dust was raised compared to the TETRA Flake zone (Figure 3).

At a speed limit of 20 km/h, visible reductions in dust generation occurred. However, this speed limit was determined not to be operationally sustainable, and was raised to 40 km/h at the end of July. A slight reduction in visible dust at this speed was noted, but impacts were not as great as the other test areas (Figure 4). This option was also determined not to be operationally feasible.

Figure 2. Dust generation in the TETRA Flake test area (km 10 – 12) before (top) and after (bottom) application.

Figure 3. Dust generation in the Dust Stop™ test area (km 48 – 50) before (top) and after (bottom) application.

Figure 4. Dust generation in the speed limit test area (km 24-26) at 50 km/h (top) and 40 km/h (bottom).

3.2 DUSTFALL SAMPLE RESULTS

Results for all samples collected in 2016 for the purposes of comparing dust suppressants are provided in Table 3. Results for all samples collected under the regular monitoring program (no dust suppressants) are presented in Table 4.

Table 3. 30-d fixed dustfall rates (mg/cm^2/30d) for samples collected in 2016 along the Meadowbank AWAR in areas undergoing dust suppression trials. Values in parentheses are duplicates. NA = not available (lost sample jar, or location inaccessible).

Side of Road	Distance from Road (m)	Fixed Dustfall (mg/cm^2/30d)							
		TETRA Flake (km 11)		Dust Stop™ (km 50)		Speed Limit (km 25)		Reference (km 18)	
		Jul.	Aug.	Jul.	Aug.	Jul.	Aug.	Jul.	Aug.
West (upwind)	1000	0.062 (NA)	0.029	0.083	0.068	0.083	0.206	0.034	0.044
	300	0.034	0.088	0.083	0.076	0.110	0.140	0.083	0.208
	150	0.096	0.228	0.158	0.129	0.257	0.283	0.255	0.191
	100	0.090	0.279	0.103	0.213	0.207	0.353	0.227	0.298
	50	0.124	0.455	0.269	0.296	0.255	0.331	0.510	0.875
	25	0.372	1.058	0.579	NA	0.771	4.099	0.448	0.771
East (down wind)	25	0.048	0.360	0.840	0.312	0.220	0.375	0.565	0.588
	50	0.179	0.242	0.379	NA	0.158 (0.186)	0.235	0.269	0.367
	100	0.083	0.242	0.103	0.160	0.275	0.171	0.179	0.272
	150	0.048	0.176	0.062	0.099	0.062	0.118	0.152	0.197
	300	0.069	0.146	0.055	0.076	0.145	0.148	0.158	0.094
	1000	0.076	0.088	0.021	0.076	NA	NA	NA	NA

Table 4. 30-d total and fixed dustfall rates for samples collected from two transects (1 & 2) in two locations without dust suppression (km 18 and 78) in 2016 along the Meadowbank AWAR. Values in parentheses are duplicates. NA = not available (lost sample jar, or location inaccessible).

Side of Road	Distance from Road (m)	km 18				km 78			
		Total Dustfall ($mg/cm^2/30d$)		Fixed Dustfall ($mg/cm^2/30d$)		Total Dustfall ($mg/cm^2/30d$)		Fixed Dustfall ($mg/cm^2/30d$)	
		1	2	1	2	1	2	1	2
West (upwind)	1000	0.228	0.125	0.191	0.073	0.236	0.357	0.106	0.076
	300	0.191	0.214	0.162	0.163	0.160	0.239	0.122	0.213
	150	NA	0.213 (0.220)	NA	0.176 (0.162)	0.258	0.258	0.220	0.220
	100	0.274	0.294	0.249	0.242	0.312	0.365	0.281	0.342
	50	0.588 (0.634)	0.566	0.588 (0.600)	0.522	0.821	0.790	0.790	0.752
	25	0.911	1.242	0.823	1.183	1.193	1.463 (1.672)	1.155	1.392 (1.604)
East (down-wind)	25	1.041	0.660	0.992	0.600	1.018	1.452	0.973	1.383
	50	0.389	0.463	0.367	0.411	0.410	0.441	0.380	0.410
	100	0.353 (0.331)	0.250	0.316 (0.301)	0.198	0.281	0.281	0.251	0.266
	150	0.235	0.206	0.213	0.163	0.228	0.220	0.205	0.205
	300	0.206	0.147	0.162	0.103	0.160	0.175	0.137	0.144
	1000	NA	NA	NA	NA	NA	NA	NA	NA

3.3 QA/QC

3.3.1 Field Duplicates

The relative percent difference (RPD) values calculated for fixed dustfall for duplicate canisters were 14, 2, 5, and 8% at distances of 25, 50, 100, and 150 m from the road, respectively (regular monitoring program). In addition one duplicate was collected where speed limit reductions were tested, at a distance of 50 m from the road, with and RPD of 16%. These values were within the range of those occurring in previous years.

3.3.2 Travel Blanks

One travel blank was assessed, with a measured total dust content of 2 mg. This is less than 5x the reportable detection limit of 1 mg, so no impacts to the data due to contamination during shipment and handling are expected.

SECTION 4 • DISCUSSION

4.1 DUST SUPPRESSION PILOT STUDY

Results of the dustfall sampling are compared in Figure 5 and 6. For the July event (Figure 5), reference samples were collected from one transect at km 18 only. For the August event, samples from three transects at km 18 and two transects at km 78 are included as reference values (i.e. all data from both the dust suppression pilot study and regular sampling program), and the maximum and minimum result for each distance from the road is presented.

During the first month after application of dust suppressants (Figure 5), only TETRA Flake produced a reduction in measured fixed dustfall compared to the reference site for all distances from the road. Both TETRA Flake and Dust Stop™ reduced the distance from the road at which measured dustfall dropped below the range of background values, particularly on the downwind side of the road. Changes in speed limit to 20 km/h did not appear to have a substantial effect on measured dustfall.

During the second month after application, no substantial differences in measured dustfall were observed between trial plots at and beyond a distance of 100 m. At a distance of 50 m, dustfall rates were lower than the minimum reference value at all three dust suppressant locations (Dust Stop™ result unavailable for 50 m east). Similarly, all three suppressants reduced dust compared to the minimum reference value at 25 m on the east side of the road. On the west side, only TETRA Flake and speed limit results were available. The measured value for the TETRA Flake zone was between the minimum and maximum reference sites. The measured value for the speed limit reduction zone was substantially higher than any fixed dustfall value recorded to date (4.099 $mg/cm^2/30d$), so can likely be considered an outlier, and was excluded from the figure to facilitate interpretation.

These data, combined with the visual assessment indicate that generally, TETRA Flake provides the greatest reduction in dustfall rates. Effects are especially apparent during the first month after application. Measured dustfall in the TETRA Flake test zone during the first month was within the range of background values at all distances from the road, except the closest sampling point (25 m) on the downwind side.

Furthermore, consultations with road maintenance crews indicated that the TETRA Flake product application was more straightforward and less time-consuming than the Dust Stop™ application, likely resulting in more efficient dust control. It was also determined that it would be difficult from a management perspective to effectively control speed limits in specific zones. These additional factors provide further rationale for use of TETRA Flake in future years.

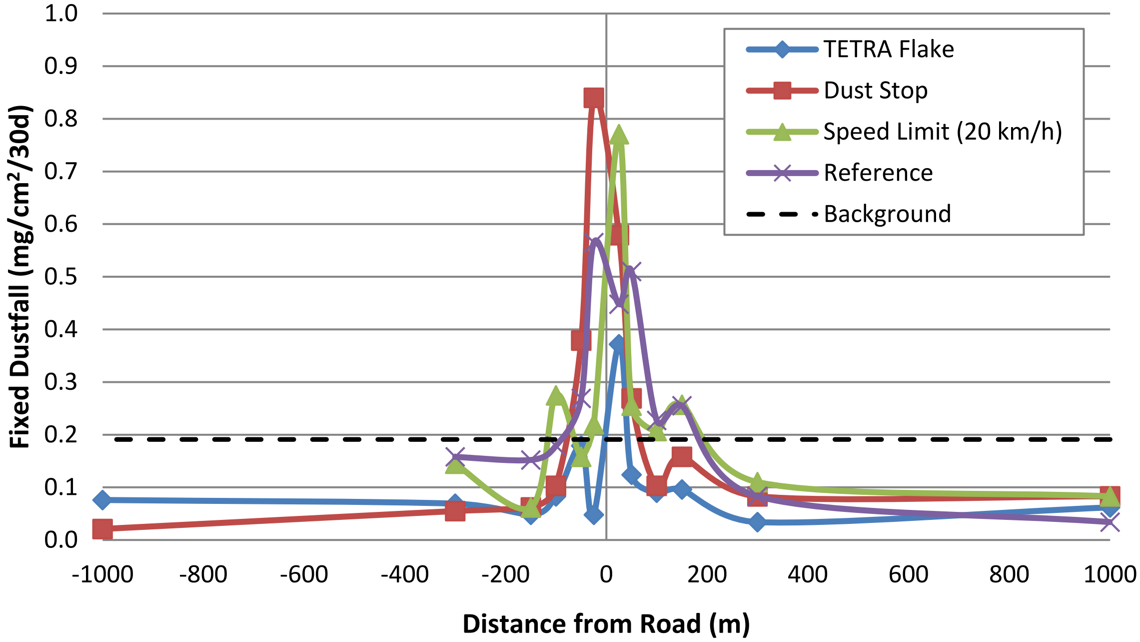

Figure 5. Month 1 - Measured rates of fixed dustfall at 25. 50, 100, 150, 300, and 1000 m on both upwind (positive) and downwind (negative) sides of the Meadowbank AWAR in a references location and areas of dust suppression trials. Samples were collected over 32 days immediately following dust suppressant application. Dashed line represents the highest recorded background dustfall rate (1000 m upwind, km 18, 2016). No regulatory guidelines are available for fixed dustfall.

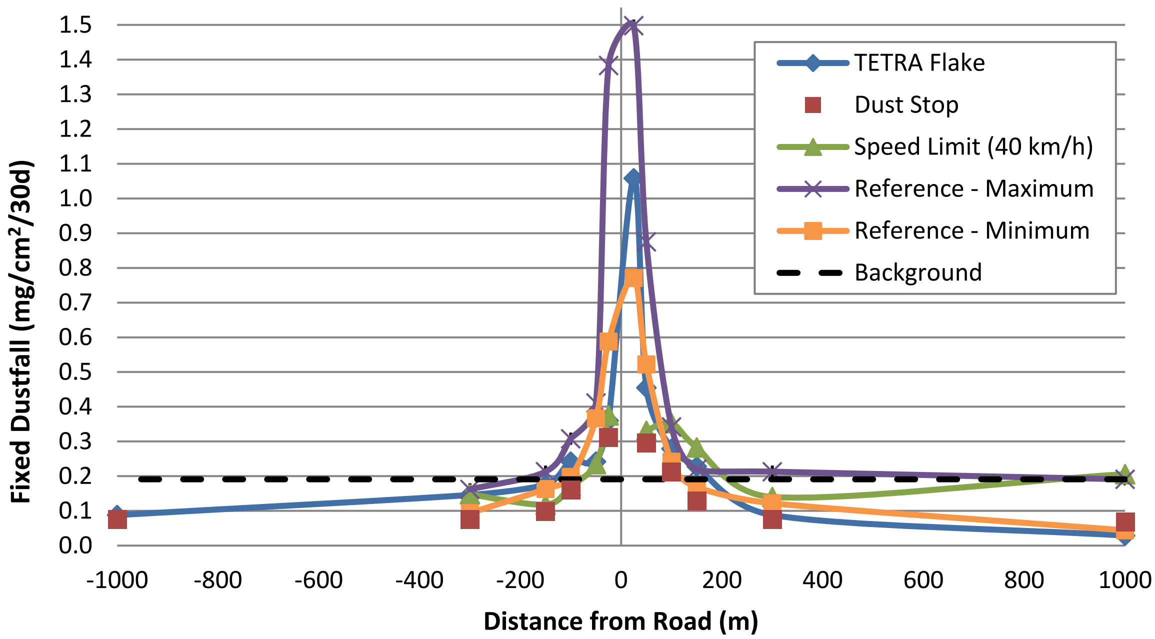

Figure 6. Month 2 - Measured rates of fixed dustfall collected at 25. 50, 100, 150, 300, and 1000 m on both upwind (positive) and downwind (negative) sides of the Meadowbank AWAR in 2016 in a references location and areas of dust suppression trials collected over 29 days beginning 32 days after dust suppressant application. The sample from -25 m for the speed limit test (4.099 mg/cm^2/30d) is omitted as an outlier, and to facilitate visual interpretation of the graphed data in this report. Dashed line represents the highest recorded background dustfall rate (1000 m upwind, km 18, 2016). No regulatory guidelines are available for fixed dustfall.

4.2 REGULAR SAMPLING PROGRAM

All results collected along the Meadowbank AWAR to date in the absence of dust suppression are presented in Figure 7 in relation to Alberta Environment guidelines for total dustfall and the range of background values observed to date. Results from canisters for the one transect at km 18 set in July, 2016, were excluded for consistency, since all other sampling programs were conducted in August. Dustfall rates in July were generally lower than those in August (see Section 4.2.3). The range of background concentrations (grey bar) was determined from 2 samples collected at an established external reference site (near Inuggugayualik Lake) in 2014, 22 samples collected along the proposed Amaruq AWAR route in 2015, and 5 samples collected at 1000 m upwind of the road at km 18 and 78 in 2016.

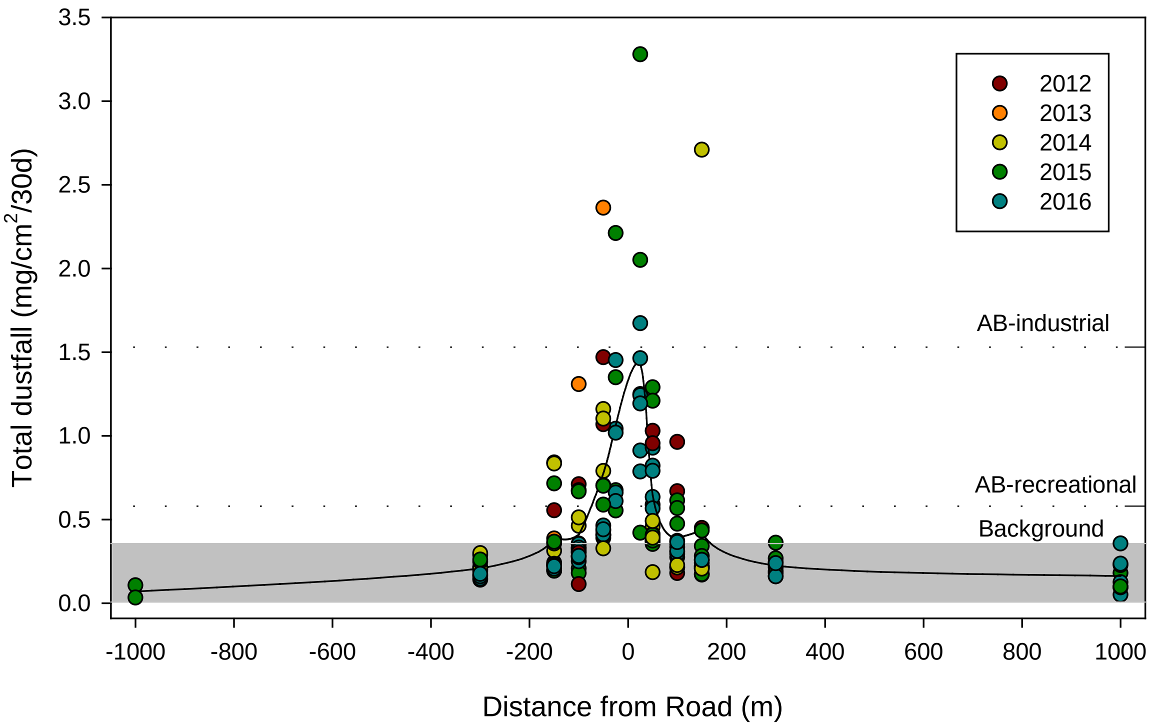

Figure 7. Total dustfall rates (mg/cm^2/30d) for all samples collected since 2012 along the Meadowbank AWAR. Negative distances represent the downwind (east) side of the road, and positive distances represent the upwind (west) side. Solid line represents the average total dustfall rate.

In addition to the results shown in Figure 7 for the Meadowbank AWAR, extra samples were collected on the Meadowbank site in 2013 and 2014 at 50 m from the road at the emulsion plant turnoff (AWAR km 103), and in one location along the Vault haul road. Assessment of those exploratory samples was discussed in prior reports (e.g. AWAR Dustfall Study Report, 2015). Dustfall samples are also collected continually throughout the year at four locations around the Meadowbank site as a component of the Air Quality and Dustfall Monitoring Program, and results are presented in Meadowbank's Annual Report to NIRB/NWB.

4.2.1 Comparison to Regulatory Guidelines and Background Values

To date (2012 – 2016), 6 samples have exceeded the Alberta Environment total dustfall guideline for industrial areas of 1.58 mg/cm^2/30d, with 5 out of 6 occurrences at the 25 or 50 m distance (i.e. within the zone where all habitat was assumed lost in the FEIS). One sample exceeded the industrial guideline at 150 m (upwind) in 2014, but all other samples at that distance have been well below the recreational area guideline, suggesting an anomaly occurred either due to natural variability, sample interference, or sampling/analytical error.

At and beyond the 100 m distance (smallest assumed ZOI), the majority of samples have been below the Alberta Environment recreational area guideline of 0.53 mg/cm^2/30d. In total, 11 out of 101 samples collected at this distance have exceeded the guideline, all at 100 or 150 m (none in 2016).

Average total dustfall to date at 100 and 150 m is below the guideline for recreational areas, at 0.403 and 0.398 mg/cm^2/30d, respectively (n = 37 and 32).

All samples collected at the 300 or 1000 m distance have been within the range of background values measured to date (0.007 – 0.357 mg/cm^2/30d). Average dustfall rates meet background values between 100 and 200 m from the road.

4.2.2 Trends Over Time

While sampling effort for each distance has varied by year, the results provided in Figure 7 do not demonstrate any clear trends towards increasing rates of dustfall along the Meadowbank AWAR.

An examination of the reference transect data (km 18) for July and August samples (Table 2) indicates that overall dustfall rates are higher in August. This is likely due to increased traffic rates due to arrival of goods into Baker Lake by barge and subsequent shipment to the Meadowbank site. This data supports the decision of Agnico Eagle to run the dustfall monitoring program in August, in order to obtain results representative of the highest dustfall rates.

4.2.3 Effect of Distance from the Road

Results of the 2012-2016 AWAR dustfall studies have shown that average dustfall rates decline by more than 70% from 25 m to 100 m on the downwind (most impacted) side of the AWAR, from an average of 1.35 mg/cm^2/30d (n = 8) at 25 m to 0.41 mg/cm^2/30d (n = 20) at 100 m (km 18, 76 and 78 data; all study years combined). A further halving of dustfall rates to an average of 0.21 mg/cm^2/30 d (n=15) occurs by 300 m.

SECTION 5 • CONCLUSIONS

5.1 REGULAR MONITORING PROGRAM

Under assumptions of continuous, long-term dust emissions from AWAR traffic, the FEIS predicted that effects of dust on vegetation and wildlife would not be significant, even without the use of mitigation measures such as minimizing traffic and applying dust suppressants. Results of AWAR monitoring to date continue to indicate that the majority of dust does settle within 100 m of the road, as predicted. In addition, average rates of dustfall decline below Alberta Environment's guideline for recreational areas within 100 m, and meet the range of background dustfall rates within 200 m of the AWAR. Based on these results, it is unlikely that FEIS predictions with respect to VECs (vegetation community productivity and wildlife) are being exceeded due to dust. As described in past reports (2015 AWAR Dustfall Study Report), these results are supported by wildlife monitoring conducted under the Terrestrial Ecosystem Management Plan, including field surveys and the Wildlife Screening Level Risk Assessment.

Nevertheless, Agnico Eagle plans to apply dust suppressant at various set locations along the AWAR in 2017, based on results of the 2016 dust suppressant pilot study, as described below.

5.2 DUST SUPPRESSION PILOT STUDY

Results of the visual assessment and dust sampling program indicate that TETRA Flake is the optimal product for dust control on the Meadowbank AWAR.

SECTION 6 • 2017 DUST SUPPRESSANT APPLICATION

6.1 LOCATIONS AND TIMING

In 2017, Agnico Eagle plans to apply TETRA Flake to the three areas of concern along the AWAR identified by the HTO, as well as to the locations previously treated in the hamlet of Baker Lake and near the Meadowbank site. Agnico Eagle also identified two additional areas of concern between km 50 – 89 (the northern limit for public use), where dust suppressant will be applied, based on the same principles identified to be of concern to the HTO (generally, proximity to water). These locations are identified in Figure 8. The planned locations and rationale are as follows:

Table 5. Planned locations for dust suppressant application in 2017.

AWAR Location	Rationale
Agnico Eagle spud barge area	High traffic area near hamlet
Agnico Eagle tank farm to Arctic Fuel site	High traffic area near hamlet
km 0 - 5	High traffic area near hamlet
km 10 - 12	Area of concern to HTO – proximity to lake
km 24 - 26	Area of concern to HTO – proximity to lake
km 48 - 50	Area of concern to HTO – water crossing
km 68 - 70	Location identified by Agnico Eagle – water crossing
km 80 - 84	Location identified by Agnico Eagle – proximity to water & crossing
Emulsion plant turn off to Meadowbank site (km 103 – 110)	High traffic area

One application of TETRA Flake is planned for the summer 2017. The application of TETRA Flake is planned to be performed from mid-July to early August.

Agnico Eagle also continues to investigate alternative dust suppression products, but understands that a primary consideration is acceptability under Government of Nunavut regulations (Environmental Guideline for Dust Suppression, 2002).

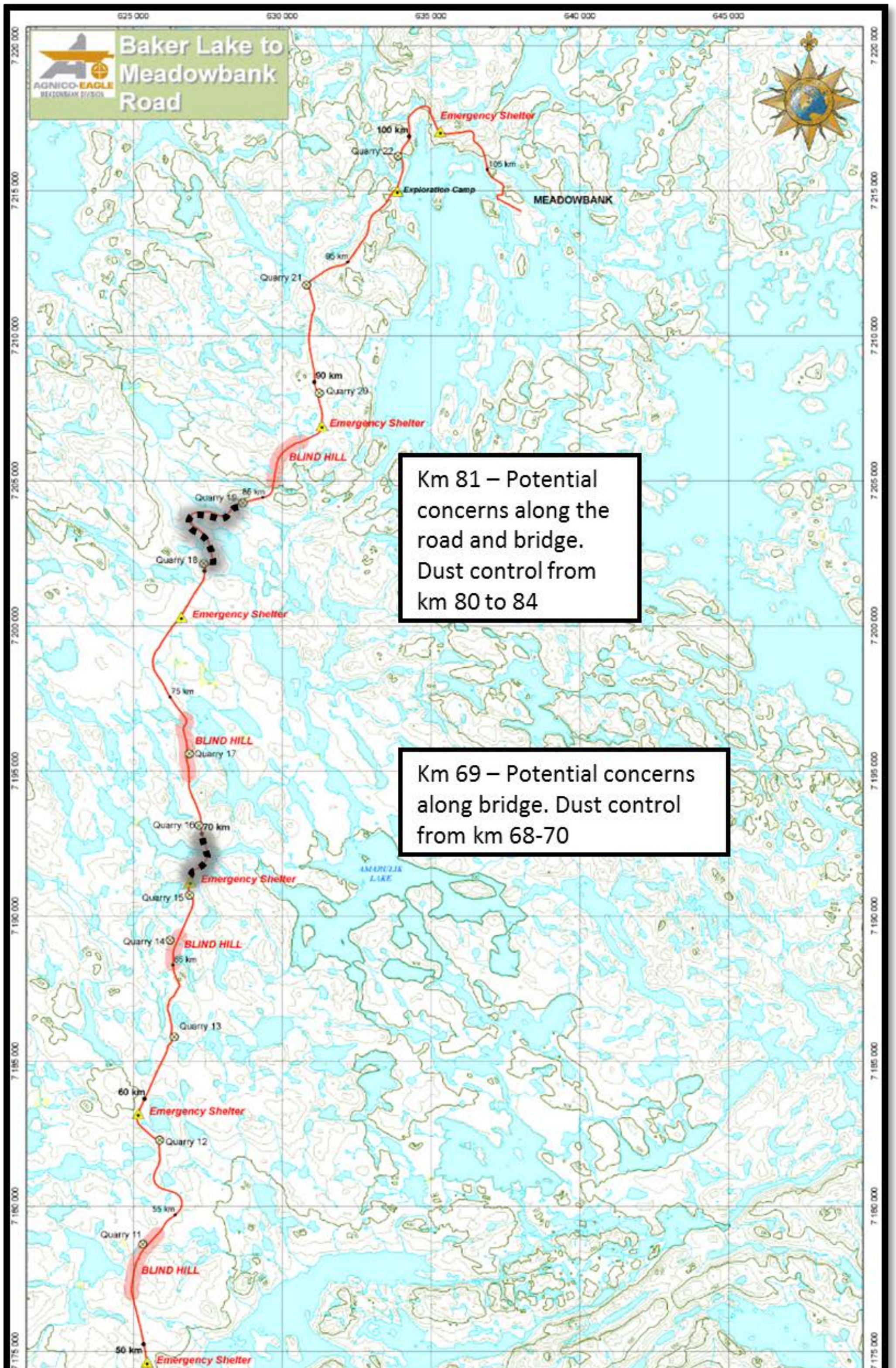

Figure 8. Supplemental areas for dust suppressant application in 2017, as identified by Agnico Eagle.

6.2 2017 AWAR DUSTFALL MONITORING PROGRAM

6.2.1 Dust Suppression Monitoring

Dustfall monitoring in 2017 will focus on confirming that reductions in dustfall continue to occur as a result of dust suppressant application in the five identified areas of concern. As in 2016, dustfall canisters will be deployed immediately following TETRA Flake application (planned for mid-July to early August), for a period of one month. A second round of sampling will follow, for an additional one month period. Dustfall sampling will occur at each of the five identified areas of concern along the AWAR, as well as at a reference location (km 18). For each TETRA Flake location, one transect will be sampled, with canisters located upwind and downwind at 25, 100, 300, and 1000 m from the road. Since the goal of the program is to confirm reductions in dustfall continue to occur, a lower spatial frequency of sampling is warranted compared to previous years. Each specific transect location will be determined based on field considerations, but they will be placed as close as possible to the middle of the segment where dust suppressant was applied. The specific locations will be recorded. For the reference location (km 18), a duplicated transect (canisters approximately 20 m apart, as in previous years) will be sampled, to better document natural variability under un-mitigated conditions. Visual observations will also be recorded every two weeks throughout the monitoring period.

6.2.2 Regular Dustfall Monitoring

In addition, the regular dustfall monitoring program will be continued at km 18 and 78, where no dust suppressant is applied. Samples will be collected in a duplicated transect at 25, 50, 100, 150, 300, and 1000 m from both sides of the roadway. As in previous years, samples will be collected mainly during the month of August, and will be deployed to coincide with timing of the dust suppression monitoring program. Canisters deployed at km 18 will be used as reference samples in this program.

SECTION 7 • REFERENCES

Alberta Environment, 2006. Guidelines for Quality Assurance and Quality Control in Surface Water Quality Programs in Alberta. Prepared by Patricia Mitchell Environmental Consulting. July, 2006. Web Site: http://www3.gov.ab.ca/env/info/infocentre/publist.cfm

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Pretium Resources Inc., 2013. Brucejack Gold Mine Project, 2012 Air Quality Baseline Report. Prepared by Rescan Environmental Services Ltd. April, 2013.

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APPENDIX A

Consultation Records

AGNICO EAGLE
MEADOWBANK

Field visit recap

Dust Assessment

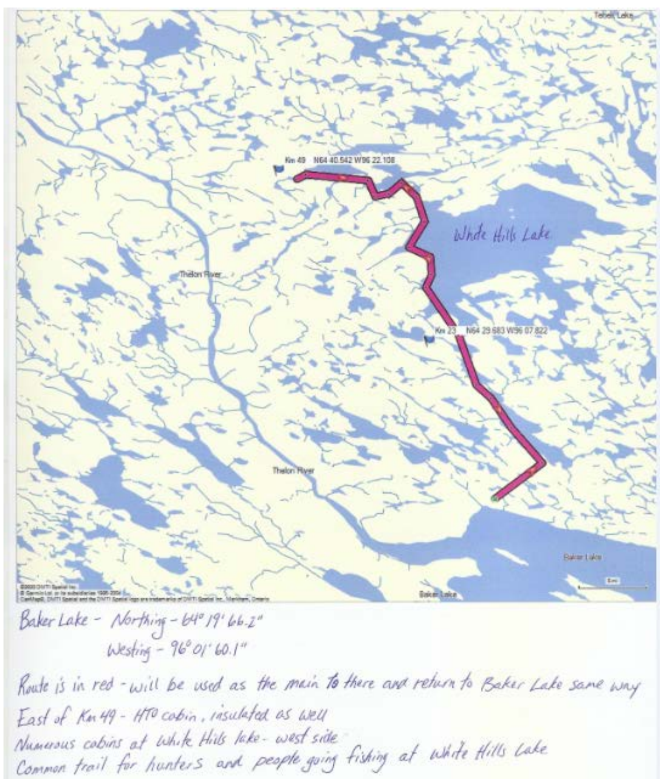
May 11, 2016 12:30 pm

Attendees –

Robin Allard	AEM Environmental Coordinator
Jamie Kataluk	AEM Environmental Sr Technician
Philippa Iksiraq	BL HTO
Thomas Anirnirq	BL HTO

The field visit started on the north side of the Baker Lake Hamlet. Snowmobiles were provided by Agnico Eagle and qamutik provided by Jamie Kataluk. HTO member were riding inside the protective enclosure of the sleigh with Agnico staff riding the snowmobiles. One machine pulling the qamutik. On site translation was done by Jamie Kataluk

See map of planned route below.



Departure was at 12:45. Heading north then east, the first stop was alongside the river at km 7 on the east side of the AWAR.

- *Comments were made about dust being visible in summer times. Creating a surface cloud on the water.*
- *Vegetation was also said to be dusty, on both sides of the road.*
- *No dark colored snow was visible.*

Next stop was north-west at km 10 and 11 along the AWAR.

- *Comments were made about dust being visible in summer times. Creating a surface cloud on the water.*
- *Vegetation was also said to be dusty, on both sides of the road.*
- *No colored snow was visible.*

Heading along the road, on the lake alongside the next stop was at km 22, 23 and 24.

- *Comments were made about dust being visible in summer times. Creating a surface cloud on the water.*
- *Vegetation was also said to be dusty, on both sides of the road.*
- *Visual - colored snow was observed on both side of the road.*
- *Comments were also made in regards to the diesel spill (tanker) that happened in 2010. Some remnant smell during summer and sheen was also reported at this area.*

Heading north on Whitehills Lake, we stopped at the northern edge of the lake. Distance from the road was roughly at 7 kilometers in strait line (km 47).

- *Comments were made about dust being visible in summer times.*
- *Water and fishes were mentioned to be different at this area, smaller in size and paler in color. Quantity being also smaller than in the past. Bottom of the lake also said to be different and water not as clear.*
- *No dark colored snow was visible.*

Heading west we stopped at the bridge at km 49.

- *Comments were made about dust being visible in summer times. Creating a surface cloud on the water.*
- *Dark colored snow was visible.*
- *Vegetation was also said to be dusty, on both sides of the road.*

We then proceeded east to a cabin on the edge of the lake.

- *Tea was served in the cabin. Unfortunately for logistic reason, snow and/or ice from the area was not used to prepare it. Hot water was brought from Baker.*
- *Stories of previous years hunting and fishing trips were told by the members of the HTO. Going as far back as memory could tell.*

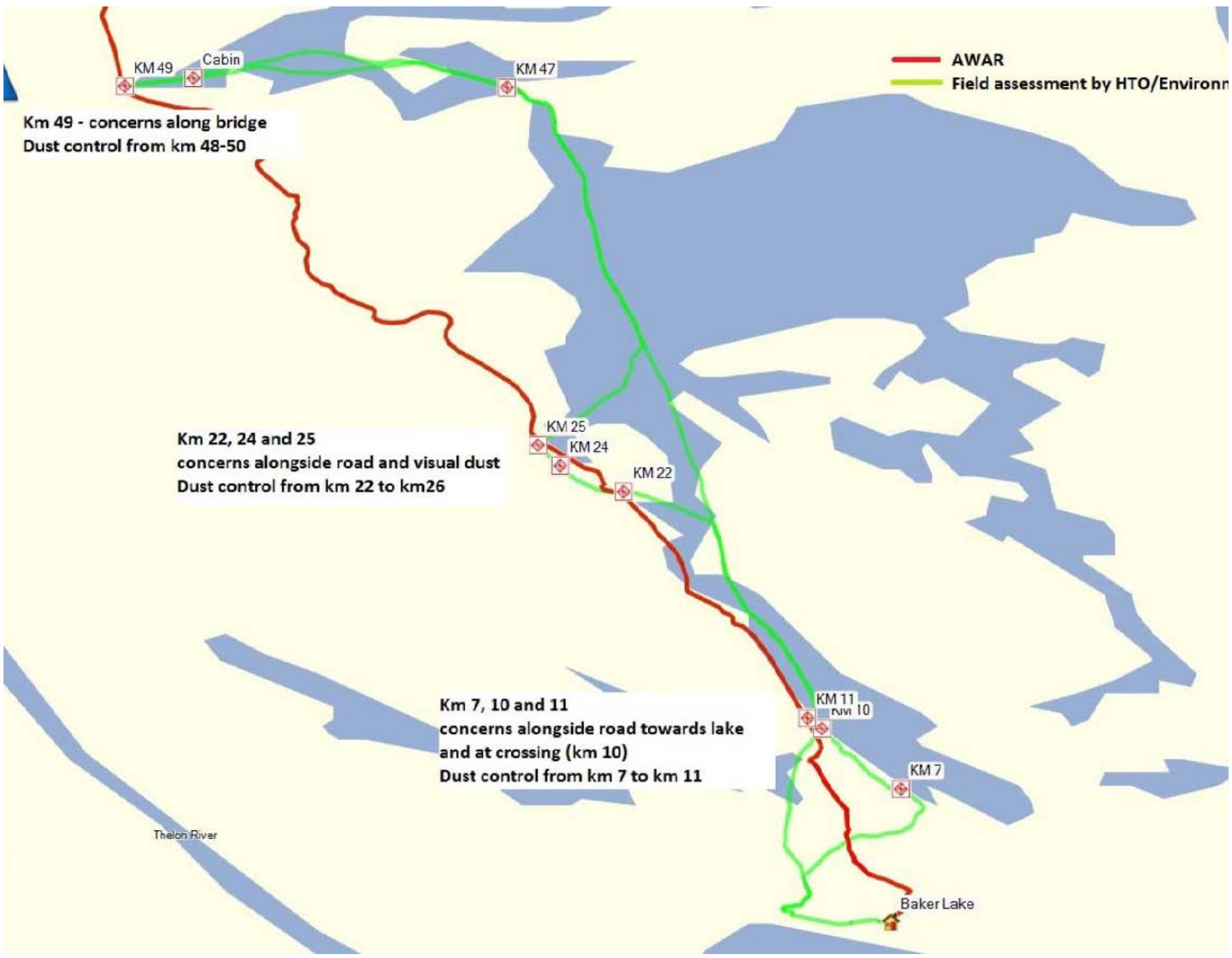
It was decided at this point to head back to Baker because of time of day and wind increasing. Arrival in Baker at 19:50.

Conclusion:

Field trip was useful to provide information on sensitive areas along Whitehills area. As well, it should help creating discussion channels with the HTO. HTO members present mentioned that once dust control has started on the AWAR, signs should be put to identify area. This suggestion was agreed to by Environment. A field study should be done in at least one of the areas of concern. Right now, km 1, 18, 78 and EMR are part of the dust sampling program. Ideally, areas of km 22-26 and 7-11 should be sampled.

Our intentions will have to be presented to the HTO at a future meeting.

See map below for proposed dust suppression that could be done on the AWAR.



APPENDIX B

Dust Suppressant Product Data Sheets

TETRA FLAKE DRY CALCIUM CHLORIDE

Product Data Sheet

TETRA CHEMICALS

General Description

TETRA Flake calcium chloride is a white, flaked, dihydrate product with 80 weight percent calcium chloride.

Applications

Chemical Industry. Provides good source of soluble calcium

Oilfield. Can be used as fluid for drilling, cementing, and workover operations

Ready Mix Concrete. Accelerates setting times

Snow and Ice Melting. Facilitates deicing on highways and pavement

Soil Conditioning. Stabilizes roadbeds and facilitates salt remediation

Availability

FLAKE PACKAGING			
Package	Pallet Size	Units/ Pallet	Pallets/ Truckload
50 lb Plastic Bag	A variety of palletization and stow options are available.		
1000 kg Bulk Bag			

TETRA Flake is made in the USA.

TETRA's new flake product is available for shipment from our El Dorado, Arkansas facility.

Safety and Handling

TETRA Flake dry calcium chloride when in solution forms a strong salt solution. Wear appropriate protective, impervious clothing. Wear safety glasses with non-flexible side shields or chemical goggles for proper protection of the eyes. Wear appropriate protective non-leather protective gloves and boots. Chemical protective gloves and boots such as PVC or Nitrile are recommended. Leather products do not offer adequate protection and will dehydrate with resultant shrinkage and possible destruction. This product should be handled in areas with proper ventilation. Before using this product, refer to the SDS which is available on the Company's website for complete safety and handling guidelines.

PHYSICAL PROPERTIES	
Chemical Formula	$CaCl_2 . 2H_20$
Appearance	White flakes
Bulk Density	Approx. 50 lb/cubic foot

CHEMICAL PROPERTIES	
Calcium Chloride ($CaCl_2$)*	80 wt% minimum
Total Alkali Chlorides as NaCl**	6.0 % maximum
Total Magnesium Chloride ($MgCl_2$)**	0.5% maximum
*EDTA titration similar to ASTM E449-08	
**Active ingredient basis	

PARTICLE SIZE	
Screen Number:	**Mass % Passing**
3/8 (9.5 mm)	100
4 (4.75 mm)	80-100
30 (0.59 mm)	0-5

TETRA Chemicals
24955 Interstate 45 North
The Woodlands, Texas 77380
Phone: 281.367.1983
Customer Service: 800.327.7817
Fax: 281.298.7150

www.tetrachemicals.com

Dust Stop

CYPHER ENVIRONMENTAL

Significantly reduce operational costs through better haul road management

Dust Stop is a 100% environmentally friendly, concentrated dust suppressant consisting of high-grade polymers specifically engineered for the mining industry. The solution is applicable to any soil type and is applied using standard equipment and techniques. Dust Stop is designed to be extremely flexible and can withstand the weight of even the world's heaviest haul trucks. It is also non-soluble, so it will not run off or get sticky in the rain, and will even maintain engineering properties of the road in wet weather.

- **Significantly reduces long term maintenance costs**
  - » Significant reduction in grading frequency
  - » Significant reduction in watering frequency
  - » Improved tire life
- **Reduction in maintenance requirements produces significant fuel savings**
  - » Resulting from minimal use of graders and water trucks to maintain roads
- **Improved productivity due to increased visibility, leading to increased haul truck speeds**
- **Improved engineering properties resulting in reduced rolling resistance**
  - » **Better fuel economy**
  - » **Further improvements in productivity**
  - » **Improved CBR Value**
- **Increased water resistance resulting in better performance in all weather conditions**
  - » **Reduction in maintenance requirements as a result of wet weather**
- **Long lasting results**

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Applications

- Haul Roads
- Secondary Roads
- Logging Roads
- Construction Sites
- Parking Lots
- Erosion Control
- Tailings Piles / Stock Piles
- Tarmacs, Runways & Helipads

Testimonials

Treating our roads would permit us to get going much sooner after heavy rain due to the fact that its (Dust Stop) stabilizing effect would allow us to maintain the proper profiling and allow rain water to run off.
– Mike Proulx, Acting Mine Manager of SMD Lefa Gold Mine, Guinea, West Africa

Since we have used it (Dust Stop), we have had no issues with dust and are happy with its long lasting capabilities – once cured, it is insoluble in the rain.
– Jose Fernandes, Airfields Maintenance Supervisor, Pierre Elliott Trudeau Airport, Montreal, Quebec

Even with an extremely wet summer, we were pleased with the performance of this product. We are definitely planning to use Dust Stop again next season.
– Richard Gamble, Mayor, Village of Dunnottar, Manitoba

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