Memorandum

Date:	March 18, 2016
To:	John Roberts, VP Environmental Affairs Katsky Venter, Environmental Advisor
From:	Philip Porter (B.A.Sc., P. Eng.), Senior Consultant
Cc:	Erin Forster (B.Sc., R.P.Bio.), Project Manager Marc Wen (M.Sc., R.P.Bio.), Partner in Charge
Subject:	**Doris North Project 2015 Dustfall Compliance Monitoring Program**

In response to the commencement of the construction of Pad T, the Mill Pad and anticipated crusher activity in 2015, TMAC Resources Ltd. (TMAC) contracted ERM Consultants Canada Ltd. (ERM) to collect and analyze total dustfall and sulphate, nitrate, and dust metal concentrations in 2015. Construction activities were monitored using three dustfall stations from June 3, 2015 to October 3, 2015. Construction and crushing activities were then monitored using five stations from October 1, 2015 to November 26, 2015.

All dustfall results were below the Alberta Ambient Air Quality Guideline for commercial and industrial areas. One dustfall station, CDF6, from July 29 to August 31, 2015 had total dustfall concentrations that were above the Alberta Ambient Air Quality Guideline for residential and recreation areas. The total dustfall at CDF6 during this period was found to be 3.77 milligrams per square decimetre per day (mg/(dm^2-d)). The 3.77 mg/(dm^2-d) result is 250% higher than the 2nd highest dustfall result in 2015 and therefore could be a data outlier associated with possible sample contamination.

All acid deposition results were below any of the Canadian Council of Ministers of the Environment (CCME) calculated critical loads of acid deposition for forest soils for provinces in Canada. The highest acid deposition calculated was 234 acid equivalents per hectare per year (eq/ha/yr) at CDF5 during the June 30 to July 29, 2015 monitoring period.

Of the 33 metals that were analyzed, 11 (antimony, beryllium, bismuth, boron, cadmium, lithium, mercury, molybdenum, selenium, thallium and tin) were consistently below the detection limit. All other metals had at least one reading during the sampling period that was above the detection limit; however, there are no guidelines by which to directly compare these results. Overall, metals were close to or below detection limits at each dustfall station throughout the sampling period.

1. BACKGROUND

The Nunavut Water Board (NWB) Type A Water Licence No. 2AM-DOH1323 (the Water Licence; renewed August 16, 2013) outlines the following dustfall monitoring requirements for the Doris North Project (the Project):

- Part D, Item 8: *The Licensee shall submit an annual Construction Monitoring Report no later than March 31 in the year following the calendar year being reported. The report shall be developed in accordance with Schedule D Item 1.*
- Schedule D, Item 1: *The Construction Monitoring Report referred to in Part D, Item 8 shall include the following, where applicable*:
  - (f) *Monitoring of dust generation and use of water by the contractor to manage dust emissions from crushing and construction activity.*

The Air Quality Management Plan (AQMP) also includes a commitment to monitor dustfall related to construction and crushing in order to fulfil the Water Licence requirements (TMAC 2015). In response to the commencement of the construction of Pad T, the Mill Pad and anticipated crusher activity in 2015, TMAC contracted ERM to collect and analyze total dustfall and sulphate, nitrate, and dust metal concentrations in 2015. Both crusher and construction monitoring are required under the Water Licence and AQMP. Mill Pad drilling and blasting occurred between late June and September, and Pad T preparation and construction continued from the summer until the end of the year. A crusher was operated in Quarry 2 from late September onwards. This memorandum summarizes the results of the Doris North Project 2015 Dustfall Compliance Monitoring Program, including total dustfall, nitrate, sulphate, and dust metal deposition rates. Acid deposition, which is calculated based on nitrate and sulphate deposition rates, is also included.

2. METHODS

Dustfall collection is a passive monitoring method which provides a measure of particulates that would be directly deposited onto vegetation or soil. There are various sampling methodologies available, but the basis of all methodologies is that canisters are exposed in the field to collect and retain ambient dustfall. The canisters are then sent to a laboratory for analysis after a set exposure period. Results of the monitoring program can be used to modify dust management procedures at site, if required. However, sampling does not occur in "real time" and, consequently, a delay exists between the events that lead to any elevated dustfall, the receipt of monitoring results, and the implementation of changes to dustfall management. Real-time dust management occurs through application of water or chemical (EK-35) dust suppressants based on on-site observations of dust generation. Water usage is tracked and reported in the Water Licence monthly and annual reports filed with the NWB.

In 2015, dustfall was monitored in accordance with the ASTM D1739-98 sampling method (ASTM 2010). This method requires the use of containers of a standard size and shape, which are sealed in a laboratory. Two dustfall sample bottles were deployed at each station in order to collect enough sample quantity for all parameters to be analyzed and to also act as a form of redundancy in case one of the samples became void. The containers were installed on a 2 metre (m) pole, surrounded by a windscreen and were exposed to the atmosphere for roughly 30 days (Plates 2-1 and 2-2). The windscreen around the sample container improved dustfall collection efficiency and bird spikes were used to minimize contaminants from bird faeces. The samplers collected particles small enough to pass through a 1 millimetre (mm) screen and large enough to settle by virtue of their weight. Dustfall containers were filled with deionized water and algaecide to prevent algae

from interfering with dustfall measurements. During sampling periods when air temperatures were below 0 degrees Celsius (°C), an isopropyl alcohol based solution was added to the dustfall monitoring station canisters to reduce captured precipitation from freezing. The stations were checked regularly to ensure that the canisters did not overfill or evaporate.

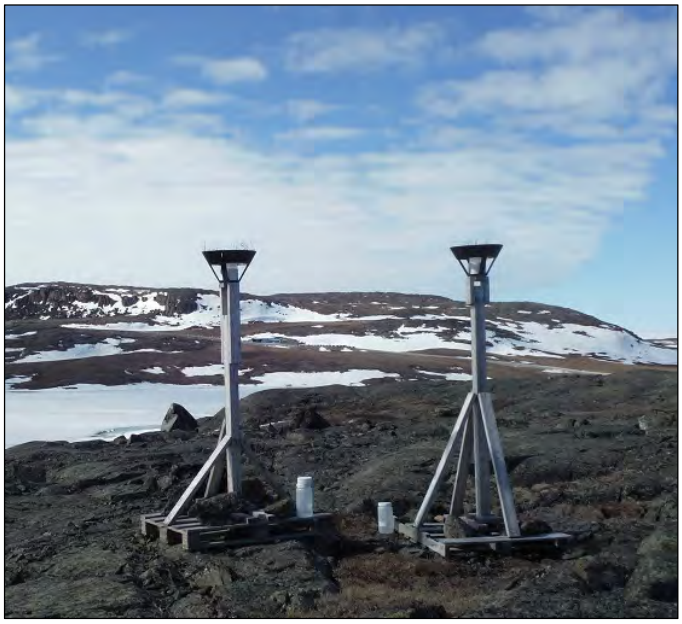

Plate 2-1. Dustfall Monitoring Station CDF7 (June 2015).

Plate 2-2. Dustfall Monitoring Station CDF4 (October 2015).

At the end of the sampling period, dustfall canisters were collected and sent to ALS Laboratory Group (Canadian Association for Laboratory Accreditation [CALA] accreditation no. 1719) for analysis. The condition of the canisters was evaluated at the time of collection. If canisters were

found to be full of precipitation upon collection, indicating the canister overflowed, the dustfall canister was not sent for analysis because the sample was considered void. In 2015, no dustfall samples were considered void due to overflowing precipitation despite unusually high quantities of precipitation in July.

Both containers were combined for each station and sampling period at the laboratory so that enough material was present to conduct the analysis. The combined samples were then analyzed for particulates (total, soluble, and insoluble), anions (sulphate, nitrate, chloride, and ammonia) and for total metals. Acid deposition was calculated by adding nitrate and sulphate deposition and converting mg/(dm^2-d) to eq/ha/yr. Acid equivalent is determined by how much nitrate would form nitric acid and how much sulphate would form sulphuric acid in air. The formation of these acids in the atmosphere can then be deposited on the ground by rain, known as acid rain. Laboratory analysis sheets from the 2015 construction monitoring period can be found in Appendix A.

Nunavut does not have established siting requirements for ambient air samplers. Therefore, the siting criteria provided by the BC MoE (BC MoE 2009) and from the United States Environmental Protection Agency (US EPA) methods (US EPA 2009 and US EPA 1999) were used. The monitoring locations were selected based on the following:

- the samplers were not in an area of future infrastructure development;
- the samplers were sited up and down wind of the surface facilities and zones of high activity, taking into account the dominant wind direction during the summer months;
- the samplers were more than 20 m away from structures, vegetation and topographic features; and
- the samplers could be safely accessed.

Three dustfall stations (CDF5, CDF6, and CDF7) were initially installed to monitor construction activities from June 3, 2015 to October 3, 2015 in a northeast to southwest direction (Figure 2-1; Table 2-1). In early October 2015, it was determined that dustfall stations should conform to the Air Quality Management Plan (AQMP) locations used during previous construction periods to facilitate comparability between years. As such, stations CDF1, CDF2, and DFA1 were activated between October 1 and 3, 2015 and CDF5, CDF6, and CDF7 were deactivated October 1, 2015. Two additional dustfall stations were also activated on October 1, 2015: CDF4, to monitor crushing activities near the Doris North Quarry 2, and TIA DF, a location downwind (i.e., at the southeast end) of the Tailings Impoundment Area (TIA), to capture baseline data for the Water Licence Amendment Application.

These five stations (Figure 2-1; Table 2-1) were active from October 1 to October 23, 2015. After that time, CDF4 blew over in high winds and the dustfall canisters were considered void and were not analyzed. TIA DF was no longer accessible as a helicopter was not available and the snowpack was not sufficient for snowmobile travel. The remaining three stations (CDF1, CDF2, and DFA1) were operated until sample collection, between November 20 and 26, 2015.

Figure 2-1
Project Dustfall Locations - Construction 2015

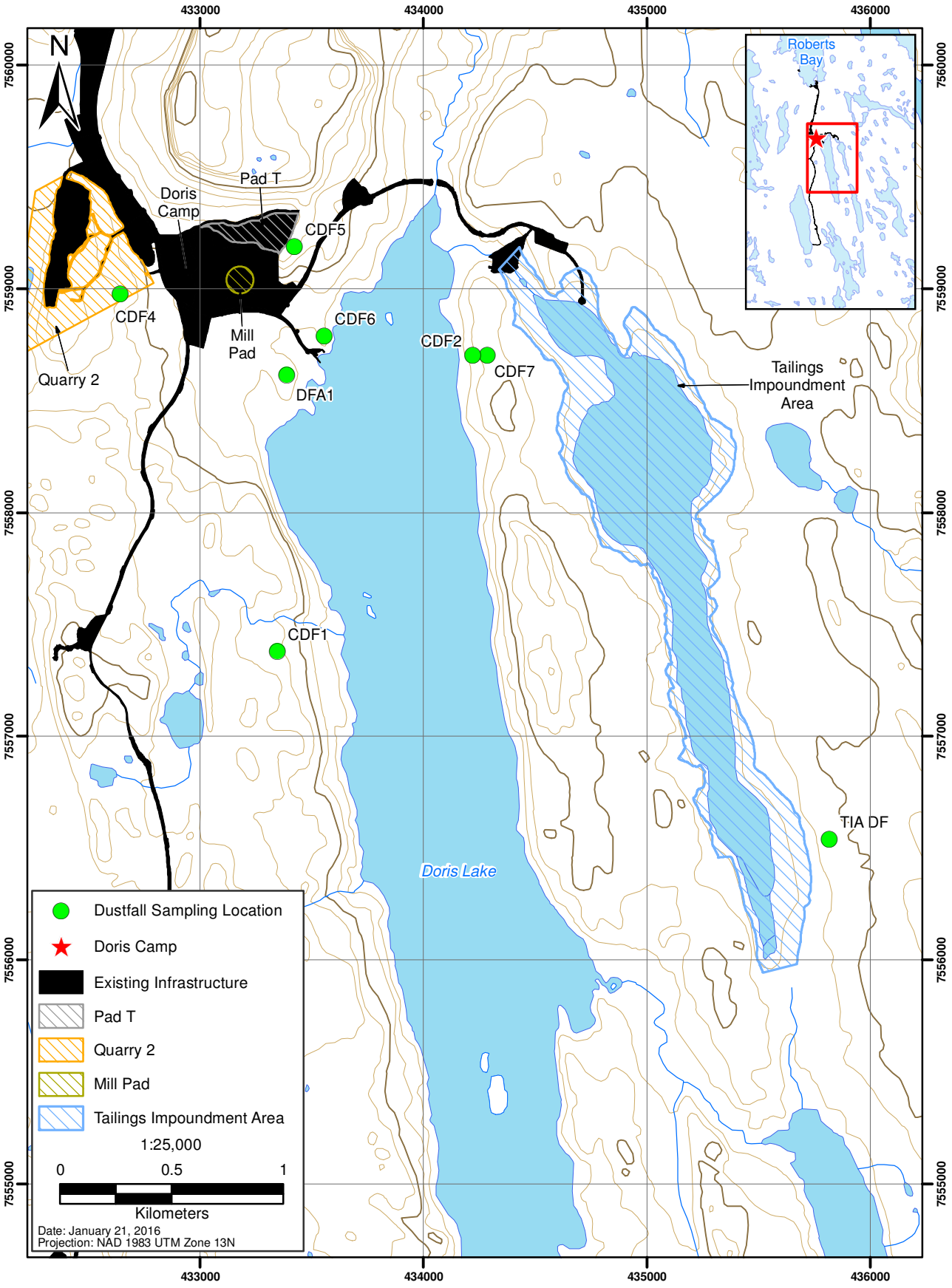

Table 2-1. Dustfall Station Summary, Doris North Project, 2015

Dustfall Station	UTM Location (Zone 13W)		Monitoring Period		Purpose
	Easting	Northing	Start Date	End Date	
CDF1	433345 m	7557380 m	Oct 1, 2015	Nov 26, 2015	Monitor dustfall during construction activities at Pad T and crushing activities.
CDF2	434219 m	7558704 m	Oct 3, 2015	Nov 20, 2015	Monitor dustfall during construction activities at Pad T and crushing activities.
CDF4	432642 m	7558980 m	Oct 1, 2015	Oct 21, 2015	Monitor dustfall during construction activities at Pad T and crushing activities.
CDF5	433421 m	7559188 m	Jun 3, 2015	Oct 1, 2015	Monitor dustfall during construction activities at Pad T.
CDF6	433555 m	7558791 m	Jun 3, 2015	Oct 1, 2015	Monitor dustfall during construction activities at Pad T.
CDF7	434286 m	7558704 m	Jun 3, 2015	Oct 1, 2015	Monitor dustfall during construction activities at Pad T.
DFA1	433388 m	7558617 m	Oct 1, 2015	Nov 20, 2015	Monitor dustfall during construction activities at Pad T and crushing activities.
TIA DF	435818 m	7556540 m	Oct 1, 2015	Oct 20, 2015	Baseline data collection for the TIA.

Dustfall results are prorated by the laboratory to a 30-day average. Nunavut does not currently have dustfall guidelines or standards, thus dustfall results were compared to the Alberta Ambient Air Quality Guidelines of 5.27 mg/(dm^2-d) for commercial and industrial areas and 1.77 mg/(dm^2-d) for residential and recreation areas (Alberta Environment 2013). Calculated acid deposition rates were compared against CCME critical loads of acid deposition for forest soils for provinces in Canada (Aherne 2008). In addition, temporal trends in total dustfall and acid deposition were examined to determine whether any trends in measured concentrations were apparent in 2015, with consideration to the project activity, time of year and meteorological conditions.

3. RESULTS AND DISCUSSION

Table 3-1 summarizes the total dustfall results obtained during construction activities in 2015. Alberta dustfall guidelines were used for comparison to the dustfall samples.

All dustfall results were below the guidelines except for dustfall station CDF6 from July 29 to August 31, 2015 which was greater than the Alberta Ambient Air Quality Guideline of 1.77 mg/(dm^2-d) for residential and recreational areas, but less than the Alberta Ambient Air Quality Guideline of 5.27 mg/(dm^2-d) for commercial and industrial areas. The total dustfall at CDF6 during this period was found to be 3.77 mg/(dm^2-d). CDF6 was located directly downwind of construction activity at Pad T and therefore increased construction activities in August 2015 may account for the elevated reading at this site at this time. The 3.77 mg/(dm^2-d)

result is 250% higher than the next highest dustfall result in 2015 and therefore could be an outlier associated with possible sample contamination.

Table 3-1. Total Dustfall Results, Doris North Project, 2015

Dustfall Station	CDF5	CDF6	CDF7	CDF1	CDF2	CDF4	DFA1	TIA DF	Monitoring Period Average[a]
Date	mg/(dm²-d)								
Jun 3 – 30, 2015	0.94	0.88	0.89	-	-	-	-	-	**0.90**
Jun 30 – Jul 29, 2015	0.54	<0.10	<0.10	-	-	-	-	-	**0.21**
Jul 29 – Aug 31, 2015	1.08	*3.77[b]*	0.33	-	-	-	-	-	**1.73**
Aug 31 – Oct 1, 2015	0.94	0.57	0.51	-	-	-	-	-	**0.67**
Oct 1 – 23, 2015	-	-	-	<0.14	<0.17	0.63	0.22	<0.16	**0.22**
Oct 23 – Nov 26, 2015	-	-	-	0.40	0.33	-	0.46	-	**0.40**
Dustfall Station Average[a]	**0.88**	**1.32**	**0.45**	**0.24**	**0.21**	**0.63**	**0.34**	**0.08**	

[a] Values below the detection limit (0.10 mg/(dm²-d)) were considered to be half of the detection limit for calculation purposes.
[b] The total dustfall at CDF6 from Jul 29 – Aug 31, 2015 exceeded the Alberta Ambient Air Quality Guideline of 1.77 mg/(dm²-d); however, it was below the Alberta Ambient Air Quality Guideline of 5.27 mg/(dm²-d).

Dustfall concentrations during summer months appeared to be higher than in other months. Environmental effects (e.g., dry surface soils) may be responsible for these results as well as increased construction activities during the warmer summer months compared to fall months such as in October. Snow covered ground during the winter months also tends to suppress dust through reduced re-suspension and hence dustfall concentrations in the winter months tend to be lower than in the summer months when there is no snow cover. The results may also be related to the repositioning of the dustfall monitoring stations during this time. However, repositioning included the placement of a station in the immediate vicinity of the crusher (CDF4) where no station was previously located and included DFA1 which was similarly close to Pad T construction activity as the previously deployed CDF6.

Table 3-2 provides the nitrate and sulphate deposition rates for the dustfall locations and Table 3-3 provides the calculated acid deposition rates. Nitrate and sulphate concentrations were used to calculate acid deposition. Although there are no guidelines for nitrate and sulphate deposition specifically, results for each of these components are presented to show how they contributed to acid deposition.

All results were below any of the CCME published calculated critical loads of acid deposition for forest soils for provinces in Canada (Aherne 2008). The highest acid deposition calculated was 234 eq/ha/yr at CDF5 during the Jun 30 – Jul 29, 2015 monitoring period, which was about half of the guidance value for the province with the lowest mean critical load (i.e., Saskatchewan; 539 eq/ha/yr). The province with the highest mean critical load is Prince Edward Island with a value of 1,936 eq/ha/yr. There are currently no available CCME guidelines for critical loads of acid deposition for Nunavut.

Table 3-2. Nitrate and Sulphate Deposition Results – Construction Activities 2015

Dustfall Station	CDF5	CDF6	CDF7	CDF1	CDF2	CDF4	DFA1	TIA DF	Monitoring Period Average[a]
Date	mg/(dm²-d)[b]								
Nitrate Deposition									
Jun 3 – 30, 2015	0.0012	0.0009	0.0007	-	-	-	-	-	**0.0009**
Jun 30 – Jul 29, 2015	0.0036	0.0013	0.0010	-	-	-	-	-	**0.002**
Jul 29 – Aug 31, 2015	0.0015	0.0011	0.0008	-	-	-	-	-	**0.0011**
Aug 31 – Oct 1, 2015	0.0009	0.0006	0.0003	-	-	-	-	-	**0.0006**
Oct 1 – 23, 2015	-	-	-	0.0003	0.0008	<0.00069	0.0004	0.0003	**0.0004**
Oct 23 – Nov 26, 2015	-	-	-	0.0004	0.0005	-	0.0003	-	**0.0004**
Sulphate Deposition									
Jun 3 – 30, 2015	<0.028	<0.030	<0.026	-	-	-	-	-	**0.014**
Jun 30 – Jul 29, 2015	<0.037	<0.033	<0.033	-	-	-	-	-	**0.017**
Jul 29 – Aug 31, 2015	<0.020	<0.015	<0.015	-	-	-	-	-	**0.008**
Aug 31 – Oct 1, 2015	<0.029	<0.027	<0.026	-	-	-	-	-	**0.014**
Oct 1 – 23, 2015	-	-	-	<0.0071	<0.0036	<0.0039	<0.0071	<0.0087	**0.010**
Oct 23 – Nov 26, 2015	-	-	-	0.011	0.008	-	0.007	-	**0.009**

[a] *Values below detection limit were considered to be half of the detection limit for calculation purposes.*
[b] *Detection limits are variable due to the volume of sample left for analysis and the number of days monitored.*

Table 3-3. Calculated Acid Deposition Rates – Construction Activities 2015

Dustfall Station	CDF5	CDF6	CDF7	CDF1	CDF2	CDF4	DFA1	TIA DF	Monitoring Period Average[a]
Date	mg/(dm²-d)								
Jun 3 – 30, 2015	138	137	118	-	-	-	-	-	**131**
Jun 30 – Jul 29, 2015	234	159	151	-	-	-	-	-	**181**
Jul 29 – Aug 31, 2015	114	85	77	-	-	-	-	-	**92**
Aug 31 – Oct 1, 2015	134	119	107	-	-	-	-	-	**120**
Oct 1 – 23, 2015	-	-	-	34	158	157	37	40	**85**
Oct 23 – Nov 26, 2015	-	-	-	97	74	-	57	-	**76**
Dustfall Station Average[a]	**155**	**125**	**113**	**66**	**116**	**157**	**47**	**40**	

[a] *Values below detection limit were considered to be half of the detection limit for calculation purposes.*

No obvious trends were observed for nitrogen, sulphate, or acid deposition during the monitoring periods. In 2015, the maximum acid deposition value (234 eq/ha/yr) calculated was in July while the lowest (34 eq/ha/yr) was in October. Again, environmental effects such as dry surface soils may be responsible for these results as well as increased construction activities during the warmer

summer months compared to fall months such as in October. Changes through time may also be related to the relocation of the monitoring stations.

Of the 33 metals that were analyzed, concentrations of 11 (antimony, beryllium, bismuth, boron, cadmium, lithium, mercury, molybdenum, selenium, thallium, and tin) were consistently below the detection limits (Appendix A). All other metals had at least one reading during the sampling timeframe that was above the detection limit. There are no CCME or other provincial guidelines for metal concentrations in dustfall. There are workplace or occupational air quality standards (e.g., industrial hygiene) for airborne metals that are of concern with respect to human health for chromium, lead, manganese, nickel and arsenic (Alberta Environment 2013). However, these standards are 1-hour guidelines on a volumetric basis and cannot be directly compared to the measured dustfall metals concentrations which are on a square area basis.

Metals were close to or below detection limits at each dustfall station throughout the sampling period (Table 3-4).

Table 3-4. Dust Metal Deposition Rates – Construction Activities 2015

Metal	% of Samples Less than Detection Limit	Maximum Deposition Rate in 2015 (mg/(dm^2-d))
Chromium	55	0.00015
Lead	60	0.0000055
Manganese	0	0.00089
Nickel	65	0.000091
Arsenic	85	0.00023

4. SUMMARY

In response to the commencement of the construction of Pad T, the Mill Pad and anticipated crusher activity in 2015, TMAC contracted ERM to collect and analyze total dustfall and sulphate, nitrate, and dust metal concentrations in 2015. Construction activities were monitored using three dustfall stations from June 3, 2015 to October 3, 2015. Construction and crushing activities were then monitored using five stations from October 1, 2015 to November 26, 2015.

All dustfall results were below Alberta guidelines except for dustfall station CDF6 from July 29 to August 31, 2015 which had total dustfall concentrations that were above the Alberta Ambient Air Quality Guideline for residential and recreation areas, but less than the Alberta Ambient Air Quality Guideline for commercial and industrial areas. The total dustfall at CDF6 during this period was found to be 3.77 mg/(dm^2-d). The 3.77 mg/(dm^2-d) result is 250% higher than the 2nd highest dustfall result in 2015 and therefore could be an outlier associated with possible sample contamination.

All acid deposition results were below any of the CCME calculated critical loads of acid deposition for forest soils for provinces in Canada. The highest acid deposition calculated was 234 eq/ha/yr at CDF5 during the June 30 – July 29, 2015 monitoring period.

Of the 33 metals that were analyzed, 11 (antimony, beryllium, bismuth, boron, cadmium, lithium, mercury, molybdenum, selenium, thallium and tin) were consistently below the detection limit. All other metals had at least one reading during the sampling period that was above the detection limit; however, there are no guidelines by which to directly compare these results. Overall, metals were close to or below detection limits at each dustfall station throughout the sampling period.

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REFERENCES

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— Appendix A —

Laboratory Analytical Reports

ERM Consultants Canada Ltd.
ATTN: Jem Morrison
1500-1111 West Hastings Street
Vancouver BC V6E 2J3

Date Received: 30-JUN-15
Report Date: 15-DEC-15 13:14 (MT)
Version: FINAL REV. 3

Client Phone: 604-689-9460

Certificate of Analysis

Lab Work Order #: L1635601

Project P.O. #: NOT SUBMITTED
Job Reference: 0298923-0002 HOPE BAY
C of C Numbers:
Legal Site Desc:

Comments:

20-JUL-2015 Job number and COC have been added.

15-DEC-2015 Sample IDs have been updated.

Amber Springer, B.Sc
Account Manager

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L1635601-1	L1635601-2	L1635601-3		
	Description	WATER	WATER	WATER		
	Sampled Date	30-JUN-15	29-JUN-15	30-JUN-15		
	Sampled Time					
	Client ID	CDF5	CDF6	CDF7		
Grouping	**Analyte**					
DUSTFALL						
Particulates	Total Dustfall (mg/dm2.day)	0.94	0.88	0.89		
	Total Insoluble Dustfall (mg/dm2.day)	<0.11	<0.12	<0.11		
	Total Soluble Dustfall (mg/dm2.day)	0.84	0.86	0.90		
Anions and Nutrients	Ammonia, Total (as N) (mg/dm2.day)	0.00196	0.00185	0.00143		
	Chloride (Cl) (mg/dm2.day)	<1.1	<1.2	<1.0		
	Nitrate (as N) (mg/dm2.day)	0.00121	0.00090	0.00073		
	Sulfate (SO4) (mg/dm2.day)	<0.028	<0.030	<0.026		
Metals	Aluminum (Al)-Total (mg/dm2.day)	0.00148	0.00026	0.00040		
	Antimony (Sb)-Total (mg/dm2.day)	<0.0000044	<0.0000045	<0.0000044		
	Arsenic (As)-Total (mg/dm2.day)	<0.0000044	<0.0000045	<0.0000044		
	Barium (Ba)-Total (mg/dm2.day)	0.0000080	0.0000081	0.0000114		
	Beryllium (Be)-Total (mg/dm2.day)	<0.000022	<0.000023	<0.000022		
	Bismuth (Bi)-Total (mg/dm2.day)	<0.000022	<0.000023	<0.000022		
	Boron (B)-Total (mg/dm2.day)	<0.00044	<0.00045	<0.00044		
	Cadmium (Cd)-Total (mg/dm2.day)	<0.0000022	<0.0000023	<0.0000022		
	Calcium (Ca)-Total (mg/dm2.day)	0.00910	0.00253	0.00189		
	Chromium (Cr)-Total (mg/dm2.day)	<0.000022	<0.000023	<0.000022		
	Cobalt (Co)-Total (mg/dm2.day)	<0.0000044	<0.0000045	<0.0000044		
	Copper (Cu)-Total (mg/dm2.day)	0.000399	0.000291	<0.000022		
	Iron (Fe)-Total (mg/dm2.day)	0.0025	<0.0014	<0.0013		
	Lead (Pb)-Total (mg/dm2.day)	0.0000035	0.0000031	<0.0000022		
	Lithium (Li)-Total (mg/dm2.day)	<0.00022	<0.00023	<0.00022		
	Magnesium (Mg)-Total (mg/dm2.day)	0.00167	0.00035	0.00037		
	Manganese (Mn)-Total (mg/dm2.day)	0.0000974	0.0000272	0.0000237		
	Mercury (Hg)-Total (mg/dm2.day)	<0.0000022	<0.0000023	<0.0000022		
	Molybdenum (Mo)-Total (mg/dm2.day)	<0.0000022	<0.0000023	<0.0000022		
	Nickel (Ni)-Total (mg/dm2.day)	<0.000022	<0.000023	<0.000022		
	Phosphorus (P)-Total (mg/dm2.day)	<0.0022	<0.0023	<0.0022		
	Potassium (K)-Total (mg/dm2.day)	<0.0022	<0.0023	<0.0022		
	Selenium (Se)-Total (mg/dm2.day)	<0.000044	<0.000045	<0.000044		
	Silicon (Si)-Total (mg/dm2.day)	<0.0022	<0.0023	<0.0022		
	Silver (Ag)-Total (mg/dm2.day)	<0.00000044	<0.00000045	<0.00000044		
	Sodium (Na)-Total (mg/dm2.day)	<0.0022	<0.0023	<0.0022		
	Strontium (Sr)-Total (mg/dm2.day)	0.0000073	<0.0000045	<0.0000044		
	Thallium (Tl)-Total (mg/dm2.day)	<0.0000044	<0.0000045	<0.0000044		
	Tin (Sn)-Total (mg/dm2.day)	<0.0000044	<0.0000045	<0.0000044		
	Titanium (Ti)-Total (mg/dm2.day)	<0.00044	<0.00045	<0.00044		

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L1635601-1	L1635601-2	L1635601-3		
	Description	WATER	WATER	WATER		
	Sampled Date	30-JUN-15	29-JUN-15	30-JUN-15		
	Sampled Time					
	Client ID	CDF5	CDF6	CDF7		
Grouping	**Analyte**					
DUSTFALL						
Metals	Uranium (U)-Total (mg/dm2.day)	<0.00000044	<0.00000045	<0.00000044		
	Vanadium (V)-Total (mg/dm2.day)	<0.000044	<0.000045	<0.000044		
	Zinc (Zn)-Total (mg/dm2.day)	<0.00013	<0.00014	<0.00013		

Reference Information

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
CL-IC-VA	Dustfall	Dustfall Chloride by Ion Chromatography	BC LAB MAN. - PART. - SOLUBLE - ANIONS

The Dustfall analysis is carried out in accordance with the B.C. Laboratory Manual method 'Particulate - Total' and 'Particulate - Soluble - Anions and Cations by Ion Chromatography'. The chloride analysis is specifcially carried out using procedures adapted from APHA Method 4110 "Determination of Anions by Ion Chromatography" and EPA Method 300.0 "Determination of Inorganic Anions by Ion Chromatography".

DUSTFALLS-COM-DM2-VA	Dustfall	Combined Dustfalls-Total, soluble, insol	BCMOE PARTICULATE

This analysis is carried out using procedures modified from British Columbia Environmental Manual "Particulate."
Particulates or Dustfall are determined gravimetrically. Total Insoluble Dustfall is determined by filtering a sample through a 0.45 um membrane filter and drying the filter at 104 degrees celsius. Total Soluble Dustfall is determined by evaporating the filtrate to dryness at 104 degrees celsius. The Total Dustfall is the sum of Insoluble Dustfall and the Soluble Dustfall.

HG-DUST(DM2-CVAFS-VA	Dustfall	Total Mercury in Dustfalls by CVAFS	EPA 245.7

This analysis is carried out using procedures adapted from "Standard Methods for the Examination of Water and Wastewater" published by the American Public Health Association, and with procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846 published by the United States Environmental Protection Agency (EPA). Instrumental analysis is by cold vapour atomic fluorescence spectrophotometry or atomic absorption spectrophotometry (EPA Method 245.7).

MET-DUST(DM2)-MS-VA	Dustfall	Total Metals in Dustfalls by ICPMS	EPA 6020A

This analysis is carried out using procedures adapted from "Standard Methods for the Examination of Water and Wastewater" published by the American Public Health Association, and with procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846 published by the United States Environmental Protection Agency (EPA). Instrumental analysis is by inductively coupled plasma - mass spectrometry (EPA Method 6020A).

NH3-F-VA	Dustfall	Dustfall Ammonia by Fluorescence	BC LAB MAN. - PART. - SOLUBLE - ANIONS

The Dustfall analysis is carried out in accordance with the B.C. Laboratory Manual method 'Particulate - Total' and 'Particulate - Soluble - Anions and Cations by Ion Chromatography'. The ammonia analysis is specifcially carried out using procedures modified from J. Environ. Monit., 2005, 7, 37 - 42, The Royal Society of Chemistry, "Flow-injection analysis with fluorescence detection for the determination of trace levels of ammonium in seawater", Roslyn J. Waston et al.

NO3-IC-VA	Dustfall	Dustfall Nitrate by Ion Chromatography	BC LAB MAN. - PART. - SOLUBLE - ANIONS

The Dustfall analysis is carried out in accordance with the B.C. Laboratory Manual method 'Particulate - Total' and 'Particulate - Soluble - Anions and Cations by Ion Chromatography'. The nitrate analysis is specifcially carried out using procedures adapted from APHA Method 4110 "Determination of Anions by Ion Chromatography" and EPA Method 300.0 "Determination of Inorganic Anions by Ion Chromatography".

SO4-IC-VA	Dustfall	Dustfall Sulfate by Ion Chromatography	BC LAB MAN. - PART. - SOLUBLE - ANIONS

The Dustfall analysis is carried out in accordance with the B.C. Laboratory Manual method 'Particulate - Total' and 'Particulate - Soluble - Anions and Cations by Ion Chromatography'. The sulfate analysis is specifcially carried out using procedures adapted from APHA Method 4110 "Determination of Anions by Ion Chromatography" and EPA Method 300.0 "Determination of Inorganic Anions by Ion Chromatography".

** ALS test methods may incorporate modifications from specified reference methods to improve performance.

The last two letters of the above test code(s) indicate the laboratory that performed analytical analysis for that test. Refer to the list below:

Laboratory Definition Code	Laboratory Location

Chain of Custody Numbers:

GLOSSARY OF REPORT TERMS

Surrogate - A compound that is similar in behaviour to target analyte(s), but that does not occur naturally in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery.
mg/kg - milligrams per kilogram based on dry weight of sample.
mg/kg wwt - milligrams per kilogram based on wet weight of sample.
mg/kg lwt - milligrams per kilogram based on lipid-adjusted weight of sample.
mg/L - milligrams per litre.
< - Less than.
D.L. - The reported Detection Limit, also known as the Limit of Reporting (LOR).
N/A - Result not available. Refer to qualifier code and definition for explanation.

Test results reported relate only to the samples as received by the laboratory.
UNLESS OTHERWISE STATED, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.
Analytical results in unsigned test reports with the DRAFT watermark are subject to change, pending final QC review.

ALS Laboratory Group
Environmental Division

Chain of Custody / Analytical Request Form

Canada Toll Free: 1 800 668 9878
www.alsglobal.com

COC # _____

Page 1 of 1

Report To		Report Format / Distribution		Service Requested (Rush for routine analysis subject to availability)
Company:	ERM Consultants Canada Ltd.	☑ Standard ☐ Other		◉ Regular (Default)
Contact:	Jem Morrison	☑ PDF ☑ Excel ☐ Digital ☐ Fax		○ Priority (Specify Date Required — —) Surcharges apply
Address	1111 West Hastings Street	Email 1: jem.morrison@erm.com		○ Emergency (1 Business Day) - 100% Surcharge
	Vancouver, B.C. V6E 2J3	Email 2: daniel.casanova@erm.com		○ For Emergency < 1 Day, ASAP or Weekend - Contact ALS
Phone:	(604)689-9560 Fax:			Analysis Request
Invoice To	Same as Report ? ☐ Yes ☑ No	Client / Project Information		Please indicate below Filtered, Preserved or both (F, P, F/P)
Company:	ERM Consultants Canada Ltd.	Job #: 0298923-0002 (Hope Bay Project)		
Contact:	Accounts Payable (ermcanada.payables@erm.com)	PO / AFE:		
Address	1111 West Hastings Street	LSD:		
	Vancouver, B.C. V6E 2J3			
Phone:	(604)689-9560 Fax:	Quote #:		
Lab Work Order # (lab use only):	☑ No. L1635601	ALS Contact: Amber Springer	Sampler: DK	

Sample #	Sample Identification (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	Total Particulate	Soluble particulate	Insoluble particulate	Sulphate	Nitrate	NH3, NH4	Cl	Total Metals	Mg+	Ca+	K+		Number of Containers
	CDF1	03-JUN-15	30-JUN-15	Water	X	X	X	X	X	X	X	X	X	X	X		2
	CDF2	03-JUN-15	29-JUN-15	Water	X	X	X	X	X	X	X	X	X	X	X		2
	CDF3	03-JUN-15	30-JUN-15	Water	X	X	X	X	X	X	X	X	X	X	X		2

L1635601-COFC

Special Instructions / Regulations / Hazardous Details

Installed 03-JUN-15. Retrieved on two different days.

Failure to complete all portions of this form may delay analysis. Please fill in this form LEGIBLY.

By the use of this form the user acknowledges and agrees with the Terms and Conditions as provided on a separate Excel tab.

Also provided on another Excel tab are the ALS location addresses, phone numbers and sample container / preservation / holding time table for common analyses.

SHIPMENT RELEASE (client use)			SHIPMENT RECEPTION (lab use only)				SHIPMENT VERIFICATION (lab use only)			
Released by	Date (dd-mmm-yy)	Time (hh:mm)	Received by:	Date:	Time:	Temperature:	Verified by:	Date:	Time:	Observations: Yes / No ? If Yes add SIF
Sarah Warnock	30-JUN-15	10:00	LC	June 30/15	1730	°C				

Shaya July. 2 19:55 6°C

GENF 16.02 Front

ERM Consultants Canada Ltd.
ATTN: Jem Morrison
1500-1111 West Hastings Street
Vancouver BC V6E 2J3

Date Received: 31-JUL-15
Report Date: 15-DEC-15 13:15 (MT)
Version: FINAL REV. 2

Client Phone: 604-689-9460

Certificate of Analysis

Lab Work Order #: L1651477

Project P.O. #: NOT SUBMITTED
Job Reference: 0298923-0002(HOPE BAY PROJECT)
C of C Numbers:
Legal Site Desc:

Comments:
15-DEC-2015 Sample IDs have been updated.

Amber Springer, B.Sc
Account Manager

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L1651477-1	L1651477-2	L1651477-3		
	Description	WATER	WATER	WATER		
	Sampled Date	29-JUL-15	29-JUL-15	29-JUL-15		
	Sampled Time					
	Client ID	CDF5	CDF6	CDF7		
Grouping	**Analyte**					
DUSTFALL						
Particulates	Total Dustfall (mg/dm2.day)	0.54	<0.10	<0.10		
	Total Insoluble Dustfall (mg/dm2.day)	0.21	<0.10	<0.10		
	Total Soluble Dustfall (mg/dm2.day)	0.33	<0.10	<0.10		
Anions and Nutrients	Ammonia, Total (as N) (mg/dm2.day)	0.00322	0.00228	0.00342		
	Chloride (Cl) (mg/dm2.day)	<1.5	<1.3	<1.3		
	Nitrate (as N) (mg/dm2.day)	0.00360	0.00131	0.00098		
	Sulfate (SO4) (mg/dm2.day)	<0.037	<0.033	<0.033		
Metals	Aluminum (Al)-Total (mg/dm2.day)	0.0109	0.00150	0.00097		
	Antimony (Sb)-Total (mg/dm2.day)	<0.0000065	<0.0000065	<0.0000073		
	Arsenic (As)-Total (mg/dm2.day)	<0.0000065	<0.0000065	<0.0000073		
	Barium (Ba)-Total (mg/dm2.day)	0.0000143	0.0000044	0.0000127		
	Beryllium (Be)-Total (mg/dm2.day)	<0.000032	<0.000032	<0.000037		
	Bismuth (Bi)-Total (mg/dm2.day)	<0.000032	<0.000032	<0.000037		
	Boron (B)-Total (mg/dm2.day)	<0.00065	<0.00065	<0.00073		
	Cadmium (Cd)-Total (mg/dm2.day)	<0.0000032	<0.0000032	<0.0000037		
	Calcium (Ca)-Total (mg/dm2.day)	0.0280	0.0029	0.0046		
	Chromium (Cr)-Total (mg/dm2.day)	0.000086	<0.000032	<0.000037		
	Cobalt (Co)-Total (mg/dm2.day)	0.0000126	<0.0000065	<0.0000073		
	Copper (Cu)-Total (mg/dm2.day)	0.000049	0.000195	0.000210		
	Iron (Fe)-Total (mg/dm2.day)	0.0196	0.0029	<0.0022		
	Lead (Pb)-Total (mg/dm2.day)	<0.0000032	<0.0000032	0.0000042		
	Lithium (Li)-Total (mg/dm2.day)	<0.00032	<0.00032	<0.00037		
	Magnesium (Mg)-Total (mg/dm2.day)	0.0109	0.00135	0.00221		
	Manganese (Mn)-Total (mg/dm2.day)	0.000462	0.0000609	0.0000644		
	Mercury (Hg)-Total (mg/dm2.day)	<0.0000032	<0.0000032	<0.0000037		
	Molybdenum (Mo)-Total (mg/dm2.day)	<0.0000032	<0.0000032	<0.0000037		
	Nickel (Ni)-Total (mg/dm2.day)	0.000049	<0.000032	<0.000037		
	Phosphorus (P)-Total (mg/dm2.day)	<0.0032	<0.0032	0.0063		
	Potassium (K)-Total (mg/dm2.day)	<0.0032	<0.0032	0.0107		
	Selenium (Se)-Total (mg/dm2.day)	<0.000065	<0.000065	<0.000073		
	Silicon (Si)-Total (mg/dm2.day)	0.0154	<0.0032	<0.0037		
	Silver (Ag)-Total (mg/dm2.day)	<0.00000065	<0.00000065	<0.00000073		
	Sodium (Na)-Total (mg/dm2.day)	0.0034	<0.0032	0.0054		
	Strontium (Sr)-Total (mg/dm2.day)	0.0000177	<0.0000065	0.0000099		
	Thallium (Tl)-Total (mg/dm2.day)	<0.0000065	<0.0000065	<0.0000073		
	Tin (Sn)-Total (mg/dm2.day)	<0.0000065	<0.0000065	<0.0000073		
	Titanium (Ti)-Total (mg/dm2.day)	0.00076	<0.00065	<0.00073		

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L1651477-1	L1651477-2	L1651477-3		
	Description	WATER	WATER	WATER		
	Sampled Date	29-JUL-15	29-JUL-15	29-JUL-15		
	Sampled Time					
	Client ID	CDF5	CDF6	CDF7		
Grouping	**Analyte**					
DUSTFALL						
Metals	Uranium (U)-Total (mg/dm2.day)	<0.00000065	<0.00000065	<0.00000073		
	Vanadium (V)-Total (mg/dm2.day)	<0.000065	<0.000065	<0.000073		
	Zinc (Zn)-Total (mg/dm2.day)	<0.00019	<0.00019	<0.00022		

Reference Information

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
CL-IC-VA	Dustfall	Dustfall Chloride by Ion Chromatography	BC LAB MAN. - PART. - SOLUBLE - ANIONS

The Dustfall analysis is carried out in accordance with the B.C. Laboratory Manual method 'Particulate - Total' and 'Particulate - Soluble - Anions and Cations by Ion Chromatography'. The chloride analysis is specifcially carried out using procedures adapted from APHA Method 4110 "Determination of Anions by Ion Chromatography" and EPA Method 300.0 "Determination of Inorganic Anions by Ion Chromatography".

DUSTFALLS-COM-DM2-VA	Dustfall	Combined Dustfalls-Total, soluble, insol	BCMOE PARTICULATE

This analysis is carried out using procedures modified from British Columbia Environmental Manual "Particulate."
Particulates or Dustfall are determined gravimetrically. Total Insoluble Dustfall is determined by filtering a sample through a 0.45 um membrane filter and drying the filter at 104 degrees celsius. Total Soluble Dustfall is determined by evaporating the filtrate to dryness at 104 degrees celsius. The Total Dustfall is the sum of Insoluble Dustfall and the Soluble Dustfall.

HG-DUST(DM2-CVAFS-VA	Dustfall	Total Mercury in Dustfalls by CVAFS	EPA 245.7

This analysis is carried out using procedures adapted from "Standard Methods for the Examination of Water and Wastewater" published by the American Public Health Association, and with procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846 published by the United States Environmental Protection Agency (EPA). Instrumental analysis is by cold vapour atomic fluorescence spectrophotometry or atomic absorption spectrophotometry (EPA Method 245.7).

MET-DUST(DM2)-MS-VA	Dustfall	Total Metals in Dustfalls by ICPMS	EPA 6020A

This analysis is carried out using procedures adapted from "Standard Methods for the Examination of Water and Wastewater" published by the American Public Health Association, and with procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846 published by the United States Environmental Protection Agency (EPA). Instrumental analysis is by inductively coupled plasma - mass spectrometry (EPA Method 6020A).

NH3-F-VA	Dustfall	Dustfall Ammonia by Fluorescence	BC LAB MAN. - PART. - SOLUBLE - ANIONS

The Dustfall analysis is carried out in accordance with the B.C. Laboratory Manual method 'Particulate - Total' and 'Particulate - Soluble - Anions and Cations by Ion Chromatography'. The ammonia analysis is specifcially carried out using procedures modified from J. Environ. Monit., 2005, 7, 37 - 42, The Royal Society of Chemistry, "Flow-injection analysis with fluorescence detection for the determination of trace levels of ammonium in seawater", Roslyn J. Waston et al.

NO3-IC-VA	Dustfall	Dustfall Nitrate by Ion Chromatography	BC LAB MAN. - PART. - SOLUBLE - ANIONS

The Dustfall analysis is carried out in accordance with the B.C. Laboratory Manual method 'Particulate - Total' and 'Particulate - Soluble - Anions and Cations by Ion Chromatography'. The nitrate analysis is specifcially carried out using procedures adapted from APHA Method 4110 "Determination of Anions by Ion Chromatography" and EPA Method 300.0 "Determination of Inorganic Anions by Ion Chromatography".

SO4-IC-VA	Dustfall	Dustfall Sulfate by Ion Chromatography	BC LAB MAN. - PART. - SOLUBLE - ANIONS

The Dustfall analysis is carried out in accordance with the B.C. Laboratory Manual method 'Particulate - Total' and 'Particulate - Soluble - Anions and Cations by Ion Chromatography'. The sulfate analysis is specifcially carried out using procedures adapted from APHA Method 4110 "Determination of Anions by Ion Chromatography" and EPA Method 300.0 "Determination of Inorganic Anions by Ion Chromatography".

** ALS test methods may incorporate modifications from specified reference methods to improve performance.

The last two letters of the above test code(s) indicate the laboratory that performed analytical analysis for that test. Refer to the list below:

Laboratory Definition Code	Laboratory Location

Chain of Custody Numbers:

GLOSSARY OF REPORT TERMS

Surrogate - A compound that is similar in behaviour to target analyte(s), but that does not occur naturally in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery.
mg/kg - milligrams per kilogram based on dry weight of sample.
mg/kg wwt - milligrams per kilogram based on wet weight of sample.
mg/kg lwt - milligrams per kilogram based on lipid-adjusted weight of sample.
mg/L - milligrams per litre.
< - Less than.
D.L. - The reported Detection Limit, also known as the Limit of Reporting (LOR).
N/A - Result not available. Refer to qualifier code and definition for explanation.

Test results reported relate only to the samples as received by the laboratory.
UNLESS OTHERWISE STATED, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.
Analytical results in unsigned test reports with the DRAFT watermark are subject to change, pending final QC review.

ALS Laboratory Group
ANALYTICAL CHEMISTRY & TESTING SERVICES

Environmental Division

Chain of Custody / Analytical Request Form

Canada Toll Free: 1 800 668 9878

www.alsglobal.com

COC # _____

Page 1 of 1

Report To		Report Format / Distribution				Service Requested (Rush for routine analysis subject to availability)
Company:	ERM Consultants Canada Ltd.	☑ Standard	☐ Other			◉ Regular (Default)
Contact:	Jem Morrison	☑ PDF	☑ Excel	☐ Digital	☐ Fax	○ Priority (Specify Date Required → →) Surcharges apply
Address:	1111 West Hastings Street	Email 1:	jem.morrison@erm.com			○ Emergency (1 Business Day) - 100% Surcharge
	Vancouver, B.C. V6E 2J3	Email 2:	daniel.casanova@erm.com			○ For Emergency < 1 Day, ASAP or Weekend - Contact ALS
Phone:	(604)689-9560 Fax:					
Invoice To	Same as Report ? ☐ Yes ☑ No	**Client / Project Information**				**Analysis Request**
Company:	ERM Consultants Canada Ltd.	Job #:	0298923-0002 (Hope Bay Project)			Please indicate below Filtered, Preserved or both (F, P, F/P)
Contact:	Accounts Payable (ermcanada.payables@erm.com)	PO / AFE:				
Address:	1111 West Hastings Street	LSD:				
	Vancouver, B.C. V6E 2J3					
Phone:	(604)689-9560 Fax:	Quote #:				
Lab Work Order # (lab use only)	☑ No L1651477	ALS Contact:	Amber Springer	Sampler:	Darcy Kanayok	

Sample #	Sample Identification (This description will appear on the report)	Date (dd-mmm-yy) Installed	Time (hh:mm) Retrieved	Sample Type	Total Particulate	Soluble particulate	Insoluble particulate	Sulphate	Nitrate	NH3, NH4	Cl	Total Metals	Mg+	Ca+	K+		Number of Containers
	CDF1	30-JUN-15	30-JUL-15	Water	X	X	X	X	X	X	X	X	X	X	X		2
	CDF2	29-JUN-15	29-JUL-15	Water	X	X	X	X	X	X	X	X	X	X	X		2
	CDF3	30-JUN-15	29-JUL-15	Water	X	X	X	X	X	X	X	X	X	X	X		2

L1651477-COFC

Special Instructions / Regulations / Hazardous Details

Failure to complete all portions of this form may delay analysis. Please fill in this form LEGIBLY.

By the use of this form the user acknowledges and agrees with the Terms and Conditions as provided on a separate Excel tab.

Also provided on another Excel tab are the ALS location addresses, phone numbers and sample container / preservation / holding time table for common analyses.

SHIPMENT RELEASE (client use)			SHIPMENT RECEPTION (lab use only)				SHIPMENT VERIFICATION (lab use only)			
Released by:	Date (dd-mmm-yy)	Time (hh-mm)	Received by:	Date:	Time:	Temperature:	Verified by:	Date:	Time:	Observations: Yes / No ? If Yes add SIF
Claire Brown	31-JUL-15	11:00	LC	July 31/15	14:45	°C				

ERM Consultants Canada Ltd.
ATTN: Jem Morrison
1500-1111 West Hastings Street
Vancouver BC V6E 2J3

Date Received: 01-SEP-15
Report Date: 15-DEC-15 13:15 (MT)
Version: FINAL REV. 2

Client Phone: 604-689-9560

Certificate of Analysis

Lab Work Order #: L1666666

Project P.O. #: NOT SUBMITTED
Job Reference: 0298923-0002 (HOPE BAY PROJECT)
C of C Numbers:
Legal Site Desc:

Comments:
15-DEC-2015 Sample IDs have been updated.

Amber Springer, B.Sc
Account Manager

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L1666666-1	L1666666-2	L1666666-3		
	Description	DUSTFALL	DUSTFALL	DUSTFALL		
	Sampled Date	29-AUG-15	29-AUG-15	29-AUG-15		
	Sampled Time					
	Client ID	CDF5	CDF6	CDF7		
Grouping	**Analyte**					
DUSTFALL						
Particulates	Total Dustfall (mg/dm2.day)	1.08	3.77	0.33		
	Total Insoluble Dustfall (mg/dm2.day)	0.71	1.46	<0.10		
	Total Soluble Dustfall (mg/dm2.day)	0.38	2.31	0.24		
Anions and Nutrients	Ammonia, Total (as N) (mg/dm2.day)	0.00605	0.268	0.00841		
	Chloride (Cl) (mg/dm2.day)	<0.79	<0.62	<0.59		
	Nitrate (as N) (mg/dm2.day)	0.00147	0.00109	0.00076		
	Sulfate (SO4) (mg/dm2.day)	<0.020	<0.015	<0.015		
Metals	Aluminum (Al)-Total (mg/dm2.day)	0.0201	0.00283	0.00134		
	Antimony (Sb)-Total (mg/dm2.day)	<0.0000026	<0.0000034	<0.0000030		
	Arsenic (As)-Total (mg/dm2.day)	<0.0000026	<0.0000034	<0.0000030		
	Barium (Ba)-Total (mg/dm2.day)	0.0000230	0.0000056	0.0000080		
	Beryllium (Be)-Total (mg/dm2.day)	<0.000013	<0.000017	<0.000015		
	Bismuth (Bi)-Total (mg/dm2.day)	<0.000013	<0.000017	<0.000015		
	Boron (B)-Total (mg/dm2.day)	<0.00026	<0.00034	<0.00030		
	Cadmium (Cd)-Total (mg/dm2.day)	<0.0000013	<0.0000017	<0.0000015		
	Calcium (Ca)-Total (mg/dm2.day)	0.0577	0.0123	0.00679		
	Chromium (Cr)-Total (mg/dm2.day)	0.000148	0.000021	<0.000015		
	Cobalt (Co)-Total (mg/dm2.day)	0.0000225	0.0000037	<0.0000030		
	Copper (Cu)-Total (mg/dm2.day)	0.000116	0.000080	0.000058		
	Iron (Fe)-Total (mg/dm2.day)	0.0360	0.0058	0.00316		
	Lead (Pb)-Total (mg/dm2.day)	0.0000023	<0.0000017	<0.0000015		
	Lithium (Li)-Total (mg/dm2.day)	<0.00013	<0.00017	<0.00015		
	Magnesium (Mg)-Total (mg/dm2.day)	0.0196	0.00686	0.00401		
	Manganese (Mn)-Total (mg/dm2.day)	0.000885	0.000160	0.0000940		
	Mercury (Hg)-Total (mg/dm2.day)	<0.0000013	<0.0000017	<0.0000015		
	Molybdenum (Mo)-Total (mg/dm2.day)	<0.0000013	<0.0000017	<0.0000015		
	Nickel (Ni)-Total (mg/dm2.day)	0.000091	<0.000017	<0.000015		
	Phosphorus (P)-Total (mg/dm2.day)	0.0015	0.0324	0.0222		
	Potassium (K)-Total (mg/dm2.day)	0.0023	0.0353	0.0279		
	Selenium (Se)-Total (mg/dm2.day)	<0.000026	<0.000034	<0.000030		
	Silicon (Si)-Total (mg/dm2.day)	0.0262	0.0038	0.0020		
	Silver (Ag)-Total (mg/dm2.day)	<0.00000026	0.00000091	<0.00000030		
	Sodium (Na)-Total (mg/dm2.day)	0.0075	0.0179	0.0132		
	Strontium (Sr)-Total (mg/dm2.day)	0.0000320	0.0000115	0.0000156		
	Thallium (Tl)-Total (mg/dm2.day)	<0.0000026	<0.0000034	<0.0000030		
	Tin (Sn)-Total (mg/dm2.day)	<0.0000026	<0.0000034	<0.0000030		
	Titanium (Ti)-Total (mg/dm2.day)	0.00090	<0.00034	<0.00030		

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L1666666-1	L1666666-2	L1666666-3		
	Description	DUSTFALL	DUSTFALL	DUSTFALL		
	Sampled Date	29-AUG-15	29-AUG-15	29-AUG-15		
	Sampled Time					
	Client ID	CDF5	CDF6	CDF7		
Grouping	**Analyte**					
DUSTFALL						
Metals	Uranium (U)-Total (mg/dm2.day)	<0.00000026	<0.00000034	<0.00000030		
	Vanadium (V)-Total (mg/dm2.day)	0.000075	<0.000034	<0.000030		
	Zinc (Zn)-Total (mg/dm2.day)	0.000093	0.00048	0.000301		

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

Reference Information

QC Samples with Qualifiers & Comments:

QC Type Description	Parameter	Qualifier	Applies to Sample Number(s)
Method Blank	Manganese (Mn)-Total	MB-LOR	L1666666-1, -2, -3

Qualifiers for Individual Parameters Listed:

Qualifier	Description
MB-LOR	Method Blank exceeds ALS DQO. Limits of Reporting have been adjusted for samples with positive hits below 5x blank level.

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
CL-IC-VA	Dustfall	Dustfall Chloride by Ion Chromatography	BC LAB MAN. - PART. - SOLUBLE - ANIONS

The Dustfall analysis is carried out in accordance with the B.C. Laboratory Manual method 'Particulate - Total' and 'Particulate - Soluble - Anions and Cations by Ion Chromatography'. The chloride analysis is specifcially carried out using procedures adapted from APHA Method 4110 "Determination of Anions by Ion Chromatography" and EPA Method 300.0 "Determination of Inorganic Anions by Ion Chromatography".

DUSTFALLS-COM-DM2-VA	Dustfall	Combined Dustfalls-Total, soluble, insol	BCMOE PARTICULATE

This analysis is carried out using procedures modified from British Columbia Environmental Manual "Particulate."
Particulates or Dustfall are determined gravimetrically. Total Insoluble Dustfall is determined by filtering a sample through a 0.45 um membrane filter and drying the filter at 104 degrees celsius. Total Soluble Dustfall is determined by evaporating the filtrate to dryness at 104 degrees celsius. The Total Dustfall is the sum of Insoluble Dustfall and the Soluble Dustfall.

HG-DUST(DM2-CVAFS-VA	Dustfall	Total Mercury in Dustfalls by CVAFS	EPA 245.7

This analysis is carried out using procedures adapted from "Standard Methods for the Examination of Water and Wastewater" published by the American Public Health Association, and with procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846 published by the United States Environmental Protection Agency (EPA). Instrumental analysis is by cold vapour atomic fluorescence spectrophotometry or atomic absorption spectrophotometry (EPA Method 245.7).

MET-DUST(DM2)-MS-VA	Dustfall	Total Metals in Dustfalls by ICPMS	EPA 6020A

This analysis is carried out using procedures adapted from "Standard Methods for the Examination of Water and Wastewater" published by the American Public Health Association, and with procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846 published by the United States Environmental Protection Agency (EPA). Instrumental analysis is by inductively coupled plasma - mass spectrometry (EPA Method 6020A).

NH3-F-VA	Dustfall	Dustfall Ammonia by Fluorescence	BC LAB MAN. - PART. - SOLUBLE - ANIONS

The Dustfall analysis is carried out in accordance with the B.C. Laboratory Manual method 'Particulate - Total' and 'Particulate - Soluble - Anions and Cations by Ion Chromatography'. The ammonia analysis is specifcially carried out using procedures modified from J. Environ. Monit., 2005, 7, 37 - 42, The Royal Society of Chemistry, "Flow-injection analysis with fluorescence detection for the determination of trace levels of ammonium in seawater", Roslyn J. Waston et al.

NO3-IC-VA	Dustfall	Dustfall Nitrate by Ion Chromatography	BC LAB MAN. - PART. - SOLUBLE - ANIONS

The Dustfall analysis is carried out in accordance with the B.C. Laboratory Manual method 'Particulate - Total' and 'Particulate - Soluble - Anions and Cations by Ion Chromatography'. The nitrate analysis is specifcially carried out using procedures adapted from APHA Method 4110 "Determination of Anions by Ion Chromatography" and EPA Method 300.0 "Determination of Inorganic Anions by Ion Chromatography".

SO4-IC-VA	Dustfall	Dustfall Sulfate by Ion Chromatography	BC LAB MAN. - PART. - SOLUBLE - ANIONS

The Dustfall analysis is carried out in accordance with the B.C. Laboratory Manual method 'Particulate - Total' and 'Particulate - Soluble - Anions and Cations by Ion Chromatography'. The sulfate analysis is specifcially carried out using procedures adapted from APHA Method 4110 "Determination of Anions by Ion Chromatography" and EPA Method 300.0 "Determination of Inorganic Anions by Ion Chromatography".

** ALS test methods may incorporate modifications from specified reference methods to improve performance.

The last two letters of the above test code(s) indicate the laboratory that performed analytical analysis for that test. Refer to the list below:

Laboratory Definition Code	Laboratory Location

Chain of Custody Numbers:

Reference Information

GLOSSARY OF REPORT TERMS

Surrogate - A compound that is similar in behaviour to target analyte(s), but that does not occur naturally in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery.
mg/kg - milligrams per kilogram based on dry weight of sample.
mg/kg wwt - milligrams per kilogram based on wet weight of sample.
mg/kg lwt - milligrams per kilogram based on lipid-adjusted weight of sample.
mg/L - milligrams per litre.
< - Less than.
D.L. - The reported Detection Limit, also known as the Limit of Reporting (LOR).
N/A - Result not available. Refer to qualifier code and definition for explanation.

Test results reported relate only to the samples as received by the laboratory.
UNLESS OTHERWISE STATED, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.
Analytical results in unsigned test reports with the DRAFT watermark are subject to change, pending final QC review.

ALS Laboratory Group
Environmental Division

Chain of Custody / Analytical Request Form

Canada Toll Free: 1 800 668 9878
www.alsglobal.com

COC # _____

Page 1 of 1

Report To		Report Format / Distribution				Service Requested (Rush for routine analysis subject to availability)
Company:	ERM Consultants Canada Ltd.	☑ Standard	☐ Other			◉ Regular (Default)
Contact:	Jem Morrison	☑ PDF	☑ Excel	☐ Digital	☐ Fax	○ Priority (Specify Date Required → →) Surcharges apply
Address:	1111 West Hastings Street	Email 1:	jem.morrison@erm.com			○ Emergency (1 Business Day) - 100% Surcharge
	Vancouver, B.C. V6E 2J3	Email 2:	daniel.casanova@erm.com			○ For Emergency < 1 Day, ASAP or Weekend - Contact ALS
Phone:	(604)689-9560 Fax:					Analysis Request
Invoice To	Same as Report ? ☐ Yes ☑ No	**Client / Project Information**				Please indicate below Filtered, Preserved or both (F, P, F/P)
Company:	ERM Consultants Canada Ltd.	Job #:	0298923-0002 (Hope Bay Project)			
Contact:	Accounts Payable (ermcanada.payables@erm.com)	PO / AFE:				
Address:	1111 West Hastings Street	LSD:				
	Vancouver, B.C. V6E 2J3					
Phone:	(604)689-9560 Fax:	Quote #:				
Lab Work Order # (lab use only)	☑ No L1666666	**ALS Contact:**	Amber Springer	**Sampler:**	RM	

Sample #	Sample Identification (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	Total Particulate	Soluble particulate	Insoluble particulate	Sulphate	Nitrate	NH3, NH4	Cl	Total Metals	Mg+	Ca+	K+		Number of Containers
	CDF1	29-JUL-15	31-AUG-15	Water	X	X	X	X	X	X	X	X	X	X	X		2
	CDF2	29-JUL-15	31-AUG-15	Water	X	X	X	X	X	X	X	X	X	X	X		2
	CDF3	29-JUL-15	31-AUG-15	Water	X	X	X	X	X	X	X	X	X	X	X		2

L1666666-COFC

Special Instructions / Regulations / Hazardous Details

Failure to complete all portions of this form may delay analysis. Please fill in this form LEGIBLY.

By the use of this form the user acknowledges and agrees with the Terms and Conditions as provided on a separate Excel tab.

Also provided on another Excel tab are the ALS location addresses, phone numbers and sample container / preservation / holding time table for common analyses.

SHIPMENT RELEASE (client use)			SHIPMENT RECEPTION (lab use only)				SHIPMENT VERIFICATION (lab use only)			
Released by:	Date (dd-mmm-yy)	Time (hh-mm)	Received by:	Date:	Time:	Temperature:	Verified by:	Date:	Time:	Observations: Yes / No ? If Yes add SIF
Sarah Warnock	1-Sep-15	10:00				°C				

ERM Consultants Canada Ltd.
ATTN: Jem Morrison
1500-1111 West Hastings Street
Vancouver BC V6E 2J3

Date Received: 10-OCT-15
Report Date: 15-DEC-15 13:16 (MT)
Version: FINAL REV. 2

Client Phone: 604-689-9460

Certificate of Analysis

Lab Work Order #: L1686424

Project P.O. #: NOT SUBMITTED
Job Reference: 0298923-0002(HOPE BAY PROJECT)
C of C Numbers:
Legal Site Desc:

Comments:
15-DEC-2015 Sample IDs have been updated.

Amber Springer, B.Sc
Account Manager

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L1686424-1	L1686424-2	L1686424-3		
	Description	Water	Water	Water		
	Sampled Date					
	Sampled Time					
	Client ID	CDF5-AUG31/2015-OCT1/15	CDF6-AUG31/2015-OCT1/15	CDF7-AUG31/2015-OCT1/15		
Grouping	**Analyte**					
DUSTFALL						
Particulates	Total Dustfall (mg/dm2.day)	0.94	0.57	0.51		
	Total Insoluble Dustfall (mg/dm2.day)	0.32	<0.10	<0.10		
	Total Soluble Dustfall (mg/dm2.day)	0.62	0.51	0.50		
Anions and Nutrients	Ammonia, Total (as N) (mg/dm2.day)	0.00151	0.00093	0.00090		
	Chloride (Cl) (mg/dm2.day)	<1.2	<1.1	<1.0		
	Nitrate (as N) (mg/dm2.day)	0.00090	0.00062	0.00033		
	Sulfate (SO4) (mg/dm2.day)	<0.029	<0.027	<0.026		
Metals	Aluminum (Al)-Total (mg/dm2.day)	0.00727	0.00016	0.00015		
	Antimony (Sb)-Total (mg/dm2.day)	<0.0000053	<0.0000053	<0.0000046		
	Arsenic (As)-Total (mg/dm2.day)	<0.0000053	<0.0000053	<0.0000046		
	Barium (Ba)-Total (mg/dm2.day)	0.0000125	0.0000054	<0.0000023		
	Beryllium (Be)-Total (mg/dm2.day)	<0.000027	<0.000027	<0.000023		
	Bismuth (Bi)-Total (mg/dm2.day)	<0.000027	<0.000027	<0.000023		
	Boron (B)-Total (mg/dm2.day)	<0.00053	<0.00053	<0.00046		
	Cadmium (Cd)-Total (mg/dm2.day)	<0.0000027	<0.0000027	<0.0000023		
	Calcium (Ca)-Total (mg/dm2.day)	0.0236	0.0058	0.00265		
	Chromium (Cr)-Total (mg/dm2.day)	0.000061	<0.000027	<0.000023		
	Cobalt (Co)-Total (mg/dm2.day)	0.0000086	<0.0000053	<0.0000046		
	Copper (Cu)-Total (mg/dm2.day)	0.000034	0.000153	<0.000023		
	Iron (Fe)-Total (mg/dm2.day)	0.0128	<0.0016	<0.0014		
	Lead (Pb)-Total (mg/dm2.day)	<0.0000027	<0.0000027	<0.0000023		
	Lithium (Li)-Total (mg/dm2.day)	<0.00027	<0.00027	<0.00023		
	Magnesium (Mg)-Total (mg/dm2.day)	0.00981	0.00191	0.00208		
	Manganese (Mn)-Total (mg/dm2.day)	0.000323	0.0000373	0.0000162		
	Mercury (Hg)-Total (mg/dm2.day)	<0.0000027	<0.0000027	<0.0000023		
	Molybdenum (Mo)-Total (mg/dm2.day)	<0.0000027	<0.0000027	<0.0000023		
	Nickel (Ni)-Total (mg/dm2.day)	0.000039	<0.000027	<0.000023		
	Phosphorus (P)-Total (mg/dm2.day)	<0.0027	<0.0027	<0.0023		
	Potassium (K)-Total (mg/dm2.day)	<0.0027	<0.0027	<0.0023		
	Selenium (Se)-Total (mg/dm2.day)	<0.000053	<0.000053	<0.000046		
	Silicon (Si)-Total (mg/dm2.day)	0.0104	<0.0027	<0.0023		
	Silver (Ag)-Total (mg/dm2.day)	<0.00000053	<0.00000053	<0.00000046		
	Sodium (Na)-Total (mg/dm2.day)	0.0159	0.0112	0.0124		
	Strontium (Sr)-Total (mg/dm2.day)	0.0000222	0.0000110	0.0000092		
	Thallium (Tl)-Total (mg/dm2.day)	<0.0000053	<0.0000053	<0.0000046		
	Tin (Sn)-Total (mg/dm2.day)	<0.0000053	<0.0000053	<0.0000046		
	Titanium (Ti)-Total (mg/dm2.day)	<0.00053	<0.00053	<0.00046		

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L1686424-1	L1686424-2	L1686424-3		
	Description	Water	Water	Water		
	Sampled Date					
	Sampled Time					
	Client ID	CDF5-AUG31/2015-OCT1/15	CDF6-AUG31/2015-OCT1/15	CDF7-AUG31/2015-OCT1/15		
Grouping	**Analyte**					
DUSTFALL						
Metals	Uranium (U)-Total (mg/dm2.day)	<0.00000053	<0.00000053	<0.00000046		
	Vanadium (V)-Total (mg/dm2.day)	<0.000053	<0.000053	<0.000046		
	Zinc (Zn)-Total (mg/dm2.day)	<0.00016	<0.00016	<0.00014		

Reference Information

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
CL-IC-VA	Dustfall	Dustfall Chloride by Ion Chromatography	BC LAB MAN. - PART. - SOLUBLE - ANIONS

The Dustfall analysis is carried out in accordance with the B.C. Laboratory Manual method 'Particulate - Total' and 'Particulate - Soluble - Anions and Cations by Ion Chromatography'. The chloride analysis is specifcially carried out using procedures adapted from APHA Method 4110 "Determination of Anions by Ion Chromatography" and EPA Method 300.0 "Determination of Inorganic Anions by Ion Chromatography".

DUSTFALLS-COM-DM2-VA	Dustfall	Combined Dustfalls-Total, soluble, insol	BCMOE PARTICULATE

This analysis is carried out using procedures modified from British Columbia Environmental Manual "Particulate."
Particulates or Dustfall are determined gravimetrically. Total Insoluble Dustfall is determined by filtering a sample through a 0.45 um membrane filter and drying the filter at 104 degrees celsius. Total Soluble Dustfall is determined by evaporating the filtrate to dryness at 104 degrees celsius. The Total Dustfall is the sum of Insoluble Dustfall and the Soluble Dustfall.

HG-DUST(DM2-CVAFS-VA	Dustfall	Total Mercury in Dustfalls by CVAFS	EPA 245.7

This analysis is carried out using procedures adapted from "Standard Methods for the Examination of Water and Wastewater" published by the American Public Health Association, and with procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846 published by the United States Environmental Protection Agency (EPA). Instrumental analysis is by cold vapour atomic fluorescence spectrophotometry or atomic absorption spectrophotometry (EPA Method 245.7).

MET-DUST(DM2)-MS-VA	Dustfall	Total Metals in Dustfalls by ICPMS	EPA 6020A

This analysis is carried out using procedures adapted from "Standard Methods for the Examination of Water and Wastewater" published by the American Public Health Association, and with procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846 published by the United States Environmental Protection Agency (EPA). Instrumental analysis is by inductively coupled plasma - mass spectrometry (EPA Method 6020A).

NH3-F-VA	Dustfall	Dustfall Ammonia by Fluorescence	BC LAB MAN. - PART. - SOLUBLE - ANIONS

The Dustfall analysis is carried out in accordance with the B.C. Laboratory Manual method 'Particulate - Total' and 'Particulate - Soluble - Anions and Cations by Ion Chromatography'. The ammonia analysis is specifcially carried out using procedures modified from J. Environ. Monit., 2005, 7, 37 - 42, The Royal Society of Chemistry, "Flow-injection analysis with fluorescence detection for the determination of trace levels of ammonium in seawater", Roslyn J. Waston et al.

NO3-IC-VA	Dustfall	Dustfall Nitrate by Ion Chromatography	BC LAB MAN. - PART. - SOLUBLE - ANIONS

The Dustfall analysis is carried out in accordance with the B.C. Laboratory Manual method 'Particulate - Total' and 'Particulate - Soluble - Anions and Cations by Ion Chromatography'. The nitrate analysis is specifcially carried out using procedures adapted from APHA Method 4110 "Determination of Anions by Ion Chromatography" and EPA Method 300.0 "Determination of Inorganic Anions by Ion Chromatography".

SO4-IC-VA	Dustfall	Dustfall Sulfate by Ion Chromatography	BC LAB MAN. - PART. - SOLUBLE - ANIONS

The Dustfall analysis is carried out in accordance with the B.C. Laboratory Manual method 'Particulate - Total' and 'Particulate - Soluble - Anions and Cations by Ion Chromatography'. The sulfate analysis is specifcially carried out using procedures adapted from APHA Method 4110 "Determination of Anions by Ion Chromatography" and EPA Method 300.0 "Determination of Inorganic Anions by Ion Chromatography".

** ALS test methods may incorporate modifications from specified reference methods to improve performance.

The last two letters of the above test code(s) indicate the laboratory that performed analytical analysis for that test. Refer to the list below:

Laboratory Definition Code	Laboratory Location

Chain of Custody Numbers:

GLOSSARY OF REPORT TERMS

Surrogate - A compound that is similar in behaviour to target analyte(s), but that does not occur naturally in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery.
mg/kg - milligrams per kilogram based on dry weight of sample.
mg/kg wwt - milligrams per kilogram based on wet weight of sample.
mg/kg lwt - milligrams per kilogram based on lipid-adjusted weight of sample.
mg/L - milligrams per litre.
< - Less than.
D.L. - The reported Detection Limit, also known as the Limit of Reporting (LOR).
N/A - Result not available. Refer to qualifier code and definition for explanation.

Test results reported relate only to the samples as received by the laboratory.
UNLESS OTHERWISE STATED, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.
Analytical results in unsigned test reports with the DRAFT watermark are subject to change, pending final QC review.

ALS Laboratory G
ANALYTICAL CHEMISTRY & TESTING SERVICES

Environmental Division

L1686424-COFC

...in of Custody / Analytical Request Form

Canada Toll Free: 1 800 668 9878

www.alsglobal.com

COC # _____

Page 1 of 1

Report To		Report Format / Distribution		Service Requested (Rush for routine analysis subject to availability)
Company:	ERM Consultants Canada Ltd.	☑ Standard ☐ Other		◉ Regular (Default)
Contact:	Jem Morrison	☑ PDF ☑ Excel ☐ Digital ☐ Fax		○ Priority (Specify Date Required → →) Surcharges apply
Address:	1111 West Hastings Street	Email 1: jem.morrison@erm.com		○ Emergency (1 Business Day) - 100% Surcharge
	Vancouver, B.C. V6E 2J3	Email 2: daniel.casanova@erm.com		○ For Emergency < 1 Day, ASAP or Weekend - Contact ALS
Phone:	(604)689-9560 Fax:			
Invoice To	Same as Report ? ☐ Yes ☑ No	Client / Project Information		Analysis Request
Company:	ERM Consultants Canada Ltd.	Job #: 0298923-0002 (Hope Bay Project)		Please indicate below Filtered, Preserved or both (F, P, F/P)
Contact:	Accounts Payable (ermcanada.payables@erm.com)	PO / AFE:		
Address:	1111 West Hastings Street	LSD:		
	Vancouver, B.C. V6E 2J3			
Phone:	(604)689-9560 Fax:	Quote #:		
Lab Work Order # (lab use only)	☑ No	ALS Contact: Amber Springer	Sampler: Jem Morrison	

Sample #	Sample Identification (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	Total Particulate	Soluble particulate	Insoluble particulate	Sulphate	Nitrate	NH3, NH4	Cl	Total Metals	Mg+	Ca+	K+		Number of Containers
	CDF1	Aug 31 to	Oct1	Water	X	X	X	X	X	X	X	X	X	X	X		2
	CDF2	"	"	Water	X	X	X	X	X	X	X	X	X	X	X		2
	CDF3	"	"	Water	X	X	X	X	X	X	X	X	X	X	X		2

Special Instructions / Regulations / Hazardous Details

Failure to complete all portions of this form may delay analysis. Please fill in this form LEGIBLY.

By the use of this form the user acknowledges and agrees with the Terms and Conditions as provided on a separate Excel tab.

Also provided on another Excel tab are the ALS location addresses, phone numbers and sample container / preservation / holding time table for common analyses.

SHIPMENT RELEASE (client use)			SHIPMENT RECEPTION (lab use only)				SHIPMENT VERIFICATION (lab use only)			
Released by:	Date (dd-mmm-yy)	Time (hh-mm)	Received by:	Date:	Time:	Temperature:	Verified by:	Date:	Time:	Observations: Yes / No ? If Yes add SIF
	Oct 4/2015					14,16 18,17, °C	Eduard	oct 14/15	1015	

oct of 4

ERM Consultants Canada Ltd.
ATTN: Jem Morrison
1500-1111 West Hastings Street
Vancouver BC V6E 2J3

Date Received: 28-OCT-15
Report Date: 10-NOV-15 13:39 (MT)
Version: FINAL

Client Phone: 604-689-9460

Certificate of Analysis

Lab Work Order #: L1694891

Project P.O. #: NOT SUBMITTED
Job Reference: 0298923-0002 (HOPE BAY PROJECT)
C of C Numbers:
Legal Site Desc:

Amber Springer, B.Sc
Account Manager

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L1694891-1	L1694891-2	L1694891-3	L1694891-4	L1694891-5
	Description	Dustfall	Dustfall	Dustfall	Dustfall	Dustfall
	Sampled Date	23-OCT-15	21-OCT-15	21-OCT-15	21-OCT-15	20-OCT-15
	Sampled Time					
	Client ID	CDF1 OCT01/2015 - OCT23/2015	CDF2 OCT03/2015 - OCT21/2015	CDF4 OCT01/2015 - OCT21/2015	DFA1 OCT01/2015 - OCT21/2015	TIADF OCT01/2015 - OCT20/2015
Grouping	**Analyte**					
DUSTFALL						
Particulates	Total Dustfall (mg/dm2.day)	<0.14	<0.17	0.63	0.22	<0.16
	Total Insoluble Dustfall (mg/dm2.day)	<0.14	<0.17	0.34	<0.15	<0.16
	Total Soluble Dustfall (mg/dm2.day)	<0.14	<0.17	0.30	<0.15	<0.16
Anions and Nutrients	Ammonia, Total (as N) (mg/dm2.day)	<0.00071 DLB	<0.0036 DLB	<0.0039 DLB	<0.00071 DLB	<0.00087 DLB
	Chloride (Cl) (mg/dm2.day)	<0.29	<1.4	<1.5	<0.28	<0.35
	Nitrate (as N) (mg/dm2.day)	0.00027	0.00080	<0.00069	0.00037	0.00025
	Sulfate (SO4) (mg/dm2.day)	<0.0071	<0.036	<0.039	<0.0071	<0.0087
Metals	Aluminum (Al)-Total (mg/dm2.day)	0.000614	0.00331	0.0146	0.0112	0.00153
	Antimony (Sb)-Total (mg/dm2.day)	<0.0000016	<0.0000072	<0.0000080	<0.0000017	<0.0000018
	Arsenic (As)-Total (mg/dm2.day)	<0.00017 DLM	<0.00020 DLM	<0.00018 DLM	<0.00017 DLM	<0.00017 DLM
	Barium (Ba)-Total (mg/dm2.day)	0.00000284	0.0000094	0.0000249	0.0000129	0.00000919
	Beryllium (Be)-Total (mg/dm2.day)	<0.0000079	<0.000036	<0.000040	<0.0000086	<0.0000091
	Bismuth (Bi)-Total (mg/dm2.day)	<0.0000079	<0.000036	<0.000040	<0.0000086	<0.0000091
	Boron (B)-Total (mg/dm2.day)	<0.00016	<0.00072	<0.00080	<0.00017	<0.00018
	Cadmium (Cd)-Total (mg/dm2.day)	<0.00000079	<0.0000036	<0.0000040	<0.00000086	<0.00000091
	Calcium (Ca)-Total (mg/dm2.day)	0.00366	0.0095	0.0474	0.0301	0.00764
	Chromium (Cr)-Total (mg/dm2.day)	<0.0000079	<0.000036	0.000092	0.0000620	0.0000099
	Cobalt (Co)-Total (mg/dm2.day)	0.0000019	<0.0000072	0.0000162	0.0000123	0.0000021
	Copper (Cu)-Total (mg/dm2.day)	0.000573	<0.00018 DLB	<0.00016 DLB	0.000103	0.000249
	Iron (Fe)-Total (mg/dm2.day)	0.00094	0.0056	0.0236	0.0199	0.00270
	Lead (Pb)-Total (mg/dm2.day)	0.00000086	<0.0000036	0.0000055	0.00000209	0.00000158
	Lithium (Li)-Total (mg/dm2.day)	<0.000079	<0.00036	<0.00040	<0.000086	<0.000091
	Magnesium (Mg)-Total (mg/dm2.day)	0.00211	0.00429	0.0138	0.0121	0.00421
	Manganese (Mn)-Total (mg/dm2.day)	0.0000349	0.000136	0.000567	0.000443	0.0000810
	Mercury (Hg)-Total (mg/dm2.day)	<0.00000079	<0.0000036	<0.0000040	<0.00000086	<0.00000091
	Molybdenum (Mo)-Total (mg/dm2.day)	<0.00000079	<0.0000036	<0.0000040	<0.00000086	<0.00000091
	Nickel (Ni)-Total (mg/dm2.day)	<0.0000079	<0.000036	0.000053	0.0000339	<0.0000091
	Phosphorus (P)-Total (mg/dm2.day)	<0.00079	<0.0036	<0.0040	<0.00086	<0.00091
	Potassium (K)-Total (mg/dm2.day)	<0.00079	<0.0036	<0.0040	0.00194	<0.00091
	Selenium (Se)-Total (mg/dm2.day)	<0.000016	<0.000072	<0.000080	<0.000017	<0.000018
	Silicon (Si)-Total (mg/dm2.day)	<0.00079	0.0048	0.0230	0.0174	0.00278
	Silver (Ag)-Total (mg/dm2.day)	<0.00000016	<0.00000072	<0.00000080	<0.00000017	<0.00000018
	Sodium (Na)-Total (mg/dm2.day)	0.0133	0.0125	0.0161	0.0234	0.0242
	Strontium (Sr)-Total (mg/dm2.day)	0.0000117	0.0000152	0.0000392	0.0000333	0.0000231
	Thallium (Tl)-Total (mg/dm2.day)	<0.0000016	<0.0000072	<0.0000080	<0.0000017	<0.0000018
	Tin (Sn)-Total (mg/dm2.day)	<0.0000016	<0.0000072	<0.0000080	<0.0000017	<0.0000018
	Titanium (Ti)-Total (mg/dm2.day)	<0.00016	<0.00072	0.00104	0.00072	<0.00018

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L1694891-1	L1694891-2	L1694891-3	L1694891-4	L1694891-5
	Description	Dustfall	Dustfall	Dustfall	Dustfall	Dustfall
	Sampled Date	23-OCT-15	21-OCT-15	21-OCT-15	21-OCT-15	20-OCT-15
	Sampled Time					
	Client ID	CDF1 OCT01/2015 - OCT23/2015	CDF2 OCT03/2015 - OCT21/2015	CDF4 OCT01/2015 - OCT21/2015	DFA1 OCT01/2015 - OCT21/2015	TIADF OCT01/2015 - OCT20/2015
Grouping	**Analyte**					
DUSTFALL						
Metals	Uranium (U)-Total (mg/dm2.day)	<0.00000016	<0.00000072	<0.00000080	<0.00000017	<0.00000018
	Vanadium (V)-Total (mg/dm2.day)	<0.000016	<0.000072	<0.000080	0.000048	<0.000018
	Zinc (Zn)-Total (mg/dm2.day)	0.000072	<0.00022	<0.00024	0.000060	<0.000055

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

Reference Information

Qualifiers for Individual Parameters Listed:

Qualifier	Description
DLB	Detection Limit Raised. Analyte detected at comparable level in Method Blank.
DLM	Detection Limit Adjusted due to sample matrix effects.

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
CL-IC-VA	Dustfall	Dustfall Chloride by Ion Chromatography	BC LAB MAN. - PART. - SOLUBLE - ANIONS

The Dustfall analysis is carried out in accordance with the B.C. Laboratory Manual method 'Particulate - Total' and 'Particulate - Soluble - Anions and Cations by Ion Chromatography'. The chloride analysis is specifcially carried out using procedures adapted from APHA Method 4110 "Determination of Anions by Ion Chromatography" and EPA Method 300.0 "Determination of Inorganic Anions by Ion Chromatography".

DUSTFALLS-COM-DM2-VA	Dustfall	Combined Dustfalls-Total, soluble, insol	BCMOE PARTICULATE

This analysis is carried out using procedures modified from British Columbia Environmental Manual "Particulate."
Particulates or Dustfall are determined gravimetrically. Total Insoluble Dustfall is determined by filtering a sample through a 0.45 um membrane filter and drying the filter at 104 degrees celsius. Total Soluble Dustfall is determined by evaporating the filtrate to dryness at 104 degrees celsius. The Total Dustfall is the sum of Insoluble Dustfall and the Soluble Dustfall.

HG-DUST(DM2-CVAFS-VA	Dustfall	Total Mercury in Dustfalls by CVAFS	EPA 245.7

This analysis is carried out using procedures adapted from "Standard Methods for the Examination of Water and Wastewater" published by the American Public Health Association, and with procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846 published by the United States Environmental Protection Agency (EPA). Instrumental analysis is by cold vapour atomic fluorescence spectrophotometry or atomic absorption spectrophotometry (EPA Method 245.7).

MET-DUST(DM2)-MS-VA	Dustfall	Total Metals in Dustfalls by ICPMS	EPA 6020A

This analysis is carried out using procedures adapted from "Standard Methods for the Examination of Water and Wastewater" published by the American Public Health Association, and with procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846 published by the United States Environmental Protection Agency (EPA). Instrumental analysis is by inductively coupled plasma - mass spectrometry (EPA Method 6020A).

NH3-F-VA	Dustfall	Dustfall Ammonia by Fluorescence	BC LAB MAN. - PART. - SOLUBLE - ANIONS

The Dustfall analysis is carried out in accordance with the B.C. Laboratory Manual method 'Particulate - Total' and 'Particulate - Soluble - Anions and Cations by Ion Chromatography'. The ammonia analysis is specifcially carried out using procedures modified from J. Environ. Monit., 2005, 7, 37 - 42, The Royal Society of Chemistry, "Flow-injection analysis with fluorescence detection for the determination of trace levels of ammonium in seawater", Roslyn J. Waston et al.

NO3-IC-VA	Dustfall	Dustfall Nitrate by Ion Chromatography	BC LAB MAN. - PART. - SOLUBLE - ANIONS

The Dustfall analysis is carried out in accordance with the B.C. Laboratory Manual method 'Particulate - Total' and 'Particulate - Soluble - Anions and Cations by Ion Chromatography'. The nitrate analysis is specifcially carried out using procedures adapted from APHA Method 4110 "Determination of Anions by Ion Chromatography" and EPA Method 300.0 "Determination of Inorganic Anions by Ion Chromatography".

SO4-IC-VA	Dustfall	Dustfall Sulfate by Ion Chromatography	BC LAB MAN. - PART. - SOLUBLE - ANIONS

The Dustfall analysis is carried out in accordance with the B.C. Laboratory Manual method 'Particulate - Total' and 'Particulate - Soluble - Anions and Cations by Ion Chromatography'. The sulfate analysis is specifcially carried out using procedures adapted from APHA Method 4110 "Determination of Anions by Ion Chromatography" and EPA Method 300.0 "Determination of Inorganic Anions by Ion Chromatography".

** ALS test methods may incorporate modifications from specified reference methods to improve performance.

The last two letters of the above test code(s) indicate the laboratory that performed analytical analysis for that test. Refer to the list below:

Laboratory Definition Code	Laboratory Location

Chain of Custody Numbers:

Reference Information

GLOSSARY OF REPORT TERMS

Surrogate - A compound that is similar in behaviour to target analyte(s), but that does not occur naturally in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery.
mg/kg - milligrams per kilogram based on dry weight of sample.
mg/kg wwt - milligrams per kilogram based on wet weight of sample.
mg/kg lwt - milligrams per kilogram based on lipid-adjusted weight of sample.
mg/L - milligrams per litre.
< - Less than.
D.L. - The reported Detection Limit, also known as the Limit of Reporting (LOR).
N/A - Result not available. Refer to qualifier code and definition for explanation.

Test results reported relate only to the samples as received by the laboratory.
UNLESS OTHERWISE STATED, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.
Analytical results in unsigned test reports with the DRAFT watermark are subject to change, pending final QC review.

ALS Laboratory Group
ANALYTICAL CHEMISTRY & TESTING SERVICES
Environmental Division

Chain of Custody / Analytical Request Form

Canada Toll Free: 1 800 668 9878
www.alsglobal.com

COC # _____

Page 1 of 1

Report To		Report Format / Distribution		Service Requested (Rush for routine analysis subject to availability)
Company:	ERM Consultants Canada Ltd	☑ Standard ☐ Other		◉ Regular (Default)
Contact:	Jem Morrison	☑ PDF ☑ Excel ☐ Digital ☐ Fax		○ Priority (Specify Date Required → →) Surcharges apply
Address:	1111 West Hastings Street	Email 1: jem.morrison@erm.com		○ Emergency (1 Business Day) - 100% Surcharge
	Vancouver, B.C. V6E 2J3	Email 2: daniel.casanova@erm.com		○ For Emergency < 1 Day, ASAP or Weekend - Contact ALS
Phone:	(604)689-9560 Fax:			**Analysis Request**
Invoice To	Same as Report ? ☐ Yes ☑ No	**Client / Project Information**		Please indicate below Filtered, Preserved or both (F, P, F/P)
Company:	ERM Consultants Canada Ltd.	Job #: 0298923-0002 (Hope Bay Project)		
Contact:	Accounts Payable (ermcanada.payables@erm.com)	PO / AFE:		
Address:	1111 West Hastings Street	LSD:		
	Vancouver, B.C. V6E 2J3			
Phone:	(604)689-9560 Fax:	Quote #:		
Lab Work Order # (lab use only)	☑ No L1694891	**ALS Contact:** Amber Springer	**Sampler:** Sarah Warnock	

Sample #	Sample Identification (This description will appear on the report)	Date (dd-mmm-yy) Installed	~~Time~~ Date (hh:mm) Retrieved	Sample Type	Total Particulate	Soluble particulate	Insoluble particulate	Sulphate	Nitrate	NH3, NH4	Cl	Total Metals	Mg+	Ca+	K+		Number of Containers
	CDF1	01-OCT-15	23-OCT-15	Water	X	X	X	X	X	X	X	X	X	X	X		2
	CDF2	03-OCT-15	21-OCT-15	Water	X	X	X	X	X	X	X	X	X	X	X		2
	CDF4	01-OCT-15	21-OCT-15	Water	X	X	X	X	X	X	X	X	X	X	X		2
	DFA1	01-OCT-15	21-OCT-15	Water	X	X	X	X	X	X	X	X	X	X	X		2
	TIADF	01-OCT-15	20-OCT-15	Water	X	X	X	X	X	X	X	X	X	X	X		2

L1694891-COFC

Special Instructions / Regulations / Hazardous Details

Shortened sample period. Low sample volume. CDF2 → One canister cracked. Retrieved on different dates
↳ Do analysis from one container that is not cracked.

Failure to complete all portions of this form may delay analysis. Please fill in this form LEGIBLY.

By the use of this form the user acknowledges and agrees with the Terms and Conditions as provided on a separate Excel tab.

Also provided on another Excel tab are the ALS location addresses, phone numbers and sample container / preservation / holding time table for common analyses.

SHIPMENT RELEASE (client use)			SHIPMENT RECEPTION (lab use only)				SHIPMENT VERIFICATION (lab use only)			
Released by:	Date (dd-mmm-yy)	Time (hh-mm)	Received by:	Date:	Time:	Temperature:	Verified by:	Date:	Time:	Observations: Yes / No ? If Yes add SIF
Sol Wal	27-OCT-15	11:00		Oct 28/15	1500	9.8 °C				

Nov 1/15. 7.1°C 9:00 am NZ/EC

ERM Consultants Canada Ltd.
ATTN: Jem Morrison
1500-1111 West Hastings Street
Vancouver BC V6E 2J3

Date Received: 01-DEC-15
Report Date: 10-DEC-15 13:52 (MT)
Version: FINAL

Client Phone: 604-689-9460

Certificate of Analysis

Lab Work Order #: L1709201

Project P.O. #: NOT SUBMITTED
Job Reference: 0298923-0002 (HOPE BAY PROJECT)
C of C Numbers:
Legal Site Desc:

Amber Springer, B.Sc
Account Manager

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L1709201-1	L1709201-2	L1709201-3		
	Description	WATER	WATER	WATER		
	Sampled Date	23-OCT-15	21-OCT-15	21-OCT-15		
	Sampled Time					
	Client ID	CDF1	CDF2	DFA1		
Grouping	**Analyte**					
DUSTFALL						
Particulates	Total Dustfall (mg/dm2.day)	0.40	0.33	0.46		
	Total Insoluble Dustfall (mg/dm2.day)	<0.10	<0.10	0.26		
	Total Soluble Dustfall (mg/dm2.day)	0.36	0.27	0.20		
Anions and Nutrients	Ammonia, Total (as N) (mg/dm2.day)	<0.00032 DLB	<0.00034 DLB	0.00051 DLB		
	Chloride (Cl) (mg/dm2.day)	<0.26	<0.27	<0.26		
	Nitrate (as N) (mg/dm2.day)	0.000405	0.000499	0.000250		
	Sulfate (SO4) (mg/dm2.day)	0.0114	0.0081	0.0066		
Metals	Aluminum (Al)-Total (mg/dm2.day)	0.000386	0.00231	0.00895		
	Antimony (Sb)-Total (mg/dm2.day)	<0.0000031 DLB	<0.0000035 DLB	<0.000015 DLB		
	Arsenic (As)-Total (mg/dm2.day)	0.000185	0.000225	0.000137		
	Barium (Ba)-Total (mg/dm2.day)	0.00000577	0.0000103	0.0000197		
	Beryllium (Be)-Total (mg/dm2.day)	<0.0000051	<0.0000058	<0.0000058		
	Bismuth (Bi)-Total (mg/dm2.day)	<0.0000051	<0.0000058	<0.0000058		
	Boron (B)-Total (mg/dm2.day)	<0.00010	<0.00012	<0.00012		
	Cadmium (Cd)-Total (mg/dm2.day)	<0.00000051	<0.00000058	<0.00000058		
	Calcium (Ca)-Total (mg/dm2.day)	0.00552	0.0108	0.0205		
	Chromium (Cr)-Total (mg/dm2.day)	<0.0000051	0.0000163	0.0000612		
	Cobalt (Co)-Total (mg/dm2.day)	<0.0000010	0.0000027	0.0000100		
	Copper (Cu)-Total (mg/dm2.day)	0.000310	<0.000046 DLB	0.000123		
	Iron (Fe)-Total (mg/dm2.day)	0.00052	0.00366	0.0139		
	Lead (Pb)-Total (mg/dm2.day)	<0.0000010 DLB	<0.0000069 DLB	<0.0000023 DLB		
	Lithium (Li)-Total (mg/dm2.day)	<0.000051	<0.000058	<0.000058		
	Magnesium (Mg)-Total (mg/dm2.day)	0.00831	0.00854	0.0153		
	Manganese (Mn)-Total (mg/dm2.day)	0.0000239	0.0000955	0.000267		
	Mercury (Hg)-Total (mg/dm2.day)	<0.0000051 DLM	<0.0000058 DLM	<0.0000058 DLM		
	Molybdenum (Mo)-Total (mg/dm2.day)	<0.00000051	<0.00000058	<0.00000058		
	Nickel (Ni)-Total (mg/dm2.day)	<0.0000051	0.0000104	0.0000365		
	Phosphorus (P)-Total (mg/dm2.day)	<0.00051	<0.00058	<0.00058		
	Potassium (K)-Total (mg/dm2.day)	0.00239	0.00204	0.00260		
	Selenium (Se)-Total (mg/dm2.day)	<0.000010	<0.000012	<0.000012		
	Silicon (Si)-Total (mg/dm2.day)	0.00064	0.00371	0.0124		
	Silver (Ag)-Total (mg/dm2.day)	<0.00000010	<0.00000012	0.00000016		
	Sodium (Na)-Total (mg/dm2.day)	0.0596	0.0482	0.0597		
	Strontium (Sr)-Total (mg/dm2.day)	0.0000513	0.0000459	0.0000645		
	Thallium (Tl)-Total (mg/dm2.day)	<0.0000010	<0.0000012	<0.0000012		
	Tin (Sn)-Total (mg/dm2.day)	<0.0000010	<0.0000012	<0.0000012		
	Titanium (Ti)-Total (mg/dm2.day)	<0.00010	0.00014	0.00047		

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L1709201-1	L1709201-2	L1709201-3		
	Description	WATER	WATER	WATER		
	Sampled Date	23-OCT-15	21-OCT-15	21-OCT-15		
	Sampled Time					
	Client ID	CDF1	CDF2	DFA1		
Grouping	**Analyte**					
DUSTFALL						
Metals	Uranium (U)-Total (mg/dm2.day)	<0.00000010	<0.00000012	0.00000014		
	Vanadium (V)-Total (mg/dm2.day)	<0.000010	<0.000012	0.000030		
	Zinc (Zn)-Total (mg/dm2.day)	<0.000031	<0.000035	0.000045		

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

Reference Information

Qualifiers for Individual Parameters Listed:

Qualifier	Description
DLB	Detection Limit Raised. Analyte detected at comparable level in Method Blank.
DLM	Detection Limit Adjusted due to sample matrix effects.

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
CL-IC-VA	Dustfall	Dustfall Chloride by Ion Chromatography	BC LAB MAN. - PART. - SOLUBLE - ANIONS

The Dustfall analysis is carried out in accordance with the B.C. Laboratory Manual method 'Particulate - Total' and 'Particulate - Soluble - Anions and Cations by Ion Chromatography'. The chloride analysis is specifcially carried out using procedures adapted from APHA Method 4110 "Determination of Anions by Ion Chromatography" and EPA Method 300.0 "Determination of Inorganic Anions by Ion Chromatography".

DUSTFALLS-COM-DM2-VA	Dustfall	Combined Dustfalls-Total, soluble, insol	BCMOE PARTICULATE

This analysis is carried out using procedures modified from British Columbia Environmental Manual "Particulate."
Particulates or Dustfall are determined gravimetrically. Total Insoluble Dustfall is determined by filtering a sample through a 0.45 um membrane filter and drying the filter at 104 degrees celsius. Total Soluble Dustfall is determined by evaporating the filtrate to dryness at 104 degrees celsius. The Total Dustfall is the sum of Insoluble Dustfall and the Soluble Dustfall.

HG-DUST(DM2-CVAFS-VA	Dustfall	Total Mercury in Dustfalls by CVAFS	EPA 245.7

This analysis is carried out using procedures adapted from "Standard Methods for the Examination of Water and Wastewater" published by the American Public Health Association, and with procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846 published by the United States Environmental Protection Agency (EPA). Instrumental analysis is by cold vapour atomic fluorescence spectrophotometry or atomic absorption spectrophotometry (EPA Method 245.7).

MET-DUST(DM2)-MS-VA	Dustfall	Total Metals in Dustfalls by ICPMS	EPA 6020A

This analysis is carried out using procedures adapted from "Standard Methods for the Examination of Water and Wastewater" published by the American Public Health Association, and with procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846 published by the United States Environmental Protection Agency (EPA). Instrumental analysis is by inductively coupled plasma - mass spectrometry (EPA Method 6020A).

NH3-F-VA	Dustfall	Dustfall Ammonia by Fluorescence	BC LAB MAN. - PART. - SOLUBLE - ANIONS

The Dustfall analysis is carried out in accordance with the B.C. Laboratory Manual method 'Particulate - Total' and 'Particulate - Soluble - Anions and Cations by Ion Chromatography'. The ammonia analysis is specifcially carried out using procedures modified from J. Environ. Monit., 2005, 7, 37 - 42, The Royal Society of Chemistry, "Flow-injection analysis with fluorescence detection for the determination of trace levels of ammonium in seawater", Roslyn J. Waston et al.

NO3-IC-VA	Dustfall	Dustfall Nitrate by Ion Chromatography	BC LAB MAN. - PART. - SOLUBLE - ANIONS

The Dustfall analysis is carried out in accordance with the B.C. Laboratory Manual method 'Particulate - Total' and 'Particulate - Soluble - Anions and Cations by Ion Chromatography'. The nitrate analysis is specifcially carried out using procedures adapted from APHA Method 4110 "Determination of Anions by Ion Chromatography" and EPA Method 300.0 "Determination of Inorganic Anions by Ion Chromatography".

SO4-IC-VA	Dustfall	Dustfall Sulfate by Ion Chromatography	BC LAB MAN. - PART. - SOLUBLE - ANIONS

The Dustfall analysis is carried out in accordance with the B.C. Laboratory Manual method 'Particulate - Total' and 'Particulate - Soluble - Anions and Cations by Ion Chromatography'. The sulfate analysis is specifcially carried out using procedures adapted from APHA Method 4110 "Determination of Anions by Ion Chromatography" and EPA Method 300.0 "Determination of Inorganic Anions by Ion Chromatography".

** ALS test methods may incorporate modifications from specified reference methods to improve performance.

The last two letters of the above test code(s) indicate the laboratory that performed analytical analysis for that test. Refer to the list below:

Laboratory Definition Code	Laboratory Location

Chain of Custody Numbers:

Reference Information

GLOSSARY OF REPORT TERMS

Surrogate - A compound that is similar in behaviour to target analyte(s), but that does not occur naturally in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery.
mg/kg - milligrams per kilogram based on dry weight of sample.
mg/kg wwt - milligrams per kilogram based on wet weight of sample.
mg/kg lwt - milligrams per kilogram based on lipid-adjusted weight of sample.
mg/L - milligrams per litre.
< - Less than.
D.L. - The reported Detection Limit, also known as the Limit of Reporting (LOR).
N/A - Result not available. Refer to qualifier code and definition for explanation.

Test results reported relate only to the samples as received by the laboratory.
UNLESS OTHERWISE STATED, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.
Analytical results in unsigned test reports with the DRAFT watermark are subject to change, pending final QC review.

ALS Laboratory Group
ANALYTICAL CHEMISTRY & TESTING SERVICES
Environmental Division

Chain of Custody / Analytical Request Form
Canada Toll Free: 1 800 668 9878
www.alsglobal.com

COC # _____

Page 1 of 1

Report To		Report Format / Distribution		Service Requested (Rush for routine analysis subject to availability)
Company:	ERM Consultants Canada Ltd.	☑ Standard ☐ Other		◉ Regular (Default)
Contact:	Jem Morrison	☑ PDF ☑ Excel ☐ Digital ☐ Fax		○ Priority (Specify Date Required → →) Surcharges apply
Address:	1111 West Hastings Street	Email 1:	jem.morrison@erm.com	○ Emergency (1 Business Day) - 100% Surcharge
	Vancouver, B.C. V6E 2J3	Email 2:	daniel.casanova@erm.com	○ For Emergency < 1 Day, ASAP or Weekend - Contact ALS
Phone:	(604)689-9560 Fax:			**Analysis Request**
Invoice To	Same as Report ? ☐ Yes ☑ No	**Client / Project Information**		Please indicate below Filtered, Preserved or both (F, P, F/P)
Company:	ERM Consultants Canada Ltd.	Job #:	0298923-0002 (Hope Bay Project)	
Contact:	Accounts Payable (ermcanada.payables@erm.com)	PO / AFE:		
Address:	1111 West Hastings Street	LSD:		
	Vancouver, B.C. V6E 2J3			
Phone:	(604)689-9560 Fax:	Quote #:		
Lab Work Order # (lab use only)	☑ No L1709201	**ALS Contact:** Amber Springer	**Sampler:**	

Sample #	Sample Identification (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	Total Particulate	Soluble particulate	Insoluble particulate	Sulphate	Nitrate	NH3, NH4	Cl	Total Metals	Mg+	Ca+	K+		Number of Containers
	CDF1	26/11/2015	26/11/2015	Water	X	X	X	X	X	X	X	X	X	X	X		2
	CDF2	25/11/2015	25/11/2015	Water	X	X	X	X	X	X	X	X	X	X	X		2
	DFA1	24/11/2015	25/11/2015	Water	X	X	X	X	X	X	X	X	X	X	X		2

L1709201-COFC

Special Instructions / Regulations / Hazardous Details

Failure to complete all portions of this form may delay analysis. Please fill in this form LEGIBLY.

By the use of this form the user acknowledges and agrees with the Terms and Conditions as provided on a separate Excel tab.

Also provided on another Excel tab are the ALS location addresses, phone numbers and sample container / preservation / holding time table for common analyses.

SHIPMENT RELEASE (client use)			SHIPMENT RECEPTION (lab use only)				SHIPMENT VERIFICATION (lab use only)			
Released by:	Date (dd-mmm-yy)	Time (hh-mm)	Received by:	Date:	Time:	Temperature:	Verified by:	Date:	Time:	Observations: Yes / No ? If Yes add SIF
Amber Chelczynski	~~NOV 27~~ 27/NOV/15	0800	LC	Dec 1/15	1620	°C				