

Appendix C-1

Q1-Q3 2019 Atmospheric Compliance Monitoring
Program Report – Doris and Madrid Projects



**Q1-Q3 2019 Atmospheric Compliance Monitoring Program
Report**

Doris and Madrid Projects

Final Report

March 2020

Prepared for:
TMAC Resources Inc.
Toronto, Ontario

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Project Number: 160930343





NUNAMI STANTEC

Executive Summary

This report presents the results of ambient air quality, dustfall, and meteorological monitoring conducted at the Doris and Madrid sites (the Sites) from January 2019 to September 2019 as outlined under the Air Quality Management Plan (AQMP; TMAC 2016,2019). To calculate annual average concentrations for requisite parameters, data from October to December 2018 (already reported by TMAC Resources Inc. (TMAC)) was also utilized and is included in this report.

Starting in Q2 2019, ambient monitoring around the Madrid Site commenced following the installation of dustfall jars at nine locations around the site. Monitoring around the Doris Site in Q1-Q3 2019 continued using the same methods/locations as in prior years.

The 2019 monitoring program included the following:

- Monthly dustfall sampling at six locations in the vicinity of the Doris site utilizing dustfall canisters for the period May - September 2019
- Monthly dustfall sampling at nine locations in the vicinity of the Madrid site utilizing dustfall canisters for the same period
- Snow core sampling for dustfall at six locations in the vicinity of the Doris site utilizing snow cores over the period September 10, 2018 (first snow fall) to April 27-28, 2019
- Total Suspended Particulate (TSP), particulate less than 10-microns (PM₁₀) and particulate less than 2.5 microns (PM_{2.5}) using Partisol Samplers at one location at the Doris site
- Dioxins and furans and mercury source emissions testing from September 15-18 on the new Doris waste incinerator (installed in 2019)

Meteorological monitoring for wind speed, wind direction, temperature, relative humidity, snowfall, rainfall, solar radiation and barometric pressure at one location. The meteorological data were used in the interpretation of the air quality measurements.

The results of the Q1-Q3 2019 ambient monitoring were compared to:

1. Relevant ambient air quality Standards, Objectives and Guidelines (SOGs)
2. The Doris Project dispersion model predictions for dustfall, TSP, PM₁₀ and PM_{2.5} presented in the Final Environmental Impact Statement (FEIS) Air Quality Assessment (Miramar, 2005)
3. Dustfall predictions downwind of the Tailings Impoundment Area included in the 2016 Doris North Project Certificate and Type A Water License Amendment Application (the 2016 Amendment)
4. The Madrid Project dispersion model predictions for dustfall presented in the Final Environmental Impact Statement (FEIS) Air Quality Assessment (Nunami Stantec, 2017)

A summary of the results and conclusions of the Q1-Q3 2019 compliance monitoring program are presented in Table ES-1.

Table ES-1: Summary of Q1-Q3 Compliance Monitoring Results

Measurement Parameter	Monitoring Period	Averaging Period	Results	Report Section	Action
Dustfall using Snow Core Sampling – Doris Site	September 2018 – April 2019	30-day	<ul style="list-style-type: none"> All measurements are below the ambient air quality objective for residential areas. All measurements are less than the maximum dustfall prediction in the 2016 Amendment. 	4.1.1	Results Satisfactory
Dustfall using Canisters – Doris and Madrid Sites	May - Sep 2019	30-day	<ul style="list-style-type: none"> Doris Site - All dustfall measurements around the Doris site were below the ambient air quality objective for residential and recreational areas. Doris Site – All measurements were below the maximum dustfall prediction in the 2016 Amendment. Madrid Site - One dustfall measurement was above the ambient air quality objective for residential and recreational areas, but below the air quality objective for commercial and industrial areas. The elevated level was measured at the closest downwind station to the Doris-Madrid Road. Madrid Site – The same measurement was above the maximum dustfall prediction in the 2017 FEIS for the Madrid-Boston Project. 	4.1.2	TMAC will continue to implement mitigation measures and monitor in 2020 to determine if there is a trend.
TSP	Jan - Sep 2019	24-hour	<ul style="list-style-type: none"> One measurement was above the ambient air quality objective by 1%. The exceedance is likely attributable to Crown Pillar Recovery Trench backfilling that was occurring around the time of the measurement. The measured concentration is not expected to be representative of air quality of the region due to the proximity of the monitor to the trench. The same measurement was above the maximum FEIS prediction for operations. 	4.2.1	TMAC is in the process of moving station DFA1 to avoid being unduly influenced by local sources.
	Oct 2018 - Sep 2019	annual	<ul style="list-style-type: none"> Annual average concentration is below the ambient air quality objective. Measured annual average concentration is less than the maximum FEIS prediction. 	4.2.1	Results Satisfactory

Table ES-1: Summary of Q1-Q3 Compliance Monitoring Results

Measurement Parameter	Monitoring Period	Averaging Period	Results	Report Section	Action
PM ₁₀	Jan - Sep 2019	24-hour	<ul style="list-style-type: none"> All measurements are below the ambient air quality objective. All measurements are below the maximum FEIS prediction. 	4.2.2	Results Satisfactory
PM _{2.5}	Oct 2018 - Sep 2019	24-hour	<ul style="list-style-type: none"> Measured 98th percentile concentration is below the CAAQS. All measurements are below the maximum FEIS prediction. 	4.2.3	Results Satisfactory
	Oct 2018 - Sep 2019	annual	<ul style="list-style-type: none"> Measured annual average concentration is below the CAAQS. Measured annual average concentration is less than the maximum FEIS prediction. 	4.2.3	Results Satisfactory
Incinerator dioxins and furans / mercury	Sept 15 - 18, 2019	-	<ul style="list-style-type: none"> The average stack concentration of mercury was below the CWS/Nunavut stack limit. The average stack concentration of dioxins and furans was above the CWS/Nunavut stack limit but is 70% lower than measurements on TMAC's previous incinerators. 	4.4	TMAC is reviewing options including reviewing with the manufacturer, ensuring recommended operational procedures have been implemented, ensuring all operators are adequately trained and, reviewing TMAC's waste segregation practices.

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Abbreviations

µg	Microgram
AAAQO	Alberta Ambient Air Quality Objective
ALS	ALS Laboratory Group
AMSL	Above Mean Sea Level
ASTM	ASTM International
AWR	All-weather road
BC	British Columbia
BC MoE	British Columbia Ministry of Environment
CAAQS	Canadian Ambient Air Quality Standards
CAC	Criteria Air Contaminant
CALA	Canadian Association for Laboratory Accreditation
CCME	Canadian Council of Ministers of the Environment
CWS	Canada-Wide Standard
cm	Centimetre
dm ²	Square decimetre (equal to 100 square centimetres)
ECCC	Environment and Climate Change Canada
ERM	ERM Consultants Canada Ltd.
FEIS	Final Environmental Impact Statement
GN	Government of Nunavut
hr	Hour
km	Kilometre
m	Metre
m ²	Square metre
m ³	Cubic metre
mg	Milligram
mg/dm ² /d	Milligrams per square decimeter per day
mg/100-cm ² /30-days	Milligram per 100 square centimetres per 30-day period

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mg/L	Milligram per Litre
NAPS	National Ambient Air Quality Pollution Surveillance Program
ng/TEQ/Rm ³	Nanograms tetrachlorodibenzo-para-dioxin equivalent per dry cubic meter at reference conditions
NIRB	Nunavut Impact Review Board
Nunami Stantec	Nunami Stantec Ltd.
NWB	Nunavut Water Board
PM	Particulate Matter
PM ₁₀	Particulate Matter less than 10 µm in diameter
PM _{2.5}	Particulate Matter less than 2.5 µm in diameter
Project	Doris North Project or Site
Rm ³	Reference cubic meters (corrected to 25° C and 101.3 kPa)
Rescan	Rescan Environmental Services Ltd.
Site	Doris North Site or Project
SOGs	Standards, Objectives and Guidelines
SWE	Snow-Water Equivalent
TIA	Tailings Impoundment Area (Doris)
TMAC	TMAC Resources Inc.
TSP	Total Suspended Particulate
TSS	Total Suspended Solids
US	United States
US EPA	United States Environmental Protection Agency

1 INTRODUCTION

This report presents the results of ambient air quality, dustfall, and meteorological monitoring conducted at the Doris and Madrid Projects (the Sites or Projects) from January 2019 to September 2019 as outlined under the Air Quality Management Plan (AQMP; TMAC 2016/2019). To calculate annual average concentrations for requisite parameters, data from October to December 2018 (already reported by TMAC Resources Inc. (TMAC)) was also utilized in this report.

Starting in Q2 2019, ambient monitoring around the Madrid Site commenced following the installation of dustfall jars at nine locations around the site. Monitoring around the Doris Site in Q1-Q3 2019 continued using the same methods/locations as in prior years. TMAC is currently installing new continuous monitoring stations at both Doris and Madrid that should become operational in 2020 – the new Doris continuous monitors will replace the existing Doris non-continuous particulate matter samplers.

The 2019 monitoring program included the following:

- Monthly dustfall sampling at six locations in the vicinity of the Doris site utilizing dustfall canisters for the period May - September 2019.
- Monthly dustfall sampling at nine locations in the vicinity of the Madrid site utilizing dustfall canisters for May - September 2019.
- Snow core sampling for dustfall at six locations in the vicinity of the Doris site over the period September 10, 2018 (first snow fall) to April 27-28, 2019.
- Total Suspended Particulate (TSP), particulate less than 10-microns (PM₁₀) and particulate less than 2.5 microns (PM_{2.5}) using Partisol Samplers at one location at the Doris site.
- Dioxins and furans and mercury source emissions testing from September 15-18 on the new Doris waste incinerator.
- Meteorological monitoring for wind speed, wind direction, temperature, relative humidity, snowfall, rainfall, solar radiation, and barometric pressure at one location. The meteorological data were used in the interpretation of the air quality measurements.

The results of the Quarter 1 to Quarter 3 2019 (Q1-Q3 2019) ambient monitoring were compared to:

- Relevant ambient air quality Standards, Objectives and Guidelines (SOGs);
- The Doris Project dispersion model predictions for dustfall, TSP, PM₁₀ and PM_{2.5} presented in the Final Environmental Impact Statement (FEIS) Air Quality Assessment (Miramar, 2005);
- Dustfall predictions downwind of the Tailings Impoundment Area included in the 2016 Doris North Project Certificate and Type A Water License Amendment Application (the 2016 Amendment); and,
- The Madrid Project dispersion model predictions for dustfall presented in the Final Environmental Impact Statement (FEIS) Air Quality Assessment (Nunami Stantec, 2017).

Operations at the Doris Site in Q1-Q3 2019 continued to most closely correspond to those presented in the 2005 FEIS and 2016 Doris North Project Certificate, so the Doris monitoring was compared to the same studies as in previous years. The start of Madrid North construction in 2019 corresponds with the construction phase air quality assessment presented in the Madrid-Boston Project FEIS, so this study was used for comparison to the Madrid measurements.

2 AMBIENT MONITORING DATA COMPARISONS

The results of the Q1-Q3 2019 ambient monitoring were compared to relevant air quality standards, objective and guidelines and Doris Site dispersion modelling studies, as detailed in the following sections.

2.1 Air Quality Standards, Objectives and Guidelines

Ambient air quality Standards, Objectives and Guidelines (SOGs) have been developed by the Canadian federal government and individual provinces and territories to assist or mandate the management of common air contaminants.

The assessment incorporates the Nunavut Environmental Guideline for Ambient Air Quality (Government of Nunavut 2011). Nunavut does not have guidelines or standards for some of the air contaminants. In these cases, guidelines, objectives or standards from the federal government (CCME 2016b, 2016a), British Columbia (BC) government (BC MOE 2016) and Alberta government (Alberta Environment and Parks 2016) have been used.

The ambient air quality SOGs that are used in this report are summarized in Table 2-1. Canadian Ambient Air Quality Standards (CAAQS) for particulate matter with diameter less than 2.5 µm (PM_{2.5}) have recently been revised and will come into effect in 2020.

2.2 Dispersion Model Prediction Comparisons

As construction activities at the Doris site related to the Madrid-Boston Project have not yet commenced, the Doris site air quality data are also compared to predictions made in the Doris North Final Environmental Impact Statement (FEIS; Miramar 2005), which is the modelling most representative of the Doris site in Q1-Q3 2019. For dustfall, the FEIS predicted a maximum deposition rate of 10.8 mg/100-cm²/30-days and that the maximum deposition rate would occur immediately adjacent to the mine portal.

The 2016 Doris North Project Certificate and Type A Water License Amendment Application (the 2016 Amendment) also contained predictions for dustfall. The Amendment predicted that Tailings Impoundment Area (TIA) maximum monthly dustfall contributions (modelled over three years) would be more than 53 mg/100-cm²/30-days up to 250-m from the TIA and would drop to 2.1 mg/100-cm²/30-days at approximately 1 km from the TIA. These predictions were for dustfall resulting from the subaerial deposition of tailings in the TIA only and did not include dust emissions from any other sources (e.g., unpaved roads) or project phases (e.g., construction), nor did these predictions include background (non-project related) dust contributions.

Table 2-1: Ambient Air Quality Standards, Objectives and Guidelines

Contaminant	Units	Averaging Period	Nunavut Ambient Air Quality Guideline ^a	Guidelines or Standards from Other Government Agencies	
				Value	Agency
Total Suspended Particulate (TSP)	$\mu\text{g}/\text{m}^3$	24-hour	120	-	
		Annual (geometric mean)	60	-	
Particulate Matter < 10 μm diameter (PM ₁₀)	$\mu\text{g}/\text{m}^3$	24-hour	-	50	BC Ambient Air Quality Objective ^e
Particulate Matter <2.5 μm diameter (PM _{2.5})	$\mu\text{g}/\text{m}^3$	24-hour	30	28 ^b 27 (Effective in 2020) ^b	CAAQS ^d
	$\mu\text{g}/\text{m}^3$	Annual	-	10 ^f 8.8 (Effective in 2020) ^c	CAAQS ^d
Dust deposition	$\text{mg}/\text{dm}^2/30$ days	30-day	-	53 (residential and recreation areas) 158 (commercial and industrial areas)	Alberta Ambient Air Quality Objectives and Guidelines ^f
<p>NOTES:</p> <p>Dash (-) = not applicable</p> <p>a: Reference: Government of Nunavut 2011</p> <p>b: The 24-hour PM_{2.5} value is calculated from the 3-year average of the annual 98th percentile of the daily 24-hour average concentration.</p> <p>c: The annual PM_{2.5} value is calculated from the 3-year average of the annual average concentrations.</p> <p>d: Canadian Ambient Air Quality Standards for O₃ and PM_{2.5}. Reference: CCME 2016</p> <p>e: Reference: BC MOE 2016</p> <p>f: Reference: Alberta Environment and Parks 2016</p>					

Maximum Doris site FEIS predictions for TSP, PM₁₀ and PM_{2.5} are presented in Table 2-2.

Table 2-2: Summary of FEIS Particulate Predictions - Doris

Parameter	Averaging Period	Maximum Predicted Concentration (µg/m ³)
TSP	24-hour	76.3
	Annual	14.5
PM ₁₀	24-hour	61.9
PM _{2.5}	24-hour	18.4 (98 th percentile)
	Annual	4.5

The FEIS predictions do not include background concentrations and would therefore be expected to under-predict actual ambient levels, as would be measured by the compliance monitoring program.

Dustfall measurements made in the vicinity of the Madrid North site (currently under construction) were compared to construction predictions made in the air quality modelling study in the FEIS for the Madrid-Boston Project (Nunami Stantec, 2017). Construction phase dustfall predictions in the FEIS at the locations of the Madrid dust fall monitoring sites ranged from 8.9 to 46.6 mg/100-cm²/30-days.

2.3 Stack Emission Limits

The incinerator stack testing for mercury and dioxins and furans were assessed against the emissions standards set out in the Nunavut Water Board, Water License 2AM-DOH1323 Amendment No. 1, Part G-5 and the Government of Nunavut's "Environmental Guideline for the Burning and Incineration of Solid Waste", which is based on the Canadian Council of Ministers of the Environment (CCME) Canada Wide Standards (CWS). The relevant stack emissions criteria are:

- Mercury stack limit of 20 µg/Rm³ (dry, reference conditions of 25°C and 101.3 kPa, corrected to 11% oxygen).
- Dioxins and furans stack limit of 0.08 ng TEQ/Rm³ (dry, reference conditions of 25°C and 101.3 kPa, corrected to 11% oxygen).

3 MONITORING PROGRAM DESCRIPTION

3.1 Dustfall

Dustfall is the measure of airborne particulate that has settled onto a given surface. The main dust generation sources will be from wind erosion from tailings facilities, the use of the crushers, and the movement of vehicles and large equipment on site. The dustfall monitoring program measures the quantities of dust deposited near project sites. Dustfall is monitored using dustfall canisters in the summer and by snow core sampling in the winter. Results of the monitoring program can be used to modify dust management procedures at a site, if required. Since dustfall measurements are a non-continuous methodology requiring laboratory analysis, the sampling is only used to retroactively confirm the effectiveness of mitigation measures. Real-time dust management on the site is carried out through application of water or approved chemical dust suppressants based on on-site observations of dust generation. Water usage is tracked and reported in the Water License monthly and annual reports filed with the NWB.

3.1.1 Sample Locations

Nunavut does not have established siting requirements for dustfall samplers. Therefore, the siting criteria from the BC MoE (BC MoE 2009) and the US EPA methods (US EPA 1999, 2009) are used. The monitoring locations were selected based on the following criteria:

- The samplers are not in an area of future infrastructure development
- Samplers are sited up and down wind of the surface facilities and zones of high activity, considering the dominant wind direction during the summer months
- The samplers are more than 20 m away from structures, vegetation and topographic features
- The samplers can be safely accessed

3.1.1.1 *Doris Dustfall*

Dustfall monitoring at the Doris site is undertaken at six locations, including a control station. The reasons for each selected location are provided in Table 3-1 and shown in Figure 3-1.

Table 3-1: Reasons for Doris Site Dustfall Sampling Location Selection

Station	Reason for Selected Location	UTM Coordinates (Zone 13W)		Elevation (m above mean sea level)
		Easting (m)	Northing (m)	
DFA1	This location has historical data and represents dustfall from the general site area, is located downwind of crushing activities, and close to the camp and mill site. The station is co-located with the Doris Meteorological Station.	433388	7558617	36
CDF4	This station is located approximately 200 m away from Quarry 2, where crushing activities occur, to monitor dustfall from crushing activities.	432616	7558982	80
TIA-DF1	This station is located approximately 250 m downwind of the TIA tailings beach at a distance which corresponds with the maximum predicted monthly Project-generated dustfall of 53 mg/100-cm ² /30-days in the 2016 Amendment.	435881	7556806	51
TIA-DF2	This station is located approximately 1.65 km downwind (east) of the TIA tailings beach. This location is approximately 300 m west (upwind) of the location predicted to have a maximum annual TIA-generated dustfall level of 23 mg/100-cm ² /year (1.9 mg/100-cm ² /30-days) in the 2016 Amendment.	437318	7557017	46
TIA-DF3	This station is located approximately 3 km downwind of the TIA tailings beach at a distance which corresponds with minimal annual predicted Project-generated dustfall.	438574	7557252	23
ControlDF	This station is located well away from potential project contributions and represents background conditions. The station is approximately 2 km southwest of Windy Camp.	430993	7549219	35



- Legend
- Project Development Area (PDA)
 - Ambient Monitoring Stations
 - Roads

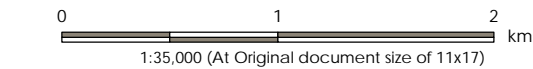
Notes

1. Coordinate System: NAD 1983 UTM Zone 13N

2. Service Layer Credits: Sources: Esri, HERE, Garmin, USGS, Intermap, INCREMENT P, NRCan, Esri Japan, METI, Esri China (Hong Kong), Esri Korea, Esri (Thailand), NGCC, © OpenStreetMap contributors, and the GIS User Community

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Project Location
Hope Bay,
Nunavut

160930343 REVA
Prepared by BCC on 2020-03-18
Technical Review by ## on 2020-##-##

Client/Project
TMAC - RESOURCES-HOPE BAY
NUNAMI STANTEC LIMITED

Figure No.
3-1

Title
Locations of the Doris Ambient Monitoring
Stations

3.1.1.2 *Madrid Dustfall*

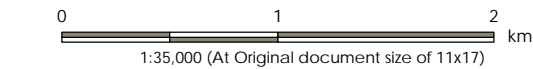
Dustfall monitoring stations around the Madrid site were installed in the spring of 2019. Dustfall monitoring was undertaken at nine locations around the Madrid North and Madrid South locations, including a control station in the predominantly upwind location and three locations to quantify dustfall with perpendicular distance from the Doris-Madrid Road. The reasons for each selected location are provided in Table 3-2 and are shown in Figure 3-2.

Table 3-2: Reasons for Madrid Site Dustfall Sampling Location Selection

Station	Reason for Selected Location	UTM Coordinates (Zone 13W)		Elevation (m above mean sea level)
		Easting (m)	Northing (m)	
M-DF01	Control station in a predominantly upwind location of the Madrid sites - in the vicinity of the Windy Radio Tower	432912	7550152	26
M-DF02	This station is located in the vicinity of the predicted maximum dustfall along the property boundary for the overall Madrid operations – 2 km east of Madrid North processing plant	435586	7550597	44
M-DF03	This station is located in the vicinity of the predicted maximum dustfall along the property boundary in the vicinity of Madrid South operations – 2 km east of the Madrid South Portal.	436338	7547550	45
M-DF04	Station is located to assess the maximum impact inside the property boundary but outside the PDA near the Madrid North operations – along vent raise pad access road east of the ore stockpile.	433848	7549908	44
M-DF05	Station is located to assess the maximum impact inside the property boundary but outside the PDA near the Madrid South operations – along shore of Patch Lake east of the waste rock pile.	435052	7547168	52
M-DF06	Upwind station for roadway dustfall study - 50 m west of Doris-Madrid All-Weather Road.	432650	7553066	62
M-DF07	Downwind station for roadway dustfall study - 50 m east of Doris-Madrid All-Weather Road (in a perpendicular line to road).	432758	7553086	62
M-DF08	Downwind station for roadway dustfall study 100 m east of Doris-Madrid All-Weather Road (in a perpendicular line to road).	432823	7552891	66
M-DF09	Downwind station for roadway dustfall study (200 m east of Doris-Madrid All-Weather Road (in a perpendicular line to road).	432922	7552895	45



- Legend
- Project Development Area (PDA)
 - Ambient Monitoring Stations
 - Roads



Project Location
Hope Bay,
Nunavut

160930343 REVA
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Client/Project
TMAC - RESOURCES-HOPE BAY
NUNAMI STANTEC LIMITED

Figure No.

3-2

Title

Locations of the Madrid Ambient
Monitoring Stations

Notes

1. Coordinate System: NAD 1983 UTM Zone 13N
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3.1.2 Methods

Dustfall collection is a passive monitoring method which provides a measure of particulates that would be directly deposited onto vegetation or soil. The basis of the methodologies is that field-deposited dust is collected in a manner that is quantifiable in terms of area (cm²) and exposure length (days), and that samples are then sent to a laboratory for analysis.

Dustfall is monitored at each station via dustfall canisters during summer and through snow core sampling in winter. The details of each methodology are provided below.

3.1.2.1 Summer Dustfall Sampling

Summer dustfall is quantified by the American Society for Testing and Materials (ASTM) D1739-98 sampling method (ASTM 2010). Two dustfall sample canisters were deployed at each station to act as a form of redundancy in case one of the samples became void and to provide sufficient sample material to analyze for a full range of parameters including metals. Laboratory cleaned canisters of standard size and shape containing a liquid sampling matrix (deionized water and algaecide) are attached to 2 m tall poles and are exposed to the atmosphere for an approximate 30-day period. Windscreens around the sample containers improves the dustfall collection efficiency, and bird spikes are used to minimize contaminants from bird feces. The samplers collect particles small enough to pass through a 1-millimetre (mm) screen and large enough to settle by their own weight.

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

Following exposure, the canisters are collected and sent to ALS Laboratory Group (ALS) - a Canadian Association for Laboratory Accreditation Quality Assurance (CALA) accredited laboratory (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 had overflowed, the dustfall canister was not sent for analysis because the sample was considered void.

At the laboratory, samples are analyzed for total particulates, anions, cations, and total metals. The data are standardized to units of (mg/100-cm²/30-days or kg/ha/year). For canister samples, this standardization is based on canister opening dimensions and the duration of exposure. Both containers were combined for each station and sampling period at the laboratory. The combined samples were then analyzed for particulates (total, soluble, and insoluble), anions (sulphate, nitrate, chloride, and ammonia) and total metals.

3.1.2.2 *Snow Core Sampling*

Snow core sampling for the Doris site was instituted in 2016 to record dustfall during the winter months due to issues with using the canister method during winter months. Snow core sampling will be implemented at the new Madrid dustfall stations started for winter 2019-2020. At each dustfall station, snow core subsamples are collected using a snow corer to retrieve a cylindrical snow core from the snowpack. A minimum of three snow cores are collected along a transect at each monitoring location. The samples are composited in the field to produce a single representative composite snow sample for the location. Composite samples are bagged, labelled, and shipped to an accredited laboratory (ALS) for processing. Processing of snow cores require filtration, drying and weighing in the laboratory. For quality assurance/quality control (QA/QC), a duplicate sample is collected from one of the snow core sampling locations.

Snow core samples are analyzed by the laboratory as water samples and are reported in units of mg/L. These units are converted to dustfall units of mg/100-cm² and standardized to mg/100cm²/30-days over the monitoring period. The surface loading rate was calculated by multiplying the parameter concentration (mg/L or mg/1000 cm³) by the average snow-water-equivalent of the transect samples (measured in cm of water) and dividing by the number of days snow had accumulated (time from the first snowfall to the sampling day).

3.1.3 Data Analysis

Standardized dustfall is compared to the Alberta AAQO for dustfall (Table 2-1) as Nunavut does not currently have a dustfall standard. Analysis of temporal trends is undertaken to identify any trends in the measured dustfall levels with time of year or meteorological conditions. A qualitative comparison to the 2005 FEIS and 2016 Amendment predictions was also made. Review of dustfall levels with distance from the tailings management areas was also made to determine spatial trends in dustfall.

3.1.4 Schedule

Summer dustfall canister samples are collected from May through September, inclusive. Winter dustfall is collected at the end of winter (late April/early May). The snow core composite sample reflects cumulative winter dust deposition since the date of first snowfall (October) to the sampling period end (approximately October through April, inclusive).

3.2 Suspended Particulate Monitoring (PM₁₀, PM_{2.5} and TSP)

Suspended particulate matter includes both airborne solid and low-vapour-pressure liquid particles having aerodynamic diameters ranging in size from 0.01 to about 44 µm. The generation of particulate matter results from the movement of vehicles, mobile equipment, crushing, blasting, bulk handling, and storage and other activities associated with mineral processing and construction. Wind erosion from sources such as tailings can also generate particulate emissions.

3.2.1 Sample Location

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

- A stable 120 VAC power source is available
- The sampler is not in an area of future infrastructure development
- The sampler inlet is mounted at a height of 2 to 15 m above ground level
- The location is accessible year-round
- The sampler is away from structures, vegetation and topographic features

Sampling is conducted at monitoring location DFA1 in the Doris site. This location is free from obstructions and nearby pollutant sources that may cause interference in suspended particulate monitoring. Samplers for suspended particulate monitoring are being installed at the Madrid site and are expected to be operational in early 2020.

3.2.2 Sampling Methods

At the Doris site ambient particulate monitoring in Q1-Q3 2019 continued to use the Partisol monitors described below following the protocols described in the 2016 version of the TMAC AQMP (TMAC, 2016). Installation and operation of new continuous particulate and NO_x monitors described in the 2019 version of the TMAC AQMP (TMAC, 2019) is expected to be completed in early 2020.

A Partisol Plus Model 2025 ambient air sampler is used to monitor TSP and a Partisol Sequential Dichotomous Model 2025D ambient air sampler is used to monitor PM₁₀ and PM_{2.5} simultaneously. The Partisol instruments are used in Canada for compliance monitoring programs and are recognized as equivalent reference methods by the US EPA (2009).

The Partisol ambient air samplers draw a particulate-laden ambient air stream through a size-selective inlet, and then through a filter. A built-in pump provides the vacuum required to draw the air flow through the sample filter and a volume flow controller monitors and automatically adjusts the flow rate. The filters are sealed pre and post use, thereby protecting them from environmental interferences during sampling operations. The filters are pre and post-weighed by ALS.

Pallflex TX40H120-WW Teflon coated glass fibre filters were used with the Partisol samplers. To reduce contamination, filter exchanges were performed using pneumatic pressure from the sample pump and did not involve any special electromechanical components, belts or motors. New filter cassettes from the supply magazine were pushed up and rightward to the sampling position, while the previous cassette was moved to the storage magazine. The supply and storage magazines were covered to seal off the filter cassettes, thereby protecting them from environmental interference during sampling operations.

The Partisol Sequential Dichotomous Model 2025-D PM₁₀/PM_{2.5} sampler uses a PM₁₀ air inlet followed by a US EPA dichotomous virtual impactor that separates the incoming PM₁₀ air stream into fine (PM_{2.5}) and coarse (PM₁₀ minus PM_{2.5}) components. These two air components are collected onto separate filter cassettes; one for fine and one for coarse components. The Partisol Plus 2025 TSP sampler collects TSP directly and does not use a special air inlet or virtual impactor.

Due to the very cold climate, the Partisol samplers are installed inside temperature-controlled shelters to minimize sample schedule interruptions caused by cold weather, wet conditions and excess humidity (filter conditioning), air leaks, and pump malfunctions. The Partisol air sampler locations are free from obstructions and nearby pollutant sources that may cause interference in suspended particulate monitoring.

3.2.3 Data Analysis

The Partisol sampler filters were analyzed by ALS. Following standard protocol, filter weights reported by the laboratory as being less than the detection limit were taken to be half the detection limit in the analysis.

The particulate sampling provides a 24-hour average ground-level concentration for each size fraction. This was compared to the relevant 24-hour standards (Table 3-1). Temporal trends in the TSP, PM₁₀ and PM_{2.5} ambient concentrations over the study period were examined with respect to time of year and meteorological conditions.

3.2.4 Schedule

The Partisol samplers were programmed to follow Environment and Climate Change Canada's (ECCC). National Ambient Air Quality Objectives Pollution Surveillance Program (NAPS) schedule, which requires 24-hour sampling every six days for particulate matter (ECCC 2016). By operating on a six-day cycle, different days are sampled each week allowing for differing production intensity or other cyclical production variations.

Scheduled calibration, maintenance, and audits occurred throughout the year in accordance with the Partisol maintenance standard operating procedure (SOP). Training in these activities is provided to staff as required.

3.3 Meteorological Monitoring Program

The Doris meteorological station has recorded air temperature, relative humidity, wind speed and direction, precipitation, and solar radiation since 2004. Barometric pressure has been recorded since 2010. In September 2016, a Geonor T-200B all-weather precipitation gauge was installed to collect precipitation year-round.

3.3.1 Sampling Location

The meteorological station is installed at location DFA1. This siting was chosen in consultation with Environment Canada and Health Canada officials.

3.3.2 Sampling Methods

The meteorological station is a self-contained, solar/battery-powered system and includes instrumentation to measure hourly values of temperature, wind speed, wind direction, relative humidity, solar radiation and rainfall. Data is recorded by a data logger located at the station and is downloaded manually or through remote access.

3.3.3 Data Analysis

Meteorological data are analyzed on a monthly basis and compiled into summary tables. Data validity checks are conducted and missing / invalid data is flagged. For the Q1-Q3 2019 period, six hours of wind speed and wind direction data were invalidated due to calibration/maintenance activities or icing of the sensor. The data recovery rates for all meteorological instruments in this period were better than 99.9%.

3.3.4 Schedule

Meteorological data is collected continuously and is downloaded at the beginning of each month, or on an as-needed basis.

3.4 Incinerator Stack Testing

TMAC installed a new, larger capacity waste incinerator to replace two older vintage and smaller units in Q3 2019. Commissioning of the new unit was completed approximately 3 weeks prior to Nunami Stantec conducting source emissions testing of the new unit over the period of September 15 to 18, 2019. Source emissions testing was completed with the incinerator operating under normal steady state conditions (i.e., after the primary chamber burner ignited and stabilized) for the duration of the sampling period.

The testing was conducted in accordance with the ECCC reference methods EPS 1/RM/2 and 1/RM/3 (for dioxins and furans), US EPA Method 29 (for mercury) and EPS 1/RM/15 (combustion gases). Three replicate tests were conducted for each contaminant from each incinerator exhaust stack and the results averaged. The specific contaminants tested, and their associated source emissions testing reference methods are presented in Table 3-3.

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Table 3-3: Test Methods

Source	Contaminant	Reference Method	No. of Tests
Incinerator	Velocity Traverse / Flowrate, Molecular Weight, Moisture Content	EPS 1/RM/8 Methods B, C and D	3
	Oxygen (O ₂)	EPS 1/RM/15	3
	Carbon Dioxide (CO ₂)	EPS 1/RM/15	3
	Polychlorinated dibenzo- <i>para</i> -dioxins and Polychlorinated dibenzofurans	EPS 1/RM/2 and 1/RM/3	3
	Mercury (Hg)	US EPA Method 29	3

4 MONITORING PROGRAM RESULTS AND DISCUSSION

4.1 Dustfall Results

4.1.1 Snow Cores

The measurement period for each snow core sample is provided in Table 4-1. Measured dustfall rates estimated for each monitoring location in winter 2018-2019 are summarized in Table 4-2. Laboratory results are presented in Appendix A.

Table 4-1: Snow Core Sampling Periods (2018-2019)

Snow Core Station	Date of First Snowfall	Sample Retrieval Date	Sample Time (days)
CDF4	09/10/2018	4/27/2019	229
DFA1		4/27/2019	229
TIA-DF1		4/28/2019	230
TIA-DF2		4/28/2019	230
TIA-DF3		4/28/2019	230
ControlDF		4/27/2019	229

Table 4-2: Measured Deposition Rates from Snow Core Sampling

Snow Core Station	Alberta Ambient Air Quality Objective (AAAQO)	Measured Dustfall Level (mg/100-cm ² /30-days)	Percentage of AAAQO (Residential and Recreation Area)
CDF4	53 (residential and recreation areas)	10.1	19%
DFA1		11.7	22%
TIA-DF1		8.3	16%
TIA-DF2	158 (commercial and industrial areas)	2.7	5%
TIA-DF3		8.1	15%
ControlDF		2.2	4%

Dustfall levels estimated from the snow core sampling ranged from 2.2 mg/100-cm²/30-days (at ControlDF) to 11.7 mg/100-cm²/30-days (DFA1) during the September 2018 to April 2019 monitoring period (229 to 230 days). All measured dustfall levels were less than the AAAQO of 53 mg/100-cm²/30-days for residential and recreational areas and less than the AAAQO of 158 mg/100-cm²/30-days for commercial and industrial areas. The maximum deposition rate (11.7 mg/100-cm²/30-days) occurred at Station DFA1 which is downwind of the Doris crushing and processing area.

The dustfall rates from all monitoring stations were less than the maximum predicted dustfall level of 53 mg/100-cm²/30-days in the 2016 Amendment modelling.

4.1.2 Dustfall Canisters

4.1.2.1 Doris Site

In 2019, one dustfall sample (TIA - DFA1 in July was not analyzed due to a sample recovery issue resulting in the sample being lost.

A summary of the measured monthly dustfall levels at each monitoring location using dustfall canisters in 2019 is presented in Table 4-3. Laboratory results are presented in Appendix B. Dustfall levels estimated from the canister sampling ranged from 1.5 mg/100-cm²/30-days (at TIA-DF1 to 3) to 31.5 mg/100-cm²/30-days (DFA1). There were no dustfall exceedances measured at the Doris site.

Table 4-3 also presents the predominant wind direction over each month based on the Doris meteorological data. In May, winds were predominantly blowing from easterly directions, for which direction the TIA was downwind of stations TIA – DF1 to DF3, which all had dustfall measurements below the laboratory method detection limit.

The measured monthly dustfall levels at locations TIA-DF1, TIA-DF2, and TIA-DF3 are plotted versus distance from the TIA in Figure 4-1.

All monthly dustfall rates from the Doris monitoring stations were less than the maximum predicted dustfall level of 53 mg/100-cm²/30-days (at 250-m from the TIA) in the 2016 Amendment modelling.

Table 4-3: Summary of Measured Dustfall Levels from Canister Sampling in 2019 – Doris Site

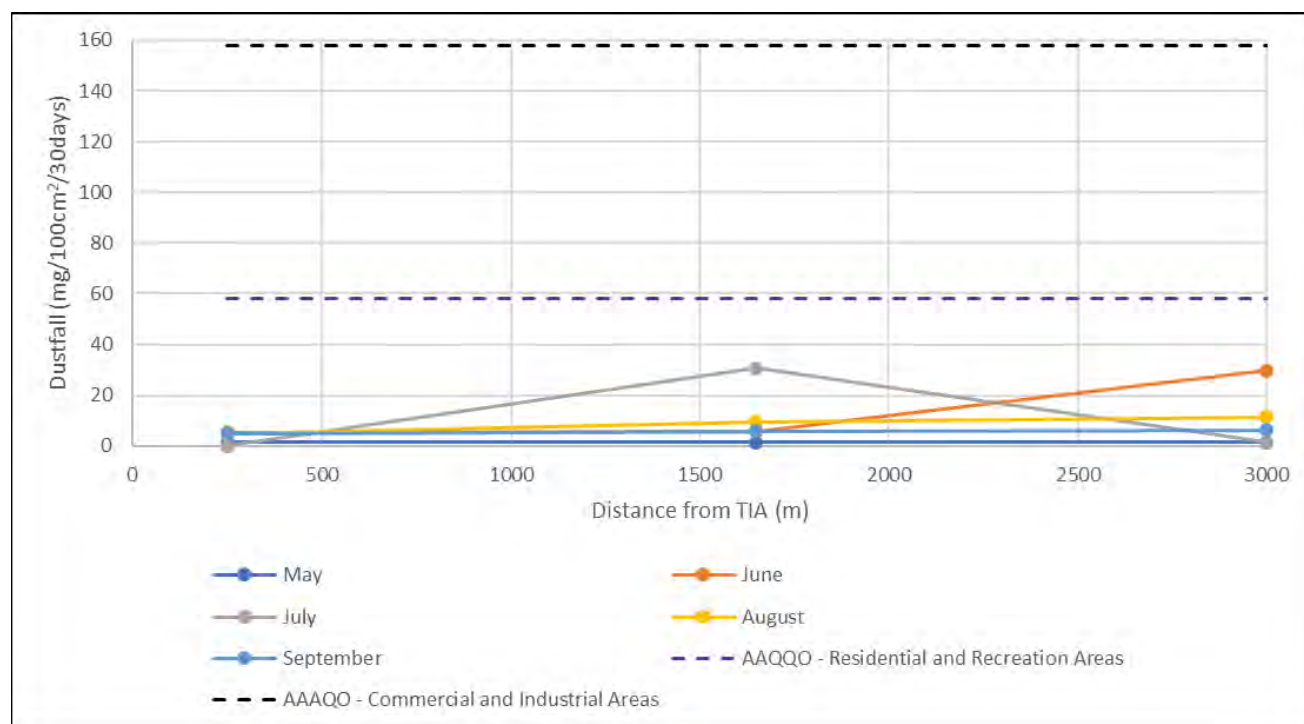
Sample Month	AAAQO	Units	Dustfall Location						Monthly Average	Prevailing Wind Direction
			CDF4	DFA1	TIA-DF1	TIA-DF2	TIA-DF3	Control DF		
May	53 (residential and recreation areas) 158 (commercial and industrial areas)	mg/100-cm²/30-days	4.2	5.1	1.5 ¹	1.5 ¹	1.5 ¹	1.5 ¹	2.8	ESE
June		mg/100-cm²/30-days	19.5	6.0	5.4	5.7	29.7	10.2	13.3	W
July		mg/100-cm²/30-days	15.9	31.5	N/A ²	30.6	1.5	12.3	15.9	W
August		mg/100-cm²/30-days	12.0	18.0	4.8	9.6	11.4	18.0	11.2	W
September		mg/100-cm²/30-days	14.4	17.1	4.8	5.7	6.3	14.1	9.7	NW
Maximum		mg/100-cm²/30-days	36.0	19.5	31.5	5.4	30.6	29.7	18.0	
Average		mg/100-cm²/30-days	25.8	13.2	15.5	3.3	10.6	10.1	11.2	
Max Percentage of Alberta AAQO for Residential Recreational Areas		%	67.9%	36.8%	59.4%	10.2%	57.7%	56.0%	34.0%	

Notes:

1 - Measurement was below the laboratory minimum detection limit of 2.5 mg/100 cm²/day. A value of ½ the detection limit was used in the assessment.

2 - No sample collected.

Figure 4-1: Variation in Measured Monthly Dustfall Levels with Distance from the Doris TIA



4.1.2.2 Madrid Site

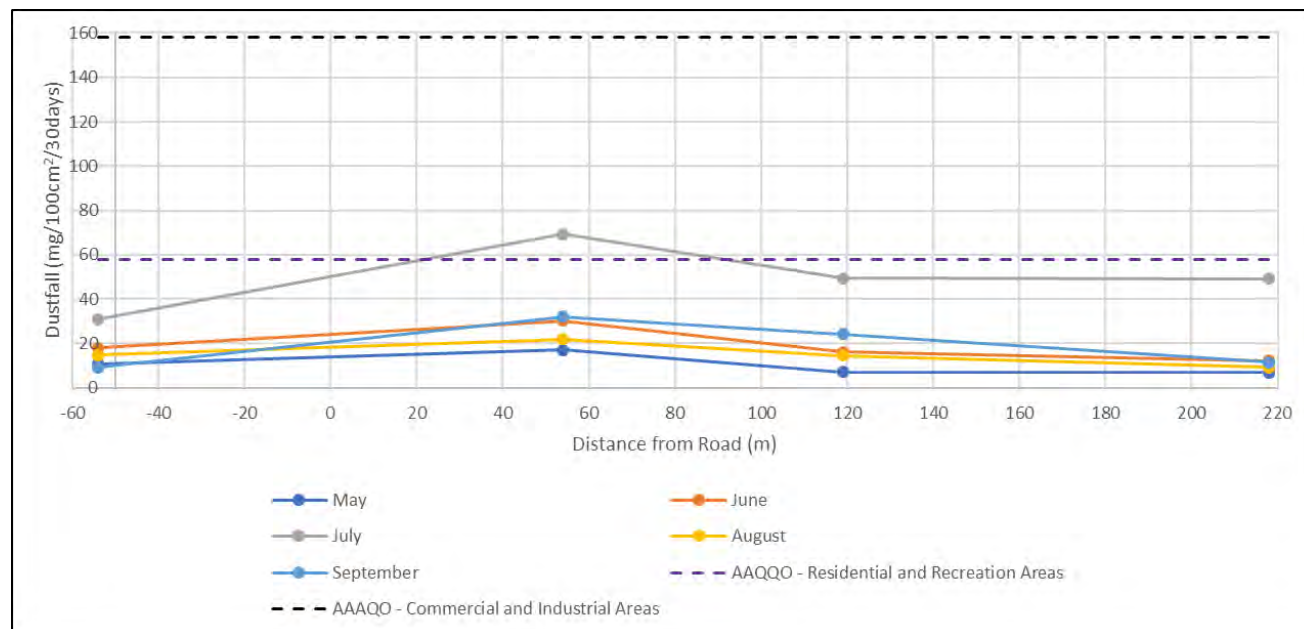
All dustfall samples collected at the Madrid site in 2019 were valid. A summary of the measured monthly dustfall levels at each monitoring location using dustfall canisters in 2019 is presented in Table 4-4. Laboratory results are presented in Appendix B. Dustfall levels estimated from the canister sampling ranged from 3.9 mg/100-cm²/30-days (at M-DF01) to 69.3 mg/100-cm²/30-days (M-DF07). There was one exceedance of the dustfall AAQO of 53 mg/100-cm²/30-days for residential and recreational areas, which occurred in July 2019 at location M-DF07. This measurement was however, less than the AAQO of 158 mg/100-cm²/30-days for commercial and industrial areas.

The measured monthly dustfall levels at locations M-DF06, M-DF07, M-DF08 and M-DF09 are plotted versus distance from the Doris-Madrid Road in Figure 4-2. These monitoring locations were chosen to study the variation in dustfall levels with distance from the roadway. MD-F06 is located 50 m from the road in the predominantly upwind direction, while the other three stations are located 50 m, 100 m and 200 m downwind. Dustfall levels in all months except for July were relatively consistent. In July the measurements at all roadway dustfall locations were elevated relative to the other months. July had higher windspeeds on average and lower precipitation than the other months, which likely contributed to the higher measured dustfall levels. TMAC will continue to implement mitigation measures and monitor in 2020 to determine if there is a trend.

Table 4-4: Summary of Measured Dustfall Levels from Canister Sampling in 2019 – Madrid Site

Sample Month	AAAQO	Units	Dustfall Location									Monthly Average	Prevailing Wind Direction
			M-DF01	M-DF02	M-DF03	M-DF04	M-DF05	M-DF06	M-DF07	M-DF08	M-DF09		
May	53 (residential and recreation areas)	mg/100-cm ² /30-days	3.9	5.1	6.0	12.9	4.2	10.8	17.1	7.2	6.9	8.2	ESE
June		mg/100-cm ² /30-days	25.5	7.5	4.2	12.3	12.0	18.0	30.3	16.2	12.3	15.4	W
July		mg/100-cm ² /30-days	6.0	15.0	12.0	15.6	8.7	30.9	69.3	49.5	49.2	28.5	W
August	158 (commercial and industrial areas)	mg/100-cm ² /30-days	15.0	8.7	8.7	8.4	6.9	14.7	21.9	14.4	9.3	12.0	W
September		mg/100-cm ² /30-days	8.4	5.4	8.7	7.2	13.2	9.3	32.1	24.3	11.4	13.3	NW
Maximum		mg/100-cm ² /30-days	25.5	15.0	12.0	15.6	13.2	30.9	69.3	49.5	49.2		
Average		mg/100-cm ² /30-days	11.8	8.3	7.9	11.3	9.0	16.7	34.1	22.3	17.8		
Max Percentage of Alberta AAQO for Residential Recreational Areas		%	48.1%	28.3%	22.6%	29.4%	24.9%	58.3%	130.8%	93.4%	92.8%		

Figure 4-2: Variation in Measured Monthly Dustfall Levels with Distance from the Doris-Madrid Road



Over the Madrid monitoring stations, one dustfall measurement (M-DF07 in July) was above the maximum predicted dustfall level at that location in the 2017 FEIS modelling ($46.6 \text{ mg}/100\text{-cm}^2/30\text{-days}$). At all monitoring locations (including M-DF07), the measured dustfall levels were within the expected range of variability for the dispersion modelling predictions.

4.2 Particulate Matter Sampling

TSP, PM_{10} and $\text{PM}_{2.5}$ ambient monitoring in Q1-Q3 2019 was conducted at location DFA1 at the Doris site. A summary of the measured ambient TSP, PM_{10} and $\text{PM}_{2.5}$ concentrations for the study period are presented in Table 4-5. Data recovery rates and detection limit statistics are presented in Table 4-6. Laboratory results for the Partisol samplers are presented in Appendix C. Calibration records are presented in Appendix D.

Table 4-5: Summary of Ambient TSP, PM₁₀ and PM_{2.5} Measurements

Parameter	Air Quality Standard / Objective		24-Hour Average (µg/m ³)				Annual Average (µg/m ³) ²	
	24-Hour	Annual	Maximum ¹	98 th Percentile ²	Range	% of Criteria	Average ³	% of Criteria
TSP	120	60	121.0		1.1 - 121	101%	7.3	12%
PM ₁₀	50	-	9.0		1.2 - 9	18%	3.4	N/A
PM _{2.5}	28	10	6.3	5.6	1.2 - 6.3	20%	2.3	23%

Notes:

1 - Results reported for Jan 2019 to Sep 2019

2 - Results reported for Oct 2018 to Sep 2019

3 - Geometric mean reported for TSP and arithmetic average for PM₁₀ and PM_{2.5}

Table 4-6: Summary of Data Recovery Rates and Detection Limit Statistics for Partisol Sampling (Jan - Sep 2019)

Parameter	TSP	PM ₁₀	PM _{2.5}
Number of Samples	46	46	46.0
Number of Samples Less Than Detection Limit	3	18	23
Number of Invalid Samples	0	0	0
Data Recovery Rate (%)	100%	100%	100%
Percent of Samples Less Than Detection Limit	7%	39%	50%

4.2.1 TSP

The data recovery rate for the Partisol TSP sampling was 100% which is well above acceptable levels. Of the valid samples, 7% were below the laboratory detection limit - for these samples half the detection limit was used in the analysis.

The maximum measured 24-hour average TSP concentration in the January to September 2019 period was $121 \mu\text{g}/\text{m}^3$ which is 1% above the applicable Government of Nunavut (GN) air quality objective and was measured on March 10, 2019. The exceedance is likely attributable to Crown Pillar Recovery Trench backfilling that was occurring around the time of the measurement. The measured concentration is not expected to be representative of the air quality of the region due to the proximity of the monitor to the trench.

The same TSP sample was the only measurement above the maximum predicted TSP concentration in the 2005 FEIS of $76.3 \mu\text{g}/\text{m}^3$. TMAC will examine moving station DFA1 to avoid being unduly influenced by local emissions sources.

To calculate an annual average concentration, TSP monitoring data for October - December 2018, which have been previously reported, were used in conjunction with the January - September 2019 TSP measurements. The annual geometric mean of the measured TSP concentrations for the period October 2018 to September 2019 was $7.3 \mu\text{g}/\text{m}^3$ which is 12% of the applicable GN annual objective. This concentration is below the maximum predicted annual average TSP concentration in the 2005 FEIS of $14.3 \mu\text{g}/\text{m}^3$.

A time history plot of measured 24-hour average TSP concentrations for the period October 2018 to September 2019 is presented in Figure 4-3. Higher TSP concentrations were more frequently measured in March and April 2019.

4.2.2 PM₁₀

The data recovery rate for the Partisol PM₁₀ sampling was 100% which is well above acceptable levels. Of the valid samples, 39% were below the laboratory detection limit, and half the detection limit was used in the analysis for these samples.

The maximum measured 24-hour average PM₁₀ concentration in the January to September 2018 period was $9 \mu\text{g}/\text{m}^3$ which is 18% of the applicable GN objective. This measured concentration is below the maximum predicted PM₁₀ concentration in the 2005 FEIS of $61.9 \mu\text{g}/\text{m}^3$.

A time history plot of measured 24-hour average PM₁₀ concentrations for the period October 2018 to September 2019 is presented in Figure 4-4. Higher PM₁₀ concentrations are more frequently measured in summer months relative to winter months, which is likely due to the warmer temperatures and lack of snow cover.

4.2.3 PM_{2.5}

The PM_{2.5} data recovery rate was 100% which is well above acceptable levels. Of the valid samples, 50% were below the laboratory detection limit, and half the detection limit was used in the analysis.

The calculated 98th percentile of the measured 24-hour average PM_{2.5} concentrations in the October 2018 to September 2019 period was 5.6 µg/m³ which is below the Canadian Ambient Air Quality Standard (CAAQS) of 28 µg/m³. An explicit comparison to the CAAQS for PM_{2.5} requires averaging the 98th percentile daily average levels in each of three consecutive calendar years, with a valid comparison requiring valid data for a minimum of two of the three years. Since the data presented in this report is for a single year and is not based on a calendar year, comparison to the CAAQS is provided for informational purposes only; not to assess compliance. The 98th percentile of the measured 24-hour average PM_{2.5} concentrations is below the maximum predicted 98th percentile PM_{2.5} concentration in the 2005 FEIS of 18.4 µg/m³.

The annual average of the measured PM_{2.5} concentrations for the period October 2018 to September 2019 was 2.3 µg/m³ which is less than the annual CAAQS of 10 µg/m³. As with the 24-hour CAAQS, compliance with the annual average CAAQS requires averaging daily measurements in each of three consecutive calendar years, with a valid comparison requiring valid data for a minimum of two of the three years. Since the data presented in this report is for a single year and is not based on a calendar year, comparison to the annual CAAQS is provided for informational purposes only; not to assess compliance. The measured annual average concentration is below the maximum predicted annual average PM_{2.5} concentration in the 2005 FEIS of 4.5 µg/m³.

A time history plot of measured 24-hour average PM_{2.5} concentrations for the period October 2018 to September 2019 is presented in Figure 4-5. Similar to PM₁₀, higher PM_{2.5} concentrations are generally more frequently measured in summer months relative to winter months.

Figure 4-3: Summary of Measured TSP Concentrations (Oct 2018 - Sep 2019)

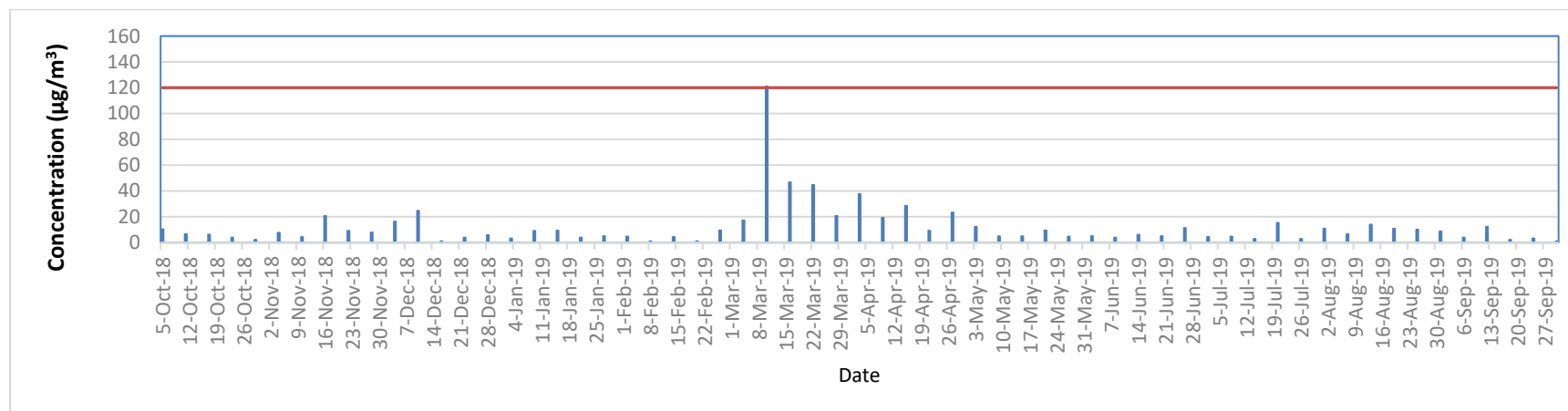


Figure 4-4: Summary of Measured PM₁₀ Concentrations (Oct 2018 - Sep 2019)

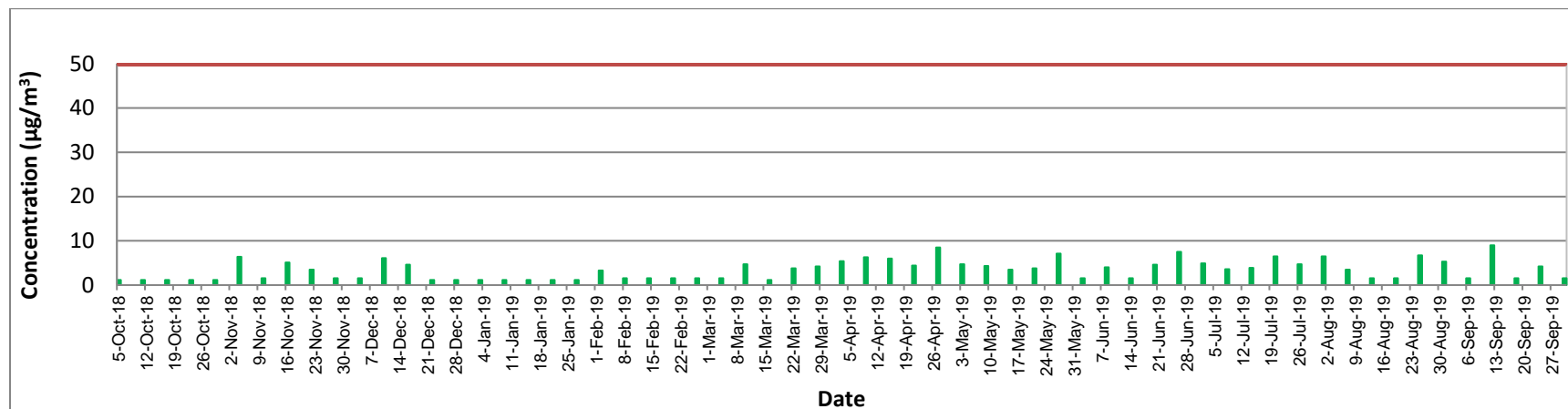
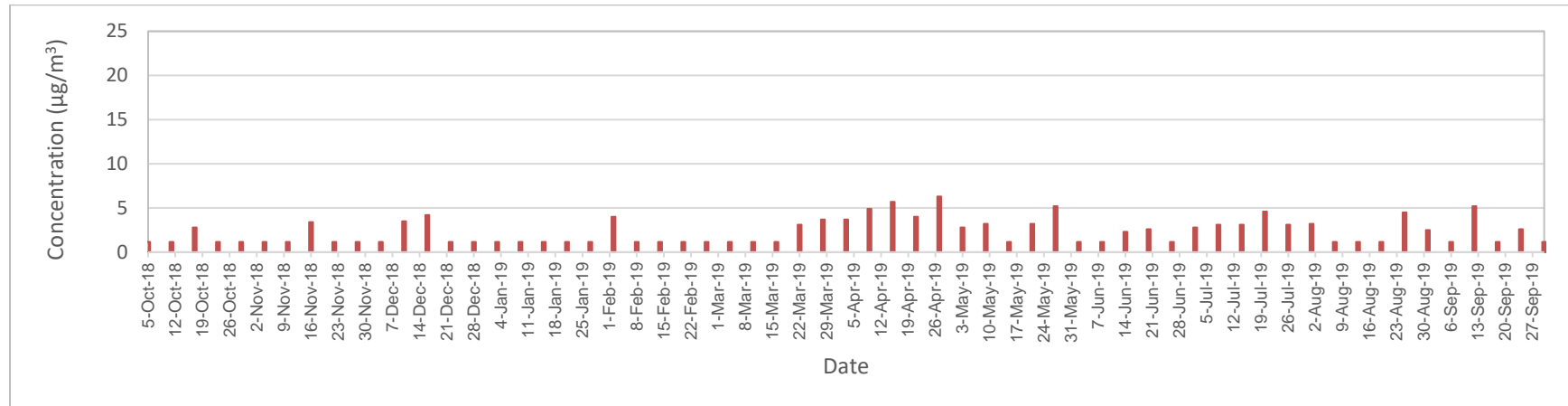


Figure 4-5: Summary of Measured PM_{2.5} Concentrations (Oct 2018 - Sep 2019)



4.2.4 Historical Trends in Ambient Particulate

4.2.4.1 January to September Reporting Period Trends

Table 4-7 below provides a comparison of maximum measured 24-hour and annual average TSP, PM₁₀ and PM_{2.5} measurements in the January to September period over the last 4 years. The highest 24-hour average TSP concentration was measured in 2016 and exceeded the guideline by 28%. No 24-hour average TSP exceedances were measured in 2017, however exceedances of 5% and 1% of the guideline was measured in 2018 and 2019, respectively.

The highest measured PM₁₀ concentration occurred in 2017 and was 83% of the guideline. In 2016 and 2018 the maximum measured PM₁₀ concentrations were both similar and were well below the guideline. In 2019, the highest measured PM₁₀ concentration was lower than those measured in the 3 previous years.

Measured 24-hour and annual average PM_{2.5} concentrations were similar throughout the 2016 to 2019 period.

Table 4-7: Summary of Maximum Measured 24-Hour and Annual Average TSP/PM₁₀/PM_{2.5} Concentrations for 2016-2019

Contaminant	Averaging Period	Criteria	Jan - Sep 2016	Jan -Sep 2017	Jan -Sep 2018	Jan -Sep 2019
TSP	24-hour	120	153.0	37.8	126	121
	Annual (1)	60	7.8	4.2	6.2	7.3
PM ₁₀	24-hour	50	18.3	41.5	19	9
PM _{2.5}	24-hour (1)	28	5.3	6.1	5.6	5.6
	Annual (1)	10	1.6	2.1	2.4	2.3

Note:

1 Annual averages for the period Oct to Sep of the prior and subsequent year.

4.2.4.2 Four Year Trend in Air Quality

Time history plots of measured TSP, PM₁₀ and PM_{2.5} concentrations at DFA1 over the last 4 years are presented in Figure 4-7 to Figure 4-9, respectively. In Figure 4-7 and Figure 4-8, the 24-hour average guidelines of 120 ug/m³ for TSP and 50 ug/m³ for PM₁₀ are presented as orange lines. There have been only two days (24-hour periods) of measured exceedances of the TSP guideline in the last 4 years and no measured exceedances of the PM₁₀ guideline. For PM_{2.5}, the Canadian Ambient Air Quality Standard (CAAQS) is 28 ug/m³ and is based on the average of the 98th percentile concentration in each of three consecutive years (with at least two valid years of data available). As seen in Figure 4-9, all measured PM_{2.5} concentrations at the station have been well less than this level.

Table 4-8 presents the data recovery and detection limit statistics for the particulate measurements over the last four years. Data recovery rates have been well above acceptable levels during this period. The detection limit is the lowest concentration that the laboratory can measure - samples below the detection limit are assessed as half of the detection limit following standard monitoring protocols. For PM₁₀, close to half of the collected samples had concentrations less than the detection limit, while for PM_{2.5}, 57% of the measurements were less than the detection limit.

Table 4-9 presents summary statistics from the last four years of particulate monitoring. The 90th percentile concentrations are well below the maximum measured levels, indicating that elevated particulate concentrations occur infrequently.

Table 4-8: Summary of Particulate Monitoring Data Recovery Statistics (2015-2019)

Parameter	TSP	PM ₁₀	PM _{2.5}
Number of Samples	246	246	246
Number Less than the Detection Limit	32	121	141
Number of Missing Samples	7	17	18
Data Recovery	97%	93%	93%
Percent less than the Detection Limit	13%	49%	57%

Table 4-9: Summary of Particulate Monitoring Measurement Statistics (2015-2019)

Statistic	TSP	PM ₁₀	PM _{2.5}
Maximum (ug/m ³)	153.0	41.5	16.7
90 th Percentile (ug/m ³)	27.4	7.6	4.6
Median (ug/m ³)	5.8	1.6	1.2
25 th Percentile (ug/m ³)	3.2	1.2	1.2

Measured ambient PM₁₀ measurements have all been below their guideline with only one instance (<1% of the samples) in the past four years when measured concentrations reached above 80% of the guideline. About 45% of the PM₁₀ measurements are below the detection limit and the 90th percentile PM₁₀ concentration is about 16% of the criteria, indicating that elevated PM₁₀ levels are infrequent and ambient levels are commonly below the method detection limit.

TMAC is in the process of installing new ambient monitoring equipment for particulates and nitrogen oxides at DFA1 in 2019 (as well as a second station to monitor construction activities in the vicinity of the Madrid site). Continuous monitors will be utilized that will provide enhanced coverage of ambient particulate levels by measuring hourly data as opposed to TMAC's current non-continuous monitors that collect a single 24-hour sample once every six days. The focus of TMAC's continuous particulate monitoring program will be TSP and PM_{2.5} - the parameters with GN criteria.

Figure 4-6: Four Year Time History Plot of Measured Ambient TSP Concentrations

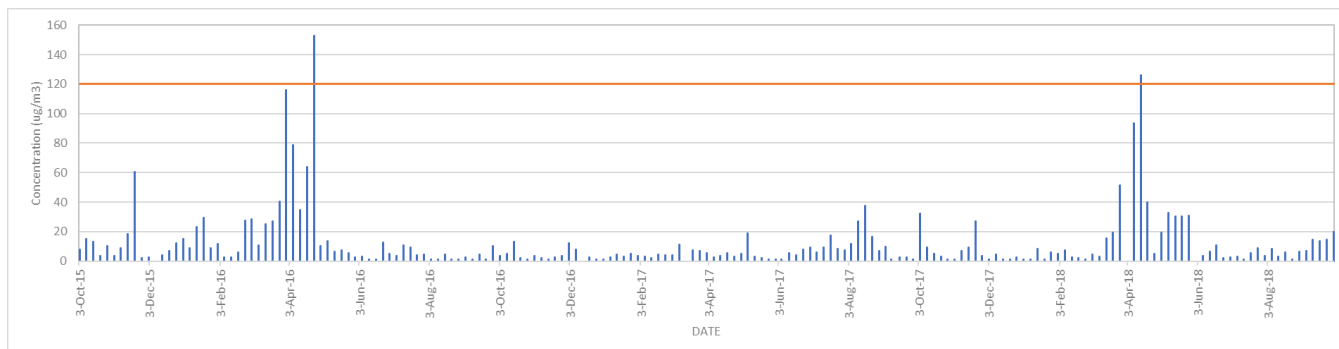


Figure 4-7: Four Year Time History Plot of Measured Ambient PM₁₀ Concentrations

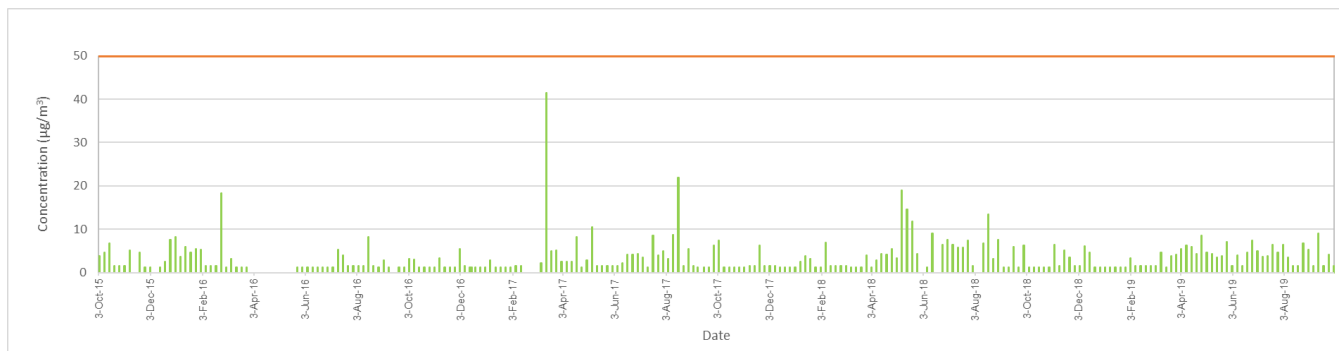
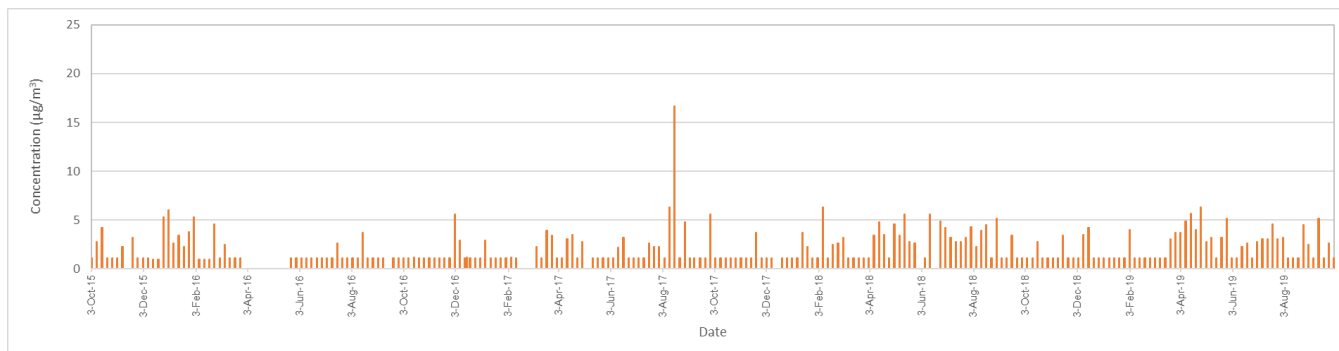


Figure 4-8: Four Year Time History Plot of Measured Ambient PM_{2.5} Concentrations



4.3 Meteorology

A summary of the maximum, minimum, and average of the hourly average meteorological parameters in each month of January to September 2019 are presented in Table 4-10. Meteorological data collected in January - September 2019 at the Doris station are presented in Appendix E.

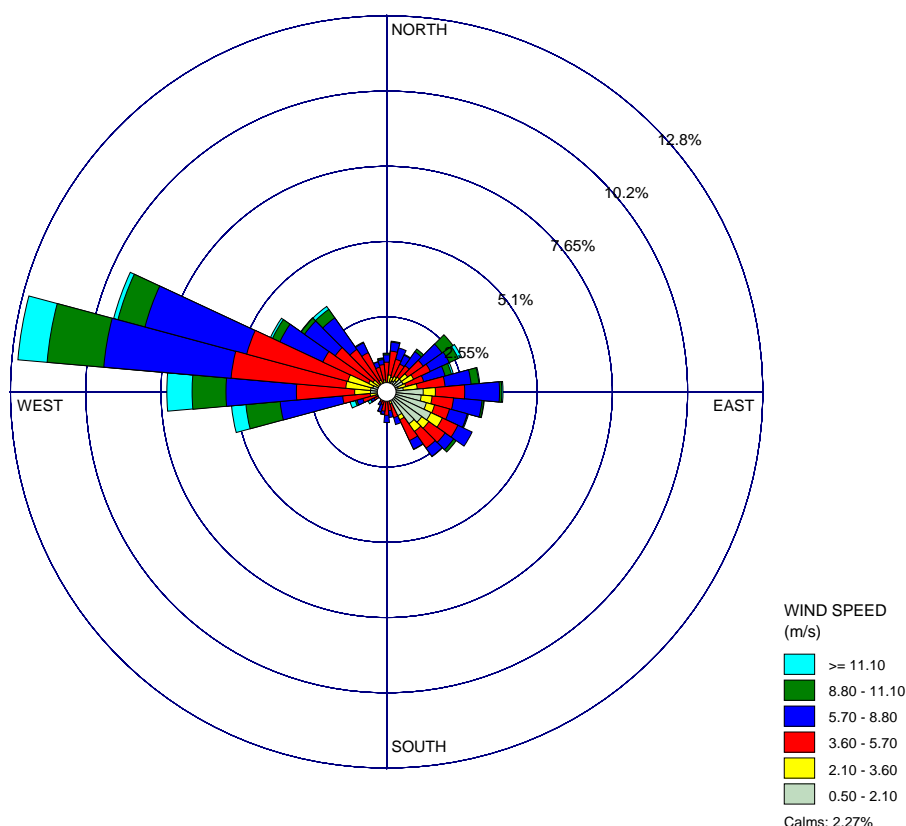
A wind rose showing the measured directionality and speed for the period January - September 2019 is presented in Figure 4-9. The length of the radial barbs gives the total percent frequency of winds from the indicated direction, while portions of the barbs of different widths indicate the frequency associated with each wind speed category.

Winds over the nine-month period occurred predominantly from westerly to west-northwesterly directions. Higher wind speeds occurred most frequently from the west.

Table 4-10: Summary of Meteorological Measurements (Jan - Sep 2019)

Date (m-y)	Average Air Temperature (°C)	Minimum Daily Air Temperature (°C)	Maximum Daily Air Temperature (°C)	Absolute Minimum Temperature (°C)	Absolute Maximum Temperature (°C)	Average Wind Speed (m/s)	Maximum Instantaneous Wind Speed (m/s)	Time of Maximum Instantaneous Wind Speed (mm/dd/yyyy h:m)	Total Precipitation (mm)	Total Rainfall (mm)	Total SWE (mm)	Average Relative Humidity (%)	Average Solar Radiation (W/m²)	Total Bright Sunshine Hours (hr)	Station Pressure (kpa)
Jan-19	-31.7	-34.3	-28.6	-41.3	-18.5	5.4	19.2	1/19/2019 2:52	9.8	0.0	9.8	73.2	2.2	0	100.0
Feb-19	-29.1	-33.5	-25.1	-39.9	-12.4	5.1	20.0	2/22/2019 1:51	7.1	0.0	7.1	75.2	23.5	50	101.7
Mar-19	-20.2	-25.2	-15.6	-34.9	-5.1	5.6	18.9	3/2/2019 4:05	14.0	0.0	14.0	81.2	86.1	234	101.3
Apr-19	-19.8	-25.4	-14.5	-33.4	-4.2	4.0	16.7	4/4/2019 6:46	17.8	0.0	17.8	80.7	187.6	348	101.3
May-19	-6.4	-10.0	-3.2	-24.7	3.6	4.9	15.3	5/2/2019 15:19	13.6	0.0	13.6	88.1	249.1	431	101.9
Jun-19	3.8	0.3	7.2	-5.0	20.5	5.1	18.5	6/10/2019 13:11	47.0	36.1	10.9	81.6	231.0	408	101.2
Jul-19	8.0	4.7	11.6	1.7	21.6	5.8	16.2	7/5/2019 13:13	32.3	32.3	0.0	81.6	186.9	400	100.4
Aug-19	9.3	6.3	12.1	0.6	24.9	5.2	25.8	8/23/2019 11:06	37.8	37.8	0.0	80.9	118.6	276	100.6
Sep-19	2.1	-0.3	4.8	-6.0	17.6	5.4	20.0	9/16/2019 6:23	15.3	12.3	3.0	85.8	70.1	166	100.5
Average	-9.3	-13.0	-5.7	-20.3	5.3	5.2	18.9		21.7	13.2	8.5	80.9	128.3	257.0	101.0
Maximum	9.3	6.3	12.1	1.7	24.9	5.8	25.8		47.0	37.8	17.8	88.1	249.1	431.0	101.9
Minimum	-31.7	-34.3	-28.6	-41.3	-18.5	4.0	15.3		7.1	0.0	0.0	73.2	2.2	0.0	100.0
Total									194.9	118.6	76.3				

Figure 4-9: Wind Rose for January to September 2019



4.4 Incinerator Stack Testing

A new waste incinerator was installed in 2019 to replace two smaller and older units. Testing for mercury and dioxins and furans was conducted on the new waste incinerator. The results of the testing were:

- The average concentration of mercury was $0.26 \mu\text{g}/\text{Rm}^3$, which is below the CWS/Nunavut stack limit of $20 \mu\text{g}/\text{Rm}^3$ (corrected to 11% oxygen).
- The average concentration of dioxins and furans was $1.27 \text{ ng}/\text{TEQ}/\text{Rm}^3$, which is above the CWS/Nunavut stack limit of $0.08 \text{ ng TEQ}/\text{Rm}^3$, corrected to 11% oxygen. The measured dioxins and furans concentration from the new incinerator is 70% lower than that from the two older incinerators that it replaced.

The detailed stack testing report including the measured stack parameters, concentrations and emission rates is included in Appendix F. Based on the results of the dioxins and furans testing, TMAC is reviewing potential options to reduce dioxins and furans emissions. Options could include:

- Reviewing with the manufacturer;

- Ensuring manufacturer recommended operational procedures for the incinerator have been implemented and ensuring all operators are adequately trained; and,
- Reviewing TMAC's waste segregation practices.

5 CONCLUSIONS AND RECOMMENDATIONS

5.1 Conclusions

This report presents the results of ambient air quality, dustfall, and meteorological monitoring conducted at the Doris and Madrid sites (the Sites) from January 2019 to September 2019 as outlined under the Air Quality Management Plan (AQMP; TMAC 2016,2019). To calculate annual average concentrations for requisite parameters, data from October to December 2018 (already reported by TMAC Resources Inc. (TMAC)) was also utilized and is included in this report.

Starting in Q2 2019, ambient monitoring around the Madrid Site commenced following the installation of dustfall jars at nine locations around the site. Monitoring around the Doris Site in Q1-Q3 2019 continued using the same methods/locations as in prior years.

The 2019 monitoring program included the following:

- Monthly dustfall sampling at six locations in the vicinity of the Doris site utilizing dustfall canisters for the period May - September 2019.
- Monthly dustfall sampling at nine locations in the vicinity of the Madrid site utilizing dustfall canisters for the same period.
- Snow core sampling for dustfall at six locations in the vicinity of the Doris site utilizing snow cores over the period September 10, 2018 (first snow fall) to April 27-28, 2019.
- Total Suspended Particulate (TSP), particulate less than 10-microns (PM_{10}) and particulate less than 2.5 microns ($PM_{2.5}$) using Partisol Samplers at one location at the Doris site.
- Dioxins and furans and mercury source emissions testing from September 15-18 on the new Doris waste incinerator (installed in 2019).

Meteorological monitoring for wind speed, wind direction, temperature, relative humidity, snowfall, rainfall, solar radiation and barometric pressure at one location. The meteorological data were used in the interpretation of the air quality measurements.

The main results and findings of the report are presented below.

Snow Core Dustfall Sampling

- Dustfall levels estimated from the snow core sampling ranged from 2.2 mg/100-cm²/30-days (at ControlDF) to 11.7 mg/100-cm²/30-days (DFA1).
- All measured dustfall levels were less than the AAAQO of 53 mg/100-cm²/30-days for residential and recreational areas and less than the AAAQO of 158 mg/100-cm²/30-days for commercial and industrial areas.
- The dustfall rates from all monitoring stations were less than the maximum predicted dustfall level of 53 mg/100-cm²/30-days (at 250 m from the TIA) in the 2016 Amendment modelling.

Canister Dustfall Sampling – Doris Site

- Dustfall levels estimated from the canister sampling ranged from 1.5 mg/100-cm²/30-days (at TIA-DF1 to 3) to 31.5 mg/100-cm²/30-days (DFA1).
- There were no dustfall exceedances measured at the Doris site of the AAAQO of 53 mg/100 cm²/30-days for residential and recreational areas.
- The monthly dustfall rates from the monitoring stations were less than the maximum predicted dustfall level of 53 mg/100-cm²/30-days (at 250-m from the TIA) in the 2016 Amendment modelling.

Canister Dustfall Sampling – Madrid Site

- Dustfall levels estimated from the canister sampling ranged from 3.9 mg/100-cm²/30-days (at M-DF01) to 69.3 mg/100-cm²/30-days (M-DF07).
- There was one dustfall measurement above the AAAQO of 53 mg/100-cm²/30-days for residential and recreational areas, which occurred in July 2019 at location M-DF07. This measurement was, however, less than the AAAQO of 158 mg/100-cm²/30-days for commercial and industrial areas.
- One dustfall measurement was above the maximum predicted dustfall level in the 2017 FEIS modelling but was within the expected range of variability for the dispersion modelling predictions.

Particulate Monitoring – Doris Site

- The maximum measured 24-hour and annual average TSP concentrations were 121 and 7.3 µg/m³. The maximum 24-hour average TSP concentration exceeded the GN objective by 1%, while the annual average TSP concentration was below the applicable GN objective.
- The 24-hour TSP exceedance is likely attributable to Crown Pillar Recovery Trench backfilling that was occurring around the time of the measurement. The measured concentration is not expected to be representative of the air quality of the region due to the proximity of the monitor to the trench.
- The maximum measured 24-hour average PM₁₀ concentration was 9.0 µg/m³ which is 18% of the applicable objective.
- The calculated 98th percentile of the measured 24-hour average PM_{2.5} concentrations in the October 2018 to September 2019 period was 5.6 µg/m³ which is below the CAAQS of 28 µg/m³. The annual average of the measured PM_{2.5} concentrations was 2.3 µg/m³ which is less than the annual CAAQS of 10 µg/m³. Assessment with respect to the CAAQS is provided for informational purposes only, as a comparison to the CAAQS requires three calendar years of data.
- The maximum measured PM₁₀ and PM_{2.5} concentrations were below the maximum predicted concentrations in the 2005 FEIS. The maximum measured 24-hour average TSP concentration was above the predicted level in the 2005 FEIS, while the measured annual average TSP concentration was below the maximum predicted level.

Stack Sampling

- The average concentration of mercury was $0.26 \mu\text{g}/\text{Rm}^3$, which is below the CWS/Nunavut stack limit of $20 \mu\text{g}/\text{Rm}^3$ (corrected to 11% oxygen).
- The average concentration of dioxins and furans was $1.27 \text{ ng}/\text{TEQ}/\text{Rm}^3$, which is above the CWS/Nunavut stack limit of $0.08 \text{ ng TEQ}/\text{Rm}^3$, corrected to 11% oxygen. The measured dioxins and furans concentration from the new incinerator is 70% lower than that from the two older incinerators that it replaced.
- TMAC is reviewing potential options to reduce dioxins and furans emissions, including reviewing with the manufacturer, ensuring manufacturer recommended operational procedures for the incinerator have been implemented and ensuring all operators are adequately trained and reviewing TMAC's waste segregation practices.

6 CLOSURE

This document entitled Q1-Q3 2019 Atmospheric Compliance Monitoring Program Report was prepared by Nunami Stantec Ltd. for the account of TMAC Resources Ltd. The material in it reflects Nunami Stantec's best judgment in light of the information available to it at the time of preparation. Any use which a third party makes of this report, or any reliance on or decisions made based on it, are the responsibilities of such third parties. Nunami Stantec Ltd. accepts no responsibility for damages, if any, suffered by any third party as a result of decisions made or actions based on this report.

Respectfully Submitted.

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Monitoring\Final\rpt_2019_Q1_Q3_ambient_monitoring_20200323_fnl.docx

7 REFERENCES

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

- Alberta Environment and Parks. 2016. Alberta Ambient Air Quality Objectives and Guidelines Summary. Alberta Environment and Parks
- ASTM. 2010. Standard Test Method for Collection and Measurement of Dustfall (Settleable Particulate Matter). Designation D 1739-98 Reapproved 2010, West Conshohocken, PA.
- BC MoE. 2009. Air Monitoring Site Selection and Exposure Criteria. British Columbia Ministry of the Environment: Victoria, BC.
- BC MOE. 2016. British Columbia Ambient Air Quality Objectives. BC Ministry of Environment. <http://www.bcairquality.ca/reports/pdfs/aqotable.pdf> (accessed November 2016).
- CALA. 2016. Canadian Association for Laboratory Accreditation Quality Assurance. <http://www.cala.ca/index.html>, Ottawa, ON.
- CCME. 2016. Particulate Matter and Ground-level Ozone. Canadian Council of Ministers of the Environment. http://www.ccme.ca/en/resources/air/pm_ozone.html (accessed November 2016).
- Environment and Climate Change Canada. 2016. National Ambient Air Quality Objectives Pollution Surveillance Program (NAPS). <http://maps-cartes.ec.gc.ca/rnspa-naps/data.aspx> (accessed November 2016).
- ERM. 2016. Memorandum: Potential Dust Fall Associated with Subaerial Tailings Deposition and Wildlife Habitat Effects at TMAC Doris North Project, Nunavut.
- Government of Nunavut. 2011. Environmental Guideline for Ambient Air Quality. Environmental Protection Service. http://gov.nu.ca/sites/default/files/guideline_-_ambient_air_quality_2011.pdf (accessed November 2016).
- Miramar Hope Bay Ltd (Miramar). 2005. Environmental Impact Statement Air Quality Assessment Methods, Doris North Site, Nunavut, Canada. Prepared for Miramar Hope Bay Ltd.: North Vancouver, BC by Golder Associates.
- Nunami Stantec Limited. 2017. Madrid-Boston Project: Air Quality Modeling Study. Prepared for TMAC Resources Inc. by Nunami Stantec Limited.
- TMAC. 2016. Revisions to TMAC Resources Inc. Amendment Application No. 1 of Project Certificate No. 003 and Water License 2AM-DOH1323. Submitted June 2015 with approval received in 2016.

Q1-Q3 2019 Atmospheric Compliance Monitoring Program Report

Doris and Madrid Projects

Section 7: References

March 2020

TMAC. 2017. Hope Bay Project Air Quality Management Plan. Rev 5. December 2017.

TMAC. 2019. Hope Bay Project Air Quality Management Plan. Rev 6. April 2019.

US EPA. 1999. Compendium Method IO-2.3 Sampling of Ambient Air for PM10 Concentration Using the Rupprecht and Patashnick (R&P) Low Volume Partisol Sampler. Center for Environmental Research Information - Office of Research and Development, Cincinnati, OH.

US EPA. 2009. Title 40: Protection of Environment Part 58 -Ambient air Quality Surveillance, Subpart G - Federal Monitoring Appendix E - Probe and Monitoring Path Siting Criteria for Ambient Air Quality Monitoring, Research Triangle Park, NC.

APPENDIX A

Snow Core Laboratory Analysis



TMAC Resources Inc
ATTN: Environmental Site Manager
Hope Bay Project
95 Wellington St West
Toronto ON M5J 2N7

Date Received: 30-APR-19
Report Date: 08-MAY-19 14:08 (MT)
Version: FINAL

Client Phone: 867-988-0569

Certificate of Analysis

Lab Work Order #: L2264733
Project P.O. #: 4500011700
Job Reference: SNOWCORE DUSTFALL
C of C Numbers:
Legal Site Desc:

Amber Springer, B.Sc
Account Manager

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ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters		Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L2264733-1	CONTROLDf-SNOW							
Sampled By: SW/PJ on 29-APR-19 @ 15:10								
Matrix: WATER								
Anions by Ion Chromatography								
Bromide in Water by IC (Low Level)								
Bromide (Br)		<0.050		0.050	mg/L		03-MAY-19	R4626489
Chloride in Water by IC								
Chloride (Cl)		0.57		0.50	mg/L		03-MAY-19	R4626489
Fluoride in Water by IC								
Fluoride (F)		<0.020		0.020	mg/L		03-MAY-19	R4626489
Nitrate in Water by IC (Low Level)								
Nitrate (as N)		0.0557		0.0050	mg/L		03-MAY-19	R4626489
Nitrite in Water by IC (Low Level)								
Nitrite (as N)		<0.0010		0.0010	mg/L		03-MAY-19	R4626489
Sulfate in Water by IC								
Sulfate (SO4)		<0.30		0.30	mg/L		03-MAY-19	R4626489
Total Metals in Water + Hg (CCME/BCWQG)								
Hardness								
Hardness (as CaCO3)		<0.50	HTC	0.50	mg/L		04-MAY-19	
Total Mercury in Water by CVAAS or CVAFS								
Mercury (Hg)-Total		<0.0000050		0.0000050	mg/L		05-MAY-19	R4623075
Total Metals in Water by CRC ICPMS								
Aluminum (Al)-Total		0.0155		0.0050	mg/L		04-MAY-19	R4622665
Antimony (Sb)-Total		<0.00050		0.00050	mg/L		04-MAY-19	R4622665
Arsenic (As)-Total		<0.00050		0.00050	mg/L		04-MAY-19	R4622665
Barium (Ba)-Total		<0.020		0.020	mg/L		04-MAY-19	R4622665
Beryllium (Be)-Total		<0.00010		0.00010	mg/L		04-MAY-19	R4622665
Boron (B)-Total		<0.10		0.10	mg/L		04-MAY-19	R4622665
Cadmium (Cd)-Total		<0.0000050		0.0000050	mg/L		04-MAY-19	R4622665
Calcium (Ca)-Total		<0.10		0.10	mg/L		04-MAY-19	R4622665
Chromium (Cr)-Total		<0.0010		0.0010	mg/L		04-MAY-19	R4622665
Cobalt (Co)-Total		<0.00030		0.00030	mg/L		04-MAY-19	R4622665
Copper (Cu)-Total		<0.0010		0.0010	mg/L		04-MAY-19	R4622665
Iron (Fe)-Total		<0.030		0.030	mg/L		04-MAY-19	R4622665
Lead (Pb)-Total		<0.00050		0.00050	mg/L		04-MAY-19	R4622665
Lithium (Li)-Total		<0.0010		0.0010	mg/L		04-MAY-19	R4622665
Magnesium (Mg)-Total		<0.10		0.10	mg/L		04-MAY-19	R4622665
Manganese (Mn)-Total		0.00076		0.00030	mg/L		04-MAY-19	R4622665
Molybdenum (Mo)-Total		<0.0010		0.0010	mg/L		04-MAY-19	R4622665
Nickel (Ni)-Total		<0.0010		0.0010	mg/L		04-MAY-19	R4622665
Potassium (K)-Total		<2.0		2.0	mg/L		04-MAY-19	R4622665
Selenium (Se)-Total		<0.000050		0.000050	mg/L		04-MAY-19	R4622665
Silver (Ag)-Total		<0.000020		0.000020	mg/L		04-MAY-19	R4622665
Sodium (Na)-Total		<2.0		2.0	mg/L		04-MAY-19	R4622665
Thallium (Tl)-Total		<0.000010		0.000010	mg/L		04-MAY-19	R4622665
Tin (Sn)-Total		<0.00050		0.00050	mg/L		04-MAY-19	R4622665
Titanium (Ti)-Total		<0.010		0.010	mg/L		04-MAY-19	R4622665
Uranium (U)-Total		<0.00020		0.00020	mg/L		04-MAY-19	R4622665
Vanadium (V)-Total		<0.00050		0.00050	mg/L		04-MAY-19	R4622665
Zinc (Zn)-Total		<0.0050		0.0050	mg/L		04-MAY-19	R4622665
Miscellaneous Parameters								
Ammonia, Total (as N)		0.0140		0.0050	mg/L		03-MAY-19	R4622658
Total Dissolved Solids		<10		10	mg/L		04-MAY-19	R4624186
Total Suspended Solids		<3.0		3.0	mg/L		03-MAY-19	R4623732

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters		Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L2264733-2 TIADF1-SNOW								
Sampled By: SW/PJ on 29-APR-19 @ 15:45								
Matrix: WATER								
Anions by Ion Chromatography								
Bromide in Water by IC (Low Level)								
Bromide (Br)		<0.050		0.050	mg/L		03-MAY-19	R4626489
Chloride in Water by IC								
Chloride (Cl)		2.63		0.50	mg/L		03-MAY-19	R4626489
Fluoride in Water by IC								
Fluoride (F)		<0.020		0.020	mg/L		03-MAY-19	R4626489
Nitrate in Water by IC (Low Level)								
Nitrate (as N)		0.0261		0.0050	mg/L		03-MAY-19	R4626489
Nitrite in Water by IC (Low Level)								
Nitrite (as N)		0.0019		0.0010	mg/L		03-MAY-19	R4626489
Sulfate in Water by IC								
Sulfate (SO4)		1.00		0.30	mg/L		03-MAY-19	R4626489
Total Metals in Water + Hg (CCME/BCWQG)								
Hardness								
Hardness (as CaCO3)		5.16	HTC	0.50	mg/L		04-MAY-19	
Total Mercury in Water by CVAAS or CVAFS								
Mercury (Hg)-Total		<0.000025	DLM	0.000025	mg/L		05-MAY-19	R4623075
Total Metals in Water by CRC ICPMS								
Aluminum (Al)-Total		0.154		0.0050	mg/L		04-MAY-19	R4622665
Antimony (Sb)-Total		<0.00050		0.00050	mg/L		04-MAY-19	R4622665
Arsenic (As)-Total		<0.00050		0.00050	mg/L		04-MAY-19	R4622665
Barium (Ba)-Total		<0.020		0.020	mg/L		04-MAY-19	R4622665
Beryllium (Be)-Total		<0.00010		0.00010	mg/L		04-MAY-19	R4622665
Boron (B)-Total		<0.10		0.10	mg/L		04-MAY-19	R4622665
Cadmium (Cd)-Total		0.0000077		0.0000050	mg/L		04-MAY-19	R4622665
Calcium (Ca)-Total		1.11		0.10	mg/L		04-MAY-19	R4622665
Chromium (Cr)-Total		<0.0010		0.0010	mg/L		04-MAY-19	R4622665
Cobalt (Co)-Total		<0.00030		0.00030	mg/L		04-MAY-19	R4622665
Copper (Cu)-Total		0.0015		0.0010	mg/L		04-MAY-19	R4622665
Iron (Fe)-Total		0.430		0.030	mg/L		04-MAY-19	R4622665
Lead (Pb)-Total		<0.00050		0.00050	mg/L		04-MAY-19	R4622665
Lithium (Li)-Total		<0.0010		0.0010	mg/L		04-MAY-19	R4622665
Magnesium (Mg)-Total		0.58		0.10	mg/L		04-MAY-19	R4622665
Manganese (Mn)-Total		0.0213		0.00030	mg/L		04-MAY-19	R4622665
Molybdenum (Mo)-Total		<0.0010		0.0010	mg/L		04-MAY-19	R4622665
Nickel (Ni)-Total		<0.0010		0.0010	mg/L		04-MAY-19	R4622665
Potassium (K)-Total		<2.0		2.0	mg/L		04-MAY-19	R4622665
Selenium (Se)-Total		<0.000050		0.000050	mg/L		04-MAY-19	R4622665
Silver (Ag)-Total		<0.000020		0.000020	mg/L		04-MAY-19	R4622665
Sodium (Na)-Total		<2.0		2.0	mg/L		04-MAY-19	R4622665
Thallium (Tl)-Total		<0.000010		0.000010	mg/L		04-MAY-19	R4622665
Tin (Sn)-Total		<0.00050		0.00050	mg/L		04-MAY-19	R4622665
Titanium (Ti)-Total		<0.010		0.010	mg/L		04-MAY-19	R4622665
Uranium (U)-Total		<0.00020		0.00020	mg/L		04-MAY-19	R4622665
Vanadium (V)-Total		0.00067		0.00050	mg/L		04-MAY-19	R4622665
Zinc (Zn)-Total		<0.0050		0.0050	mg/L		04-MAY-19	R4622665
Miscellaneous Parameters								
Ammonia, Total (as N)		0.0246		0.0050	mg/L		06-MAY-19	R4625319
Total Dissolved Solids		15		10	mg/L		04-MAY-19	R4624186
Total Suspended Solids		13.4		3.0	mg/L		03-MAY-19	R4623732

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters		Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L2264733-3 TIADF2-SNOW								
Sampled By: SW/PJ on 29-APR-19 @ 15:35								
Matrix: WATER								
Anions by Ion Chromatography								
Bromide in Water by IC (Low Level)								
Bromide (Br)		<0.050		0.050	mg/L		03-MAY-19	R4626489
Chloride in Water by IC								
Chloride (Cl)		1.51		0.50	mg/L		03-MAY-19	R4626489
Fluoride in Water by IC								
Fluoride (F)		<0.020		0.020	mg/L		03-MAY-19	R4626489
Nitrate in Water by IC (Low Level)								
Nitrate (as N)		0.0389		0.0050	mg/L		03-MAY-19	R4626489
Nitrite in Water by IC (Low Level)								
Nitrite (as N)		<0.0010		0.0010	mg/L		03-MAY-19	R4626489
Sulfate in Water by IC								
Sulfate (SO4)		0.31		0.30	mg/L		03-MAY-19	R4626489
Total Metals in Water + Hg (CCME/BCWQG)								
Hardness								
Hardness (as CaCO3)		2.41	HTC	0.50	mg/L		04-MAY-19	
Total Mercury in Water by CVAAS or CVAFS								
Mercury (Hg)-Total		<0.0000050		0.0000050	mg/L		05-MAY-19	R4623075
Total Metals in Water by CRC ICPMS								
Aluminum (Al)-Total		0.138		0.0050	mg/L		04-MAY-19	R4622665
Antimony (Sb)-Total		<0.00050		0.00050	mg/L		04-MAY-19	R4622665
Arsenic (As)-Total		<0.00050		0.00050	mg/L		04-MAY-19	R4622665
Barium (Ba)-Total		<0.020		0.020	mg/L		04-MAY-19	R4622665
Beryllium (Be)-Total		<0.00010		0.00010	mg/L		04-MAY-19	R4622665
Boron (B)-Total		<0.10		0.10	mg/L		04-MAY-19	R4622665
Cadmium (Cd)-Total		<0.0000050		0.0000050	mg/L		04-MAY-19	R4622665
Calcium (Ca)-Total		0.54		0.10	mg/L		04-MAY-19	R4622665
Chromium (Cr)-Total		0.0011		0.0010	mg/L		04-MAY-19	R4622665
Cobalt (Co)-Total		<0.00030		0.00030	mg/L		04-MAY-19	R4622665
Copper (Cu)-Total		0.0011		0.0010	mg/L		04-MAY-19	R4622665
Iron (Fe)-Total		0.372		0.030	mg/L		04-MAY-19	R4622665
Lead (Pb)-Total		<0.00050		0.00050	mg/L		04-MAY-19	R4622665
Lithium (Li)-Total		<0.0010		0.0010	mg/L		04-MAY-19	R4622665
Magnesium (Mg)-Total		0.26		0.10	mg/L		04-MAY-19	R4622665
Manganese (Mn)-Total		0.0107		0.00030	mg/L		04-MAY-19	R4622665
Molybdenum (Mo)-Total		<0.0010		0.0010	mg/L		04-MAY-19	R4622665
Nickel (Ni)-Total		0.0011		0.0010	mg/L		04-MAY-19	R4622665
Potassium (K)-Total		<2.0		2.0	mg/L		04-MAY-19	R4622665
Selenium (Se)-Total		<0.000050		0.000050	mg/L		04-MAY-19	R4622665
Silver (Ag)-Total		<0.000020		0.000020	mg/L		04-MAY-19	R4622665
Sodium (Na)-Total		<2.0		2.0	mg/L		04-MAY-19	R4622665
Thallium (Tl)-Total		<0.000010		0.000010	mg/L		04-MAY-19	R4622665
Tin (Sn)-Total		<0.00050		0.00050	mg/L		04-MAY-19	R4622665
Titanium (Ti)-Total		<0.010		0.010	mg/L		04-MAY-19	R4622665
Uranium (U)-Total		<0.00020		0.00020	mg/L		04-MAY-19	R4622665
Vanadium (V)-Total		0.00058		0.00050	mg/L		04-MAY-19	R4622665
Zinc (Zn)-Total		<0.0050		0.0050	mg/L		04-MAY-19	R4622665
Miscellaneous Parameters								
Ammonia, Total (as N)		0.0224		0.0050	mg/L		03-MAY-19	R4622658
Total Dissolved Solids		<10		10	mg/L		04-MAY-19	R4624186
Total Suspended Solids		7.6		3.0	mg/L		03-MAY-19	R4623732

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters		Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L2264733-4 TIADF3-SNOW								
Sampled By: SW/PJ on 29-APR-19 @ 15:20								
Matrix: WATER								
Anions by Ion Chromatography								
Bromide in Water by IC (Low Level)								
Bromide (Br)		<0.050		0.050	mg/L		03-MAY-19	R4626489
Chloride in Water by IC								
Chloride (Cl)		2.28		0.50	mg/L		03-MAY-19	R4626489
Fluoride in Water by IC								
Fluoride (F)		<0.020		0.020	mg/L		03-MAY-19	R4626489
Nitrate in Water by IC (Low Level)								
Nitrate (as N)		<0.0050		0.0050	mg/L		03-MAY-19	R4626489
Nitrite in Water by IC (Low Level)								
Nitrite (as N)		<0.0010		0.0010	mg/L		03-MAY-19	R4626489
Sulfate in Water by IC								
Sulfate (SO4)		0.45		0.30	mg/L		03-MAY-19	R4626489
Total Metals in Water + Hg (CCME/BCWQG)								
Hardness								
Hardness (as CaCO3)		4.23	HTC	0.50	mg/L		04-MAY-19	
Total Mercury in Water by CVAAS or CVAFS								
Mercury (Hg)-Total		<0.000025	DLM	0.000025	mg/L		05-MAY-19	R4623075
Total Metals in Water by CRC ICPMS								
Aluminum (Al)-Total		0.189		0.0050	mg/L		04-MAY-19	R4622665
Antimony (Sb)-Total		<0.00050		0.00050	mg/L		04-MAY-19	R4622665
Arsenic (As)-Total		<0.00050		0.00050	mg/L		04-MAY-19	R4622665
Barium (Ba)-Total		<0.020		0.020	mg/L		04-MAY-19	R4622665
Beryllium (Be)-Total		<0.00010		0.00010	mg/L		04-MAY-19	R4622665
Boron (B)-Total		<0.10		0.10	mg/L		04-MAY-19	R4622665
Cadmium (Cd)-Total		<0.0000050		0.0000050	mg/L		04-MAY-19	R4622665
Calcium (Ca)-Total		0.90		0.10	mg/L		04-MAY-19	R4622665
Chromium (Cr)-Total		<0.0010		0.0010	mg/L		04-MAY-19	R4622665
Cobalt (Co)-Total		<0.00030		0.00030	mg/L		04-MAY-19	R4622665
Copper (Cu)-Total		0.0013		0.0010	mg/L		04-MAY-19	R4622665
Iron (Fe)-Total		0.538		0.030	mg/L		04-MAY-19	R4622665
Lead (Pb)-Total		<0.00050		0.00050	mg/L		04-MAY-19	R4622665
Lithium (Li)-Total		<0.0010		0.0010	mg/L		04-MAY-19	R4622665
Magnesium (Mg)-Total		0.48		0.10	mg/L		04-MAY-19	R4622665
Manganese (Mn)-Total		0.0263		0.00030	mg/L		04-MAY-19	R4622665
Molybdenum (Mo)-Total		<0.0010		0.0010	mg/L		04-MAY-19	R4622665
Nickel (Ni)-Total		<0.0010		0.0010	mg/L		04-MAY-19	R4622665
Potassium (K)-Total		<2.0		2.0	mg/L		04-MAY-19	R4622665
Selenium (Se)-Total		<0.000050		0.000050	mg/L		04-MAY-19	R4622665
Silver (Ag)-Total		<0.000020		0.000020	mg/L		04-MAY-19	R4622665
Sodium (Na)-Total		<2.0		2.0	mg/L		04-MAY-19	R4622665
Thallium (Tl)-Total		<0.000010		0.000010	mg/L		04-MAY-19	R4622665
Tin (Sn)-Total		<0.00050		0.00050	mg/L		04-MAY-19	R4622665
Titanium (Ti)-Total		<0.010		0.010	mg/L		04-MAY-19	R4622665
Uranium (U)-Total		<0.00020		0.00020	mg/L		04-MAY-19	R4622665
Vanadium (V)-Total		0.00063		0.00050	mg/L		04-MAY-19	R4622665
Zinc (Zn)-Total		<0.0050		0.0050	mg/L		04-MAY-19	R4622665
Miscellaneous Parameters								
Ammonia, Total (as N)		0.0283		0.0050	mg/L		03-MAY-19	R4622658
Total Dissolved Solids		18		10	mg/L		04-MAY-19	R4624186
Total Suspended Solids		11.4		3.0	mg/L		03-MAY-19	R4623732

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters		Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L2264733-5 DFA1-SNOW								
Sampled By: SW/PJ on 29-APR-19 @ 16:00								
Matrix: WATER								
Anions by Ion Chromatography								
Bromide in Water by IC (Low Level)								
Bromide (Br)		<0.050		0.050	mg/L		03-MAY-19	R4626489
Chloride in Water by IC								
Chloride (Cl)		0.76		0.50	mg/L		03-MAY-19	R4626489
Fluoride in Water by IC								
Fluoride (F)		<0.020		0.020	mg/L		03-MAY-19	R4626489
Nitrate in Water by IC (Low Level)								
Nitrate (as N)		0.0591		0.0050	mg/L		03-MAY-19	R4626489
Nitrite in Water by IC (Low Level)								
Nitrite (as N)		<0.0010		0.0010	mg/L		03-MAY-19	R4626489
Sulfate in Water by IC								
Sulfate (SO4)		0.35		0.30	mg/L		03-MAY-19	R4626489
Total Metals in Water + Hg (CCME/BCWQG)								
Hardness								
Hardness (as CaCO3)		15.5	HTC	0.50	mg/L		04-MAY-19	
Total Mercury in Water by CVAAS or CVAFS								
Mercury (Hg)-Total		0.0000072		0.0000050	mg/L		05-MAY-19	R4623075
Total Metals in Water by CRC ICPMS								
Aluminum (Al)-Total		1.27		0.0050	mg/L		04-MAY-19	R4622665
Antimony (Sb)-Total		<0.00050		0.00050	mg/L		04-MAY-19	R4622665
Arsenic (As)-Total		0.00074		0.00050	mg/L		04-MAY-19	R4622665
Barium (Ba)-Total		<0.020		0.020	mg/L		04-MAY-19	R4622665
Beryllium (Be)-Total		<0.00010		0.00010	mg/L		04-MAY-19	R4622665
Boron (B)-Total		<0.10		0.10	mg/L		04-MAY-19	R4622665
Cadmium (Cd)-Total		0.0000305		0.0000050	mg/L		04-MAY-19	R4622665
Calcium (Ca)-Total		4.41		0.10	mg/L		04-MAY-19	R4622665
Chromium (Cr)-Total		0.0047		0.0010	mg/L		04-MAY-19	R4622665
Cobalt (Co)-Total		0.00157		0.00030	mg/L		04-MAY-19	R4622665
Copper (Cu)-Total		0.0066		0.0010	mg/L		04-MAY-19	R4622665
Iron (Fe)-Total		2.83		0.030	mg/L		04-MAY-19	R4622665
Lead (Pb)-Total		0.00051		0.00050	mg/L		04-MAY-19	R4622665
Lithium (Li)-Total		<0.0010		0.0010	mg/L		04-MAY-19	R4622665
Magnesium (Mg)-Total		1.09		0.10	mg/L		04-MAY-19	R4622665
Manganese (Mn)-Total		0.0682		0.00030	mg/L		04-MAY-19	R4622665
Molybdenum (Mo)-Total		<0.0010		0.0010	mg/L		04-MAY-19	R4622665
Nickel (Ni)-Total		0.0029		0.0010	mg/L		04-MAY-19	R4622665
Potassium (K)-Total		<2.0		2.0	mg/L		04-MAY-19	R4622665
Selenium (Se)-Total		<0.000050		0.000050	mg/L		04-MAY-19	R4622665
Silver (Ag)-Total		<0.000020		0.000020	mg/L		04-MAY-19	R4622665
Sodium (Na)-Total		<2.0		2.0	mg/L		04-MAY-19	R4622665
Thallium (Tl)-Total		<0.000010		0.000010	mg/L		04-MAY-19	R4622665
Tin (Sn)-Total		<0.00050		0.00050	mg/L		04-MAY-19	R4622665
Titanium (Ti)-Total		0.068		0.010	mg/L		04-MAY-19	R4622665
Uranium (U)-Total		<0.00020		0.00020	mg/L		04-MAY-19	R4622665
Vanadium (V)-Total		0.00537		0.00050	mg/L		04-MAY-19	R4622665
Zinc (Zn)-Total		0.0063		0.0050	mg/L		04-MAY-19	R4622665
Miscellaneous Parameters								
Ammonia, Total (as N)		0.0788		0.0050	mg/L		03-MAY-19	R4622658
Total Dissolved Solids		18		10	mg/L		04-MAY-19	R4624186
Total Suspended Solids		38.8		3.0	mg/L		03-MAY-19	R4623732

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L2264733-6 CDF4-SNOW							
Sampled By: SW/PJ on 29-APR-19 @ 15:50							
Matrix: WATER							
Anions by Ion Chromatography							
Bromide in Water by IC (Low Level)							
Bromide (Br)	<0.050		0.050	mg/L		03-MAY-19	R4626489
Chloride in Water by IC							
Chloride (Cl)	1.37		0.50	mg/L		03-MAY-19	R4626489
Fluoride in Water by IC							
Fluoride (F)	<0.020		0.020	mg/L		03-MAY-19	R4626489
Nitrate in Water by IC (Low Level)							
Nitrate (as N)	0.0386		0.0050	mg/L		03-MAY-19	R4626489
Nitrite in Water by IC (Low Level)							
Nitrite (as N)	<0.0010		0.0010	mg/L		03-MAY-19	R4626489
Sulfate in Water by IC							
Sulfate (SO4)	0.40		0.30	mg/L		03-MAY-19	R4626489
Total Metals in Water + Hg (CCME/BCWQG)							
Hardness							
Hardness (as CaCO3)	22.9	HTC	0.50	mg/L		04-MAY-19	
Total Mercury in Water by CVAAS or CVAFS							
Mercury (Hg)-Total	<0.0000050		0.0000050	mg/L		05-MAY-19	R4623075
Total Metals in Water by CRC ICPMS							
Aluminum (Al)-Total	1.99		0.0050	mg/L		04-MAY-19	R4622665
Antimony (Sb)-Total	<0.00050		0.00050	mg/L		04-MAY-19	R4622665
Arsenic (As)-Total	0.00063		0.00050	mg/L		04-MAY-19	R4622665
Barium (Ba)-Total	<0.020		0.020	mg/L		04-MAY-19	R4622665
Beryllium (Be)-Total	<0.00010		0.00010	mg/L		04-MAY-19	R4622665
Boron (B)-Total	<0.10		0.10	mg/L		04-MAY-19	R4622665
Cadmium (Cd)-Total	0.0000185		0.0000050	mg/L		04-MAY-19	R4622665
Calcium (Ca)-Total	6.42		0.10	mg/L		04-MAY-19	R4622665
Chromium (Cr)-Total	0.0064		0.0010	mg/L		04-MAY-19	R4622665
Cobalt (Co)-Total	0.00238		0.00030	mg/L		04-MAY-19	R4622665
Copper (Cu)-Total	0.0067		0.0010	mg/L		04-MAY-19	R4622665
Iron (Fe)-Total	4.13		0.030	mg/L		04-MAY-19	R4622665
Lead (Pb)-Total	0.00052		0.00050	mg/L		04-MAY-19	R4622665
Lithium (Li)-Total	0.0010		0.0010	mg/L		04-MAY-19	R4622665
Magnesium (Mg)-Total	1.66		0.10	mg/L		04-MAY-19	R4622665
Manganese (Mn)-Total	0.102		0.00030	mg/L		04-MAY-19	R4622665
Molybdenum (Mo)-Total	<0.0010		0.0010	mg/L		04-MAY-19	R4622665
Nickel (Ni)-Total	0.0035		0.0010	mg/L		04-MAY-19	R4622665
Potassium (K)-Total	<2.0		2.0	mg/L		04-MAY-19	R4622665
Selenium (Se)-Total	<0.000050		0.000050	mg/L		04-MAY-19	R4622665
Silver (Ag)-Total	<0.000020		0.000020	mg/L		04-MAY-19	R4622665
Sodium (Na)-Total	<2.0		2.0	mg/L		04-MAY-19	R4622665
Thallium (Tl)-Total	<0.000010		0.000010	mg/L		04-MAY-19	R4622665
Tin (Sn)-Total	<0.00050		0.00050	mg/L		04-MAY-19	R4622665
Titanium (Ti)-Total	0.103		0.010	mg/L		04-MAY-19	R4622665
Uranium (U)-Total	<0.00020		0.00020	mg/L		04-MAY-19	R4622665
Vanadium (V)-Total	0.00974		0.00050	mg/L		04-MAY-19	R4622665
Zinc (Zn)-Total	0.0079		0.0050	mg/L		04-MAY-19	R4622665
Miscellaneous Parameters							
Ammonia, Total (as N)	0.0308		0.0050	mg/L		03-MAY-19	R4622658
Total Dissolved Solids	21		10	mg/L		04-MAY-19	R4624186
Total Suspended Solids	51.4		3.0	mg/L		03-MAY-19	R4623732

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L2264733-7 BLANKE							
Sampled By: SW/PJ on 29-APR-19 @ 15:00							
Matrix: WATER							
Anions by Ion Chromatography							
Bromide in Water by IC (Low Level)							
Bromide (Br)	<0.050		0.050	mg/L		03-MAY-19	R4626489
Chloride in Water by IC							
Chloride (Cl)	<0.50		0.50	mg/L		03-MAY-19	R4626489
Fluoride in Water by IC							
Fluoride (F)	<0.020		0.020	mg/L		03-MAY-19	R4626489
Nitrate in Water by IC (Low Level)							
Nitrate (as N)	<0.0050		0.0050	mg/L		03-MAY-19	R4626489
Nitrite in Water by IC (Low Level)							
Nitrite (as N)	<0.0010		0.0010	mg/L		03-MAY-19	R4626489
Sulfate in Water by IC							
Sulfate (SO4)	<0.30		0.30	mg/L		03-MAY-19	R4626489
Total Metals in Water + Hg (CCME/BCWQG)							
Hardness							
Hardness (as CaCO3)	<0.50	HTC	0.50	mg/L		07-MAY-19	
Total Mercury in Water by CVAAS or CVAFS							
Mercury (Hg)-Total	0.0000059		0.0000050	mg/L		05-MAY-19	R4623075
Total Metals in Water by CRC ICPMS							
Aluminum (Al)-Total	<0.0050		0.0050	mg/L		04-MAY-19	R4622665
Antimony (Sb)-Total	<0.00050		0.00050	mg/L		04-MAY-19	R4622665
Arsenic (As)-Total	<0.00050		0.00050	mg/L		04-MAY-19	R4622665
Barium (Ba)-Total	<0.020		0.020	mg/L		04-MAY-19	R4622665
Beryllium (Be)-Total	<0.00010		0.00010	mg/L		04-MAY-19	R4622665
Boron (B)-Total	<0.10		0.10	mg/L		04-MAY-19	R4622665
Cadmium (Cd)-Total	<0.0000050		0.0000050	mg/L		04-MAY-19	R4622665
Calcium (Ca)-Total	<0.10		0.10	mg/L		04-MAY-19	R4622665
Chromium (Cr)-Total	<0.0010		0.0010	mg/L		04-MAY-19	R4622665
Cobalt (Co)-Total	<0.00030		0.00030	mg/L		04-MAY-19	R4622665
Copper (Cu)-Total	<0.0010		0.0010	mg/L		04-MAY-19	R4622665
Iron (Fe)-Total	<0.030		0.030	mg/L		04-MAY-19	R4622665
Lead (Pb)-Total	<0.00050		0.00050	mg/L		04-MAY-19	R4622665
Lithium (Li)-Total	<0.0010		0.0010	mg/L		04-MAY-19	R4622665
Magnesium (Mg)-Total	<0.10		0.10	mg/L		04-MAY-19	R4622665
Manganese (Mn)-Total	0.00073	RRV	0.00030	mg/L		06-MAY-19	R4625711
Molybdenum (Mo)-Total	<0.0010		0.0010	mg/L		04-MAY-19	R4622665
Nickel (Ni)-Total	<0.0010		0.0010	mg/L		04-MAY-19	R4622665
Potassium (K)-Total	<2.0		2.0	mg/L		04-MAY-19	R4622665
Selenium (Se)-Total	<0.000050		0.000050	mg/L		04-MAY-19	R4622665
Silver (Ag)-Total	<0.000020		0.000020	mg/L		04-MAY-19	R4622665
Sodium (Na)-Total	<2.0		2.0	mg/L		04-MAY-19	R4622665
Thallium (Tl)-Total	<0.000010		0.000010	mg/L		04-MAY-19	R4622665
Tin (Sn)-Total	<0.00050		0.00050	mg/L		04-MAY-19	R4622665
Titanium (Ti)-Total	<0.010		0.010	mg/L		04-MAY-19	R4622665
Uranium (U)-Total	<0.00020		0.00020	mg/L		04-MAY-19	R4622665
Vanadium (V)-Total	<0.00050		0.00050	mg/L		04-MAY-19	R4622665
Zinc (Zn)-Total	<0.0050		0.0050	mg/L		04-MAY-19	R4622665
Miscellaneous Parameters							
Ammonia, Total (as N)	<0.0050		0.0050	mg/L		03-MAY-19	R4622658
Total Dissolved Solids	<10		10	mg/L		04-MAY-19	R4624186
Total Suspended Solids	<3.0		3.0	mg/L		03-MAY-19	R4623732

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L2264733-8 DUPLICATE							
Sampled By: SW/PJ on 29-APR-19 @ 15:20							
Matrix: WATER							
Anions by Ion Chromatography							
Bromide in Water by IC (Low Level)							
Bromide (Br)	<0.050		0.050	mg/L		03-MAY-19	R4626489
Chloride in Water by IC							
Chloride (Cl)	2.11		0.50	mg/L		03-MAY-19	R4626489
Fluoride in Water by IC							
Fluoride (F)	<0.020		0.020	mg/L		03-MAY-19	R4626489
Nitrate in Water by IC (Low Level)							
Nitrate (as N)	0.0464		0.0050	mg/L		03-MAY-19	R4626489
Nitrite in Water by IC (Low Level)							
Nitrite (as N)	0.0012		0.0010	mg/L		03-MAY-19	R4626489
Sulfate in Water by IC							
Sulfate (SO4)	0.44		0.30	mg/L		03-MAY-19	R4626489
Total Metals in Water + Hg (CCME/BCWQG)							
Hardness							
Hardness (as CaCO3)	3.32	HTC	0.50	mg/L		04-MAY-19	
Total Mercury in Water by CVAAS or CVAFS							
Mercury (Hg)-Total	<0.0000050		0.0000050	mg/L		05-MAY-19	R4623075
Total Metals in Water by CRC ICPMS							
Aluminum (Al)-Total	0.162		0.0050	mg/L		04-MAY-19	R4622665
Antimony (Sb)-Total	<0.00050		0.00050	mg/L		04-MAY-19	R4622665
Arsenic (As)-Total	<0.00050		0.00050	mg/L		04-MAY-19	R4622665
Barium (Ba)-Total	<0.020		0.020	mg/L		04-MAY-19	R4622665
Beryllium (Be)-Total	<0.00010		0.00010	mg/L		04-MAY-19	R4622665
Boron (B)-Total	<0.10		0.10	mg/L		04-MAY-19	R4622665
Cadmium (Cd)-Total	<0.0000050		0.0000050	mg/L		04-MAY-19	R4622665
Calcium (Ca)-Total	0.71		0.10	mg/L		04-MAY-19	R4622665
Chromium (Cr)-Total	<0.0010		0.0010	mg/L		04-MAY-19	R4622665
Cobalt (Co)-Total	<0.00030		0.00030	mg/L		04-MAY-19	R4622665
Copper (Cu)-Total	<0.0010		0.0010	mg/L		04-MAY-19	R4622665
Iron (Fe)-Total	0.474		0.030	mg/L		04-MAY-19	R4622665
Lead (Pb)-Total	<0.00050		0.00050	mg/L		04-MAY-19	R4622665
Lithium (Li)-Total	<0.0010		0.0010	mg/L		04-MAY-19	R4622665
Magnesium (Mg)-Total	0.38		0.10	mg/L		04-MAY-19	R4622665
Manganese (Mn)-Total	0.0152		0.00030	mg/L		04-MAY-19	R4622665
Molybdenum (Mo)-Total	<0.0010		0.0010	mg/L		04-MAY-19	R4622665
Nickel (Ni)-Total	<0.0010		0.0010	mg/L		04-MAY-19	R4622665
Potassium (K)-Total	<2.0		2.0	mg/L		04-MAY-19	R4622665
Selenium (Se)-Total	<0.000050		0.000050	mg/L		04-MAY-19	R4622665
Silver (Ag)-Total	<0.000020		0.000020	mg/L		04-MAY-19	R4622665
Sodium (Na)-Total	<2.0		2.0	mg/L		04-MAY-19	R4622665
Thallium (Tl)-Total	<0.000010		0.000010	mg/L		04-MAY-19	R4622665
Tin (Sn)-Total	<0.00050		0.00050	mg/L		04-MAY-19	R4622665
Titanium (Ti)-Total	<0.010		0.010	mg/L		04-MAY-19	R4622665
Uranium (U)-Total	<0.00020		0.00020	mg/L		04-MAY-19	R4622665
Vanadium (V)-Total	0.00060		0.00050	mg/L		04-MAY-19	R4622665
Zinc (Zn)-Total	<0.0050		0.0050	mg/L		04-MAY-19	R4622665
Miscellaneous Parameters							
Ammonia, Total (as N)	0.0237		0.0050	mg/L		03-MAY-19	R4622658
Total Dissolved Solids	11		10	mg/L		04-MAY-19	R4624186
Total Suspended Solids	9.4		3.0	mg/L		03-MAY-19	R4623732

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

Reference Information

Sample Parameter Qualifier Key:

Qualifier	Description
DLM	Detection Limit Adjusted due to sample matrix effects (e.g. chemical interference, colour, turbidity).
HTC	Hardness was calculated from Total Ca and/or Mg concentrations and may be biased high (dissolved Ca/Mg results unavailable).
MS-B	Matrix Spike recovery could not be accurately calculated due to high analyte background in sample.
RRV	Reported Result Verified By Repeat Analysis

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
BR-L-IC-N-VA	Water	Bromide in Water by IC (Low Level)	EPA 300.1 (mod)
Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.			
CL-IC-N-VA	Water	Chloride in Water by IC	EPA 300.1 (mod)
Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.			
EC-SCREEN-VA	Water	Conductivity Screen (Internal Use Only)	APHA 2510
Qualitative analysis of conductivity where required during preparation of other tests - e.g. TDS, metals, etc.			
F-IC-N-VA	Water	Fluoride in Water by IC	EPA 300.1 (mod)
Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.			
HARDNESS-CALC-VA	Water	Hardness	APHA 2340B
Hardness (also known as Total Hardness) is calculated from the sum of Calcium and Magnesium concentrations, expressed in CaCO ₃ equivalents. Dissolved Calcium and Magnesium concentrations are preferentially used for the hardness calculation.			
HG-T-CVAA-VA	Water	Total Mercury in Water by CVAAS or CVAFS	EPA 1631E (mod)
Water samples undergo a cold-oxidation using bromine monochloride prior to reduction with stannous chloride, and analyzed by CVAAS or CVAFS.			
MET-T-CCMS-VA	Water	Total Metals in Water by CRC ICPMS	EPA 200.2/6020A (mod)
Water samples are digested with nitric and hydrochloric acids, and analyzed by CRC ICPMS.			
Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.			
NH3-F-VA	Water	Ammonia in Water by Fluorescence	J. ENVIRON. MONIT., 2005, 7, 37-42, RSC
This analysis is carried out, on sulfuric acid preserved samples, 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.			
NO2-L-IC-N-VA	Water	Nitrite in Water by IC (Low Level)	EPA 300.1 (mod)
Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.			
NO3-L-IC-N-VA	Water	Nitrate in Water by IC (Low Level)	EPA 300.1 (mod)
Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.			
SO4-IC-N-VA	Water	Sulfate in Water by IC	EPA 300.1 (mod)
Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.			
TDS-VA	Water	Total Dissolved Solids by Gravimetric	APHA 2540 C - GRAVIMETRIC
This analysis is carried out using procedures adapted from APHA Method 2540 "Solids". Solids are determined gravimetrically. Total Dissolved Solids (TDS) are determined by filtering a sample through a glass fibre filter, TDS is determined by evaporating the filtrate to dryness at 180 degrees celsius.			
TSS-VA	Water	Total Suspended Solids by Gravimetric	APHA 2540 D - GRAVIMETRIC
This analysis is carried out using procedures adapted from APHA Method 2540 "Solids". Solids are determined gravimetrically. Total Suspended Solids (TSS) are determined by filtering a sample through a glass fibre filter, TSS is determined by drying the filter at 104 degrees celsius. Samples containing very high dissolved solid content (i.e. seawaters, brackish waters) may produce a positive bias by this method. Alternate analysis methods are available for these types of samples.			

** 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
----------------------------	---------------------

Reference Information

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
VA		ALS ENVIRONMENTAL - VANCOUVER, BRITISH COLUMBIA, CANADA	

Chain of Custody Numbers:

GLOSSARY OF REPORT TERMS

Surrogates are compounds that are similar in behaviour to target analyte(s), but that do not normally occur in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery. In reports that display the D.L. column, laboratory objectives for surrogates are listed there.

- mg/kg - milligrams per kilogram based on dry weight of sample
- mg/kg ww - milligrams per kilogram based on wet weight of sample
- mg/kg lwt - milligrams per kilogram based on lipid-adjusted weight
- mg/L - unit of concentration based on volume, parts per million.
- < - Less than.
- D.L. - The reporting limit.
- 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.

Quality Control Report

Workorder: L2264733

Report Date: 08-MAY-19

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Client: TMAC Resources Inc
Hope Bay Project 95 Wellington St West
Toronto ON M5J 2N7

Contact: Environmental Site Manager

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
BR-L-IC-N-VA								
Water								
Batch	R4626489							
WG3040592-2	LCS							
Bromide (Br)			100.4		%		85-115	03-MAY-19
WG3040592-1	MB							
Bromide (Br)			<0.050		mg/L		0.05	03-MAY-19
CL-IC-N-VA								
Water								
Batch	R4626489							
WG3040592-2	LCS							
Chloride (Cl)			100.0		%		90-110	03-MAY-19
WG3040592-1	MB							
Chloride (Cl)			<0.50		mg/L		0.5	03-MAY-19
F-IC-N-VA								
Water								
Batch	R4626489							
WG3040592-2	LCS							
Fluoride (F)			102.2		%		90-110	03-MAY-19
WG3040592-1	MB							
Fluoride (F)			<0.020		mg/L		0.02	03-MAY-19
HG-T-CVAA-VA								
Water								
Batch	R4623075							
WG3042057-9	DUP	L2264733-5						
Mercury (Hg)-Total		0.0000072	0.0000076		mg/L	5.7	20	05-MAY-19
WG3042057-2	LCS							
Mercury (Hg)-Total			96.9		%		80-120	05-MAY-19
WG3042057-1	MB							
Mercury (Hg)-Total			<0.0000050		mg/L		0.000005	05-MAY-19
WG3042057-10	MS	L2264733-6						
Mercury (Hg)-Total			97.1		%		70-130	05-MAY-19
MET-T-CCMS-VA								
Water								
Batch	R4622665							
WG3041354-2	LCS							
Aluminum (Al)-Total			106.5		%		80-120	04-MAY-19
Antimony (Sb)-Total			100.4		%		80-120	04-MAY-19
Arsenic (As)-Total			103.3		%		80-120	04-MAY-19
Barium (Ba)-Total			99.8		%		80-120	04-MAY-19
Beryllium (Be)-Total			101.9		%		80-120	04-MAY-19
Boron (B)-Total			99.0		%		80-120	04-MAY-19
Cadmium (Cd)-Total			102.2		%		80-120	04-MAY-19
Calcium (Ca)-Total			102.5		%		80-120	04-MAY-19

Quality Control Report

Workorder: L2264733

Report Date: 08-MAY-19

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Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-T-CCMS-VA		Water						
Batch	R4622665							
WG3041354-2	LCS							
Chromium (Cr)-Total			105.7		%		80-120	04-MAY-19
Cobalt (Co)-Total			101.6		%		80-120	04-MAY-19
Copper (Cu)-Total			100.8		%		80-120	04-MAY-19
Iron (Fe)-Total			96.7		%		80-120	04-MAY-19
Lead (Pb)-Total			96.4		%		80-120	04-MAY-19
Lithium (Li)-Total			103.6		%		80-120	04-MAY-19
Magnesium (Mg)-Total			106.2		%		80-120	04-MAY-19
Manganese (Mn)-Total			101.4		%		80-120	04-MAY-19
Molybdenum (Mo)-Total			103.0		%		80-120	04-MAY-19
Nickel (Ni)-Total			103.2		%		80-120	04-MAY-19
Potassium (K)-Total			105.5		%		80-120	04-MAY-19
Selenium (Se)-Total			102.6		%		80-120	04-MAY-19
Silver (Ag)-Total			99.1		%		80-120	04-MAY-19
Sodium (Na)-Total			101.1		%		80-120	04-MAY-19
Thallium (Tl)-Total			97.8		%		80-120	04-MAY-19
Tin (Sn)-Total			98.5		%		80-120	04-MAY-19
Titanium (Ti)-Total			101.8		%		80-120	04-MAY-19
Uranium (U)-Total			94.9		%		80-120	04-MAY-19
Vanadium (V)-Total			103.0		%		80-120	04-MAY-19
Zinc (Zn)-Total			106.8		%		80-120	04-MAY-19
WG3041354-1	MB							
Aluminum (Al)-Total			<0.0030		mg/L		0.003	04-MAY-19
Antimony (Sb)-Total			<0.00010		mg/L		0.0001	04-MAY-19
Arsenic (As)-Total			<0.00010		mg/L		0.0001	04-MAY-19
Barium (Ba)-Total			<0.00010		mg/L		0.0001	04-MAY-19
Beryllium (Be)-Total			<0.00010		mg/L		0.0001	04-MAY-19
Boron (B)-Total			<0.010		mg/L		0.01	04-MAY-19
Cadmium (Cd)-Total			<0.0000050		mg/L		0.000005	04-MAY-19
Calcium (Ca)-Total			<0.050		mg/L		0.05	04-MAY-19
Chromium (Cr)-Total			<0.00010		mg/L		0.0001	04-MAY-19
Cobalt (Co)-Total			<0.00010		mg/L		0.0001	04-MAY-19
Copper (Cu)-Total			<0.00050		mg/L		0.0005	04-MAY-19
Iron (Fe)-Total			<0.010		mg/L		0.01	04-MAY-19
Lead (Pb)-Total			<0.000050		mg/L		0.00005	04-MAY-19

Quality Control Report

Workorder: L2264733

Report Date: 08-MAY-19

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Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-T-CCMS-VA		Water						
Batch R4622665								
WG3041354-1 MB								
Lithium (Li)-Total			<0.0010		mg/L		0.001	04-MAY-19
Magnesium (Mg)-Total			<0.0050		mg/L		0.005	04-MAY-19
Manganese (Mn)-Total			<0.00010		mg/L		0.0001	04-MAY-19
Molybdenum (Mo)-Total			<0.000050		mg/L		0.00005	04-MAY-19
Nickel (Ni)-Total			<0.00050		mg/L		0.0005	04-MAY-19
Potassium (K)-Total			<0.050		mg/L		0.05	04-MAY-19
Selenium (Se)-Total			<0.000050		mg/L		0.00005	04-MAY-19
Silver (Ag)-Total			<0.000010		mg/L		0.00001	04-MAY-19
Sodium (Na)-Total			<0.050		mg/L		0.05	04-MAY-19
Thallium (Tl)-Total			<0.000010		mg/L		0.00001	04-MAY-19
Tin (Sn)-Total			<0.00010		mg/L		0.0001	04-MAY-19
Titanium (Ti)-Total			<0.00030		mg/L		0.0003	04-MAY-19
Uranium (U)-Total			<0.000010		mg/L		0.00001	04-MAY-19
Vanadium (V)-Total			<0.00050		mg/L		0.0005	04-MAY-19
Zinc (Zn)-Total			<0.0030		mg/L		0.003	04-MAY-19
Batch R4625711								
WG3042039-3 DUP		L2264733-7						
Aluminum (Al)-Total		<0.0050	<0.0050	RPD-NA	mg/L	N/A	20	06-MAY-19
Antimony (Sb)-Total		<0.00050	<0.00050	RPD-NA	mg/L	N/A	20	06-MAY-19
Arsenic (As)-Total		<0.00050	<0.00050	RPD-NA	mg/L	N/A	20	06-MAY-19
Barium (Ba)-Total		<0.020	<0.020	RPD-NA	mg/L	N/A	20	06-MAY-19
Beryllium (Be)-Total		<0.00010	<0.00010	RPD-NA	mg/L	N/A	20	06-MAY-19
Boron (B)-Total		<0.10	<0.10	RPD-NA	mg/L	N/A	20	06-MAY-19
Cadmium (Cd)-Total		<0.0000050	<0.0000050	RPD-NA	mg/L	N/A	20	06-MAY-19
Calcium (Ca)-Total		<0.10	<0.10	RPD-NA	mg/L	N/A	20	06-MAY-19
Chromium (Cr)-Total		<0.0010	<0.0010	RPD-NA	mg/L	N/A	20	06-MAY-19
Cobalt (Co)-Total		<0.00030	<0.00030	RPD-NA	mg/L	N/A	20	06-MAY-19
Copper (Cu)-Total		<0.0010	<0.0010	RPD-NA	mg/L	N/A	20	06-MAY-19
Iron (Fe)-Total		<0.030	<0.030	RPD-NA	mg/L	N/A	20	06-MAY-19
Lead (Pb)-Total		<0.00050	<0.00050	RPD-NA	mg/L	N/A	20	06-MAY-19
Lithium (Li)-Total		<0.0010	<0.0010	RPD-NA	mg/L	N/A	20	06-MAY-19
Magnesium (Mg)-Total		<0.10	<0.10	RPD-NA	mg/L	N/A	20	06-MAY-19
Manganese (Mn)-Total		0.00073	0.00104	J	mg/L	0.00031	0.0006	06-MAY-19
Molybdenum (Mo)-Total		<0.0010	<0.0010	RPD-NA	mg/L	N/A	20	06-MAY-19

Quality Control Report

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Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-T-CCMS-VA		Water						
Batch	R4625711							
WG3042039-3	DUP	L2264733-7						
Nickel (Ni)-Total		<0.0010	<0.0010	RPD-NA	mg/L	N/A	20	06-MAY-19
Potassium (K)-Total		<2.0	<2.0	RPD-NA	mg/L	N/A	20	06-MAY-19
Selenium (Se)-Total		<0.000050	<0.000050	RPD-NA	mg/L	N/A	20	06-MAY-19
Silver (Ag)-Total		<0.000020	<0.000020	RPD-NA	mg/L	N/A	20	06-MAY-19
Sodium (Na)-Total		<2.0	<2.0	RPD-NA	mg/L	N/A	20	06-MAY-19
Thallium (Tl)-Total		<0.000010	<0.000010	RPD-NA	mg/L	N/A	20	06-MAY-19
Tin (Sn)-Total		<0.00050	<0.00050	RPD-NA	mg/L	N/A	20	06-MAY-19
Titanium (Ti)-Total		<0.010	<0.010	RPD-NA	mg/L	N/A	20	06-MAY-19
Uranium (U)-Total		<0.00020	<0.00020	RPD-NA	mg/L	N/A	20	06-MAY-19
Vanadium (V)-Total		<0.00050	<0.00050	RPD-NA	mg/L	N/A	20	06-MAY-19
Zinc (Zn)-Total		<0.0050	<0.0050	RPD-NA	mg/L	N/A	20	06-MAY-19
WG3042039-2	LCS							
Aluminum (Al)-Total			103.2		%		80-120	06-MAY-19
Antimony (Sb)-Total			112.2		%		80-120	06-MAY-19
Arsenic (As)-Total			102.3		%		80-120	06-MAY-19
Barium (Ba)-Total			101.6		%		80-120	06-MAY-19
Beryllium (Be)-Total			97.3		%		80-120	06-MAY-19
Boron (B)-Total			99.6		%		80-120	06-MAY-19
Cadmium (Cd)-Total			101.6		%		80-120	06-MAY-19
Calcium (Ca)-Total			99.7		%		80-120	06-MAY-19
Chromium (Cr)-Total			102.6		%		80-120	06-MAY-19
Cobalt (Co)-Total			102.9		%		80-120	06-MAY-19
Copper (Cu)-Total			99.6		%		80-120	06-MAY-19
Iron (Fe)-Total			92.5		%		80-120	06-MAY-19
Lead (Pb)-Total			100.4		%		80-120	06-MAY-19
Lithium (Li)-Total			92.4		%		80-120	06-MAY-19
Magnesium (Mg)-Total			107.0		%		80-120	06-MAY-19
Manganese (Mn)-Total			103.3		%		80-120	06-MAY-19
Molybdenum (Mo)-Total			97.9		%		80-120	06-MAY-19
Nickel (Ni)-Total			100.1		%		80-120	06-MAY-19
Potassium (K)-Total			98.0		%		80-120	06-MAY-19
Selenium (Se)-Total			97.9		%		80-120	06-MAY-19
Silver (Ag)-Total			98.5		%		80-120	06-MAY-19
Sodium (Na)-Total			98.5		%		80-120	06-MAY-19

Quality Control Report

Workorder: L2264733

Report Date: 08-MAY-19

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Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-T-CCMS-VA		Water						
Batch	R4625711							
WG3042039-2	LCS							
Thallium (Tl)-Total			103.7		%		80-120	06-MAY-19
Tin (Sn)-Total			97.6		%		80-120	06-MAY-19
Titanium (Ti)-Total			103.4		%		80-120	06-MAY-19
Uranium (U)-Total			98.3		%		80-120	06-MAY-19
Vanadium (V)-Total			101.8		%		80-120	06-MAY-19
Zinc (Zn)-Total			104.4		%		80-120	06-MAY-19
WG3042039-1	MB							
Aluminum (Al)-Total			<0.0030		mg/L		0.003	06-MAY-19
Antimony (Sb)-Total			<0.00010		mg/L		0.0001	06-MAY-19
Arsenic (As)-Total			<0.00010		mg/L		0.0001	06-MAY-19
Barium (Ba)-Total			<0.00010		mg/L		0.0001	06-MAY-19
Beryllium (Be)-Total			<0.00010		mg/L		0.0001	06-MAY-19
Boron (B)-Total			<0.010		mg/L		0.01	06-MAY-19
Cadmium (Cd)-Total			<0.0000050		mg/L		0.000005	06-MAY-19
Calcium (Ca)-Total			<0.050		mg/L		0.05	06-MAY-19
Chromium (Cr)-Total			<0.00010		mg/L		0.0001	06-MAY-19
Cobalt (Co)-Total			<0.00010		mg/L		0.0001	06-MAY-19
Copper (Cu)-Total			<0.00050		mg/L		0.0005	06-MAY-19
Iron (Fe)-Total			<0.010		mg/L		0.01	06-MAY-19
Lead (Pb)-Total			<0.000050		mg/L		0.00005	06-MAY-19
Lithium (Li)-Total			<0.0010		mg/L		0.001	06-MAY-19
Magnesium (Mg)-Total			<0.0050		mg/L		0.005	06-MAY-19
Manganese (Mn)-Total			<0.00010		mg/L		0.0001	06-MAY-19
Molybdenum (Mo)-Total			<0.000050		mg/L		0.00005	06-MAY-19
Nickel (Ni)-Total			<0.00050		mg/L		0.0005	06-MAY-19
Potassium (K)-Total			<0.050		mg/L		0.05	06-MAY-19
Selenium (Se)-Total			<0.000050		mg/L		0.00005	06-MAY-19
Silver (Ag)-Total			<0.000010		mg/L		0.00001	06-MAY-19
Sodium (Na)-Total			<0.050		mg/L		0.05	06-MAY-19
Thallium (Tl)-Total			<0.000010		mg/L		0.00001	06-MAY-19
Tin (Sn)-Total			<0.00010		mg/L		0.0001	06-MAY-19
Titanium (Ti)-Total			<0.00030		mg/L		0.0003	06-MAY-19
Uranium (U)-Total			<0.000010		mg/L		0.00001	06-MAY-19
Vanadium (V)-Total			<0.00050		mg/L		0.0005	06-MAY-19

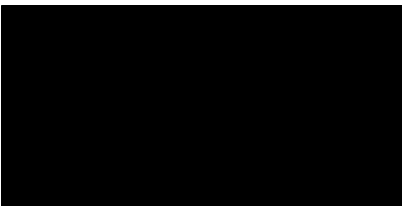
Quality Control Report

Workorder: L2264733

Report Date: 08-MAY-19

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Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-T-CCMS-VA	Water							
Batch	R4625711							
WG3042039-1 MB								
Zinc (Zn)-Total			<0.0030		mg/L		0.003	06-MAY-19
NH3-F-VA	Water							
Batch	R4622658							
WG3040665-2 LCS								
Ammonia, Total (as N)			103.8		%		85-115	03-MAY-19
WG3040665-1 MB								
Ammonia, Total (as N)			<0.0050		mg/L		0.005	03-MAY-19
Batch	R4625319							
WG3042631-2 LCS								
Ammonia, Total (as N)			101.9		%		85-115	06-MAY-19
WG3042631-1 MB								
Ammonia, Total (as N)			<0.0050		mg/L		0.005	06-MAY-19
NO2-L-IC-N-VA	Water							
Batch	R4626489							
WG3040592-2 LCS								
Nitrite (as N)			100.6		%		90-110	03-MAY-19
WG3040592-1 MB								
Nitrite (as N)			<0.0010		mg/L		0.001	03-MAY-19
NO3-L-IC-N-VA	Water							
Batch	R4626489							
WG3040592-2 LCS								
Nitrate (as N)			100.2		%		90-110	03-MAY-19
WG3040592-1 MB								
Nitrate (as N)			<0.0050		mg/L		0.005	03-MAY-19
SO4-IC-N-VA	Water							
Batch	R4626489							
WG3040592-2 LCS								
Sulfate (SO4)			100.7		%		90-110	03-MAY-19
WG3040592-1 MB								
Sulfate (SO4)			<0.30		mg/L		0.3	03-MAY-19
TDS-VA	Water							
Batch	R4624186							
WG3041835-2 LCS								
Total Dissolved Solids			100.2		%		85-115	04-MAY-19
WG3041835-1 MB								



Quality Control Report

Workorder: L2264733 Report Date: 08-MAY-19 Page 7 of 9

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
TDS-VA Water								
Batch R4624186								
WG3041835-1 MB								
Total Dissolved Solids			<10		mg/L		10	04-MAY-19
TSS-VA Water								
Batch R4623732								
WG3041246-2 LCS								
Total Suspended Solids			101.3		%		85-115	03-MAY-19
WG3041246-1 MB								
Total Suspended Solids			<3.0		mg/L		3	03-MAY-19

Quality Control Report

Workorder: L2264733

Report Date: 08-MAY-19

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Legend:

Limit	ALS Control Limit (Data Quality Objectives)
DUP	Duplicate
RPD	Relative Percent Difference
N/A	Not Available
LCS	Laboratory Control Sample
SRM	Standard Reference Material
MS	Matrix Spike
MSD	Matrix Spike Duplicate
ADE	Average Desorption Efficiency
MB	Method Blank
IRM	Internal Reference Material
CRM	Certified Reference Material
CCV	Continuing Calibration Verification
CVS	Calibration Verification Standard
LCSD	Laboratory Control Sample Duplicate

Sample Parameter Qualifier Definitions:

Qualifier	Description
J	Duplicate results and limits are expressed in terms of absolute difference.
RPD-NA	Relative Percent Difference Not Available due to result(s) being less than detection limit.

Quality Control Report

Workorder: L2264733

Report Date: 08-MAY-19

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Hold Time Exceedances:

ALS Product Description	Sample ID	Sampling Date	Date Processed	Rec. HT	Actual HT	Units	Qualifier
Anions and Nutrients							
Nitrate in Water by IC (Low Level)							
	1	29-APR-19 15:10	03-MAY-19 08:18	3	4	days	EHT
	2	29-APR-19 15:45	03-MAY-19 08:18	3	4	days	EHT
	3	29-APR-19 15:35	03-MAY-19 08:18	3	4	days	EHT
	4	29-APR-19 15:20	03-MAY-19 08:18	3	4	days	EHT
	5	29-APR-19 16:00	03-MAY-19 08:18	3	4	days	EHT
	6	29-APR-19 15:50	03-MAY-19 08:18	3	4	days	EHT
	7	29-APR-19 15:00	03-MAY-19 08:18	3	4	days	EHT
	8	29-APR-19 15:20	03-MAY-19 08:18	3	4	days	EHT
Nitrite in Water by IC (Low Level)							
	1	29-APR-19 15:10	03-MAY-19 08:18	3	4	days	EHT
	2	29-APR-19 15:45	03-MAY-19 08:18	3	4	days	EHT
	3	29-APR-19 15:35	03-MAY-19 08:18	3	4	days	EHT
	4	29-APR-19 15:20	03-MAY-19 08:18	3	4	days	EHT
	5	29-APR-19 16:00	03-MAY-19 08:18	3	4	days	EHT
	6	29-APR-19 15:50	03-MAY-19 08:18	3	4	days	EHT
	7	29-APR-19 15:00	03-MAY-19 08:18	3	4	days	EHT
	8	29-APR-19 15:20	03-MAY-19 08:18	3	4	days	EHT

Legend & Qualifier Definitions:

EHTR-FM: Exceeded ALS recommended hold time prior to sample receipt. Field Measurement recommended.
EHTR: Exceeded ALS recommended hold time prior to sample receipt.
EHTL: Exceeded ALS recommended hold time prior to analysis. Sample was received less than 24 hours prior to expiry.
EHT: Exceeded ALS recommended hold time prior to analysis.
Rec. HT: ALS recommended hold time (see units).

Notes*:

Where actual sampling date is not provided to ALS, the date (& time) of receipt is used for calculation purposes.
Where actual sampling time is not provided to ALS, the earlier of 12 noon on the sampling date or the time (& date) of receipt is used for calculation purposes. Samples for L2264733 were received on 30-APR-19 09:50.

ALS recommended hold times may vary by province. They are assigned to meet known provincial and/or federal government requirements. In the absence of regulatory hold times, ALS establishes recommendations based on guidelines published by the US EPA, APHA Standard Methods, or Environment Canada (where available). For more information, please contact ALS.

The ALS Quality Control Report is provided to ALS clients upon request. ALS includes comprehensive QC checks with every analysis to ensure our high standards of quality are met. Each QC result has a known or expected target value, which is compared against pre-determined data quality objectives to provide confidence in the accuracy of associated test results.

Please note that this report may contain QC results from anonymous Sample Duplicates and Matrix Spikes that do not originate from this Work Order.



Report To:		Report Format / Distribution		Service Requested (Rush for routine analysis subject to availability)						
Company: TMAC Resources Ltd (Hope Bay)		<input checked="" type="checkbox"/> Standard <input type="checkbox"/> Other		<input checked="" type="radio"/> Regular (Standard Turnaround Times - Business Days)						
Contact: Environmental Site Manager		<input checked="" type="checkbox"/> PDF <input checked="" type="checkbox"/> Excel <input checked="" type="checkbox"/> Digital <input type="checkbox"/> Fax		<input type="radio"/> Priority (2-4 Business Days) - 50% Surcharge - Contact ALS to Confirm TAT						
Address: 95 Welling Street West, Suite 1010		Email 1: enviro@tmacresources.com		<input type="radio"/> Emergency (1-2 Bus. Days) - 100% Surcharge - Contact ALS to Confirm TAT						
P.O. Box 44, Toronto, ON, M5J 2N7		Email 2: enviro.tech@tmacresources.com		<input type="radio"/> Same Day or Weekend Emergency - Contact ALS to Confirm TAT						
Phone: 1-416-628-0215 Fax:		Email 3:		Analysis Request						
Invoice To Same as Report? Y		Client / Project Information		Please indicate below Filtered, Preserved or both (F, P, F/P)						
Hardcopy of Invoice with Report?		Job #:		P						
Company:		PO / AFE: 4500011700								
Contact:		LSD:								
Address:		Job Ref. Snowcore Dustfall								
Phone: Fax:		Quote #:								
Lab Work Order # (lab use only)		ALS Contact: Amber Springer		Sampler: SW/PJ						
L2264733										
Sample #	Sample Identification (This description will appear on the report)	Date In (dd-mm-yy)	TIME	Sample Type	TDS	TSS	Anions	Total Metals + Total Hg	Ammonia	Number of Containers
	CONTROLDF-SNOW	29-Apr-19	15:10	Water	X	X	X	X	X	4
	TIADF1-SNOW	29-Apr-19	15:45	Water	X	X	X	X	X	4
	TIADF2-SNOW	29-Apr-19	15:35	Water	X	X	X	X	X	4
	TIADF3-SNOW	29-Apr-19	15:20	Water	X	X	X	X	X	4
	DFA1-SNOW	29-Apr-19	16:00	Water	X	X	X	X	X	4
	CDF4-SNOW	29-Apr-19	15:50	Water	X	X	X	X	X	4
	BLANKE	29-Apr-19	15:00	Water	X	X	X	X	X	4
	DUPLICATE	29-Apr-19	15:20	Water	X	X	X	X	X	4
Special Instructions / Regulations with water or land use (CCME-Freshwater Aquatic Life/BC CSR - Commercial/AB Tier 1 - Natural, etc) / 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-mm-yy)	Time (hh-mm)	Received by:	Date:	Time:	Temperature:	Verified by:	Date:	Time:	Observations:
Patrick Jolliffe	30-Apr-19	7:30	WC	04/30/19	1325	8.9 °C				Yes / No ? If Yes add SIF

APPENDIX B

Dustfall Canister Laboratory Analysis



TMAC Resources Inc
ATTN: Environmental Site Manager
Hope Bay Project
95 Wellington St West
Toronto ON M5J 2N7

Date Received: 05-JUN-19
Report Date: 14-JUN-19 16:09 (MT)
Version: FINAL

Client Phone: 867-988-0569

Certificate of Analysis

Lab Work Order #: L2286347
Project P.O. #: 4500011700
Job Reference: DORIS DUSTFALL
C of C Numbers:
Legal Site Desc:

Amber Springer, B.Sc
Account Manager

[This report shall not be reproduced except in full without the written authority of the Laboratory.]

ADDRESS: 8081 Lougheed Hwy, Suite 100, Burnaby, BC V5A 1W9 Canada | Phone: +1 604 253 4188 | Fax: +1 604 253 6700
ALS CANADA LTD Part of the ALS Group An ALS Limited Company

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L2286347-1 CONTROLDF Sampled By: DS/SE/AT on 01-JUN-19 Matrix: WATER							
Combined Dustfalls-Total, soluble, insol							
Total Dustfall	<0.10		0.10	mg/dm2.day		10-JUN-19	R4668027
Total Insoluble Dustfall	<0.10		0.10	mg/dm2.day		10-JUN-19	R4668027
Total Soluble Dustfall	<0.10		0.10	mg/dm2.day		10-JUN-19	R4668027
Ammonia, Total (as N)	<0.00047		0.00047	mg/dm2.day	08-JUN-19	12-JUN-19	R4666949
Interval			1	days		08-JUN-19	R4662399
Chloride (Cl)	<0.082		0.082	mg/dm2.day	08-JUN-19	11-JUN-19	R4665554
Interval			1	days		08-JUN-19	R4662399
Interval			1	days		08-JUN-19	R4662399
Nitrate (as N)	<0.00047		0.00047	mg/dm2.day	08-JUN-19	11-JUN-19	R4665554
Interval			1	days		08-JUN-19	R4662399
Sulfate (SO4)	<0.0058		0.0058	mg/dm2.day	08-JUN-19	11-JUN-19	R4665554
Interval			1	days		14-JUN-19	R4669844
Mercury (Hg)-Total	<0.0000013		0.0000013	mg/dm2.day	14-JUN-19	14-JUN-19	R4669942
Total Metals in Dustfalls by ICPMS							
Aluminum (Al)-Total	0.000226		0.000039	mg/dm2.day	14-JUN-19	14-JUN-19	R4670284
Interval			1	days		14-JUN-19	R4669844
Antimony (Sb)-Total	<0.0000013		0.0000013	mg/dm2.day	14-JUN-19	14-JUN-19	R4670284
Arsenic (As)-Total	<0.000046	DLM	0.000046	mg/dm2.day	14-JUN-19	14-JUN-19	R4670284
Barium (Ba)-Total	0.0000132		0.0000006	mg/dm2.day	14-JUN-19	14-JUN-19	R4670284
			5				
Beryllium (Be)-Total	<0.0000065		0.0000065	mg/dm2.day	14-JUN-19	14-JUN-19	R4670284
Bismuth (Bi)-Total	<0.0000065		0.0000065	mg/dm2.day	14-JUN-19	14-JUN-19	R4670284
Boron (B)-Total	<0.00013		0.00013	mg/dm2.day	14-JUN-19	14-JUN-19	R4670284
Cadmium (Cd)-Total	<0.00000065		0.0000006	mg/dm2.day	14-JUN-19	14-JUN-19	R4670284
			5				
Calcium (Ca)-Total	0.00329		0.00026	mg/dm2.day	14-JUN-19	14-JUN-19	R4670284
Chromium (Cr)-Total	<0.0000065		0.0000065	mg/dm2.day	14-JUN-19	14-JUN-19	R4670284
Cobalt (Co)-Total	<0.0000013		0.0000013	mg/dm2.day	14-JUN-19	14-JUN-19	R4670284
Copper (Cu)-Total	<0.00078	DLB	0.00078	mg/dm2.day	14-JUN-19	14-JUN-19	R4670284
Lead (Pb)-Total	<0.0000033	DLB	0.0000033	mg/dm2.day	14-JUN-19	14-JUN-19	R4670284
Iron (Fe)-Total	0.00059		0.00039	mg/dm2.day	14-JUN-19	14-JUN-19	R4670284
Lithium (Li)-Total	<0.000065		0.000065	mg/dm2.day	14-JUN-19	14-JUN-19	R4670284
Magnesium (Mg)-Total	0.000470		0.000065	mg/dm2.day	14-JUN-19	14-JUN-19	R4670284
Manganese (Mn)-Total	<0.000017	DLB	0.000017	mg/dm2.day	14-JUN-19	14-JUN-19	R4670284
Molybdenum (Mo)-Total	0.00000132		0.0000006	mg/dm2.day	14-JUN-19	14-JUN-19	R4670284
			5				
Nickel (Ni)-Total	<0.0000065		0.0000065	mg/dm2.day	14-JUN-19	14-JUN-19	R4670284
Phosphorus (P)-Total	<0.00065		0.00065	mg/dm2.day	14-JUN-19	14-JUN-19	R4670284
Potassium (K)-Total	<0.00065		0.00065	mg/dm2.day	14-JUN-19	14-JUN-19	R4670284
Selenium (Se)-Total	<0.000013		0.000013	mg/dm2.day	14-JUN-19	14-JUN-19	R4670284
Silicon (Si)-Total	<0.00065		0.00065	mg/dm2.day	14-JUN-19	14-JUN-19	R4670284
Silver (Ag)-Total	<0.00000013		0.0000001	mg/dm2.day	14-JUN-19	14-JUN-19	R4670284
			3				
Sodium (Na)-Total	0.00104		0.00065	mg/dm2.day	14-JUN-19	14-JUN-19	R4670284
Strontium (Sr)-Total	0.0000057		0.0000013	mg/dm2.day	14-JUN-19	14-JUN-19	R4670284
Thallium (Tl)-Total	<0.0000013		0.0000013	mg/dm2.day	14-JUN-19	14-JUN-19	R4670284
Tin (Sn)-Total	<0.0000013		0.0000013	mg/dm2.day	14-JUN-19	14-JUN-19	R4670284
Titanium (Ti)-Total	<0.00013		0.00013	mg/dm2.day	14-JUN-19	14-JUN-19	R4670284
Uranium (U)-Total	<0.00000026	DLB	0.0000002	mg/dm2.day	14-JUN-19	14-JUN-19	R4670284
			6				
Vanadium (V)-Total	<0.000013		0.000013	mg/dm2.day	14-JUN-19	14-JUN-19	R4670284
Zinc (Zn)-Total	<0.00027	DLB	0.00027	mg/dm2.day	14-JUN-19	14-JUN-19	R4670284

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters		Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L2286347-1	CONTROLDF							
Sampled By: DS/SE/AT on 01-JUN-19								
Matrix: WATER								
L2286347-2	TIADF1							
Sampled By: DS/SE/AT on 01-JUN-19								
Matrix: WATER								
Combined Dustfalls-Total, soluble, insol								
Total Dustfall		<0.10		0.10	mg/dm2.day		10-JUN-19	R4668027
Total Insoluble Dustfall		<0.10		0.10	mg/dm2.day		10-JUN-19	R4668027
Total Soluble Dustfall		<0.10		0.10	mg/dm2.day		10-JUN-19	R4668027
Ammonia, Total (as N)		<0.00039		0.00039	mg/dm2.day	08-JUN-19	12-JUN-19	R4666949
Interval				1	days		08-JUN-19	R4662399
Chloride (Cl)		<0.068		0.068	mg/dm2.day	08-JUN-19	11-JUN-19	R4665554
Interval				1	days		08-JUN-19	R4662399
Interval				1	days		08-JUN-19	R4662399
Nitrate (as N)		<0.00066	DLB	0.00066	mg/dm2.day	08-JUN-19	11-JUN-19	R4665554
Interval				1	days		08-JUN-19	R4662399
Sulfate (SO4)		<0.0049		0.0049	mg/dm2.day	08-JUN-19	11-JUN-19	R4665554
Interval				1	days		14-JUN-19	R4669844
Mercury (Hg)-Total		<0.0000013		0.0000013	mg/dm2.day	14-JUN-19	14-JUN-19	R4669942
Total Metals in Dustfalls by ICPMS								
Aluminum (Al)-Total		0.000386		0.000040	mg/dm2.day	14-JUN-19	14-JUN-19	R4670284
Interval				1	days		14-JUN-19	R4669844
Antimony (Sb)-Total		<0.0000013		0.0000013	mg/dm2.day	14-JUN-19	14-JUN-19	R4670284
Arsenic (As)-Total		<0.000044	DLM	0.000044	mg/dm2.day	14-JUN-19	14-JUN-19	R4670284
Barium (Ba)-Total		<0.0000040	DLB	0.0000040	mg/dm2.day	14-JUN-19	14-JUN-19	R4670284
Beryllium (Be)-Total		<0.0000067		0.0000067	mg/dm2.day	14-JUN-19	14-JUN-19	R4670284
Bismuth (Bi)-Total		<0.0000067		0.0000067	mg/dm2.day	14-JUN-19	14-JUN-19	R4670284
Boron (B)-Total		<0.00013		0.00013	mg/dm2.day	14-JUN-19	14-JUN-19	R4670284
Cadmium (Cd)-Total		<0.00000067		0.0000006	mg/dm2.day	14-JUN-19	14-JUN-19	R4670284
				7				
Calcium (Ca)-Total		0.00227		0.00027	mg/dm2.day	14-JUN-19	14-JUN-19	R4670284
Chromium (Cr)-Total		<0.0000067		0.0000067	mg/dm2.day	14-JUN-19	14-JUN-19	R4670284
Cobalt (Co)-Total		<0.0000013		0.0000013	mg/dm2.day	14-JUN-19	14-JUN-19	R4670284
Copper (Cu)-Total		<0.00067	DLB	0.00067	mg/dm2.day	14-JUN-19	14-JUN-19	R4670284
Lead (Pb)-Total		<0.0000013	DLB	0.0000013	mg/dm2.day	14-JUN-19	14-JUN-19	R4670284
Iron (Fe)-Total		0.00044		0.00040	mg/dm2.day	14-JUN-19	14-JUN-19	R4670284
Lithium (Li)-Total		<0.000067		0.000067	mg/dm2.day	14-JUN-19	14-JUN-19	R4670284
Magnesium (Mg)-Total		0.000398		0.000067	mg/dm2.day	14-JUN-19	14-JUN-19	R4670284
Manganese (Mn)-Total		0.000021	DLB	0.000021	mg/dm2.day	14-JUN-19	14-JUN-19	R4670284
Molybdenum (Mo)-Total		<0.00000067		0.0000006	mg/dm2.day	14-JUN-19	14-JUN-19	R4670284
				7				
Nickel (Ni)-Total		<0.0000067		0.0000067	mg/dm2.day	14-JUN-19	14-JUN-19	R4670284
Phosphorus (P)-Total		<0.00067		0.00067	mg/dm2.day	14-JUN-19	14-JUN-19	R4670284
Potassium (K)-Total		<0.00067		0.00067	mg/dm2.day	14-JUN-19	14-JUN-19	R4670284
Selenium (Se)-Total		<0.000013		0.000013	mg/dm2.day	14-JUN-19	14-JUN-19	R4670284
Silicon (Si)-Total		<0.00067		0.00067	mg/dm2.day	14-JUN-19	14-JUN-19	R4670284
Silver (Ag)-Total		<0.00000013		0.0000001	mg/dm2.day	14-JUN-19	14-JUN-19	R4670284
				3				
Sodium (Na)-Total		<0.00067		0.00067	mg/dm2.day	14-JUN-19	14-JUN-19	R4670284
Strontium (Sr)-Total		0.0000029		0.0000013	mg/dm2.day	14-JUN-19	14-JUN-19	R4670284
Thallium (Tl)-Total		<0.0000013		0.0000013	mg/dm2.day	14-JUN-19	14-JUN-19	R4670284
Tin (Sn)-Total		<0.0000013		0.0000013	mg/dm2.day	14-JUN-19	14-JUN-19	R4670284
Titanium (Ti)-Total		<0.00013		0.00013	mg/dm2.day	14-JUN-19	14-JUN-19	R4670284
Uranium (U)-Total		<0.00000013		0.0000001	mg/dm2.day	14-JUN-19	14-JUN-19	R4670284

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L2286347-2 TIADF1 Sampled By: DS/SE/AT on 01-JUN-19 Matrix: WATER Total Metals in Dustfalls by ICPMS							
			3				
Vanadium (V)-Total	<0.000013		0.000013	mg/dm2.day	14-JUN-19	14-JUN-19	R4670284
Zinc (Zn)-Total	<0.00020	DLB	0.00020	mg/dm2.day	14-JUN-19	14-JUN-19	R4670284
L2286347-3 TIADF2 Sampled By: DS/SE/AT on 01-JUN-19 Matrix: WATER Combined Dustfalls-Total, soluble, insol							
Total Dustfall	<0.10		0.10	mg/dm2.day		10-JUN-19	R4668027
Total Insoluble Dustfall	<0.10		0.10	mg/dm2.day		10-JUN-19	R4668027
Total Soluble Dustfall	<0.10		0.10	mg/dm2.day		10-JUN-19	R4668027
Ammonia, Total (as N)	<0.00043		0.00043	mg/dm2.day	08-JUN-19	12-JUN-19	R4666949
Interval			1	days		08-JUN-19	R4662399
Chloride (Cl)	<0.074		0.074	mg/dm2.day	08-JUN-19	11-JUN-19	R4665554
Interval			1	days		08-JUN-19	R4662399
Interval			1	days		08-JUN-19	R4662399
Nitrate (as N)	<0.00047	DLB	0.00047	mg/dm2.day	08-JUN-19	11-JUN-19	R4665554
Interval			1	days		08-JUN-19	R4662399
Sulfate (SO4)	<0.0053		0.0053	mg/dm2.day	08-JUN-19	11-JUN-19	R4665554
Interval			1	days		14-JUN-19	R4669844
Mercury (Hg)-Total	<0.0000010		0.0000010	mg/dm2.day	14-JUN-19	14-JUN-19	R4669942
Total Metals in Dustfalls by ICPMS							
Aluminum (Al)-Total	0.000290		0.000031	mg/dm2.day	14-JUN-19	14-JUN-19	R4670284
Interval			1	days		14-JUN-19	R4669844
Antimony (Sb)-Total	<0.0000010		0.0000010	mg/dm2.day	14-JUN-19	14-JUN-19	R4670284
Arsenic (As)-Total	<0.000049	DLM	0.000049	mg/dm2.day	14-JUN-19	14-JUN-19	R4670284
Barium (Ba)-Total	<0.0000041	DLB	0.0000041	mg/dm2.day	14-JUN-19	14-JUN-19	R4670284
Beryllium (Be)-Total	<0.0000051		0.0000051	mg/dm2.day	14-JUN-19	14-JUN-19	R4670284
Bismuth (Bi)-Total	<0.0000051		0.0000051	mg/dm2.day	14-JUN-19	14-JUN-19	R4670284
Boron (B)-Total	<0.00010		0.00010	mg/dm2.day	14-JUN-19	14-JUN-19	R4670284
Cadmium (Cd)-Total	<0.00000051		0.0000005	mg/dm2.day	14-JUN-19	14-JUN-19	R4670284
			1				
Calcium (Ca)-Total	0.00257		0.00020	mg/dm2.day	14-JUN-19	14-JUN-19	R4670284
Chromium (Cr)-Total	<0.0000051		0.0000051	mg/dm2.day	14-JUN-19	14-JUN-19	R4670284
Cobalt (Co)-Total	<0.0000010		0.0000010	mg/dm2.day	14-JUN-19	14-JUN-19	R4670284
Copper (Cu)-Total	<0.00036	DLB	0.00036	mg/dm2.day	14-JUN-19	14-JUN-19	R4670284
Lead (Pb)-Total	0.0000151		0.0000005	mg/dm2.day	14-JUN-19	14-JUN-19	R4670284
			1				
Iron (Fe)-Total	0.00047		0.00031	mg/dm2.day	14-JUN-19	14-JUN-19	R4670284
Lithium (Li)-Total	<0.000051		0.000051	mg/dm2.day	14-JUN-19	14-JUN-19	R4670284
Magnesium (Mg)-Total	0.000302		0.000051	mg/dm2.day	14-JUN-19	14-JUN-19	R4670284
Manganese (Mn)-Total	0.0000219		0.0000010	mg/dm2.day	14-JUN-19	14-JUN-19	R4670284
Molybdenum (Mo)-Total	0.00000055		0.0000005	mg/dm2.day	14-JUN-19	14-JUN-19	R4670284
			1				
Nickel (Ni)-Total	<0.0000051		0.0000051	mg/dm2.day	14-JUN-19	14-JUN-19	R4670284
Phosphorus (P)-Total	<0.00051		0.00051	mg/dm2.day	14-JUN-19	14-JUN-19	R4670284
Potassium (K)-Total	<0.00051		0.00051	mg/dm2.day	14-JUN-19	14-JUN-19	R4670284
Selenium (Se)-Total	<0.000010		0.000010	mg/dm2.day	14-JUN-19	14-JUN-19	R4670284
Silicon (Si)-Total	<0.00051		0.00051	mg/dm2.day	14-JUN-19	14-JUN-19	R4670284
Silver (Ag)-Total	<0.00000010		0.0000001	mg/dm2.day	14-JUN-19	14-JUN-19	R4670284
			0				
Sodium (Na)-Total	<0.00051		0.00051	mg/dm2.day	14-JUN-19	14-JUN-19	R4670284

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters		Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L2286347-3	TIADF2							
Sampled By:	DS/SE/AT on 01-JUN-19							
Matrix:	WATER							
Total Metals in Dustfalls by ICPMS								
Strontium (Sr)-Total	0.0000029			0.0000010	mg/dm2.day	14-JUN-19	14-JUN-19	R4670284
Thallium (Tl)-Total	<0.0000010			0.0000010	mg/dm2.day	14-JUN-19	14-JUN-19	R4670284
Tin (Sn)-Total	<0.0000010			0.0000010	mg/dm2.day	14-JUN-19	14-JUN-19	R4670284
Titanium (Ti)-Total	<0.00010			0.00010	mg/dm2.day	14-JUN-19	14-JUN-19	R4670284
Uranium (U)-Total	<0.00000010			0.00000010	mg/dm2.day	14-JUN-19	14-JUN-19	R4670284
Vanadium (V)-Total	<0.000010			0.000010	mg/dm2.day	14-JUN-19	14-JUN-19	R4670284
Zinc (Zn)-Total	<0.00018	DLB		0.00018	mg/dm2.day	14-JUN-19	14-JUN-19	R4670284
L2286347-4	TIADF3							
Sampled By:	DS/SE/AT on 01-JUN-19							
Matrix:	WATER							
Combined Dustfalls-Total, soluble, insol								
Total Dustfall	<0.10			0.10	mg/dm2.day		10-JUN-19	R4668027
Total Insoluble Dustfall	<0.10			0.10	mg/dm2.day		10-JUN-19	R4668027
Total Soluble Dustfall	<0.10			0.10	mg/dm2.day		10-JUN-19	R4668027
Ammonia, Total (as N)	<0.00041			0.00041	mg/dm2.day	08-JUN-19	12-JUN-19	R4666949
Interval				1	days		08-JUN-19	R4662399
Chloride (Cl)	<0.071			0.071	mg/dm2.day	08-JUN-19	11-JUN-19	R4665554
Interval				1	days		08-JUN-19	R4662399
Interval				1	days		08-JUN-19	R4662399
Nitrate (as N)	<0.00049	DLB		0.00049	mg/dm2.day	08-JUN-19	11-JUN-19	R4665554
Interval				1	days		08-JUN-19	R4662399
Sulfate (SO4)	<0.0051			0.0051	mg/dm2.day	08-JUN-19	11-JUN-19	R4665554
Interval				1	days		14-JUN-19	R4669844
Mercury (Hg)-Total	<0.0000012			0.0000012	mg/dm2.day	14-JUN-19	14-JUN-19	R4669942
Total Metals in Dustfalls by ICPMS								
Aluminum (Al)-Total	0.000258			0.000036	mg/dm2.day	14-JUN-19	14-JUN-19	R4670284
Interval				1	days		14-JUN-19	R4669844
Antimony (Sb)-Total	<0.0000012			0.0000012	mg/dm2.day	14-JUN-19	14-JUN-19	R4670284
Arsenic (As)-Total	<0.000067	DLM		0.000067	mg/dm2.day	14-JUN-19	14-JUN-19	R4670284
Barium (Ba)-Total	<0.0000054	DLB		0.0000054	mg/dm2.day	14-JUN-19	14-JUN-19	R4670284
Beryllium (Be)-Total	<0.0000060			0.0000060	mg/dm2.day	14-JUN-19	14-JUN-19	R4670284
Bismuth (Bi)-Total	<0.0000060			0.0000060	mg/dm2.day	14-JUN-19	14-JUN-19	R4670284
Boron (B)-Total	<0.00012			0.00012	mg/dm2.day	14-JUN-19	14-JUN-19	R4670284
Cadmium (Cd)-Total	<0.00000060			0.00000060	mg/dm2.day	14-JUN-19	14-JUN-19	R4670284
Calcium (Ca)-Total	0.0014	DLB		0.0014	mg/dm2.day	14-JUN-19	14-JUN-19	R4670284
Chromium (Cr)-Total	<0.0000060			0.0000060	mg/dm2.day	14-JUN-19	14-JUN-19	R4670284
Cobalt (Co)-Total	<0.0000012			0.0000012	mg/dm2.day	14-JUN-19	14-JUN-19	R4670284
Copper (Cu)-Total	<0.00072	DLB		0.00072	mg/dm2.day	14-JUN-19	14-JUN-19	R4670284
Lead (Pb)-Total	0.00000524			0.00000060	mg/dm2.day	14-JUN-19	14-JUN-19	R4670284
Iron (Fe)-Total	<0.00036			0.00036	mg/dm2.day	14-JUN-19	14-JUN-19	R4670284
Lithium (Li)-Total	<0.000060			0.000060	mg/dm2.day	14-JUN-19	14-JUN-19	R4670284
Magnesium (Mg)-Total	0.000208			0.000060	mg/dm2.day	14-JUN-19	14-JUN-19	R4670284
Manganese (Mn)-Total	<0.000016	DLB		0.000016	mg/dm2.day	14-JUN-19	14-JUN-19	R4670284
Molybdenum (Mo)-Total	<0.00000060			0.00000060	mg/dm2.day	14-JUN-19	14-JUN-19	R4670284
Nickel (Ni)-Total	<0.0000060			0.0000060	mg/dm2.day	14-JUN-19	14-JUN-19	R4670284
Phosphorus (P)-Total	<0.00060			0.00060	mg/dm2.day	14-JUN-19	14-JUN-19	R4670284
Potassium (K)-Total	<0.00060			0.00060	mg/dm2.day	14-JUN-19	14-JUN-19	R4670284

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters		Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L2286347-4 TIADF3 Sampled By: DS/SE/AT on 01-JUN-19 Matrix: WATER								
Total Metals in Dustfalls by ICPMS								
Selenium (Se)-Total		<0.000012		0.000012	mg/dm2.day	14-JUN-19	14-JUN-19	R4670284
Silicon (Si)-Total		<0.00060		0.00060	mg/dm2.day	14-JUN-19	14-JUN-19	R4670284
Silver (Ag)-Total		<0.00000012		0.00000012	mg/dm2.day	14-JUN-19	14-JUN-19	R4670284
Sodium (Na)-Total		<0.00060		0.00060	mg/dm2.day	14-JUN-19	14-JUN-19	R4670284
Strontium (Sr)-Total		0.0000025		0.0000012	mg/dm2.day	14-JUN-19	14-JUN-19	R4670284
Thallium (Tl)-Total		<0.0000012		0.0000012	mg/dm2.day	14-JUN-19	14-JUN-19	R4670284
Tin (Sn)-Total		<0.0000012		0.0000012	mg/dm2.day	14-JUN-19	14-JUN-19	R4670284
Titanium (Ti)-Total		<0.00012		0.00012	mg/dm2.day	14-JUN-19	14-JUN-19	R4670284
Uranium (U)-Total		<0.00000024	DLB	0.00000024	mg/dm2.day	14-JUN-19	14-JUN-19	R4670284
Vanadium (V)-Total		<0.000012		0.000012	mg/dm2.day	14-JUN-19	14-JUN-19	R4670284
Zinc (Zn)-Total		<0.00022	DLB	0.00022	mg/dm2.day	14-JUN-19	14-JUN-19	R4670284
L2286347-5 DFA1 Sampled By: DS/SE/AT on 01-JUN-19 Matrix: WATER								
Combined Dustfalls-Total, soluble, insol								
Total Dustfall		0.17		0.10	mg/dm2.day		10-JUN-19	R4668027
Total Insoluble Dustfall		<0.10		0.10	mg/dm2.day		10-JUN-19	R4668027
Total Soluble Dustfall		0.11		0.10	mg/dm2.day		10-JUN-19	R4668027
Ammonia, Total (as N)		0.00202		0.00049	mg/dm2.day	08-JUN-19	12-JUN-19	R4666949
Interval				1	days		08-JUN-19	R4662399
Chloride (Cl)		<0.085		0.085	mg/dm2.day	08-JUN-19	11-JUN-19	R4665554
Interval				1	days		08-JUN-19	R4662399
Interval				1	days		08-JUN-19	R4662399
Nitrate (as N)		<0.00087	DLB	0.00087	mg/dm2.day	08-JUN-19	11-JUN-19	R4665554
Interval				1	days		08-JUN-19	R4662399
Sulfate (SO4)		<0.0061		0.0061	mg/dm2.day	08-JUN-19	11-JUN-19	R4665554
Interval				1	days		14-JUN-19	R4669844
Mercury (Hg)-Total		<0.0000013		0.0000013	mg/dm2.day	14-JUN-19	14-JUN-19	R4669942
Total Metals in Dustfalls by ICPMS								
Aluminum (Al)-Total		0.000283		0.000039	mg/dm2.day	14-JUN-19	14-JUN-19	R4670284
Interval				1	days		14-JUN-19	R4669844
Antimony (Sb)-Total		<0.0000013		0.0000013	mg/dm2.day	14-JUN-19	14-JUN-19	R4670284
Arsenic (As)-Total		<0.000046	DLM	0.000046	mg/dm2.day	14-JUN-19	14-JUN-19	R4670284
Barium (Ba)-Total		<0.0000039	DLB	0.0000039	mg/dm2.day	14-JUN-19	14-JUN-19	R4670284
Beryllium (Be)-Total		<0.0000065		0.0000065	mg/dm2.day	14-JUN-19	14-JUN-19	R4670284
Bismuth (Bi)-Total		<0.0000065		0.0000065	mg/dm2.day	14-JUN-19	14-JUN-19	R4670284
Boron (B)-Total		<0.00013		0.00013	mg/dm2.day	14-JUN-19	14-JUN-19	R4670284
Cadmium (Cd)-Total		<0.00000065		0.00000065	mg/dm2.day	14-JUN-19	14-JUN-19	R4670284
Calcium (Ca)-Total		0.00631		0.00026	mg/dm2.day	14-JUN-19	14-JUN-19	R4670284
Chromium (Cr)-Total		<0.0000065		0.0000065	mg/dm2.day	14-JUN-19	14-JUN-19	R4670284
Cobalt (Co)-Total		<0.0000013		0.0000013	mg/dm2.day	14-JUN-19	14-JUN-19	R4670284
Copper (Cu)-Total		<0.00065	DLB	0.00065	mg/dm2.day	14-JUN-19	14-JUN-19	R4670284
Lead (Pb)-Total		0.00000473		0.00000065	mg/dm2.day	14-JUN-19	14-JUN-19	R4670284
Iron (Fe)-Total		0.00077		0.00039	mg/dm2.day	14-JUN-19	14-JUN-19	R4670284
Lithium (Li)-Total		<0.000065		0.000065	mg/dm2.day	14-JUN-19	14-JUN-19	R4670284
Magnesium (Mg)-Total		0.000685		0.000065	mg/dm2.day	14-JUN-19	14-JUN-19	R4670284
Manganese (Mn)-Total		0.0000709		0.0000013	mg/dm2.day	14-JUN-19	14-JUN-19	R4670284

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L2286347-5 DFA1 Sampled By: DS/SE/AT on 01-JUN-19 Matrix: WATER Total Metals in Dustfalls by ICPMS Molybdenum (Mo)-Total	<0.00000065		0.0000006 5	mg/dm2.day	14-JUN-19	14-JUN-19	R4670284
Nickel (Ni)-Total	<0.0000065		0.0000065	mg/dm2.day	14-JUN-19	14-JUN-19	R4670284
Phosphorus (P)-Total	<0.00065		0.00065	mg/dm2.day	14-JUN-19	14-JUN-19	R4670284
Potassium (K)-Total	<0.00065		0.00065	mg/dm2.day	14-JUN-19	14-JUN-19	R4670284
Selenium (Se)-Total	<0.000013		0.000013	mg/dm2.day	14-JUN-19	14-JUN-19	R4670284
Silicon (Si)-Total	<0.00065		0.00065	mg/dm2.day	14-JUN-19	14-JUN-19	R4670284
Silver (Ag)-Total	<0.00000013		0.0000001 3	mg/dm2.day	14-JUN-19	14-JUN-19	R4670284
Sodium (Na)-Total	<0.00065		0.00065	mg/dm2.day	14-JUN-19	14-JUN-19	R4670284
Strontium (Sr)-Total	0.0000047		0.0000013	mg/dm2.day	14-JUN-19	14-JUN-19	R4670284
Thallium (Tl)-Total	<0.0000013		0.0000013	mg/dm2.day	14-JUN-19	14-JUN-19	R4670284
Tin (Sn)-Total	<0.0000013		0.0000013	mg/dm2.day	14-JUN-19	14-JUN-19	R4670284
Titanium (Ti)-Total	<0.00013		0.00013	mg/dm2.day	14-JUN-19	14-JUN-19	R4670284
Uranium (U)-Total	<0.00000013		0.0000001 3	mg/dm2.day	14-JUN-19	14-JUN-19	R4670284
Vanadium (V)-Total	<0.000013		0.000013	mg/dm2.day	14-JUN-19	14-JUN-19	R4670284
Zinc (Zn)-Total	<0.00023	DLB	0.00023	mg/dm2.day	14-JUN-19	14-JUN-19	R4670284
L2286347-6 CDF4 Sampled By: DS/SE/AT on 03-JUN-19 Matrix: WATER Combined Dustfalls-Total, soluble, insol Total Dustfall	0.14		0.10	mg/dm2.day		10-JUN-19	R4668027
Total Insoluble Dustfall	<0.10		0.10	mg/dm2.day		10-JUN-19	R4668027
Total Soluble Dustfall	0.12		0.10	mg/dm2.day		10-JUN-19	R4668027
Ammonia, Total (as N)	0.00100		0.00039	mg/dm2.day	08-JUN-19	12-JUN-19	R4666949
Interval			1	days		08-JUN-19	R4662399
Chloride (Cl)	<0.068		0.068	mg/dm2.day	08-JUN-19	11-JUN-19	R4665554
Interval			1	days		08-JUN-19	R4662399
Interval			1	days		08-JUN-19	R4662399
Nitrate (as N)	<0.0011	DLB	0.0011	mg/dm2.day	08-JUN-19	11-JUN-19	R4665554
Interval			1	days		08-JUN-19	R4662399
Sulfate (SO4)	<0.0049		0.0049	mg/dm2.day	08-JUN-19	11-JUN-19	R4665554
Interval			1	days		14-JUN-19	R4669844
Mercury (Hg)-Total	<0.0000014		0.0000014	mg/dm2.day	14-JUN-19	14-JUN-19	R4669942
Total Metals in Dustfalls by ICPMS Aluminum (Al)-Total	0.000426		0.000041	mg/dm2.day	14-JUN-19	14-JUN-19	R4670284
Interval			1	days		14-JUN-19	R4669844
Antimony (Sb)-Total	<0.0000014		0.0000014	mg/dm2.day	14-JUN-19	14-JUN-19	R4670284
Arsenic (As)-Total	0.000035	DLM	0.000035	mg/dm2.day	14-JUN-19	14-JUN-19	R4670284
Barium (Ba)-Total	<0.0000027	DLB	0.0000027	mg/dm2.day	14-JUN-19	14-JUN-19	R4670284
Beryllium (Be)-Total	<0.0000068		0.0000068	mg/dm2.day	14-JUN-19	14-JUN-19	R4670284
Bismuth (Bi)-Total	<0.0000068		0.0000068	mg/dm2.day	14-JUN-19	14-JUN-19	R4670284
Boron (B)-Total	<0.00014		0.00014	mg/dm2.day	14-JUN-19	14-JUN-19	R4670284
Cadmium (Cd)-Total	<0.00000068		0.0000006 8	mg/dm2.day	14-JUN-19	14-JUN-19	R4670284
Calcium (Ca)-Total	0.00285		0.00027	mg/dm2.day	14-JUN-19	14-JUN-19	R4670284
Chromium (Cr)-Total	<0.0000068		0.0000068	mg/dm2.day	14-JUN-19	14-JUN-19	R4670284
Cobalt (Co)-Total	<0.0000014		0.0000014	mg/dm2.day	14-JUN-19	14-JUN-19	R4670284
Copper (Cu)-Total	<0.00027	DLB	0.00027	mg/dm2.day	14-JUN-19	14-JUN-19	R4670284
Lead (Pb)-Total	<0.0000027	DLB	0.0000027	mg/dm2.day	14-JUN-19	14-JUN-19	R4670284

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters		Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L2286347-6	CDF4							
Sampled By:	DS/SE/AT on 03-JUN-19							
Matrix:	WATER							
Total Metals in Dustfalls by ICPMS								
Iron (Fe)-Total	0.00081			0.00041	mg/dm2.day	14-JUN-19	14-JUN-19	R4670284
Lithium (Li)-Total	<0.000068			0.000068	mg/dm2.day	14-JUN-19	14-JUN-19	R4670284
Magnesium (Mg)-Total	0.000470			0.000068	mg/dm2.day	14-JUN-19	14-JUN-19	R4670284
Manganese (Mn)-Total	0.0000368			0.0000014	mg/dm2.day	14-JUN-19	14-JUN-19	R4670284
Molybdenum (Mo)-Total	<0.00000068			0.00000068	mg/dm2.day	14-JUN-19	14-JUN-19	R4670284
Nickel (Ni)-Total	<0.0000068			0.0000068	mg/dm2.day	14-JUN-19	14-JUN-19	R4670284
Phosphorus (P)-Total	<0.00068			0.00068	mg/dm2.day	14-JUN-19	14-JUN-19	R4670284
Potassium (K)-Total	<0.00068			0.00068	mg/dm2.day	14-JUN-19	14-JUN-19	R4670284
Selenium (Se)-Total	<0.000014			0.000014	mg/dm2.day	14-JUN-19	14-JUN-19	R4670284
Silicon (Si)-Total	<0.00068			0.00068	mg/dm2.day	14-JUN-19	14-JUN-19	R4670284
Silver (Ag)-Total	<0.00000014			0.00000014	mg/dm2.day	14-JUN-19	14-JUN-19	R4670284
Sodium (Na)-Total	<0.00068			0.00068	mg/dm2.day	14-JUN-19	14-JUN-19	R4670284
Strontium (Sr)-Total	0.0000028			0.0000014	mg/dm2.day	14-JUN-19	14-JUN-19	R4670284
Thallium (Tl)-Total	<0.0000014			0.0000014	mg/dm2.day	14-JUN-19	14-JUN-19	R4670284
Tin (Sn)-Total	<0.0000014			0.0000014	mg/dm2.day	14-JUN-19	14-JUN-19	R4670284
Titanium (Ti)-Total	<0.00014			0.00014	mg/dm2.day	14-JUN-19	14-JUN-19	R4670284
Uranium (U)-Total	<0.00000014			0.00000014	mg/dm2.day	14-JUN-19	14-JUN-19	R4670284
Vanadium (V)-Total	<0.000014			0.000014	mg/dm2.day	14-JUN-19	14-JUN-19	R4670284
Zinc (Zn)-Total	<0.00020		DLB	0.00020	mg/dm2.day	14-JUN-19	14-JUN-19	R4670284

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

Reference Information

Sample Parameter Qualifier Key:

Qualifier	Description
B	Method Blank exceeds ALS DQO. Associated sample results which are < Limit of Reporting or > 5 times blank level are considered reliable.
DLB	Detection Limit Raised. Analyte detected at comparable level in Method Blank.
DLM	Detection Limit Adjusted due to sample matrix effects (e.g. chemical interference, colour, turbidity).
DUP-H	Duplicate results outside ALS DQO, due to sample heterogeneity.
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 specifically 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 specifically 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.			
Results are reported in units of nitrogen weight. To convert to units by weight of ammonium, multiply by 1.29.			
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 specifically 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".			
Results are reported in units of nitrogen weight. To convert to units by weight of nitrate, multiply by 4.43.			
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 specifically 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
VA	ALS ENVIRONMENTAL - VANCOUVER, BRITISH COLUMBIA, CANADA

Reference Information

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
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Chain of Custody Numbers:

GLOSSARY OF REPORT TERMS

Surrogates are compounds that are similar in behaviour to target analyte(s), but that do not normally occur in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery. In reports that display the D.L. column, laboratory objectives for surrogates are listed there.

- mg/kg - milligrams per kilogram based on dry weight of sample
- mg/kg ww - milligrams per kilogram based on wet weight of sample
- mg/kg lwt - milligrams per kilogram based on lipid-adjusted weight
- mg/L - unit of concentration based on volume, parts per million.
- < - Less than.
- D.L. - The reporting limit.
- 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.

Quality Control Report

Workorder: L2286347

Report Date: 14-JUN-19

Page 1 of 5

Client: TMAC Resources Inc
Hope Bay Project 95 Wellington St West
Toronto ON M5J 2N7

Contact: Environmental Site Manager

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
CL-IC-VA Dustfall								
Batch	R4665554							
WG3071662-3 DUP		L2286347-5						
Chloride (Cl)		<0.085	<0.085	RPD-NA	mg/dm2.day	N/A	20	11-JUN-19
WG3071662-2 LCS			102.1		%		90-110	11-JUN-19
Chloride (Cl)								
WG3071662-1 MB			<0.18		mg/dm2.day		0.18	11-JUN-19
Chloride (Cl)								
WG3071662-4 MS		L2286347-6	107.7		%		75-125	11-JUN-19
Chloride (Cl)								
DUSTFALLS-COM-DM2-VA Dustfall								
Batch	R4668027							
WG3072540-2 LCS								
Total Dustfall			99.3		%		85-115	10-JUN-19
Total Insoluble Dustfall			97.0		%		85-115	10-JUN-19
Total Soluble Dustfall			99.7		%		85-115	10-JUN-19
WG3072540-1 MB								
Total Dustfall			<0.10		mg/dm2.day		0.1	10-JUN-19
Total Insoluble Dustfall			<0.10		mg/dm2.day		0.1	10-JUN-19
Total Soluble Dustfall			<0.10		mg/dm2.day		0.1	10-JUN-19
HG-DUST(DM2-CVAFS-VA Dustfall								
Batch	R4669942							
WG3076557-2 LCS								
Mercury (Hg)-Total			92.3		%		70-130	14-JUN-19
WG3076557-1 MB								
Mercury (Hg)-Total			<0.0000013		mg/dm2.day		0.0000013	14-JUN-19
MET-DUST(DM2-MS-VA Dustfall								
Batch	R4670284							
WG3076557-2 LCS								
Aluminum (Al)-Total			102.2		%		80-120	14-JUN-19
Antimony (Sb)-Total			100.6		%		80-120	14-JUN-19
Arsenic (As)-Total			94.9		%		80-120	14-JUN-19
Barium (Ba)-Total			100.5		%		80-120	14-JUN-19
Beryllium (Be)-Total			93.5		%		80-120	14-JUN-19
Bismuth (Bi)-Total			110.4		%		80-120	14-JUN-19
Boron (B)-Total			94.1		%		80-120	14-JUN-19
Cadmium (Cd)-Total			99.0		%		80-120	14-JUN-19
Calcium (Ca)-Total			96.5		%		80-120	14-JUN-19



Quality Control Report

Workorder: L2286347

Report Date: 14-JUN-19

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Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-DUST(DM2)-MS-VA		Dustfall						
Batch	R4670284							
WG3076557-2		LCS						
Chromium (Cr)-Total			102.6		%		80-120	14-JUN-19
Cobalt (Co)-Total			98.3		%		80-120	14-JUN-19
Copper (Cu)-Total			119.6		%		80-120	14-JUN-19
Lead (Pb)-Total			98.2		%		80-120	14-JUN-19
Iron (Fe)-Total			95.5		%		80-120	14-JUN-19
Lithium (Li)-Total			90.9		%		80-120	14-JUN-19
Magnesium (Mg)-Total			102.6		%		80-120	14-JUN-19
Manganese (Mn)-Total			103.3		%		80-120	14-JUN-19
Molybdenum (Mo)-Total			96.4		%		80-120	14-JUN-19
Nickel (Ni)-Total			99.3		%		80-120	14-JUN-19
Phosphorus (P)-Total			98.5		%		80-120	14-JUN-19
Potassium (K)-Total			96.3		%		80-120	14-JUN-19
Selenium (Se)-Total			95.9		%		80-120	14-JUN-19
Silicon (Si)-Total			96.4		%		80-120	14-JUN-19
Silver (Ag)-Total			93.2		%		80-120	14-JUN-19
Sodium (Na)-Total			104.4		%		80-120	14-JUN-19
Strontium (Sr)-Total			92.2		%		80-120	14-JUN-19
Thallium (Tl)-Total			92.8		%		80-120	14-JUN-19
Tin (Sn)-Total			94.5		%		80-120	14-JUN-19
Titanium (Ti)-Total			95.9		%		80-120	14-JUN-19
Uranium (U)-Total			93.8		%		80-120	14-JUN-19
Vanadium (V)-Total			97.8		%		80-120	14-JUN-19
Zinc (Zn)-Total			102.7		%		80-120	14-JUN-19
WG3076557-1		MB						
Aluminum (Al)-Total			0.000080	B	mg/dm2.day		0.000079	14-JUN-19
Antimony (Sb)-Total			0.0000027	B	mg/dm2.day		0.0000026	14-JUN-19
Arsenic (As)-Total			<0.000092		mg/dm2.day		0.000092	14-JUN-19
Barium (Ba)-Total			0.0000024	MB-LOR	mg/dm2.day		0.0000013	14-JUN-19
Beryllium (Be)-Total			<0.000013		mg/dm2.day		0.000013	14-JUN-19
Bismuth (Bi)-Total			<0.000013		mg/dm2.day		0.000013	14-JUN-19
Boron (B)-Total			<0.00026		mg/dm2.day		0.00026	14-JUN-19
Cadmium (Cd)-Total			<0.0000013		mg/dm2.day		0.0000013	14-JUN-19
Calcium (Ca)-Total			0.00087	MB-LOR	mg/dm2.day		0.00052	14-JUN-19
Chromium (Cr)-Total			<0.000013		mg/dm2.day		0.000013	14-JUN-19



Quality Control Report

Workorder: L2286347

Report Date: 14-JUN-19

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Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
NO3-IC-VA		Dustfall						
Batch	R4665554							
WG3071662-1	MB	L2286347-6						
Nitrate (as N)			<0.0043		mg/dm2.day		0.0043	11-JUN-19
WG3071662-4	MS							
Nitrate (as N)			108.9		%		75-125	11-JUN-19
SO4-IC-VA		Dustfall						
Batch	R4665554							
WG3071662-3	DUP	L2286347-5						
Sulfate (SO4)		<0.0061	<0.0061	RPD-NA	mg/dm2.day	N/A	20	11-JUN-19
WG3071662-2	LCS							
Sulfate (SO4)			102.0		%		90-110	11-JUN-19
WG3071662-1	MB							
Sulfate (SO4)			<0.013		mg/dm2.day		0.013	11-JUN-19
WG3071662-4	MS	L2286347-6						
Sulfate (SO4)			115.8		%		75-125	11-JUN-19

Quality Control Report

Workorder: L2286347

Report Date: 14-JUN-19

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Legend:

Limit	ALS Control Limit (Data Quality Objectives)
DUP	Duplicate
RPD	Relative Percent Difference
N/A	Not Available
LCS	Laboratory Control Sample
SRM	Standard Reference Material
MS	Matrix Spike
MSD	Matrix Spike Duplicate
ADE	Average Desorption Efficiency
MB	Method Blank
IRM	Internal Reference Material
CRM	Certified Reference Material
CCV	Continuing Calibration Verification
CVS	Calibration Verification Standard
LCSD	Laboratory Control Sample Duplicate

Sample Parameter Qualifier Definitions:

Qualifier	Description
B	Method Blank exceeds ALS DQO. Associated sample results which are < Limit of Reporting or > 5 times blank level are considered reliable.
MB-LOR	Method Blank exceeds ALS DQO. Limits of Reporting have been adjusted for samples with positive hits below 5x blank level.
RPD-NA	Relative Percent Difference Not Available due to result(s) being less than detection limit.

Hold Time Exceedances:

All test results reported with this submission were conducted within ALS recommended hold times.

ALS recommended hold times may vary by province. They are assigned to meet known provincial and/or federal government requirements. In the absence of regulatory hold times, ALS establishes recommendations based on guidelines published by the US EPA, APHA Standard Methods, or Environment Canada (where available). For more information, please contact ALS.

The ALS Quality Control Report is provided to ALS clients upon request. ALS includes comprehensive QC checks with every analysis to ensure our high standards of quality are met. Each QC result has a known or expected target value, which is compared against pre-determined data quality objectives to provide confidence in the accuracy of associated test results.

Please note that this report may contain QC results from anonymous Sample Duplicates and Matrix Spikes that do not originate from this Work Order.



Canada Toll Free: 1 800 668 9878

COC #

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GENF 18.01 Front

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TMAC Resources Inc
ATTN: Environmental Site Manager
Hope Bay Project
95 Wellington St West
Toronto ON M5J 2N7

Date Received: 05-JUN-19
Report Date: 17-JUN-19 12:31 (MT)
Version: FINAL

Client Phone: 867-988-0569

Certificate of Analysis

Lab Work Order #: L2286370
Project P.O. #: 4500011700
Job Reference: MADRID DUSTFALL
C of C Numbers:
Legal Site Desc:

Amber Springer, B.Sc
Account Manager

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ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L2286370-1 M-DF01 Sampled By: DS/AT/SE on 01-JUN-19 Matrix: WATER							
Combined Dustfalls-Total, soluble, insol							
Total Dustfall	0.13		0.12	mg/dm2.day		14-JUN-19	R4670822
Total Insoluble Dustfall	<0.12		0.12	mg/dm2.day		14-JUN-19	R4670822
Total Soluble Dustfall	<0.12		0.12	mg/dm2.day		14-JUN-19	R4670822
Ammonia, Total (as N)	<0.00065		0.00065	mg/dm2.day	13-JUN-19	13-JUN-19	R4669710
Interval			1	days		13-JUN-19	R4668766
Chloride (Cl)	<0.11		0.11	mg/dm2.day	13-JUN-19	13-JUN-19	R4670490
Interval			1	days		13-JUN-19	R4668766
Interval			1	days		13-JUN-19	R4668766
Nitrate (as N)	0.00099		0.00065	mg/dm2.day	13-JUN-19	13-JUN-19	R4670490
Interval			1	days		13-JUN-19	R4668766
Sulfate (SO4)	<0.0082		0.0082	mg/dm2.day	13-JUN-19	13-JUN-19	R4670490
Interval			1	days		14-JUN-19	R4669844
Mercury (Hg)-Total	<0.0000018		0.0000018	mg/dm2.day	14-JUN-19	14-JUN-19	R4669942
Total Metals in Dustfalls by ICPMS							
Aluminum (Al)-Total	0.00120		0.000055	mg/dm2.day	14-JUN-19	14-JUN-19	R4670284
Interval			1	days		14-JUN-19	R4669844
Antimony (Sb)-Total	<0.0000018		0.0000018	mg/dm2.day	14-JUN-19	14-JUN-19	R4670284
Arsenic (As)-Total	0.00010	DLM	0.00010	mg/dm2.day	14-JUN-19	14-JUN-19	R4670284
Barium (Ba)-Total	0.0000362		0.0000009	mg/dm2.day	14-JUN-19	14-JUN-19	R4670284
			2				
Beryllium (Be)-Total	<0.0000092		0.0000092	mg/dm2.day	14-JUN-19	14-JUN-19	R4670284
Bismuth (Bi)-Total	<0.0000092		0.0000092	mg/dm2.day	14-JUN-19	14-JUN-19	R4670284
Boron (B)-Total	<0.00018		0.00018	mg/dm2.day	14-JUN-19	14-JUN-19	R4670284
Cadmium (Cd)-Total	<0.00000092		0.0000009	mg/dm2.day	14-JUN-19	14-JUN-19	R4670284
			2				
Calcium (Ca)-Total	0.0222		0.00037	mg/dm2.day	14-JUN-19	14-JUN-19	R4670284
Chromium (Cr)-Total	0.0000104		0.0000092	mg/dm2.day	14-JUN-19	14-JUN-19	R4670284
Cobalt (Co)-Total	<0.0000018		0.0000018	mg/dm2.day	14-JUN-19	14-JUN-19	R4670284
Copper (Cu)-Total	<0.0011	DLB	0.0011	mg/dm2.day	14-JUN-19	14-JUN-19	R4670284
Lead (Pb)-Total	<0.0000046	DLB	0.0000046	mg/dm2.day	14-JUN-19	14-JUN-19	R4670284
Iron (Fe)-Total	0.00170		0.00055	mg/dm2.day	14-JUN-19	14-JUN-19	R4670284
Lithium (Li)-Total	<0.000092		0.000092	mg/dm2.day	14-JUN-19	14-JUN-19	R4670284
Magnesium (Mg)-Total	0.00253		0.000092	mg/dm2.day	14-JUN-19	14-JUN-19	R4670284
Manganese (Mn)-Total	0.000116		0.0000018	mg/dm2.day	14-JUN-19	14-JUN-19	R4670284
Molybdenum (Mo)-Total	<0.00000092		0.0000009	mg/dm2.day	14-JUN-19	14-JUN-19	R4670284
			2				
Nickel (Ni)-Total	<0.0000092		0.0000092	mg/dm2.day	14-JUN-19	14-JUN-19	R4670284
Phosphorus (P)-Total	<0.00092		0.00092	mg/dm2.day	14-JUN-19	14-JUN-19	R4670284
Potassium (K)-Total	<0.00092		0.00092	mg/dm2.day	14-JUN-19	14-JUN-19	R4670284
Selenium (Se)-Total	<0.000018		0.000018	mg/dm2.day	14-JUN-19	14-JUN-19	R4670284
Silicon (Si)-Total	0.00140		0.00092	mg/dm2.day	14-JUN-19	14-JUN-19	R4670284
Silver (Ag)-Total	<0.00000018		0.0000001	mg/dm2.day	14-JUN-19	14-JUN-19	R4670284
			8				
Sodium (Na)-Total	0.00133		0.00092	mg/dm2.day	14-JUN-19	14-JUN-19	R4670284
Strontium (Sr)-Total	0.0000657		0.0000018	mg/dm2.day	14-JUN-19	14-JUN-19	R4670284
Thallium (Tl)-Total	<0.0000018		0.0000018	mg/dm2.day	14-JUN-19	14-JUN-19	R4670284
Tin (Sn)-Total	<0.0000018		0.0000018	mg/dm2.day	14-JUN-19	14-JUN-19	R4670284
Titanium (Ti)-Total	<0.00018		0.00018	mg/dm2.day	14-JUN-19	14-JUN-19	R4670284
Uranium (U)-Total	<0.00000037	DLB	0.0000003	mg/dm2.day	14-JUN-19	14-JUN-19	R4670284
			7				
Vanadium (V)-Total	<0.000018		0.000018	mg/dm2.day	14-JUN-19	14-JUN-19	R4670284
Zinc (Zn)-Total	<0.00050	DLB	0.00050	mg/dm2.day	14-JUN-19	14-JUN-19	R4670284

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters		Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L2286370-1	M-DF01							
Sampled By: DS/AT/SE on 01-JUN-19								
Matrix: WATER								
L2286370-2	M-DF02							
Sampled By: DS/AT/SE on 01-JUN-19								
Matrix: WATER								
Combined Dustfalls-Total, soluble, insol								
Total Dustfall		0.17		0.13	mg/dm2.day		14-JUN-19	R4670822
Total Insoluble Dustfall		<0.13		0.13	mg/dm2.day		14-JUN-19	R4670822
Total Soluble Dustfall		0.14		0.13	mg/dm2.day		14-JUN-19	R4670822
Ammonia, Total (as N)		<0.00055		0.00055	mg/dm2.day	13-JUN-19	13-JUN-19	R4669710
Interval				1	days		13-JUN-19	R4668766
Chloride (Cl)		<0.096		0.096	mg/dm2.day	13-JUN-19	13-JUN-19	R4670490
Interval				1	days		13-JUN-19	R4668766
Interval				1	days		13-JUN-19	R4668766
Nitrate (as N)		0.00075		0.00055	mg/dm2.day	13-JUN-19	13-JUN-19	R4670490
Interval				1	days		13-JUN-19	R4668766
Sulfate (SO4)		<0.0069		0.0069	mg/dm2.day	13-JUN-19	13-JUN-19	R4670490
Interval				1	days		14-JUN-19	R4669844
Mercury (Hg)-Total		<0.0000014		0.0000014	mg/dm2.day	14-JUN-19	14-JUN-19	R4669942
Total Metals in Dustfalls by ICPMS								
Aluminum (Al)-Total		0.000274		0.000043	mg/dm2.day	14-JUN-19	14-JUN-19	R4670284
Interval				1	days		14-JUN-19	R4669844
Antimony (Sb)-Total		<0.0000014		0.0000014	mg/dm2.day	14-JUN-19	14-JUN-19	R4670284
Arsenic (As)-Total		<0.000095	DLM	0.000095	mg/dm2.day	14-JUN-19	14-JUN-19	R4670284
Barium (Ba)-Total		0.00000658		0.0000007	mg/dm2.day	14-JUN-19	14-JUN-19	R4670284
				2				
Beryllium (Be)-Total		<0.0000072		0.0000072	mg/dm2.day	14-JUN-19	14-JUN-19	R4670284
Bismuth (Bi)-Total		<0.0000072		0.0000072	mg/dm2.day	14-JUN-19	14-JUN-19	R4670284
Boron (B)-Total		<0.00014		0.00014	mg/dm2.day	14-JUN-19	14-JUN-19	R4670284
Cadmium (Cd)-Total		<0.00000072		0.0000007	mg/dm2.day	14-JUN-19	14-JUN-19	R4670284
				2				
Calcium (Ca)-Total		0.00525		0.00029	mg/dm2.day	14-JUN-19	14-JUN-19	R4670284
Chromium (Cr)-Total		<0.0000072		0.0000072	mg/dm2.day	14-JUN-19	14-JUN-19	R4670284
Cobalt (Co)-Total		<0.0000014		0.0000014	mg/dm2.day	14-JUN-19	14-JUN-19	R4670284
Copper (Cu)-Total		<0.00065	DLB	0.00065	mg/dm2.day	14-JUN-19	14-JUN-19	R4670284
Lead (Pb)-Total		0.00000675		0.0000007	mg/dm2.day	14-JUN-19	14-JUN-19	R4670284
				2				
Iron (Fe)-Total		0.00044		0.00043	mg/dm2.day	14-JUN-19	14-JUN-19	R4670284
Lithium (Li)-Total		<0.000072		0.000072	mg/dm2.day	14-JUN-19	14-JUN-19	R4670284
Magnesium (Mg)-Total		0.000381		0.000072	mg/dm2.day	14-JUN-19	14-JUN-19	R4670284
Manganese (Mn)-Total		0.0000427		0.0000014	mg/dm2.day	14-JUN-19	14-JUN-19	R4670284
Molybdenum (Mo)-Total		<0.00000072		0.0000007	mg/dm2.day	14-JUN-19	14-JUN-19	R4670284
				2				
Nickel (Ni)-Total		<0.0000072		0.0000072	mg/dm2.day	14-JUN-19	14-JUN-19	R4670284
Phosphorus (P)-Total		<0.00072		0.00072	mg/dm2.day	14-JUN-19	14-JUN-19	R4670284
Potassium (K)-Total		<0.00072		0.00072	mg/dm2.day	14-JUN-19	14-JUN-19	R4670284
Selenium (Se)-Total		<0.000014		0.000014	mg/dm2.day	14-JUN-19	14-JUN-19	R4670284
Silicon (Si)-Total		<0.00072		0.00072	mg/dm2.day	14-JUN-19	14-JUN-19	R4670284
Silver (Ag)-Total		<0.00000014		0.0000001	mg/dm2.day	14-JUN-19	14-JUN-19	R4670284
				4				
Sodium (Na)-Total		<0.00072		0.00072	mg/dm2.day	14-JUN-19	14-JUN-19	R4670284
Strontium (Sr)-Total		0.0000048		0.0000014	mg/dm2.day	14-JUN-19	14-JUN-19	R4670284
Thallium (Tl)-Total		<0.0000014		0.0000014	mg/dm2.day	14-JUN-19	14-JUN-19	R4670284
Tin (Sn)-Total		<0.0000014		0.0000014	mg/dm2.day	14-JUN-19	14-JUN-19	R4670284

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters		Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L2286370-2	M-DF02							
Sampled By:	DS/AT/SE on 01-JUN-19							
Matrix:	WATER							
Total Metals in Dustfalls by ICPMS								
Titanium (Ti)-Total		<0.00014		0.00014	mg/dm2.day	14-JUN-19	14-JUN-19	R4670284
Uranium (U)-Total		<0.00000014		0.00000014	mg/dm2.day	14-JUN-19	14-JUN-19	R4670284
Vanadium (V)-Total		<0.000014		0.000014	mg/dm2.day	14-JUN-19	14-JUN-19	R4670284
Zinc (Zn)-Total		<0.00035	DLB	0.00035	mg/dm2.day	14-JUN-19	14-JUN-19	R4670284
L2286370-3	M-DF03							
Sampled By:	DS/AT/SE on 01-JUN-19							
Matrix:	WATER							
Combined Dustfalls-Total, soluble, insol								
Total Dustfall		0.20		0.13	mg/dm2.day		14-JUN-19	R4670822
Total Insoluble Dustfall		<0.13		0.13	mg/dm2.day		14-JUN-19	R4670822
Total Soluble Dustfall		0.18		0.13	mg/dm2.day		14-JUN-19	R4670822
Ammonia, Total (as N)		<0.00055		0.00055	mg/dm2.day	13-JUN-19	13-JUN-19	R4669710
Interval				1	days		13-JUN-19	R4668766
Chloride (Cl)		<0.096		0.096	mg/dm2.day	13-JUN-19	13-JUN-19	R4670490
Interval				1	days		13-JUN-19	R4668766
Interval				1	days		13-JUN-19	R4668766
Nitrate (as N)		0.00093		0.00055	mg/dm2.day	13-JUN-19	13-JUN-19	R4670490
Interval				1	days		13-JUN-19	R4668766
Sulfate (SO4)		<0.0069		0.0069	mg/dm2.day	13-JUN-19	13-JUN-19	R4670490
Interval				1	days		14-JUN-19	R4669844
Mercury (Hg)-Total		<0.0000019		0.0000019	mg/dm2.day	14-JUN-19	14-JUN-19	R4669942
Total Metals in Dustfalls by ICPMS								
Aluminum (Al)-Total		0.00134		0.000057	mg/dm2.day	14-JUN-19	14-JUN-19	R4670284
Interval				1	days		14-JUN-19	R4669844
Antimony (Sb)-Total		<0.0000019		0.0000019	mg/dm2.day	14-JUN-19	14-JUN-19	R4670284
Arsenic (As)-Total		0.00010	DLM	0.00010	mg/dm2.day	14-JUN-19	14-JUN-19	R4670284
Barium (Ba)-Total		0.0000132		0.00000096	mg/dm2.day	14-JUN-19	14-JUN-19	R4670284
Beryllium (Be)-Total		<0.0000096		0.0000096	mg/dm2.day	14-JUN-19	14-JUN-19	R4670284
Bismuth (Bi)-Total		<0.0000096		0.0000096	mg/dm2.day	14-JUN-19	14-JUN-19	R4670284
Boron (B)-Total		<0.00019		0.00019	mg/dm2.day	14-JUN-19	14-JUN-19	R4670284
Cadmium (Cd)-Total		<0.00000096		0.00000096	mg/dm2.day	14-JUN-19	14-JUN-19	R4670284
Calcium (Ca)-Total		0.00906		0.00038	mg/dm2.day	14-JUN-19	14-JUN-19	R4670284
Chromium (Cr)-Total		0.0000129		0.0000096	mg/dm2.day	14-JUN-19	14-JUN-19	R4670284
Cobalt (Co)-Total		<0.0000019		0.0000019	mg/dm2.day	14-JUN-19	14-JUN-19	R4670284
Copper (Cu)-Total		<0.00057	DLB	0.00057	mg/dm2.day	14-JUN-19	14-JUN-19	R4670284
Lead (Pb)-Total		<0.0000057	DLB	0.0000057	mg/dm2.day	14-JUN-19	14-JUN-19	R4670284
Iron (Fe)-Total		0.00201		0.00057	mg/dm2.day	14-JUN-19	14-JUN-19	R4670284
Lithium (Li)-Total		<0.000096		0.000096	mg/dm2.day	14-JUN-19	14-JUN-19	R4670284
Magnesium (Mg)-Total		0.00130		0.000096	mg/dm2.day	14-JUN-19	14-JUN-19	R4670284
Manganese (Mn)-Total		0.0000884		0.0000019	mg/dm2.day	14-JUN-19	14-JUN-19	R4670284
Molybdenum (Mo)-Total		<0.00000096		0.00000096	mg/dm2.day	14-JUN-19	14-JUN-19	R4670284
Nickel (Ni)-Total		<0.0000096		0.0000096	mg/dm2.day	14-JUN-19	14-JUN-19	R4670284
Phosphorus (P)-Total		<0.00096		0.00096	mg/dm2.day	14-JUN-19	14-JUN-19	R4670284
Potassium (K)-Total		<0.00096		0.00096	mg/dm2.day	14-JUN-19	14-JUN-19	R4670284
Selenium (Se)-Total		<0.000019		0.000019	mg/dm2.day	14-JUN-19	14-JUN-19	R4670284
Silicon (Si)-Total		0.00145		0.00096	mg/dm2.day	14-JUN-19	14-JUN-19	R4670284
Silver (Ag)-Total		<0.00000019		0.0000001	mg/dm2.day	14-JUN-19	14-JUN-19	R4670284

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L2286370-3M-DF03 Sampled By: DS/AT/SE on 01-JUN-19 Matrix: WATER Total Metals in Dustfalls by ICPMS							
			9				
Sodium (Na)-Total	0.00346		0.00096	mg/dm2.day	14-JUN-19	14-JUN-19	R4670284
Strontium (Sr)-Total	0.0000078		0.0000019	mg/dm2.day	14-JUN-19	14-JUN-19	R4670284
Thallium (Tl)-Total	<0.0000019		0.0000019	mg/dm2.day	14-JUN-19	14-JUN-19	R4670284
Tin (Sn)-Total	<0.0000019		0.0000019	mg/dm2.day	14-JUN-19	14-JUN-19	R4670284
Titanium (Ti)-Total	<0.00019		0.00019	mg/dm2.day	14-JUN-19	14-JUN-19	R4670284
Uranium (U)-Total	<0.00000038	DLB	0.0000003	mg/dm2.day	14-JUN-19	14-JUN-19	R4670284
			8				
Vanadium (V)-Total	<0.000019		0.000019	mg/dm2.day	14-JUN-19	14-JUN-19	R4670284
Zinc (Zn)-Total	<0.00040	DLB	0.00040	mg/dm2.day	14-JUN-19	14-JUN-19	R4670284
L2286370-4M-DF04 Sampled By: DS/AT/SE on 01-JUN-19 Matrix: WATER Combined Dustfalls-Total, soluble, insol							
Total Dustfall	0.43		0.12	mg/dm2.day		14-JUN-19	R4670822
Total Insoluble Dustfall	<0.12		0.12	mg/dm2.day		14-JUN-19	R4670822
Total Soluble Dustfall	0.36		0.12	mg/dm2.day		14-JUN-19	R4670822
Ammonia, Total (as N)	<0.00053		0.00053	mg/dm2.day	13-JUN-19	13-JUN-19	R4669710
Interval			1	days		13-JUN-19	R4668766
Chloride (Cl)	<0.092		0.092	mg/dm2.day	13-JUN-19	13-JUN-19	R4670490
Interval			1	days		13-JUN-19	R4668766
Interval			1	days		13-JUN-19	R4668766
Nitrate (as N)	0.00126		0.00053	mg/dm2.day	13-JUN-19	13-JUN-19	R4670490
Interval			1	days		13-JUN-19	R4668766
Sulfate (SO4)	<0.0066		0.0066	mg/dm2.day	13-JUN-19	13-JUN-19	R4670490
Interval			1	days		14-JUN-19	R4669844
Mercury (Hg)-Total	<0.0000017		0.0000017	mg/dm2.day	14-JUN-19	14-JUN-19	R4669942
Total Metals in Dustfalls by ICPMS							
Aluminum (Al)-Total	0.00333		0.000051	mg/dm2.day	14-JUN-19	14-JUN-19	R4670284
Interval			1	days		14-JUN-19	R4669844
Antimony (Sb)-Total	<0.0000017		0.0000017	mg/dm2.day	14-JUN-19	14-JUN-19	R4670284
Arsenic (As)-Total	<0.000085	DLM	0.000085	mg/dm2.day	14-JUN-19	14-JUN-19	R4670284
Barium (Ba)-Total	0.0000110		0.0000008	mg/dm2.day	14-JUN-19	14-JUN-19	R4670284
			5				
Beryllium (Be)-Total	<0.0000085		0.0000085	mg/dm2.day	14-JUN-19	14-JUN-19	R4670284
Bismuth (Bi)-Total	<0.0000085		0.0000085	mg/dm2.day	14-JUN-19	14-JUN-19	R4670284
Boron (B)-Total	<0.00017		0.00017	mg/dm2.day	14-JUN-19	14-JUN-19	R4670284
Cadmium (Cd)-Total	<0.00000085		0.0000008	mg/dm2.day	14-JUN-19	14-JUN-19	R4670284
			5				
Calcium (Ca)-Total	0.0303		0.00034	mg/dm2.day	14-JUN-19	14-JUN-19	R4670284
Chromium (Cr)-Total	0.0000302		0.0000085	mg/dm2.day	14-JUN-19	14-JUN-19	R4670284
Cobalt (Co)-Total	0.0000041		0.0000017	mg/dm2.day	14-JUN-19	14-JUN-19	R4670284
Copper (Cu)-Total	<0.00017	DLB	0.00017	mg/dm2.day	14-JUN-19	14-JUN-19	R4670284
Lead (Pb)-Total	<0.0000017	DLB	0.0000017	mg/dm2.day	14-JUN-19	14-JUN-19	R4670284
Iron (Fe)-Total	0.00560		0.00051	mg/dm2.day	14-JUN-19	14-JUN-19	R4670284
Lithium (Li)-Total	<0.000085		0.000085	mg/dm2.day	14-JUN-19	14-JUN-19	R4670284
Magnesium (Mg)-Total	0.00362		0.000085	mg/dm2.day	14-JUN-19	14-JUN-19	R4670284
Manganese (Mn)-Total	0.000252		0.0000017	mg/dm2.day	14-JUN-19	14-JUN-19	R4670284
Molybdenum (Mo)-Total	0.00000129		0.0000008	mg/dm2.day	14-JUN-19	14-JUN-19	R4670284
			5				
Nickel (Ni)-Total	0.0000151		0.0000085	mg/dm2.day	14-JUN-19	14-JUN-19	R4670284

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L2286370-4M-DF04 Sampled By: DS/AT/SE on 01-JUN-19 Matrix: WATER Total Metals in Dustfalls by ICPMS Phosphorus (P)-Total<0.000850.00085mg/dm2.day14-JUN-1914-JUN-19R4670284 Potassium (K)-Total<0.000850.00085mg/dm2.day14-JUN-1914-JUN-19R4670284 Selenium (Se)-Total<0.0000170.000017mg/dm2.day14-JUN-1914-JUN-19R4670284 Silicon (Si)-Total0.005740.00085mg/dm2.day14-JUN-1914-JUN-19R4670284 Silver (Ag)-Total<0.000000170.00000017mg/dm2.day14-JUN-1914-JUN-19R4670284 Sodium (Na)-Total0.001390.00085mg/dm2.day14-JUN-1914-JUN-19R4670284 Strontium (Sr)-Total0.00001040.000017mg/dm2.day14-JUN-1914-JUN-19R4670284 Thallium (Tl)-Total<0.00000170.0000017mg/dm2.day14-JUN-1914-JUN-19R4670284 Tin (Sn)-Total<0.00000170.0000017mg/dm2.day14-JUN-1914-JUN-19R4670284 Titanium (Ti)-Total0.000200.00017mg/dm2.day14-JUN-1914-JUN-19R4670284 Uranium (U)-Total<0.000000170.00000017mg/dm2.day14-JUN-1914-JUN-19R4670284 Vanadium (V)-Total<0.0000170.000017mg/dm2.day14-JUN-1914-JUN-19R4670284 Zinc (Zn)-Total<0.000250.00025mg/dm2.day14-JUN-1914-JUN-19R4670284							
L2286370-5M-DF05 Sampled By: DS/AT/SE on 01-JUN-19 Matrix: WATER Combined Dustfalls-Total, soluble, insol Total Dustfall0.140.12mg/dm2.day14-JUN-19R4670822 Total Insoluble Dustfall<0.120.12mg/dm2.day14-JUN-19R4670822 Total Soluble Dustfall0.130.12mg/dm2.day14-JUN-19R4670822 Ammonia, Total (as N)<0.000580.00058mg/dm2.day13-JUN-1913-JUN-19R4669710 Interval1days13-JUN-19R4668766 Chloride (Cl)<0.100.10mg/dm2.day13-JUN-1913-JUN-19R4670490 Interval1days13-JUN-19R4668766 Interval1days13-JUN-19R4668766 Nitrate (as N)0.000690.00058mg/dm2.day13-JUN-1913-JUN-19R4670490 Interval1days13-JUN-19R4668766 Sulfate (SO4)<0.00720.0072mg/dm2.day13-JUN-1913-JUN-19R4670490 Interval1days14-JUN-19R4669844 Mercury (Hg)-Total<0.00000140.0000014mg/dm2.day14-JUN-1914-JUN-19R4669942 Total Metals in Dustfalls by ICPMS Aluminum (Al)-Total0.0003410.000041mg/dm2.day14-JUN-1914-JUN-19R4670284 Interval1days14-JUN-19R4669844 Antimony (Sb)-Total<0.00000140.0000014mg/dm2.day14-JUN-1914-JUN-19R4670284 Arsenic (As)-Total<0.0000980.000098mg/dm2.day14-JUN-1914-JUN-19R4670284 Barium (Ba)-Total0.000006580.00000069mg/dm2.day14-JUN-1914-JUN-19R4670284 Beryllium (Be)-Total<0.00000690.0000069mg/dm2.day14-JUN-1914-JUN-19R4670284 Bismuth (Bi)-Total<0.00000690.0000069mg/dm2.day14-JUN-1914-JUN-19R4670284 Boron (B)-Total<0.000140.00014mg/dm2.day14-JUN-1914-JUN-19R4670284 Cadmium (Cd)-Total<0.000000690.00000069mg/dm2.day14-JUN-1914-JUN-19R4670284 Calcium (Ca)-Total0.003660.00028mg/dm2.day14-JUN-1914-JUN-19R4670284 Chromium (Cr)-Total<0.00000690.0000069mg/dm2.day14-JUN-1914-JUN-19R4670284 Cobalt (Co)-Total<0.00000140.0000014mg/dm2.day14-JUN-1914-JUN-19R4670284 Copper (Cu)-Total<0.00130.0013mg/dm2.day14-JUN-1914-JUN-19R4670284 Lead (Pb)-Total0.000006530.00000069mg/dm2.day14-JUN-1914-JUN-19R4670284 Iron (Fe)-Total0.000500.00041mg/dm2.day14-JUN-1914-JUN-19R4670284		DLB					

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters		Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L2286370-5	M-DF05							
Sampled By:	DS/AT/SE on 01-JUN-19							
Matrix:	WATER							
Total Metals in Dustfalls by ICPMS								
Lithium (Li)-Total	<0.000069			0.000069	mg/dm2.day	14-JUN-19	14-JUN-19	R4670284
Magnesium (Mg)-Total	0.000357			0.000069	mg/dm2.day	14-JUN-19	14-JUN-19	R4670284
Manganese (Mn)-Total	0.0000284			0.0000014	mg/dm2.day	14-JUN-19	14-JUN-19	R4670284
Molybdenum (Mo)-Total	<0.00000069			0.00000069	mg/dm2.day	14-JUN-19	14-JUN-19	R4670284
Nickel (Ni)-Total	<0.0000069			0.0000069	mg/dm2.day	14-JUN-19	14-JUN-19	R4670284
Phosphorus (P)-Total	<0.00069			0.00069	mg/dm2.day	14-JUN-19	14-JUN-19	R4670284
Potassium (K)-Total	<0.00069			0.00069	mg/dm2.day	14-JUN-19	14-JUN-19	R4670284
Selenium (Se)-Total	<0.000014			0.000014	mg/dm2.day	14-JUN-19	14-JUN-19	R4670284
Silicon (Si)-Total	<0.00069			0.00069	mg/dm2.day	14-JUN-19	14-JUN-19	R4670284
Silver (Ag)-Total	<0.00000014			0.00000014	mg/dm2.day	14-JUN-19	14-JUN-19	R4670284
Sodium (Na)-Total	<0.00069			0.00069	mg/dm2.day	14-JUN-19	14-JUN-19	R4670284
Strontium (Sr)-Total	0.0000032			0.0000014	mg/dm2.day	14-JUN-19	14-JUN-19	R4670284
Thallium (Tl)-Total	<0.0000014			0.0000014	mg/dm2.day	14-JUN-19	14-JUN-19	R4670284
Tin (Sn)-Total	<0.0000014			0.0000014	mg/dm2.day	14-JUN-19	14-JUN-19	R4670284
Titanium (Ti)-Total	<0.00014			0.00014	mg/dm2.day	14-JUN-19	14-JUN-19	R4670284
Uranium (U)-Total	<0.00000028		DLB	0.00000028	mg/dm2.day	14-JUN-19	14-JUN-19	R4670284
Vanadium (V)-Total	<0.000014			0.000014	mg/dm2.day	14-JUN-19	14-JUN-19	R4670284
Zinc (Zn)-Total	<0.00025		DLB	0.00025	mg/dm2.day	14-JUN-19	14-JUN-19	R4670284
L2286370-6	M-DF06							
Sampled By:	DS/AT/SE on 01-JUN-19							
Matrix:	WATER							
Combined Dustfalls-Total, soluble, insol								
Total Dustfall	0.36			0.11	mg/dm2.day		14-JUN-19	R4670822
Total Insoluble Dustfall	<0.11			0.11	mg/dm2.day		14-JUN-19	R4670822
Total Soluble Dustfall	0.32			0.11	mg/dm2.day		14-JUN-19	R4670822
Ammonia, Total (as N)	<0.00047			0.00047	mg/dm2.day	13-JUN-19	13-JUN-19	R4669710
Interval				1	days		13-JUN-19	R4668766
Chloride (Cl)	<0.082			0.082	mg/dm2.day	13-JUN-19	13-JUN-19	R4670490
Interval				1	days		13-JUN-19	R4668766
Interval				1	days		13-JUN-19	R4668766
Nitrate (as N)	0.00099			0.00047	mg/dm2.day	13-JUN-19	13-JUN-19	R4670490
Interval				1	days		13-JUN-19	R4668766
Sulfate (SO4)	<0.0058			0.0058	mg/dm2.day	13-JUN-19	13-JUN-19	R4670490
Interval				1	days		14-JUN-19	R4669844
Mercury (Hg)-Total	<0.0000019			0.0000019	mg/dm2.day	14-JUN-19	14-JUN-19	R4669942
Total Metals in Dustfalls by ICPMS								
Aluminum (Al)-Total	0.00532			0.000058	mg/dm2.day	14-JUN-19	14-JUN-19	R4670284
Interval				1	days		14-JUN-19	R4669844
Antimony (Sb)-Total	<0.0000019			0.0000019	mg/dm2.day	14-JUN-19	14-JUN-19	R4670284
Arsenic (As)-Total	<0.000070		DLM	0.000070	mg/dm2.day	14-JUN-19	14-JUN-19	R4670284
Barium (Ba)-Total	0.0000150			0.00000097	mg/dm2.day	14-JUN-19	14-JUN-19	R4670284
Beryllium (Be)-Total	<0.0000097			0.0000097	mg/dm2.day	14-JUN-19	14-JUN-19	R4670284
Bismuth (Bi)-Total	<0.0000097			0.0000097	mg/dm2.day	14-JUN-19	14-JUN-19	R4670284
Boron (B)-Total	<0.00019			0.00019	mg/dm2.day	14-JUN-19	14-JUN-19	R4670284
Cadmium (Cd)-Total	<0.00000097			0.00000097	mg/dm2.day	14-JUN-19	14-JUN-19	R4670284
Calcium (Ca)-Total	0.0368			0.00039	mg/dm2.day	14-JUN-19	14-JUN-19	R4670284

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L2286370-6M-DF06 Sampled By: DS/AT/SE on 01-JUN-19 Matrix: WATER Total Metals in Dustfalls by ICPMS Chromium (Cr)-Total0.0000251 Cobalt (Co)-Total0.0000060 Copper (Cu)-Total<0.00058 Lead (Pb)-Total<0.0000068 Iron (Fe)-Total0.0104 Lithium (Li)-Total<0.000097 Magnesium (Mg)-Total0.00580 Manganese (Mn)-Total0.000481 Molybdenum (Mo)-Total<0.00000097 Nickel (Ni)-Total0.0000167 Phosphorus (P)-Total<0.00097 Potassium (K)-Total<0.00097 Selenium (Se)-Total<0.000019 Silicon (Si)-Total0.00646 Silver (Ag)-Total<0.00000019 Sodium (Na)-Total0.00176 Strontium (Sr)-Total0.0000189 Thallium (Tl)-Total<0.0000019 Tin (Sn)-Total<0.0000019 Titanium (Ti)-Total0.00029 Uranium (U)-Total<0.00000019 Vanadium (V)-Total0.000027 Zinc (Zn)-Total<0.00029							
		DLB	0.0000097	mg/dm2.day	14-JUN-19	14-JUN-19	R4670284
		DLB	0.0000019	mg/dm2.day	14-JUN-19	14-JUN-19	R4670284
		DLB	0.00058	mg/dm2.day	14-JUN-19	14-JUN-19	R4670284
		DLB	0.0000068	mg/dm2.day	14-JUN-19	14-JUN-19	R4670284
			0.00058	mg/dm2.day	14-JUN-19	14-JUN-19	R4670284
			0.000097	mg/dm2.day	14-JUN-19	14-JUN-19	R4670284
			0.000097	mg/dm2.day	14-JUN-19	14-JUN-19	R4670284
			0.0000019	mg/dm2.day	14-JUN-19	14-JUN-19	R4670284
			0.0000009	mg/dm2.day	14-JUN-19	14-JUN-19	R4670284
			7				
			0.0000097	mg/dm2.day	14-JUN-19	14-JUN-19	R4670284
			0.00097	mg/dm2.day	14-JUN-19	14-JUN-19	R4670284
			0.00097	mg/dm2.day	14-JUN-19	14-JUN-19	R4670284
			0.000019	mg/dm2.day	14-JUN-19	14-JUN-19	R4670284
			0.00097	mg/dm2.day	14-JUN-19	14-JUN-19	R4670284
			0.0000001	mg/dm2.day	14-JUN-19	14-JUN-19	R4670284
			9				
			0.00097	mg/dm2.day	14-JUN-19	14-JUN-19	R4670284
			0.0000019	mg/dm2.day	14-JUN-19	14-JUN-19	R4670284
			0.0000019	mg/dm2.day	14-JUN-19	14-JUN-19	R4670284
			0.00019	mg/dm2.day	14-JUN-19	14-JUN-19	R4670284
			0.0000001	mg/dm2.day	14-JUN-19	14-JUN-19	R4670284
			9				
		DLB	0.000019	mg/dm2.day	14-JUN-19	14-JUN-19	R4670284
		DLB	0.00029	mg/dm2.day	14-JUN-19	14-JUN-19	R4670284
L2286370-7M-DF07 Sampled By: DS/AT/SE on 01-JUN-19 Matrix: WATER Combined Dustfalls-Total, soluble, insol Total Dustfall0.57 Total Insoluble Dustfall0.18 Total Soluble Dustfall0.39 Ammonia, Total (as N)<0.00051 Interval1 Chloride (Cl)<0.089 Interval0.089 Interval1 Interval1 Nitrate (as N)0.00103 Interval1 Sulfate (SO4)<0.0063 Interval1 Mercury (Hg)-Total<0.0000016 Total Metals in Dustfalls by ICPMS Aluminum (Al)-Total0.00256 Interval1 Antimony (Sb)-Total<0.0000016 Arsenic (As)-Total0.00010 Barium (Ba)-Total0.0000161 Beryllium (Be)-Total<0.0000079							
			0.12	mg/dm2.day		14-JUN-19	R4670822
			0.12	mg/dm2.day		14-JUN-19	R4670822
			0.12	mg/dm2.day		14-JUN-19	R4670822
			0.00051	mg/dm2.day	13-JUN-19	13-JUN-19	R4669710
			1	days		13-JUN-19	R4668766
			0.089	mg/dm2.day	13-JUN-19	13-JUN-19	R4670490
			1	days		13-JUN-19	R4668766
			1	days		13-JUN-19	R4668766
			0.00051	mg/dm2.day	13-JUN-19	13-JUN-19	R4670490
			1	days		13-JUN-19	R4668766
			0.0063	mg/dm2.day	13-JUN-19	13-JUN-19	R4670490
			1	days		14-JUN-19	R4669844
			0.0000016	mg/dm2.day	14-JUN-19	14-JUN-19	R4669942
			0.000047	mg/dm2.day	14-JUN-19	14-JUN-19	R4670284
			1	days		14-JUN-19	R4669844
			0.0000016	mg/dm2.day	14-JUN-19	14-JUN-19	R4670284
		DLM	0.00010	mg/dm2.day	14-JUN-19	14-JUN-19	R4670284
			0.0000007	mg/dm2.day	14-JUN-19	14-JUN-19	R4670284
			9				
			0.0000079	mg/dm2.day	14-JUN-19	14-JUN-19	R4670284

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters		Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L2286370-7	M-DF07							
Sampled By:	DS/AT/SE on 01-JUN-19							
Matrix:	WATER							
Total Metals in Dustfalls by ICPMS								
Bismuth (Bi)-Total	<0.0000079			0.0000079	mg/dm2.day	14-JUN-19	14-JUN-19	R4670284
Boron (B)-Total	<0.00016			0.00016	mg/dm2.day	14-JUN-19	14-JUN-19	R4670284
Cadmium (Cd)-Total	<0.00000079			0.00000079	mg/dm2.day	14-JUN-19	14-JUN-19	R4670284
Calcium (Ca)-Total	0.0512			0.00031	mg/dm2.day	14-JUN-19	14-JUN-19	R4670284
Chromium (Cr)-Total	0.0000120			0.0000079	mg/dm2.day	14-JUN-19	14-JUN-19	R4670284
Cobalt (Co)-Total	0.0000040			0.0000016	mg/dm2.day	14-JUN-19	14-JUN-19	R4670284
Copper (Cu)-Total	<0.0017			0.0017	mg/dm2.day	14-JUN-19	14-JUN-19	R4670284
Lead (Pb)-Total	0.00000586			0.00000079	mg/dm2.day	14-JUN-19	14-JUN-19	R4670284
Iron (Fe)-Total	0.00428			0.00047	mg/dm2.day	14-JUN-19	14-JUN-19	R4670284
Lithium (Li)-Total	<0.000079			0.000079	mg/dm2.day	14-JUN-19	14-JUN-19	R4670284
Magnesium (Mg)-Total	0.00455			0.000079	mg/dm2.day	14-JUN-19	14-JUN-19	R4670284
Manganese (Mn)-Total	0.000540			0.0000016	mg/dm2.day	14-JUN-19	14-JUN-19	R4670284
Molybdenum (Mo)-Total	<0.00000079			0.00000079	mg/dm2.day	14-JUN-19	14-JUN-19	R4670284
Nickel (Ni)-Total	0.0000090			0.0000079	mg/dm2.day	14-JUN-19	14-JUN-19	R4670284
Phosphorus (P)-Total	<0.00079			0.00079	mg/dm2.day	14-JUN-19	14-JUN-19	R4670284
Potassium (K)-Total	<0.00079			0.00079	mg/dm2.day	14-JUN-19	14-JUN-19	R4670284
Selenium (Se)-Total	<0.000016			0.000016	mg/dm2.day	14-JUN-19	14-JUN-19	R4670284
Silicon (Si)-Total	0.00269			0.00079	mg/dm2.day	14-JUN-19	14-JUN-19	R4670284
Silver (Ag)-Total	<0.00000016			0.00000016	mg/dm2.day	14-JUN-19	14-JUN-19	R4670284
Sodium (Na)-Total	0.00497			0.00079	mg/dm2.day	14-JUN-19	14-JUN-19	R4670284
Strontium (Sr)-Total	0.0000280			0.0000016	mg/dm2.day	14-JUN-19	14-JUN-19	R4670284
Thallium (Tl)-Total	<0.0000016			0.0000016	mg/dm2.day	14-JUN-19	14-JUN-19	R4670284
Tin (Sn)-Total	<0.0000016			0.0000016	mg/dm2.day	14-JUN-19	14-JUN-19	R4670284
Titanium (Ti)-Total	<0.00016			0.00016	mg/dm2.day	14-JUN-19	14-JUN-19	R4670284
Uranium (U)-Total	<0.00000031			0.00000031	mg/dm2.day	14-JUN-19	14-JUN-19	R4670284
Vanadium (V)-Total	<0.000016			0.000016	mg/dm2.day	14-JUN-19	14-JUN-19	R4670284
Zinc (Zn)-Total	<0.00038			0.00038	mg/dm2.day	14-JUN-19	14-JUN-19	R4670284
L2286370-8	M-DF08							
Sampled By:	DS/AT/SE on 01-JUN-19							
Matrix:	WATER							
Combined Dustfalls-Total, soluble, insol								
Total Dustfall	0.24			0.13	mg/dm2.day		14-JUN-19	R4670822
Total Insoluble Dustfall	<0.13			0.13	mg/dm2.day		14-JUN-19	R4670822
Total Soluble Dustfall	0.15			0.13	mg/dm2.day		14-JUN-19	R4670822
Ammonia, Total (as N)	<0.00056			0.00056	mg/dm2.day	13-JUN-19	13-JUN-19	R4669710
Interval				1	days		13-JUN-19	R4668766
Chloride (Cl)	<0.099			0.099	mg/dm2.day	13-JUN-19	13-JUN-19	R4670490
Interval				1	days		13-JUN-19	R4668766
Interval				1	days		13-JUN-19	R4668766
Nitrate (as N)	0.00094			0.00056	mg/dm2.day	13-JUN-19	13-JUN-19	R4670490
Interval				1	days		13-JUN-19	R4668766
Sulfate (SO4)	<0.0070			0.0070	mg/dm2.day	13-JUN-19	13-JUN-19	R4670490
Interval				1	days		14-JUN-19	R4669844
Mercury (Hg)-Total	<0.0000017			0.0000017	mg/dm2.day	14-JUN-19	14-JUN-19	R4669

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L2286370-8M-DF08 Sampled By: DS/AT/SE on 01-JUN-19 Matrix: WATER Total Metals in Dustfalls by ICPMS							
Interval			1	days		14-JUN-19	R4669844
Antimony (Sb)-Total	<0.0000017	DLM	0.0000017	mg/dm2.day	14-JUN-19	14-JUN-19	R4670284
Arsenic (As)-Total	<0.000097		0.000097	mg/dm2.day	14-JUN-19	14-JUN-19	R4670284
Barium (Ba)-Total	0.0000126		0.0000008	mg/dm2.day	14-JUN-19	14-JUN-19	R4670284
			5				
Beryllium (Be)-Total	<0.0000085		0.0000085	mg/dm2.day	14-JUN-19	14-JUN-19	R4670284
Bismuth (Bi)-Total	<0.0000085		0.0000085	mg/dm2.day	14-JUN-19	14-JUN-19	R4670284
Boron (B)-Total	<0.00017		0.00017	mg/dm2.day	14-JUN-19	14-JUN-19	R4670284
Cadmium (Cd)-Total	<0.00000085		0.0000008	mg/dm2.day	14-JUN-19	14-JUN-19	R4670284
			5				
Calcium (Ca)-Total	0.0337		0.00034	mg/dm2.day	14-JUN-19	14-JUN-19	R4670284
Chromium (Cr)-Total	0.0000263		0.0000085	mg/dm2.day	14-JUN-19	14-JUN-19	R4670284
Cobalt (Co)-Total	0.0000056		0.0000017	mg/dm2.day	14-JUN-19	14-JUN-19	R4670284
Copper (Cu)-Total	<0.00051	DLB	0.00051	mg/dm2.day	14-JUN-19	14-JUN-19	R4670284
Lead (Pb)-Total	<0.0000043	DLB	0.0000043	mg/dm2.day	14-JUN-19	14-JUN-19	R4670284
Iron (Fe)-Total	0.0101		0.00051	mg/dm2.day	14-JUN-19	14-JUN-19	R4670284
Lithium (Li)-Total	<0.000085		0.000085	mg/dm2.day	14-JUN-19	14-JUN-19	R4670284
Magnesium (Mg)-Total	0.00512		0.000085	mg/dm2.day	14-JUN-19	14-JUN-19	R4670284
Manganese (Mn)-Total	0.000452		0.0000017	mg/dm2.day	14-JUN-19	14-JUN-19	R4670284
Molybdenum (Mo)-Total	<0.00000085		0.0000008	mg/dm2.day	14-JUN-19	14-JUN-19	R4670284
			5				
Nickel (Ni)-Total	0.0000142		0.0000085	mg/dm2.day	14-JUN-19	14-JUN-19	R4670284
Phosphorus (P)-Total	<0.00085		0.00085	mg/dm2.day	14-JUN-19	14-JUN-19	R4670284
Potassium (K)-Total	<0.00085		0.00085	mg/dm2.day	14-JUN-19	14-JUN-19	R4670284
Selenium (Se)-Total	<0.000017		0.000017	mg/dm2.day	14-JUN-19	14-JUN-19	R4670284
Silicon (Si)-Total	0.00586		0.00085	mg/dm2.day	14-JUN-19	14-JUN-19	R4670284
Silver (Ag)-Total	<0.00000017		0.0000001	mg/dm2.day	14-JUN-19	14-JUN-19	R4670284
			7				
Sodium (Na)-Total	<0.00085		0.00085	mg/dm2.day	14-JUN-19	14-JUN-19	R4670284
Strontium (Sr)-Total	0.0000181		0.0000017	mg/dm2.day	14-JUN-19	14-JUN-19	R4670284
Thallium (Tl)-Total	<0.0000017		0.0000017	mg/dm2.day	14-JUN-19	14-JUN-19	R4670284
Tin (Sn)-Total	<0.0000017		0.0000017	mg/dm2.day	14-JUN-19	14-JUN-19	R4670284
Titanium (Ti)-Total	0.00025		0.00017	mg/dm2.day	14-JUN-19	14-JUN-19	R4670284
Uranium (U)-Total	<0.00000034	DLB	0.0000003	mg/dm2.day	14-JUN-19	14-JUN-19	R4670284
			4				
Vanadium (V)-Total	0.000025		0.000017	mg/dm2.day	14-JUN-19	14-JUN-19	R4670284
Zinc (Zn)-Total	<0.00041	DLB	0.00041	mg/dm2.day	14-JUN-19	14-JUN-19	R4670284
L2286370-9M-DF09 Sampled By: DS/AT/SE on 01-JUN-19 Matrix: WATER Combined Dustfalls-Total, soluble, insol							
Total Dustfall	0.23		0.13	mg/dm2.day		14-JUN-19	R4670822
Total Insoluble Dustfall	<0.13		0.13	mg/dm2.day		14-JUN-19	R4670822
Total Soluble Dustfall	0.18		0.13	mg/dm2.day		14-JUN-19	R4670822
Ammonia, Total (as N)	<0.00052		0.00052	mg/dm2.day	13-JUN-19	13-JUN-19	R4669710
Interval			1	days		13-JUN-19	R4668766
Chloride (Cl)	<0.092		0.092	mg/dm2.day	13-JUN-19	13-JUN-19	R4670490
Interval			1	days		13-JUN-19	R4668766
Interval			1	days		13-JUN-19	R4668766
Nitrate (as N)	0.00061		0.00052	mg/dm2.day	13-JUN-19	13-JUN-19	R4670490
Interval			1	days		13-JUN-19	R4668766

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters		Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L2286370-9	M-DF09							
Sampled By:	DS/AT/SE on 01-JUN-19							
Matrix:	WATER							
Sulfate (SO4)		<0.0065		0.0065	mg/dm2.day	13-JUN-19	13-JUN-19	R4670490
Interval				1	days		14-JUN-19	R4669844
Mercury (Hg)-Total		<0.0000017		0.0000017	mg/dm2.day	14-JUN-19	14-JUN-19	R4669942
Total Metals in Dustfalls by ICPMS								
Aluminum (Al)-Total		0.00138		0.000051	mg/dm2.day	14-JUN-19	14-JUN-19	R4670284
Interval				1	days		14-JUN-19	R4669844
Antimony (Sb)-Total		<0.0000017		0.0000017	mg/dm2.day	14-JUN-19	14-JUN-19	R4670284
Arsenic (As)-Total		0.00010	DLM	0.00010	mg/dm2.day	14-JUN-19	14-JUN-19	R4670284
Barium (Ba)-Total		0.00000922		0.00000085	mg/dm2.day	14-JUN-19	14-JUN-19	R4670284
Beryllium (Be)-Total		<0.0000085		0.0000085	mg/dm2.day	14-JUN-19	14-JUN-19	R4670284
Bismuth (Bi)-Total		<0.0000085		0.0000085	mg/dm2.day	14-JUN-19	14-JUN-19	R4670284
Boron (B)-Total		<0.00017		0.00017	mg/dm2.day	14-JUN-19	14-JUN-19	R4670284
Cadmium (Cd)-Total		<0.00000085		0.00000085	mg/dm2.day	14-JUN-19	14-JUN-19	R4670284
Calcium (Ca)-Total		0.0146		0.00034	mg/dm2.day	14-JUN-19	14-JUN-19	R4670284
Chromium (Cr)-Total		0.0000146		0.0000085	mg/dm2.day	14-JUN-19	14-JUN-19	R4670284
Cobalt (Co)-Total		<0.0000017		0.0000017	mg/dm2.day	14-JUN-19	14-JUN-19	R4670284
Copper (Cu)-Total		<0.00094	DLB	0.00094	mg/dm2.day	14-JUN-19	14-JUN-19	R4670284
Lead (Pb)-Total		0.00000631		0.00000085	mg/dm2.day	14-JUN-19	14-JUN-19	R4670284
Iron (Fe)-Total		0.00257		0.00051	mg/dm2.day	14-JUN-19	14-JUN-19	R4670284
Lithium (Li)-Total		<0.000085		0.000085	mg/dm2.day	14-JUN-19	14-JUN-19	R4670284
Magnesium (Mg)-Total		0.00163		0.000085	mg/dm2.day	14-JUN-19	14-JUN-19	R4670284
Manganese (Mn)-Total		0.000174		0.0000017	mg/dm2.day	14-JUN-19	14-JUN-19	R4670284
Molybdenum (Mo)-Total		<0.00000085		0.00000085	mg/dm2.day	14-JUN-19	14-JUN-19	R4670284
Nickel (Ni)-Total		<0.0000085		0.0000085	mg/dm2.day	14-JUN-19	14-JUN-19	R4670284
Phosphorus (P)-Total		<0.00085		0.00085	mg/dm2.day	14-JUN-19	14-JUN-19	R4670284
Potassium (K)-Total		<0.00085		0.00085	mg/dm2.day	14-JUN-19	14-JUN-19	R4670284
Selenium (Se)-Total		<0.000017		0.000017	mg/dm2.day	14-JUN-19	14-JUN-19	R4670284
Silicon (Si)-Total		0.00159		0.00085	mg/dm2.day	14-JUN-19	14-JUN-19	R4670284
Silver (Ag)-Total		<0.00000017		0.0000001	mg/dm2.day	14-JUN-19	14-JUN-19	R4670284
Sodium (Na)-Total		<0.00085		0.00085	mg/dm2.day	14-JUN-19	14-JUN-19	R4670284
Strontium (Sr)-Total		0.0000089		0.0000017	mg/dm2.day	14-JUN-19	14-JUN-19	R4670284
Thallium (Tl)-Total		<0.0000017		0.0000017	mg/dm2.day	14-JUN-19	14-JUN-19	R4670284
Tin (Sn)-Total		<0.0000017		0.0000017	mg/dm2.day	14-JUN-19	14-JUN-19	R4670284
Titanium (Ti)-Total		<0.00017		0.00017	mg/dm2.day	14-JUN-19	14-JUN-19	R4670284
Uranium (U)-Total		<0.00000034	DLB	0.0000003	mg/dm2.day	14-JUN-19	14-JUN-19	R4670284
Vanadium (V)-Total		<0.000017		0.000017	mg/dm2.day	14-JUN-19	14-JUN-19	R4670284
Zinc (Zn)-Total		<0.00051	DLB	0.00051	mg/dm2.day	14-JUN-19	14-JUN-19	R4670284

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

Reference Information

Sample Parameter Qualifier Key:

Qualifier	Description
B	Method Blank exceeds ALS DQO. Associated sample results which are < Limit of Reporting or > 5 times blank level are considered reliable.
DLB	Detection Limit Raised. Analyte detected at comparable level in Method Blank.
DLM	Detection Limit Adjusted due to sample matrix effects (e.g. chemical interference, colour, turbidity).
DUP-H	Duplicate results outside ALS DQO, due to sample heterogeneity.
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 specifically 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 specifically 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.			
Results are reported in units of nitrogen weight. To convert to units by weight of ammonium, multiply by 1.29.			
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 specifically 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".			
Results are reported in units of nitrogen weight. To convert to units by weight of nitrate, multiply by 4.43.			
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 specifically 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
VA	ALS ENVIRONMENTAL - VANCOUVER, BRITISH COLUMBIA, CANADA

Reference Information

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
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Chain of Custody Numbers:

GLOSSARY OF REPORT TERMS

Surrogates are compounds that are similar in behaviour to target analyte(s), but that do not normally occur in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery. In reports that display the D.L. column, laboratory objectives for surrogates are listed there.

- mg/kg - milligrams per kilogram based on dry weight of sample
- mg/kg ww - milligrams per kilogram based on wet weight of sample
- mg/kg lwt - milligrams per kilogram based on lipid-adjusted weight
- mg/L - unit of concentration based on volume, parts per million.
- < - Less than.
- D.L. - The reporting limit.
- 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.



Quality Control Report

Workorder: L2286370

Report Date: 17-JUN-19

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Client: TMAC Resources Inc
Hope Bay Project 95 Wellington St West
Toronto ON M5J 2N7

Contact: Environmental Site Manager

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
CL-IC-VA Dustfall								
Batch	R4670490							
WG3076300-3	DUP	L2286370-1						
Chloride (Cl)		<0.11	<0.11	RPD-NA	mg/dm2.day	N/A	20	13-JUN-19
WG3076300-2	LCS		103.9		%		90-110	13-JUN-19
Chloride (Cl)								
WG3076300-1	MB		<0.18		mg/dm2.day		0.18	13-JUN-19
Chloride (Cl)								
WG3076300-4	MS	L2286370-2	103.8		%		75-125	13-JUN-19
Chloride (Cl)								
DUSTFALLS-COM-DM2-VA Dustfall								
Batch	R4670822							
WG3077717-2	LCS							
Total Dustfall			98.6		%		85-115	14-JUN-19
Total Insoluble Dustfall			100.3		%		85-115	14-JUN-19
Total Soluble Dustfall			98.3		%		85-115	14-JUN-19
WG3077717-1	MB							
Total Dustfall			<0.10		mg/dm2.day		0.1	14-JUN-19
Total Insoluble Dustfall			<0.10		mg/dm2.day		0.1	14-JUN-19
Total Soluble Dustfall			<0.10		mg/dm2.day		0.1	14-JUN-19
HG-DUST(DM2-CVAFS-VA Dustfall								
Batch	R4669942							
WG3076557-3	DUP	L2286370-1						
Mercury (Hg)-Total		<0.0000018	<0.0000018	RPD-NA	mg/dm2.day	N/A	20	14-JUN-19
WG3076557-2	LCS		92.3		%		70-130	14-JUN-19
Mercury (Hg)-Total								
WG3076557-1	MB		<0.0000013		mg/dm2.day		0.0000013	14-JUN-19
Mercury (Hg)-Total								
MET-DUST(DM2)-MS-VA Dustfall								
Batch	R4670284							
WG3076557-3	DUP	L2286370-1						
Aluminum (Al)-Total		0.00120	0.000972	DUP-H	mg/dm2.day	21	20	14-JUN-19
Antimony (Sb)-Total		<0.0000018	<0.0000018	RPD-NA	mg/dm2.day	N/A	20	14-JUN-19
Arsenic (As)-Total		0.00010	0.00010		mg/dm2.day	0.7	20	14-JUN-19
Barium (Ba)-Total		0.0000362	0.0000375		mg/dm2.day	3.5	20	14-JUN-19
Beryllium (Be)-Total		<0.0000092	<0.0000092	RPD-NA	mg/dm2.day	N/A	20	14-JUN-19
Bismuth (Bi)-Total		<0.0000092	<0.0000092	RPD-NA	mg/dm2.day	N/A	20	14-JUN-19
Boron (B)-Total		<0.00018	<0.00018	RPD-NA	mg/dm2.day	N/A	20	14-JUN-19
Cadmium (Cd)-Total		<0.00000092	<0.0000009	RPD-NA	mg/dm2.day	N/A	20	14-JUN-19

Quality Control Report

Workorder: L2286370

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Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-DUST(DM2)-MS-VA		Dustfall						
Batch	R4670284							
WG3076557-3	DUP	L2286370-1						
Calcium (Ca)-Total		0.0222	0.0231		mg/dm2.day	4.4	20	14-JUN-19
Chromium (Cr)-Total		0.0000104	0.0000097		mg/dm2.day	7.0	20	14-JUN-19
Cobalt (Co)-Total		<0.0000018	<0.0000018	RPD-NA	mg/dm2.day	N/A	20	14-JUN-19
Copper (Cu)-Total		<0.0011	<0.0011	RPD-NA	mg/dm2.day	N/A	20	14-JUN-19
Lead (Pb)-Total		<0.0000046	<0.0000046	RPD-NA	mg/dm2.day	N/A	20	14-JUN-19
Iron (Fe)-Total		0.00170	0.00158		mg/dm2.day	7.7	20	14-JUN-19
Lithium (Li)-Total		<0.000092	<0.000092	RPD-NA	mg/dm2.day	N/A	20	14-JUN-19
Magnesium (Mg)-Total		0.00253	0.00243		mg/dm2.day	4.1	20	14-JUN-19
Manganese (Mn)-Total		0.000116	0.000112		mg/dm2.day	2.9	20	14-JUN-19
Molybdenum (Mo)-Total		<0.00000092	<0.0000009	RPD-NA	mg/dm2.day	N/A	20	14-JUN-19
Nickel (Ni)-Total		<0.0000092	<0.0000092	RPD-NA	mg/dm2.day	N/A	20	14-JUN-19
Phosphorus (P)-Total		<0.00092	<0.00092	RPD-NA	mg/dm2.day	N/A	20	14-JUN-19
Potassium (K)-Total		<0.00092	<0.00092	RPD-NA	mg/dm2.day	N/A	20	14-JUN-19
Selenium (Se)-Total		<0.000018	<0.000018	RPD-NA	mg/dm2.day	N/A	20	14-JUN-19
Silicon (Si)-Total		0.00140	0.00129		mg/dm2.day	8.3	20	14-JUN-19
Silver (Ag)-Total		<0.00000018	<0.0000001	RPD-NA	mg/dm2.day	N/A	20	14-JUN-19
Sodium (Na)-Total		0.00133	0.00133		mg/dm2.day	0.2	20	14-JUN-19
Strontium (Sr)-Total		0.0000657	0.0000643		mg/dm2.day	2.1	20	14-JUN-19
Thallium (Tl)-Total		<0.0000018	<0.0000018	RPD-NA	mg/dm2.day	N/A	20	14-JUN-19
Tin (Sn)-Total		<0.0000018	<0.0000018	RPD-NA	mg/dm2.day	N/A	20	14-JUN-19
Titanium (Ti)-Total		<0.00018	<0.00018	RPD-NA	mg/dm2.day	N/A	20	14-JUN-19
Uranium (U)-Total		<0.00000037	<0.0000001	RPD-NA	mg/dm2.day	N/A	20	14-JUN-19
Vanadium (V)-Total		<0.000018	<0.000018	RPD-NA	mg/dm2.day	N/A	20	14-JUN-19
Zinc (Zn)-Total		<0.00050	<0.00050	RPD-NA	mg/dm2.day	N/A	20	14-JUN-19
WG3076557-2	LCS							
Aluminum (Al)-Total			102.2		%		80-120	14-JUN-19
Antimony (Sb)-Total			100.6		%		80-120	14-JUN-19
Arsenic (As)-Total			94.9		%		80-120	14-JUN-19
Barium (Ba)-Total			100.5		%		80-120	14-JUN-19
Beryllium (Be)-Total			93.5		%		80-120	14-JUN-19
Bismuth (Bi)-Total			110.4		%		80-120	14-JUN-19
Boron (B)-Total			94.1		%		80-120	14-JUN-19
Cadmium (Cd)-Total			99.0		%		80-120	14-JUN-19
Calcium (Ca)-Total			96.5		%		80-120	14-JUN-19



Quality Control Report

Workorder: L2286370

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Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-DUST(DM2)-MS-VA Dustfall								
Batch R4670284								
WG3076557-2 LCS								
Chromium (Cr)-Total			102.6		%		80-120	14-JUN-19
Cobalt (Co)-Total			98.3		%		80-120	14-JUN-19
Copper (Cu)-Total			119.6		%		80-120	14-JUN-19
Lead (Pb)-Total			98.2		%		80-120	14-JUN-19
Iron (Fe)-Total			95.5		%		80-120	14-JUN-19
Lithium (Li)-Total			90.9		%		80-120	14-JUN-19
Magnesium (Mg)-Total			102.6		%		80-120	14-JUN-19
Manganese (Mn)-Total			103.3		%		80-120	14-JUN-19
Molybdenum (Mo)-Total			96.4		%		80-120	14-JUN-19
Nickel (Ni)-Total			99.3		%		80-120	14-JUN-19
Phosphorus (P)-Total			98.5		%		80-120	14-JUN-19
Potassium (K)-Total			96.3		%		80-120	14-JUN-19
Selenium (Se)-Total			95.9		%		80-120	14-JUN-19
Silicon (Si)-Total			96.4		%		80-120	14-JUN-19
Silver (Ag)-Total			93.2		%		80-120	14-JUN-19
Sodium (Na)-Total			104.4		%		80-120	14-JUN-19
Strontium (Sr)-Total			92.2		%		80-120	14-JUN-19
Thallium (Tl)-Total			92.8		%		80-120	14-JUN-19
Tin (Sn)-Total			94.5		%		80-120	14-JUN-19
Titanium (Ti)-Total			95.9		%		80-120	14-JUN-19
Uranium (U)-Total			93.8		%		80-120	14-JUN-19
Vanadium (V)-Total			97.8		%		80-120	14-JUN-19
Zinc (Zn)-Total			102.7		%		80-120	14-JUN-19
WG3076557-1 MB								
Aluminum (Al)-Total			0.000080	B	mg/dm2.day		0.000079	14-JUN-19
Antimony (Sb)-Total			0.0000027	B	mg/dm2.day		0.0000026	14-JUN-19
Arsenic (As)-Total			<0.000092		mg/dm2.day		0.000092	14-JUN-19
Barium (Ba)-Total			0.0000024	MB-LOR	mg/dm2.day		0.0000013	14-JUN-19
Beryllium (Be)-Total			<0.000013		mg/dm2.day		0.000013	14-JUN-19
Bismuth (Bi)-Total			<0.000013		mg/dm2.day		0.000013	14-JUN-19
Boron (B)-Total			<0.00026		mg/dm2.day		0.00026	14-JUN-19
Cadmium (Cd)-Total			<0.0000013		mg/dm2.day		0.0000013	14-JUN-19
Calcium (Ca)-Total			0.00087	MB-LOR	mg/dm2.day		0.00052	14-JUN-19
Chromium (Cr)-Total			<0.000013		mg/dm2.day		0.000013	14-JUN-19



Quality Control Report

Workorder: L2286370

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Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
NO3-IC-VA	Dustfall							
Batch	R4670490							
WG3076300-1 MB								
Nitrate (as N)			<0.0010		mg/dm2.day		0.001	13-JUN-19
WG3076300-4 MS		L2286370-2						
Nitrate (as N)			104.4		%		75-125	13-JUN-19
SO4-IC-VA	Dustfall							
Batch	R4670490							
WG3076300-3 DUP		L2286370-1						
Sulfate (SO4)		<0.0082	<0.0082	RPD-NA	mg/dm2.day	N/A	20	13-JUN-19
WG3076300-2 LCS								
Sulfate (SO4)			105.8		%		90-110	13-JUN-19
WG3076300-1 MB								
Sulfate (SO4)			<0.013		mg/dm2.day		0.013	13-JUN-19
WG3076300-4 MS		L2286370-2						
Sulfate (SO4)			105.6		%		75-125	13-JUN-19

Quality Control Report

Workorder: L2286370

Report Date: 17-JUN-19

Page 6 of 6

Legend:

Limit	ALS Control Limit (Data Quality Objectives)
DUP	Duplicate
RPD	Relative Percent Difference
N/A	Not Available
LCS	Laboratory Control Sample
SRM	Standard Reference Material
MS	Matrix Spike
MSD	Matrix Spike Duplicate
ADE	Average Desorption Efficiency
MB	Method Blank
IRM	Internal Reference Material
CRM	Certified Reference Material
CCV	Continuing Calibration Verification
CVS	Calibration Verification Standard
LCSD	Laboratory Control Sample Duplicate

Sample Parameter Qualifier Definitions:

Qualifier	Description
B	Method Blank exceeds ALS DQO. Associated sample results which are < Limit of Reporting or > 5 times blank level are considered reliable.
DUP-H	Duplicate results outside ALS DQO, due to sample heterogeneity.
MB-LOR	Method Blank exceeds ALS DQO. Limits of Reporting have been adjusted for samples with positive hits below 5x blank level.
RPD-NA	Relative Percent Difference Not Available due to result(s) being less than detection limit.

Hold Time Exceedances:

All test results reported with this submission were conducted within ALS recommended hold times.

ALS recommended hold times may vary by province. They are assigned to meet known provincial and/or federal government requirements. In the absence of regulatory hold times, ALS establishes recommendations based on guidelines published by the US EPA, APHA Standard Methods, or Environment Canada (where available). For more information, please contact ALS.

The ALS Quality Control Report is provided to ALS clients upon request. ALS includes comprehensive QC checks with every analysis to ensure our high standards of quality are met. Each QC result has a known or expected target value, which is compared against pre-determined data quality objectives to provide confidence in the accuracy of associated test results.

Please note that this report may contain QC results from anonymous Sample Duplicates and Matrix Spikes that do not originate from this Work Order.



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: TMAC Resources Ltd (Hope Bay)			<input checked="" type="checkbox"/> Standard <input type="checkbox"/> Other			<input checked="" type="radio"/> Regular (Standard Turnaround Times - Business Days)																																									
Contact: Environmental Site Manager			<input checked="" type="checkbox"/> PDF <input checked="" type="checkbox"/> Excel <input checked="" type="checkbox"/> Digital <input type="checkbox"/> Fax			<input type="radio"/> Priority (2-4 Business Days) - 50% Surcharge - Contact ALS to Confirm TAT																																									
Address: 95 Welling Street West, Suite 1010			Email 1: enviro@tmacresources.com			<input type="radio"/> Emergency (1-2 Bus. Days) - 100% Surcharge - Contact ALS to Confirm TAT																																									
P.O. Box 44, Toronto, ON, M5J 2N7			Email 2: enviro.tech@tmacresources.com			<input type="radio"/> Same Day or Weekend Emergency - Contact ALS to Confirm TAT																																									
Phone: 1-416-628-0216 Fax:			Email 3:			Analysis Request																																									
Invoice To: Same as Report ? Y			Client / Project Information			Please indicate below Filtered, Preserved or both (F, P, F/P)																																									
Hardcopy of Invoice with Report?			Job #:			P																																									
Company:			PO / AFE: 4500011700																																												
Contact:			LSD:																																												
Address:			Job Ref: Madrid Dustfall																																												
Phone: Fax:			Quote #:																																												
Lab Work Order # (lab use only)			ALS Contact: Amber Springer			Sampler: DS/AT/SE																																									
Sample #			Date In (dd-mm-yy)			Date Out (dd-mm-yy)			Sample Type			Total Particulate			Soluble particulate			Insoluble particulate			Sulphate			Nitrate			NH3, NH4			Cl			Total Metals			Mg+			Ca+			K+			Number of Containers		
1 M-DF01			07-May-19			01-Jun-19			Water			X			X			X			X			X			X			X			X			X			X			2					
2 M-DF02			08-May-19			01-Jun-19			Water			X			X			X			X			X			X			X			X			X			X			2					
3 M-DF03			08-May-19			01-Jun-19			Water			X			X			X			X			X			X			X			X			X			X			2					
4 M-DF04			07-May-19			01-Jun-19			Water			X			X			X			X			X			X			X			X			X			X			2					
5 M-DF05			07-May-19			01-Jun-19			Water			X			X			X			X			X			X			X			X			X			X			2					
6 M-DF06			05-May-19			01-Jun-19			Water			X			X			X			X			X			X			X			X			X			X			2					
7 M-DF07			05-May-19			01-Jun-19			Water			X			X			X			X			X			X			X			X			X			X			2					
8 M-DF08			08-May-19			01-Jun-19			Water			X			X			X			X			X			X			X			X			X			X			2					
9 M-DF09			08-May-19			01-Jun-19			Water			X			X			X			X			X			X			X			X			X			X			2					
Special Instructions			CCME-Freshwater Aquatic Life/BC CSR - Commercial/AB Tier 1 - Natural, etc) / Hazardous Details																																												
VERY LOW VOLUME IN ALL JARS. SOME JARS DRY.																																															
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)																																															
Released by:		Date (dd-mm-yy)		Time (hh-mm)		Received by:		Date:		Time:		Temperature:		Verified by:		Date:		Time:		Observations:																											
Dan Skinner		4-Jun-19		7:30		CP		June 5/19		1400		9°C		DJ		June 11/19		12:15		Yes / No ? If Yes add SIF																											



TMAC Resources Inc
ATTN: Environmental Site Manager
Hope Bay Project
95 Wellington St West
Toronto ON M5J 2N7

Date Received: 04-JUL-19
Report Date: 15-JUL-19 17:41 (MT)
Version: FINAL

Client Phone: 867-988-0569

Certificate of Analysis

Lab Work Order #: L2303772
Project P.O. #: 4500011700
Job Reference: DORIS DUSTFALL
C of C Numbers:
Legal Site Desc:

Amber Springer, B.Sc
Account Manager

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ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L2303772-1 CONTROLDF Sampled By: CLIENT on 01-JUL-19 Matrix: WATER							
Combined Dustfalls-Total, soluble, insol							
Total Dustfall	0.34		0.16	mg/dm2.day		11-JUL-19	R4711229
Total Insoluble Dustfall	<0.16		0.16	mg/dm2.day		11-JUL-19	R4711229
Total Soluble Dustfall	0.20		0.16	mg/dm2.day		11-JUL-19	R4711229
Ammonia, Total (as N)	<0.0017		0.0017	mg/dm2.day	10-JUL-19	12-JUL-19	R4709160
Interval			1	days		10-JUL-19	R4704411
Chloride (Cl)	<0.15		0.15	mg/dm2.day	10-JUL-19	10-JUL-19	R4709300
Interval			1	days		10-JUL-19	R4704411
Interval			1	days		10-JUL-19	R4704411
Nitrate (as N)	<0.00084		0.00084	mg/dm2.day	10-JUL-19	13-JUL-19	R4712012
Interval			1	days		10-JUL-19	R4704411
Sulfate (SO4)	<0.011		0.011	mg/dm2.day	10-JUL-19	10-JUL-19	R4709300
Interval			1	days		11-JUL-19	R4707873
Mercury (Hg)-Total	<0.0000020	DLM	0.0000020	mg/dm2.day	11-JUL-19	12-JUL-19	R4708573
Total Metals in Dustfalls by ICPMS							
Aluminum (Al)-Total	0.000131		0.000060	mg/dm2.day	11-JUL-19	13-JUL-19	R4709721
Interval			1	days		11-JUL-19	R4707873
Antimony (Sb)-Total	<0.0000020		0.0000020	mg/dm2.day	11-JUL-19	13-JUL-19	R4709721
Arsenic (As)-Total	<0.000044	DLM	0.000044	mg/dm2.day	11-JUL-19	13-JUL-19	R4709721
Barium (Ba)-Total	0.00000270		0.0000009	mg/dm2.day	11-JUL-19	13-JUL-19	R4709721
			9				
Beryllium (Be)-Total	<0.0000099		0.0000099	mg/dm2.day	11-JUL-19	13-JUL-19	R4709721
Bismuth (Bi)-Total	<0.0000099		0.0000099	mg/dm2.day	11-JUL-19	13-JUL-19	R4709721
Boron (B)-Total	<0.00020		0.00020	mg/dm2.day	11-JUL-19	13-JUL-19	R4709721
Cadmium (Cd)-Total	<0.00000099		0.0000009	mg/dm2.day	11-JUL-19	13-JUL-19	R4709721
			9				
Calcium (Ca)-Total	<0.0012	DLB	0.0012	mg/dm2.day	11-JUL-19	13-JUL-19	R4709721
Chromium (Cr)-Total	<0.0000099		0.0000099	mg/dm2.day	11-JUL-19	13-JUL-19	R4709721
Cobalt (Co)-Total	<0.0000020		0.0000020	mg/dm2.day	11-JUL-19	13-JUL-19	R4709721
Copper (Cu)-Total	0.000169		0.0000099	mg/dm2.day	11-JUL-19	13-JUL-19	R4709721
Lead (Pb)-Total	0.00000209		0.0000009	mg/dm2.day	11-JUL-19	13-JUL-19	R4709721
			9				
Iron (Fe)-Total	<0.00060		0.00060	mg/dm2.day	11-JUL-19	13-JUL-19	R4709721
Lithium (Li)-Total	<0.000099		0.000099	mg/dm2.day	11-JUL-19	13-JUL-19	R4709721
Magnesium (Mg)-Total	0.000180		0.000099	mg/dm2.day	11-JUL-19	13-JUL-19	R4709721
Manganese (Mn)-Total	0.0000082		0.0000020	mg/dm2.day	11-JUL-19	13-JUL-19	R4709721
Molybdenum (Mo)-Total	<0.00000099		0.0000009	mg/dm2.day	11-JUL-19	13-JUL-19	R4709721
			9				
Nickel (Ni)-Total	<0.0000099		0.0000099	mg/dm2.day	11-JUL-19	13-JUL-19	R4709721
Phosphorus (P)-Total	<0.00099		0.00099	mg/dm2.day	11-JUL-19	13-JUL-19	R4709721
Potassium (K)-Total	<0.00099		0.00099	mg/dm2.day	11-JUL-19	13-JUL-19	R4709721
Selenium (Se)-Total	<0.000020		0.000020	mg/dm2.day	11-JUL-19	13-JUL-19	R4709721
Silicon (Si)-Total	<0.00099		0.00099	mg/dm2.day	11-JUL-19	13-JUL-19	R4709721
Silver (Ag)-Total	<0.00000020		0.0000002	mg/dm2.day	11-JUL-19	13-JUL-19	R4709721
			0				
Sodium (Na)-Total	<0.00099		0.00099	mg/dm2.day	11-JUL-19	13-JUL-19	R4709721
Strontium (Sr)-Total	<0.0000020		0.0000020	mg/dm2.day	11-JUL-19	13-JUL-19	R4709721
Thallium (Tl)-Total	<0.0000020		0.0000020	mg/dm2.day	11-JUL-19	13-JUL-19	R4709721
Tin (Sn)-Total	<0.0000020		0.0000020	mg/dm2.day	11-JUL-19	13-JUL-19	R4709721
Titanium (Ti)-Total	<0.00020		0.00020	mg/dm2.day	11-JUL-19	13-JUL-19	R4709721
Uranium (U)-Total	<0.00000020		0.0000002	mg/dm2.day	11-JUL-19	13-JUL-19	R4709721
			0				
Vanadium (V)-Total	<0.000020		0.000020	mg/dm2.day	11-JUL-19	13-JUL-19	R4709721

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters		Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L2303772-1	CONTROLDF							
Sampled By:	CLIENT on 01-JUL-19							
Matrix:	WATER							
Total Metals in Dustfalls by ICPMS								
Zinc (Zn)-Total		<0.00018	DLB	0.00018	mg/dm2.day	11-JUL-19	13-JUL-19	R4709721
L2303772-2	TIADF1							
Sampled By:	CLIENT on 01-JUL-19							
Matrix:	WATER							
Combined Dustfalls-Total, soluble, insol								
Total Dustfall		0.18		0.10	mg/dm2.day		11-JUL-19	R4711229
Total Insoluble Dustfall		<0.10		0.10	mg/dm2.day		11-JUL-19	R4711229
Total Soluble Dustfall		0.12		0.10	mg/dm2.day		11-JUL-19	R4711229
Ammonia, Total (as N)		0.00085		0.00079	mg/dm2.day	10-JUL-19	12-JUL-19	R4709160
Interval				1	days		10-JUL-19	R4704411
Chloride (Cl)		<0.069		0.069	mg/dm2.day	10-JUL-19	10-JUL-19	R4709300
Interval				1	days		10-JUL-19	R4704411
Interval				1	days		10-JUL-19	R4704411
Nitrate (as N)		0.00108		0.00039	mg/dm2.day	10-JUL-19	13-JUL-19	R4712012
Interval				1	days		10-JUL-19	R4704411
Sulfate (SO4)		<0.0049		0.0049	mg/dm2.day	10-JUL-19	10-JUL-19	R4709300
Interval				1	days		11-JUL-19	R4707873
Mercury (Hg)-Total		<0.0000011	DLM	0.0000011	mg/dm2.day	11-JUL-19	12-JUL-19	R4708573
Total Metals in Dustfalls by ICPMS								
Aluminum (Al)-Total		0.000116		0.000032	mg/dm2.day	11-JUL-19	13-JUL-19	R4709721
Interval				1	days		11-JUL-19	R4707873
Antimony (Sb)-Total		<0.0000011		0.0000011	mg/dm2.day	11-JUL-19	13-JUL-19	R4709721
Arsenic (As)-Total		<0.000076	DLM	0.000076	mg/dm2.day	11-JUL-19	13-JUL-19	R4709721
Barium (Ba)-Total		0.00000202		0.0000005	mg/dm2.day	11-JUL-19	13-JUL-19	R4709721
				4				
Beryllium (Be)-Total		<0.0000054		0.0000054	mg/dm2.day	11-JUL-19	13-JUL-19	R4709721
Bismuth (Bi)-Total		<0.0000054		0.0000054	mg/dm2.day	11-JUL-19	13-JUL-19	R4709721
Boron (B)-Total		<0.00011		0.00011	mg/dm2.day	11-JUL-19	13-JUL-19	R4709721
Cadmium (Cd)-Total		<0.00000054		0.0000005	mg/dm2.day	11-JUL-19	13-JUL-19	R4709721
				4				
Calcium (Ca)-Total		0.00246		0.00022	mg/dm2.day	11-JUL-19	13-JUL-19	R4709721
Chromium (Cr)-Total		<0.0000054		0.0000054	mg/dm2.day	11-JUL-19	13-JUL-19	R4709721
Cobalt (Co)-Total		<0.0000011		0.0000011	mg/dm2.day	11-JUL-19	13-JUL-19	R4709721
Copper (Cu)-Total		0.000557		0.0000054	mg/dm2.day	11-JUL-19	13-JUL-19	R4709721
Lead (Pb)-Total		0.00000196		0.0000005	mg/dm2.day	11-JUL-19	13-JUL-19	R4709721
				4				
Iron (Fe)-Total		<0.00032		0.00032	mg/dm2.day	11-JUL-19	13-JUL-19	R4709721
Lithium (Li)-Total		<0.000054		0.000054	mg/dm2.day	11-JUL-19	13-JUL-19	R4709721
Magnesium (Mg)-Total		0.000264		0.000054	mg/dm2.day	11-JUL-19	13-JUL-19	R4709721
Manganese (Mn)-Total		0.0000274		0.0000011	mg/dm2.day	11-JUL-19	13-JUL-19	R4709721
Molybdenum (Mo)-Total		<0.00000054		0.0000005	mg/dm2.day	11-JUL-19	13-JUL-19	R4709721
				4				
Nickel (Ni)-Total		<0.0000054		0.0000054	mg/dm2.day	11-JUL-19	13-JUL-19	R4709721
Phosphorus (P)-Total		<0.00054		0.00054	mg/dm2.day	11-JUL-19	13-JUL-19	R4709721
Potassium (K)-Total		<0.00054		0.00054	mg/dm2.day	11-JUL-19	13-JUL-19	R4709721
Selenium (Se)-Total		<0.000011		0.000011	mg/dm2.day	11-JUL-19	13-JUL-19	R4709721
Silicon (Si)-Total		<0.00054		0.00054	mg/dm2.day	11-JUL-19	13-JUL-19	R4709721
Silver (Ag)-Total		<0.00000011		0.0000001	mg/dm2.day	11-JUL-19	13-JUL-19	R4709721
				1				
Sodium (Na)-Total		<0.00054		0.00054	mg/dm2.day	11-JUL-19	13-JUL-19	R4709721
Strontium (Sr)-Total		0.0000025		0.0000011	mg/dm2.day	11-JUL-19	13-JUL-19	R4709721

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters		Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L2303772-3	TIADF2							
Sampled By:	CLIENT on 01-JUL-19							
Matrix:	WATER							
Total Metals in Dustfalls by ICPMS								
Selenium (Se)-Total	<0.000013			0.000013	mg/dm2.day	11-JUL-19	13-JUL-19	R4709721
Silicon (Si)-Total	<0.00066			0.00066	mg/dm2.day	11-JUL-19	13-JUL-19	R4709721
Silver (Ag)-Total	<0.00000013			0.00000013	mg/dm2.day	11-JUL-19	13-JUL-19	R4709721
Sodium (Na)-Total	<0.00066			0.00066	mg/dm2.day	11-JUL-19	13-JUL-19	R4709721
Strontium (Sr)-Total	0.0000045			0.0000013	mg/dm2.day	11-JUL-19	13-JUL-19	R4709721
Thallium (Tl)-Total	<0.0000013			0.0000013	mg/dm2.day	11-JUL-19	13-JUL-19	R4709721
Tin (Sn)-Total	<0.0000013			0.0000013	mg/dm2.day	11-JUL-19	13-JUL-19	R4709721
Titanium (Ti)-Total	<0.00013			0.00013	mg/dm2.day	11-JUL-19	13-JUL-19	R4709721
Uranium (U)-Total	<0.00000013			0.00000013	mg/dm2.day	11-JUL-19	13-JUL-19	R4709721
Vanadium (V)-Total	<0.000013			0.000013	mg/dm2.day	11-JUL-19	13-JUL-19	R4709721
Zinc (Zn)-Total	<0.00012	DLB		0.00012	mg/dm2.day	11-JUL-19	13-JUL-19	R4709721
L2303772-4	TIADF3							
Sampled By:	CLIENT on 01-JUL-19							
Matrix:	WATER							
Combined Dustfalls-Total, soluble, insol								
Total Dustfall	0.99			0.10	mg/dm2.day		11-JUL-19	R4711229
Total Insoluble Dustfall	0.29			0.10	mg/dm2.day		11-JUL-19	R4711229
Total Soluble Dustfall	0.71			0.10	mg/dm2.day		11-JUL-19	R4711229
Ammonia, Total (as N)	0.0170			0.0045	mg/dm2.day	10-JUL-19	12-JUL-19	R4709160
Interval				1	days		10-JUL-19	R4704411
Chloride (Cl)	<0.078			0.078	mg/dm2.day	10-JUL-19	10-JUL-19	R4709300
Interval				1	days		10-JUL-19	R4704411
Interval				1	days		10-JUL-19	R4704411
Nitrate (as N)	0.00089			0.00045	mg/dm2.day	10-JUL-19	13-JUL-19	R4712012
Interval				1	days		10-JUL-19	R4704411
Sulfate (SO4)	0.0174			0.0056	mg/dm2.day	10-JUL-19	10-JUL-19	R4709300
Interval				1	days		11-JUL-19	R4707873
Mercury (Hg)-Total	<0.0000012	DLM		0.0000012	mg/dm2.day	11-JUL-19	12-JUL-19	R4708573
Total Metals in Dustfalls by ICPMS								
Aluminum (Al)-Total	0.00128			0.000035	mg/dm2.day	11-JUL-19	13-JUL-19	R4709721
Interval				1	days		11-JUL-19	R4707873
Antimony (Sb)-Total	<0.0000012			0.0000012	mg/dm2.day	11-JUL-19	13-JUL-19	R4709721
Arsenic (As)-Total	<0.000082	DLM		0.000082	mg/dm2.day	11-JUL-19	13-JUL-19	R4709721
Barium (Ba)-Total	0.0000156			0.00000058	mg/dm2.day	11-JUL-19	13-JUL-19	R4709721
Beryllium (Be)-Total	<0.0000058			0.0000058	mg/dm2.day	11-JUL-19	13-JUL-19	R4709721
Bismuth (Bi)-Total	0.0000166			0.0000058	mg/dm2.day	11-JUL-19	13-JUL-19	R4709721
Boron (B)-Total	<0.00012			0.00012	mg/dm2.day	11-JUL-19	13-JUL-19	R4709721
Cadmium (Cd)-Total	<0.00000058			0.00000058	mg/dm2.day	11-JUL-19	13-JUL-19	R4709721
Calcium (Ca)-Total	0.00303			0.00023	mg/dm2.day	11-JUL-19	13-JUL-19	R4709721
Chromium (Cr)-Total	0.0000063			0.0000058	mg/dm2.day	11-JUL-19	13-JUL-19	R4709721
Cobalt (Co)-Total	<0.0000012			0.0000012	mg/dm2.day	11-JUL-19	13-JUL-19	R4709721
Copper (Cu)-Total	0.000761			0.0000058	mg/dm2.day	11-JUL-19	13-JUL-19	R4709721
Lead (Pb)-Total	0.00000613			0.00000058	mg/dm2.day	11-JUL-19	13-JUL-19	R4709721
Iron (Fe)-Total	0.00163			0.00035	mg/dm2.day	11-JUL-19	13-JUL-19	R4709721
Lithium (Li)-Total	<0.000058			0.000058	mg/dm2.day	11-JUL-19	13-JUL-19	R4709721
Magnesium (Mg)-Total	0.000849			0.000058	mg/dm2.day	11-JUL-19	13-JUL-19	R4709721

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

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ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters		Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L2303772-6 CDF4								
Sampled By: CLIENT on 01-JUL-19								
Matrix: WATER								
Total Metals in Dustfalls by ICPMS								
Boron (B)-Total		<0.00013		0.00013	mg/dm2.day	11-JUL-19	13-JUL-19	R4709721
Cadmium (Cd)-Total		<0.00000063		0.00000063	mg/dm2.day	11-JUL-19	13-JUL-19	R4709721
Calcium (Ca)-Total		0.0200		0.00025	mg/dm2.day	11-JUL-19	13-JUL-19	R4709721
Chromium (Cr)-Total		0.0000235		0.0000063	mg/dm2.day	11-JUL-19	13-JUL-19	R4709721
Cobalt (Co)-Total		0.0000095		0.0000013	mg/dm2.day	11-JUL-19	13-JUL-19	R4709721
Copper (Cu)-Total		0.000150		0.0000063	mg/dm2.day	11-JUL-19	13-JUL-19	R4709721
Lead (Pb)-Total		0.0000123		0.00000063	mg/dm2.day	11-JUL-19	13-JUL-19	R4709721
Iron (Fe)-Total		0.0175		0.00038	mg/dm2.day	11-JUL-19	13-JUL-19	R4709721
Lithium (Li)-Total		<0.000063		0.000063	mg/dm2.day	11-JUL-19	13-JUL-19	R4709721
Magnesium (Mg)-Total		0.00672		0.000063	mg/dm2.day	11-JUL-19	13-JUL-19	R4709721
Manganese (Mn)-Total		0.000433		0.0000013	mg/dm2.day	11-JUL-19	13-JUL-19	R4709721
Molybdenum (Mo)-Total		0.00000103		0.00000063	mg/dm2.day	11-JUL-19	13-JUL-19	R4709721
Nickel (Ni)-Total		0.0000181		0.0000063	mg/dm2.day	11-JUL-19	13-JUL-19	R4709721
Phosphorus (P)-Total		<0.00063		0.00063	mg/dm2.day	11-JUL-19	13-JUL-19	R4709721
Potassium (K)-Total		0.00067		0.00063	mg/dm2.day	11-JUL-19	13-JUL-19	R4709721
Selenium (Se)-Total		<0.000013		0.000013	mg/dm2.day	11-JUL-19	13-JUL-19	R4709721
Silicon (Si)-Total		0.0115		0.00063	mg/dm2.day	11-JUL-19	13-JUL-19	R4709721
Silver (Ag)-Total		<0.00000013		0.00000013	mg/dm2.day	11-JUL-19	13-JUL-19	R4709721
Sodium (Na)-Total		0.00149		0.00063	mg/dm2.day	11-JUL-19	13-JUL-19	R4709721
Strontium (Sr)-Total		0.0000165		0.0000013	mg/dm2.day	11-JUL-19	13-JUL-19	R4709721
Thallium (Tl)-Total		<0.0000013		0.0000013	mg/dm2.day	11-JUL-19	13-JUL-19	R4709721
Tin (Sn)-Total		<0.0000013		0.0000013	mg/dm2.day	11-JUL-19	13-JUL-19	R4709721
Titanium (Ti)-Total		0.00050		0.00013	mg/dm2.day	11-JUL-19	13-JUL-19	R4709721
Uranium (U)-Total		0.00000014		0.00000013	mg/dm2.day	11-JUL-19	13-JUL-19	R4709721
Vanadium (V)-Total		0.000049		0.000013	mg/dm2.day	11-JUL-19	13-JUL-19	R4709721
Zinc (Zn)-Total		0.000261		0.000038	mg/dm2.day	11-JUL-19	13-JUL-19	R4709721

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

Reference Information

Sample Parameter Qualifier Key:

Qualifier	Description
B	Method Blank exceeds ALS DQO. Associated sample results which are < Limit of Reporting or > 5 times blank level are considered reliable.
DLB	Detection Limit Raised. Analyte detected at comparable level in Method Blank.
DLM	Detection Limit Adjusted due to sample matrix effects (e.g. chemical interference, colour, turbidity).
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 specifically 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 specifically 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.			
Results are reported in units of nitrogen weight. To convert to units by weight of ammonium, multiply by 1.29.			
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 specifically 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".			
Results are reported in units of nitrogen weight. To convert to units by weight of nitrate, multiply by 4.43.			
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 specifically 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
VA	ALS ENVIRONMENTAL - VANCOUVER, BRITISH COLUMBIA, CANADA

Chain of Custody Numbers:

Reference Information

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
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GLOSSARY OF REPORT TERMS

Surrogates are compounds that are similar in behaviour to target analyte(s), but that do not normally occur in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery. In reports that display the D.L. column, laboratory objectives for surrogates are listed there.

mg/kg - milligrams per kilogram based on dry weight of sample
mg/kg ww - milligrams per kilogram based on wet weight of sample
mg/kg lwt - milligrams per kilogram based on lipid-adjusted weight
mg/L - unit of concentration based on volume, parts per million.

< - Less than.
D.L. - The reporting limit.
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.



Quality Control Report

Workorder: L2303772

Report Date: 15-JUL-19

Page 1 of 5

Client: TMAC Resources Inc
Hope Bay Project 95 Wellington St West
Toronto ON M5J 2N7

Contact: Environmental Site Manager

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
CL-IC-VA Dustfall								
Batch	R4709300							
WG3101008-3	DUP	L2303772-1						
Chloride (Cl)		<0.15	<0.15	RPD-NA	mg/dm2.day	N/A	20	10-JUL-19
WG3101008-2	LCS		100.2		%		90-110	10-JUL-19
Chloride (Cl)								
WG3101008-1	MB		<0.18		mg/dm2.day		0.18	10-JUL-19
Chloride (Cl)								
WG3101008-4	MS	L2303772-2	108.5		%		75-125	10-JUL-19
Chloride (Cl)								
DUSTFALLS-COM-DM2-VA Dustfall								
Batch	R4711229							
WG3102054-2	LCS							
Total Dustfall			109.0		%		85-115	11-JUL-19
Total Insoluble Dustfall			97.6		%		85-115	11-JUL-19
Total Soluble Dustfall			111.1		%		85-115	11-JUL-19
WG3102054-1	MB							
Total Dustfall			<0.10		mg/dm2.day		0.1	11-JUL-19
Total Insoluble Dustfall			<0.10		mg/dm2.day		0.1	11-JUL-19
Total Soluble Dustfall			<0.10		mg/dm2.day		0.1	11-JUL-19
HG-DUST(DM2-CVAFS-VA Dustfall								
Batch	R4708573							
WG3102079-2	LCS							
Mercury (Hg)-Total			93.8		%		70-130	12-JUL-19
WG3102079-1	MB							
Mercury (Hg)-Total			<0.0000012		mg/dm2.day		0.0000012	12-JUL-19
MET-DUST(DM2-MS-VA Dustfall								
Batch	R4709721							
WG3102079-2	LCS							
Aluminum (Al)-Total			101.1		%		80-120	13-JUL-19
Antimony (Sb)-Total			95.9		%		80-120	13-JUL-19
Arsenic (As)-Total			103.0		%		80-120	13-JUL-19
Barium (Ba)-Total			99.5		%		80-120	13-JUL-19
Beryllium (Be)-Total			98.4		%		80-120	13-JUL-19
Bismuth (Bi)-Total			104.2		%		80-120	13-JUL-19
Boron (B)-Total			93.5		%		80-120	13-JUL-19
Cadmium (Cd)-Total			109.9		%		80-120	13-JUL-19
Calcium (Ca)-Total			99.0		%		80-120	13-JUL-19



Quality Control Report

Workorder: L2303772

Report Date: 15-JUL-19

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Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-DUST(DM2)-MS-VA Dustfall								
Batch R4709721								
WG3102079-2 LCS								
Chromium (Cr)-Total			107.5		%		80-120	13-JUL-19
Cobalt (Co)-Total			107.3		%		80-120	13-JUL-19
Copper (Cu)-Total			106.1		%		80-120	13-JUL-19
Lead (Pb)-Total			102.2		%		80-120	13-JUL-19
Iron (Fe)-Total			103.1		%		80-120	13-JUL-19
Lithium (Li)-Total			95.9		%		80-120	13-JUL-19
Magnesium (Mg)-Total			106.0		%		80-120	13-JUL-19
Manganese (Mn)-Total			101.9		%		80-120	13-JUL-19
Molybdenum (Mo)-Total			92.2		%		80-120	13-JUL-19
Nickel (Ni)-Total			105.8		%		80-120	13-JUL-19
Phosphorus (P)-Total			109.5		%		80-120	13-JUL-19
Potassium (K)-Total			110.0		%		80-120	13-JUL-19
Selenium (Se)-Total			103.9		%		80-120	13-JUL-19
Silicon (Si)-Total			103.8		%		80-120	13-JUL-19
Silver (Ag)-Total			94.7		%		80-120	13-JUL-19
Sodium (Na)-Total			109.0		%		80-120	13-JUL-19
Strontium (Sr)-Total			95.2		%		80-120	13-JUL-19
Thallium (Tl)-Total			100.6		%		80-120	13-JUL-19
Tin (Sn)-Total			92.0		%		80-120	13-JUL-19
Titanium (Ti)-Total			105.2		%		80-120	13-JUL-19
Uranium (U)-Total			107.7		%		80-120	13-JUL-19
Vanadium (V)-Total			108.3		%		80-120	13-JUL-19
Zinc (Zn)-Total			105.5		%		80-120	13-JUL-19
WG3102079-1 MB								
Aluminum (Al)-Total			<0.000069		mg/dm2.day		0.000069	13-JUL-19
Antimony (Sb)-Total			0.0000032	B	mg/dm2.day		0.0000023	13-JUL-19
Arsenic (As)-Total			<0.000092		mg/dm2.day		0.000092	13-JUL-19
Barium (Ba)-Total			<0.0000012		mg/dm2.day		0.0000012	13-JUL-19
Beryllium (Be)-Total			<0.000012		mg/dm2.day		0.000012	13-JUL-19
Bismuth (Bi)-Total			<0.000012		mg/dm2.day		0.000012	13-JUL-19
Boron (B)-Total			<0.00023		mg/dm2.day		0.00023	13-JUL-19
Cadmium (Cd)-Total			<0.0000012		mg/dm2.day		0.0000012	13-JUL-19
Calcium (Ca)-Total			0.00087	MB-LOR	mg/dm2.day		0.00046	13-JUL-19
Chromium (Cr)-Total			<0.000012		mg/dm2.day		0.000012	13-JUL-19



Quality Control Report

Workorder: L2303772

Report Date: 15-JUL-19

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Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
SO4-IC-VA	Dustfall							
Batch	R4709300							
WG3101008-3	DUP	L2303772-1						
Sulfate (SO4)		<0.011	<0.011	RPD-NA	mg/dm2.day	N/A	20	10-JUL-19
WG3101008-2	LCS							
Sulfate (SO4)			100.9		%		90-110	10-JUL-19
WG3101008-1	MB							
Sulfate (SO4)			<0.013		mg/dm2.day		0.013	10-JUL-19
WG3101008-4	MS	L2303772-2						
Sulfate (SO4)			113.0		%		75-125	10-JUL-19

Quality Control Report

Workorder: L2303772

Report Date: 15-JUL-19

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Legend:

Limit	ALS Control Limit (Data Quality Objectives)
DUP	Duplicate
RPD	Relative Percent Difference
N/A	Not Available
LCS	Laboratory Control Sample
SRM	Standard Reference Material
MS	Matrix Spike
MSD	Matrix Spike Duplicate
ADE	Average Desorption Efficiency
MB	Method Blank
IRM	Internal Reference Material
CRM	Certified Reference Material
CCV	Continuing Calibration Verification
CVS	Calibration Verification Standard
LCSD	Laboratory Control Sample Duplicate

Sample Parameter Qualifier Definitions:

Qualifier	Description
B	Method Blank exceeds ALS DQO. Associated sample results which are < Limit of Reporting or > 5 times blank level are considered reliable.
MB-LOR	Method Blank exceeds ALS DQO. Limits of Reporting have been adjusted for samples with positive hits below 5x blank level.
RPD-NA	Relative Percent Difference Not Available due to result(s) being less than detection limit.

Hold Time Exceedances:

All test results reported with this submission were conducted within ALS recommended hold times.

ALS recommended hold times may vary by province. They are assigned to meet known provincial and/or federal government requirements. In the absence of regulatory hold times, ALS establishes recommendations based on guidelines published by the US EPA, APHA Standard Methods, or Environment Canada (where available). For more information, please contact ALS.

The ALS Quality Control Report is provided to ALS clients upon request. ALS includes comprehensive QC checks with every analysis to ensure our high standards of quality are met. Each QC result has a known or expected target value, which is compared against pre-determined data quality objectives to provide confidence in the accuracy of associated test results.

Please note that this report may contain QC results from anonymous Sample Duplicates and Matrix Spikes that do not originate from this Work Order.



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GENF 18.01 Front

L2303772-COFC



TMAC Resources Inc
ATTN: Environmental Site Manager
Hope Bay Project
95 Wellington St West
Toronto ON M5J 2N7

Date Received: 04-JUL-19
Report Date: 17-JUL-19 17:23 (MT)
Version: FINAL

Client Phone: 867-988-0569

Certificate of Analysis

Lab Work Order #: L2303789
Project P.O. #: 4500011700
Job Reference: MADRID DUSTFALL
C of C Numbers:
Legal Site Desc:

Amber Springer, B.Sc
Account Manager

[This report shall not be reproduced except in full without the written authority of the Laboratory.]

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ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L2303789-1 M-DF01 Sampled By: CLIENT on 15-JUN-19 Matrix: WATER							
Combined Dustfalls-Total, soluble, insol							
Total Dustfall	0.85		0.23	mg/dm2.day		11-JUL-19	R4711229
Total Insoluble Dustfall	<0.23		0.23	mg/dm2.day		11-JUL-19	R4711229
Total Soluble Dustfall	0.73		0.23	mg/dm2.day		11-JUL-19	R4711229
Ammonia, Total (as N)	0.0014		0.0013	mg/dm2.day	10-JUL-19	11-JUL-19	R4709160
Interval			1	days		10-JUL-19	R4704395
Chloride (Cl)	<0.23		0.23	mg/dm2.day	10-JUL-19	10-JUL-19	R4709300
Interval			1	days		10-JUL-19	R4704395
Interval			1	days		10-JUL-19	R4704395
Nitrate (as N)	<0.0013		0.0013	mg/dm2.day	10-JUL-19	10-JUL-19	R4709300
Interval			1	days		10-JUL-19	R4704395
Sulfate (SO4)	<0.016		0.016	mg/dm2.day	10-JUL-19	10-JUL-19	R4709300
Interval			1	days		12-JUL-19	R4708112
Interval			1	days		11-JUL-19	R4708112
Mercury (Hg)-Total	<0.0000014		0.0000014	mg/dm2.day	12-JUL-19	12-JUL-19	R4709353
Total Metals in Dustfalls by ICPMS							
Aluminum (Al)-Total	0.00134		0.000083	mg/dm2.day	12-JUL-19	13-JUL-19	R4709721
Interval			1	days		11-JUL-19	R4708112
Interval			1	days		12-JUL-19	R4708112
Antimony (Sb)-Total	<0.0000028		0.0000028	mg/dm2.day	12-JUL-19	13-JUL-19	R4709721
Arsenic (As)-Total	<0.0000028		0.0000028	mg/dm2.day	12-JUL-19	13-JUL-19	R4709721
Barium (Ba)-Total	0.0000198		0.0000014	mg/dm2.day	12-JUL-19	13-JUL-19	R4709721
Beryllium (Be)-Total	<0.000014		0.000014	mg/dm2.day	12-JUL-19	13-JUL-19	R4709721
Bismuth (Bi)-Total	0.000029		0.000014	mg/dm2.day	12-JUL-19	13-JUL-19	R4709721
Boron (B)-Total	<0.00028		0.00028	mg/dm2.day	12-JUL-19	13-JUL-19	R4709721
Cadmium (Cd)-Total	<0.0000014		0.0000014	mg/dm2.day	12-JUL-19	13-JUL-19	R4709721
Calcium (Ca)-Total	0.0061	DLB	0.0061	mg/dm2.day	12-JUL-19	13-JUL-19	R4709721
Chromium (Cr)-Total	<0.000014		0.000014	mg/dm2.day	12-JUL-19	13-JUL-19	R4709721
Cobalt (Co)-Total	<0.0000028		0.0000028	mg/dm2.day	12-JUL-19	13-JUL-19	R4709721
Copper (Cu)-Total	0.000592		0.000014	mg/dm2.day	12-JUL-19	13-JUL-19	R4709721
Lead (Pb)-Total	0.0000124		0.0000014	mg/dm2.day	12-JUL-19	13-JUL-19	R4709721
Iron (Fe)-Total	0.00240		0.00083	mg/dm2.day	12-JUL-19	13-JUL-19	R4709721
Lithium (Li)-Total	<0.00014		0.00014	mg/dm2.day	12-JUL-19	13-JUL-19	R4709721
Magnesium (Mg)-Total	0.00108		0.00014	mg/dm2.day	12-JUL-19	13-JUL-19	R4709721
Manganese (Mn)-Total	0.0000569		0.0000028	mg/dm2.day	12-JUL-19	13-JUL-19	R4709721
Molybdenum (Mo)-Total	<0.0000014		0.0000014	mg/dm2.day	12-JUL-19	13-JUL-19	R4709721
Nickel (Ni)-Total	<0.000014		0.000014	mg/dm2.day	12-JUL-19	13-JUL-19	R4709721
Phosphorus (P)-Total	<0.0014		0.0014	mg/dm2.day	12-JUL-19	13-JUL-19	R4709721
Potassium (K)-Total	<0.0014		0.0014	mg/dm2.day	12-JUL-19	13-JUL-19	R4709721
Selenium (Se)-Total	<0.000028		0.000028	mg/dm2.day	12-JUL-19	13-JUL-19	R4709721
Silicon (Si)-Total	0.0018		0.0014	mg/dm2.day	12-JUL-19	13-JUL-19	R4709721
Silver (Ag)-Total	0.00000032		0.00000028	mg/dm2.day	12-JUL-19	13-JUL-19	R4709721
Sodium (Na)-Total	0.0014		0.0014	mg/dm2.day	12-JUL-19	13-JUL-19	R4709721
Strontium (Sr)-Total	0.0000062		0.0000028	mg/dm2.day	12-JUL-19	13-JUL-19	R4709721
Thallium (Tl)-Total	<0.0000028		0.0000028	mg/dm2.day	12-JUL-19	13-JUL-19	R4709721
Tin (Sn)-Total	<0.0000028		0.0000028	mg/dm2.day	12-JUL-19	13-JUL-19	R4709721
Titanium (Ti)-Total	<0.00028		0.00028	mg/dm2.day	12-JUL-19	13-JUL-19	R4709721
Uranium (U)-Total	0.00000040		0.00000028	mg/dm2.day	12-JUL-19	13-JUL-19	R4709721
Vanadium (V)-Total	<0.000028		0.000028	mg/dm2.day	12-JUL-19	13-JUL-19	R4709721
Zinc (Zn)-Total	0.000411		0.000083	mg/dm2.day	12-JUL-19	13-JUL-19	R4709721

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters		Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L2303789-1	M-DF01							
Sampled By: CLIENT on 15-JUN-19								
Matrix: WATER								
L2303789-2	M-DF02							
Sampled By: CLIENT on 01-JUN-19								
Matrix: WATER								
Combined Dustfalls-Total, soluble, insol								
Total Dustfall		0.25		0.10	mg/dm2.day		11-JUL-19	R4711229
Total Insoluble Dustfall		<0.10		0.10	mg/dm2.day		11-JUL-19	R4711229
Total Soluble Dustfall		0.18		0.10	mg/dm2.day		11-JUL-19	R4711229
Ammonia, Total (as N)		0.00107		0.00081	mg/dm2.day	10-JUL-19	12-JUL-19	R4709160
Interval				1	days		10-JUL-19	R4704411
Chloride (Cl)		<0.071		0.071	mg/dm2.day	10-JUL-19	10-JUL-19	R4709300
Interval				1	days		10-JUL-19	R4704411
Interval				1	days		10-JUL-19	R4704411
Nitrate (as N)		0.00086		0.00041	mg/dm2.day	10-JUL-19	13-JUL-19	R4712012
Interval				1	days		10-JUL-19	R4704411
Sulfate (SO4)		<0.0051		0.0051	mg/dm2.day	10-JUL-19	10-JUL-19	R4709300
Interval				1	days		11-JUL-19	R4707873
Mercury (Hg)-Total		<0.00000063		0.00000063	mg/dm2.day	11-JUL-19	12-JUL-19	R4708573
				3				
Total Metals in Dustfalls by ICPMS								
Aluminum (Al)-Total		0.000190		0.000038	mg/dm2.day	11-JUL-19	13-JUL-19	R4709721
Interval				1	days		11-JUL-19	R4707873
Antimony (Sb)-Total		<0.0000013		0.0000013	mg/dm2.day	11-JUL-19	13-JUL-19	R4709721
Arsenic (As)-Total		<0.000093	DLM	0.000093	mg/dm2.day	11-JUL-19	13-JUL-19	R4709721
Barium (Ba)-Total		0.00000880		0.00000063	mg/dm2.day	11-JUL-19	13-JUL-19	R4709721
				3				
Beryllium (Be)-Total		<0.0000063		0.0000063	mg/dm2.day	11-JUL-19	13-JUL-19	R4709721
Bismuth (Bi)-Total		<0.0000063		0.0000063	mg/dm2.day	11-JUL-19	13-JUL-19	R4709721
Boron (B)-Total		<0.00013		0.00013	mg/dm2.day	11-JUL-19	13-JUL-19	R4709721
Cadmium (Cd)-Total		<0.00000063		0.00000063	mg/dm2.day	11-JUL-19	13-JUL-19	R4709721
				3				
Calcium (Ca)-Total		0.00257		0.00025	mg/dm2.day	11-JUL-19	13-JUL-19	R4709721
Chromium (Cr)-Total		<0.0000063		0.0000063	mg/dm2.day	11-JUL-19	13-JUL-19	R4709721
Cobalt (Co)-Total		<0.0000013		0.0000013	mg/dm2.day	11-JUL-19	13-JUL-19	R4709721
Copper (Cu)-Total		0.000468		0.0000063	mg/dm2.day	11-JUL-19	13-JUL-19	R4709721
Lead (Pb)-Total		0.00000445		0.00000063	mg/dm2.day	11-JUL-19	13-JUL-19	R4709721
				3				
Iron (Fe)-Total		<0.00038		0.00038	mg/dm2.day	11-JUL-19	13-JUL-19	R4709721
Lithium (Li)-Total		<0.000063		0.000063	mg/dm2.day	11-JUL-19	13-JUL-19	R4709721
Magnesium (Mg)-Total		0.000351		0.000063	mg/dm2.day	11-JUL-19	13-JUL-19	R4709721
Manganese (Mn)-Total		0.0000264		0.0000013	mg/dm2.day	11-JUL-19	13-JUL-19	R4709721
Molybdenum (Mo)-Total		<0.00000063		0.00000063	mg/dm2.day	11-JUL-19	13-JUL-19	R4709721
				3				
Nickel (Ni)-Total		<0.0000063		0.0000063	mg/dm2.day	11-JUL-19	13-JUL-19	R4709721
Phosphorus (P)-Total		<0.00063		0.00063	mg/dm2.day	11-JUL-19	13-JUL-19	R4709721
Potassium (K)-Total		<0.00063		0.00063	mg/dm2.day	11-JUL-19	13-JUL-19	R4709721
Selenium (Se)-Total		<0.000013		0.000013	mg/dm2.day	11-JUL-19	13-JUL-19	R4709721
Silicon (Si)-Total		<0.00063		0.00063	mg/dm2.day	11-JUL-19	13-JUL-19	R4709721
Silver (Ag)-Total		<0.00000013		0.0000001	mg/dm2.day	11-JUL-19	13-JUL-19	R4709721
				3				
Sodium (Na)-Total		0.00076		0.00063	mg/dm2.day	11-JUL-19	13-JUL-19	R4709721
Strontium (Sr)-Total		0.0000068		0.0000013	mg/dm2.day	11-JUL-19	13-JUL-19	R4709721
Thallium (Tl)-Total		<0.0000013		0.0000013	mg/dm2.day	11-JUL-19	13-JUL-19	R4709721
Tin (Sn)-Total		<0.0000013		0.0000013	mg/dm2.day	11-JUL-19	13-JUL-19	R4709721

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters		Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L2303789-2	M-DF02							
Sampled By:	CLIENT on 01-JUN-19							
Matrix:	WATER							
Total Metals in Dustfalls by ICPMS								
Titanium (Ti)-Total		<0.00013		0.00013	mg/dm2.day	11-JUL-19	13-JUL-19	R4709721
Uranium (U)-Total		0.00000029		0.00000013	mg/dm2.day	11-JUL-19	13-JUL-19	R4709721
Vanadium (V)-Total		<0.000013		0.000013	mg/dm2.day	11-JUL-19	13-JUL-19	R4709721
Zinc (Zn)-Total		<0.00011	DLB	0.00011	mg/dm2.day	11-JUL-19	13-JUL-19	R4709721
L2303789-3	M-DF03							
Sampled By:	CLIENT on 01-JUN-19							
Matrix:	WATER							
Combined Dustfalls-Total, soluble, insol								
Total Dustfall		0.14		0.10	mg/dm2.day		11-JUL-19	R4711229
Total Insoluble Dustfall		<0.10		0.10	mg/dm2.day		11-JUL-19	R4711229
Total Soluble Dustfall		<0.10		0.10	mg/dm2.day		11-JUL-19	R4711229
Ammonia, Total (as N)		<0.00089		0.00089	mg/dm2.day	10-JUL-19	12-JUL-19	R4709160
Interval				1	days		10-JUL-19	R4704411
Chloride (Cl)		<0.078		0.078	mg/dm2.day	10-JUL-19	10-JUL-19	R4709300
Interval				1	days		10-JUL-19	R4704411
Interval				1	days		10-JUL-19	R4704411
Nitrate (as N)		0.00089		0.00045	mg/dm2.day	10-JUL-19	13-JUL-19	R4712012
Interval				1	days		10-JUL-19	R4704411
Sulfate (SO4)		<0.0056		0.0056	mg/dm2.day	10-JUL-19	10-JUL-19	R4709300
Interval				1	days		11-JUL-19	R4707873
Mercury (Hg)-Total		<0.0000013	DLM	0.0000013	mg/dm2.day	11-JUL-19	12-JUL-19	R4708573
Total Metals in Dustfalls by ICPMS								
Aluminum (Al)-Total		0.000185		0.000040	mg/dm2.day	11-JUL-19	13-JUL-19	R4709721
Interval				1	days		11-JUL-19	R4707873
Antimony (Sb)-Total		<0.0000013		0.0000013	mg/dm2.day	11-JUL-19	13-JUL-19	R4709721
Arsenic (As)-Total		<0.000083	DLM	0.000083	mg/dm2.day	11-JUL-19	13-JUL-19	R4709721
Barium (Ba)-Total		0.0000103		0.00000066	mg/dm2.day	11-JUL-19	13-JUL-19	R4709721
Beryllium (Be)-Total		<0.0000066		0.0000066	mg/dm2.day	11-JUL-19	13-JUL-19	R4709721
Bismuth (Bi)-Total		<0.0000066		0.0000066	mg/dm2.day	11-JUL-19	13-JUL-19	R4709721
Boron (B)-Total		<0.00013		0.00013	mg/dm2.day	11-JUL-19	13-JUL-19	R4709721
Cadmium (Cd)-Total		<0.00000066		0.00000066	mg/dm2.day	11-JUL-19	13-JUL-19	R4709721
Calcium (Ca)-Total		0.00261		0.00026	mg/dm2.day	11-JUL-19	13-JUL-19	R4709721
Chromium (Cr)-Total		<0.0000066		0.0000066	mg/dm2.day	11-JUL-19	13-JUL-19	R4709721
Cobalt (Co)-Total		<0.0000013		0.0000013	mg/dm2.day	11-JUL-19	13-JUL-19	R4709721
Copper (Cu)-Total		0.000494		0.0000066	mg/dm2.day	11-JUL-19	13-JUL-19	R4709721
Lead (Pb)-Total		0.0000117		0.00000066	mg/dm2.day	11-JUL-19	13-JUL-19	R4709721
Iron (Fe)-Total		<0.00040		0.00040	mg/dm2.day	11-JUL-19	13-JUL-19	R4709721
Lithium (Li)-Total		<0.000066		0.000066	mg/dm2.day	11-JUL-19	13-JUL-19	R4709721
Magnesium (Mg)-Total		0.000295		0.000066	mg/dm2.day	11-JUL-19	13-JUL-19	R4709721
Manganese (Mn)-Total		0.0000311		0.0000013	mg/dm2.day	11-JUL-19	13-JUL-19	R4709721
Molybdenum (Mo)-Total		<0.00000066		0.00000066	mg/dm2.day	11-JUL-19	13-JUL-19	R4709721
Nickel (Ni)-Total		<0.0000066		0.0000066	mg/dm2.day	11-JUL-19	13-JUL-19	R4709721
Phosphorus (P)-Total		<0.00066		0.00066	mg/dm2.day	11-JUL-19	13-JUL-19	R4709721
Potassium (K)-Total		<0.00066		0.00066	mg/dm2.day	11-JUL-19	13-JUL-19	R4709721
Selenium (Se)-Total		<0.000013		0.000013	mg/dm2.day	11-JUL-19	13-JUL-19	R47097

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters		Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L2303789-3	M-DF03							
Sampled By:	CLIENT on 01-JUN-19							
Matrix:	WATER							
Total Metals in Dustfalls by ICPMS								
Silver (Ag)-Total	<0.00000013			0.00000013	mg/dm2.day	11-JUL-19	13-JUL-19	R4709721
Sodium (Na)-Total	<0.00066			0.00066	mg/dm2.day	11-JUL-19	13-JUL-19	R4709721
Strontium (Sr)-Total	0.0000038			0.0000013	mg/dm2.day	11-JUL-19	13-JUL-19	R4709721
Thallium (Tl)-Total	<0.0000013			0.0000013	mg/dm2.day	11-JUL-19	13-JUL-19	R4709721
Tin (Sn)-Total	<0.0000013			0.0000013	mg/dm2.day	11-JUL-19	13-JUL-19	R4709721
Titanium (Ti)-Total	<0.00013			0.00013	mg/dm2.day	11-JUL-19	13-JUL-19	R4709721
Uranium (U)-Total	0.00000024			0.00000013	mg/dm2.day	11-JUL-19	13-JUL-19	R4709721
Vanadium (V)-Total	<0.000013			0.000013	mg/dm2.day	11-JUL-19	13-JUL-19	R4709721
Zinc (Zn)-Total	<0.00016	DLB		0.00016	mg/dm2.day	11-JUL-19	13-JUL-19	R4709721
L2303789-4	M-DF04							
Sampled By:	CLIENT on 15-JUN-19							
Matrix:	WATER							
Combined Dustfalls-Total, soluble, insol								
Total Dustfall	0.41			0.18	mg/dm2.day		11-JUL-19	R4711229
Total Insoluble Dustfall	<0.18			0.18	mg/dm2.day		11-JUL-19	R4711229
Total Soluble Dustfall	0.30			0.18	mg/dm2.day		11-JUL-19	R4711229
Ammonia, Total (as N)	<0.0014			0.0014	mg/dm2.day	10-JUL-19	11-JUL-19	R4709160
Interval				1	days		10-JUL-19	R4704395
Chloride (Cl)	<0.24			0.24	mg/dm2.day	10-JUL-19	10-JUL-19	R4709300
Interval				1	days		10-JUL-19	R4704395
Interval				1	days		10-JUL-19	R4704395
Nitrate (as N)	<0.0014			0.0014	mg/dm2.day	10-JUL-19	10-JUL-19	R4709300
Interval				1	days		10-JUL-19	R4704395
Sulfate (SO4)	<0.017			0.017	mg/dm2.day	10-JUL-19	10-JUL-19	R4709300
Interval				1	days		12-JUL-19	R4708112
Interval				1	days		11-JUL-19	R4708112
Mercury (Hg)-Total	<0.0000010			0.0000010	mg/dm2.day	12-JUL-19	12-JUL-19	R4709353
Total Metals in Dustfalls by ICPMS								
Aluminum (Al)-Total	0.00138			0.000061	mg/dm2.day	12-JUL-19	13-JUL-19	R4709721
Interval				1	days		12-JUL-19	R4708112
Interval				1	days		11-JUL-19	R4708112
Antimony (Sb)-Total	<0.0000020			0.0000020	mg/dm2.day	12-JUL-19	13-JUL-19	R4709721
Arsenic (As)-Total	<0.0000020			0.0000020	mg/dm2.day	12-JUL-19	13-JUL-19	R4709721
Barium (Ba)-Total	0.0000111			0.0000010	mg/dm2.day	12-JUL-19	13-JUL-19	R4709721
Beryllium (Be)-Total	<0.000010			0.000010	mg/dm2.day	12-JUL-19	13-JUL-19	R4709721
Bismuth (Bi)-Total	0.000016			0.000010	mg/dm2.day	12-JUL-19	13-JUL-19	R4709721
Boron (B)-Total	<0.00020			0.00020	mg/dm2.day	12-JUL-19	13-JUL-19	R4709721
Cadmium (Cd)-Total	<0.0000010			0.0000010	mg/dm2.day	12-JUL-19	13-JUL-19	R4709721
Calcium (Ca)-Total	0.00730			0.00041	mg/dm2.day	12-JUL-19	13-JUL-19	R4709721
Chromium (Cr)-Total	0.000015			0.000010	mg/dm2.day	12-JUL-19	13-JUL-19	R4709721
Cobalt (Co)-Total	<0.0000020			0.0000020	mg/dm2.day	12-JUL-19	13-JUL-19	R4709721
Copper (Cu)-Total	0.000258			0.000010	mg/dm2.day	12-JUL-19	13-JUL-19	R4709721
Lead (Pb)-Total	0.0000058			0.0000010	mg/dm2.day	12-JUL-19	13-JUL-19	R4709721
Iron (Fe)-Total	0.00282			0.00061	mg/dm2.day	12-JUL-19	13-JUL-19	R4709721
Lithium (Li)-Total	<0.00010			0.00010	mg/dm2.day	12-JUL-19	13-JUL-19	R4709721
Magnesium (Mg)-Total	0.00124			0.00010	mg/dm2.day	12-JUL-19	13-JUL-19	R4709721
Manganese (Mn)-Total	0.0000953			0.0000020	mg/dm2.day	12-JUL-19	13-JUL-19	R4709721
Molybdenum (Mo)-Total	<0.0000010			0.0000010	mg/dm2.day	12-JUL-19	13-JUL-19	R4709721

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L2303789-4 M-DF04 Sampled By: CLIENT on 15-JUN-19 Matrix: WATER Total Metals in Dustfalls by ICPMS Nickel (Ni)-Total Phosphorus (P)-Total Potassium (K)-Total Selenium (Se)-Total Silicon (Si)-Total Silver (Ag)-Total Sodium (Na)-Total Strontium (Sr)-Total Thallium (Tl)-Total Tin (Sn)-Total Titanium (Ti)-Total Uranium (U)-Total Vanadium (V)-Total Zinc (Zn)-Total	<0.000010 <0.0010 <0.0010 <0.000020 0.0022 <0.00000020 0.0012 0.0000070 <0.0000020 <0.0000020 <0.00020 <0.00000020 <0.000020 0.000157		0.000010 0.0010 0.0010 0.000020 0.0010 0.00000020 0.0010 0.0000020 0.0000020 0.0000020 0.00020 0.00000020 0.000020 0.000061	mg/dm2.day mg/dm2.day mg/dm2.day mg/dm2.day mg/dm2.day mg/dm2.day mg/dm2.day mg/dm2.day mg/dm2.day mg/dm2.day mg/dm2.day mg/dm2.day mg/dm2.day mg/dm2.day	12-JUL-19 12-JUL-19 12-JUL-19 12-JUL-19 12-JUL-19 12-JUL-19 12-JUL-19 12-JUL-19 12-JUL-19 12-JUL-19 12-JUL-19 12-JUL-19 12-JUL-19 12-JUL-19	13-JUL-19 13-JUL-19 13-JUL-19 13-JUL-19 13-JUL-19 13-JUL-19 13-JUL-19 13-JUL-19 13-JUL-19 13-JUL-19 13-JUL-19 13-JUL-19 13-JUL-19 13-JUL-19	R4709721 R4709721 R4709721 R4709721 R4709721 R4709721 R4709721 R4709721 R4709721 R4709721 R4709721 R4709721 R4709721 R4709721
L2303789-5 M-DF05 Sampled By: CLIENT on 15-JUN-19 Matrix: WATER Combined Dustfalls-Total, soluble, insol Total Dustfall Total Insoluble Dustfall Total Soluble Dustfall Ammonia, Total (as N) Interval Chloride (Cl) Interval Interval Nitrate (as N) Interval Sulfate (SO4) Interval Interval Mercury (Hg)-Total Total Metals in Dustfalls by ICPMS Aluminum (Al)-Total Interval Interval Antimony (Sb)-Total Arsenic (As)-Total Barium (Ba)-Total Beryllium (Be)-Total Bismuth (Bi)-Total Boron (B)-Total Cadmium (Cd)-Total Calcium (Ca)-Total Chromium (Cr)-Total Cobalt (Co)-Total Copper (Cu)-Total Lead (Pb)-Total	0.40 <0.18 0.33 <0.0013 <0.23 <0.0013 <0.016 <0.0000012 0.000201 <0.0000023 <0.0000023 0.0000107 <0.000012 <0.000012 <0.00023 <0.0000012 <0.00023 <0.000012 <0.0000023 0.000284 0.0000049		0.18 0.18 0.18 0.0013 1 0.23 1 1 0.0013 1 0.016 1 1 0.0000012 0.000069 1 1 0.0000023 0.0000023 0.0000012 0.000012 0.000012 0.00023 0.0000012 0.00023 0.000012 0.0000023 0.000012 0.0000012	mg/dm2.day mg/dm2.day mg/dm2.day mg/dm2.day days mg/dm2.day days days mg/dm2.day days mg/dm2.day days days mg/dm2.day mg/dm2.day days days mg/dm2.day mg/dm2.day mg/dm2.day mg/dm2.day mg/dm2.day mg/dm2.day mg/dm2.day mg/dm2.day mg/dm2.day mg/dm2.day mg/dm2.day	10-JUL-19 10-JUL-19 10-JUL-19 10-JUL-19 10-JUL-19 10-JUL-19 10-JUL-19 12-JUL-19 11-JUL-19 12-JUL-19 12-JUL-19 12-JUL-19 12-JUL-19 12-JUL-19 12-JUL-19 12-JUL-19 12-JUL-19 12-JUL-19 12-JUL-19 12-JUL-19 12-JUL-19 12-JUL-19	11-JUL-19 11-JUL-19 11-JUL-19 11-JUL-19 10-JUL-19 10-JUL-19 10-JUL-19 10-JUL-19 10-JUL-19 10-JUL-19 10-JUL-19 12-JUL-19 11-JUL-19 12-JUL-19 13-JUL-19 13-JUL-19 13-JUL-19 13-JUL-19 13-JUL-19 13-JUL-19 13-JUL-19 13-JUL-19 13-JUL-19 13-JUL-19 13-JUL-19 13-JUL-19 13-JUL-19 13-JUL-19	R4711229 R4711229 R4711229 R4709160 R4704395 R4709300 R4704395 R4704395 R4709300 R4704395 R4709300 R4708112 R4708112 R4709353 R4709721 R4708112 R4708112 R4709721 R4709721 R4709721 R4709721 R4709721 R4709721 R4709721 R4709721 R4709721 R4709721 R4709721 R4709721 R4709721

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters		Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L2303789-5	M-DF05							
Sampled By:	CLIENT on 15-JUN-19							
Matrix:	WATER							
Total Metals in Dustfalls by ICPMS								
Iron (Fe)-Total	<0.00069			0.00069	mg/dm2.day	12-JUL-19	13-JUL-19	R4709721
Lithium (Li)-Total	<0.00012			0.00012	mg/dm2.day	12-JUL-19	13-JUL-19	R4709721
Magnesium (Mg)-Total	0.00026			0.00012	mg/dm2.day	12-JUL-19	13-JUL-19	R4709721
Manganese (Mn)-Total	0.0000212			0.0000023	mg/dm2.day	12-JUL-19	13-JUL-19	R4709721
Molybdenum (Mo)-Total	<0.0000012			0.0000012	mg/dm2.day	12-JUL-19	13-JUL-19	R4709721
Nickel (Ni)-Total	<0.000012			0.000012	mg/dm2.day	12-JUL-19	13-JUL-19	R4709721
Phosphorus (P)-Total	<0.0012			0.0012	mg/dm2.day	12-JUL-19	13-JUL-19	R4709721
Potassium (K)-Total	<0.0012			0.0012	mg/dm2.day	12-JUL-19	13-JUL-19	R4709721
Selenium (Se)-Total	<0.000023			0.000023	mg/dm2.day	12-JUL-19	13-JUL-19	R4709721
Silicon (Si)-Total	<0.0012			0.0012	mg/dm2.day	12-JUL-19	13-JUL-19	R4709721
Silver (Ag)-Total	<0.00000023			0.00000023	mg/dm2.day	12-JUL-19	13-JUL-19	R4709721
Sodium (Na)-Total	<0.0012			0.0012	mg/dm2.day	12-JUL-19	13-JUL-19	R4709721
Strontium (Sr)-Total	0.0000057			0.0000023	mg/dm2.day	12-JUL-19	13-JUL-19	R4709721
Thallium (Tl)-Total	<0.0000023			0.0000023	mg/dm2.day	12-JUL-19	13-JUL-19	R4709721
Tin (Sn)-Total	<0.0000023			0.0000023	mg/dm2.day	12-JUL-19	13-JUL-19	R4709721
Titanium (Ti)-Total	<0.00023			0.00023	mg/dm2.day	12-JUL-19	13-JUL-19	R4709721
Uranium (U)-Total	0.00000023			0.00000023	mg/dm2.day	12-JUL-19	13-JUL-19	R4709721
Vanadium (V)-Total	<0.000023			0.000023	mg/dm2.day	12-JUL-19	13-JUL-19	R4709721
Zinc (Zn)-Total	0.000093			0.000069	mg/dm2.day	12-JUL-19	13-JUL-19	R4709721
L2303789-6	M-DF06							
Sampled By:	CLIENT on 01-JUN-19							
Matrix:	WATER							
Combined Dustfalls-Total, soluble, insol								
Total Dustfall	0.60			0.10	mg/dm2.day		11-JUL-19	R4711229
Total Insoluble Dustfall	0.39			0.10	mg/dm2.day		11-JUL-19	R4711229
Total Soluble Dustfall	0.21			0.10	mg/dm2.day		11-JUL-19	R4711229
Ammonia, Total (as N)	<0.00047			0.00047	mg/dm2.day	11-JUL-19	17-JUL-19	R4713359
Interval				1	days		11-JUL-19	R4704411
Chloride (Cl)	<0.082			0.082	mg/dm2.day	11-JUL-19	11-JUL-19	R4711985
Interval				1	days		11-JUL-19	R4704411
Interval				1	days		11-JUL-19	R4704411
Nitrate (as N)	0.00126			0.00047	mg/dm2.day	11-JUL-19	11-JUL-19	R4711985
Interval				1	days		11-JUL-19	R4704411
Sulfate (SO4)	<0.0058			0.0058	mg/dm2.day	11-JUL-19	11-JUL-19	R4711985
Interval				1	days		11-JUL-19	R4707873
Mercury (Hg)-Total	<0.0000012	DLM		0.0000012	mg/dm2.day	11-JUL-19	12-JUL-19	R4708573
Total Metals in Dustfalls by ICPMS								
Aluminum (Al)-Total	0.0108			0.000035	mg/dm2.day	11-JUL-19	13-JUL-19	R4709721
Interval				1	days		11-JUL-19	R4707873
Antimony (Sb)-Total	<0.0000012			0.0000012	mg/dm2.day	11-JUL-19	13-JUL-19	R4709721
Arsenic (As)-Total	<0.000078	DLM		0.000078	mg/dm2.day	11-JUL-19	13-JUL-19	R4709721
Barium (Ba)-Total	0.0000232			0.0000005	mg/dm2.day	11-JUL-19	13-JUL-19	R4709721
Beryllium (Be)-Total	<0.0000058			0.0000058	mg/dm2.day	11-JUL-19	13-JUL-19	R4709721
Bismuth (Bi)-Total	0.0000087			0.0000058	mg/dm2.day	11-JUL-19	13-JUL-19	R4709721
Boron (B)-Total	<0.00012			0.00012	mg/dm2.day	11-JUL-19	13-JUL-19	R4709721
Cadmium (Cd)-Total	<0.00000058			0.0000005	mg/dm2.day	11-JUL-19	13-JUL-19	R4709721
Calcium (Ca)-Total	0.0450			0.00023	mg/dm2.day	11-JUL-19	13-JUL-19	R4709721

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters		Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L2303789-6	M-DF06							
Sampled By:	CLIENT on 01-JUN-19							
Matrix:	WATER							
Total Metals in Dustfalls by ICPMS								
Chromium (Cr)-Total	0.0000441			0.0000058	mg/dm2.day	11-JUL-19	13-JUL-19	R4709721
Cobalt (Co)-Total	0.0000117			0.0000012	mg/dm2.day	11-JUL-19	13-JUL-19	R4709721
Copper (Cu)-Total	0.000717			0.0000058	mg/dm2.day	11-JUL-19	13-JUL-19	R4709721
Lead (Pb)-Total	0.00000539			0.0000005	mg/dm2.day	11-JUL-19	13-JUL-19	R4709721
				8				
Iron (Fe)-Total	0.0215			0.00035	mg/dm2.day	11-JUL-19	13-JUL-19	R4709721
Lithium (Li)-Total	<0.000058			0.000058	mg/dm2.day	11-JUL-19	13-JUL-19	R4709721
Magnesium (Mg)-Total	0.0104			0.000058	mg/dm2.day	11-JUL-19	13-JUL-19	R4709721
Manganese (Mn)-Total	0.000677			0.0000012	mg/dm2.day	11-JUL-19	13-JUL-19	R4709721
Molybdenum (Mo)-Total	0.00000070			0.0000005	mg/dm2.day	11-JUL-19	13-JUL-19	R4709721
				8				
Nickel (Ni)-Total	0.0000261			0.0000058	mg/dm2.day	11-JUL-19	13-JUL-19	R4709721
Phosphorus (P)-Total	<0.00058			0.00058	mg/dm2.day	11-JUL-19	13-JUL-19	R4709721
Potassium (K)-Total	0.00074			0.00058	mg/dm2.day	11-JUL-19	13-JUL-19	R4709721
Selenium (Se)-Total	<0.000012			0.000012	mg/dm2.day	11-JUL-19	13-JUL-19	R4709721
Silicon (Si)-Total	0.0160			0.00058	mg/dm2.day	11-JUL-19	13-JUL-19	R4709721
Silver (Ag)-Total	<0.00000012			0.0000001	mg/dm2.day	11-JUL-19	13-JUL-19	R4709721
				2				
Sodium (Na)-Total	0.00104			0.00058	mg/dm2.day	11-JUL-19	13-JUL-19	R4709721
Strontium (Sr)-Total	0.0000257			0.0000012	mg/dm2.day	11-JUL-19	13-JUL-19	R4709721
Thallium (Tl)-Total	<0.0000012			0.0000012	mg/dm2.day	11-JUL-19	13-JUL-19	R4709721
Tin (Sn)-Total	<0.0000012			0.0000012	mg/dm2.day	11-JUL-19	13-JUL-19	R4709721
Titanium (Ti)-Total	0.00065			0.00012	mg/dm2.day	11-JUL-19	13-JUL-19	R4709721
Uranium (U)-Total	0.00000034			0.0000001	mg/dm2.day	11-JUL-19	13-JUL-19	R4709721
				2				
Vanadium (V)-Total	0.000063			0.000012	mg/dm2.day	11-JUL-19	13-JUL-19	R4709721
Zinc (Zn)-Total	0.000326			0.000035	mg/dm2.day	11-JUL-19	13-JUL-19	R4709721
L2303789-7	M-DF07							
Sampled By:	CLIENT on 01-JUN-19							
Matrix:	WATER							
Combined Dustfalls-Total, soluble, insol								
Total Dustfall	1.01			0.10	mg/dm2.day		11-JUL-19	R4711229
Total Insoluble Dustfall	0.61			0.10	mg/dm2.day		11-JUL-19	R4711229
Total Soluble Dustfall	0.40			0.10	mg/dm2.day		11-JUL-19	R4711229
Ammonia, Total (as N)	<0.00091			0.00091	mg/dm2.day	10-JUL-19	12-JUL-19	R4709160
Interval				1	days		10-JUL-19	R4704411
Chloride (Cl)	<0.080			0.080	mg/dm2.day	10-JUL-19	10-JUL-19	R4709300
Interval				1	days		10-JUL-19	R4704411
Interval				1	days		10-JUL-19	R4704411
Nitrate (as N)	0.00090			0.00046	mg/dm2.day	10-JUL-19	13-JUL-19	R4712012
Interval				1	days		10-JUL-19	R4704411
Sulfate (SO4)	<0.0057			0.0057	mg/dm2.day	10-JUL-19	10-JUL-19	R4709300
Interval				1	days		11-JUL-19	R4707873
Mercury (Hg)-Total	<0.0000017	DLM		0.0000017	mg/dm2.day	11-JUL-19	12-JUL-19	R4708573
Total Metals in Dustfalls by ICPMS								
Aluminum (Al)-Total	0.00927			0.000050	mg/dm2.day	11-JUL-19	13-JUL-19	R4709721
Interval				1	days		11-JUL-19	R4707873
Antimony (Sb)-Total	<0.0000017			0.0000017	mg/dm2.day	11-JUL-19	13-JUL-19	R4709721
Arsenic (As)-Total	<0.000074	DLM		0.000074	mg/dm2.day	11-JUL-19	13-JUL-19	R4709721
Barium (Ba)-Total	0.0000234			0.0000008	mg/dm2.day	11-JUL-19	13-JUL-19	R4709721
				4				

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L2303789-7 M-DF07 Sampled By: CLIENT on 01-JUN-19 Matrix: WATER Total Metals in Dustfalls by ICPMS							
Beryllium (Be)-Total	<0.0000084		0.0000084	mg/dm2.day	11-JUL-19	13-JUL-19	R4709721
Bismuth (Bi)-Total	0.0000245		0.0000084	mg/dm2.day	11-JUL-19	13-JUL-19	R4709721
Boron (B)-Total	<0.00017		0.00017	mg/dm2.day	11-JUL-19	13-JUL-19	R4709721
Cadmium (Cd)-Total	<0.00000084		0.00000084	mg/dm2.day	11-JUL-19	13-JUL-19	R4709721
			4				
Calcium (Ca)-Total	0.0607		0.00033	mg/dm2.day	11-JUL-19	13-JUL-19	R4709721
Chromium (Cr)-Total	0.0000381		0.0000084	mg/dm2.day	11-JUL-19	13-JUL-19	R4709721
Cobalt (Co)-Total	0.0000105		0.0000017	mg/dm2.day	11-JUL-19	13-JUL-19	R4709721
Copper (Cu)-Total	0.000834		0.0000084	mg/dm2.day	11-JUL-19	13-JUL-19	R4709721
Lead (Pb)-Total	0.00000854		0.0000008	mg/dm2.day	11-JUL-19	13-JUL-19	R4709721
			4				
Iron (Fe)-Total	0.0180		0.00050	mg/dm2.day	11-JUL-19	13-JUL-19	R4709721
Lithium (Li)-Total	<0.000084		0.000084	mg/dm2.day	11-JUL-19	13-JUL-19	R4709721
Magnesium (Mg)-Total	0.00967		0.000084	mg/dm2.day	11-JUL-19	13-JUL-19	R4709721
Manganese (Mn)-Total	0.000788		0.0000017	mg/dm2.day	11-JUL-19	13-JUL-19	R4709721
Molybdenum (Mo)-Total	<0.00000084		0.0000008	mg/dm2.day	11-JUL-19	13-JUL-19	R4709721
			4				
Nickel (Ni)-Total	0.0000234		0.0000084	mg/dm2.day	11-JUL-19	13-JUL-19	R4709721
Phosphorus (P)-Total	<0.00084		0.00084	mg/dm2.day	11-JUL-19	13-JUL-19	R4709721
Potassium (K)-Total	0.00104		0.00084	mg/dm2.day	11-JUL-19	13-JUL-19	R4709721
Selenium (Se)-Total	<0.000017		0.000017	mg/dm2.day	11-JUL-19	13-JUL-19	R4709721
Silicon (Si)-Total	0.0155		0.00084	mg/dm2.day	11-JUL-19	13-JUL-19	R4709721
Silver (Ag)-Total	<0.00000017		0.0000001	mg/dm2.day	11-JUL-19	13-JUL-19	R4709721
			7				
Sodium (Na)-Total	0.00115		0.00084	mg/dm2.day	11-JUL-19	13-JUL-19	R4709721
Strontium (Sr)-Total	0.0000325		0.0000017	mg/dm2.day	11-JUL-19	13-JUL-19	R4709721
Thallium (Tl)-Total	<0.0000017		0.0000017	mg/dm2.day	11-JUL-19	13-JUL-19	R4709721
Tin (Sn)-Total	<0.0000017		0.0000017	mg/dm2.day	11-JUL-19	13-JUL-19	R4709721
Titanium (Ti)-Total	0.00058		0.00017	mg/dm2.day	11-JUL-19	13-JUL-19	R4709721
Uranium (U)-Total	0.00000052		0.0000001	mg/dm2.day	11-JUL-19	13-JUL-19	R4709721
			7				
Vanadium (V)-Total	0.000053		0.000017	mg/dm2.day	11-JUL-19	13-JUL-19	R4709721
Zinc (Zn)-Total	0.000303		0.000050	mg/dm2.day	11-JUL-19	13-JUL-19	R4709721
L2303789-8 M-DF08 Sampled By: CLIENT on 01-JUN-19 Matrix: WATER Combined Dustfalls-Total, soluble, insol							
Total Dustfall	0.54		0.10	mg/dm2.day		11-JUL-19	R4711229
Total Insoluble Dustfall	0.32		0.10	mg/dm2.day		11-JUL-19	R4711229
Total Soluble Dustfall	0.23		0.10	mg/dm2.day		11-JUL-19	R4711229
Ammonia, Total (as N)	<0.00081		0.00081	mg/dm2.day	10-JUL-19	12-JUL-19	R4709160
Interval			1	days		10-JUL-19	R4704411
Chloride (Cl)	<0.071		0.071	mg/dm2.day	10-JUL-19	10-JUL-19	R4709300
Interval			1	days		10-JUL-19	R4704411
Interval			1	days		10-JUL-19	R4704411
Nitrate (as N)	0.00075		0.00041	mg/dm2.day	10-JUL-19	13-JUL-19	R4712012
Interval			1	days		10-JUL-19	R4704411
Sulfate (SO4)	<0.0051		0.0051	mg/dm2.day	10-JUL-19	10-JUL-19	R4709300
Interval			1	days		11-JUL-19	R4707873
Mercury (Hg)-Total	<0.0000013	DLM	0.0000013	mg/dm2.day	11-JUL-19	12-JUL-19	R4708573
Total Metals in Dustfalls by ICPMS							

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L2303789-8 M-DF08 Sampled By: CLIENT on 01-JUN-19 Matrix: WATER Total Metals in Dustfalls by ICPMS							
Aluminum (Al)-Total	0.00225	DLM	0.000040	mg/dm2.day	11-JUL-19	13-JUL-19	R4709721
Interval			1	days		11-JUL-19	R4707873
Antimony (Sb)-Total	<0.0000013		0.0000013	mg/dm2.day	11-JUL-19	13-JUL-19	R4709721
Arsenic (As)-Total	<0.000075		0.000075	mg/dm2.day	11-JUL-19	13-JUL-19	R4709721
Barium (Ba)-Total	0.0000133		0.0000006	mg/dm2.day	11-JUL-19	13-JUL-19	R4709721
			6				
Beryllium (Be)-Total	<0.0000066		0.0000066	mg/dm2.day	11-JUL-19	13-JUL-19	R4709721
Bismuth (Bi)-Total	0.0000084		0.0000066	mg/dm2.day	11-JUL-19	13-JUL-19	R4709721
Boron (B)-Total	<0.00013		0.00013	mg/dm2.day	11-JUL-19	13-JUL-19	R4709721
Cadmium (Cd)-Total	<0.00000066		0.0000006	mg/dm2.day	11-JUL-19	13-JUL-19	R4709721
			6				
Calcium (Ca)-Total	0.0332		0.00026	mg/dm2.day	11-JUL-19	13-JUL-19	R4709721
Chromium (Cr)-Total	0.0000102		0.0000066	mg/dm2.day	11-JUL-19	13-JUL-19	R4709721
Cobalt (Co)-Total	0.0000033		0.0000013	mg/dm2.day	11-JUL-19	13-JUL-19	R4709721
Copper (Cu)-Total	0.000568		0.0000066	mg/dm2.day	11-JUL-19	13-JUL-19	R4709721
Lead (Pb)-Total	0.00000490		0.0000006	mg/dm2.day	11-JUL-19	13-JUL-19	R4709721
			6				
Iron (Fe)-Total	0.00387		0.00040	mg/dm2.day	11-JUL-19	13-JUL-19	R4709721
Lithium (Li)-Total	<0.000066		0.000066	mg/dm2.day	11-JUL-19	13-JUL-19	R4709721
Magnesium (Mg)-Total	0.00343		0.000066	mg/dm2.day	11-JUL-19	13-JUL-19	R4709721
Manganese (Mn)-Total	0.000386		0.0000013	mg/dm2.day	11-JUL-19	13-JUL-19	R4709721
Molybdenum (Mo)-Total	<0.00000066		0.0000006	mg/dm2.day	11-JUL-19	13-JUL-19	R4709721
			6				
Nickel (Ni)-Total	0.0000079		0.0000066	mg/dm2.day	11-JUL-19	13-JUL-19	R4709721
Phosphorus (P)-Total	<0.00066		0.00066	mg/dm2.day	11-JUL-19	13-JUL-19	R4709721
Potassium (K)-Total	0.00069		0.00066	mg/dm2.day	11-JUL-19	13-JUL-19	R4709721
Selenium (Se)-Total	<0.000013		0.000013	mg/dm2.day	11-JUL-19	13-JUL-19	R4709721
Silicon (Si)-Total	0.00376		0.00066	mg/dm2.day	11-JUL-19	13-JUL-19	R4709721
Silver (Ag)-Total	<0.00000013		0.0000001	mg/dm2.day	11-JUL-19	13-JUL-19	R4709721
			3				
Sodium (Na)-Total	0.00086		0.00066	mg/dm2.day	11-JUL-19	13-JUL-19	R4709721
Strontium (Sr)-Total	0.0000193		0.0000013	mg/dm2.day	11-JUL-19	13-JUL-19	R4709721
Thallium (Tl)-Total	<0.0000013		0.0000013	mg/dm2.day	11-JUL-19	13-JUL-19	R4709721
Tin (Sn)-Total	<0.0000013		0.0000013	mg/dm2.day	11-JUL-19	13-JUL-19	R4709721
Titanium (Ti)-Total	<0.00013		0.00013	mg/dm2.day	11-JUL-19	13-JUL-19	R4709721
Uranium (U)-Total	0.00000016		0.0000001	mg/dm2.day	11-JUL-19	13-JUL-19	R4709721
			3				
Vanadium (V)-Total	0.000014		0.000013	mg/dm2.day	11-JUL-19	13-JUL-19	R4709721
Zinc (Zn)-Total	0.000241		0.000040	mg/dm2.day	11-JUL-19	13-JUL-19	R4709721
L2303789-9 M-DF09 Sampled By: CLIENT on 13-JUN-19 Matrix: WATER Combined Dustfalls-Total, soluble, insol							
Total Dustfall	0.41		0.16	mg/dm2.day		11-JUL-19	R4711229
Total Insoluble Dustfall	0.21		0.16	mg/dm2.day		11-JUL-19	R4711229
Total Soluble Dustfall	0.20		0.16	mg/dm2.day		11-JUL-19	R4711229
Ammonia, Total (as N)	0.0018		0.0013	mg/dm2.day	10-JUL-19	12-JUL-19	R4709160
Interval			1	days		10-JUL-19	R4704411
Chloride (Cl)	<0.12		0.12	mg/dm2.day	10-JUL-19	10-JUL-19	R4709300
Interval			1	days		10-JUL-19	R4704411
Interval			1	days		10-JUL-19	R4704411
Nitrate (as N)	0.00111		0.00066	mg/dm2.day	10-JUL-19	13-JUL-19	R4712012

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

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Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L2303789-9 M-DF09 Sampled By: CLIENT on 13-JUN-19 Matrix: WATER							
Interval			1	days		10-JUL-19	R4704411
Sulfate (SO4)	<0.0083		0.0083	mg/dm2.day	10-JUL-19	10-JUL-19	R4709300
Interval			1	days		11-JUL-19	R4707873
Mercury (Hg)-Total	<0.0000018	DLM	0.0000018	mg/dm2.day	11-JUL-19	12-JUL-19	R4708573
Total Metals in Dustfalls by ICPMS							
Aluminum (Al)-Total	0.00152		0.000055	mg/dm2.day	11-JUL-19	13-JUL-19	R4709721
Interval			1	days		11-JUL-19	R4707873
Antimony (Sb)-Total	<0.0000018		0.0000018	mg/dm2.day	11-JUL-19	13-JUL-19	R4709721
Arsenic (As)-Total	<0.00015	DLM	0.00015	mg/dm2.day	11-JUL-19	13-JUL-19	R4709721
Barium (Ba)-Total	0.0000211		0.0000009	mg/dm2.day	11-JUL-19	13-JUL-19	R4709721
			1				
Beryllium (Be)-Total	<0.0000091		0.0000091	mg/dm2.day	11-JUL-19	13-JUL-19	R4709721
Bismuth (Bi)-Total	0.0000094		0.0000091	mg/dm2.day	11-JUL-19	13-JUL-19	R4709721
Boron (B)-Total	<0.00018		0.00018	mg/dm2.day	11-JUL-19	13-JUL-19	R4709721
Cadmium (Cd)-Total	<0.00000091		0.0000009	mg/dm2.day	11-JUL-19	13-JUL-19	R4709721
			1				
Calcium (Ca)-Total	0.0238		0.00036	mg/dm2.day	11-JUL-19	13-JUL-19	R4709721
Chromium (Cr)-Total	<0.0000091		0.0000091	mg/dm2.day	11-JUL-19	13-JUL-19	R4709721
Cobalt (Co)-Total	0.0000022		0.0000018	mg/dm2.day	11-JUL-19	13-JUL-19	R4709721
Copper (Cu)-Total	0.00406		0.0000091	mg/dm2.day	11-JUL-19	13-JUL-19	R4709721
Lead (Pb)-Total	0.0000150		0.0000009	mg/dm2.day	11-JUL-19	13-JUL-19	R4709721
			1				
Iron (Fe)-Total	0.00229		0.00055	mg/dm2.day	11-JUL-19	13-JUL-19	R4709721
Lithium (Li)-Total	<0.000091		0.000091	mg/dm2.day	11-JUL-19	13-JUL-19	R4709721
Magnesium (Mg)-Total	0.00264		0.000091	mg/dm2.day	11-JUL-19	13-JUL-19	R4709721
Manganese (Mn)-Total	0.000272		0.0000018	mg/dm2.day	11-JUL-19	13-JUL-19	R4709721
Molybdenum (Mo)-Total	<0.00000091		0.0000009	mg/dm2.day	11-JUL-19	13-JUL-19	R4709721
			1				
Nickel (Ni)-Total	<0.0000091		0.0000091	mg/dm2.day	11-JUL-19	13-JUL-19	R4709721
Phosphorus (P)-Total	<0.00091		0.00091	mg/dm2.day	11-JUL-19	13-JUL-19	R4709721
Potassium (K)-Total	<0.00091		0.00091	mg/dm2.day	11-JUL-19	13-JUL-19	R4709721
Selenium (Se)-Total	<0.000018		0.000018	mg/dm2.day	11-JUL-19	13-JUL-19	R4709721
Silicon (Si)-Total	0.00154		0.00091	mg/dm2.day	11-JUL-19	13-JUL-19	R4709721
Silver (Ag)-Total	<0.00000018		0.0000001	mg/dm2.day	11-JUL-19	13-JUL-19	R4709721
			8				
Sodium (Na)-Total	0.00110		0.00091	mg/dm2.day	11-JUL-19	13-JUL-19	R4709721
Strontium (Sr)-Total	0.0000192		0.0000018	mg/dm2.day	11-JUL-19	13-JUL-19	R4709721
Thallium (Tl)-Total	<0.0000018		0.0000018	mg/dm2.day	11-JUL-19	13-JUL-19	R4709721
Tin (Sn)-Total	<0.0000018		0.0000018	mg/dm2.day	11-JUL-19	13-JUL-19	R4709721
Titanium (Ti)-Total	<0.00018		0.00018	mg/dm2.day	11-JUL-19	13-JUL-19	R4709721
Uranium (U)-Total	0.00000026		0.0000001	mg/dm2.day	11-JUL-19	13-JUL-19	R4709721
			8				
Vanadium (V)-Total	<0.000018		0.000018	mg/dm2.day	11-JUL-19	13-JUL-19	R4709721
Zinc (Zn)-Total	0.000791		0.000055	mg/dm2.day	11-JUL-19	13-JUL-19	R4709721

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

Reference Information

Sample Parameter Qualifier Key:

Qualifier	Description
B	Method Blank exceeds ALS DQO. Associated sample results which are < Limit of Reporting or > 5 times blank level are considered reliable.
DLB	Detection Limit Raised. Analyte detected at comparable level in Method Blank.
DLM	Detection Limit Adjusted due to sample matrix effects (e.g. chemical interference, colour, turbidity).
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 specifically 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 specifically 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.			
Results are reported in units of nitrogen weight. To convert to units by weight of ammonium, multiply by 1.29.			
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 specifically 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".			
Results are reported in units of nitrogen weight. To convert to units by weight of nitrate, multiply by 4.43.			
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 specifically 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
VA	ALS ENVIRONMENTAL - VANCOUVER, BRITISH COLUMBIA, CANADA

Chain of Custody Numbers:

Reference Information

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
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GLOSSARY OF REPORT TERMS

Surrogates are compounds that are similar in behaviour to target analyte(s), but that do not normally occur in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery. In reports that display the D.L. column, laboratory objectives for surrogates are listed there.

mg/kg - milligrams per kilogram based on dry weight of sample
mg/kg ww - milligrams per kilogram based on wet weight of sample
mg/kg lw - milligrams per kilogram based on lipid-adjusted weight
mg/L - unit of concentration based on volume, parts per million.

< - Less than.
D.L. - The reporting limit.
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.



Quality Control Report

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Client: TMAC Resources Inc
Hope Bay Project 95 Wellington St West
Toronto ON M5J 2N7

Contact: Environmental Site Manager

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
CL-IC-VA Dustfall								
Batch R4709300								
WG3101046-3	DUP	L2303789-1						
Chloride (Cl)		<0.23	<0.23	RPD-NA	mg/dm2.day	N/A	20	10-JUL-19
WG3101008-2	LCS		100.2		%		90-110	10-JUL-19
Chloride (Cl)								
WG3101046-2	LCS		99.9		%		90-110	10-JUL-19
Chloride (Cl)								
WG3101008-1	MB		<0.18		mg/dm2.day		0.18	10-JUL-19
Chloride (Cl)								
WG3101046-1	MB		<0.18		mg/dm2.day		0.18	10-JUL-19
Chloride (Cl)								
WG3101046-5	MS	L2303789-4	101.0		%		75-125	10-JUL-19
Chloride (Cl)								
DUSTFALLS-COM-DM2-VA Dustfall								
Batch R4711229								
WG3102054-2	LCS		109.0		%		85-115	11-JUL-19
Total Dustfall								
Total Insoluble Dustfall			97.6		%		85-115	11-JUL-19
Total Soluble Dustfall			111.1		%		85-115	11-JUL-19
WG3102054-1	MB		<0.10		mg/dm2.day		0.1	11-JUL-19
Total Dustfall								
Total Insoluble Dustfall			<0.10		mg/dm2.day		0.1	11-JUL-19
Total Soluble Dustfall			<0.10		mg/dm2.day		0.1	11-JUL-19
HG-DUST(DM2-CVAFS-VA Dustfall								
Batch R4708573								
WG3102079-3	DUP	L2303789-3						
Mercury (Hg)-Total		<0.0000013	<0.0000006	RPD-NA	mg/dm2.day	N/A	20	12-JUL-19
WG3102079-2	LCS		93.8		%		70-130	12-JUL-19
Mercury (Hg)-Total								
WG3102079-1	MB		<0.0000012		mg/dm2.day		0.0000012	12-JUL-19
Mercury (Hg)-Total								
WG3102079-4	MS	L2303789-2	87.4		%		70-130	12-JUL-19
Mercury (Hg)-Total								
Batch R4709353								
WG3102084-3	DUP	L2303789-1						
Mercury (Hg)-Total		<0.0000014	<0.0000014	RPD-NA	mg/dm2.day	N/A	20	12-JUL-19
WG3102084-2	LCS		81.4		%		70-130	12-JUL-19
Mercury (Hg)-Total								
WG3102084-1	MB							



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Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
HG-DUST(DM2-CVAFS-VA Dustfall)								
Batch R4709353								
WG3102084-1 MB								
Mercury (Hg)-Total			<0.0000012		mg/dm2.day		0.0000012	12-JUL-19
WG3102084-4 MS L2303789-4								
Mercury (Hg)-Total			73.1		%		70-130	12-JUL-19
MET-DUST(DM2)-MS-VA Dustfall								
Batch R4709721								
WG3102079-3 DUP L2303789-3								
Aluminum (Al)-Total		0.000185	0.000234	J	mg/dm2.day	0.000049	0.00008	13-JUL-19
Antimony (Sb)-Total		<0.0000013	<0.0000013	RPD-NA	mg/dm2.day	N/A	20	13-JUL-19
Arsenic (As)-Total		<0.000083	<0.000083	RPD-NA	mg/dm2.day	N/A	20	13-JUL-19
Barium (Ba)-Total		0.0000103	0.0000112		mg/dm2.day	8.6	20	13-JUL-19
Beryllium (Be)-Total		<0.0000066	<0.0000066	RPD-NA	mg/dm2.day	N/A	20	13-JUL-19
Bismuth (Bi)-Total		<0.0000066	<0.0000066	RPD-NA	mg/dm2.day	N/A	20	13-JUL-19
Boron (B)-Total		<0.00013	<0.00013	RPD-NA	mg/dm2.day	N/A	20	13-JUL-19
Cadmium (Cd)-Total		<0.00000066	<0.0000006	RPD-NA	mg/dm2.day	N/A	20	13-JUL-19
Calcium (Ca)-Total		0.00261	0.00271		mg/dm2.day	3.6	20	13-JUL-19
Chromium (Cr)-Total		<0.0000066	<0.0000066	RPD-NA	mg/dm2.day	N/A	20	13-JUL-19
Cobalt (Co)-Total		<0.0000013	<0.0000013	RPD-NA	mg/dm2.day	N/A	20	13-JUL-19
Copper (Cu)-Total		0.000494	0.000515		mg/dm2.day	4.1	20	13-JUL-19
Lead (Pb)-Total		0.0000117	0.0000130		mg/dm2.day	11	20	13-JUL-19
Iron (Fe)-Total		<0.00040	0.00047	RPD-NA	mg/dm2.day	N/A	20	13-JUL-19
Lithium (Li)-Total		<0.000066	<0.000066	RPD-NA	mg/dm2.day	N/A	20	13-JUL-19
Magnesium (Mg)-Total		0.000295	0.000320		mg/dm2.day	8.0	20	13-JUL-19
Manganese (Mn)-Total		0.0000311	0.0000336		mg/dm2.day	7.8	20	13-JUL-19
Molybdenum (Mo)-Total		<0.00000066	<0.0000006	RPD-NA	mg/dm2.day	N/A	20	13-JUL-19
Nickel (Ni)-Total		<0.0000066	<0.0000066	RPD-NA	mg/dm2.day	N/A	20	13-JUL-19
Phosphorus (P)-Total		<0.00066	<0.00066	RPD-NA	mg/dm2.day	N/A	20	13-JUL-19
Potassium (K)-Total		<0.00066	<0.00066	RPD-NA	mg/dm2.day	N/A	20	13-JUL-19
Selenium (Se)-Total		<0.000013	<0.000013	RPD-NA	mg/dm2.day	N/A	20	13-JUL-19
Silicon (Si)-Total		<0.00066	<0.00066	RPD-NA	mg/dm2.day	N/A	20	13-JUL-19
Silver (Ag)-Total		<0.00000013	<0.0000001	RPD-NA	mg/dm2.day	N/A	20	13-JUL-19
Sodium (Na)-Total		<0.00066	<0.00066	RPD-NA	mg/dm2.day	N/A	20	13-JUL-19
Strontium (Sr)-Total		0.0000038	0.0000038		mg/dm2.day	0.9	20	13-JUL-19
Thallium (Tl)-Total		<0.0000013	<0.0000013	RPD-NA	mg/dm2.day	N/A	20	13-JUL-19
Tin (Sn)-Total		<0.0000013	<0.0000013	RPD-NA	mg/dm2.day	N/A	20	13-JUL-19



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Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-DUST(DM2)-MS-VA		Dustfall						
Batch	R4709721							
WG3102079-3	DUP	L2303789-3						
Titanium (Ti)-Total		<0.00013	<0.00013	RPD-NA	mg/dm2.day	N/A	20	13-JUL-19
Uranium (U)-Total		0.00000024	0.00000029	J	mg/dm2.day	0.000000	0.00000026	13-JUL-19
Vanadium (V)-Total		<0.000013	<0.000013	RPD-NA	mg/dm2.day	N/A	20	13-JUL-19
Zinc (Zn)-Total		<0.00016	<0.00016	RPD-NA	mg/dm2.day	N/A	20	13-JUL-19
WG3102084-3	DUP	L2303789-1						
Aluminum (Al)-Total		0.00134	0.00115		mg/dm2.day	15	20	13-JUL-19
Antimony (Sb)-Total		<0.0000028	<0.0000028	RPD-NA	mg/dm2.day	N/A	20	13-JUL-19
Arsenic (As)-Total		<0.0000028	<0.0000028	RPD-NA	mg/dm2.day	N/A	20	13-JUL-19
Barium (Ba)-Total		0.0000198	0.0000201		mg/dm2.day	1.6	20	13-JUL-19
Beryllium (Be)-Total		<0.000014	<0.000014	RPD-NA	mg/dm2.day	N/A	20	13-JUL-19
Bismuth (Bi)-Total		0.000029	0.000030		mg/dm2.day	3.7	20	13-JUL-19
Boron (B)-Total		<0.00028	<0.00028	RPD-NA	mg/dm2.day	N/A	20	13-JUL-19
Cadmium (Cd)-Total		<0.0000014	<0.0000014	RPD-NA	mg/dm2.day	N/A	20	13-JUL-19
Calcium (Ca)-Total		0.0061	<0.0061	RPD-NA	mg/dm2.day	N/A	20	13-JUL-19
Chromium (Cr)-Total		<0.000014	<0.000014	RPD-NA	mg/dm2.day	N/A	20	13-JUL-19
Cobalt (Co)-Total		<0.0000028	<0.0000028	RPD-NA	mg/dm2.day	N/A	20	13-JUL-19
Copper (Cu)-Total		0.000592	0.000613		mg/dm2.day	3.5	20	13-JUL-19
Lead (Pb)-Total		0.0000124	0.0000131		mg/dm2.day	5.9	20	13-JUL-19
Iron (Fe)-Total		0.00240	0.00234		mg/dm2.day	2.5	20	13-JUL-19
Lithium (Li)-Total		<0.00014	<0.00014	RPD-NA	mg/dm2.day	N/A	20	13-JUL-19
Magnesium (Mg)-Total		0.00108	0.00104		mg/dm2.day	3.7	20	13-JUL-19
Manganese (Mn)-Total		0.0000569	0.0000571		mg/dm2.day	0.3	20	13-JUL-19
Molybdenum (Mo)-Total		<0.0000014	<0.0000014	RPD-NA	mg/dm2.day	N/A	20	13-JUL-19
Nickel (Ni)-Total		<0.000014	<0.000014	RPD-NA	mg/dm2.day	N/A	20	13-JUL-19
Phosphorus (P)-Total		<0.0014	<0.0014	RPD-NA	mg/dm2.day	N/A	20	13-JUL-19
Potassium (K)-Total		<0.0014	<0.0014	RPD-NA	mg/dm2.day	N/A	20	13-JUL-19
Selenium (Se)-Total		<0.000028	<0.000028	RPD-NA	mg/dm2.day	N/A	20	13-JUL-19
Silicon (Si)-Total		0.0018	0.0017		mg/dm2.day	6.9	20	13-JUL-19
Silver (Ag)-Total		0.00000032	<0.0000002	RPD-NA	mg/dm2.day	N/A	20	13-JUL-19
Sodium (Na)-Total		0.0014	0.0015		mg/dm2.day	5.7	20	13-JUL-19
Strontium (Sr)-Total		0.0000062	0.0000064		mg/dm2.day	3.1	20	13-JUL-19
Thallium (Tl)-Total		<0.0000028	<0.0000028	RPD-NA	mg/dm2.day	N/A	20	13-JUL-19
Tin (Sn)-Total		<0.0000028	<0.0000028	RPD-NA	mg/dm2.day	N/A	20	13-JUL-19
Titanium (Ti)-Total		<0.00028	<0.00028	RPD-NA	mg/dm2.day	N/A	20	13-JUL-19



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Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-DUST(DM2)-MS-VA Dustfall								
Batch	R4709721							
WG3102084-3 DUP		L2303789-1						
Uranium (U)-Total		0.00000040	0.00000049	J	mg/dm2.day	0.000000	0.00000056	13-JUL-19
Vanadium (V)-Total		<0.000028	<0.000028	RPD-NA	mg/dm2.day	N/A	20	13-JUL-19
Zinc (Zn)-Total		0.000411	0.000411		mg/dm2.day	0.0	20	13-JUL-19
WG3102079-2 LCS								
Aluminum (Al)-Total			101.1		%		80-120	13-JUL-19
Antimony (Sb)-Total			95.9		%		80-120	13-JUL-19
Arsenic (As)-Total			103.0		%		80-120	13-JUL-19
Barium (Ba)-Total			99.5		%		80-120	13-JUL-19
Beryllium (Be)-Total			98.4		%		80-120	13-JUL-19
Bismuth (Bi)-Total			104.2		%		80-120	13-JUL-19
Boron (B)-Total			93.5		%		80-120	13-JUL-19
Cadmium (Cd)-Total			109.9		%		80-120	13-JUL-19
Calcium (Ca)-Total			99.0		%		80-120	13-JUL-19
Chromium (Cr)-Total			107.5		%		80-120	13-JUL-19
Cobalt (Co)-Total			107.3		%		80-120	13-JUL-19
Copper (Cu)-Total			106.1		%		80-120	13-JUL-19
Lead (Pb)-Total			102.2		%		80-120	13-JUL-19
Iron (Fe)-Total			103.1		%		80-120	13-JUL-19
Lithium (Li)-Total			95.9		%		80-120	13-JUL-19
Magnesium (Mg)-Total			106.0		%		80-120	13-JUL-19
Manganese (Mn)-Total			101.9		%		80-120	13-JUL-19
Molybdenum (Mo)-Total			92.2		%		80-120	13-JUL-19
Nickel (Ni)-Total			105.8		%		80-120	13-JUL-19
Phosphorus (P)-Total			109.5		%		80-120	13-JUL-19
Potassium (K)-Total			110.0		%		80-120	13-JUL-19
Selenium (Se)-Total			103.9		%		80-120	13-JUL-19
Silicon (Si)-Total			103.8		%		80-120	13-JUL-19
Silver (Ag)-Total			94.7		%		80-120	13-JUL-19
Sodium (Na)-Total			109.0		%		80-120	13-JUL-19
Strontium (Sr)-Total			95.2		%		80-120	13-JUL-19
Thallium (Tl)-Total			100.6		%		80-120	13-JUL-19
Tin (Sn)-Total			92.0		%		80-120	13-JUL-19
Titanium (Ti)-Total			105.2		%		80-120	13-JUL-19
Uranium (U)-Total			107.7		%		80-120	13-JUL-19

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Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-DUST(DM2)-MS-VA	Dustfall							
Batch	R4709721							
WG3102079-2	LCS							
Vanadium (V)-Total			108.3		%		80-120	13-JUL-19
Zinc (Zn)-Total			105.5		%		80-120	13-JUL-19
WG3102084-2	LCS							
Aluminum (Al)-Total			94.9		%		80-120	13-JUL-19
Antimony (Sb)-Total			101.3		%		80-120	13-JUL-19
Arsenic (As)-Total			102.2		%		80-120	13-JUL-19
Barium (Ba)-Total			99.8		%		80-120	13-JUL-19
Beryllium (Be)-Total			91.8		%		80-120	13-JUL-19
Bismuth (Bi)-Total			101.1		%		80-120	13-JUL-19
Boron (B)-Total			95.1		%		80-120	13-JUL-19
Cadmium (Cd)-Total			102.5		%		80-120	13-JUL-19
Calcium (Ca)-Total			91.1		%		80-120	13-JUL-19
Chromium (Cr)-Total			100.7		%		80-120	13-JUL-19
Cobalt (Co)-Total			101.5		%		80-120	13-JUL-19
Copper (Cu)-Total			99.9		%		80-120	13-JUL-19
Lead (Pb)-Total			101.1		%		80-120	13-JUL-19
Iron (Fe)-Total			98.0		%		80-120	13-JUL-19
Lithium (Li)-Total			90.2		%		80-120	13-JUL-19
Magnesium (Mg)-Total			100.1		%		80-120	13-JUL-19
Manganese (Mn)-Total			94.5		%		80-120	13-JUL-19
Molybdenum (Mo)-Total			95.8		%		80-120	13-JUL-19
Nickel (Ni)-Total			100.4		%		80-120	13-JUL-19
Phosphorus (P)-Total			110.2		%		80-120	13-JUL-19
Potassium (K)-Total			104.8		%		80-120	13-JUL-19
Selenium (Se)-Total			103.1		%		80-120	13-JUL-19
Silicon (Si)-Total			108.4		%		80-120	13-JUL-19
Silver (Ag)-Total			96.5		%		80-120	13-JUL-19
Sodium (Na)-Total			108.4		%		80-120	13-JUL-19
Strontium (Sr)-Total			97.1		%		80-120	13-JUL-19
Thallium (Tl)-Total			91.7		%		80-120	13-JUL-19
Tin (Sn)-Total			99.4		%		80-120	13-JUL-19
Titanium (Ti)-Total			104.7		%		80-120	13-JUL-19
Uranium (U)-Total			107.0		%		80-120	13-JUL-19
Vanadium (V)-Total			102.0		%		80-120	13-JUL-19

Quality Control Report

Workorder: L2303789

Report Date: 17-JUL-19

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Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-DUST(DM2)-MS-VA Dustfall								
Batch R4709721								
WG3102084-2 LCS								
Zinc (Zn)-Total			101.0		%		80-120	13-JUL-19
WG3102079-1 MB								
Aluminum (Al)-Total			<0.000069		mg/dm2.day		0.000069	13-JUL-19
Antimony (Sb)-Total			0.0000032	B	mg/dm2.day		0.0000023	13-JUL-19
Arsenic (As)-Total			<0.000092		mg/dm2.day		0.000092	13-JUL-19
Barium (Ba)-Total			<0.0000012		mg/dm2.day		0.0000012	13-JUL-19
Beryllium (Be)-Total			<0.000012		mg/dm2.day		0.000012	13-JUL-19
Bismuth (Bi)-Total			<0.000012		mg/dm2.day		0.000012	13-JUL-19
Boron (B)-Total			<0.00023		mg/dm2.day		0.00023	13-JUL-19
Cadmium (Cd)-Total			<0.0000012		mg/dm2.day		0.0000012	13-JUL-19
Calcium (Ca)-Total			0.00087	MB-LOR	mg/dm2.day		0.00046	13-JUL-19
Chromium (Cr)-Total			<0.000012		mg/dm2.day		0.000012	13-JUL-19
Cobalt (Co)-Total			<0.0000023		mg/dm2.day		0.0000023	13-JUL-19
Copper (Cu)-Total			<0.000012		mg/dm2.day		0.000012	13-JUL-19
Lead (Pb)-Total			<0.0000012		mg/dm2.day		0.0000012	13-JUL-19
Iron (Fe)-Total			<0.00069		mg/dm2.day		0.00069	13-JUL-19
Lithium (Li)-Total			<0.00012		mg/dm2.day		0.00012	13-JUL-19
Magnesium (Mg)-Total			<0.00012		mg/dm2.day		0.00012	13-JUL-19
Manganese (Mn)-Total			<0.0000023		mg/dm2.day		0.0000023	13-JUL-19
Molybdenum (Mo)-Total			<0.0000012		mg/dm2.day		0.0000012	13-JUL-19
Nickel (Ni)-Total			<0.000012		mg/dm2.day		0.000012	13-JUL-19
Phosphorus (P)-Total			0.0014	B	mg/dm2.day		0.0012	13-JUL-19
Potassium (K)-Total			<0.0012		mg/dm2.day		0.0012	13-JUL-19
Selenium (Se)-Total			<0.000023		mg/dm2.day		0.000023	13-JUL-19
Silicon (Si)-Total			<0.0012		mg/dm2.day		0.0012	13-JUL-19
Silver (Ag)-Total			<0.0000002		mg/dm2.day		0.00000023	13-JUL-19
Sodium (Na)-Total			<0.0012		mg/dm2.day		0.0012	13-JUL-19
Strontium (Sr)-Total			<0.0000023		mg/dm2.day		0.0000023	13-JUL-19
Thallium (Tl)-Total			<0.0000023		mg/dm2.day		0.0000023	13-JUL-19
Tin (Sn)-Total			<0.0000023		mg/dm2.day		0.0000023	13-JUL-19
Titanium (Ti)-Total			<0.00023		mg/dm2.day		0.00023	13-JUL-19
Uranium (U)-Total			<0.0000002		mg/dm2.day		0.00000023	13-JUL-19
Vanadium (V)-Total			<0.000023		mg/dm2.day		0.000023	13-JUL-19
Zinc (Zn)-Total			0.000072	MB-LOR	mg/dm2.day		0.000069	13-JUL-19



Quality Control Report

Workorder: L2303789

Report Date: 17-JUL-19

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Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-DUST(DM2)-MS-VA	Dustfall							
Batch	R4709721							
WG3102084-1 MB								
Aluminum (Al)-Total			<0.000069		mg/dm2.day		0.000069	13-JUL-19
Antimony (Sb)-Total			<0.0000023		mg/dm2.day		0.0000023	13-JUL-19
Arsenic (As)-Total			<0.0000023		mg/dm2.day		0.0000023	13-JUL-19
Barium (Ba)-Total			<0.0000012		mg/dm2.day		0.0000012	13-JUL-19
Beryllium (Be)-Total			<0.000012		mg/dm2.day		0.000012	13-JUL-19
Bismuth (Bi)-Total			<0.000012		mg/dm2.day		0.000012	13-JUL-19
Boron (B)-Total			<0.00023		mg/dm2.day		0.00023	13-JUL-19
Cadmium (Cd)-Total			<0.0000012		mg/dm2.day		0.0000012	13-JUL-19
Calcium (Ca)-Total			0.00111	MB-LOR	mg/dm2.day		0.00046	13-JUL-19
Chromium (Cr)-Total			<0.000012		mg/dm2.day		0.000012	13-JUL-19
Cobalt (Co)-Total			<0.0000023		mg/dm2.day		0.0000023	13-JUL-19
Copper (Cu)-Total			<0.000012		mg/dm2.day		0.000012	13-JUL-19
Lead (Pb)-Total			<0.0000012		mg/dm2.day		0.0000012	13-JUL-19
Iron (Fe)-Total			<0.00069		mg/dm2.day		0.00069	13-JUL-19
Lithium (Li)-Total			<0.00012		mg/dm2.day		0.00012	13-JUL-19
Magnesium (Mg)-Total			<0.00012		mg/dm2.day		0.00012	13-JUL-19
Manganese (Mn)-Total			<0.0000023		mg/dm2.day		0.0000023	13-JUL-19
Molybdenum (Mo)-Total			<0.0000012		mg/dm2.day		0.0000012	13-JUL-19
Nickel (Ni)-Total			<0.000012		mg/dm2.day		0.000012	13-JUL-19
Phosphorus (P)-Total			<0.0012		mg/dm2.day		0.0012	13-JUL-19
Potassium (K)-Total			<0.0012		mg/dm2.day		0.0012	13-JUL-19
Selenium (Se)-Total			<0.000023		mg/dm2.day		0.000023	13-JUL-19
Silicon (Si)-Total			<0.0012		mg/dm2.day		0.0012	13-JUL-19
Silver (Ag)-Total			<0.0000002		mg/dm2.day		0.00000023	13-JUL-19
Sodium (Na)-Total			<0.0012		mg/dm2.day		0.0012	13-JUL-19
Strontium (Sr)-Total			<0.0000023		mg/dm2.day		0.0000023	13-JUL-19
Thallium (Tl)-Total			<0.0000023		mg/dm2.day		0.0000023	13-JUL-19
Tin (Sn)-Total			<0.0000023		mg/dm2.day		0.0000023	13-JUL-19
Titanium (Ti)-Total			<0.00023		mg/dm2.day		0.00023	13-JUL-19
Uranium (U)-Total			<0.0000002		mg/dm2.day		0.00000023	13-JUL-19
Vanadium (V)-Total			<0.000023		mg/dm2.day		0.000023	13-JUL-19
Zinc (Zn)-Total			<0.000069		mg/dm2.day		0.000069	13-JUL-19
NH3-F-VA	Dustfall							

Quality Control Report

Workorder: L2303789

Report Date: 17-JUL-19

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Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
NH3-F-VA								
Dustfall								
Batch	R4709160							
WG3101046-3	DUP	L2303789-1						
Ammonia, Total (as N)		0.0014	0.0016		mg/dm2.day	16	20	11-JUL-19
WG3101008-1	MB							
Ammonia, Total (as N)			<0.0021	MB-LOR	mg/dm2.day		0.0021	12-JUL-19
WG3101046-1	MB							
Ammonia, Total (as N)			<0.0010		mg/dm2.day		0.001	11-JUL-19
NO3-IC-VA								
Dustfall								
Batch	R4709300							
WG3101046-3	DUP	L2303789-1						
Nitrate (as N)		<0.0013	<0.0013	RPD-NA	mg/dm2.day	N/A	20	10-JUL-19
WG3101046-2	LCS							
Nitrate (as N)			99.97		%		90-110	10-JUL-19
WG3101046-1	MB							
Nitrate (as N)			<0.0010		mg/dm2.day		0.001	10-JUL-19
WG3101046-5	MS	L2303789-4						
Nitrate (as N)			101.4		%		75-125	10-JUL-19
Batch	R4712012							
WG3101008-2	LCS							
Nitrate (as N)			103.3		%		90-110	13-JUL-19
WG3101008-1	MB							
Nitrate (as N)			<0.0010		mg/dm2.day		0.001	13-JUL-19
SO4-IC-VA								
Dustfall								
Batch	R4709300							
WG3101046-3	DUP	L2303789-1						
Sulfate (SO4)		<0.016	<0.016	RPD-NA	mg/dm2.day	N/A	20	10-JUL-19
WG3101008-2	LCS							
Sulfate (SO4)			100.9		%		90-110	10-JUL-19
WG3101046-2	LCS							
Sulfate (SO4)			100.5		%		90-110	10-JUL-19
WG3101008-1	MB							
Sulfate (SO4)			<0.013		mg/dm2.day		0.013	10-JUL-19
WG3101046-1	MB							
Sulfate (SO4)			<0.013		mg/dm2.day		0.013	10-JUL-19
WG3101046-5	MS	L2303789-4						
Sulfate (SO4)			101.9		%		75-125	10-JUL-19

Quality Control Report

Workorder: L2303789

Report Date: 17-JUL-19

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Legend:

Limit	ALS Control Limit (Data Quality Objectives)
DUP	Duplicate
RPD	Relative Percent Difference
N/A	Not Available
LCS	Laboratory Control Sample
SRM	Standard Reference Material
MS	Matrix Spike
MSD	Matrix Spike Duplicate
ADE	Average Desorption Efficiency
MB	Method Blank
IRM	Internal Reference Material
CRM	Certified Reference Material
CCV	Continuing Calibration Verification
CVS	Calibration Verification Standard
LCSD	Laboratory Control Sample Duplicate

Sample Parameter Qualifier Definitions:

Qualifier	Description
B	Method Blank exceeds ALS DQO. Associated sample results which are < Limit of Reporting or > 5 times blank level are considered reliable.
J	Duplicate results and limits are expressed in terms of absolute difference.
MB-LOR	Method Blank exceeds ALS DQO. Limits of Reporting have been adjusted for samples with positive hits below 5x blank level.
RPD-NA	Relative Percent Difference Not Available due to result(s) being less than detection limit.

Hold Time Exceedances:

All test results reported with this submission were conducted within ALS recommended hold times.

ALS recommended hold times may vary by province. They are assigned to meet known provincial and/or federal government requirements. In the absence of regulatory hold times, ALS establishes recommendations based on guidelines published by the US EPA, APHA Standard Methods, or Environment Canada (where available). For more information, please contact ALS.

The ALS Quality Control Report is provided to ALS clients upon request. ALS includes comprehensive QC checks with every analysis to ensure our high standards of quality are met. Each QC result has a known or expected target value, which is compared against pre-determined data quality objectives to provide confidence in the accuracy of associated test results.

Please note that this report may contain QC results from anonymous Sample Duplicates and Matrix Spikes that do not originate from this Work Order.



ALS Environmental

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: TMAC Resources Ltd (Hope Bay)			<input checked="" type="checkbox"/> Standard <input type="checkbox"/> Other			<input checked="" type="radio"/> Regular (Standard Turnaround Times - Business Days)														
Contact: Environmental Site Manager			<input checked="" type="checkbox"/> PDF <input checked="" type="checkbox"/> Excel <input checked="" type="checkbox"/> Digital <input type="checkbox"/> Fax			<input type="radio"/> Priority (2-4 Business Days) - 50% Surcharge - Contact ALS to Confirm TAT														
Address: 95 Welling Street West, Suite 1010			Email 1: enviro@tmacresources.com			<input type="radio"/> Emergency (1-2 Bus. Days) - 100% Surcharge - Contact ALS to Confirm TAT														
P.O. Box 44, Toronto, ON, M5J 2N7			Email 2: enviro.tech@tmacresources.com			<input type="radio"/> Same Day or Weekend Emergency - Contact ALS to Confirm TAT														
Phone: 1-416-628-0216 Fax: _____			Email 3: _____																	
Invoice To Same as Report? Y			Client / Project Information			Analysis Request														
Hardcopy of Invoice with Report?			Job #:			Please indicate below Filtered, Preserved or both (F, P, F/P)														
Company:			PO / AFE: 4500011700																	
Contact:			LSD:																	
Address:			Job Ref: Madrid Dustfall																	
Phone: _____ Fax: _____			Quote #:																	
Lab Work Order # _____ (lab use only)			ALS Contact: Amber Springer			Sampler:														
Sample #	Sample Identification (This description will appear on the report)	Date In (dd-mm-yy)	Date Out (dd-mm-yy)	Sample Type	Total Particulate	Soluble particulate	Insoluble particulate	Sulphate	Nitrate	NH₃, NH₄	Cl	Total Metals	Mg+	Ca+	K+	Number of Containers				
M-DF01		15-Jun-19	02-Jul-19	Water	X	X	X	X	X	X	X	X	X	X	X	2				
M-DF02		01-Jun-19	02-Jul-19	Water	X	X	X	X	X	X	X	X	X	X	X	2				
M-DF03		01-Jun-19	02-Jul-19	Water	X	X	X	X	X	X	X	X	X	X	X	2				
M-DF04		15-Jun-19	02-Jul-19	Water	X	X	X	X	X	X	X	X	X	X	X	2				
M-DF05		15-Jun-19	02-Jul-19	Water	X	X	X	X	X	X	X	X	X	X	X	2				
M-DF06		01-Jun-19	02-Jul-19	Water	X	X	X	X	X	X	X	X	X	X	X	2				
M-DF07		01-Jun-19	02-Jul-19	Water	X	X	X	X	X	X	X	X	X	X	X	2				
M-DF08		01-Jun-19	02-Jul-19	Water	X	X	X	X	X	X	X	X	X	X	X	2				
M-DF09		13-Jun-19	02-Jul-19	Water	X	X	X	X	X	X	X	X	X	X	X	2				
Special Instructions / Regulations with water or land use (CCME-Freshwater Aquatic Life/BC CSR - Commercial/AB Tier 1 - Natural, etc) / 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-mm-yy)	Time (hh-mm)	Received by:	Date:	Time:	Temperature:	Verified by:	Date:	Time:	Observations:										
Cedar Metatawabin	4-Jul-19	7:30	<i>[Signature]</i>	July 4	12:15	3.1 °C				Yes / No ?										
										If Yes add SIF										

GENF 18.01 Front

L2303789-COFC





TMAC Resources Inc
ATTN: Environmental Site Manager
Hope Bay Project
95 Wellington St West
Toronto ON M5J 2N7

Date Received: 06-AUG-19
Report Date: 15-AUG-19 13:30 (MT)
Version: FINAL

Client Phone: 416-628-0216

Certificate of Analysis

Lab Work Order #: L2323197
Project P.O. #: 4500011700
Job Reference: DORIS DUSTFALL
C of C Numbers:
Legal Site Desc:

Amber Springer, B.Sc
Account Manager

[This report shall not be reproduced except in full without the written authority of the Laboratory.]

ADDRESS: 8081 Lougheed Hwy, Suite 100, Burnaby, BC V5A 1W9 Canada | Phone: +1 604 253 4188 | Fax: +1 604 253 6700
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ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L2323197-1 CONTROLDF Sampled By: CLIENT on 02-JUL-19 Matrix: WATER							
Combined Dustfalls-Total, soluble, insol							
Total Dustfall	0.41		0.10	mg/dm2.day		13-AUG-19	R4752671
Total Insoluble Dustfall	<0.10		0.10	mg/dm2.day		13-AUG-19	R4752671
Total Soluble Dustfall	0.41		0.10	mg/dm2.day		13-AUG-19	R4752671
Ammonia, Total (as N)	0.00272		0.00049	mg/dm2.day	13-AUG-19	14-AUG-19	R4753549
Interval			1	days		13-AUG-19	R4752293
Chloride (Cl)	<0.086		0.086	mg/dm2.day	13-AUG-19	13-AUG-19	R4753148
Interval			1	days		13-AUG-19	R4752293
Interval			1	days		13-AUG-19	R4752293
Nitrate (as N)	0.00067		0.00049	mg/dm2.day	13-AUG-19	13-AUG-19	R4753148
Interval			1	days		13-AUG-19	R4752293
Sulfate (SO4)	<0.0061		0.0061	mg/dm2.day	13-AUG-19	13-AUG-19	R4753148
Interval			1	days		12-AUG-19	R4746811
Mercury (Hg)-Total	<0.00000061		0.0000006	mg/dm2.day	12-AUG-19	12-AUG-19	R4747339
			1				
Total Metals in Dustfalls by ICPMS							
Aluminum (Al)-Total	0.000246		0.000037	mg/dm2.day	12-AUG-19	12-AUG-19	R4748589
Interval			1	days		12-AUG-19	R4747829
Antimony (Sb)-Total	<0.0000012		0.0000012	mg/dm2.day	12-AUG-19	12-AUG-19	R4748589
Arsenic (As)-Total	<0.0000012		0.0000012	mg/dm2.day	12-AUG-19	12-AUG-19	R4748589
Barium (Ba)-Total	0.0000155		0.0000006	mg/dm2.day	12-AUG-19	12-AUG-19	R4748589
			1				
Beryllium (Be)-Total	<0.0000061		0.0000061	mg/dm2.day	12-AUG-19	12-AUG-19	R4748589
Bismuth (Bi)-Total	0.0000137		0.0000061	mg/dm2.day	12-AUG-19	12-AUG-19	R4748589
Boron (B)-Total	<0.00012		0.00012	mg/dm2.day	12-AUG-19	12-AUG-19	R4748589
Cadmium (Cd)-Total	<0.00000061		0.0000006	mg/dm2.day	12-AUG-19	12-AUG-19	R4748589
			1				
Calcium (Ca)-Total	0.00158		0.00025	mg/dm2.day	12-AUG-19	12-AUG-19	R4748589
Chromium (Cr)-Total	<0.0000061		0.0000061	mg/dm2.day	12-AUG-19	12-AUG-19	R4748589
Cobalt (Co)-Total	<0.0000012		0.0000012	mg/dm2.day	12-AUG-19	12-AUG-19	R4748589
Copper (Cu)-Total	0.000670		0.0000061	mg/dm2.day	12-AUG-19	12-AUG-19	R4748589
Lead (Pb)-Total	0.00000769		0.0000006	mg/dm2.day	12-AUG-19	12-AUG-19	R4748589
			1				
Iron (Fe)-Total	<0.00037		0.00037	mg/dm2.day	12-AUG-19	12-AUG-19	R4748589
Lithium (Li)-Total	<0.000061		0.000061	mg/dm2.day	12-AUG-19	12-AUG-19	R4748589
Magnesium (Mg)-Total	0.00100		0.000061	mg/dm2.day	12-AUG-19	12-AUG-19	R4748589
Manganese (Mn)-Total	0.0000269		0.0000012	mg/dm2.day	12-AUG-19	12-AUG-19	R4748589
Molybdenum (Mo)-Total	<0.00000061		0.0000006	mg/dm2.day	12-AUG-19	12-AUG-19	R4748589
			1				
Nickel (Ni)-Total	<0.0000061		0.0000061	mg/dm2.day	12-AUG-19	12-AUG-19	R4748589
Phosphorus (P)-Total	0.00387		0.00061	mg/dm2.day	12-AUG-19	12-AUG-19	R4748589
Potassium (K)-Total	0.00710		0.00061	mg/dm2.day	12-AUG-19	12-AUG-19	R4748589
Selenium (Se)-Total	<0.000012		0.000012	mg/dm2.day	12-AUG-19	12-AUG-19	R4748589
Silicon (Si)-Total	<0.00061		0.00061	mg/dm2.day	12-AUG-19	12-AUG-19	R4748589
Silver (Ag)-Total	<0.00000012		0.0000001	mg/dm2.day	12-AUG-19	12-AUG-19	R4748589
			2				
Sodium (Na)-Total	0.00247		0.00061	mg/dm2.day	12-AUG-19	12-AUG-19	R4748589
Strontium (Sr)-Total	0.0000053		0.0000012	mg/dm2.day	12-AUG-19	12-AUG-19	R4748589
Thallium (Tl)-Total	<0.0000012		0.0000012	mg/dm2.day	12-AUG-19	12-AUG-19	R4748589
Tin (Sn)-Total	<0.0000012		0.0000012	mg/dm2.day	12-AUG-19	12-AUG-19	R4748589
Titanium (Ti)-Total	<0.00012		0.00012	mg/dm2.day	12-AUG-19	12-AUG-19	R4748589
Uranium (U)-Total	<0.00000012		0.0000001	mg/dm2.day	12-AUG-19	12-AUG-19	R4748589
			2				

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters		Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L2323197-1	CONTROLDF							
Sampled By:	CLIENT on 02-JUL-19							
Matrix:	WATER							
Total Metals in Dustfalls by ICPMS								
Vanadium (V)-Total		<0.000012		0.000012	mg/dm2.day	12-AUG-19	12-AUG-19	R4748589
Zinc (Zn)-Total		0.00029	DLB	0.00029	mg/dm2.day	12-AUG-19	12-AUG-19	R4748589
L2323197-2	TIADF2							
Sampled By:	CLIENT on 02-JUL-19							
Matrix:	WATER							
Combined Dustfalls-Total, soluble, insol								
Total Dustfall		1.02		0.10	mg/dm2.day		13-AUG-19	R4752671
Total Insoluble Dustfall		<0.10		0.10	mg/dm2.day		13-AUG-19	R4752671
Total Soluble Dustfall		0.98		0.10	mg/dm2.day		13-AUG-19	R4752671
Ammonia, Total (as N)		0.0106		0.0018	mg/dm2.day	13-AUG-19	14-AUG-19	R4753549
Interval				1	days		13-AUG-19	R4752293
Chloride (Cl)		<0.064		0.064	mg/dm2.day	13-AUG-19	13-AUG-19	R4753148
Interval				1	days		13-AUG-19	R4752293
Interval				1	days		13-AUG-19	R4752293
Nitrate (as N)		0.00097		0.00037	mg/dm2.day	13-AUG-19	13-AUG-19	R4753148
Interval				1	days		13-AUG-19	R4752293
Sulfate (SO4)		0.0053		0.0046	mg/dm2.day	13-AUG-19	13-AUG-19	R4753148
Interval				1	days		12-AUG-19	R4746811
Mercury (Hg)-Total		<0.0000011		0.0000011	mg/dm2.day	12-AUG-19	12-AUG-19	R4747339
Total Metals in Dustfalls by ICPMS								
Aluminum (Al)-Total		0.000702		0.000066	mg/dm2.day	12-AUG-19	12-AUG-19	R4748589
Interval				1	days		12-AUG-19	R4747829
Antimony (Sb)-Total		<0.0000022		0.0000022	mg/dm2.day	12-AUG-19	12-AUG-19	R4748589
Arsenic (As)-Total		<0.0000022		0.0000022	mg/dm2.day	12-AUG-19	12-AUG-19	R4748589
Barium (Ba)-Total		0.0000115		0.0000011	mg/dm2.day	12-AUG-19	12-AUG-19	R4748589
Beryllium (Be)-Total		<0.000011		0.000011	mg/dm2.day	12-AUG-19	12-AUG-19	R4748589
Bismuth (Bi)-Total		0.000012		0.000011	mg/dm2.day	12-AUG-19	12-AUG-19	R4748589
Boron (B)-Total		<0.00022		0.00022	mg/dm2.day	12-AUG-19	12-AUG-19	R4748589
Cadmium (Cd)-Total		<0.0000011		0.0000011	mg/dm2.day	12-AUG-19	12-AUG-19	R4748589
Calcium (Ca)-Total		0.00391		0.00044	mg/dm2.day	12-AUG-19	12-AUG-19	R4748589
Chromium (Cr)-Total		<0.000011		0.000011	mg/dm2.day	12-AUG-19	12-AUG-19	R4748589
Cobalt (Co)-Total		<0.0000022		0.0000022	mg/dm2.day	12-AUG-19	12-AUG-19	R4748589
Copper (Cu)-Total		<0.00022	DLB	0.00022	mg/dm2.day	12-AUG-19	12-AUG-19	R4748589
Lead (Pb)-Total		<0.0000044	DLB	0.0000044	mg/dm2.day	12-AUG-19	12-AUG-19	R4748589
Iron (Fe)-Total		0.00137		0.00066	mg/dm2.day	12-AUG-19	12-AUG-19	R4748589
Lithium (Li)-Total		<0.00011		0.00011	mg/dm2.day	12-AUG-19	12-AUG-19	R4748589
Magnesium (Mg)-Total		0.00393		0.00011	mg/dm2.day	12-AUG-19	12-AUG-19	R4748589
Manganese (Mn)-Total		0.000111		0.0000022	mg/dm2.day	12-AUG-19	12-AUG-19	R4748589
Molybdenum (Mo)-Total		<0.0000011		0.0000011	mg/dm2.day	12-AUG-19	12-AUG-19	R4748589
Nickel (Ni)-Total		<0.000011		0.000011	mg/dm2.day	12-AUG-19	12-AUG-19	R4748589
Phosphorus (P)-Total		0.0197		0.0011	mg/dm2.day	12-AUG-19	12-AUG-19	R4748589
Potassium (K)-Total		0.0326		0.0011	mg/dm2.day	12-AUG-19	12-AUG-19	R4748589
Selenium (Se)-Total		<0.000022		0.000022	mg/dm2.day	12-AUG-19	12-AUG-19	R4748589
Silicon (Si)-Total		<0.0011		0.0011	mg/dm2.day	12-AUG-19	12-AUG-19	R4748589
Silver (Ag)-Total		<0.00000022		0.0000002	mg/dm2.day	12-AUG-19	12-AUG-19	R4748589

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters		Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L2323197-2	TIADF2							
Sampled By:	CLIENT on 02-JUL-19							
Matrix:	WATER							
Total Metals in Dustfalls by ICPMS								
Titanium (Ti)-Total		<0.00022		0.00022	mg/dm2.day	12-AUG-19	12-AUG-19	R4748589
Uranium (U)-Total		<0.00000022		0.00000022	mg/dm2.day	12-AUG-19	12-AUG-19	R4748589
Vanadium (V)-Total		<0.000022		0.000022	mg/dm2.day	12-AUG-19	12-AUG-19	R4748589
Zinc (Zn)-Total		<0.00066	DLB	0.00066	mg/dm2.day	12-AUG-19	12-AUG-19	R4748589
L2323197-3	TIADF3							
Sampled By:	CLIENT on 02-JUL-19							
Matrix:	WATER							
Combined Dustfalls-Total, soluble, insol								
Total Dustfall		<0.10		0.10	mg/dm2.day		13-AUG-19	R4752671
Total Insoluble Dustfall		<0.10		0.10	mg/dm2.day		13-AUG-19	R4752671
Total Soluble Dustfall		<0.10		0.10	mg/dm2.day		13-AUG-19	R4752671
Ammonia, Total (as N)		0.00062		0.00012	mg/dm2.day	13-AUG-19	14-AUG-19	R4753549
Interval				1	days		13-AUG-19	R4752293
Chloride (Cl)		<0.021		0.021	mg/dm2.day	13-AUG-19	13-AUG-19	R4753148
Interval				1	days		13-AUG-19	R4752293
Interval				1	days		13-AUG-19	R4752293
Nitrate (as N)		0.00014		0.00012	mg/dm2.day	13-AUG-19	13-AUG-19	R4753148
Interval				1	days		13-AUG-19	R4752293
Sulfate (SO4)		<0.0015		0.0015	mg/dm2.day	13-AUG-19	13-AUG-19	R4753148
Interval				1	days		12-AUG-19	R4746811
Mercury (Hg)-Total		<0.00000076		0.00000076	mg/dm2.day	12-AUG-19	12-AUG-19	R4747339
Total Metals in Dustfalls by ICPMS								
Aluminum (Al)-Total		0.000762		0.000046	mg/dm2.day	12-AUG-19	12-AUG-19	R4748589
Interval				1	days		12-AUG-19	R4747829
Antimony (Sb)-Total		<0.00000015		0.00000015	mg/dm2.day	12-AUG-19	12-AUG-19	R4748589
Arsenic (As)-Total		<0.00000015		0.00000015	mg/dm2.day	12-AUG-19	12-AUG-19	R4748589
Barium (Ba)-Total		0.00000775		0.00000076	mg/dm2.day	12-AUG-19	12-AUG-19	R4748589
Beryllium (Be)-Total		<0.00000076		0.00000076	mg/dm2.day	12-AUG-19	12-AUG-19	R4748589
Bismuth (Bi)-Total		0.0000282		0.00000076	mg/dm2.day	12-AUG-19	12-AUG-19	R4748589
Boron (B)-Total		<0.00015		0.00015	mg/dm2.day	12-AUG-19	12-AUG-19	R4748589
Cadmium (Cd)-Total		<0.00000076		0.00000076	mg/dm2.day	12-AUG-19	12-AUG-19	R4748589
Calcium (Ca)-Total		0.00351		0.00030	mg/dm2.day	12-AUG-19	12-AUG-19	R4748589
Chromium (Cr)-Total		<0.00000076		0.00000076	mg/dm2.day	12-AUG-19	12-AUG-19	R4748589
Cobalt (Co)-Total		<0.00000015		0.00000015	mg/dm2.day	12-AUG-19	12-AUG-19	R4748589
Copper (Cu)-Total		0.000586		0.00000076	mg/dm2.day	12-AUG-19	12-AUG-19	R4748589
Lead (Pb)-Total		<0.00000046	DLB	0.00000046	mg/dm2.day	12-AUG-19	12-AUG-19	R4748589
Iron (Fe)-Total		0.00175		0.00046	mg/dm2.day	12-AUG-19	12-AUG-19	R4748589
Lithium (Li)-Total		<0.000076		0.000076	mg/dm2.day	12-AUG-19	12-AUG-19	R4748589
Magnesium (Mg)-Total		0.00278		0.000076	mg/dm2.day	12-AUG-19	12-AUG-19	R4748589
Manganese (Mn)-Total		0.0000551		0.00000015	mg/dm2.day	12-AUG-19	12-AUG-19	R4748589
Molybdenum (Mo)-Total		<0.00000076		0.00000076	mg/dm2.day	12-AUG-19	12-AUG-19	R4748589
Nickel (Ni)-Total		<0.00000076		0.00000076	mg/dm2.day	12-AUG-19	12-AUG-19	R4748589
Phosphorus (P)-Total		0.0111		0.00076	mg/dm2.day	12-AUG-19	12-AUG-19	R4748589
Potassium (K)-Total		0.0175		0.00076	mg/dm2.day	12-AUG-19	12-AUG-19	R4748589
Selenium (Se)-Total		<0.00000015		0.00000015	mg/dm2.day	12-AUG-19	12-AUG-19	R4748589
Silicon (Si)-Total		0.00115		0.00076	mg/dm2.day	12-AUG-19	12-AUG-19	R4748589

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters		Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L2323197-3	TIADF3							
Sampled By:	CLIENT on 02-JUL-19							
Matrix:	WATER							
Total Metals in Dustfalls by ICPMS								
Silver (Ag)-Total	0.00000019			0.00000015	mg/dm2.day	12-AUG-19	12-AUG-19	R4748589
Sodium (Na)-Total	0.00904			0.00076	mg/dm2.day	12-AUG-19	12-AUG-19	R4748589
Strontium (Sr)-Total	0.0000084			0.0000015	mg/dm2.day	12-AUG-19	12-AUG-19	R4748589
Thallium (Tl)-Total	<0.0000015			0.0000015	mg/dm2.day	12-AUG-19	12-AUG-19	R4748589
Tin (Sn)-Total	<0.0000015			0.0000015	mg/dm2.day	12-AUG-19	12-AUG-19	R4748589
Titanium (Ti)-Total	<0.00015			0.00015	mg/dm2.day	12-AUG-19	12-AUG-19	R4748589
Uranium (U)-Total	0.00000021			0.00000015	mg/dm2.day	12-AUG-19	12-AUG-19	R4748589
Vanadium (V)-Total	<0.000015			0.000015	mg/dm2.day	12-AUG-19	12-AUG-19	R4748589
Zinc (Zn)-Total	<0.00041	DLB		0.00041	mg/dm2.day	12-AUG-19	12-AUG-19	R4748589
L2323197-4	DFA1							
Sampled By:	CLIENT on 02-JUL-19							
Matrix:	WATER							
Combined Dustfalls-Total, soluble, insol								
Total Dustfall	1.05			0.10	mg/dm2.day		13-AUG-19	R4752671
Total Insoluble Dustfall	<0.10			0.10	mg/dm2.day		13-AUG-19	R4752671
Total Soluble Dustfall	0.96			0.10	mg/dm2.day		13-AUG-19	R4752671
Ammonia, Total (as N)	0.0135			0.0024	mg/dm2.day	13-AUG-19	14-AUG-19	R4753549
Interval				1	days		13-AUG-19	R4752293
Chloride (Cl)	<0.083			0.083	mg/dm2.day	13-AUG-19	13-AUG-19	R4753148
Interval				1	days		13-AUG-19	R4752293
Interval				1	days		13-AUG-19	R4752293
Nitrate (as N)	0.00093			0.00047	mg/dm2.day	13-AUG-19	13-AUG-19	R4753148
Interval				1	days		13-AUG-19	R4752293
Sulfate (SO4)	<0.0059			0.0059	mg/dm2.day	13-AUG-19	13-AUG-19	R4753148
Interval				1	days		12-AUG-19	R4746811
Mercury (Hg)-Total	<0.00000058			0.000000058	mg/dm2.day	12-AUG-19	12-AUG-19	R4747339
Total Metals in Dustfalls by ICPMS								
Aluminum (Al)-Total	0.00107			0.000035	mg/dm2.day	12-AUG-19	12-AUG-19	R4748589
Interval				1	days		12-AUG-19	R4747829
Antimony (Sb)-Total	<0.0000012			0.0000012	mg/dm2.day	12-AUG-19	12-AUG-19	R4748589
Arsenic (As)-Total	<0.0000012			0.0000012	mg/dm2.day	12-AUG-19	12-AUG-19	R4748589
Barium (Ba)-Total	0.0000258			0.000000058	mg/dm2.day	12-AUG-19	12-AUG-19	R4748589
Beryllium (Be)-Total	<0.0000058			0.0000058	mg/dm2.day	12-AUG-19	12-AUG-19	R4748589
Bismuth (Bi)-Total	0.0000196			0.0000058	mg/dm2.day	12-AUG-19	12-AUG-19	R4748589
Boron (B)-Total	<0.00012			0.00012	mg/dm2.day	12-AUG-19	12-AUG-19	R4748589
Cadmium (Cd)-Total	0.00000338			0.000000058	mg/dm2.day	12-AUG-19	12-AUG-19	R4748589
Calcium (Ca)-Total	0.0110			0.00023	mg/dm2.day	12-AUG-19	12-AUG-19	R4748589
Chromium (Cr)-Total	0.0000066			0.0000058	mg/dm2.day	12-AUG-19	12-AUG-19	R4748589
Cobalt (Co)-Total	0.0000015			0.0000012	mg/dm2.day	12-AUG-19	12-AUG-19	R4748589
Copper (Cu)-Total	0.000319			0.0000058	mg/dm2.day	12-AUG-19	12-AUG-19	R4748589
Lead (Pb)-Total	<0.0000047	DLB		0.0000047	mg/dm2.day	12-AUG-19	12-AUG-19	R4748589
Iron (Fe)-Total	0.00210			0.00035	mg/dm2.day	12-AUG-19	12-AUG-19	R4748589
Lithium (Li)-Total	<0.000058			0.000058	mg/dm2.day	12-AUG-19	12-AUG-19	R4748589
Magnesium (Mg)-Total	0.00310			0.000058	mg/dm2.day	12-AUG-19	12-AUG-19	R4748589
Manganese (Mn)-Total	0.000136			0.0000012	mg/dm2.day	12-AUG-19	12-AUG-19	R4748589
Molybdenum (Mo)-Total	<0.00000058			0.000000058	mg/dm2.day	12-AUG-19	12-AUG-19	R4748589

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L2323197-4 DFA1 Sampled By: CLIENT on 02-JUL-19 Matrix: WATER Total Metals in Dustfalls by ICPMS							
			8				
Nickel (Ni)-Total	<0.0000058		0.0000058	mg/dm2.day	12-AUG-19	12-AUG-19	R4748589
Phosphorus (P)-Total	0.00834		0.00058	mg/dm2.day	12-AUG-19	12-AUG-19	R4748589
Potassium (K)-Total	0.0135		0.00058	mg/dm2.day	12-AUG-19	12-AUG-19	R4748589
Selenium (Se)-Total	<0.000012		0.000012	mg/dm2.day	12-AUG-19	12-AUG-19	R4748589
Silicon (Si)-Total	0.00119		0.00058	mg/dm2.day	12-AUG-19	12-AUG-19	R4748589
Silver (Ag)-Total	<0.00000012		0.00000012	mg/dm2.day	12-AUG-19	12-AUG-19	R4748589
			2				
Sodium (Na)-Total	0.00769		0.00058	mg/dm2.day	12-AUG-19	12-AUG-19	R4748589
Strontium (Sr)-Total	0.0000398		0.0000012	mg/dm2.day	12-AUG-19	12-AUG-19	R4748589
Thallium (Tl)-Total	<0.0000012		0.0000012	mg/dm2.day	12-AUG-19	12-AUG-19	R4748589
Tin (Sn)-Total	<0.0000012		0.0000012	mg/dm2.day	12-AUG-19	12-AUG-19	R4748589
Titanium (Ti)-Total	<0.00012		0.00012	mg/dm2.day	12-AUG-19	12-AUG-19	R4748589
Uranium (U)-Total	<0.00000012		0.00000012	mg/dm2.day	12-AUG-19	12-AUG-19	R4748589
			2				
Vanadium (V)-Total	<0.000012		0.000012	mg/dm2.day	12-AUG-19	12-AUG-19	R4748589
Zinc (Zn)-Total	<0.00028	DLB	0.00028	mg/dm2.day	12-AUG-19	12-AUG-19	R4748589
L2323197-5 CDF4 Sampled By: CLIENT on 02-JUL-19 Matrix: WATER Combined Dustfalls-Total, soluble, insol							
Total Dustfall	0.53		0.10	mg/dm2.day		13-AUG-19	R4752671
Total Insoluble Dustfall	<0.10		0.10	mg/dm2.day		13-AUG-19	R4752671
Total Soluble Dustfall	0.44		0.10	mg/dm2.day		13-AUG-19	R4752671
Ammonia, Total (as N)	0.00495		0.00048	mg/dm2.day	13-AUG-19	14-AUG-19	R4753549
Interval			1	days		13-AUG-19	R4752293
Chloride (Cl)	<0.084		0.084	mg/dm2.day	13-AUG-19	13-AUG-19	R4753148
Interval			1	days		13-AUG-19	R4752293
Interval			1	days		13-AUG-19	R4752293
Nitrate (as N)	0.00085		0.00048	mg/dm2.day	13-AUG-19	13-AUG-19	R4753148
Interval			1	days		13-AUG-19	R4752293
Sulfate (SO4)	<0.0060		0.0060	mg/dm2.day	13-AUG-19	13-AUG-19	R4753148
Interval			1	days		12-AUG-19	R4746811
Mercury (Hg)-Total	<0.00000068		0.00000068	mg/dm2.day	12-AUG-19	12-AUG-19	R4747339
			8				
Total Metals in Dustfalls by ICPMS							
Aluminum (Al)-Total	0.00348		0.000041	mg/dm2.day	12-AUG-19	12-AUG-19	R4748589
Interval			1	days		12-AUG-19	R4747829
Antimony (Sb)-Total	<0.0000014		0.0000014	mg/dm2.day	12-AUG-19	12-AUG-19	R4748589
Arsenic (As)-Total	<0.0000014		0.0000014	mg/dm2.day	12-AUG-19	12-AUG-19	R4748589
Barium (Ba)-Total	0.00000854		0.00000068	mg/dm2.day	12-AUG-19	12-AUG-19	R4748589
			8				
Beryllium (Be)-Total	<0.0000068		0.0000068	mg/dm2.day	12-AUG-19	12-AUG-19	R4748589
Bismuth (Bi)-Total	0.0000130		0.0000068	mg/dm2.day	12-AUG-19	12-AUG-19	R4748589
Boron (B)-Total	<0.00014		0.00014	mg/dm2.day	12-AUG-19	12-AUG-19	R4748589
Cadmium (Cd)-Total	<0.00000068		0.00000068	mg/dm2.day	12-AUG-19	12-AUG-19	R4748589
			8				
Calcium (Ca)-Total	0.0145		0.00027	mg/dm2.day	12-AUG-19	12-AUG-19	R4748589
Chromium (Cr)-Total	0.0000126		0.0000068	mg/dm2.day	12-AUG-19	12-AUG-19	R4748589
Cobalt (Co)-Total	0.0000035		0.0000014	mg/dm2.day	12-AUG-19	12-AUG-19	R4748589
Copper (Cu)-Total	<0.00029	DLB	0.00029	mg/dm2.day	12-AUG-19	12-AUG-19	R4748589

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters		Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L2323197-5	CDF4							
Sampled By:	CLIENT on 02-JUL-19							
Matrix:	WATER							
Total Metals in Dustfalls by ICPMS								
Lead (Pb)-Total	<0.0000041	DLB	0.0000041	mg/dm2.day	12-AUG-19	12-AUG-19	R4748589	
Iron (Fe)-Total	0.00729		0.00041	mg/dm2.day	12-AUG-19	12-AUG-19	R4748589	
Lithium (Li)-Total	<0.000068		0.000068	mg/dm2.day	12-AUG-19	12-AUG-19	R4748589	
Magnesium (Mg)-Total	0.00414		0.000068	mg/dm2.day	12-AUG-19	12-AUG-19	R4748589	
Manganese (Mn)-Total	0.000241		0.0000014	mg/dm2.day	12-AUG-19	12-AUG-19	R4748589	
Molybdenum (Mo)-Total	<0.00000068		0.00000068	mg/dm2.day	12-AUG-19	12-AUG-19	R4748589	
Nickel (Ni)-Total	0.0000080		0.0000068	mg/dm2.day	12-AUG-19	12-AUG-19	R4748589	
Phosphorus (P)-Total	0.00363		0.00068	mg/dm2.day	12-AUG-19	12-AUG-19	R4748589	
Potassium (K)-Total	0.00561		0.00068	mg/dm2.day	12-AUG-19	12-AUG-19	R4748589	
Selenium (Se)-Total	<0.000014		0.000014	mg/dm2.day	12-AUG-19	12-AUG-19	R4748589	
Silicon (Si)-Total	0.00387		0.00068	mg/dm2.day	12-AUG-19	12-AUG-19	R4748589	
Silver (Ag)-Total	<0.00000014		0.00000014	mg/dm2.day	12-AUG-19	12-AUG-19	R4748589	
Sodium (Na)-Total	0.00556		0.00068	mg/dm2.day	12-AUG-19	12-AUG-19	R4748589	
Strontium (Sr)-Total	0.0000108		0.0000014	mg/dm2.day	12-AUG-19	12-AUG-19	R4748589	
Thallium (Tl)-Total	<0.0000014		0.0000014	mg/dm2.day	12-AUG-19	12-AUG-19	R4748589	
Tin (Sn)-Total	<0.0000014		0.0000014	mg/dm2.day	12-AUG-19	12-AUG-19	R4748589	
Titanium (Ti)-Total	<0.00014		0.00014	mg/dm2.day	12-AUG-19	12-AUG-19	R4748589	
Uranium (U)-Total	<0.00000014		0.00000014	mg/dm2.day	12-AUG-19	12-AUG-19	R4748589	
Vanadium (V)-Total	0.000018		0.000014	mg/dm2.day	12-AUG-19	12-AUG-19	R4748589	
Zinc (Zn)-Total	<0.00025	DLB	0.00025	mg/dm2.day	12-AUG-19	12-AUG-19	R4748589	

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

Reference Information

Sample Parameter Qualifier Key:

Qualifier	Description
B	Method Blank exceeds ALS DQO. Associated sample results which are < Limit of Reporting or > 5 times blank level are considered reliable.
DLB	Detection Limit Raised. Analyte detected at comparable level in Method Blank.
DUP-H	Duplicate results outside ALS DQO, due to sample heterogeneity.
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
DUSTFALLS-COM-DM2-VA	Dustfall	Combined Dustfalls-Total, soluble, insol	BCMOE PARTICULATE

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 specifically 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".

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
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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
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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
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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 specifically 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.

Results are reported in units of nitrogen weight. To convert to units by weight of ammonium, multiply by 1.29.

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

Results are reported in units of nitrogen weight. To convert to units by weight of nitrate, multiply by 4.43.

SO4-IC-VA	Dustfall	Dustfall Sulfate by Ion Chromatography	BC LAB MAN. - PART. - SOLUBLE - ANIONS
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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 specifically 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
VA	ALS ENVIRONMENTAL - VANCOUVER, BRITISH COLUMBIA, CANADA

Chain of Custody Numbers:

Reference Information

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
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GLOSSARY OF REPORT TERMS

Surrogates are compounds that are similar in behaviour to target analyte(s), but that do not normally occur in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery. In reports that display the D.L. column, laboratory objectives for surrogates are listed there.

mg/kg - milligrams per kilogram based on dry weight of sample
mg/kg ww - milligrams per kilogram based on wet weight of sample
mg/kg lwt - milligrams per kilogram based on lipid-adjusted weight
mg/L - unit of concentration based on volume, parts per million.

< - Less than.
D.L. - The reporting limit.
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.



Quality Control Report

Workorder: L2323197

Report Date: 15-AUG-19

Page 1 of 5

Client: TMAC Resources Inc
Hope Bay Project 95 Wellington St West
Toronto ON M5J 2N7

Contact: Environmental Site Manager

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
CL-IC-VA Dustfall								
Batch	R4753148							
WG3130871-2	LCS							
Chloride (Cl)			98.2		%		90-110	13-AUG-19
WG3130871-1	MB							
Chloride (Cl)			<0.18		mg/dm2.day		0.18	13-AUG-19
WG3130871-4	MS	L2323197-1						
Chloride (Cl)			100.8		%		75-125	13-AUG-19
DUSTFALLS-COM-DM2-VA Dustfall								
Batch	R4752671							
WG3130978-2	LCS							
Total Dustfall			101.0		%		85-115	13-AUG-19
Total Insoluble Dustfall			94.0		%		85-115	13-AUG-19
Total Soluble Dustfall			102.2		%		85-115	13-AUG-19
WG3130978-1	MB							
Total Dustfall			<0.10		mg/dm2.day		0.1	13-AUG-19
Total Insoluble Dustfall			<0.10		mg/dm2.day		0.1	13-AUG-19
Total Soluble Dustfall			<0.10		mg/dm2.day		0.1	13-AUG-19
HG-DUST(DM2-CVAFS-VA Dustfall								
Batch	R4747339							
WG3130071-2	LCS							
Mercury (Hg)-Total			87.5		%		70-130	12-AUG-19
WG3130071-1	MB							
Mercury (Hg)-Total			<0.0000013		mg/dm2.day		0.0000013	12-AUG-19
MET-DUST(DM2)-MS-VA Dustfall								
Batch	R4748589							
WG3130075-2	LCS							
Aluminum (Al)-Total			104.6		%		80-120	12-AUG-19
Antimony (Sb)-Total			99.0		%		80-120	12-AUG-19
Arsenic (As)-Total			99.0		%		80-120	12-AUG-19
Barium (Ba)-Total			108.0		%		80-120	12-AUG-19
Beryllium (Be)-Total			97.8		%		80-120	12-AUG-19
Bismuth (Bi)-Total			100.7		%		80-120	12-AUG-19
Boron (B)-Total			99.3		%		80-120	12-AUG-19
Cadmium (Cd)-Total			99.1		%		80-120	12-AUG-19
Calcium (Ca)-Total			99.0		%		80-120	12-AUG-19
Chromium (Cr)-Total			103.3		%		80-120	12-AUG-19
Cobalt (Co)-Total			99.5		%		80-120	12-AUG-19



Quality Control Report

Workorder: L2323197

Report Date: 15-AUG-19

Page 2 of 5

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-DUST(DM2)-MS-VA Dustfall								
Batch R4748589								
WG3130075-2 LCS								
Copper (Cu)-Total			102.8		%		80-120	12-AUG-19
Lead (Pb)-Total			97.2		%		80-120	12-AUG-19
Iron (Fe)-Total			94.2		%		80-120	12-AUG-19
Lithium (Li)-Total			94.1		%		80-120	12-AUG-19
Magnesium (Mg)-Total			99.9		%		80-120	12-AUG-19
Manganese (Mn)-Total			96.8		%		80-120	12-AUG-19
Molybdenum (Mo)-Total			101.3		%		80-120	12-AUG-19
Nickel (Ni)-Total			100.5		%		80-120	12-AUG-19
Phosphorus (P)-Total			88.8		%		80-120	12-AUG-19
Potassium (K)-Total			102.5		%		80-120	12-AUG-19
Selenium (Se)-Total			93.9		%		80-120	12-AUG-19
Silicon (Si)-Total			95.4		%		80-120	12-AUG-19
Silver (Ag)-Total			98.2		%		80-120	12-AUG-19
Sodium (Na)-Total			104.1		%		80-120	12-AUG-19
Strontium (Sr)-Total			102.6		%		80-120	12-AUG-19
Thallium (Tl)-Total			94.4		%		80-120	12-AUG-19
Tin (Sn)-Total			98.4		%		80-120	12-AUG-19
Titanium (Ti)-Total			97.8		%		80-120	12-AUG-19
Uranium (U)-Total			102.7		%		80-120	12-AUG-19
Vanadium (V)-Total			100.8		%		80-120	12-AUG-19
Zinc (Zn)-Total			102.3		%		80-120	12-AUG-19
WG3130075-1 MB								
Aluminum (Al)-Total			0.000082	MB-LOR	mg/dm2.day		0.000079	12-AUG-19
Antimony (Sb)-Total			<0.0000026		mg/dm2.day		0.0000026	12-AUG-19
Arsenic (As)-Total			<0.0000026		mg/dm2.day		0.0000026	12-AUG-19
Barium (Ba)-Total			0.0000013	B	mg/dm2.day		0.0000013	12-AUG-19
Beryllium (Be)-Total			<0.000013		mg/dm2.day		0.000013	12-AUG-19
Bismuth (Bi)-Total			<0.000013		mg/dm2.day		0.000013	12-AUG-19
Boron (B)-Total			<0.00026		mg/dm2.day		0.00026	12-AUG-19
Cadmium (Cd)-Total			<0.0000013		mg/dm2.day		0.0000013	12-AUG-19
Calcium (Ca)-Total			<0.00052		mg/dm2.day		0.00052	12-AUG-19
Chromium (Cr)-Total			<0.000013		mg/dm2.day		0.000013	12-AUG-19
Cobalt (Co)-Total			<0.0000026		mg/dm2.day		0.0000026	12-AUG-19
Copper (Cu)-Total			0.000126	MB-LOR	mg/dm2.day		0.000013	12-AUG-19



Quality Control Report

Workorder: L2323197

Report Date: 15-AUG-19

Page 4 of 5

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
SO4-IC-VA	Dustfall							
Batch	R4753148							
WG3130871-2	LCS							
Sulfate (SO4)			100.5		%		90-110	13-AUG-19
WG3130871-1	MB							
Sulfate (SO4)			<0.013		mg/dm2.day		0.013	13-AUG-19
WG3130871-4	MS	L2323197-1						
Sulfate (SO4)			103.1		%		75-125	13-AUG-19

Quality Control Report

Workorder: L2323197

Report Date: 15-AUG-19

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Legend:

Limit	ALS Control Limit (Data Quality Objectives)
DUP	Duplicate
RPD	Relative Percent Difference
N/A	Not Available
LCS	Laboratory Control Sample
SRM	Standard Reference Material
MS	Matrix Spike
MSD	Matrix Spike Duplicate
ADE	Average Desorption Efficiency
MB	Method Blank
IRM	Internal Reference Material
CRM	Certified Reference Material
CCV	Continuing Calibration Verification
CVS	Calibration Verification Standard
LCSD	Laboratory Control Sample Duplicate

Sample Parameter Qualifier Definitions:

Qualifier	Description
B	Method Blank exceeds ALS DQO. Associated sample results which are < Limit of Reporting or > 5 times blank level are considered reliable.
MB-LOR	Method Blank exceeds ALS DQO. Limits of Reporting have been adjusted for samples with positive hits below 5x blank level.

Hold Time Exceedances:

All test results reported with this submission were conducted within ALS recommended hold times.

ALS recommended hold times may vary by province. They are assigned to meet known provincial and/or federal government requirements. In the absence of regulatory hold times, ALS establishes recommendations based on guidelines published by the US EPA, APHA Standard Methods, or Environment Canada (where available). For more information, please contact ALS.

The ALS Quality Control Report is provided to ALS clients upon request. ALS includes comprehensive QC checks with every analysis to ensure our high standards of quality are met. Each QC result has a known or expected target value, which is compared against pre-determined data quality objectives to provide confidence in the accuracy of associated test results.

Please note that this report may contain QC results from anonymous Sample Duplicates and Matrix Spikes that do not originate from this Work Order.



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: TMAC Resources Ltd (Hope Bay)		<input checked="" type="checkbox"/> Standard <input type="checkbox"/> Other		<input checked="" type="radio"/> Regular (Standard Turnaround Times - Business Days)												
Contact: Environmental Site Manager		<input checked="" type="checkbox"/> PDF <input checked="" type="checkbox"/> Excel <input checked="" type="checkbox"/> Digital <input type="checkbox"/> Fax		<input type="radio"/> Priority (2-4 Business Days) - 50% Surcharge - Contact ALS to Confirm TAT												
Address: 95 Welling Street West, Suite 1010		Email 1: enviro@tmacresources.com		<input type="radio"/> Emergency (1-2 Bus. Days) - 100% Surcharge - Contact ALS to Confirm TAT												
P.O. Box 44, Toronto, ON, M5J 2N7		Email 2: enviro.tech@tmacresources.com		<input type="radio"/> Same Day or Weekend Emergency - Contact ALS to Confirm TAT												
Phone: 1-416-628-0216 Fax:		Email 3: Gregory.Crooks@stantec.com		Analysis Request												
Invoice To Same as Report? Y		Client / Project Information		Please indicate below Filtered, Preserved or both (F, P, F/P)												
Hardcopy of Invoice with Report?		Job #:		P												
Company:		PO / AFE: 4500011700														
Contact:		LSD:														
Address:		Job Ref: Doris Dustfall														
Phone: Fax:		Quote #:														
Lab Work Order # (lab use only):		ALS Contact: Amber Springer		Sampler:												
L2323197																
Sample	Sample Identification (This description will appear on the report)	Date In (dd-mmm-yy)	Date Out (dd-mmm-yy)	Sample Type	Total Particulate	Soluble particulate	Insoluble particulate	Sulphate	Nitrate	NH3, NH4	Cl	Total Metals	Mg+	Ca+	K+	Number of Containers
CONTROLDF		02-Jul-19	02-Aug-19	Water	X	X	X	X	X	X	X	X	X	X	X	1
TIADF2		02-Jul-19	02-Aug-19	Water	X	X	X	X	X	X	X	X	X	X	X	2
TIADF3		02-Jul-19	02-Aug-19	Water	X	X	X	X	X	X	X	X	X	X	X	2
DFA1		02-Jul-19	02-Aug-19	Water	X	X	X	X	X	X	X	X	X	X	X	2
CDF4		02-Jul-19	02-Aug-19	Water	X	X	X	X	X	X	X	X	X	X	X	2
Special Instructions / Regulations with water or land use (CCME-Freshwater Aquatic Life/BC CSR - Commercial/AB Tier 1 - Na																
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 sepa.																
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:						
Kyle Conway	6-Aug-19	7:30	<i>[Signature]</i>	Aug 6/19	15:00	4.4 9.0 9.3 48°C	HA	8/8	12:10p	Yes / No ? If Yes add SIF						



L2323197-COFC



TMAC Resources Inc
ATTN: Environmental Site Manager
Hope Bay Project
95 Wellington St West
Toronto ON M5J 2N7

Date Received: 06-AUG-19
Report Date: 15-AUG-19 13:36 (MT)
Version: FINAL

Client Phone: 867-988-0569

Certificate of Analysis

Lab Work Order #: L2323212
Project P.O. #: 4500011700
Job Reference: MADRID DUSTFALL
C of C Numbers:
Legal Site Desc:

Amber Springer, B.Sc
Account Manager

[This report shall not be reproduced except in full without the written authority of the Laboratory.]

ADDRESS: 8081 Lougheed Hwy, Suite 100, Burnaby, BC V5A 1W9 Canada | Phone: +1 604 253 4188 | Fax: +1 604 253 6700
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ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L2323212-1 M-DF01 Sampled By: CLIENT on 02-AUG-19 Matrix: WATER							
Combined Dustfalls-Total, soluble, insol							
Total Dustfall	0.20		0.10	mg/dm2.day		13-AUG-19	R4752671
Total Insoluble Dustfall	<0.10		0.10	mg/dm2.day		13-AUG-19	R4752671
Total Soluble Dustfall	0.17		0.10	mg/dm2.day		13-AUG-19	R4752671
Ammonia, Total (as N)	0.00066		0.00012	mg/dm2.day	13-AUG-19	14-AUG-19	R4753549
Interval			1	days		13-AUG-19	R4752293
Chloride (Cl)	<0.021		0.021	mg/dm2.day	13-AUG-19	13-AUG-19	R4753148
Interval			1	days		13-AUG-19	R4752293
Interval			1	days		13-AUG-19	R4752293
Nitrate (as N)	0.00029		0.00012	mg/dm2.day	13-AUG-19	13-AUG-19	R4753148
Interval			1	days		13-AUG-19	R4752293
Sulfate (SO4)	<0.0015		0.0015	mg/dm2.day	13-AUG-19	13-AUG-19	R4753148
Interval			1	days		13-AUG-19	R4750349
Mercury (Hg)-Total	<0.00000069		0.00000069	mg/dm2.day	13-AUG-19	13-AUG-19	R4749512
Total Metals in Dustfalls by ICPMS							
Aluminum (Al)-Total	0.000894		0.000041	mg/dm2.day	13-AUG-19	13-AUG-19	R4752344
Interval			1	days		13-AUG-19	R4751934
Antimony (Sb)-Total	<0.0000014		0.0000014	mg/dm2.day	13-AUG-19	13-AUG-19	R4752344
Arsenic (As)-Total	<0.0000014		0.0000014	mg/dm2.day	13-AUG-19	13-AUG-19	R4752344
Barium (Ba)-Total	0.0000191		0.00000069	mg/dm2.day	13-AUG-19	13-AUG-19	R4752344
Beryllium (Be)-Total	<0.0000069		0.0000069	mg/dm2.day	13-AUG-19	13-AUG-19	R4752344
Bismuth (Bi)-Total	<0.0000069		0.0000069	mg/dm2.day	13-AUG-19	13-AUG-19	R4752344
Boron (B)-Total	<0.00014		0.00014	mg/dm2.day	13-AUG-19	13-AUG-19	R4752344
Cadmium (Cd)-Total	<0.00000069		0.00000069	mg/dm2.day	13-AUG-19	13-AUG-19	R4752344
Calcium (Ca)-Total	0.00347		0.00028	mg/dm2.day	13-AUG-19	13-AUG-19	R4752344
Chromium (Cr)-Total	<0.0000069		0.0000069	mg/dm2.day	13-AUG-19	13-AUG-19	R4752344
Cobalt (Co)-Total	<0.0000014		0.0000014	mg/dm2.day	13-AUG-19	13-AUG-19	R4752344
Copper (Cu)-Total	<0.00014	DLB	0.00014	mg/dm2.day	13-AUG-19	13-AUG-19	R4752344
Lead (Pb)-Total	<0.0000028	DLB	0.0000028	mg/dm2.day	13-AUG-19	13-AUG-19	R4752344
Iron (Fe)-Total	0.00150		0.00041	mg/dm2.day	13-AUG-19	13-AUG-19	R4752344
Lithium (Li)-Total	<0.000069		0.000069	mg/dm2.day	13-AUG-19	13-AUG-19	R4752344
Magnesium (Mg)-Total	0.00107		0.000069	mg/dm2.day	13-AUG-19	13-AUG-19	R4752344
Manganese (Mn)-Total	0.0000566		0.0000014	mg/dm2.day	13-AUG-19	13-AUG-19	R4752344
Molybdenum (Mo)-Total	<0.00000069		0.00000069	mg/dm2.day	13-AUG-19	13-AUG-19	R4752344
Nickel (Ni)-Total	<0.0000069		0.0000069	mg/dm2.day	13-AUG-19	13-AUG-19	R4752344
Phosphorus (P)-Total	0.00103		0.00069	mg/dm2.day	13-AUG-19	13-AUG-19	R4752344
Potassium (K)-Total	0.00093		0.00069	mg/dm2.day	13-AUG-19	13-AUG-19	R4752344
Selenium (Se)-Total	<0.000014		0.000014	mg/dm2.day	13-AUG-19	13-AUG-19	R4752344
Silicon (Si)-Total	0.00095		0.00069	mg/dm2.day	13-AUG-19	13-AUG-19	R4752344
Silver (Ag)-Total	<0.00000014		0.00000014	mg/dm2.day	13-AUG-19	13-AUG-19	R4752344
Sodium (Na)-Total	0.00158		0.00069	mg/dm2.day	13-AUG-19	13-AUG-19	R4752344
Strontium (Sr)-Total	0.0000234		0.0000014	mg/dm2.day	13-AUG-19	13-AUG-19	R4752344
Thallium (Tl)-Total	<0.0000014		0.0000014	mg/dm2.day	13-AUG-19	13-AUG-19	R4752344
Tin (Sn)-Total	<0.0000014		0.0000014	mg/dm2.day	13-AUG-19	13-AUG-19	R4752344
Titanium (Ti)-Total	<0.00014		0.00014	mg/dm2.day	13-AUG-19	13-AUG-19	R4752344
Uranium (U)-Total	<0.00000014		0.00000014	mg/dm2.day	13-AUG-19	13-AUG-19	R4752344
Vanadium (V)-Total	<0.000014		0.000014	mg/dm2.day	13-AUG-19	13-AUG-19	R4752344

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters		Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L2323212-1	M-DF01							
Sampled By:	CLIENT on 02-AUG-19							
Matrix:	WATER							
Total Metals in Dustfalls by ICPMS								
Zinc (Zn)-Total		<0.00017	DLB	0.00017	mg/dm2.day	13-AUG-19	13-AUG-19	R4752344
L2323212-2	M-DF02							
Sampled By:	CLIENT on 02-AUG-19							
Matrix:	WATER							
Combined Dustfalls-Total, soluble, insol								
Total Dustfall		0.50		0.10	mg/dm2.day		13-AUG-19	R4752671
Total Insoluble Dustfall		<0.10		0.10	mg/dm2.day		13-AUG-19	R4752671
Total Soluble Dustfall		0.44		0.10	mg/dm2.day		13-AUG-19	R4752671
Ammonia, Total (as N)		0.00279		0.00034	mg/dm2.day	13-AUG-19	14-AUG-19	R4753549
Interval				1	days		13-AUG-19	R4752293
Chloride (Cl)		<0.060		0.060	mg/dm2.day	13-AUG-19	13-AUG-19	R4753148
Interval				1	days		13-AUG-19	R4752293
Interval				1	days		13-AUG-19	R4752293
Nitrate (as N)		0.00081		0.00034	mg/dm2.day	13-AUG-19	13-AUG-19	R4753148
Interval				1	days		13-AUG-19	R4752293
Sulfate (SO4)		<0.0043		0.0043	mg/dm2.day	13-AUG-19	13-AUG-19	R4753148
Interval				1	days		13-AUG-19	R4750349
Mercury (Hg)-Total		<0.00000056		0.00000056	mg/dm2.day	13-AUG-19	13-AUG-19	R4749512
Total Metals in Dustfalls by ICPMS								
Aluminum (Al)-Total		0.00123		0.000034	mg/dm2.day	13-AUG-19	13-AUG-19	R4752344
Interval				1	days		13-AUG-19	R4751934
Antimony (Sb)-Total		<0.0000011		0.0000011	mg/dm2.day	13-AUG-19	13-AUG-19	R4752344
Arsenic (As)-Total		0.0000039		0.0000011	mg/dm2.day	13-AUG-19	13-AUG-19	R4752344
Barium (Ba)-Total		0.0000387		0.00000056	mg/dm2.day	13-AUG-19	13-AUG-19	R4752344
Beryllium (Be)-Total		<0.0000056		0.0000056	mg/dm2.day	13-AUG-19	13-AUG-19	R4752344
Bismuth (Bi)-Total		0.0000272		0.0000056	mg/dm2.day	13-AUG-19	13-AUG-19	R4752344
Boron (B)-Total		<0.00011		0.00011	mg/dm2.day	13-AUG-19	13-AUG-19	R4752344
Cadmium (Cd)-Total		<0.00000056		0.00000056	mg/dm2.day	13-AUG-19	13-AUG-19	R4752344
Calcium (Ca)-Total		0.00484		0.00023	mg/dm2.day	13-AUG-19	13-AUG-19	R4752344
Chromium (Cr)-Total		<0.0000056		0.0000056	mg/dm2.day	13-AUG-19	13-AUG-19	R4752344
Cobalt (Co)-Total		0.0000013		0.0000011	mg/dm2.day	13-AUG-19	13-AUG-19	R4752344
Copper (Cu)-Total		0.000757		0.0000056	mg/dm2.day	13-AUG-19	13-AUG-19	R4752344
Lead (Pb)-Total		0.0000100		0.00000056	mg/dm2.day	13-AUG-19	13-AUG-19	R4752344
Iron (Fe)-Total		0.00229		0.00034	mg/dm2.day	13-AUG-19	13-AUG-19	R4752344
Lithium (Li)-Total		<0.000056		0.000056	mg/dm2.day	13-AUG-19	13-AUG-19	R4752344
Magnesium (Mg)-Total		0.00228		0.000056	mg/dm2.day	13-AUG-19	13-AUG-19	R4752344
Manganese (Mn)-Total		0.0000810		0.0000011	mg/dm2.day	13-AUG-19	13-AUG-19	R4752344
Molybdenum (Mo)-Total		<0.00000056		0.00000056	mg/dm2.day	13-AUG-19	13-AUG-19	R4752344
Nickel (Ni)-Total		<0.0000056		0.0000056	mg/dm2.day	13-AUG-19	13-AUG-19	R4752344
Phosphorus (P)-Total		0.00756		0.00056	mg/dm2.day	13-AUG-19	13-AUG-19	R4752344
Potassium (K)-Total		0.00952		0.00056	mg/dm2.day	13-AUG-19	13-AUG-19	R4752344
Selenium (Se)-Total		<0.000011		0.000011	mg/dm2.day	13-AUG-19	13-AUG-19	R4752344
Silicon (Si)-Total		0.00164		0.00056	mg/dm2.day	13-AUG-19	13-AUG-19	R4752344
Silver (Ag)-Total		<0.00000011		0.00000011	mg/dm2.day	13-AUG-19	13-AUG-19	R4752344
Sodium (Na)-Total		0.00316		0.00056	mg/dm2.day	13-AUG-19	13-AUG-19	R47523

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters		Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L2323212-2	M-DF02							
Sampled By:	CLIENT on 02-AUG-19							
Matrix:	WATER							
Total Metals in Dustfalls by ICPMS								
Strontium (Sr)-Total		0.0000108		0.0000011	mg/dm2.day	13-AUG-19	13-AUG-19	R4752344
Thallium (Tl)-Total		<0.0000011		0.0000011	mg/dm2.day	13-AUG-19	13-AUG-19	R4752344
Tin (Sn)-Total		<0.0000011		0.0000011	mg/dm2.day	13-AUG-19	13-AUG-19	R4752344
Titanium (Ti)-Total		<0.00011		0.00011	mg/dm2.day	13-AUG-19	13-AUG-19	R4752344
Uranium (U)-Total		0.00000015		0.0000001	mg/dm2.day	13-AUG-19	13-AUG-19	R4752344
Vanadium (V)-Total		<0.000011		0.000011	mg/dm2.day	13-AUG-19	13-AUG-19	R4752344
Zinc (Zn)-Total		<0.00034	DLB	0.00034	mg/dm2.day	13-AUG-19	13-AUG-19	R4752344
L2323212-3	M-DF03							
Sampled By:	CLIENT on 02-AUG-19							
Matrix:	WATER							
Combined Dustfalls-Total, soluble, insol								
Total Dustfall		0.40		0.10	mg/dm2.day		13-AUG-19	R4752671
Total Insoluble Dustfall		<0.10		0.10	mg/dm2.day		13-AUG-19	R4752671
Total Soluble Dustfall		0.36		0.10	mg/dm2.day		13-AUG-19	R4752671
Ammonia, Total (as N)		0.00142		0.00034	mg/dm2.day	13-AUG-19	14-AUG-19	R4753549
Interval				1	days		13-AUG-19	R4752293
Chloride (Cl)		<0.060		0.060	mg/dm2.day	13-AUG-19	13-AUG-19	R4753148
Interval				1	days		13-AUG-19	R4752293
Interval				1	days		13-AUG-19	R4752293
Nitrate (as N)		0.00074		0.00034	mg/dm2.day	13-AUG-19	13-AUG-19	R4753148
Interval				1	days		13-AUG-19	R4752293
Sulfate (SO4)		<0.0043		0.0043	mg/dm2.day	13-AUG-19	13-AUG-19	R4753148
Interval				1	days		13-AUG-19	R4750349
Mercury (Hg)-Total		<0.00000061		0.0000006	mg/dm2.day	13-AUG-19	13-AUG-19	R4749512
Total Metals in Dustfalls by ICPMS								
Aluminum (Al)-Total		0.000633		0.000037	mg/dm2.day	13-AUG-19	13-AUG-19	R4752344
Interval				1	days		13-AUG-19	R4751934
Antimony (Sb)-Total		<0.0000012		0.0000012	mg/dm2.day	13-AUG-19	13-AUG-19	R4752344
Arsenic (As)-Total		<0.0000012		0.0000012	mg/dm2.day	13-AUG-19	13-AUG-19	R4752344
Barium (Ba)-Total		0.0000100		0.0000006	mg/dm2.day	13-AUG-19	13-AUG-19	R4752344
Beryllium (Be)-Total		<0.00000061		0.00000061	mg/dm2.day	13-AUG-19	13-AUG-19	R4752344
Bismuth (Bi)-Total		0.0000090		0.0000061	mg/dm2.day	13-AUG-19	13-AUG-19	R4752344
Boron (B)-Total		<0.00012		0.00012	mg/dm2.day	13-AUG-19	13-AUG-19	R4752344
Cadmium (Cd)-Total		0.00000073		0.0000006	mg/dm2.day	13-AUG-19	13-AUG-19	R4752344
Calcium (Ca)-Total		0.00333		0.00025	mg/dm2.day	13-AUG-19	13-AUG-19	R4752344
Chromium (Cr)-Total		<0.0000061		0.0000061	mg/dm2.day	13-AUG-19	13-AUG-19	R4752344
Cobalt (Co)-Total		<0.0000012		0.0000012	mg/dm2.day	13-AUG-19	13-AUG-19	R4752344
Copper (Cu)-Total		0.000463		0.0000061	mg/dm2.day	13-AUG-19	13-AUG-19	R4752344
Lead (Pb)-Total		<0.0000037	DLB	0.0000037	mg/dm2.day	13-AUG-19	13-AUG-19	R4752344
Iron (Fe)-Total		0.00137		0.00037	mg/dm2.day	13-AUG-19	13-AUG-19	R4752344
Lithium (Li)-Total		<0.000061		0.000061	mg/dm2.day	13-AUG-19	13-AUG-19	R4752344
Magnesium (Mg)-Total		0.00360		0.000061	mg/dm2.day	13-AUG-19	13-AUG-19	R4752344
Manganese (Mn)-Total		0.0000793		0.0000012	mg/dm2.day	13-AUG-19	13-AUG-19	R4752344
Molybdenum (Mo)-Total		0.00000079		0.0000006	mg/dm2.day	13-AUG-19	13-AUG-19	R4752344
Nickel (Ni)-Total		<0.0000061		0.0000061	mg/dm2.day	13-AUG-19	13-AUG-19	R4752344
Phosphorus (P)-Total		0.0216		0.00061	mg/dm2.day	13-AUG-19	13-AUG-19	R4752344

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters		Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L2323212-3	M-DF03							
Sampled By:	CLIENT on 02-AUG-19							
Matrix:	WATER							
Total Metals in Dustfalls by ICPMS								
Potassium (K)-Total	0.0299			0.00061	mg/dm2.day	13-AUG-19	13-AUG-19	R4752344
Selenium (Se)-Total	<0.000012			0.000012	mg/dm2.day	13-AUG-19	13-AUG-19	R4752344
Silicon (Si)-Total	0.00089			0.00061	mg/dm2.day	13-AUG-19	13-AUG-19	R4752344
Silver (Ag)-Total	<0.00000012			0.00000012	mg/dm2.day	13-AUG-19	13-AUG-19	R4752344
Sodium (Na)-Total	0.00729			0.00061	mg/dm2.day	13-AUG-19	13-AUG-19	R4752344
Strontium (Sr)-Total	0.0000093			0.0000012	mg/dm2.day	13-AUG-19	13-AUG-19	R4752344
Thallium (Tl)-Total	<0.0000012			0.0000012	mg/dm2.day	13-AUG-19	13-AUG-19	R4752344
Tin (Sn)-Total	<0.0000012			0.0000012	mg/dm2.day	13-AUG-19	13-AUG-19	R4752344
Titanium (Ti)-Total	<0.00012			0.00012	mg/dm2.day	13-AUG-19	13-AUG-19	R4752344
Uranium (U)-Total	<0.00000012			0.00000012	mg/dm2.day	13-AUG-19	13-AUG-19	R4752344
Vanadium (V)-Total	<0.000012			0.000012	mg/dm2.day	13-AUG-19	13-AUG-19	R4752344
Zinc (Zn)-Total	<0.00063		DLB	0.00063	mg/dm2.day	13-AUG-19	13-AUG-19	R4752344
L2323212-4	M-DF04							
Sampled By:	CLIENT on 02-AUG-19							
Matrix:	WATER							
Combined Dustfalls-Total, soluble, insol								
Total Dustfall	0.52			0.10	mg/dm2.day		13-AUG-19	R4752671
Total Insoluble Dustfall	<0.10			0.10	mg/dm2.day		13-AUG-19	R4752671
Total Soluble Dustfall	0.44			0.10	mg/dm2.day		13-AUG-19	R4752671
Ammonia, Total (as N)	0.00312			0.00032	mg/dm2.day	13-AUG-19	14-AUG-19	R4753549
Interval				1	days		13-AUG-19	R4752293
Chloride (Cl)	<0.057			0.057	mg/dm2.day	13-AUG-19	13-AUG-19	R4753148
Interval				1	days		13-AUG-19	R4752293
Interval				1	days		13-AUG-19	R4752293
Nitrate (as N)	0.00066			0.00032	mg/dm2.day	13-AUG-19	13-AUG-19	R4753148
Interval				1	days		13-AUG-19	R4752293
Sulfate (SO4)	<0.0041			0.0041	mg/dm2.day	13-AUG-19	13-AUG-19	R4753148
Interval				1	days		13-AUG-19	R4750349
Mercury (Hg)-Total	<0.00000069			0.00000069	mg/dm2.day	13-AUG-19	13-AUG-19	R4749512
Total Metals in Dustfalls by ICPMS								
Aluminum (Al)-Total	0.00376			0.000041	mg/dm2.day	13-AUG-19	13-AUG-19	R4752344
Interval				1	days		13-AUG-19	R4751934
Antimony (Sb)-Total	<0.0000014			0.0000014	mg/dm2.day	13-AUG-19	13-AUG-19	R4752344
Arsenic (As)-Total	<0.0000014			0.0000014	mg/dm2.day	13-AUG-19	13-AUG-19	R4752344
Barium (Ba)-Total	0.0000127			0.00000069	mg/dm2.day	13-AUG-19	13-AUG-19	R4752344
Beryllium (Be)-Total	<0.0000069			0.0000069	mg/dm2.day	13-AUG-19	13-AUG-19	R4752344
Bismuth (Bi)-Total	0.0000082			0.0000069	mg/dm2.day	13-AUG-19	13-AUG-19	R4752344
Boron (B)-Total	<0.00014			0.00014	mg/dm2.day	13-AUG-19	13-AUG-19	R4752344
Cadmium (Cd)-Total	<0.00000069			0.00000069	mg/dm2.day	13-AUG-19	13-AUG-19	R4752344
Calcium (Ca)-Total	0.00936			0.00028	mg/dm2.day	13-AUG-19	13-AUG-19	R4752344
Chromium (Cr)-Total	0.0000176			0.0000069	mg/dm2.day	13-AUG-19	13-AUG-19	R4752344
Cobalt (Co)-Total	0.0000035			0.0000014	mg/dm2.day	13-AUG-19	13-AUG-19	R4752344
Copper (Cu)-Total	<0.00030		DLB	0.00030	mg/dm2.day	13-AUG-19	13-AUG-19	R4752344
Lead (Pb)-Total	<0.0000034		DLB	0.0000034	mg/dm2.day	13-AUG-19	13-AUG-19	R4752344
Iron (Fe)-Total	0.00674			0.00041	mg/dm2.day	13-AUG-19	13-AUG-19	R4752344
Lithium (Li)-Total	<0.000069			0.000069	mg/dm2.day	13-AUG-19	13-AUG-19	R4752344

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

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ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters		Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L2323212-5	M-DF05							
Sampled By:	CLIENT on 02-AUG-19							
Matrix:	WATER							
Total Metals in Dustfalls by ICPMS								
Chromium (Cr)-Total	<0.0000061			0.0000061	mg/dm2.day	13-AUG-19	13-AUG-19	R4752344
Cobalt (Co)-Total	<0.0000012			0.0000012	mg/dm2.day	13-AUG-19	13-AUG-19	R4752344
Copper (Cu)-Total	<0.00025	DLB		0.00025	mg/dm2.day	13-AUG-19	13-AUG-19	R4752344
Lead (Pb)-Total	<0.0000037	DLB		0.0000037	mg/dm2.day	13-AUG-19	13-AUG-19	R4752344
Iron (Fe)-Total	0.00069			0.00037	mg/dm2.day	13-AUG-19	13-AUG-19	R4752344
Lithium (Li)-Total	<0.000061			0.000061	mg/dm2.day	13-AUG-19	13-AUG-19	R4752344
Magnesium (Mg)-Total	0.000555			0.000061	mg/dm2.day	13-AUG-19	13-AUG-19	R4752344
Manganese (Mn)-Total	0.0000185			0.0000012	mg/dm2.day	13-AUG-19	13-AUG-19	R4752344
Molybdenum (Mo)-Total	<0.00000061			0.00000061	mg/dm2.day	13-AUG-19	13-AUG-19	R4752344
Nickel (Ni)-Total	<0.0000061			0.0000061	mg/dm2.day	13-AUG-19	13-AUG-19	R4752344
Phosphorus (P)-Total	0.00116			0.00061	mg/dm2.day	13-AUG-19	13-AUG-19	R4752344
Potassium (K)-Total	0.00174			0.00061	mg/dm2.day	13-AUG-19	13-AUG-19	R4752344
Selenium (Se)-Total	<0.000012			0.000012	mg/dm2.day	13-AUG-19	13-AUG-19	R4752344
Silicon (Si)-Total	<0.00061			0.00061	mg/dm2.day	13-AUG-19	13-AUG-19	R4752344
Silver (Ag)-Total	<0.00000012			0.00000012	mg/dm2.day	13-AUG-19	13-AUG-19	R4752344
Sodium (Na)-Total	0.00082			0.00061	mg/dm2.day	13-AUG-19	13-AUG-19	R4752344
Strontium (Sr)-Total	0.0000035			0.0000012	mg/dm2.day	13-AUG-19	13-AUG-19	R4752344
Thallium (Tl)-Total	<0.0000012			0.0000012	mg/dm2.day	13-AUG-19	13-AUG-19	R4752344
Tin (Sn)-Total	<0.0000012			0.0000012	mg/dm2.day	13-AUG-19	13-AUG-19	R4752344
Titanium (Ti)-Total	<0.00012			0.00012	mg/dm2.day	13-AUG-19	13-AUG-19	R4752344
Uranium (U)-Total	0.00000013			0.00000012	mg/dm2.day	13-AUG-19	13-AUG-19	R4752344
Vanadium (V)-Total	<0.000012			0.000012	mg/dm2.day	13-AUG-19	13-AUG-19	R4752344
Zinc (Zn)-Total	<0.00018	DLB		0.00018	mg/dm2.day	13-AUG-19	13-AUG-19	R4752344
L2323212-6	M-DF06							
Sampled By:	CLIENT on 02-AUG-19							
Matrix:	WATER							
Combined Dustfalls-Total, soluble, insol								
Total Dustfall	1.03			0.10	mg/dm2.day		13-AUG-19	R4752671
Total Insoluble Dustfall	0.20			0.10	mg/dm2.day		13-AUG-19	R4752671
Total Soluble Dustfall	0.83			0.10	mg/dm2.day		13-AUG-19	R4752671
Ammonia, Total (as N)	0.00506			0.00041	mg/dm2.day	13-AUG-19	14-AUG-19	R4753549
Interval				1	days		13-AUG-19	R4752293
Chloride (Cl)	<0.071			0.071	mg/dm2.day	13-AUG-19	13-AUG-19	R4753148
Interval				1	days		13-AUG-19	R4752293
Interval				1	days		13-AUG-19	R4752293
Nitrate (as N)	0.00076			0.00041	mg/dm2.day	13-AUG-19	13-AUG-19	R4753148
Interval				1	days		13-AUG-19	R4752293
Sulfate (SO4)	<0.0051			0.0051	mg/dm2.day	13-AUG-19	13-AUG-19	R4753148
Interval				1	days		13-AUG-19	R4750349
Mercury (Hg)-Total	<0.00000066			0.00000066	mg/dm2.day	13-AUG-19	13-AUG-19	R4749512
Total Metals in Dustfalls by ICPMS								
Aluminum (Al)-Total	0.00698			0.000040	mg/dm2.day	13-AUG-19	13-AUG-19	R4752344
Interval				1	days		13-AUG-19	R4751934
Antimony (Sb)-Total	<0.0000013			0.0000013	mg/dm2.day	13-AUG-19	13-AUG-19	R4752344
Arsenic (As)-Total	0.0000016			0.0000013	mg/dm2.day	13-AUG-19	13-AUG-19	R4752344
Barium (Ba)-Total	0.0000154			0.00000066	mg/dm2.day	13-AUG-19	13-AUG-19	R4752344

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L2323212-6M-DF06 Sampled By: CLIENT on 02-AUG-19 Matrix: WATER Total Metals in Dustfalls by ICPMS							
Beryllium (Be)-Total	<0.0000066		0.0000066	mg/dm2.day	13-AUG-19	13-AUG-19	R4752344
Bismuth (Bi)-Total	0.0000205		0.0000066	mg/dm2.day	13-AUG-19	13-AUG-19	R4752344
Boron (B)-Total	<0.00013		0.00013	mg/dm2.day	13-AUG-19	13-AUG-19	R4752344
Cadmium (Cd)-Total	<0.00000066		0.0000006	mg/dm2.day	13-AUG-19	13-AUG-19	R4752344
Calcium (Ca)-Total	0.0206		0.00027	mg/dm2.day	13-AUG-19	13-AUG-19	R4752344
Chromium (Cr)-Total	0.0000303		0.0000066	mg/dm2.day	13-AUG-19	13-AUG-19	R4752344
Cobalt (Co)-Total	0.0000071		0.0000013	mg/dm2.day	13-AUG-19	13-AUG-19	R4752344
Copper (Cu)-Total	0.000570		0.0000066	mg/dm2.day	13-AUG-19	13-AUG-19	R4752344
Lead (Pb)-Total	0.00000745		0.0000006	mg/dm2.day	13-AUG-19	13-AUG-19	R4752344
Iron (Fe)-Total	0.0139		0.00040	mg/dm2.day	13-AUG-19	13-AUG-19	R4752344
Lithium (Li)-Total	<0.000066		0.000066	mg/dm2.day	13-AUG-19	13-AUG-19	R4752344
Magnesium (Mg)-Total	0.00789		0.000066	mg/dm2.day	13-AUG-19	13-AUG-19	R4752344
Manganese (Mn)-Total	0.000401		0.0000013	mg/dm2.day	13-AUG-19	13-AUG-19	R4752344
Molybdenum (Mo)-Total	<0.00000066		0.0000006	mg/dm2.day	13-AUG-19	13-AUG-19	R4752344
Nickel (Ni)-Total	0.0000165		0.0000066	mg/dm2.day	13-AUG-19	13-AUG-19	R4752344
Phosphorus (P)-Total	0.0124		0.00066	mg/dm2.day	13-AUG-19	13-AUG-19	R4752344
Potassium (K)-Total	0.0163		0.00066	mg/dm2.day	13-AUG-19	13-AUG-19	R4752344
Selenium (Se)-Total	<0.000013		0.000013	mg/dm2.day	13-AUG-19	13-AUG-19	R4752344
Silicon (Si)-Total	0.00857		0.00066	mg/dm2.day	13-AUG-19	13-AUG-19	R4752344
Silver (Ag)-Total	<0.00000013		0.0000001	mg/dm2.day	13-AUG-19	13-AUG-19	R4752344
Sodium (Na)-Total	0.00506		0.00066	mg/dm2.day	13-AUG-19	13-AUG-19	R4752344
Strontium (Sr)-Total	0.0000246		0.0000013	mg/dm2.day	13-AUG-19	13-AUG-19	R4752344
Thallium (Tl)-Total	<0.0000013		0.0000013	mg/dm2.day	13-AUG-19	13-AUG-19	R4752344
Tin (Sn)-Total	<0.0000013		0.0000013	mg/dm2.day	13-AUG-19	13-AUG-19	R4752344
Titanium (Ti)-Total	<0.00013		0.00013	mg/dm2.day	13-AUG-19	13-AUG-19	R4752344
Uranium (U)-Total	<0.00000013		0.0000001	mg/dm2.day	13-AUG-19	13-AUG-19	R4752344
Vanadium (V)-Total	0.000034		0.000013	mg/dm2.day	13-AUG-19	13-AUG-19	R4752344
Zinc (Zn)-Total	<0.00044	DLB	0.00044	mg/dm2.day	13-AUG-19	13-AUG-19	R4752344
L2323212-7M-DF07 Sampled By: CLIENT on 02-AUG-19 Matrix: WATER Combined Dustfalls-Total, soluble, insol							
Total Dustfall	2.31		0.10	mg/dm2.day		13-AUG-19	R4752671
Total Insoluble Dustfall	1.24		0.10	mg/dm2.day		13-AUG-19	R4752671
Total Soluble Dustfall	1.07		0.10	mg/dm2.day		13-AUG-19	R4752671
Ammonia, Total (as N)	0.0076		0.0017	mg/dm2.day	13-AUG-19	14-AUG-19	R4753549
Interval			1	days		13-AUG-19	R4752293
Chloride (Cl)	<0.060		0.060	mg/dm2.day	13-AUG-19	13-AUG-19	R4753148
Interval			1	days		13-AUG-19	R4752293
Interval			1	days		13-AUG-19	R4752293
Nitrate (as N)	0.00076		0.00034	mg/dm2.day	13-AUG-19	13-AUG-19	R4753148
Interval			1	days		13-AUG-19	R4752293
Sulfate (SO4)	0.0053		0.0043	mg/dm2.day	13-AUG-19	13-AUG-19	R4753148
Interval			1	days		13-AUG-19	R4750349
Mercury (Hg)-Total	<0.00000066		0.0000006	mg/dm2.day	13-AUG-19	13-AUG-19	R4749512

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L2323212-7M-DF07 Sampled By: CLIENT on 02-AUG-19 Matrix: WATER Total Metals in Dustfalls by ICPMS							
Aluminum (Al)-Total	0.0436		0.000040	mg/dm2.day	13-AUG-19	13-AUG-19	R4752344
Interval			1	days		13-AUG-19	R4751934
Antimony (Sb)-Total	<0.0000013		0.0000013	mg/dm2.day	13-AUG-19	13-AUG-19	R4752344
Arsenic (As)-Total	0.0000048		0.0000013	mg/dm2.day	13-AUG-19	13-AUG-19	R4752344
Barium (Ba)-Total	0.0000368		0.0000006	mg/dm2.day	13-AUG-19	13-AUG-19	R4752344
			6				
Beryllium (Be)-Total	<0.0000066		0.0000066	mg/dm2.day	13-AUG-19	13-AUG-19	R4752344
Bismuth (Bi)-Total	0.0000133		0.0000066	mg/dm2.day	13-AUG-19	13-AUG-19	R4752344
Boron (B)-Total	<0.00013		0.00013	mg/dm2.day	13-AUG-19	13-AUG-19	R4752344
Cadmium (Cd)-Total	<0.00000066		0.0000006	mg/dm2.day	13-AUG-19	13-AUG-19	R4752344
			6				
Calcium (Ca)-Total	0.126		0.00027	mg/dm2.day	13-AUG-19	13-AUG-19	R4752344
Chromium (Cr)-Total	0.000169		0.0000066	mg/dm2.day	13-AUG-19	13-AUG-19	R4752344
Cobalt (Co)-Total	0.0000418		0.0000013	mg/dm2.day	13-AUG-19	13-AUG-19	R4752344
Copper (Cu)-Total	<0.00032	DLB	0.00032	mg/dm2.day	13-AUG-19	13-AUG-19	R4752344
Lead (Pb)-Total	<0.0000053	DLB	0.0000053	mg/dm2.day	13-AUG-19	13-AUG-19	R4752344
Iron (Fe)-Total	0.0869		0.00040	mg/dm2.day	13-AUG-19	13-AUG-19	R4752344
Lithium (Li)-Total	<0.000066		0.000066	mg/dm2.day	13-AUG-19	13-AUG-19	R4752344
Magnesium (Mg)-Total	0.0405		0.000066	mg/dm2.day	13-AUG-19	13-AUG-19	R4752344
Manganese (Mn)-Total	0.00234		0.0000013	mg/dm2.day	13-AUG-19	13-AUG-19	R4752344
Molybdenum (Mo)-Total	0.00000069		0.0000006	mg/dm2.day	13-AUG-19	13-AUG-19	R4752344
			6				
Nickel (Ni)-Total	0.000108		0.0000066	mg/dm2.day	13-AUG-19	13-AUG-19	R4752344
Phosphorus (P)-Total	0.00769		0.00066	mg/dm2.day	13-AUG-19	13-AUG-19	R4752344
Potassium (K)-Total	0.0117		0.00066	mg/dm2.day	13-AUG-19	13-AUG-19	R4752344
Selenium (Se)-Total	<0.000013		0.000013	mg/dm2.day	13-AUG-19	13-AUG-19	R4752344
Silicon (Si)-Total	0.0499		0.00066	mg/dm2.day	13-AUG-19	13-AUG-19	R4752344
Silver (Ag)-Total	0.00000014		0.0000001	mg/dm2.day	13-AUG-19	13-AUG-19	R4752344
			3				
Sodium (Na)-Total	0.00493		0.00066	mg/dm2.day	13-AUG-19	13-AUG-19	R4752344
Strontium (Sr)-Total	0.0000731		0.0000013	mg/dm2.day	13-AUG-19	13-AUG-19	R4752344
Thallium (Tl)-Total	<0.0000013		0.0000013	mg/dm2.day	13-AUG-19	13-AUG-19	R4752344
Tin (Sn)-Total	0.0000026		0.0000013	mg/dm2.day	13-AUG-19	13-AUG-19	R4752344
Titanium (Ti)-Total	0.00081		0.00013	mg/dm2.day	13-AUG-19	13-AUG-19	R4752344
Uranium (U)-Total	0.00000026		0.0000001	mg/dm2.day	13-AUG-19	13-AUG-19	R4752344
			3				
Vanadium (V)-Total	0.000219		0.000013	mg/dm2.day	13-AUG-19	13-AUG-19	R4752344
Zinc (Zn)-Total	<0.00040	DLB	0.00040	mg/dm2.day	13-AUG-19	13-AUG-19	R4752344
L2323212-8M-DF08 Sampled By: CLIENT on 02-AUG-19 Matrix: WATER Combined Dustfalls-Total, soluble, insol							
Total Dustfall	1.65		0.10	mg/dm2.day		13-AUG-19	R4752671
Total Insoluble Dustfall	0.69		0.10	mg/dm2.day		13-AUG-19	R4752671
Total Soluble Dustfall	0.96		0.10	mg/dm2.day		13-AUG-19	R4752671
Ammonia, Total (as N)	0.0063		0.0020	mg/dm2.day	13-AUG-19	14-AUG-19	R4753549
Interval			1	days		13-AUG-19	R4752293
Chloride (Cl)	<0.071		0.071	mg/dm2.day	13-AUG-19	13-AUG-19	R4753148
Interval			1	days		13-AUG-19	R4752293
Interval			1	days		13-AUG-19	R4752293
Nitrate (as N)	0.00089		0.00041	mg/dm2.day	13-AUG-19	13-AUG-19	R4753148

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L2323212-8 M-DF08 Sampled By: CLIENT on 02-AUG-19 Matrix: WATER							
Interval			1	days		13-AUG-19	R4752293
Sulfate (SO4)	0.0056		0.0051	mg/dm2.day	13-AUG-19	13-AUG-19	R4753148
Interval			1	days		13-AUG-19	R4750349
Mercury (Hg)-Total	<0.00000064		0.00000064	mg/dm2.day	13-AUG-19	13-AUG-19	R4749512
			4				
Total Metals in Dustfalls by ICPMS							
Aluminum (Al)-Total	0.0472		0.000038	mg/dm2.day	13-AUG-19	13-AUG-19	R4752344
Interval			1	days		13-AUG-19	R4751934
Antimony (Sb)-Total	<0.0000013		0.0000013	mg/dm2.day	13-AUG-19	13-AUG-19	R4752344
Arsenic (As)-Total	0.0000057		0.0000013	mg/dm2.day	13-AUG-19	13-AUG-19	R4752344
Barium (Ba)-Total	0.0000437		0.00000064	mg/dm2.day	13-AUG-19	13-AUG-19	R4752344
			4				
Beryllium (Be)-Total	<0.0000064		0.0000064	mg/dm2.day	13-AUG-19	13-AUG-19	R4752344
Bismuth (Bi)-Total	0.0000156		0.0000064	mg/dm2.day	13-AUG-19	13-AUG-19	R4752344
Boron (B)-Total	<0.00013		0.00013	mg/dm2.day	13-AUG-19	13-AUG-19	R4752344
Cadmium (Cd)-Total	0.00000070		0.00000064	mg/dm2.day	13-AUG-19	13-AUG-19	R4752344
			4				
Calcium (Ca)-Total	0.126		0.00026	mg/dm2.day	13-AUG-19	13-AUG-19	R4752344
Chromium (Cr)-Total	0.000198		0.0000064	mg/dm2.day	13-AUG-19	13-AUG-19	R4752344
Cobalt (Co)-Total	0.0000468		0.0000013	mg/dm2.day	13-AUG-19	13-AUG-19	R4752344
Copper (Cu)-Total	0.000461		0.0000064	mg/dm2.day	13-AUG-19	13-AUG-19	R4752344
Lead (Pb)-Total	0.00000701		0.00000064	mg/dm2.day	13-AUG-19	13-AUG-19	R4752344
			4				
Iron (Fe)-Total	0.0953		0.00038	mg/dm2.day	13-AUG-19	13-AUG-19	R4752344
Lithium (Li)-Total	<0.000064		0.000064	mg/dm2.day	13-AUG-19	13-AUG-19	R4752344
Magnesium (Mg)-Total	0.0436		0.000064	mg/dm2.day	13-AUG-19	13-AUG-19	R4752344
Manganese (Mn)-Total	0.00251		0.0000013	mg/dm2.day	13-AUG-19	13-AUG-19	R4752344
Molybdenum (Mo)-Total	0.00000099		0.00000064	mg/dm2.day	13-AUG-19	13-AUG-19	R4752344
			4				
Nickel (Ni)-Total	0.000108		0.0000064	mg/dm2.day	13-AUG-19	13-AUG-19	R4752344
Phosphorus (P)-Total	0.0105		0.00064	mg/dm2.day	13-AUG-19	13-AUG-19	R4752344
Potassium (K)-Total	0.0149		0.00064	mg/dm2.day	13-AUG-19	13-AUG-19	R4752344
Selenium (Se)-Total	<0.000013		0.000013	mg/dm2.day	13-AUG-19	13-AUG-19	R4752344
Silicon (Si)-Total	0.0554		0.00064	mg/dm2.day	13-AUG-19	13-AUG-19	R4752344
Silver (Ag)-Total	0.00000020		0.00000013	mg/dm2.day	13-AUG-19	13-AUG-19	R4752344
			3				
Sodium (Na)-Total	0.00690		0.00064	mg/dm2.day	13-AUG-19	13-AUG-19	R4752344
Strontium (Sr)-Total	0.0000804		0.0000013	mg/dm2.day	13-AUG-19	13-AUG-19	R4752344
Thallium (Tl)-Total	<0.0000013		0.0000013	mg/dm2.day	13-AUG-19	13-AUG-19	R4752344
Tin (Sn)-Total	0.0000031		0.0000013	mg/dm2.day	13-AUG-19	13-AUG-19	R4752344
Titanium (Ti)-Total	0.00100		0.00013	mg/dm2.day	13-AUG-19	13-AUG-19	R4752344
Uranium (U)-Total	0.00000018		0.00000013	mg/dm2.day	13-AUG-19	13-AUG-19	R4752344
			3				
Vanadium (V)-Total	0.000241		0.000013	mg/dm2.day	13-AUG-19	13-AUG-19	R4752344
Zinc (Zn)-Total	<0.00057	DLB	0.00057	mg/dm2.day	13-AUG-19	13-AUG-19	R4752344
L2323212-9 M-DF09 Sampled By: CLIENT on 02-AUG-19 Matrix: WATER							
Combined Dustfalls-Total, soluble, insol							
Total Dustfall	1.64		0.10	mg/dm2.day		13-AUG-19	R4752671
Total Insoluble Dustfall	0.24		0.10	mg/dm2.day		13-AUG-19	R4752671
Total Soluble Dustfall	1.40		0.10	mg/dm2.day		13-AUG-19	R4752671
Ammonia, Total (as N)	0.0103		0.0023	mg/dm2.day	13-AUG-19	14-AUG-19	R4753549

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L2323212-9 M-DF09							
Sampled By: CLIENT on 02-AUG-19							
Matrix: WATER							
Interval			1	days		13-AUG-19	R4752293
Chloride (Cl)	<0.082		0.082	mg/dm2.day	13-AUG-19	13-AUG-19	R4753148
Interval			1	days		13-AUG-19	R4752293
Interval			1	days		13-AUG-19	R4752293
Nitrate (as N)	0.00084		0.00047	mg/dm2.day	13-AUG-19	13-AUG-19	R4753148
Interval			1	days		13-AUG-19	R4752293
Sulfate (SO4)	<0.0058		0.0058	mg/dm2.day	13-AUG-19	13-AUG-19	R4753148
Interval			1	days		13-AUG-19	R4750349
Mercury (Hg)-Total	<0.00000069		0.00000069	mg/dm2.day	13-AUG-19	13-AUG-19	R4749512
Total Metals in Dustfalls by ICPMS							
Aluminum (Al)-Total	0.00734		0.000041	mg/dm2.day	13-AUG-19	13-AUG-19	R4752344
Interval			1	days		13-AUG-19	R4751934
Antimony (Sb)-Total	<0.0000014		0.0000014	mg/dm2.day	13-AUG-19	13-AUG-19	R4752344
Arsenic (As)-Total	0.0000015		0.0000014	mg/dm2.day	13-AUG-19	13-AUG-19	R4752344
Barium (Ba)-Total	0.0000249		0.00000069	mg/dm2.day	13-AUG-19	13-AUG-19	R4752344
Beryllium (Be)-Total	<0.0000069		0.0000069	mg/dm2.day	13-AUG-19	13-AUG-19	R4752344
Bismuth (Bi)-Total	0.0000084		0.0000069	mg/dm2.day	13-AUG-19	13-AUG-19	R4752344
Boron (B)-Total	<0.00014		0.00014	mg/dm2.day	13-AUG-19	13-AUG-19	R4752344
Cadmium (Cd)-Total	<0.00000069		0.00000069	mg/dm2.day	13-AUG-19	13-AUG-19	R4752344
Calcium (Ca)-Total	0.0269		0.00028	mg/dm2.day	13-AUG-19	13-AUG-19	R4752344
Chromium (Cr)-Total	0.0000313		0.0000069	mg/dm2.day	13-AUG-19	13-AUG-19	R4752344
Cobalt (Co)-Total	0.0000075		0.0000014	mg/dm2.day	13-AUG-19	13-AUG-19	R4752344
Copper (Cu)-Total	<0.00030	DLB	0.00030	mg/dm2.day	13-AUG-19	13-AUG-19	R4752344
Lead (Pb)-Total	<0.0000055	DLB	0.0000055	mg/dm2.day	13-AUG-19	13-AUG-19	R4752344
Iron (Fe)-Total	0.0149		0.00041	mg/dm2.day	13-AUG-19	13-AUG-19	R4752344
Lithium (Li)-Total	<0.000069		0.000069	mg/dm2.day	13-AUG-19	13-AUG-19	R4752344
Magnesium (Mg)-Total	0.00827		0.000069	mg/dm2.day	13-AUG-19	13-AUG-19	R4752344
Manganese (Mn)-Total	0.000481		0.0000014	mg/dm2.day	13-AUG-19	13-AUG-19	R4752344
Molybdenum (Mo)-Total	0.00000076		0.00000069	mg/dm2.day	13-AUG-19	13-AUG-19	R4752344
Nickel (Ni)-Total	0.0000191		0.0000069	mg/dm2.day	13-AUG-19	13-AUG-19	R4752344
Phosphorus (P)-Total	0.0103		0.00069	mg/dm2.day	13-AUG-19	13-AUG-19	R4752344
Potassium (K)-Total	0.0136		0.00069	mg/dm2.day	13-AUG-19	13-AUG-19	R4752344
Selenium (Se)-Total	<0.000014		0.000014	mg/dm2.day	13-AUG-19	13-AUG-19	R4752344
Silicon (Si)-Total	0.00916		0.00069	mg/dm2.day	13-AUG-19	13-AUG-19	R4752344
Silver (Ag)-Total	<0.00000014		0.00000014	mg/dm2.day	13-AUG-19	13-AUG-19	R4752344
Sodium (Na)-Total	0.00448		0.00069	mg/dm2.day	13-AUG-19	13-AUG-19	R4752344
Strontium (Sr)-Total	0.0000422		0.0000014	mg/dm2.day	13-AUG-19	13-AUG-19	R4752344
Thallium (Tl)-Total	<0.0000014		0.0000014	mg/dm2.day	13-AUG-19	13-AUG-19	R4752344
Tin (Sn)-Total	0.0000022		0.0000014	mg/dm2.day	13-AUG-19	13-AUG-19	R4752344
Titanium (Ti)-Total	<0.00014		0.00014	mg/dm2.day	13-AUG-19	13-AUG-19	R4752344
Uranium (U)-Total	<0.00000014		0.00000014	mg/dm2.day	13-AUG-19	13-AUG-19	R4752344
Vanadium (V)-Total	0.000036		0.000014	mg/dm2.day	13-AUG-19	13-AUG-19	R4752344
Zinc (Zn)-Total	<0.00041	DLB	0.00041	mg/dm2.day	13-AUG-19	13-AUG-19	R4752344

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

Reference Information

Sample Parameter Qualifier Key:

Qualifier	Description
B	Method Blank exceeds ALS DQO. Associated sample results which are < Limit of Reporting or > 5 times blank level are considered reliable.
DLB	Detection Limit Raised. Analyte detected at comparable level in Method Blank.
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**
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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 specifically 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 specifically 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.

Results are reported in units of nitrogen weight. To convert to units by weight of ammonium, multiply by 1.29.

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 specifically 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".

Results are reported in units of nitrogen weight. To convert to units by weight of nitrate, multiply by 4.43.

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 specifically 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
VA	ALS ENVIRONMENTAL - VANCOUVER, BRITISH COLUMBIA, CANADA

Chain of Custody Numbers:

Reference Information

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
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GLOSSARY OF REPORT TERMS

Surrogates are compounds that are similar in behaviour to target analyte(s), but that do not normally occur in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery. In reports that display the D.L. column, laboratory objectives for surrogates are listed there.

mg/kg - milligrams per kilogram based on dry weight of sample
mg/kg ww - milligrams per kilogram based on wet weight of sample
mg/kg lwt - milligrams per kilogram based on lipid-adjusted weight
mg/L - unit of concentration based on volume, parts per million.

< - Less than.
D.L. - The reporting limit.
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.



Quality Control Report

Workorder: L2323212

Report Date: 15-AUG-19

Page 1 of 6

Client: TMAC Resources Inc
Hope Bay Project 95 Wellington St West
Toronto ON M5J 2N7

Contact: Environmental Site Manager

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
CL-IC-VA Dustfall								
Batch	R4753148							
WG3130871-2 LCS								
Chloride (Cl)			98.2		%		90-110	13-AUG-19
WG3130871-1 MB								
Chloride (Cl)			<0.18		mg/dm2.day		0.18	13-AUG-19
DUSTFALLS-COM-DM2-VA Dustfall								
Batch	R4752671							
WG3130978-2 LCS								
Total Dustfall			101.0		%		85-115	13-AUG-19
Total Insoluble Dustfall			94.0		%		85-115	13-AUG-19
Total Soluble Dustfall			102.2		%		85-115	13-AUG-19
WG3130978-1 MB								
Total Dustfall			<0.10		mg/dm2.day		0.1	13-AUG-19
Total Insoluble Dustfall			<0.10		mg/dm2.day		0.1	13-AUG-19
Total Soluble Dustfall			<0.10		mg/dm2.day		0.1	13-AUG-19
HG-DUST(DM2-CVAFS-VA Dustfall								
Batch	R4749512							
WG3131109-3 DUP								
Mercury (Hg)-Total		L2323212-1 <0.00000069	<0.0000006	RPD-NA	mg/dm2.day	N/A	20	13-AUG-19
WG3131109-2 LCS								
Mercury (Hg)-Total			94.5		%		70-130	13-AUG-19
WG3131109-1 MB								
Mercury (Hg)-Total			<0.0000013		mg/dm2.day		0.0000013	13-AUG-19
WG3131109-4 MS								
Mercury (Hg)-Total		L2323212-2	92.8		%		70-130	13-AUG-19
MET-DUST(DM2)-MS-VA Dustfall								
Batch	R4752344							
WG3131111-3 DUP								
Aluminum (Al)-Total		L2323212-1 0.000894	0.000992		mg/dm2.day	10	20	13-AUG-19
Antimony (Sb)-Total		<0.0000014	<0.0000014	RPD-NA	mg/dm2.day	N/A	20	13-AUG-19
Arsenic (As)-Total		<0.0000014	<0.0000014	RPD-NA	mg/dm2.day	N/A	20	13-AUG-19
Barium (Ba)-Total		0.0000191	0.0000200		mg/dm2.day	4.2	20	13-AUG-19
Beryllium (Be)-Total		<0.0000069	<0.0000069	RPD-NA	mg/dm2.day	N/A	20	13-AUG-19
Bismuth (Bi)-Total		<0.0000069	<0.0000069	RPD-NA	mg/dm2.day	N/A	20	13-AUG-19
Boron (B)-Total		<0.00014	<0.00014	RPD-NA	mg/dm2.day	N/A	20	13-AUG-19
Cadmium (Cd)-Total		<0.00000069	<0.0000006	RPD-NA	mg/dm2.day	N/A	20	13-AUG-19
Calcium (Ca)-Total		0.00347	0.00383		mg/dm2.day	9.7	20	13-AUG-19



Quality Control Report

Workorder: L2323212

Report Date: 15-AUG-19

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Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-DUST(DM2)-MS-VA		Dustfall						
Batch	R4752344							
WG3131111-3	DUP	L2323212-1						
Chromium (Cr)-Total		<0.0000069	<0.0000069	RPD-NA	mg/dm2.day	N/A	20	13-AUG-19
Cobalt (Co)-Total		<0.0000014	<0.0000014	RPD-NA	mg/dm2.day	N/A	20	13-AUG-19
Copper (Cu)-Total		<0.00014	<0.00014	RPD-NA	mg/dm2.day	N/A	20	13-AUG-19
Lead (Pb)-Total		<0.0000028	<0.0000028	RPD-NA	mg/dm2.day	N/A	20	13-AUG-19
Iron (Fe)-Total		0.00150	0.00170		mg/dm2.day	12	20	13-AUG-19
Lithium (Li)-Total		<0.000069	<0.000069	RPD-NA	mg/dm2.day	N/A	20	13-AUG-19
Magnesium (Mg)-Total		0.00107	0.00116		mg/dm2.day	8.0	20	13-AUG-19
Manganese (Mn)-Total		0.0000566	0.0000621		mg/dm2.day	9.3	20	13-AUG-19
Molybdenum (Mo)-Total		<0.00000069	<0.00000069	RPD-NA	mg/dm2.day	N/A	20	13-AUG-19
Nickel (Ni)-Total		<0.0000069	<0.0000069	RPD-NA	mg/dm2.day	N/A	20	13-AUG-19
Phosphorus (P)-Total		0.00103	0.00113		mg/dm2.day	9.3	20	13-AUG-19
Potassium (K)-Total		0.00093	0.00102		mg/dm2.day	9.4	20	13-AUG-19
Selenium (Se)-Total		<0.000014	<0.000014	RPD-NA	mg/dm2.day	N/A	20	13-AUG-19
Silicon (Si)-Total		0.00095	0.00114		mg/dm2.day	18	20	13-AUG-19
Silver (Ag)-Total		<0.00000014	<0.0000001	RPD-NA	mg/dm2.day	N/A	20	13-AUG-19
Sodium (Na)-Total		0.00158	0.00171		mg/dm2.day	8.3	20	13-AUG-19
Strontium (Sr)-Total		0.0000234	0.0000256		mg/dm2.day	8.7	20	13-AUG-19
Thallium (Tl)-Total		<0.0000014	<0.0000014	RPD-NA	mg/dm2.day	N/A	20	13-AUG-19
Tin (Sn)-Total		<0.0000014	<0.0000014	RPD-NA	mg/dm2.day	N/A	20	13-AUG-19
Titanium (Ti)-Total		<0.00014	<0.00014	RPD-NA	mg/dm2.day	N/A	20	13-AUG-19
Uranium (U)-Total		<0.00000014	<0.0000001	RPD-NA	mg/dm2.day	N/A	20	13-AUG-19
Vanadium (V)-Total		<0.000014	<0.000014	RPD-NA	mg/dm2.day	N/A	20	13-AUG-19
Zinc (Zn)-Total		<0.00017	<0.00021	RPD-NA	mg/dm2.day	N/A	20	13-AUG-19
WG3131111-2	LCS							
Aluminum (Al)-Total			105.0		%		80-120	13-AUG-19
Antimony (Sb)-Total			97.2		%		80-120	13-AUG-19
Arsenic (As)-Total			99.0		%		80-120	13-AUG-19
Barium (Ba)-Total			102.1		%		80-120	13-AUG-19
Beryllium (Be)-Total			95.6		%		80-120	13-AUG-19
Bismuth (Bi)-Total			96.3		%		80-120	13-AUG-19
Boron (B)-Total			94.4		%		80-120	13-AUG-19
Cadmium (Cd)-Total			100.2		%		80-120	13-AUG-19
Calcium (Ca)-Total			95.6		%		80-120	13-AUG-19
Chromium (Cr)-Total			99.8		%		80-120	13-AUG-19

Quality Control Report

Workorder: L2323212

Report Date: 15-AUG-19

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Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-DUST(DM2)-MS-VA Dustfall								
Batch R4752344								
WG3131111-2 LCS								
Cobalt (Co)-Total			100.1		%		80-120	13-AUG-19
Copper (Cu)-Total			100.2		%		80-120	13-AUG-19
Lead (Pb)-Total			98.4		%		80-120	13-AUG-19
Iron (Fe)-Total			94.7		%		80-120	13-AUG-19
Lithium (Li)-Total			95.0		%		80-120	13-AUG-19
Magnesium (Mg)-Total			100.1		%		80-120	13-AUG-19
Manganese (Mn)-Total			98.8		%		80-120	13-AUG-19
Molybdenum (Mo)-Total			99.3		%		80-120	13-AUG-19
Nickel (Ni)-Total			99.2		%		80-120	13-AUG-19
Phosphorus (P)-Total			108.3		%		80-120	13-AUG-19
Potassium (K)-Total			96.9		%		80-120	13-AUG-19
Selenium (Se)-Total			97.2		%		80-120	13-AUG-19
Silicon (Si)-Total			99.98		%		80-120	13-AUG-19
Silver (Ag)-Total			93.3		%		80-120	13-AUG-19
Sodium (Na)-Total			100.5		%		80-120	13-AUG-19
Strontium (Sr)-Total			99.6		%		80-120	13-AUG-19
Thallium (Tl)-Total			95.5		%		80-120	13-AUG-19
Tin (Sn)-Total			99.5		%		80-120	13-AUG-19
Titanium (Ti)-Total			97.7		%		80-120	13-AUG-19
Uranium (U)-Total			99.2		%		80-120	13-AUG-19
Vanadium (V)-Total			101.1		%		80-120	13-AUG-19
Zinc (Zn)-Total			103.3		%		80-120	13-AUG-19
WG3131111-1 MB								
Aluminum (Al)-Total			0.000245	MB-LOR	mg/dm2.day		0.000079	13-AUG-19
Antimony (Sb)-Total			<0.0000026		mg/dm2.day		0.0000026	13-AUG-19
Arsenic (As)-Total			<0.0000026		mg/dm2.day		0.0000026	13-AUG-19
Barium (Ba)-Total			0.0000013	B	mg/dm2.day		0.0000013	13-AUG-19
Beryllium (Be)-Total			<0.000013		mg/dm2.day		0.000013	13-AUG-19
Bismuth (Bi)-Total			<0.000013		mg/dm2.day		0.000013	13-AUG-19
Boron (B)-Total			<0.00026		mg/dm2.day		0.00026	13-AUG-19
Cadmium (Cd)-Total			<0.0000013		mg/dm2.day		0.0000013	13-AUG-19
Calcium (Ca)-Total			<0.00052		mg/dm2.day		0.00052	13-AUG-19
Chromium (Cr)-Total			<0.000013		mg/dm2.day		0.000013	13-AUG-19
Cobalt (Co)-Total			<0.0000026		mg/dm2.day		0.0000026	13-AUG-19



Quality Control Report

Workorder: L2323212

Report Date: 15-AUG-19

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Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
SO4-IC-VA	Dustfall							
Batch	R4753148							
WG3130871-2	LCS							
Sulfate (SO4)			100.5		%		90-110	13-AUG-19
WG3130871-1	MB							
Sulfate (SO4)			<0.013		mg/dm2.day		0.013	13-AUG-19

Quality Control Report

Workorder: L2323212

Report Date: 15-AUG-19

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Legend:

Limit	ALS Control Limit (Data Quality Objectives)
DUP	Duplicate
RPD	Relative Percent Difference
N/A	Not Available
LCS	Laboratory Control Sample
SRM	Standard Reference Material
MS	Matrix Spike
MSD	Matrix Spike Duplicate
ADE	Average Desorption Efficiency
MB	Method Blank
IRM	Internal Reference Material
CRM	Certified Reference Material
CCV	Continuing Calibration Verification
CVS	Calibration Verification Standard
LCSD	Laboratory Control Sample Duplicate

Sample Parameter Qualifier Definitions:

Qualifier	Description
B	Method Blank exceeds ALS DQO. Associated sample results which are < Limit of Reporting or > 5 times blank level are considered reliable.
MB-LOR	Method Blank exceeds ALS DQO. Limits of Reporting have been adjusted for samples with positive hits below 5x blank level.
RPD-NA	Relative Percent Difference Not Available due to result(s) being less than detection limit.

Hold Time Exceedances:

All test results reported with this submission were conducted within ALS recommended hold times.

ALS recommended hold times may vary by province. They are assigned to meet known provincial and/or federal government requirements. In the absence of regulatory hold times, ALS establishes recommendations based on guidelines published by the US EPA, APHA Standard Methods, or Environment Canada (where available). For more information, please contact ALS.

The ALS Quality Control Report is provided to ALS clients upon request. ALS includes comprehensive QC checks with every analysis to ensure our high standards of quality are met. Each QC result has a known or expected target value, which is compared against pre-determined data quality objectives to provide confidence in the accuracy of associated test results.

Please note that this report may contain QC results from anonymous Sample Duplicates and Matrix Spikes that do not originate from this Work Order.



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: TMAC Resources Ltd (Hope Bay)		<input checked="" type="checkbox"/> Standard <input type="checkbox"/> Other		<input checked="" type="radio"/> Regular (Standard Turnaround Times - Business Days)																		
Contact: Environmental Site Manager		<input checked="" type="checkbox"/> PDF <input checked="" type="checkbox"/> Excel <input checked="" type="checkbox"/> Digital <input type="checkbox"/> Fax		<input type="radio"/> Priority (2-4 Business Days) - 50% Surcharge - Contact ALS to Confirm TAT																		
Address: 95 Welling Street West, Suite 1010		Email 1: enviro@tmacresources.com		<input type="radio"/> Emergency (1-2 Bus. Days) - 100% Surcharge - Contact ALS to Confirm TAT																		
P.O. Box 44, Toronto, ON, M5J 2N7		Email 2: enviro.tech@tmacresources.com		<input type="radio"/> Same Day or Weekend Emergency - Contact ALS to Confirm TAT																		
Phone: 1-416-628-0216 Fax:		Email 3: Gregory.Crooks@stantec.com		Analysis Request																		
Invoice To Same as Report ? Y		Client / Project Information		Please indicate below Filtered, Preserved or both (F, P, F/P)																		
Hardcopy of invoice with Report?		Job #:		P																		
Company:		PO / AFE: 4500011700																				
Contact:		LSD:																				
Address:		Job Ref: Madrid Dustfall																				
Phone: Fax:		Quote #:																				
Lab Work Order # (lab use only)		ALS Contact: Amber Springer		Sampler:																		
Sample #		Sample Identification (This description will appear on the report)		Date In (dd-mmm-yy)		Date Out (dd-mmm-yy)		Sample Type		Total Particulate	Soluble particulate	Insoluble particulate	Sulphate	Nitrate	NH3, NH4	Cl	Total Metals	Mg+	Ca+	K+	Number of Containers	
1	M-DF01		02-Jul-19	02-Aug-19	Water	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	2	
2	M-DF02		02-Jul-19	02-Aug-19	Water	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	2	
3	M-DF03		02-Jul-19	02-Aug-19	Water	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	2	
4	M-DF04		02-Jul-19	02-Aug-19	Water	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	2	
5	M-DF05		02-Jul-19	02-Aug-19	Water	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	2	
6	M-DF06		02-Jul-19	02-Aug-19	Water	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	2	
7	M-DF07		02-Jul-19	02-Aug-19	Water	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	2	
8	M-DF08		02-Jul-19	02-Aug-19	Water	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	2	
9	M-DF09		02-Jul-19	02-Aug-19	Water	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	2	
Special Instructions / Regulations with water or land use (CCME-Freshwater Aquatic Life/BC CSR - Commercial/AB Tier 1 - Natural, etc) / Hazardous Details																						

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

By the use of this form the user acknowledges and agrees with the Terms and Conditions as provided on:

Also provided on another Excel tab are the ALS location addresses, phone numbers and sample container / preservation /

SHIPMENT RELEASE (client use)		SHIPMENT RECEPTION (lab use only)					
Released by:	Date (dd-mmm-yy)	Time (hh-mm)	Received by:	Date:	Time:	Temperature:	Verified by:
Kyle Conway	6-Aug-19	7:30	<i>[Signature]</i>	Aug 6/19	15:00	4.4°C 9.3 48°C	



L2323212-COFC

HA 8/8 12:10 PM

7C



TMAC Resources Inc
ATTN: Environmental Site Manager
Hope Bay Project
95 Wellington St West
Toronto ON M5J 2N7

Date Received: 03-SEP-19
Report Date: 13-SEP-19 11:42 (MT)
Version: FINAL

Client Phone: 867-988-0569

Certificate of Analysis

Lab Work Order #: L2342127
Project P.O. #: 4500011700
Job Reference: DORIS DUSTFALL
C of C Numbers:
Legal Site Desc:

Amber Springer, B.Sc
Account Manager

[This report shall not be reproduced except in full without the written authority of the Laboratory.]

ADDRESS: 8081 Lougheed Hwy, Suite 100, Burnaby, BC V5A 1W9 Canada | Phone: +1 604 253 4188 | Fax: +1 604 253 6700
ALS CANADA LTD Part of the ALS Group An ALS Limited Company

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L2342127-1 CONTROLDF Sampled By: CLIENT on 01-SEP-19 Matrix: WATER							
Combined Dustfalls-Total, soluble, insol							
Total Dustfall	0.60		0.10	mg/dm2.day		11-SEP-19	R4800689
Total Insoluble Dustfall	<0.10		0.10	mg/dm2.day		11-SEP-19	R4800689
Total Soluble Dustfall	0.50		0.10	mg/dm2.day		11-SEP-19	R4800689
Ammonia, Total (as N)	0.00116		0.00050	mg/dm2.day	10-SEP-19	12-SEP-19	R4799994
Interval			1	days		10-SEP-19	R4794368
Chloride (Cl)	<0.088		0.088	mg/dm2.day	10-SEP-19	10-SEP-19	R4799351
Interval			1	days		10-SEP-19	R4794368
Interval			1	days		10-SEP-19	R4794368
Nitrate (as N)	0.00069		0.00050	mg/dm2.day	10-SEP-19	10-SEP-19	R4799351
Interval			1	days		10-SEP-19	R4794368
Sulfate (SO4)	<0.0063		0.0063	mg/dm2.day	10-SEP-19	10-SEP-19	R4799351
Interval			1	days		10-SEP-19	R4793711
Mercury (Hg)-Total	<0.00000061		0.0000006	mg/dm2.day	10-SEP-19	11-SEP-19	R4795914
			1				
Total Metals in Dustfalls by ICPMS							
Aluminum (Al)-Total	0.000226		0.000037	mg/dm2.day	10-SEP-19	10-SEP-19	R4798528
Interval			1	days		10-SEP-19	R4794672
Antimony (Sb)-Total	<0.0000012		0.0000012	mg/dm2.day	10-SEP-19	10-SEP-19	R4798528
Arsenic (As)-Total	<0.0000012		0.0000012	mg/dm2.day	10-SEP-19	10-SEP-19	R4798528
Barium (Ba)-Total	0.00000806		0.0000006	mg/dm2.day	10-SEP-19	10-SEP-19	R4798528
			1				
Beryllium (Be)-Total	<0.0000061		0.0000061	mg/dm2.day	10-SEP-19	10-SEP-19	R4798528
Bismuth (Bi)-Total	0.0000097		0.0000061	mg/dm2.day	10-SEP-19	10-SEP-19	R4798528
Boron (B)-Total	<0.00012		0.00012	mg/dm2.day	10-SEP-19	10-SEP-19	R4798528
Cadmium (Cd)-Total	<0.00000061		0.0000006	mg/dm2.day	10-SEP-19	10-SEP-19	R4798528
			1				
Calcium (Ca)-Total	0.00176		0.00024	mg/dm2.day	10-SEP-19	10-SEP-19	R4798528
Chromium (Cr)-Total	<0.0000061		0.0000061	mg/dm2.day	10-SEP-19	10-SEP-19	R4798528
Cobalt (Co)-Total	<0.0000012		0.0000012	mg/dm2.day	10-SEP-19	10-SEP-19	R4798528
Copper (Cu)-Total	0.000410		0.0000061	mg/dm2.day	10-SEP-19	10-SEP-19	R4798528
Lead (Pb)-Total	0.00000277		0.0000006	mg/dm2.day	10-SEP-19	10-SEP-19	R4798528
			1				
Iron (Fe)-Total	<0.00037		0.00037	mg/dm2.day	10-SEP-19	10-SEP-19	R4798528
Lithium (Li)-Total	<0.000061		0.000061	mg/dm2.day	10-SEP-19	10-SEP-19	R4798528
Magnesium (Mg)-Total	0.00173		0.000061	mg/dm2.day	10-SEP-19	10-SEP-19	R4798528
Manganese (Mn)-Total	0.0000219		0.0000012	mg/dm2.day	10-SEP-19	10-SEP-19	R4798528
Molybdenum (Mo)-Total	<0.00000061		0.0000006	mg/dm2.day	10-SEP-19	10-SEP-19	R4798528
			1				
Nickel (Ni)-Total	0.0000066		0.0000061	mg/dm2.day	10-SEP-19	10-SEP-19	R4798528
Phosphorus (P)-Total	0.00128		0.00061	mg/dm2.day	10-SEP-19	10-SEP-19	R4798528
Potassium (K)-Total	0.00319		0.00061	mg/dm2.day	10-SEP-19	10-SEP-19	R4798528
Selenium (Se)-Total	<0.000012		0.000012	mg/dm2.day	10-SEP-19	10-SEP-19	R4798528
Silicon (Si)-Total	<0.00061		0.00061	mg/dm2.day	10-SEP-19	10-SEP-19	R4798528
Silver (Ag)-Total	<0.00000012		0.0000001	mg/dm2.day	10-SEP-19	10-SEP-19	R4798528
			2				
Sodium (Na)-Total	0.0110		0.00061	mg/dm2.day	10-SEP-19	10-SEP-19	R4798528
Strontium (Sr)-Total	0.0000138		0.0000012	mg/dm2.day	10-SEP-19	10-SEP-19	R4798528
Thallium (Tl)-Total	<0.0000012		0.0000012	mg/dm2.day	10-SEP-19	10-SEP-19	R4798528
Tin (Sn)-Total	<0.0000012		0.0000012	mg/dm2.day	10-SEP-19	10-SEP-19	R4798528
Titanium (Ti)-Total	<0.00012		0.00012	mg/dm2.day	10-SEP-19	10-SEP-19	R4798528
Uranium (U)-Total	<0.00000012		0.0000001	mg/dm2.day	10-SEP-19	10-SEP-19	R4798528
			2				

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters		Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L2342127-1	CONTROLDF							
Sampled By:	CLIENT on 01-SEP-19							
Matrix:	WATER							
Total Metals in Dustfalls by ICPMS								
Vanadium (V)-Total		<0.000012		0.000012	mg/dm2.day	10-SEP-19	10-SEP-19	R4798528
Zinc (Zn)-Total		<0.00018	DLB	0.00018	mg/dm2.day	10-SEP-19	10-SEP-19	R4798528
L2342127-2	TIADF2							
Sampled By:	CLIENT on 01-SEP-19							
Matrix:	WATER							
Combined Dustfalls-Total, soluble, insol								
Total Dustfall		0.32		0.10	mg/dm2.day		11-SEP-19	R4800689
Total Insoluble Dustfall		<0.10		0.10	mg/dm2.day		11-SEP-19	R4800689
Total Soluble Dustfall		0.27		0.10	mg/dm2.day		11-SEP-19	R4800689
Ammonia, Total (as N)		0.00285		0.00073	mg/dm2.day	10-SEP-19	11-SEP-19	R4795769
Interval				1	days		10-SEP-19	R4794454
Chloride (Cl)		<0.13		0.13	mg/dm2.day	10-SEP-19	10-SEP-19	R4799351
Interval				1	days		10-SEP-19	R4794454
Interval				1	days		10-SEP-19	R4794454
Nitrate (as N)		0.00078		0.00073	mg/dm2.day	10-SEP-19	10-SEP-19	R4799351
Interval				1	days		10-SEP-19	R4794454
Sulfate (SO4)		<0.0092		0.0092	mg/dm2.day	10-SEP-19	10-SEP-19	R4799351
Interval				1	days		10-SEP-19	R4793711
Mercury (Hg)-Total		<0.00000071		0.00000071	mg/dm2.day	10-SEP-19	11-SEP-19	R4795914
Total Metals in Dustfalls by ICPMS								
Aluminum (Al)-Total		0.000318		0.000043	mg/dm2.day	10-SEP-19	10-SEP-19	R4798528
Interval				1	days		10-SEP-19	R4794672
Antimony (Sb)-Total		<0.0000014		0.0000014	mg/dm2.day	10-SEP-19	10-SEP-19	R4798528
Arsenic (As)-Total		<0.0000014		0.0000014	mg/dm2.day	10-SEP-19	10-SEP-19	R4798528
Barium (Ba)-Total		0.0000180		0.00000071	mg/dm2.day	10-SEP-19	10-SEP-19	R4798528
Beryllium (Be)-Total		<0.00000071		0.00000071	mg/dm2.day	10-SEP-19	10-SEP-19	R4798528
Bismuth (Bi)-Total		<0.00000071		0.00000071	mg/dm2.day	10-SEP-19	10-SEP-19	R4798528
Boron (B)-Total		<0.00014		0.00014	mg/dm2.day	10-SEP-19	10-SEP-19	R4798528
Cadmium (Cd)-Total		<0.00000071		0.00000071	mg/dm2.day	10-SEP-19	10-SEP-19	R4798528
Calcium (Ca)-Total		0.00398		0.00028	mg/dm2.day	10-SEP-19	10-SEP-19	R4798528
Chromium (Cr)-Total		<0.0000071		0.0000071	mg/dm2.day	10-SEP-19	10-SEP-19	R4798528
Cobalt (Co)-Total		0.0000032		0.0000014	mg/dm2.day	10-SEP-19	10-SEP-19	R4798528
Copper (Cu)-Total		0.000404		0.0000071	mg/dm2.day	10-SEP-19	10-SEP-19	R4798528
Lead (Pb)-Total		0.00000502		0.00000071	mg/dm2.day	10-SEP-19	10-SEP-19	R4798528
Iron (Fe)-Total		0.00068		0.00043	mg/dm2.day	10-SEP-19	10-SEP-19	R4798528
Lithium (Li)-Total		<0.000071		0.000071	mg/dm2.day	10-SEP-19	10-SEP-19	R4798528
Magnesium (Mg)-Total		0.00373		0.000071	mg/dm2.day	10-SEP-19	10-SEP-19	R4798528
Manganese (Mn)-Total		0.000200		0.0000014	mg/dm2.day	10-SEP-19	10-SEP-19	R4798528
Molybdenum (Mo)-Total		<0.00000071		0.00000071	mg/dm2.day	10-SEP-19	10-SEP-19	R4798528
Nickel (Ni)-Total		<0.00000071		0.0000071	mg/dm2.day	10-SEP-19	10-SEP-19	R4798528
Phosphorus (P)-Total		0.00384		0.00071	mg/dm2.day	10-SEP-19	10-SEP-19	R4798528
Potassium (K)-Total		0.00470		0.00071	mg/dm2.day	10-SEP-19	10-SEP-19	R4798528
Selenium (Se)-Total		<0.000014		0.000014	mg/dm2.day	10-SEP-19	10-SEP-19	R4798528
Silicon (Si)-Total		<0.00071		0.00071	mg/dm2.day	10-SEP-19	10-SEP-19	R4798528
Silver (Ag)-Total		<0.00000014		0.00000014	mg/dm2.day	10-SEP-19	10-SEP-19	R4798528

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters		Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L2342127-2	TIADF2							
Sampled By:	CLIENT on 01-SEP-19							
Matrix:	WATER							
Total Metals in Dustfalls by ICPMS								
Sodium (Na)-Total	0.0236			0.00071	mg/dm2.day	10-SEP-19	10-SEP-19	R4798528
Strontium (Sr)-Total	0.0000422			0.0000014	mg/dm2.day	10-SEP-19	10-SEP-19	R4798528
Thallium (Tl)-Total	<0.0000014			0.0000014	mg/dm2.day	10-SEP-19	10-SEP-19	R4798528
Tin (Sn)-Total	0.0000021			0.0000014	mg/dm2.day	10-SEP-19	10-SEP-19	R4798528
Titanium (Ti)-Total	<0.00014			0.00014	mg/dm2.day	10-SEP-19	10-SEP-19	R4798528
Uranium (U)-Total	<0.00000014			0.00000014	mg/dm2.day	10-SEP-19	10-SEP-19	R4798528
Vanadium (V)-Total	<0.000014			0.000014	mg/dm2.day	10-SEP-19	10-SEP-19	R4798528
Zinc (Zn)-Total	<0.00021		DLB	0.00021	mg/dm2.day	10-SEP-19	10-SEP-19	R4798528
L2342127-3	TIADF3							
Sampled By:	CLIENT on 01-SEP-19							
Matrix:	WATER							
Combined Dustfalls-Total, soluble, insol								
Total Dustfall	0.38			0.10	mg/dm2.day		11-SEP-19	R4800689
Total Insoluble Dustfall	<0.10			0.10	mg/dm2.day		11-SEP-19	R4800689
Total Soluble Dustfall	0.33			0.10	mg/dm2.day		11-SEP-19	R4800689
Ammonia, Total (as N)	0.00392			0.00063	mg/dm2.day	10-SEP-19	11-SEP-19	R4795769
Interval				1	days		10-SEP-19	R4794454
Chloride (Cl)	<0.11			0.11	mg/dm2.day	10-SEP-19	10-SEP-19	R4799351
Interval				1	days		10-SEP-19	R4794454
Interval				1	days		10-SEP-19	R4794454
Nitrate (as N)	0.00070			0.00063	mg/dm2.day	10-SEP-19	10-SEP-19	R4799351
Interval				1	days		10-SEP-19	R4794454
Sulfate (SO4)	<0.0079			0.0079	mg/dm2.day	10-SEP-19	10-SEP-19	R4799351
Interval				1	days		10-SEP-19	R4793711
Mercury (Hg)-Total	<0.00000079			0.00000079	mg/dm2.day	10-SEP-19	11-SEP-19	R4795914
Total Metals in Dustfalls by ICPMS								
Aluminum (Al)-Total	0.000127			0.000047	mg/dm2.day	10-SEP-19	10-SEP-19	R4798528
Interval				1	days		10-SEP-19	R4794672
Antimony (Sb)-Total	<0.0000016			0.0000016	mg/dm2.day	10-SEP-19	10-SEP-19	R4798528
Arsenic (As)-Total	<0.0000016			0.0000016	mg/dm2.day	10-SEP-19	10-SEP-19	R4798528
Barium (Ba)-Total	0.00000503			0.00000079	mg/dm2.day	10-SEP-19	10-SEP-19	R4798528
Beryllium (Be)-Total	<0.0000079			0.0000079	mg/dm2.day	10-SEP-19	10-SEP-19	R4798528
Bismuth (Bi)-Total	<0.0000079			0.0000079	mg/dm2.day	10-SEP-19	10-SEP-19	R4798528
Boron (B)-Total	<0.00016			0.00016	mg/dm2.day	10-SEP-19	10-SEP-19	R4798528
Cadmium (Cd)-Total	<0.00000079			0.00000079	mg/dm2.day	10-SEP-19	10-SEP-19	R4798528
Calcium (Ca)-Total	0.00196			0.00031	mg/dm2.day	10-SEP-19	10-SEP-19	R4798528
Chromium (Cr)-Total	<0.0000079			0.0000079	mg/dm2.day	10-SEP-19	10-SEP-19	R4798528
Cobalt (Co)-Total	<0.0000016			0.0000016	mg/dm2.day	10-SEP-19	10-SEP-19	R4798528
Copper (Cu)-Total	0.000280			0.0000079	mg/dm2.day	10-SEP-19	10-SEP-19	R4798528
Lead (Pb)-Total	0.00000214			0.00000079	mg/dm2.day	10-SEP-19	10-SEP-19	R4798528
Iron (Fe)-Total	<0.00047			0.00047	mg/dm2.day	10-SEP-19	10-SEP-19	R4798528
Lithium (Li)-Total	<0.000079			0.000079	mg/dm2.day	10-SEP-19	10-SEP-19	R4798528
Magnesium (Mg)-Total	0.00247			0.000079	mg/dm2.day	10-SEP-19	10-SEP-19	R4798528
Manganese (Mn)-Total	0.0000286			0.0000016	mg/dm2.day	10-SEP-19	10-SEP-19	R4798528
Molybdenum (Mo)-Total	<0.00000079			0.00000079	mg/dm2.day	10-SEP-19	10-SEP-19	R4798528

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters		Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L2342127-3 TIADF3 Sampled By: CLIENT on 01-SEP-19 Matrix: WATER								
Total Metals in Dustfalls by ICPMS								
Nickel (Ni)-Total	<0.0000079			0.0000079	mg/dm2.day	10-SEP-19	10-SEP-19	R4798528
Phosphorus (P)-Total	0.00373			0.00079	mg/dm2.day	10-SEP-19	10-SEP-19	R4798528
Potassium (K)-Total	0.00604			0.00079	mg/dm2.day	10-SEP-19	10-SEP-19	R4798528
Selenium (Se)-Total	<0.000016			0.000016	mg/dm2.day	10-SEP-19	10-SEP-19	R4798528
Silicon (Si)-Total	<0.00079			0.00079	mg/dm2.day	10-SEP-19	10-SEP-19	R4798528
Silver (Ag)-Total	<0.00000016			0.00000016	mg/dm2.day	10-SEP-19	10-SEP-19	R4798528
Sodium (Na)-Total	0.0160			0.00079	mg/dm2.day	10-SEP-19	10-SEP-19	R4798528
Strontium (Sr)-Total	0.0000132			0.0000016	mg/dm2.day	10-SEP-19	10-SEP-19	R4798528
Thallium (Tl)-Total	<0.0000016			0.0000016	mg/dm2.day	10-SEP-19	10-SEP-19	R4798528
Tin (Sn)-Total	<0.0000016			0.0000016	mg/dm2.day	10-SEP-19	10-SEP-19	R4798528
Titanium (Ti)-Total	<0.00016			0.00016	mg/dm2.day	10-SEP-19	10-SEP-19	R4798528
Uranium (U)-Total	<0.00000016			0.00000016	mg/dm2.day	10-SEP-19	10-SEP-19	R4798528
Vanadium (V)-Total	<0.000016			0.000016	mg/dm2.day	10-SEP-19	10-SEP-19	R4798528
Zinc (Zn)-Total	<0.00024		DLB	0.00024	mg/dm2.day	10-SEP-19	10-SEP-19	R4798528
L2342127-4 DFA1 Sampled By: CLIENT on 01-SEP-19 Matrix: WATER								
Combined Dustfalls-Total, soluble, insol								
Total Dustfall	0.60			0.10	mg/dm2.day		11-SEP-19	R4800689
Total Insoluble Dustfall	<0.10			0.10	mg/dm2.day		11-SEP-19	R4800689
Total Soluble Dustfall	0.53			0.10	mg/dm2.day		11-SEP-19	R4800689
Ammonia, Total (as N)	0.0125			0.0018	mg/dm2.day	10-SEP-19	11-SEP-19	R4799711
Interval				1	days		10-SEP-19	R4794454
Chloride (Cl)	<0.12			0.12	mg/dm2.day	10-SEP-19	10-SEP-19	R4799351
Interval				1	days		10-SEP-19	R4794454
Interval				1	days		10-SEP-19	R4794454
Nitrate (as N)	0.00085			0.00070	mg/dm2.day	10-SEP-19	10-SEP-19	R4799351
Interval				1	days		10-SEP-19	R4794454
Sulfate (SO4)	0.0126			0.0088	mg/dm2.day	10-SEP-19	10-SEP-19	R4799351
Interval				1	days		10-SEP-19	R4793711
Mercury (Hg)-Total	<0.00000063			0.00000063	mg/dm2.day	10-SEP-19	11-SEP-19	R4795914
Total Metals in Dustfalls by ICPMS								
Aluminum (Al)-Total	0.000685			0.000038	mg/dm2.day	10-SEP-19	10-SEP-19	R4798528
Interval				1	days		10-SEP-19	R4794672
Antimony (Sb)-Total	<0.0000013			0.0000013	mg/dm2.day	10-SEP-19	10-SEP-19	R4798528
Arsenic (As)-Total	<0.0000013			0.0000013	mg/dm2.day	10-SEP-19	10-SEP-19	R4798528
Barium (Ba)-Total	0.0000319			0.00000063	mg/dm2.day	10-SEP-19	10-SEP-19	R4798528
Beryllium (Be)-Total	<0.0000063			0.0000063	mg/dm2.day	10-SEP-19	10-SEP-19	R4798528
Bismuth (Bi)-Total	0.0000109			0.0000063	mg/dm2.day	10-SEP-19	10-SEP-19	R4798528
Boron (B)-Total	<0.00013			0.00013	mg/dm2.day	10-SEP-19	10-SEP-19	R4798528
Cadmium (Cd)-Total	<0.00000063			0.00000063	mg/dm2.day	10-SEP-19	10-SEP-19	R4798528
Calcium (Ca)-Total	0.00533			0.00025	mg/dm2.day	10-SEP-19	10-SEP-19	R4798528
Chromium (Cr)-Total	<0.0000063			0.0000063	mg/dm2.day	10-SEP-19	10-SEP-19	R4798528
Cobalt (Co)-Total	<0.0000013			0.0000013	mg/dm2.day	10-SEP-19	10-SEP-19	R4798528
Copper (Cu)-Total	0.000119			0.0000063	mg/dm2.day	10-SEP-19	10-SEP-19	R4798528
Lead (Pb)-Total	0.00000468			0.00000063	mg/dm2.day	10-SEP-19	10-SEP-19	R4798528

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L2342127-4 DFA1 Sampled By: CLIENT on 01-SEP-19 Matrix: WATER Total Metals in Dustfalls by ICPMS							
			3				
Iron (Fe)-Total	0.00139		0.00038	mg/dm2.day	10-SEP-19	10-SEP-19	R4798528
Lithium (Li)-Total	<0.000063		0.000063	mg/dm2.day	10-SEP-19	10-SEP-19	R4798528
Magnesium (Mg)-Total	0.00254		0.000063	mg/dm2.day	10-SEP-19	10-SEP-19	R4798528
Manganese (Mn)-Total	0.0000489		0.0000013	mg/dm2.day	10-SEP-19	10-SEP-19	R4798528
Molybdenum (Mo)-Total	0.00000084		0.0000006	mg/dm2.day	10-SEP-19	10-SEP-19	R4798528
			3				
Nickel (Ni)-Total	<0.0000063		0.0000063	mg/dm2.day	10-SEP-19	10-SEP-19	R4798528
Phosphorus (P)-Total	0.00146		0.00063	mg/dm2.day	10-SEP-19	10-SEP-19	R4798528
Potassium (K)-Total	0.00247		0.00063	mg/dm2.day	10-SEP-19	10-SEP-19	R4798528
Selenium (Se)-Total	<0.000013		0.000013	mg/dm2.day	10-SEP-19	10-SEP-19	R4798528
Silicon (Si)-Total	0.00095		0.00063	mg/dm2.day	10-SEP-19	10-SEP-19	R4798528
Silver (Ag)-Total	<0.00000013		0.0000001	mg/dm2.day	10-SEP-19	10-SEP-19	R4798528
			3				
Sodium (Na)-Total	0.0159		0.00063	mg/dm2.day	10-SEP-19	10-SEP-19	R4798528
Strontium (Sr)-Total	0.0000158		0.0000013	mg/dm2.day	10-SEP-19	10-SEP-19	R4798528
Thallium (Tl)-Total	<0.0000013		0.0000013	mg/dm2.day	10-SEP-19	10-SEP-19	R4798528
Tin (Sn)-Total	<0.0000013		0.0000013	mg/dm2.day	10-SEP-19	10-SEP-19	R4798528
Titanium (Ti)-Total	<0.00013		0.00013	mg/dm2.day	10-SEP-19	10-SEP-19	R4798528
Uranium (U)-Total	<0.00000013		0.0000001	mg/dm2.day	10-SEP-19	10-SEP-19	R4798528
			3				
Vanadium (V)-Total	<0.000013		0.000013	mg/dm2.day	10-SEP-19	10-SEP-19	R4798528
Zinc (Zn)-Total	<0.00023	DLB	0.00023	mg/dm2.day	10-SEP-19	10-SEP-19	R4798528
L2342127-5 CDF4 Sampled By: CLIENT on 01-SEP-19 Matrix: WATER Combined Dustfalls-Total, soluble, insol							
Total Dustfall	0.40		0.10	mg/dm2.day		11-SEP-19	R4800689
Total Insoluble Dustfall	0.11		0.10	mg/dm2.day		11-SEP-19	R4800689
Total Soluble Dustfall	0.29		0.10	mg/dm2.day		11-SEP-19	R4800689
Ammonia, Total (as N)	0.00359		0.00084	mg/dm2.day	10-SEP-19	11-SEP-19	R4795769
Interval			1	days		10-SEP-19	R4794454
Chloride (Cl)	<0.15		0.15	mg/dm2.day	10-SEP-19	10-SEP-19	R4799351
Interval			1	days		10-SEP-19	R4794454
Interval			1	days		10-SEP-19	R4794454
Nitrate (as N)	0.00086		0.00084	mg/dm2.day	10-SEP-19	10-SEP-19	R4799351
Interval			1	days		10-SEP-19	R4794454
Sulfate (SO4)	0.010		0.010	mg/dm2.day	10-SEP-19	10-SEP-19	R4799351
Interval			1	days		10-SEP-19	R4793711
Mercury (Hg)-Total	<0.00000081		0.0000008	mg/dm2.day	10-SEP-19	11-SEP-19	R4795914
			1				
Total Metals in Dustfalls by ICPMS							
Aluminum (Al)-Total	0.00103		0.000049	mg/dm2.day	10-SEP-19	10-SEP-19	R4798528
Interval			1	days		10-SEP-19	R4794672
Antimony (Sb)-Total	<0.0000016		0.0000016	mg/dm2.day	10-SEP-19	10-SEP-19	R4798528
Arsenic (As)-Total	<0.0000016		0.0000016	mg/dm2.day	10-SEP-19	10-SEP-19	R4798528
Barium (Ba)-Total	0.00000881		0.0000008	mg/dm2.day	10-SEP-19	10-SEP-19	R4798528
			1				
Beryllium (Be)-Total	<0.0000081		0.0000081	mg/dm2.day	10-SEP-19	10-SEP-19	R4798528
Bismuth (Bi)-Total	0.0000102		0.0000081	mg/dm2.day	10-SEP-19	10-SEP-19	R4798528
Boron (B)-Total	<0.00016		0.00016	mg/dm2.day	10-SEP-19	10-SEP-19	R4798528

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L2342127-5	CDF4						
Sampled By:	CLIENT on 01-SEP-19						
Matrix:	WATER						
Total Metals in Dustfalls by ICPMS							
Cadmium (Cd)-Total	<0.00000081		0.00000081	mg/dm2.day	10-SEP-19	10-SEP-19	R4798528
Calcium (Ca)-Total	0.00809		0.00032	mg/dm2.day	10-SEP-19	10-SEP-19	R4798528
Chromium (Cr)-Total	<0.0000081		0.0000081	mg/dm2.day	10-SEP-19	10-SEP-19	R4798528
Cobalt (Co)-Total	0.0000017		0.0000016	mg/dm2.day	10-SEP-19	10-SEP-19	R4798528
Copper (Cu)-Total	0.000430		0.0000081	mg/dm2.day	10-SEP-19	10-SEP-19	R4798528
Lead (Pb)-Total	0.00000626		0.00000081	mg/dm2.day	10-SEP-19	10-SEP-19	R4798528
Iron (Fe)-Total	0.00201		0.00049	mg/dm2.day	10-SEP-19	10-SEP-19	R4798528
Lithium (Li)-Total	<0.000081		0.000081	mg/dm2.day	10-SEP-19	10-SEP-19	R4798528
Magnesium (Mg)-Total	0.00389		0.000081	mg/dm2.day	10-SEP-19	10-SEP-19	R4798528
Manganese (Mn)-Total	0.000131		0.0000016	mg/dm2.day	10-SEP-19	10-SEP-19	R4798528
Molybdenum (Mo)-Total	<0.00000081		0.00000081	mg/dm2.day	10-SEP-19	10-SEP-19	R4798528
Nickel (Ni)-Total	<0.0000081		0.0000081	mg/dm2.day	10-SEP-19	10-SEP-19	R4798528
Phosphorus (P)-Total	<0.00081		0.00081	mg/dm2.day	10-SEP-19	10-SEP-19	R4798528
Potassium (K)-Total	0.00129		0.00081	mg/dm2.day	10-SEP-19	10-SEP-19	R4798528
Selenium (Se)-Total	<0.000016		0.000016	mg/dm2.day	10-SEP-19	10-SEP-19	R4798528
Silicon (Si)-Total	0.00117		0.00081	mg/dm2.day	10-SEP-19	10-SEP-19	R4798528
Silver (Ag)-Total	0.00000016		0.00000016	mg/dm2.day	10-SEP-19	10-SEP-19	R4798528
Sodium (Na)-Total	0.0236		0.00081	mg/dm2.day	10-SEP-19	10-SEP-19	R4798528
Strontium (Sr)-Total	0.0000219		0.0000016	mg/dm2.day	10-SEP-19	10-SEP-19	R4798528
Thallium (Tl)-Total	<0.0000016		0.0000016	mg/dm2.day	10-SEP-19	10-SEP-19	R4798528
Tin (Sn)-Total	<0.0000016		0.0000016	mg/dm2.day	10-SEP-19	10-SEP-19	R4798528
Titanium (Ti)-Total	<0.00016		0.00016	mg/dm2.day	10-SEP-19	10-SEP-19	R4798528
Uranium (U)-Total	<0.00000016		0.00000016	mg/dm2.day	10-SEP-19	10-SEP-19	R4798528
Vanadium (V)-Total	<0.000016		0.000016	mg/dm2.day	10-SEP-19	10-SEP-19	R4798528
Zinc (Zn)-Total	<0.00019	DLB	0.00019	mg/dm2.day	10-SEP-19	10-SEP-19	R4798528
L2342127-6	TIADF1						
Sampled By:	CLIENT on 01-SEP-19						
Matrix:	WATER						
Combined Dustfalls-Total, soluble, insol							
Total Dustfall	0.16		0.10	mg/dm2.day		11-SEP-19	R4800689
Total Insoluble Dustfall	<0.10		0.10	mg/dm2.day		11-SEP-19	R4800689
Total Soluble Dustfall	0.10		0.10	mg/dm2.day		11-SEP-19	R4800689
Ammonia, Total (as N)	0.00302		0.00061	mg/dm2.day	10-SEP-19	11-SEP-19	R4795769
Interval			1	days		10-SEP-19	R4794368
Chloride (Cl)	<0.11		0.11	mg/dm2.day	10-SEP-19	10-SEP-19	R4799351
Interval			1	days		10-SEP-19	R4794368
Interval			1	days		10-SEP-19	R4794368
Nitrate (as N)	<0.00061		0.00061	mg/dm2.day	10-SEP-19	10-SEP-19	R4799351
Interval			1	days		10-SEP-19	R4794368
Sulfate (SO4)	<0.0076		0.0076	mg/dm2.day	10-SEP-19	10-SEP-19	R4799351
Interval			1	days		10-SEP-19	R4793711
Mercury (Hg)-Total	<0.00000074		0.00000074	mg/dm2.day	10-SEP-19	11-SEP-19	R4795914
Total Metals in Dustfalls by ICPMS							
Aluminum (Al)-Total	0.000230		0.000044	mg/dm2.day	10-SEP-19	10-SEP-19	R4798528
Interval			1	days		10-SEP-19	R4794672

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters		Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L2342127-6	TIADF1							
Sampled By:	CLIENT on 01-SEP-19							
Matrix:	WATER							
Total Metals in Dustfalls by ICPMS								
Antimony (Sb)-Total	<0.0000015			0.0000015	mg/dm2.day	10-SEP-19	10-SEP-19	R4798528
Arsenic (As)-Total	<0.0000015			0.0000015	mg/dm2.day	10-SEP-19	10-SEP-19	R4798528
Barium (Ba)-Total	0.00000462			0.00000074	mg/dm2.day	10-SEP-19	10-SEP-19	R4798528
Beryllium (Be)-Total	<0.00000074			0.00000074	mg/dm2.day	10-SEP-19	10-SEP-19	R4798528
Bismuth (Bi)-Total	0.00000087			0.00000074	mg/dm2.day	10-SEP-19	10-SEP-19	R4798528
Boron (B)-Total	<0.00015			0.00015	mg/dm2.day	10-SEP-19	10-SEP-19	R4798528
Cadmium (Cd)-Total	<0.00000074			0.000000074	mg/dm2.day	10-SEP-19	10-SEP-19	R4798528
Calcium (Ca)-Total	0.00126			0.00029	mg/dm2.day	10-SEP-19	10-SEP-19	R4798528
Chromium (Cr)-Total	<0.0000074			0.0000074	mg/dm2.day	10-SEP-19	10-SEP-19	R4798528
Cobalt (Co)-Total	<0.0000015			0.0000015	mg/dm2.day	10-SEP-19	10-SEP-19	R4798528
Copper (Cu)-Total	0.000331			0.0000074	mg/dm2.day	10-SEP-19	10-SEP-19	R4798528
Lead (Pb)-Total	0.00000183			0.00000074	mg/dm2.day	10-SEP-19	10-SEP-19	R4798528
Iron (Fe)-Total	0.00055			0.00044	mg/dm2.day	10-SEP-19	10-SEP-19	R4798528
Lithium (Li)-Total	<0.000074			0.000074	mg/dm2.day	10-SEP-19	10-SEP-19	R4798528
Magnesium (Mg)-Total	0.000717			0.000074	mg/dm2.day	10-SEP-19	10-SEP-19	R4798528
Manganese (Mn)-Total	0.0000262			0.0000015	mg/dm2.day	10-SEP-19	10-SEP-19	R4798528
Molybdenum (Mo)-Total	<0.00000074			0.000000074	mg/dm2.day	10-SEP-19	10-SEP-19	R4798528
Nickel (Ni)-Total	<0.0000074			0.0000074	mg/dm2.day	10-SEP-19	10-SEP-19	R4798528
Phosphorus (P)-Total	<0.00074			0.00074	mg/dm2.day	10-SEP-19	10-SEP-19	R4798528
Potassium (K)-Total	0.00113			0.00074	mg/dm2.day	10-SEP-19	10-SEP-19	R4798528
Selenium (Se)-Total	<0.000015			0.000015	mg/dm2.day	10-SEP-19	10-SEP-19	R4798528
Silicon (Si)-Total	<0.00074			0.00074	mg/dm2.day	10-SEP-19	10-SEP-19	R4798528
Silver (Ag)-Total	<0.00000015			0.00000015	mg/dm2.day	10-SEP-19	10-SEP-19	R4798528
Sodium (Na)-Total	0.00376			0.00074	mg/dm2.day	10-SEP-19	10-SEP-19	R4798528
Strontium (Sr)-Total	0.0000044			0.0000015	mg/dm2.day	10-SEP-19	10-SEP-19	R4798528
Thallium (Tl)-Total	<0.0000015			0.0000015	mg/dm2.day	10-SEP-19	10-SEP-19	R4798528
Tin (Sn)-Total	<0.0000015			0.0000015	mg/dm2.day	10-SEP-19	10-SEP-19	R4798528
Titanium (Ti)-Total	<0.00015			0.00015	mg/dm2.day	10-SEP-19	10-SEP-19	R4798528
Uranium (U)-Total	<0.00000015			0.00000015	mg/dm2.day	10-SEP-19	10-SEP-19	R4798528
Vanadium (V)-Total	<0.000015			0.000015	mg/dm2.day	10-SEP-19	10-SEP-19	R4798528
Zinc (Zn)-Total	<0.00026	DLB		0.00026	mg/dm2.day	10-SEP-19	10-SEP-19	R4798528

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

Reference Information

Sample Parameter Qualifier Key:

Qualifier	Description
DLB	Detection Limit Raised. Analyte detected at comparable level in Method Blank.
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 specifically 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
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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
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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
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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 specifically 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.

Results are reported in units of nitrogen weight. To convert to units by weight of ammonium, multiply by 1.29.

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

Results are reported in units of nitrogen weight. To convert to units by weight of nitrate, multiply by 4.43.

SO4-IC-VA	Dustfall	Dustfall Sulfate by Ion Chromatography	BC LAB MAN. - PART. - SOLUBLE - ANIONS
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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 specifically 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
VA	ALS ENVIRONMENTAL - VANCOUVER, BRITISH COLUMBIA, CANADA

Chain of Custody Numbers:

Reference Information

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
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GLOSSARY OF REPORT TERMS

Surrogates are compounds that are similar in behaviour to target analyte(s), but that do not normally occur in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery. In reports that display the D.L. column, laboratory objectives for surrogates are listed there.

mg/kg - milligrams per kilogram based on dry weight of sample
mg/kg ww - milligrams per kilogram based on wet weight of sample
mg/kg lwt - milligrams per kilogram based on lipid-adjusted weight
mg/L - unit of concentration based on volume, parts per million.

< - Less than.
D.L. - The reporting limit.
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.



Quality Control Report

Workorder: L2342127

Report Date: 13-SEP-19

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Client: TMAC Resources Inc
Hope Bay Project 95 Wellington St West
Toronto ON M5J 2N7

Contact: Environmental Site Manager

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
CL-IC-VA Dustfall								
Batch	R4799351							
WG3156981-2	LCS							
Chloride (Cl)			99.8		%		90-110	10-SEP-19
WG3157155-2	LCS							
Chloride (Cl)			99.8		%		90-110	10-SEP-19
WG3156981-1	MB							
Chloride (Cl)			<0.18		mg/dm2.day		0.18	10-SEP-19
WG3157155-1	MB							
Chloride (Cl)			<0.18		mg/dm2.day		0.18	10-SEP-19
WG3156981-4	MS	L2342127-1						
Chloride (Cl)			100.4		%		75-125	10-SEP-19
DUSTFALLS-COM-DM2-VA Dustfall								
Batch	R4800689							
WG3157985-2	LCS							
Total Dustfall			99.5		%		85-115	11-SEP-19
Total Insoluble Dustfall			95.6		%		85-115	11-SEP-19
Total Soluble Dustfall			100.2		%		85-115	11-SEP-19
WG3157985-1	MB							
Total Dustfall			<0.10		mg/dm2.day		0.1	11-SEP-19
Total Insoluble Dustfall			<0.10		mg/dm2.day		0.1	11-SEP-19
Total Soluble Dustfall			<0.10		mg/dm2.day		0.1	11-SEP-19
HG-DUST(DM2-CVAFS-VA Dustfall								
Batch	R4795914							
WG3156979-2	LCS							
Mercury (Hg)-Total			73.1		%		70-130	11-SEP-19
WG3156979-1	MB							
Mercury (Hg)-Total			<0.0000013		mg/dm2.day		0.0000013	11-SEP-19
MET-DUST(DM2)-MS-VA Dustfall								
Batch	R4798528							
WG3156972-2	LCS							
Aluminum (Al)-Total			96.3		%		80-120	10-SEP-19
Antimony (Sb)-Total			96.7		%		80-120	10-SEP-19
Arsenic (As)-Total			96.5		%		80-120	10-SEP-19
Barium (Ba)-Total			101.7		%		80-120	10-SEP-19
Beryllium (Be)-Total			91.6		%		80-120	10-SEP-19
Bismuth (Bi)-Total			91.9		%		80-120	10-SEP-19
Boron (B)-Total			92.3		%		80-120	10-SEP-19
Cadmium (Cd)-Total			98.0		%		80-120	10-SEP-19



Quality Control Report

Workorder: L2342127

Report Date: 13-SEP-19

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Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-DUST(DM2)-MS-VA		Dustfall						
Batch	R4798528							
WG3156972-2	LCS							
Calcium (Ca)-Total			93.9		%		80-120	10-SEP-19
Chromium (Cr)-Total			96.8		%		80-120	10-SEP-19
Cobalt (Co)-Total			97.0		%		80-120	10-SEP-19
Copper (Cu)-Total			95.2		%		80-120	10-SEP-19
Lead (Pb)-Total			94.4		%		80-120	10-SEP-19
Iron (Fe)-Total			90.2		%		80-120	10-SEP-19
Lithium (Li)-Total			90.0		%		80-120	10-SEP-19
Magnesium (Mg)-Total			98.7		%		80-120	10-SEP-19
Manganese (Mn)-Total			97.3		%		80-120	10-SEP-19
Molybdenum (Mo)-Total			98.1		%		80-120	10-SEP-19
Nickel (Ni)-Total			95.5		%		80-120	10-SEP-19
Phosphorus (P)-Total			101.7		%		80-120	10-SEP-19
Potassium (K)-Total			98.7		%		80-120	10-SEP-19
Selenium (Se)-Total			94.9		%		80-120	10-SEP-19
Silicon (Si)-Total			95.3		%		80-120	10-SEP-19
Silver (Ag)-Total			92.1		%		80-120	10-SEP-19
Sodium (Na)-Total			101.1		%		80-120	10-SEP-19
Strontium (Sr)-Total			95.5		%		80-120	10-SEP-19
Thallium (Tl)-Total			88.0		%		80-120	10-SEP-19
Tin (Sn)-Total			98.9		%		80-120	10-SEP-19
Titanium (Ti)-Total			96.2		%		80-120	10-SEP-19
Uranium (U)-Total			96.8		%		80-120	10-SEP-19
Vanadium (V)-Total			97.2		%		80-120	10-SEP-19
Zinc (Zn)-Total			96.6		%		80-120	10-SEP-19
WG3156972-1	MB							
Aluminum (Al)-Total			<0.000079		mg/dm2.day		0.000079	10-SEP-19
Antimony (Sb)-Total			<0.0000026		mg/dm2.day		0.0000026	10-SEP-19
Arsenic (As)-Total			<0.0000026		mg/dm2.day		0.0000026	10-SEP-19
Barium (Ba)-Total			<0.0000013		mg/dm2.day		0.0000013	10-SEP-19
Beryllium (Be)-Total			<0.000013		mg/dm2.day		0.000013	10-SEP-19
Bismuth (Bi)-Total			<0.000013		mg/dm2.day		0.000013	10-SEP-19
Boron (B)-Total			<0.00026		mg/dm2.day		0.00026	10-SEP-19
Cadmium (Cd)-Total			<0.0000013		mg/dm2.day		0.0000013	10-SEP-19
Calcium (Ca)-Total			<0.00052		mg/dm2.day		0.00052	10-SEP-19

Quality Control Report

Workorder: L2342127

Report Date: 13-SEP-19

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Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-DUST(DM2)-MS-VA Dustfall								
Batch R4798528								
WG3156972-1 MB								
Chromium (Cr)-Total			<0.000013		mg/dm2.day		0.000013	10-SEP-19
Cobalt (Co)-Total			<0.0000026		mg/dm2.day		0.0000026	10-SEP-19
Copper (Cu)-Total			<0.000013		mg/dm2.day		0.000013	10-SEP-19
Lead (Pb)-Total			<0.0000013		mg/dm2.day		0.0000013	10-SEP-19
Iron (Fe)-Total			<0.00079		mg/dm2.day		0.00079	10-SEP-19
Lithium (Li)-Total			<0.00013		mg/dm2.day		0.00013	10-SEP-19
Magnesium (Mg)-Total			<0.00013		mg/dm2.day		0.00013	10-SEP-19
Manganese (Mn)-Total			<0.0000026		mg/dm2.day		0.0000026	10-SEP-19
Molybdenum (Mo)-Total			<0.0000013		mg/dm2.day		0.0000013	10-SEP-19
Nickel (Ni)-Total			<0.000013		mg/dm2.day		0.000013	10-SEP-19
Phosphorus (P)-Total			<0.0013		mg/dm2.day		0.0013	10-SEP-19
Potassium (K)-Total			<0.0013		mg/dm2.day		0.0013	10-SEP-19
Selenium (Se)-Total			<0.000026		mg/dm2.day		0.000026	10-SEP-19
Silicon (Si)-Total			<0.0013		mg/dm2.day		0.0013	10-SEP-19
Silver (Ag)-Total			<0.0000002		mg/dm2.day		0.00000026	10-SEP-19
Sodium (Na)-Total			<0.0013		mg/dm2.day		0.0013	10-SEP-19
Strontium (Sr)-Total			<0.0000026		mg/dm2.day		0.0000026	10-SEP-19
Thallium (Tl)-Total			<0.0000026		mg/dm2.day		0.0000026	10-SEP-19
Tin (Sn)-Total			<0.0000026		mg/dm2.day		0.0000026	10-SEP-19
Titanium (Ti)-Total			<0.00026		mg/dm2.day		0.00026	10-SEP-19
Uranium (U)-Total			<0.0000002		mg/dm2.day		0.00000026	10-SEP-19
Vanadium (V)-Total			<0.000026		mg/dm2.day		0.000026	10-SEP-19
Zinc (Zn)-Total			0.000249	MB-LOR	mg/dm2.day		0.000079	10-SEP-19
NH3-F-VA Dustfall								
Batch R4795769								
WG3156981-1 MB								
Ammonia, Total (as N)			<0.0010		mg/dm2.day		0.001	11-SEP-19
WG3157155-1 MB								
Ammonia, Total (as N)			<0.0010		mg/dm2.day		0.001	11-SEP-19
NO3-IC-VA Dustfall								
Batch R4799351								
WG3156981-2 LCS								
Nitrate (as N)			100.6		%		90-110	10-SEP-19
WG3157155-2 LCS								
Nitrate (as N)			100.4		%		90-110	10-SEP-19



Quality Control Report

Workorder: L2342127

Report Date: 13-SEP-19

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Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
NO3-IC-VA								
Dustfall								
Batch	R4799351							
WG3156981-1	MB							
Nitrate (as N)			<0.0010		mg/dm2.day		0.001	10-SEP-19
WG3157155-1	MB							
Nitrate (as N)			<0.0010		mg/dm2.day		0.001	10-SEP-19
WG3156981-4	MS	L2342127-1						
Nitrate (as N)			101.1		%		75-125	10-SEP-19
SO4-IC-VA								
Dustfall								
Batch	R4799351							
WG3156981-2	LCS							
Sulfate (SO4)			100.4		%		90-110	10-SEP-19
WG3157155-2	LCS							
Sulfate (SO4)			100.3		%		90-110	10-SEP-19
WG3156981-1	MB							
Sulfate (SO4)			<0.013		mg/dm2.day		0.013	10-SEP-19
WG3157155-1	MB							
Sulfate (SO4)			<0.013		mg/dm2.day		0.013	10-SEP-19
WG3156981-4	MS	L2342127-1						
Sulfate (SO4)			101.1		%		75-125	10-SEP-19

Quality Control Report

Workorder: L2342127

Report Date: 13-SEP-19

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Legend:

Limit	ALS Control Limit (Data Quality Objectives)
DUP	Duplicate
RPD	Relative Percent Difference
N/A	Not Available
LCS	Laboratory Control Sample
SRM	Standard Reference Material
MS	Matrix Spike
MSD	Matrix Spike Duplicate
ADE	Average Desorption Efficiency
MB	Method Blank
IRM	Internal Reference Material
CRM	Certified Reference Material
CCV	Continuing Calibration Verification
CVS	Calibration Verification Standard
LCSD	Laboratory Control Sample Duplicate

Sample Parameter Qualifier Definitions:

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

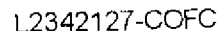
Hold Time Exceedances:

All test results reported with this submission were conducted within ALS recommended hold times.

ALS recommended hold times may vary by province. They are assigned to meet known provincial and/or federal government requirements. In the absence of regulatory hold times, ALS establishes recommendations based on guidelines published by the US EPA, APHA Standard Methods, or Environment Canada (where available). For more information, please contact ALS.

The ALS Quality Control Report is provided to ALS clients upon request. ALS includes comprehensive QC checks with every analysis to ensure our high standards of quality are met. Each QC result has a known or expected target value, which is compared against pre-determined data quality objectives to provide confidence in the accuracy of associated test results.

Please note that this report may contain QC results from anonymous Sample Duplicates and Matrix Spikes that do not originate from this Work Order.



COC #

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GENF 18.01 Front

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17



TMAC Resources Inc
ATTN: Environmental Site Manager
Hope Bay Project
95 Wellington St West
Toronto ON M5J 2N7

Date Received: 03-SEP-19
Report Date: 17-SEP-19 11:45 (MT)
Version: FINAL

Client Phone: 867-988-0569

Certificate of Analysis

Lab Work Order #: L2342137
Project P.O. #: 4500011700
Job Reference: MADRID DUSTFALL
C of C Numbers:
Legal Site Desc:

Amber Springer, B.Sc
Account Manager

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ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L2342137-1 M-DF01 Sampled By: CLIENT on 01-SEP-19 Matrix: WATER							
Combined Dustfalls-Total, soluble, insol							
Total Dustfall	0.50		0.10	mg/dm2.day		11-SEP-19	R4800689
Total Insoluble Dustfall	<0.10		0.10	mg/dm2.day		11-SEP-19	R4800689
Total Soluble Dustfall	0.47		0.10	mg/dm2.day		11-SEP-19	R4800689
Ammonia, Total (as N)	0.0056		0.0017	mg/dm2.day	10-SEP-19	12-SEP-19	R4799994
Interval			1	days		10-SEP-19	R4794454
Chloride (Cl)	<0.12		0.12	mg/dm2.day	10-SEP-19	10-SEP-19	R4799351
Interval			1	days		10-SEP-19	R4794454
Interval			1	days		10-SEP-19	R4794454
Nitrate (as N)	0.00082		0.00066	mg/dm2.day	10-SEP-19	10-SEP-19	R4799351
Interval			1	days		10-SEP-19	R4794454
Sulfate (SO4)	<0.0083		0.0083	mg/dm2.day	10-SEP-19	10-SEP-19	R4799351
Interval			1	days		12-SEP-19	R4802093
Mercury (Hg)-Total	<0.00000084		0.00000084	mg/dm2.day	12-SEP-19	13-SEP-19	R4804410
			4				
Total Metals in Dustfalls by ICPMS							
Aluminum (Al)-Total	0.000228		0.000050	mg/dm2.day	12-SEP-19	13-SEP-19	R4805428
Interval			1	days		12-SEP-19	R4803268
Antimony (Sb)-Total	<0.0000017		0.0000017	mg/dm2.day	12-SEP-19	13-SEP-19	R4805428
Arsenic (As)-Total	<0.0000017		0.0000017	mg/dm2.day	12-SEP-19	13-SEP-19	R4805428
Barium (Ba)-Total	0.00000578		0.00000084	mg/dm2.day	12-SEP-19	13-SEP-19	R4805428
			4				
Beryllium (Be)-Total	<0.0000084		0.0000084	mg/dm2.day	12-SEP-19	13-SEP-19	R4805428
Bismuth (Bi)-Total	<0.0000084		0.0000084	mg/dm2.day	12-SEP-19	13-SEP-19	R4805428
Boron (B)-Total	<0.00017		0.00017	mg/dm2.day	12-SEP-19	13-SEP-19	R4805428
Cadmium (Cd)-Total	<0.00000084		0.00000084	mg/dm2.day	12-SEP-19	13-SEP-19	R4805428
			4				
Calcium (Ca)-Total	0.00224		0.00034	mg/dm2.day	12-SEP-19	13-SEP-19	R4805428
Chromium (Cr)-Total	0.0000116		0.0000084	mg/dm2.day	12-SEP-19	13-SEP-19	R4805428
Cobalt (Co)-Total	<0.0000017		0.0000017	mg/dm2.day	12-SEP-19	13-SEP-19	R4805428
Copper (Cu)-Total	<0.00010	DLB	0.00010	mg/dm2.day	12-SEP-19	13-SEP-19	R4805428
Lead (Pb)-Total	<0.0000034	DLB	0.0000034	mg/dm2.day	12-SEP-19	13-SEP-19	R4805428
Iron (Fe)-Total	<0.00050		0.00050	mg/dm2.day	12-SEP-19	13-SEP-19	R4805428
Lithium (Li)-Total	<0.000084		0.000084	mg/dm2.day	12-SEP-19	13-SEP-19	R4805428
Magnesium (Mg)-Total	0.00255		0.000084	mg/dm2.day	12-SEP-19	13-SEP-19	R4805428
Manganese (Mn)-Total	0.0000217		0.0000017	mg/dm2.day	12-SEP-19	13-SEP-19	R4805428
Molybdenum (Mo)-Total	0.00000215		0.00000084	mg/dm2.day	12-SEP-19	13-SEP-19	R4805428
			4				
Nickel (Ni)-Total	<0.0000084		0.0000084	mg/dm2.day	12-SEP-19	13-SEP-19	R4805428
Phosphorus (P)-Total	0.00332		0.00084	mg/dm2.day	12-SEP-19	13-SEP-19	R4805428
Potassium (K)-Total	0.00536		0.00084	mg/dm2.day	12-SEP-19	13-SEP-19	R4805428
Selenium (Se)-Total	<0.000017		0.000017	mg/dm2.day	12-SEP-19	13-SEP-19	R4805428
Silicon (Si)-Total	<0.00084		0.00084	mg/dm2.day	12-SEP-19	13-SEP-19	R4805428
Silver (Ag)-Total	<0.00000017		0.00000017	mg/dm2.day	12-SEP-19	13-SEP-19	R4805428
			7				
Sodium (Na)-Total	0.0161		0.00084	mg/dm2.day	12-SEP-19	13-SEP-19	R4805428
Strontium (Sr)-Total	0.0000139		0.0000017	mg/dm2.day	12-SEP-19	13-SEP-19	R4805428
Thallium (Tl)-Total	<0.0000017		0.0000017	mg/dm2.day	12-SEP-19	13-SEP-19	R4805428
Tin (Sn)-Total	<0.0000017		0.0000017	mg/dm2.day	12-SEP-19	13-SEP-19	R4805428
Titanium (Ti)-Total	<0.00017		0.00017	mg/dm2.day	12-SEP-19	13-SEP-19	R4805428
Uranium (U)-Total	<0.00000017		0.00000017	mg/dm2.day	12-SEP-19	13-SEP-19	R4805428
			7				
Vanadium (V)-Total	<0.000017		0.000017	mg/dm2.day	12-SEP-19	13-SEP-19	R4805428

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters		Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L2342137-1	M-DF01							
Sampled By:	CLIENT on 01-SEP-19							
Matrix:	WATER							
Total Metals in Dustfalls by ICPMS								
Zinc (Zn)-Total		<0.00030	DLB	0.00030	mg/dm2.day	12-SEP-19	13-SEP-19	R4805428
L2342137-2	M-DF02							
Sampled By:	CLIENT on 01-SEP-19							
Matrix:	WATER							
Combined Dustfalls-Total, soluble, insol								
Total Dustfall		0.29		0.10	mg/dm2.day		11-SEP-19	R4800689
Total Insoluble Dustfall		<0.10		0.10	mg/dm2.day		11-SEP-19	R4800689
Total Soluble Dustfall		0.22		0.10	mg/dm2.day		11-SEP-19	R4800689
Ammonia, Total (as N)		<0.00080		0.00080	mg/dm2.day	10-SEP-19	12-SEP-19	R4802990
Interval				1	days		10-SEP-19	R4794454
Chloride (Cl)		<0.14		0.14	mg/dm2.day	10-SEP-19	10-SEP-19	R4799351
Interval				1	days		10-SEP-19	R4794454
Interval				1	days		10-SEP-19	R4794454
Nitrate (as N)		<0.00080		0.00080	mg/dm2.day	10-SEP-19	10-SEP-19	R4799351
Interval				1	days		10-SEP-19	R4794454
Sulfate (SO4)		<0.010		0.010	mg/dm2.day	10-SEP-19	10-SEP-19	R4799351
Interval				1	days		12-SEP-19	R4802093
Mercury (Hg)-Total		<0.0000011		0.0000011	mg/dm2.day	12-SEP-19	13-SEP-19	R4804410
Total Metals in Dustfalls by ICPMS								
Aluminum (Al)-Total		0.000450		0.000064	mg/dm2.day	12-SEP-19	13-SEP-19	R4805428
Interval				1	days		12-SEP-19	R4803268
Antimony (Sb)-Total		<0.0000021		0.0000021	mg/dm2.day	12-SEP-19	13-SEP-19	R4805428
Arsenic (As)-Total		<0.0000021		0.0000021	mg/dm2.day	12-SEP-19	13-SEP-19	R4805428
Barium (Ba)-Total		0.0000116		0.0000011	mg/dm2.day	12-SEP-19	13-SEP-19	R4805428
Beryllium (Be)-Total		<0.000011		0.000011	mg/dm2.day	12-SEP-19	13-SEP-19	R4805428
Bismuth (Bi)-Total		<0.000011		0.000011	mg/dm2.day	12-SEP-19	13-SEP-19	R4805428
Boron (B)-Total		<0.00021		0.00021	mg/dm2.day	12-SEP-19	13-SEP-19	R4805428
Cadmium (Cd)-Total		<0.0000011		0.0000011	mg/dm2.day	12-SEP-19	13-SEP-19	R4805428
Calcium (Ca)-Total		0.00229		0.00043	mg/dm2.day	12-SEP-19	13-SEP-19	R4805428
Chromium (Cr)-Total		<0.000011		0.000011	mg/dm2.day	12-SEP-19	13-SEP-19	R4805428
Cobalt (Co)-Total		<0.0000021		0.0000021	mg/dm2.day	12-SEP-19	13-SEP-19	R4805428
Copper (Cu)-Total		0.000162		0.000011	mg/dm2.day	12-SEP-19	13-SEP-19	R4805428
Lead (Pb)-Total		<0.0000064	DLB	0.0000064	mg/dm2.day	12-SEP-19	13-SEP-19	R4805428
Iron (Fe)-Total		0.00082		0.00064	mg/dm2.day	12-SEP-19	13-SEP-19	R4805428
Lithium (Li)-Total		<0.00011		0.00011	mg/dm2.day	12-SEP-19	13-SEP-19	R4805428
Magnesium (Mg)-Total		0.00180		0.00011	mg/dm2.day	12-SEP-19	13-SEP-19	R4805428
Manganese (Mn)-Total		0.0000311		0.0000021	mg/dm2.day	12-SEP-19	13-SEP-19	R4805428
Molybdenum (Mo)-Total		<0.0000011		0.0000011	mg/dm2.day	12-SEP-19	13-SEP-19	R4805428
Nickel (Ni)-Total		<0.000011		0.000011	mg/dm2.day	12-SEP-19	13-SEP-19	R4805428
Phosphorus (P)-Total		<0.0011		0.0011	mg/dm2.day	12-SEP-19	13-SEP-19	R4805428
Potassium (K)-Total		0.0013		0.0011	mg/dm2.day	12-SEP-19	13-SEP-19	R4805428
Selenium (Se)-Total		<0.000021		0.000021	mg/dm2.day	12-SEP-19	13-SEP-19	R4805428
Silicon (Si)-Total		<0.0011		0.0011	mg/dm2.day	12-SEP-19	13-SEP-19	R4805428
Silver (Ag)-Total		<0.00000021		0.0000002	mg/dm2.day	12-SEP-19	13-SEP-19	R4805428
				1				
Sodium (Na)-Total		0.0106		0.0011	mg/dm2.day	12-SEP-19	13-SEP-19	R4805428
Strontium (Sr)-Total		0.0000124		0.0000021	mg/dm2.day	12-SEP-19	13-SEP-19	R4805428
Thallium (Tl)-Total		<0.0000021		0.0000021	mg/dm2.day	12-SEP-19	13-SEP-19	R4805428
Tin (Sn)-Total		<0.0000021		0.0000021	mg/dm2.day	12-SEP-19	13-SEP-19	R4805428
Titanium (Ti)-Total		<0.00021		0.00021	mg/dm2.day	12-SEP-19	13-SEP-19	R4805428

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L2342137-2 M-DF02 Sampled By: CLIENT on 01-SEP-19 Matrix: WATER Total Metals in Dustfalls by ICPMS Uranium (U)-Total	<0.00000021		0.00000021	mg/dm2.day	12-SEP-19	13-SEP-19	R4805428
Vanadium (V)-Total	<0.000021		0.000021	mg/dm2.day	12-SEP-19	13-SEP-19	R4805428
Zinc (Zn)-Total	<0.00032	DLB	0.00032	mg/dm2.day	12-SEP-19	13-SEP-19	R4805428
L2342137-3 M-DF03 Sampled By: CLIENT on 01-SEP-19 Matrix: WATER Combined Dustfalls-Total, soluble, insol Total Dustfall	0.29		0.10	mg/dm2.day		11-SEP-19	R4800689
Total Insoluble Dustfall	<0.10		0.10	mg/dm2.day		11-SEP-19	R4800689
Total Soluble Dustfall	0.27		0.10	mg/dm2.day		11-SEP-19	R4800689
Ammonia, Total (as N)	0.00192		0.00069	mg/dm2.day	10-SEP-19	11-SEP-19	R4795769
Interval			1	days		10-SEP-19	R4794454
Chloride (Cl)	<0.12		0.12	mg/dm2.day	10-SEP-19	10-SEP-19	R4799351
Interval			1	days		10-SEP-19	R4794454
Interval			1	days		10-SEP-19	R4794454
Nitrate (as N)	0.00073		0.00069	mg/dm2.day	10-SEP-19	10-SEP-19	R4799351
Interval			1	days		10-SEP-19	R4794454
Sulfate (SO4)	<0.0086		0.0086	mg/dm2.day	10-SEP-19	10-SEP-19	R4799351
Interval			1	days		12-SEP-19	R4802093
Mercury (Hg)-Total	<0.0000010		0.0000010	mg/dm2.day	12-SEP-19	13-SEP-19	R4804410
Total Metals in Dustfalls by ICPMS Aluminum (Al)-Total	0.00109		0.000063	mg/dm2.day	12-SEP-19	13-SEP-19	R4805428
Interval			1	days		12-SEP-19	R4803268
Antimony (Sb)-Total	<0.0000021		0.0000021	mg/dm2.day	12-SEP-19	13-SEP-19	R4805428
Arsenic (As)-Total	<0.0000021		0.0000021	mg/dm2.day	12-SEP-19	13-SEP-19	R4805428
Barium (Ba)-Total	0.0000141		0.0000010	mg/dm2.day	12-SEP-19	13-SEP-19	R4805428
Beryllium (Be)-Total	<0.000010		0.000010	mg/dm2.day	12-SEP-19	13-SEP-19	R4805428
Bismuth (Bi)-Total	0.000018		0.000010	mg/dm2.day	12-SEP-19	13-SEP-19	R4805428
Boron (B)-Total	<0.00021		0.00021	mg/dm2.day	12-SEP-19	13-SEP-19	R4805428
Cadmium (Cd)-Total	<0.0000010		0.0000010	mg/dm2.day	12-SEP-19	13-SEP-19	R4805428
Calcium (Ca)-Total	0.00304		0.00042	mg/dm2.day	12-SEP-19	13-SEP-19	R4805428
Chromium (Cr)-Total	<0.000010		0.000010	mg/dm2.day	12-SEP-19	13-SEP-19	R4805428
Cobalt (Co)-Total	<0.0000021		0.0000021	mg/dm2.day	12-SEP-19	13-SEP-19	R4805428
Copper (Cu)-Total	0.000612		0.000010	mg/dm2.day	12-SEP-19	13-SEP-19	R4805428
Lead (Pb)-Total	<0.0000031	DLB	0.0000031	mg/dm2.day	12-SEP-19	13-SEP-19	R4805428
Iron (Fe)-Total	0.00109		0.00063	mg/dm2.day	12-SEP-19	13-SEP-19	R4805428
Lithium (Li)-Total	<0.00010		0.00010	mg/dm2.day	12-SEP-19	13-SEP-19	R4805428
Magnesium (Mg)-Total	0.00341		0.00010	mg/dm2.day	12-SEP-19	13-SEP-19	R4805428
Manganese (Mn)-Total	0.0000639		0.0000021	mg/dm2.day	12-SEP-19	13-SEP-19	R4805428
Molybdenum (Mo)-Total	0.0000010		0.0000010	mg/dm2.day	12-SEP-19	13-SEP-19	R4805428
Nickel (Ni)-Total	<0.000010		0.000010	mg/dm2.day	12-SEP-19	13-SEP-19	R4805428
Phosphorus (P)-Total	0.0016		0.0010	mg/dm2.day	12-SEP-19	13-SEP-19	R4805428
Potassium (K)-Total	0.0038		0.0010	mg/dm2.day	12-SEP-19	13-SEP-19	R4805428
Selenium (Se)-Total	<0.000021		0.000021	mg/dm2.day	12-SEP-19	13-SEP-19	R4805428
Silicon (Si)-Total	0.0015		0.0010	mg/dm2.day	12-SEP-19	13-SEP-19	R4805428
Silver (Ag)-Total	0.00000024		0.00000021	mg/dm2.day	12-SEP-19	13-SEP-19	R4805428
Sodium (Na)-Total	0.0195		0.0010	mg/dm2.day	12-SEP-19	13-SEP-19	R4805428
Strontium (Sr)-Total	0.0000179		0.0000021	mg/dm2.day	12-SEP-19	13-SEP-19	R4805428

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters		Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L2342137-3	M-DF03							
Sampled By:	CLIENT on 01-SEP-19							
Matrix:	WATER							
Total Metals in Dustfalls by ICPMS								
Thallium (Tl)-Total	<0.0000021			0.0000021	mg/dm2.day	12-SEP-19	13-SEP-19	R4805428
Tin (Sn)-Total	<0.0000021			0.0000021	mg/dm2.day	12-SEP-19	13-SEP-19	R4805428
Titanium (Ti)-Total	<0.00021			0.00021	mg/dm2.day	12-SEP-19	13-SEP-19	R4805428
Uranium (U)-Total	<0.00000021			0.00000021	mg/dm2.day	12-SEP-19	13-SEP-19	R4805428
Vanadium (V)-Total	<0.000021			0.000021	mg/dm2.day	12-SEP-19	13-SEP-19	R4805428
Zinc (Zn)-Total	<0.00038		DLB	0.00038	mg/dm2.day	12-SEP-19	13-SEP-19	R4805428
L2342137-4	M-DF04							
Sampled By:	CLIENT on 01-SEP-19							
Matrix:	WATER							
Combined Dustfalls-Total, soluble, insol								
Total Dustfall	0.28			0.10	mg/dm2.day		11-SEP-19	R4800689
Total Insoluble Dustfall	<0.10			0.10	mg/dm2.day		11-SEP-19	R4800689
Total Soluble Dustfall	0.22			0.10	mg/dm2.day		11-SEP-19	R4800689
Ammonia, Total (as N)	0.00126			0.00076	mg/dm2.day	10-SEP-19	11-SEP-19	R4795769
Interval				1	days		10-SEP-19	R4794454
Chloride (Cl)	<0.13			0.13	mg/dm2.day	10-SEP-19	10-SEP-19	R4799351
Interval				1	days		10-SEP-19	R4794454
Interval				1	days		10-SEP-19	R4794454
Nitrate (as N)	<0.00076			0.00076	mg/dm2.day	10-SEP-19	10-SEP-19	R4799351
Interval				1	days		10-SEP-19	R4794454
Sulfate (SO4)	<0.0096			0.0096	mg/dm2.day	10-SEP-19	10-SEP-19	R4799351
Interval				1	days		12-SEP-19	R4802093
Mercury (Hg)-Total	<0.00000079			0.00000079	mg/dm2.day	12-SEP-19	13-SEP-19	R4804410
Total Metals in Dustfalls by ICPMS								
Aluminum (Al)-Total	0.000772			0.000047	mg/dm2.day	12-SEP-19	13-SEP-19	R4805428
Interval				1	days		12-SEP-19	R4803268
Antimony (Sb)-Total	<0.0000016			0.0000016	mg/dm2.day	12-SEP-19	13-SEP-19	R4805428
Arsenic (As)-Total	<0.0000016			0.0000016	mg/dm2.day	12-SEP-19	13-SEP-19	R4805428
Barium (Ba)-Total	0.00000903			0.00000079	mg/dm2.day	12-SEP-19	13-SEP-19	R4805428
Beryllium (Be)-Total	<0.0000079			0.0000079	mg/dm2.day	12-SEP-19	13-SEP-19	R4805428
Bismuth (Bi)-Total	<0.0000079			0.0000079	mg/dm2.day	12-SEP-19	13-SEP-19	R4805428
Boron (B)-Total	<0.00016			0.00016	mg/dm2.day	12-SEP-19	13-SEP-19	R4805428
Cadmium (Cd)-Total	<0.00000079			0.00000079	mg/dm2.day	12-SEP-19	13-SEP-19	R4805428
Calcium (Ca)-Total	0.00432			0.00031	mg/dm2.day	12-SEP-19	13-SEP-19	R4805428
Chromium (Cr)-Total	<0.0000079			0.0000079	mg/dm2.day	12-SEP-19	13-SEP-19	R4805428
Cobalt (Co)-Total	<0.0000016			0.0000016	mg/dm2.day	12-SEP-19	13-SEP-19	R4805428
Copper (Cu)-Total	0.000238			0.0000079	mg/dm2.day	12-SEP-19	13-SEP-19	R4805428
Lead (Pb)-Total	<0.0000039		DLB	0.0000039	mg/dm2.day	12-SEP-19	13-SEP-19	R4805428
Iron (Fe)-Total	0.00145			0.00047	mg/dm2.day	12-SEP-19	13-SEP-19	R4805428
Lithium (Li)-Total	<0.000079			0.000079	mg/dm2.day	12-SEP-19	13-SEP-19	R4805428
Magnesium (Mg)-Total	0.00269			0.000079	mg/dm2.day	12-SEP-19	13-SEP-19	R4805428
Manganese (Mn)-Total	0.0000570			0.0000016	mg/dm2.day	12-SEP-19	13-SEP-19	R4805428
Molybdenum (Mo)-Total	<0.00000079			0.00000079	mg/dm2.day	12-SEP-19	13-SEP-19	R4805428
Nickel (Ni)-Total	<0.0000079			0.0000079	mg/dm2.day	12-SEP-19	13-SEP-19	R4805428
Phosphorus (P)-Total	<0.00079			0.00079	mg/dm2.day	12-SEP-19	13-SEP-19	R4805428
Potassium (K)-Total	0.00117			0.00079	mg/dm2.day	12-SEP-19	13-SEP-19	R4805428

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters		Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L2342137-4	M-DF04							
Sampled By:	CLIENT on 01-SEP-19							
Matrix:	WATER							
Total Metals in Dustfalls by ICPMS								
Selenium (Se)-Total	<0.000016			0.000016	mg/dm2.day	12-SEP-19	13-SEP-19	R4805428
Silicon (Si)-Total	0.00097			0.00079	mg/dm2.day	12-SEP-19	13-SEP-19	R4805428
Silver (Ag)-Total	<0.00000016			0.00000016	mg/dm2.day	12-SEP-19	13-SEP-19	R4805428
Sodium (Na)-Total	0.0159			0.00079	mg/dm2.day	12-SEP-19	13-SEP-19	R4805428
Strontium (Sr)-Total	0.0000141			0.0000016	mg/dm2.day	12-SEP-19	13-SEP-19	R4805428
Thallium (Tl)-Total	<0.0000016			0.0000016	mg/dm2.day	12-SEP-19	13-SEP-19	R4805428
Tin (Sn)-Total	<0.0000016			0.0000016	mg/dm2.day	12-SEP-19	13-SEP-19	R4805428
Titanium (Ti)-Total	<0.00016			0.00016	mg/dm2.day	12-SEP-19	13-SEP-19	R4805428
Uranium (U)-Total	<0.00000016			0.00000016	mg/dm2.day	12-SEP-19	13-SEP-19	R4805428
Vanadium (V)-Total	<0.000016			0.000016	mg/dm2.day	12-SEP-19	13-SEP-19	R4805428
Zinc (Zn)-Total	<0.00019		DLB	0.00019	mg/dm2.day	12-SEP-19	13-SEP-19	R4805428
L2342137-5	M-DF05							
Sampled By:	CLIENT on 01-SEP-19							
Matrix:	WATER							
Combined Dustfalls-Total, soluble, insol								
Total Dustfall	0.23			0.10	mg/dm2.day		11-SEP-19	R4800689
Total Insoluble Dustfall	<0.10			0.10	mg/dm2.day		11-SEP-19	R4800689
Total Soluble Dustfall	0.18			0.10	mg/dm2.day		11-SEP-19	R4800689
Ammonia, Total (as N)	0.00249			0.00082	mg/dm2.day	10-SEP-19	11-SEP-19	R4795769
Interval				1	days		10-SEP-19	R4794454
Chloride (Cl)	<0.14			0.14	mg/dm2.day	10-SEP-19	10-SEP-19	R4799351
Interval				1	days		10-SEP-19	R4794454
Interval				1	days		10-SEP-19	R4794454
Nitrate (as N)	<0.00082			0.00082	mg/dm2.day	10-SEP-19	10-SEP-19	R4799351
Interval				1	days		10-SEP-19	R4794454
Sulfate (SO4)	<0.010			0.010	mg/dm2.day	10-SEP-19	10-SEP-19	R4799351
Interval				1	days		12-SEP-19	R4802093
Mercury (Hg)-Total	<0.00000097			0.00000097	mg/dm2.day	12-SEP-19	13-SEP-19	R4804410
Total Metals in Dustfalls by ICPMS								
Aluminum (Al)-Total	0.000247			0.000058	mg/dm2.day	12-SEP-19	13-SEP-19	R4805428
Interval				1	days		12-SEP-19	R4803268
Antimony (Sb)-Total	<0.0000019			0.0000019	mg/dm2.day	12-SEP-19	13-SEP-19	R4805428
Arsenic (As)-Total	<0.0000019			0.0000019	mg/dm2.day	12-SEP-19	13-SEP-19	R4805428
Barium (Ba)-Total	0.00000970			0.00000097	mg/dm2.day	12-SEP-19	13-SEP-19	R4805428
Beryllium (Be)-Total	<0.0000097			0.0000097	mg/dm2.day	12-SEP-19	13-SEP-19	R4805428
Bismuth (Bi)-Total	0.0000162			0.0000097	mg/dm2.day	12-SEP-19	13-SEP-19	R4805428
Boron (B)-Total	<0.00019			0.00019	mg/dm2.day	12-SEP-19	13-SEP-19	R4805428
Cadmium (Cd)-Total	<0.00000097			0.00000097	mg/dm2.day	12-SEP-19	13-SEP-19	R4805428
Calcium (Ca)-Total	0.00168			0.00039	mg/dm2.day	12-SEP-19	13-SEP-19	R4805428
Chromium (Cr)-Total	<0.0000097			0.0000097	mg/dm2.day	12-SEP-19	13-SEP-19	R4805428
Cobalt (Co)-Total	<0.0000019			0.0000019	mg/dm2.day	12-SEP-19	13-SEP-19	R4805428
Copper (Cu)-Total	0.000597			0.0000097	mg/dm2.day	12-SEP-19	13-SEP-19	R4805428
Lead (Pb)-Total	<0.0000068		DLB	0.0000068	mg/dm2.day	12-SEP-19	13-SEP-19	R4805428
Iron (Fe)-Total	<0.00058			0.00058	mg/dm2.day	12-SEP-19	13-SEP-19	R4805428
Lithium (Li)-Total	<0.000097			0.000097	mg/dm2.day	12-SEP-19	13-SEP-19	R4805428
Magnesium (Mg)-Total	0.00103			0.000097	mg/dm2.day	12-SEP-19	13-SEP-19	R4805428

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters		Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L2342137-5	M-DF05							
Sampled By:	CLIENT on 01-SEP-19							
Matrix:	WATER							
Total Metals in Dustfalls by ICPMS								
Manganese (Mn)-Total	0.0000286			0.0000019	mg/dm2.day	12-SEP-19	13-SEP-19	R4805428
Molybdenum (Mo)-Total	<0.00000097			0.00000097	mg/dm2.day	12-SEP-19	13-SEP-19	R4805428
Nickel (Ni)-Total	<0.0000097			0.0000097	mg/dm2.day	12-SEP-19	13-SEP-19	R4805428
Phosphorus (P)-Total	0.00183			0.00097	mg/dm2.day	12-SEP-19	13-SEP-19	R4805428
Potassium (K)-Total	0.00327			0.00097	mg/dm2.day	12-SEP-19	13-SEP-19	R4805428
Selenium (Se)-Total	<0.000019			0.000019	mg/dm2.day	12-SEP-19	13-SEP-19	R4805428
Silicon (Si)-Total	<0.00097			0.00097	mg/dm2.day	12-SEP-19	13-SEP-19	R4805428
Silver (Ag)-Total	<0.00000019			0.00000019	mg/dm2.day	12-SEP-19	13-SEP-19	R4805428
Sodium (Na)-Total	0.00505			0.00097	mg/dm2.day	12-SEP-19	13-SEP-19	R4805428
Strontium (Sr)-Total	0.0000054			0.0000019	mg/dm2.day	12-SEP-19	13-SEP-19	R4805428
Thallium (Tl)-Total	<0.0000019			0.0000019	mg/dm2.day	12-SEP-19	13-SEP-19	R4805428
Tin (Sn)-Total	<0.0000019			0.0000019	mg/dm2.day	12-SEP-19	13-SEP-19	R4805428
Titanium (Ti)-Total	<0.00019			0.00019	mg/dm2.day	12-SEP-19	13-SEP-19	R4805428
Uranium (U)-Total	<0.00000019			0.00000019	mg/dm2.day	12-SEP-19	13-SEP-19	R4805428
Vanadium (V)-Total	<0.000019			0.000019	mg/dm2.day	12-SEP-19	13-SEP-19	R4805428
Zinc (Zn)-Total	<0.00029		DLB	0.00029	mg/dm2.day	12-SEP-19	13-SEP-19	R4805428
L2342137-6	M-DF06							
Sampled By:	CLIENT on 01-SEP-19							
Matrix:	WATER							
Combined Dustfalls-Total, soluble, insol								
Total Dustfall	0.49			0.10	mg/dm2.day		11-SEP-19	R4800689
Total Insoluble Dustfall	0.15			0.10	mg/dm2.day		11-SEP-19	R4800689
Total Soluble Dustfall	0.34			0.10	mg/dm2.day		11-SEP-19	R4800689
Ammonia, Total (as N)	0.00311			0.00080	mg/dm2.day	10-SEP-19	11-SEP-19	R4795769
Interval				1	days		10-SEP-19	R4794454
Chloride (Cl)	<0.14			0.14	mg/dm2.day	10-SEP-19	10-SEP-19	R4799351
Interval				1	days		10-SEP-19	R4794454
Interval				1	days		10-SEP-19	R4794454
Nitrate (as N)	<0.00080			0.00080	mg/dm2.day	10-SEP-19	10-SEP-19	R4799351
Interval				1	days		10-SEP-19	R4794454
Sulfate (SO4)	<0.010			0.010	mg/dm2.day	10-SEP-19	10-SEP-19	R4799351
Interval				1	days		12-SEP-19	R4802093
Mercury (Hg)-Total	<0.00000081			0.00000081	mg/dm2.day	12-SEP-19	13-SEP-19	R4804410
Total Metals in Dustfalls by ICPMS								
Aluminum (Al)-Total	0.000667			0.000049	mg/dm2.day	12-SEP-19	13-SEP-19	R4805428
Interval				1	days		12-SEP-19	R4803268
Antimony (Sb)-Total	<0.0000016			0.0000016	mg/dm2.day	12-SEP-19	13-SEP-19	R4805428
Arsenic (As)-Total	<0.0000016			0.0000016	mg/dm2.day	12-SEP-19	13-SEP-19	R4805428
Barium (Ba)-Total	0.0000144			0.00000081	mg/dm2.day	12-SEP-19	13-SEP-19	R4805428
Beryllium (Be)-Total	<0.0000081			0.0000081	mg/dm2.day	12-SEP-19	13-SEP-19	R4805428
Bismuth (Bi)-Total	<0.0000081			0.0000081	mg/dm2.day	12-SEP-19	13-SEP-19	R4805428
Boron (B)-Total	<0.00016			0.00016	mg/dm2.day	12-SEP-19	13-SEP-19	R4805428
Cadmium (Cd)-Total	<0.00000081			0.00000081	mg/dm2.day	12-SEP-19	13-SEP-19	R4805428
Calcium (Ca)-Total	0.0117			0.00032	mg/dm2.day	12-SEP-19	13-SEP-19	R4805428
Chromium (Cr)-Total	<0.0000081			0.0000081	mg/dm2.day	12-SEP-19	13-SEP-19	R4805428

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters		Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch	
L2342137-6	M-DF06								
Sampled By:	CLIENT on 01-SEP-19								
Matrix:	WATER								
Total Metals in Dustfalls by ICPMS									
Cobalt (Co)-Total	<0.0000016		DLB	0.0000016	mg/dm2.day	12-SEP-19	13-SEP-19	R4805428	
Copper (Cu)-Total	0.000434			0.0000081	mg/dm2.day	12-SEP-19	13-SEP-19	R4805428	
Lead (Pb)-Total	<0.0000032			0.0000032	mg/dm2.day	12-SEP-19	13-SEP-19	R4805428	
Iron (Fe)-Total	0.00118			0.00049	mg/dm2.day	12-SEP-19	13-SEP-19	R4805428	
Lithium (Li)-Total	<0.000081			0.000081	mg/dm2.day	12-SEP-19	13-SEP-19	R4805428	
Magnesium (Mg)-Total	0.00434			0.000081	mg/dm2.day	12-SEP-19	13-SEP-19	R4805428	
Manganese (Mn)-Total	0.000137			0.0000016	mg/dm2.day	12-SEP-19	13-SEP-19	R4805428	
Molybdenum (Mo)-Total	<0.00000081			0.0000008	mg/dm2.day	12-SEP-19	13-SEP-19	R4805428	
				1					
Nickel (Ni)-Total	<0.0000081			0.0000081	mg/dm2.day	12-SEP-19	13-SEP-19	R4805428	
Phosphorus (P)-Total	0.00318			0.00081	mg/dm2.day	12-SEP-19	13-SEP-19	R4805428	
Potassium (K)-Total	0.00697			0.00081	mg/dm2.day	12-SEP-19	13-SEP-19	R4805428	
Selenium (Se)-Total	<0.000016			0.000016	mg/dm2.day	12-SEP-19	13-SEP-19	R4805428	
Silicon (Si)-Total	0.00084			0.00081	mg/dm2.day	12-SEP-19	13-SEP-19	R4805428	
Silver (Ag)-Total	<0.00000016		0.0000001	mg/dm2.day	12-SEP-19	13-SEP-19	R4805428		
			6						
Sodium (Na)-Total	0.0238		0.00081	mg/dm2.day	12-SEP-19	13-SEP-19	R4805428		
Strontium (Sr)-Total	0.0000236		0.0000016	mg/dm2.day	12-SEP-19	13-SEP-19	R4805428		
Thallium (Tl)-Total	<0.0000016		0.0000016	mg/dm2.day	12-SEP-19	13-SEP-19	R4805428		
Tin (Sn)-Total	<0.0000016		0.0000016	mg/dm2.day	12-SEP-19	13-SEP-19	R4805428		
Titanium (Ti)-Total	<0.00016		0.00016	mg/dm2.day	12-SEP-19	13-SEP-19	R4805428		
Uranium (U)-Total	<0.00000016		0.0000001	mg/dm2.day	12-SEP-19	13-SEP-19	R4805428		
			6						
Vanadium (V)-Total	<0.000016		0.000016	mg/dm2.day	12-SEP-19	13-SEP-19	R4805428		
Zinc (Zn)-Total	0.00024		DLB	0.00024	mg/dm2.day	12-SEP-19	13-SEP-19	R4805428	
L2342137-7	M-DF07								
Sampled By:	CLIENT on 01-SEP-19								
Matrix:	WATER								
Combined Dustfalls-Total, soluble, insol									
Total Dustfall	0.73			0.10	mg/dm2.day		11-SEP-19	R4800689	
Total Insoluble Dustfall	0.36			0.10	mg/dm2.day		11-SEP-19	R4800689	
Total Soluble Dustfall	0.37			0.10	mg/dm2.day		11-SEP-19	R4800689	
Ammonia, Total (as N)	<0.00081			0.00081	mg/dm2.day	10-SEP-19	11-SEP-19	R4795769	
Interval				1	days		10-SEP-19	R4794454	
Chloride (Cl)	<0.14			0.14	mg/dm2.day	10-SEP-19	10-SEP-19	R4799351	
Interval				1	days		10-SEP-19	R4794454	
Interval				1	days		10-SEP-19	R4794454	
Nitrate (as N)	<0.00081			0.00081	mg/dm2.day	10-SEP-19	10-SEP-19	R4799351	
Interval				1	days		10-SEP-19	R4794454	
Sulfate (SO4)	<0.010			0.010	mg/dm2.day	10-SEP-19	10-SEP-19	R4799351	
Interval				1	days		12-SEP-19	R4802093	
Mercury (Hg)-Total	<0.00000084			0.0000008	mg/dm2.day	12-SEP-19	13-SEP-19	R4804410	
				4					
Total Metals in Dustfalls by ICPMS									
Aluminum (Al)-Total	0.00534			0.000050	mg/dm2.day	12-SEP-19	13-SEP-19	R4805428	
Interval				1	days		12-SEP-19	R4803268	
Antimony (Sb)-Total	<0.0000017			0.0000017	mg/dm2.day	12-SEP-19	13-SEP-19	R4805428	
Arsenic (As)-Total	<0.0000017			0.0000017	mg/dm2.day	12-SEP-19	13-SEP-19	R4805428	
Barium (Ba)-Total	0.0000172			0.0000008	mg/dm2.day	12-SEP-19	13-SEP-19	R4805428	
				4					
Beryllium (Be)-Total	<0.0000084			0.0000084	mg/dm2.day	12-SEP-19	13-SEP-19	R4805428	

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters		Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L2342137-7	M-DF07							
Sampled By:	CLIENT on 01-SEP-19							
Matrix:	WATER							
Total Metals in Dustfalls by ICPMS								
Bismuth (Bi)-Total	0.0000175			0.0000084	mg/dm2.day	12-SEP-19	13-SEP-19	R4805428
Boron (B)-Total	<0.00017			0.00017	mg/dm2.day	12-SEP-19	13-SEP-19	R4805428
Cadmium (Cd)-Total	<0.00000084			0.00000084	mg/dm2.day	12-SEP-19	13-SEP-19	R4805428
Calcium (Ca)-Total	0.0302			0.00034	mg/dm2.day	12-SEP-19	13-SEP-19	R4805428
Chromium (Cr)-Total	0.0000226			0.0000084	mg/dm2.day	12-SEP-19	13-SEP-19	R4805428
Cobalt (Co)-Total	0.0000060			0.0000017	mg/dm2.day	12-SEP-19	13-SEP-19	R4805428
Copper (Cu)-Total	0.000724			0.0000084	mg/dm2.day	12-SEP-19	13-SEP-19	R4805428
Lead (Pb)-Total	<0.0000067		DLB	0.0000067	mg/dm2.day	12-SEP-19	13-SEP-19	R4805428
Iron (Fe)-Total	0.0110			0.00050	mg/dm2.day	12-SEP-19	13-SEP-19	R4805428
Lithium (Li)-Total	<0.000084			0.000084	mg/dm2.day	12-SEP-19	13-SEP-19	R4805428
Magnesium (Mg)-Total	0.00822			0.000084	mg/dm2.day	12-SEP-19	13-SEP-19	R4805428
Manganese (Mn)-Total	0.000460			0.0000017	mg/dm2.day	12-SEP-19	13-SEP-19	R4805428
Molybdenum (Mo)-Total	<0.00000084			0.00000084	mg/dm2.day	12-SEP-19	13-SEP-19	R4805428
Nickel (Ni)-Total	0.0000139			0.0000084	mg/dm2.day	12-SEP-19	13-SEP-19	R4805428
Phosphorus (P)-Total	<0.00084			0.00084	mg/dm2.day	12-SEP-19	13-SEP-19	R4805428
Potassium (K)-Total	0.00190			0.00084	mg/dm2.day	12-SEP-19	13-SEP-19	R4805428
Selenium (Se)-Total	<0.000017			0.000017	mg/dm2.day	12-SEP-19	13-SEP-19	R4805428
Silicon (Si)-Total	0.00695			0.00084	mg/dm2.day	12-SEP-19	13-SEP-19	R4805428
Silver (Ag)-Total	<0.00000017			0.00000017	mg/dm2.day	12-SEP-19	13-SEP-19	R4805428
Sodium (Na)-Total	0.0193			0.00084	mg/dm2.day	12-SEP-19	13-SEP-19	R4805428
Strontium (Sr)-Total	0.0000313			0.0000017	mg/dm2.day	12-SEP-19	13-SEP-19	R4805428
Thallium (Tl)-Total	<0.0000017			0.0000017	mg/dm2.day	12-SEP-19	13-SEP-19	R4805428
Tin (Sn)-Total	<0.0000017			0.0000017	mg/dm2.day	12-SEP-19	13-SEP-19	R4805428
Titanium (Ti)-Total	0.00018			0.00017	mg/dm2.day	12-SEP-19	13-SEP-19	R4805428
Uranium (U)-Total	0.00000036			0.00000017	mg/dm2.day	12-SEP-19	13-SEP-19	R4805428
Vanadium (V)-Total	0.000027			0.000017	mg/dm2.day	12-SEP-19	13-SEP-19	R4805428
Zinc (Zn)-Total	<0.00030		DLB	0.00030	mg/dm2.day	12-SEP-19	13-SEP-19	R4805428
L2342137-8	M-DF08							
Sampled By:	CLIENT on 01-SEP-19							
Matrix:	WATER							
Combined Dustfalls-Total, soluble, insol								
Total Dustfall	0.48			0.10	mg/dm2.day		11-SEP-19	R4800689
Total Insoluble Dustfall	0.20			0.10	mg/dm2.day		11-SEP-19	R4800689
Total Soluble Dustfall	0.29			0.10	mg/dm2.day		11-SEP-19	R4800689
Ammonia, Total (as N)	0.00286			0.00087	mg/dm2.day	10-SEP-19	11-SEP-19	R4795769
Interval				1	days		10-SEP-19	R4794454
Chloride (Cl)	<0.15			0.15	mg/dm2.day	10-SEP-19	10-SEP-19	R4799351
Interval				1	days		10-SEP-19	R4794454
Interval				1	days		10-SEP-19	R4794454
Nitrate (as N)	0.00091			0.00087	mg/dm2.day	10-SEP-19	10-SEP-19	R4799351
Interval				1	days		10-SEP-19	R4794454
Sulfate (SO4)	<0.011			0.011	mg/dm2.day	10-SEP-19	10-SEP-19	R4799351
Interval				1	days		12-SEP-19	R4802093
Mercury (Hg)-Total	<0.00000092			0.00000092	mg/dm2.day	12-SEP-19	13-SEP-19	R4804410
Total Metals in Dustfalls by ICPMS								
Aluminum (Al)-Total	0.00462			0.000055	mg/dm2.day	12-SEP-19	13-SEP-19	R4805428

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L2342137-8M-DF08 Sampled By: CLIENT on 01-SEP-19 Matrix: WATER Total Metals in Dustfalls by ICPMS Interval			1	days		12-SEP-19	R4803268
Antimony (Sb)-Total	<0.0000018		0.0000018	mg/dm2.day	12-SEP-19	13-SEP-19	R4805428
Arsenic (As)-Total	<0.0000018		0.0000018	mg/dm2.day	12-SEP-19	13-SEP-19	R4805428
Barium (Ba)-Total	0.0000149		0.0000009	mg/dm2.day	12-SEP-19	13-SEP-19	R4805428
			2				
Beryllium (Be)-Total	<0.0000092		0.0000092	mg/dm2.day	12-SEP-19	13-SEP-19	R4805428
Bismuth (Bi)-Total	0.0000095		0.0000092	mg/dm2.day	12-SEP-19	13-SEP-19	R4805428
Boron (B)-Total	<0.00018		0.00018	mg/dm2.day	12-SEP-19	13-SEP-19	R4805428
Cadmium (Cd)-Total	<0.00000092		0.0000009	mg/dm2.day	12-SEP-19	13-SEP-19	R4805428
			2				
Calcium (Ca)-Total	0.0192		0.00037	mg/dm2.day	12-SEP-19	13-SEP-19	R4805428
Chromium (Cr)-Total	0.0000200		0.0000092	mg/dm2.day	12-SEP-19	13-SEP-19	R4805428
Cobalt (Co)-Total	0.0000051		0.0000018	mg/dm2.day	12-SEP-19	13-SEP-19	R4805428
Copper (Cu)-Total	0.000487		0.0000092	mg/dm2.day	12-SEP-19	13-SEP-19	R4805428
Lead (Pb)-Total	<0.0000073	DLB	0.0000073	mg/dm2.day	12-SEP-19	13-SEP-19	R4805428
Iron (Fe)-Total	0.00950		0.00055	mg/dm2.day	12-SEP-19	13-SEP-19	R4805428
Lithium (Li)-Total	<0.000092		0.000092	mg/dm2.day	12-SEP-19	13-SEP-19	R4805428
Magnesium (Mg)-Total	0.00802		0.000092	mg/dm2.day	12-SEP-19	13-SEP-19	R4805428
Manganese (Mn)-Total	0.000321		0.0000018	mg/dm2.day	12-SEP-19	13-SEP-19	R4805428
Molybdenum (Mo)-Total	<0.00000092		0.0000009	mg/dm2.day	12-SEP-19	13-SEP-19	R4805428
			2				
Nickel (Ni)-Total	0.0000134		0.0000092	mg/dm2.day	12-SEP-19	13-SEP-19	R4805428
Phosphorus (P)-Total	0.00166		0.00092	mg/dm2.day	12-SEP-19	13-SEP-19	R4805428
Potassium (K)-Total	0.00333		0.00092	mg/dm2.day	12-SEP-19	13-SEP-19	R4805428
Selenium (Se)-Total	<0.000018		0.000018	mg/dm2.day	12-SEP-19	13-SEP-19	R4805428
Silicon (Si)-Total	0.00571		0.00092	mg/dm2.day	12-SEP-19	13-SEP-19	R4805428
Silver (Ag)-Total	<0.00000018		0.0000001	mg/dm2.day	12-SEP-19	13-SEP-19	R4805428
			8				
Sodium (Na)-Total	0.0260		0.00092	mg/dm2.day	12-SEP-19	13-SEP-19	R4805428
Strontium (Sr)-Total	0.0000302		0.0000018	mg/dm2.day	12-SEP-19	13-SEP-19	R4805428
Thallium (Tl)-Total	<0.0000018		0.0000018	mg/dm2.day	12-SEP-19	13-SEP-19	R4805428
Tin (Sn)-Total	<0.0000018		0.0000018	mg/dm2.day	12-SEP-19	13-SEP-19	R4805428
Titanium (Ti)-Total	<0.00018		0.00018	mg/dm2.day	12-SEP-19	13-SEP-19	R4805428
Uranium (U)-Total	0.00000019		0.0000001	mg/dm2.day	12-SEP-19	13-SEP-19	R4805428
			8				
Vanadium (V)-Total	0.000025		0.000018	mg/dm2.day	12-SEP-19	13-SEP-19	R4805428
Zinc (Zn)-Total	<0.00028	DLB	0.00028	mg/dm2.day	12-SEP-19	13-SEP-19	R4805428
L2342137-9M-DF09 Sampled By: CLIENT on 01-SEP-19 Matrix: WATER Combined Dustfalls-Total, soluble, insol Total Dustfall	0.31		0.10	mg/dm2.day		11-SEP-19	R4800689
Total Insoluble Dustfall	<0.10		0.10	mg/dm2.day		11-SEP-19	R4800689
Total Soluble Dustfall	0.23		0.10	mg/dm2.day		11-SEP-19	R4800689
Ammonia, Total (as N)	0.00138		0.00087	mg/dm2.day	10-SEP-19	11-SEP-19	R4795769
Interval			1	days		10-SEP-19	R4794454
Chloride (Cl)	<0.15		0.15	mg/dm2.day	10-SEP-19	10-SEP-19	R4799351
Interval			1	days		10-SEP-19	R4794454
Interval			1	days		10-SEP-19	R4794454
Nitrate (as N)	<0.00087		0.00087	mg/dm2.day	10-SEP-19	10-SEP-19	R4799351
Interval			1	days		10-SEP-19	R4794454

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L2342137-9 M-DF09							
Sampled By: CLIENT on 01-SEP-19							
Matrix: WATER							
Sulfate (SO4)	<0.011		0.011	mg/dm2.day	10-SEP-19	10-SEP-19	R4799351
Interval			1	days		12-SEP-19	R4802093
Mercury (Hg)-Total	<0.00000094		0.00000094	mg/dm2.day	12-SEP-19	13-SEP-19	R4804410
			4				
Total Metals in Dustfalls by ICPMS							
Aluminum (Al)-Total	0.000782		0.000057	mg/dm2.day	12-SEP-19	13-SEP-19	R4805428
Interval			1	days		12-SEP-19	R4803268
Antimony (Sb)-Total	<0.0000019		0.0000019	mg/dm2.day	12-SEP-19	13-SEP-19	R4805428
Arsenic (As)-Total	<0.0000019		0.0000019	mg/dm2.day	12-SEP-19	13-SEP-19	R4805428
Barium (Ba)-Total	0.0000102		0.00000094	mg/dm2.day	12-SEP-19	13-SEP-19	R4805428
			4				
Beryllium (Be)-Total	<0.0000094		0.0000094	mg/dm2.day	12-SEP-19	13-SEP-19	R4805428
Bismuth (Bi)-Total	<0.0000094		0.0000094	mg/dm2.day	12-SEP-19	13-SEP-19	R4805428
Boron (B)-Total	<0.00019		0.00019	mg/dm2.day	12-SEP-19	13-SEP-19	R4805428
Cadmium (Cd)-Total	<0.00000094		0.00000094	mg/dm2.day	12-SEP-19	13-SEP-19	R4805428
			4				
Calcium (Ca)-Total	0.00633		0.00038	mg/dm2.day	12-SEP-19	13-SEP-19	R4805428
Chromium (Cr)-Total	<0.0000094		0.0000094	mg/dm2.day	12-SEP-19	13-SEP-19	R4805428
Cobalt (Co)-Total	<0.0000019		0.0000019	mg/dm2.day	12-SEP-19	13-SEP-19	R4805428
Copper (Cu)-Total	0.000249		0.0000094	mg/dm2.day	12-SEP-19	13-SEP-19	R4805428
Lead (Pb)-Total	<0.0000038	DLB	0.0000038	mg/dm2.day	12-SEP-19	13-SEP-19	R4805428
Iron (Fe)-Total	0.00143		0.00057	mg/dm2.day	12-SEP-19	13-SEP-19	R4805428
Lithium (Li)-Total	<0.000094		0.000094	mg/dm2.day	12-SEP-19	13-SEP-19	R4805428
Magnesium (Mg)-Total	0.00284		0.000094	mg/dm2.day	12-SEP-19	13-SEP-19	R4805428
Manganese (Mn)-Total	0.0000976		0.0000019	mg/dm2.day	12-SEP-19	13-SEP-19	R4805428
Molybdenum (Mo)-Total	<0.00000094		0.00000094	mg/dm2.day	12-SEP-19	13-SEP-19	R4805428
			4				
Nickel (Ni)-Total	<0.0000094		0.0000094	mg/dm2.day	12-SEP-19	13-SEP-19	R4805428
Phosphorus (P)-Total	0.00207		0.00094	mg/dm2.day	12-SEP-19	13-SEP-19	R4805428
Potassium (K)-Total	0.00414		0.00094	mg/dm2.day	12-SEP-19	13-SEP-19	R4805428
Selenium (Se)-Total	<0.000019		0.000019	mg/dm2.day	12-SEP-19	13-SEP-19	R4805428
Silicon (Si)-Total	<0.00094		0.00094	mg/dm2.day	12-SEP-19	13-SEP-19	R4805428
Silver (Ag)-Total	<0.00000019		0.00000019	mg/dm2.day	12-SEP-19	13-SEP-19	R4805428
			9				
Sodium (Na)-Total	0.0129		0.00094	mg/dm2.day	12-SEP-19	13-SEP-19	R4805428
Strontium (Sr)-Total	0.0000136		0.0000019	mg/dm2.day	12-SEP-19	13-SEP-19	R4805428
Thallium (Tl)-Total	<0.0000019		0.0000019	mg/dm2.day	12-SEP-19	13-SEP-19	R4805428
Tin (Sn)-Total	<0.0000019		0.0000019	mg/dm2.day	12-SEP-19	13-SEP-19	R4805428
Titanium (Ti)-Total	<0.00019		0.00019	mg/dm2.day	12-SEP-19	13-SEP-19	R4805428
Uranium (U)-Total	<0.00000019		0.00000019	mg/dm2.day	12-SEP-19	13-SEP-19	R4805428
			9				
Vanadium (V)-Total	<0.000019		0.000019	mg/dm2.day	12-SEP-19	13-SEP-19	R4805428
Zinc (Zn)-Total	<0.00028	DLB	0.00028	mg/dm2.day	12-SEP-19	13-SEP-19	R4805428

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

Reference Information

Sample Parameter Qualifier Key:

Qualifier	Description
B	Method Blank exceeds ALS DQO. Associated sample results which are < Limit of Reporting or > 5 times blank level are considered reliable.
DLB	Detection Limit Raised. Analyte detected at comparable level in Method Blank.
DUP-H	Duplicate results outside ALS DQO, due to sample heterogeneity.
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
DUSTFALLS-COM-DM2-VA	Dustfall	Combined Dustfalls-Total, soluble, insol	BCMOE PARTICULATE

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 specifically 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".

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
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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
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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
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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 specifically 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.

Results are reported in units of nitrogen weight. To convert to units by weight of ammonium, multiply by 1.29.

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

Results are reported in units of nitrogen weight. To convert to units by weight of nitrate, multiply by 4.43.

SO4-IC-VA	Dustfall	Dustfall Sulfate by Ion Chromatography	BC LAB MAN. - PART. - SOLUBLE - ANIONS
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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 specifically 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
VA	ALS ENVIRONMENTAL - VANCOUVER, BRITISH COLUMBIA, CANADA

Chain of Custody Numbers:

Reference Information

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
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GLOSSARY OF REPORT TERMS

Surrogates are compounds that are similar in behaviour to target analyte(s), but that do not normally occur in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery. In reports that display the D.L. column, laboratory objectives for surrogates are listed there.

mg/kg - milligrams per kilogram based on dry weight of sample
mg/kg ww - milligrams per kilogram based on wet weight of sample
mg/kg lwt - milligrams per kilogram based on lipid-adjusted weight
mg/L - unit of concentration based on volume, parts per million.

< - Less than.
D.L. - The reporting limit.
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.

Quality Control Report

Workorder: L2342137

Report Date: 17-SEP-19

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Client: TMAC Resources Inc
Hope Bay Project 95 Wellington St West
Toronto ON M5J 2N7

Contact: Environmental Site Manager

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
CL-IC-VA Dustfall								
Batch	R4799351							
WG3157155-4 DUP		L2342137-2						
Chloride (Cl)		<0.14	<0.14	RPD-NA	mg/dm2.day	N/A	20	10-SEP-19
WG3157155-2 LCS								
Chloride (Cl)			99.8		%		90-110	10-SEP-19
WG3157155-1 MB								
Chloride (Cl)			<0.18		mg/dm2.day		0.18	10-SEP-19
WG3157155-3 MS		L2342137-1						
Chloride (Cl)			101.0		%		75-125	10-SEP-19
DUSTFALLS-COM-DM2-VA Dustfall								
Batch	R4800689							
WG3157985-2 LCS								
Total Dustfall			99.5		%		85-115	11-SEP-19
Total Insoluble Dustfall			95.6		%		85-115	11-SEP-19
Total Soluble Dustfall			100.2		%		85-115	11-SEP-19
WG3157985-1 MB								
Total Dustfall			<0.10		mg/dm2.day		0.1	11-SEP-19
Total Insoluble Dustfall			<0.10		mg/dm2.day		0.1	11-SEP-19
Total Soluble Dustfall			<0.10		mg/dm2.day		0.1	11-SEP-19
HG-DUST(DM2-CVAFS-VA Dustfall								
Batch	R4804410							
WG3159742-3 DUP		L2342137-1						
Mercury (Hg)-Total		<0.00000084	<0.0000008	RPD-NA	mg/dm2.day	N/A	20	13-SEP-19
WG3159742-2 LCS								
Mercury (Hg)-Total			91.4		%		70-130	13-SEP-19
WG3159742-1 MB								
Mercury (Hg)-Total			<0.0000013		mg/dm2.day		0.0000013	13-SEP-19
WG3159742-4 MS		L2342137-2						
Mercury (Hg)-Total			93.4		%		70-130	13-SEP-19
MET-DUST(DM2)-MS-VA Dustfall								
Batch	R4805428							
WG3159737-3 DUP		L2342137-1						
Aluminum (Al)-Total		0.000228	0.000210		mg/dm2.day	8.4	20	13-SEP-19
Antimony (Sb)-Total		<0.0000017	<0.0000017	RPD-NA	mg/dm2.day	N/A	20	13-SEP-19
Arsenic (As)-Total		<0.0000017	<0.0000017	RPD-NA	mg/dm2.day	N/A	20	13-SEP-19
Barium (Ba)-Total		0.00000578	0.00000885	DUP-H	mg/dm2.day	0.000003	0.00000168	13-SEP-19
Beryllium (Be)-Total		<0.0000084	<0.0000084	RPD-NA	mg/dm2.day	N/A	20	13-SEP-19
Bismuth (Bi)-Total		<0.0000084	<0.0000084	RPD-NA	mg/dm2.day	N/A	20	13-SEP-19

Quality Control Report

Workorder: L2342137

Report Date: 17-SEP-19

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Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-DUST(DM2)-MS-VA		Dustfall						
Batch	R4805428							
WG3159737-3	DUP	L2342137-1						
Boron (B)-Total		<0.00017	<0.00017	RPD-NA	mg/dm2.day	N/A	20	13-SEP-19
Cadmium (Cd)-Total		<0.00000084	<0.0000008	RPD-NA	mg/dm2.day	N/A	20	13-SEP-19
Calcium (Ca)-Total		0.00224	0.00233		mg/dm2.day	4.3	20	13-SEP-19
Chromium (Cr)-Total		0.0000116	<0.0000084	RPD-NA	mg/dm2.day	N/A	20	13-SEP-19
Cobalt (Co)-Total		<0.0000017	<0.0000017	RPD-NA	mg/dm2.day	N/A	20	13-SEP-19
Copper (Cu)-Total		<0.00010	<0.00010	RPD-NA	mg/dm2.day	N/A	20	13-SEP-19
Lead (Pb)-Total		<0.0000034	<0.0000034	RPD-NA	mg/dm2.day	N/A	20	13-SEP-19
Iron (Fe)-Total		<0.00050	<0.00050	RPD-NA	mg/dm2.day	N/A	20	13-SEP-19
Lithium (Li)-Total		<0.000084	<0.000084	RPD-NA	mg/dm2.day	N/A	20	13-SEP-19
Magnesium (Mg)-Total		0.00255	0.00273		mg/dm2.day	6.8	20	13-SEP-19
Manganese (Mn)-Total		0.0000217	0.0000238		mg/dm2.day	9.0	20	13-SEP-19
Molybdenum (Mo)-Total		0.00000215	<0.0000008	DUP-H	mg/dm2.day	N/A	20	13-SEP-19
Nickel (Ni)-Total		<0.0000084	<0.0000084	RPD-NA	mg/dm2.day	N/A	20	13-SEP-19
Phosphorus (P)-Total		0.00332	0.00394		mg/dm2.day	17	20	13-SEP-19
Potassium (K)-Total		0.00536	0.00574		mg/dm2.day	6.9	20	13-SEP-19
Selenium (Se)-Total		<0.000017	<0.000017	RPD-NA	mg/dm2.day	N/A	20	13-SEP-19
Silicon (Si)-Total		<0.00084	<0.00084	RPD-NA	mg/dm2.day	N/A	20	13-SEP-19
Silver (Ag)-Total		<0.00000017	<0.0000001	RPD-NA	mg/dm2.day	N/A	20	13-SEP-19
Sodium (Na)-Total		0.0161	0.0172		mg/dm2.day	6.8	20	13-SEP-19
Strontium (Sr)-Total		0.0000139	0.0000147		mg/dm2.day	5.5	20	13-SEP-19
Thallium (Tl)-Total		<0.0000017	<0.0000017	RPD-NA	mg/dm2.day	N/A	20	13-SEP-19
Tin (Sn)-Total		<0.0000017	<0.0000017	RPD-NA	mg/dm2.day	N/A	20	13-SEP-19
Titanium (Ti)-Total		<0.00017	<0.00017	RPD-NA	mg/dm2.day	N/A	20	13-SEP-19
Uranium (U)-Total		<0.00000017	<0.0000001	RPD-NA	mg/dm2.day	N/A	20	13-SEP-19
Vanadium (V)-Total		<0.000017	<0.000017	RPD-NA	mg/dm2.day	N/A	20	13-SEP-19
Zinc (Zn)-Total		<0.00030	<0.00030	RPD-NA	mg/dm2.day	N/A	20	13-SEP-19
WG3159737-2	LCS							
Aluminum (Al)-Total			99.96		%		80-120	13-SEP-19
Antimony (Sb)-Total			98.7		%		80-120	13-SEP-19
Arsenic (As)-Total			97.9		%		80-120	13-SEP-19
Barium (Ba)-Total			98.0		%		80-120	13-SEP-19
Beryllium (Be)-Total			96.7		%		80-120	13-SEP-19
Bismuth (Bi)-Total			99.7		%		80-120	13-SEP-19
Boron (B)-Total			95.2		%		80-120	13-SEP-19

Quality Control Report

Workorder: L2342137

Report Date: 17-SEP-19

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Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-DUST(DM2)-MS-VA Dustfall								
Batch R4805428								
WG3159737-2 LCS								
Cadmium (Cd)-Total			94.8		%		80-120	13-SEP-19
Calcium (Ca)-Total			94.9		%		80-120	13-SEP-19
Chromium (Cr)-Total			100.2		%		80-120	13-SEP-19
Cobalt (Co)-Total			99.9		%		80-120	13-SEP-19
Copper (Cu)-Total			98.9		%		80-120	13-SEP-19
Lead (Pb)-Total			99.5		%		80-120	13-SEP-19
Iron (Fe)-Total			96.8		%		80-120	13-SEP-19
Lithium (Li)-Total			96.1		%		80-120	13-SEP-19
Magnesium (Mg)-Total			105.7		%		80-120	13-SEP-19
Manganese (Mn)-Total			99.6		%		80-120	13-SEP-19
Molybdenum (Mo)-Total			98.2		%		80-120	13-SEP-19
Nickel (Ni)-Total			98.6		%		80-120	13-SEP-19
Phosphorus (P)-Total			111.1		%		80-120	13-SEP-19
Potassium (K)-Total			99.0		%		80-120	13-SEP-19
Selenium (Se)-Total			95.6		%		80-120	13-SEP-19
Silicon (Si)-Total			101.8		%		80-120	13-SEP-19
Silver (Ag)-Total			95.8		%		80-120	13-SEP-19
Sodium (Na)-Total			102.8		%		80-120	13-SEP-19
Strontium (Sr)-Total			96.8		%		80-120	13-SEP-19
Thallium (Tl)-Total			97.0		%		80-120	13-SEP-19
Tin (Sn)-Total			97.9		%		80-120	13-SEP-19
Titanium (Ti)-Total			92.9		%		80-120	13-SEP-19
Uranium (U)-Total			100.4		%		80-120	13-SEP-19
Vanadium (V)-Total			101.3		%		80-120	13-SEP-19
Zinc (Zn)-Total			97.8		%		80-120	13-SEP-19
WG3159737-1 MB								
Aluminum (Al)-Total			<0.000079		mg/dm2.day		0.000079	13-SEP-19
Antimony (Sb)-Total			<0.0000026		mg/dm2.day		0.0000026	13-SEP-19
Arsenic (As)-Total			<0.0000026		mg/dm2.day		0.0000026	13-SEP-19
Barium (Ba)-Total			<0.0000013		mg/dm2.day		0.0000013	13-SEP-19
Beryllium (Be)-Total			<0.000013		mg/dm2.day		0.000013	13-SEP-19
Bismuth (Bi)-Total			<0.000013		mg/dm2.day		0.000013	13-SEP-19
Boron (B)-Total			<0.00026		mg/dm2.day		0.00026	13-SEP-19
Cadmium (Cd)-Total			<0.0000013		mg/dm2.day		0.0000013	13-SEP-19

Quality Control Report

Workorder: L2342137

Report Date: 17-SEP-19

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Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
NO3-IC-VA		Dustfall						
Batch	R4799351							
WG3157155-4	DUP	L2342137-2						
Nitrate (as N)		<0.00080	<0.00080	RPD-NA	mg/dm2.day	N/A	20	10-SEP-19
WG3157155-2	LCS							
Nitrate (as N)			100.4		%		90-110	10-SEP-19
WG3157155-1	MB							
Nitrate (as N)			<0.0010		mg/dm2.day		0.001	10-SEP-19
WG3157155-3	MS	L2342137-1						
Nitrate (as N)			102.0		%		75-125	10-SEP-19
SO4-IC-VA		Dustfall						
Batch	R4799351							
WG3157155-4	DUP	L2342137-2						
Sulfate (SO4)		<0.010	<0.010	RPD-NA	mg/dm2.day	N/A	20	10-SEP-19
WG3157155-2	LCS							
Sulfate (SO4)			100.3		%		90-110	10-SEP-19
WG3157155-1	MB							
Sulfate (SO4)			<0.013		mg/dm2.day		0.013	10-SEP-19
WG3157155-3	MS	L2342137-1						
Sulfate (SO4)			101.6		%		75-125	10-SEP-19

Quality Control Report

Workorder: L2342137

Report Date: 17-SEP-19

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Legend:

Limit	ALS Control Limit (Data Quality Objectives)
DUP	Duplicate
RPD	Relative Percent Difference
N/A	Not Available
LCS	Laboratory Control Sample
SRM	Standard Reference Material
MS	Matrix Spike
MSD	Matrix Spike Duplicate
ADE	Average Desorption Efficiency
MB	Method Blank
IRM	Internal Reference Material
CRM	Certified Reference Material
CCV	Continuing Calibration Verification
CVS	Calibration Verification Standard
LCSD	Laboratory Control Sample Duplicate

Sample Parameter Qualifier Definitions:

Qualifier	Description
B	Method Blank exceeds ALS DQO. Associated sample results which are < Limit of Reporting or > 5 times blank level are considered reliable.
DUP-H	Duplicate results outside ALS DQO, due to sample heterogeneity.
MB-LOR	Method Blank exceeds ALS DQO. Limits of Reporting have been adjusted for samples with positive hits below 5x blank level.
RPD-NA	Relative Percent Difference Not Available due to result(s) being less than detection limit.

Hold Time Exceedances:

All test results reported with this submission were conducted within ALS recommended hold times.

ALS recommended hold times may vary by province. They are assigned to meet known provincial and/or federal government requirements. In the absence of regulatory hold times, ALS establishes recommendations based on guidelines published by the US EPA, APHA Standard Methods, or Environment Canada (where available). For more information, please contact ALS.

The ALS Quality Control Report is provided to ALS clients upon request. ALS includes comprehensive QC checks with every analysis to ensure our high standards of quality are met. Each QC result has a known or expected target value, which is compared against pre-determined data quality objectives to provide confidence in the accuracy of associated test results.

Please note that this report may contain QC results from anonymous Sample Duplicates and Matrix Spikes that do not originate from this Work Order.



L2342137-COFC

COC #

Page 1 of 1

Report To:			Report Form			Service Requested (Rush for routine analysis subject to availability)															
Company: TMAC Resources Ltd (Hope Bay)			<input checked="" type="checkbox"/> Standard			<input checked="" type="checkbox"/> Regular (Standard Turnaround Times - Business Days)															
Contact: Environmental Site Manager			<input checked="" type="checkbox"/> PDF <input checked="" type="checkbox"/> Excel <input checked="" type="checkbox"/> Digital <input type="checkbox"/> Fax			<input checked="" type="checkbox"/> Priority (2-4 Business Days) - 50% Surcharge - Contact ALS to Confirm TAT															
Address: 95 Welling Street West, Suite 1010			Email 1: enviro@tmacresources.com			<input checked="" type="checkbox"/> Emergency (1-2 Bus. Days) - 100% Surcharge - Contact ALS to Confirm TAT															
P.O. Box 44, Toronto, ON, M5J 2N7			Email 2: enviro.tech@tmacresources.com			<input checked="" type="checkbox"/> Same Day or Weekend Emergency - Contact ALS to Confirm TAT															
Phone: 1-416-628-0216 Fax:			Email 3: Gregory.Crooks@stantec.com																		
Invoice To Same as Report ? Y			Client / Project Information			Analysis Request															
Hardcopy of Invoice with Report?			Job #:			Please indicate below Filtered, Preserved or both (F, P, F/P)															
Company:			PO / AFE: 4500011700																		
Contact:			LSD:																		
Address:			Job Ref: Madrid Dustfall																		
Phone:			Quote #:																		
Lab Work Order # (lab use only)			ALS Contact: Amber Springer			Sampler:															
Sample			Sample Identification			Date In (dd-mmm-yy)		Date Out (dd-mmm-yy)		Sample Type											
#			(This description will appear on the report)																		
1			M-DF01			02-Aug-19		01-Sep-19		Water											
2			M-DF02			02-Aug-19		01-Sep-19		Water											
3			M-DF03			02-Aug-19		01-Sep-19		Water											
4			M-DF04			02-Aug-19		01-Sep-19		Water											
5			M-DF05			02-Aug-19		01-Sep-19		Water											
6			M-DF06			02-Aug-19		01-Sep-19		Water											
7			M-DF07			02-Aug-19		01-Sep-19		Water											
8			M-DF08			02-Aug-19		01-Sep-19		Water											
9			M-DF09			02-Aug-19		01-Sep-19		Water											
Special Instructions / Regulations with water or land use (CCME-Freshwater Aquatic Life/BC CSR - Commercial/AB Tier 1 - Natural, etc) /																					
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																					
Also provided on another Excel tab are the ALS location addresses, phone numbers and sample container / preservation / holding time table																					
SHIPMENT RELEASE (client use)					SHIPMENT RECEPTION (lab use only)					SHIPMENT VERIFICATION											
Released by:		Date (dd-mmm-yy)		Time (hh-mm)	Received by:		Date:		Time:	Temperature:		Verified by:		Date:							
Kyle Conway		3-Sep-19		7:30	OG		4-Sep-19		1630	8-6 °C		LGA									

L2342137-COFC

GENF 18.01 Front

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TMAC Resources Inc
ATTN: Environmental Site Manager
Hope Bay Project
95 Welliing St West P O Box 44
Toronto ON M5J 2N7

Date Received: 01-OCT-19
Report Date: 11-OCT-19 12:58 (MT)
Version: FINAL

Client Phone: 416-628-0216

Certificate of Analysis

Lab Work Order #: L2357380
Project P.O. #: 4500011700
Job Reference: MADRID DUSTFALL
C of C Numbers:
Legal Site Desc:

Amber Springer, B.Sc
Account Manager

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ADDRESS: 8081 Lougheed Hwy, Suite 100, Burnaby, BC V5A 1W9 Canada | Phone: +1 604 253 4188 | Fax: +1 604 253 6700
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ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L2357380-1 M-DF01 Sampled By: BM/AT/SE on 26-SEP-19 Matrix: WATER							
Combined Dustfalls-Total, soluble, insol							
Total Dustfall	0.28		0.11	mg/dm2.day		10-OCT-19	R4867165
Total Insoluble Dustfall	<0.11		0.11	mg/dm2.day		10-OCT-19	R4867165
Total Soluble Dustfall	0.24		0.11	mg/dm2.day		10-OCT-19	R4867165
Ammonia, Total (as N)	0.0014		0.0010	mg/dm2.day	09-OCT-19	09-OCT-19	R4864730
Interval			1	days		09-OCT-19	R4862931
Chloride (Cl)	<0.18		0.18	mg/dm2.day	09-OCT-19	09-OCT-19	R4865318
Interval			1	days		09-OCT-19	R4862931
Interval			1	days		09-OCT-19	R4862931
Nitrate (as N)	<0.0010		0.0010	mg/dm2.day	09-OCT-19	09-OCT-19	R4865318
Interval			1	days		09-OCT-19	R4862931
Sulfate (SO4)	<0.013		0.013	mg/dm2.day	09-OCT-19	09-OCT-19	R4865318
Interval			1	days		07-OCT-19	R4861017
Mercury (Hg)-Total	<0.0000012		0.0000012	mg/dm2.day	07-OCT-19	08-OCT-19	R4861227
Total Metals in Dustfalls by ICPMS							
Aluminum (Al)-Total	0.00177		0.000074	mg/dm2.day	08-OCT-19	08-OCT-19	R4862101
Interval			1	days		08-OCT-19	R4861629
Antimony (Sb)-Total	<0.0000025		0.0000025	mg/dm2.day	08-OCT-19	08-OCT-19	R4862101
Arsenic (As)-Total	0.0000034		0.0000025	mg/dm2.day	08-OCT-19	08-OCT-19	R4862101
Barium (Ba)-Total	0.0000155		0.0000012	mg/dm2.day	08-OCT-19	08-OCT-19	R4862101
Beryllium (Be)-Total	<0.000012		0.000012	mg/dm2.day	08-OCT-19	08-OCT-19	R4862101
Bismuth (Bi)-Total	0.000015		0.000012	mg/dm2.day	08-OCT-19	08-OCT-19	R4862101
Boron (B)-Total	<0.00025		0.00025	mg/dm2.day	08-OCT-19	08-OCT-19	R4862101
Cadmium (Cd)-Total	<0.0000012		0.0000012	mg/dm2.day	08-OCT-19	08-OCT-19	R4862101
Calcium (Ca)-Total	0.0131		0.00049	mg/dm2.day	08-OCT-19	08-OCT-19	R4862101
Chromium (Cr)-Total	0.000015		0.000012	mg/dm2.day	08-OCT-19	08-OCT-19	R4862101
Cobalt (Co)-Total	<0.0000025		0.0000025	mg/dm2.day	08-OCT-19	08-OCT-19	R4862101
Copper (Cu)-Total	0.00039	DLB	0.00039	mg/dm2.day	08-OCT-19	08-OCT-19	R4862101
Lead (Pb)-Total	<0.0000074	DLB	0.0000074	mg/dm2.day	08-OCT-19	08-OCT-19	R4862101
Iron (Fe)-Total	0.00320		0.00074	mg/dm2.day	08-OCT-19	08-OCT-19	R4862101
Lithium (Li)-Total	<0.00012		0.00012	mg/dm2.day	08-OCT-19	08-OCT-19	R4862101
Magnesium (Mg)-Total	0.00252		0.00012	mg/dm2.day	08-OCT-19	08-OCT-19	R4862101
Manganese (Mn)-Total	0.000136		0.0000025	mg/dm2.day	08-OCT-19	08-OCT-19	R4862101
Molybdenum (Mo)-Total	<0.0000012		0.0000012	mg/dm2.day	08-OCT-19	08-OCT-19	R4862101
Nickel (Ni)-Total	<0.000012		0.000012	mg/dm2.day	08-OCT-19	08-OCT-19	R4862101
Phosphorus (P)-Total	<0.0012		0.0012	mg/dm2.day	08-OCT-19	08-OCT-19	R4862101
Potassium (K)-Total	<0.0012		0.0012	mg/dm2.day	08-OCT-19	08-OCT-19	R4862101
Selenium (Se)-Total	<0.000025		0.000025	mg/dm2.day	08-OCT-19	08-OCT-19	R4862101
Silicon (Si)-Total	0.0020		0.0012	mg/dm2.day	08-OCT-19	08-OCT-19	R4862101
Silver (Ag)-Total	<0.00000025		0.00000025	mg/dm2.day	08-OCT-19	08-OCT-19	R4862101
Sodium (Na)-Total	0.0074		0.0012	mg/dm2.day	08-OCT-19	08-OCT-19	R4862101
Strontium (Sr)-Total	0.0000112		0.0000025	mg/dm2.day	08-OCT-19	08-OCT-19	R4862101
Thallium (Tl)-Total	<0.0000025		0.0000025	mg/dm2.day	08-OCT-19	08-OCT-19	R4862101
Tin (Sn)-Total	<0.0000025		0.0000025	mg/dm2.day	08-OCT-19	08-OCT-19	R4862101
Titanium (Ti)-Total	<0.00025		0.00025	mg/dm2.day	08-OCT-19	08-OCT-19	R4862101
Uranium (U)-Total	<0.00000025		0.00000025	mg/dm2.day	08-OCT-19	08-OCT-19	R4862101
Vanadium (V)-Total	<0.000025		0.000025	mg/dm2.day	08-OCT-19	08-OCT-19	R4862101
Zinc (Zn)-Total	<0.00029	DLB	0.00029	mg/dm2.day	08-OCT-19	08-OCT-19	R4862101

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L2357380-2 M-DF02							
Sampled By: BM/AT/SE on 28-SEP-19							
Matrix: WATER							
Combined Dustfalls-Total, soluble, insol							
Total Dustfall	0.18		0.11	mg/dm2.day		10-OCT-19	R4867165
Total Insoluble Dustfall	<0.11		0.11	mg/dm2.day		10-OCT-19	R4867165
Total Soluble Dustfall	0.18		0.11	mg/dm2.day		10-OCT-19	R4867165
Ammonia, Total (as N)	<0.0010		0.0010	mg/dm2.day	09-OCT-19	09-OCT-19	R4864730
Interval			1	days		09-OCT-19	R4862931
Chloride (Cl)	<0.18		0.18	mg/dm2.day	09-OCT-19	09-OCT-19	R4865318
Interval			1	days		09-OCT-19	R4862931
Interval			1	days		09-OCT-19	R4862931
Nitrate (as N)	<0.0010		0.0010	mg/dm2.day	09-OCT-19	09-OCT-19	R4865318
Interval			1	days		09-OCT-19	R4862931
Sulfate (SO4)	<0.013		0.013	mg/dm2.day	09-OCT-19	09-OCT-19	R4865318
Interval			1	days		07-OCT-19	R4861017
Mercury (Hg)-Total	<0.0000011		0.0000011	mg/dm2.day	07-OCT-19	08-OCT-19	R4861227
Total Metals in Dustfalls by ICPMS							
Aluminum (Al)-Total	0.000485		0.000065	mg/dm2.day	08-OCT-19	08-OCT-19	R4862101
Interval			1	days		08-OCT-19	R4861629
Antimony (Sb)-Total	<0.0000022		0.0000022	mg/dm2.day	08-OCT-19	08-OCT-19	R4862101
Arsenic (As)-Total	<0.0000022		0.0000022	mg/dm2.day	08-OCT-19	08-OCT-19	R4862101
Barium (Ba)-Total	0.0000159		0.0000011	mg/dm2.day	08-OCT-19	08-OCT-19	R4862101
Beryllium (Be)-Total	<0.000011		0.000011	mg/dm2.day	08-OCT-19	08-OCT-19	R4862101
Bismuth (Bi)-Total	0.000044		0.000011	mg/dm2.day	08-OCT-19	08-OCT-19	R4862101
Boron (B)-Total	<0.00022		0.00022	mg/dm2.day	08-OCT-19	08-OCT-19	R4862101
Cadmium (Cd)-Total	<0.0000011		0.0000011	mg/dm2.day	08-OCT-19	08-OCT-19	R4862101
Calcium (Ca)-Total	0.00273		0.00043	mg/dm2.day	08-OCT-19	08-OCT-19	R4862101
Chromium (Cr)-Total	<0.000011		0.000011	mg/dm2.day	08-OCT-19	08-OCT-19	R4862101
Cobalt (Co)-Total	<0.0000022		0.0000022	mg/dm2.day	08-OCT-19	08-OCT-19	R4862101
Copper (Cu)-Total	0.000386		0.000011	mg/dm2.day	08-OCT-19	08-OCT-19	R4862101
Lead (Pb)-Total	0.0000120		0.0000011	mg/dm2.day	08-OCT-19	08-OCT-19	R4862101
Iron (Fe)-Total	0.00151		0.00065	mg/dm2.day	08-OCT-19	08-OCT-19	R4862101
Lithium (Li)-Total	<0.00011		0.00011	mg/dm2.day	08-OCT-19	08-OCT-19	R4862101
Magnesium (Mg)-Total	0.00122		0.00011	mg/dm2.day	08-OCT-19	08-OCT-19	R4862101
Manganese (Mn)-Total	0.0000498		0.0000022	mg/dm2.day	08-OCT-19	08-OCT-19	R4862101
Molybdenum (Mo)-Total	<0.0000011		0.0000011	mg/dm2.day	08-OCT-19	08-OCT-19	R4862101
Nickel (Ni)-Total	<0.000011		0.000011	mg/dm2.day	08-OCT-19	08-OCT-19	R4862101
Phosphorus (P)-Total	<0.0011		0.0011	mg/dm2.day	08-OCT-19	08-OCT-19	R4862101
Potassium (K)-Total	<0.0011		0.0011	mg/dm2.day	08-OCT-19	08-OCT-19	R4862101
Selenium (Se)-Total	<0.000022		0.000022	mg/dm2.day	08-OCT-19	08-OCT-19	R4862101
Silicon (Si)-Total	<0.0011		0.0011	mg/dm2.day	08-OCT-19	08-OCT-19	R4862101
Silver (Ag)-Total	<0.00000022		0.0000002	mg/dm2.day	08-OCT-19	08-OCT-19	R4862101
			2				
Sodium (Na)-Total	0.0069		0.0011	mg/dm2.day	08-OCT-19	08-OCT-19	R4862101
Strontium (Sr)-Total	0.0000083		0.0000022	mg/dm2.day	08-OCT-19	08-OCT-19	R4862101
Thallium (Tl)-Total	<0.0000022		0.0000022	mg/dm2.day	08-OCT-19	08-OCT-19	R4862101
Tin (Sn)-Total	<0.0000022		0.0000022	mg/dm2.day	08-OCT-19	08-OCT-19	R4862101
Titanium (Ti)-Total	<0.00022		0.00022	mg/dm2.day	08-OCT-19	08-OCT-19	R4862101
Uranium (U)-Total	0.00000023		0.0000002	mg/dm2.day	08-OCT-19	08-OCT-19	R4862101
			2				
Vanadium (V)-Total	<0.000022		0.000022	mg/dm2.day	08-OCT-19	08-OCT-19	R4862101
Zinc (Zn)-Total	<0.00026	DLB	0.00026	mg/dm2.day	08-OCT-19	08-OCT-19	R4862101

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L2357380-3 M-DF03 Sampled By: BM/AT/SE on 28-SEP-19 Matrix: WATER							
Combined Dustfalls-Total, soluble, insol							
Total Dustfall	0.29		0.11	mg/dm2.day		10-OCT-19	R4867165
Total Insoluble Dustfall	<0.11		0.11	mg/dm2.day		10-OCT-19	R4867165
Total Soluble Dustfall	0.29		0.11	mg/dm2.day		10-OCT-19	R4867165
Ammonia, Total (as N)	<0.00093		0.00093	mg/dm2.day	09-OCT-19	09-OCT-19	R4864730
Interval			1	days		09-OCT-19	R4862931
Chloride (Cl)	<0.16		0.16	mg/dm2.day	09-OCT-19	09-OCT-19	R4865318
Interval			1	days		09-OCT-19	R4862931
Interval			1	days		09-OCT-19	R4862931
Nitrate (as N)	<0.00093		0.00093	mg/dm2.day	09-OCT-19	09-OCT-19	R4865318
Interval			1	days		09-OCT-19	R4862931
Sulfate (SO4)	<0.012		0.012	mg/dm2.day	09-OCT-19	09-OCT-19	R4865318
Interval			1	days		07-OCT-19	R4861017
Mercury (Hg)-Total	<0.0000012		0.0000012	mg/dm2.day	07-OCT-19	08-OCT-19	R4861227
Total Metals in Dustfalls by ICPMS							
Aluminum (Al)-Total	0.000339		0.000073	mg/dm2.day	08-OCT-19	08-OCT-19	R4862101
Interval			1	days		08-OCT-19	R4861629
Antimony (Sb)-Total	<0.0000024		0.0000024	mg/dm2.day	08-OCT-19	08-OCT-19	R4862101
Arsenic (As)-Total	<0.0000024		0.0000024	mg/dm2.day	08-OCT-19	08-OCT-19	R4862101
Barium (Ba)-Total	0.0000132		0.0000012	mg/dm2.day	08-OCT-19	08-OCT-19	R4862101
Beryllium (Be)-Total	<0.000012		0.000012	mg/dm2.day	08-OCT-19	08-OCT-19	R4862101
Bismuth (Bi)-Total	<0.000012		0.000012	mg/dm2.day	08-OCT-19	08-OCT-19	R4862101
Boron (B)-Total	<0.00024		0.00024	mg/dm2.day	08-OCT-19	08-OCT-19	R4862101
Cadmium (Cd)-Total	<0.0000012		0.0000012	mg/dm2.day	08-OCT-19	08-OCT-19	R4862101
Calcium (Ca)-Total	0.00247		0.00049	mg/dm2.day	08-OCT-19	08-OCT-19	R4862101
Chromium (Cr)-Total	<0.000012		0.000012	mg/dm2.day	08-OCT-19	08-OCT-19	R4862101
Cobalt (Co)-Total	<0.0000024		0.0000024	mg/dm2.day	08-OCT-19	08-OCT-19	R4862101
Copper (Cu)-Total	<0.00034	DLB	0.00034	mg/dm2.day	08-OCT-19	08-OCT-19	R4862101
Lead (Pb)-Total	<0.0000073	DLB	0.0000073	mg/dm2.day	08-OCT-19	08-OCT-19	R4862101
Iron (Fe)-Total	<0.00073		0.00073	mg/dm2.day	08-OCT-19	08-OCT-19	R4862101
Lithium (Li)-Total	<0.00012		0.00012	mg/dm2.day	08-OCT-19	08-OCT-19	R4862101
Magnesium (Mg)-Total	0.00161		0.00012	mg/dm2.day	08-OCT-19	08-OCT-19	R4862101
Manganese (Mn)-Total	0.0000397		0.0000024	mg/dm2.day	08-OCT-19	08-OCT-19	R4862101
Molybdenum (Mo)-Total	<0.0000012		0.0000012	mg/dm2.day	08-OCT-19	08-OCT-19	R4862101
Nickel (Ni)-Total	<0.000012		0.000012	mg/dm2.day	08-OCT-19	08-OCT-19	R4862101
Phosphorus (P)-Total	<0.0012		0.0012	mg/dm2.day	08-OCT-19	08-OCT-19	R4862101
Potassium (K)-Total	<0.0012		0.0012	mg/dm2.day	08-OCT-19	08-OCT-19	R4862101
Selenium (Se)-Total	<0.000024		0.000024	mg/dm2.day	08-OCT-19	08-OCT-19	R4862101
Silicon (Si)-Total	<0.0012		0.0012	mg/dm2.day	08-OCT-19	08-OCT-19	R4862101
Silver (Ag)-Total	0.00000028		0.00000024	mg/dm2.day	08-OCT-19	08-OCT-19	R4862101
Sodium (Na)-Total	0.0108		0.0012	mg/dm2.day	08-OCT-19	08-OCT-19	R4862101
Strontium (Sr)-Total	0.0000100		0.0000024	mg/dm2.day	08-OCT-19	08-OCT-19	R4862101
Thallium (Tl)-Total	<0.0000024		0.0000024	mg/dm2.day	08-OCT-19	08-OCT-19	R4862101
Tin (Sn)-Total	<0.0000024		0.0000024	mg/dm2.day	08-OCT-19	08-OCT-19	R4862101
Titanium (Ti)-Total	<0.00024		0.00024	mg/dm2.day	08-OCT-19	08-OCT-19	R4862101
Uranium (U)-Total	<0.00000024		0.00000024	mg/dm2.day	08-OCT-19	08-OCT-19	R4862101
Vanadium (V)-Total	<0.000024		0.000024	mg/dm2.day	08-OCT-19	08-OCT-19	R4862101
Zinc (Zn)-Total	<0.00022	DLB	0.00022	mg/dm2.day	08-OCT-19	08-OCT-19	R4862101

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L2357380-4 M-DF04 Sampled By: BM/AT/SE on 28-SEP-19 Matrix: WATER							
Combined Dustfalls-Total, soluble, insol							
Total Dustfall	0.24		0.11	mg/dm2.day		10-OCT-19	R4867165
Total Insoluble Dustfall	<0.11		0.11	mg/dm2.day		10-OCT-19	R4867165
Total Soluble Dustfall	0.20		0.11	mg/dm2.day		10-OCT-19	R4867165
Ammonia, Total (as N)	<0.00093		0.00093	mg/dm2.day	09-OCT-19	09-OCT-19	R4864730
Interval			1	days		09-OCT-19	R4862931
Chloride (Cl)	<0.16		0.16	mg/dm2.day	09-OCT-19	09-OCT-19	R4865318
Interval			1	days		09-OCT-19	R4862931
Interval			1	days		09-OCT-19	R4862931
Nitrate (as N)	<0.00093		0.00093	mg/dm2.day	09-OCT-19	09-OCT-19	R4865318
Interval			1	days		09-OCT-19	R4862931
Sulfate (SO4)	<0.012		0.012	mg/dm2.day	09-OCT-19	09-OCT-19	R4865318
Interval			1	days		07-OCT-19	R4861017
Mercury (Hg)-Total	<0.0000011		0.0000011	mg/dm2.day	07-OCT-19	08-OCT-19	R4861227
Total Metals in Dustfalls by ICPMS							
Aluminum (Al)-Total	0.00129		0.000066	mg/dm2.day	08-OCT-19	08-OCT-19	R4862101
Interval			1	days		08-OCT-19	R4861629
Antimony (Sb)-Total	<0.0000022		0.0000022	mg/dm2.day	08-OCT-19	08-OCT-19	R4862101
Arsenic (As)-Total	<0.0000022		0.0000022	mg/dm2.day	08-OCT-19	08-OCT-19	R4862101
Barium (Ba)-Total	0.0000186		0.0000011	mg/dm2.day	08-OCT-19	08-OCT-19	R4862101
Beryllium (Be)-Total	<0.000011		0.000011	mg/dm2.day	08-OCT-19	08-OCT-19	R4862101
Bismuth (Bi)-Total	0.000011		0.000011	mg/dm2.day	08-OCT-19	08-OCT-19	R4862101
Boron (B)-Total	<0.00022		0.00022	mg/dm2.day	08-OCT-19	08-OCT-19	R4862101
Cadmium (Cd)-Total	<0.0000011		0.0000011	mg/dm2.day	08-OCT-19	08-OCT-19	R4862101
Calcium (Ca)-Total	0.00528		0.00044	mg/dm2.day	08-OCT-19	08-OCT-19	R4862101
Chromium (Cr)-Total	<0.000011		0.000011	mg/dm2.day	08-OCT-19	08-OCT-19	R4862101
Cobalt (Co)-Total	<0.0000022		0.0000022	mg/dm2.day	08-OCT-19	08-OCT-19	R4862101
Copper (Cu)-Total	0.000452		0.000011	mg/dm2.day	08-OCT-19	08-OCT-19	R4862101
Lead (Pb)-Total	<0.0000066	DLB	0.0000066	mg/dm2.day	08-OCT-19	08-OCT-19	R4862101
Iron (Fe)-Total	0.00246		0.00066	mg/dm2.day	08-OCT-19	08-OCT-19	R4862101
Lithium (Li)-Total	<0.00011		0.00011	mg/dm2.day	08-OCT-19	08-OCT-19	R4862101
Magnesium (Mg)-Total	0.00171		0.00011	mg/dm2.day	08-OCT-19	08-OCT-19	R4862101
Manganese (Mn)-Total	0.0000966		0.0000022	mg/dm2.day	08-OCT-19	08-OCT-19	R4862101
Molybdenum (Mo)-Total	<0.0000011		0.0000011	mg/dm2.day	08-OCT-19	08-OCT-19	R4862101
Nickel (Ni)-Total	<0.000011		0.000011	mg/dm2.day	08-OCT-19	08-OCT-19	R4862101
Phosphorus (P)-Total	<0.0011		0.0011	mg/dm2.day	08-OCT-19	08-OCT-19	R4862101
Potassium (K)-Total	<0.0011		0.0011	mg/dm2.day	08-OCT-19	08-OCT-19	R4862101
Selenium (Se)-Total	<0.000022		0.000022	mg/dm2.day	08-OCT-19	08-OCT-19	R4862101
Silicon (Si)-Total	0.0013		0.0011	mg/dm2.day	08-OCT-19	08-OCT-19	R4862101
Silver (Ag)-Total	0.00000046		0.0000002	mg/dm2.day	08-OCT-19	08-OCT-19	R4862101
			2				
Sodium (Na)-Total	0.0049		0.0011	mg/dm2.day	08-OCT-19	08-OCT-19	R4862101
Strontium (Sr)-Total	0.0000078		0.0000022	mg/dm2.day	08-OCT-19	08-OCT-19	R4862101
Thallium (Tl)-Total	<0.0000022		0.0000022	mg/dm2.day	08-OCT-19	08-OCT-19	R4862101
Tin (Sn)-Total	<0.0000022		0.0000022	mg/dm2.day	08-OCT-19	08-OCT-19	R4862101
Titanium (Ti)-Total	<0.00022		0.00022	mg/dm2.day	08-OCT-19	08-OCT-19	R4862101
Uranium (U)-Total	<0.00000022		0.0000002	mg/dm2.day	08-OCT-19	08-OCT-19	R4862101
			2				
Vanadium (V)-Total	<0.000022		0.000022	mg/dm2.day	08-OCT-19	08-OCT-19	R4862101
Zinc (Zn)-Total	<0.00033	DLB	0.00033	mg/dm2.day	08-OCT-19	08-OCT-19	R4862101

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L2357380-5 M-DF05 Sampled By: BM/AT/SE on 28-SEP-19 Matrix: WATER							
Combined Dustfalls-Total, soluble, insol							
Total Dustfall	0.44		0.11	mg/dm2.day		10-OCT-19	R4867165
Total Insoluble Dustfall	<0.11		0.11	mg/dm2.day		10-OCT-19	R4867165
Total Soluble Dustfall	0.44		0.11	mg/dm2.day		10-OCT-19	R4867165
Ammonia, Total (as N)	<0.00088		0.00088	mg/dm2.day	09-OCT-19	09-OCT-19	R4864730
Interval			1	days		09-OCT-19	R4862931
Chloride (Cl)	<0.15		0.15	mg/dm2.day	09-OCT-19	09-OCT-19	R4865318
Interval			1	days		09-OCT-19	R4862931
Interval			1	days		09-OCT-19	R4862931
Nitrate (as N)	<0.00088		0.00088	mg/dm2.day	09-OCT-19	09-OCT-19	R4865318
Interval			1	days		09-OCT-19	R4862931
Sulfate (SO4)	<0.011		0.011	mg/dm2.day	09-OCT-19	09-OCT-19	R4865318
Interval			1	days		07-OCT-19	R4861017
Mercury (Hg)-Total	<0.0000011		0.0000011	mg/dm2.day	07-OCT-19	08-OCT-19	R4861227
Total Metals in Dustfalls by ICPMS							
Aluminum (Al)-Total	0.000465		0.000066	mg/dm2.day	08-OCT-19	08-OCT-19	R4862101
Interval			1	days		08-OCT-19	R4861629
Antimony (Sb)-Total	<0.0000022		0.0000022	mg/dm2.day	08-OCT-19	08-OCT-19	R4862101
Arsenic (As)-Total	<0.0000022		0.0000022	mg/dm2.day	08-OCT-19	08-OCT-19	R4862101
Barium (Ba)-Total	0.0000115		0.0000011	mg/dm2.day	08-OCT-19	08-OCT-19	R4862101
Beryllium (Be)-Total	<0.000011		0.000011	mg/dm2.day	08-OCT-19	08-OCT-19	R4862101
Bismuth (Bi)-Total	<0.000011		0.000011	mg/dm2.day	08-OCT-19	08-OCT-19	R4862101
Boron (B)-Total	<0.00022		0.00022	mg/dm2.day	08-OCT-19	08-OCT-19	R4862101
Cadmium (Cd)-Total	<0.0000011		0.0000011	mg/dm2.day	08-OCT-19	08-OCT-19	R4862101
Calcium (Ca)-Total	0.00222		0.00044	mg/dm2.day	08-OCT-19	08-OCT-19	R4862101
Chromium (Cr)-Total	<0.000011		0.000011	mg/dm2.day	08-OCT-19	08-OCT-19	R4862101
Cobalt (Co)-Total	<0.0000022		0.0000022	mg/dm2.day	08-OCT-19	08-OCT-19	R4862101
Copper (Cu)-Total	<0.00020	DLB	0.00020	mg/dm2.day	08-OCT-19	08-OCT-19	R4862101
Lead (Pb)-Total	<0.0000055	DLB	0.0000055	mg/dm2.day	08-OCT-19	08-OCT-19	R4862101
Iron (Fe)-Total	0.00076		0.00066	mg/dm2.day	08-OCT-19	08-OCT-19	R4862101
Lithium (Li)-Total	<0.00011		0.00011	mg/dm2.day	08-OCT-19	08-OCT-19	R4862101
Magnesium (Mg)-Total	0.00112		0.00011	mg/dm2.day	08-OCT-19	08-OCT-19	R4862101
Manganese (Mn)-Total	0.0000343		0.0000022	mg/dm2.day	08-OCT-19	08-OCT-19	R4862101
Molybdenum (Mo)-Total	<0.0000011		0.0000011	mg/dm2.day	08-OCT-19	08-OCT-19	R4862101
Nickel (Ni)-Total	<0.000011		0.000011	mg/dm2.day	08-OCT-19	08-OCT-19	R4862101
Phosphorus (P)-Total	<0.0011		0.0011	mg/dm2.day	08-OCT-19	08-OCT-19	R4862101
Potassium (K)-Total	<0.0011		0.0011	mg/dm2.day	08-OCT-19	08-OCT-19	R4862101
Selenium (Se)-Total	<0.000022		0.000022	mg/dm2.day	08-OCT-19	08-OCT-19	R4862101
Silicon (Si)-Total	<0.0011		0.0011	mg/dm2.day	08-OCT-19	08-OCT-19	R4862101
Silver (Ag)-Total	0.00000023		0.0000002	mg/dm2.day	08-OCT-19	08-OCT-19	R4862101
			2				
Sodium (Na)-Total	0.0059		0.0011	mg/dm2.day	08-OCT-19	08-OCT-19	R4862101
Strontium (Sr)-Total	0.0000069		0.0000022	mg/dm2.day	08-OCT-19	08-OCT-19	R4862101
Thallium (Tl)-Total	<0.0000022		0.0000022	mg/dm2.day	08-OCT-19	08-OCT-19	R4862101
Tin (Sn)-Total	<0.0000022		0.0000022	mg/dm2.day	08-OCT-19	08-OCT-19	R4862101
Titanium (Ti)-Total	<0.00022		0.00022	mg/dm2.day	08-OCT-19	08-OCT-19	R4862101
Uranium (U)-Total	<0.00000022		0.0000002	mg/dm2.day	08-OCT-19	08-OCT-19	R4862101
			2				
Vanadium (V)-Total	<0.000022		0.000022	mg/dm2.day	08-OCT-19	08-OCT-19	R4862101
Zinc (Zn)-Total	<0.00027	DLB	0.00027	mg/dm2.day	08-OCT-19	08-OCT-19	R4862101

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L2357380-6 M-DF06							
Sampled By: BM/AT/SE on 26-SEP-19							
Matrix: WATER							
Combined Dustfalls-Total, soluble, insol							
Total Dustfall	0.31		0.11	mg/dm2.day		10-OCT-19	R4867165
Total Insoluble Dustfall	<0.11		0.11	mg/dm2.day		10-OCT-19	R4867165
Total Soluble Dustfall	0.20		0.11	mg/dm2.day		10-OCT-19	R4867165
Ammonia, Total (as N)	<0.0010		0.0010	mg/dm2.day	09-OCT-19	09-OCT-19	R4864730
Interval			1	days		09-OCT-19	R4862931
Chloride (Cl)	<0.18		0.18	mg/dm2.day	09-OCT-19	09-OCT-19	R4865318
Interval			1	days		09-OCT-19	R4862931
Interval			1	days		09-OCT-19	R4862931
Nitrate (as N)	<0.0010		0.0010	mg/dm2.day	09-OCT-19	09-OCT-19	R4865318
Interval			1	days		09-OCT-19	R4862931
Sulfate (SO4)	<0.013		0.013	mg/dm2.day	09-OCT-19	09-OCT-19	R4865318
Interval			1	days		07-OCT-19	R4861017
Mercury (Hg)-Total	<0.0000012		0.0000012	mg/dm2.day	07-OCT-19	08-OCT-19	R4861227
Total Metals in Dustfalls by ICPMS							
Aluminum (Al)-Total	0.00568		0.000072	mg/dm2.day	08-OCT-19	08-OCT-19	R4862101
Interval			1	days		08-OCT-19	R4861629
Antimony (Sb)-Total	<0.0000024		0.0000024	mg/dm2.day	08-OCT-19	08-OCT-19	R4862101
Arsenic (As)-Total	<0.0000024		0.0000024	mg/dm2.day	08-OCT-19	08-OCT-19	R4862101
Barium (Ba)-Total	0.0000205		0.0000012	mg/dm2.day	08-OCT-19	08-OCT-19	R4862101
Beryllium (Be)-Total	<0.000012		0.000012	mg/dm2.day	08-OCT-19	08-OCT-19	R4862101
Bismuth (Bi)-Total	<0.000012		0.000012	mg/dm2.day	08-OCT-19	08-OCT-19	R4862101
Boron (B)-Total	<0.00024		0.00024	mg/dm2.day	08-OCT-19	08-OCT-19	R4862101
Cadmium (Cd)-Total	<0.0000012		0.0000012	mg/dm2.day	08-OCT-19	08-OCT-19	R4862101
Calcium (Ca)-Total	0.0217		0.00048	mg/dm2.day	08-OCT-19	08-OCT-19	R4862101
Chromium (Cr)-Total	0.000024		0.000012	mg/dm2.day	08-OCT-19	08-OCT-19	R4862101
Cobalt (Co)-Total	0.0000056		0.0000024	mg/dm2.day	08-OCT-19	08-OCT-19	R4862101
Copper (Cu)-Total	0.000536		0.000012	mg/dm2.day	08-OCT-19	08-OCT-19	R4862101
Lead (Pb)-Total	0.0000084		0.0000012	mg/dm2.day	08-OCT-19	08-OCT-19	R4862101
Iron (Fe)-Total	0.0107		0.00072	mg/dm2.day	08-OCT-19	08-OCT-19	R4862101
Lithium (Li)-Total	<0.00012		0.00012	mg/dm2.day	08-OCT-19	08-OCT-19	R4862101
Magnesium (Mg)-Total	0.00609		0.00012	mg/dm2.day	08-OCT-19	08-OCT-19	R4862101
Manganese (Mn)-Total	0.000382		0.0000024	mg/dm2.day	08-OCT-19	08-OCT-19	R4862101
Molybdenum (Mo)-Total	<0.0000012		0.0000012	mg/dm2.day	08-OCT-19	08-OCT-19	R4862101
Nickel (Ni)-Total	0.000013		0.000012	mg/dm2.day	08-OCT-19	08-OCT-19	R4862101
Phosphorus (P)-Total	<0.0012		0.0012	mg/dm2.day	08-OCT-19	08-OCT-19	R4862101
Potassium (K)-Total	<0.0012		0.0012	mg/dm2.day	08-OCT-19	08-OCT-19	R4862101
Selenium (Se)-Total	<0.000024		0.000024	mg/dm2.day	08-OCT-19	08-OCT-19	R4862101
Silicon (Si)-Total	0.0066		0.0012	mg/dm2.day	08-OCT-19	08-OCT-19	R4862101
Silver (Ag)-Total	<0.00000024		0.0000002	mg/dm2.day	08-OCT-19	08-OCT-19	R4862101
			4				
Sodium (Na)-Total	0.0077		0.0012	mg/dm2.day	08-OCT-19	08-OCT-19	R4862101
Strontium (Sr)-Total	0.0000192		0.0000024	mg/dm2.day	08-OCT-19	08-OCT-19	R4862101
Thallium (Tl)-Total	<0.0000024		0.0000024	mg/dm2.day	08-OCT-19	08-OCT-19	R4862101
Tin (Sn)-Total	<0.0000024		0.0000024	mg/dm2.day	08-OCT-19	08-OCT-19	R4862101
Titanium (Ti)-Total	<0.00024		0.00024	mg/dm2.day	08-OCT-19	08-OCT-19	R4862101
Uranium (U)-Total	0.00000026		0.0000002	mg/dm2.day	08-OCT-19	08-OCT-19	R4862101
			4				
Vanadium (V)-Total	0.000028		0.000024	mg/dm2.day	08-OCT-19	08-OCT-19	R4862101
Zinc (Zn)-Total	<0.00036	DLB	0.00036	mg/dm2.day	08-OCT-19	08-OCT-19	R4862101

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L2357380-7 M-DF07 Sampled By: BM/AT/SE on 26-SEP-19 Matrix: WATER							
Combined Dustfalls-Total, soluble, insol							
Total Dustfall	1.07		0.11	mg/dm2.day		10-OCT-19	R4867165
Total Insoluble Dustfall	0.67		0.11	mg/dm2.day		10-OCT-19	R4867165
Total Soluble Dustfall	0.40		0.11	mg/dm2.day		10-OCT-19	R4867165
Ammonia, Total (as N)	<0.0010		0.0010	mg/dm2.day	09-OCT-19	09-OCT-19	R4864730
Interval			1	days		09-OCT-19	R4862931
Chloride (Cl)	<0.18		0.18	mg/dm2.day	09-OCT-19	09-OCT-19	R4865318
Interval			1	days		09-OCT-19	R4862931
Interval			1	days		09-OCT-19	R4862931
Nitrate (as N)	<0.0010		0.0010	mg/dm2.day	09-OCT-19	09-OCT-19	R4865318
Interval			1	days		09-OCT-19	R4862931
Sulfate (SO4)	<0.013		0.013	mg/dm2.day	09-OCT-19	09-OCT-19	R4865318
Interval			1	days		07-OCT-19	R4861017
Mercury (Hg)-Total	<0.0000012		0.0000012	mg/dm2.day	07-OCT-19	08-OCT-19	R4861227
Total Metals in Dustfalls by ICPMS							
Aluminum (Al)-Total	0.0314		0.000074	mg/dm2.day	08-OCT-19	08-OCT-19	R4862101
Interval			1	days		08-OCT-19	R4861629
Antimony (Sb)-Total	<0.0000025		0.0000025	mg/dm2.day	08-OCT-19	08-OCT-19	R4862101
Arsenic (As)-Total	0.0000038		0.0000025	mg/dm2.day	08-OCT-19	08-OCT-19	R4862101
Barium (Ba)-Total	0.0000500		0.0000012	mg/dm2.day	08-OCT-19	08-OCT-19	R4862101
Beryllium (Be)-Total	<0.000012		0.000012	mg/dm2.day	08-OCT-19	08-OCT-19	R4862101
Bismuth (Bi)-Total	<0.000012		0.000012	mg/dm2.day	08-OCT-19	08-OCT-19	R4862101
Boron (B)-Total	<0.00025		0.00025	mg/dm2.day	08-OCT-19	08-OCT-19	R4862101
Cadmium (Cd)-Total	<0.0000012		0.0000012	mg/dm2.day	08-OCT-19	08-OCT-19	R4862101
Calcium (Ca)-Total	0.0840		0.00049	mg/dm2.day	08-OCT-19	08-OCT-19	R4862101
Chromium (Cr)-Total	0.000116		0.000012	mg/dm2.day	08-OCT-19	08-OCT-19	R4862101
Cobalt (Co)-Total	0.0000289		0.0000025	mg/dm2.day	08-OCT-19	08-OCT-19	R4862101
Copper (Cu)-Total	0.000446		0.000012	mg/dm2.day	08-OCT-19	08-OCT-19	R4862101
Lead (Pb)-Total	<0.0000061	DLB	0.0000061	mg/dm2.day	08-OCT-19	08-OCT-19	R4862101
Iron (Fe)-Total	0.0597		0.00074	mg/dm2.day	08-OCT-19	08-OCT-19	R4862101
Lithium (Li)-Total	<0.00012		0.00012	mg/dm2.day	08-OCT-19	08-OCT-19	R4862101
Magnesium (Mg)-Total	0.0265		0.00012	mg/dm2.day	08-OCT-19	08-OCT-19	R4862101
Manganese (Mn)-Total	0.00168		0.0000025	mg/dm2.day	08-OCT-19	08-OCT-19	R4862101
Molybdenum (Mo)-Total	<0.0000012		0.0000012	mg/dm2.day	08-OCT-19	08-OCT-19	R4862101
Nickel (Ni)-Total	0.000066		0.000012	mg/dm2.day	08-OCT-19	08-OCT-19	R4862101
Phosphorus (P)-Total	<0.0012		0.0012	mg/dm2.day	08-OCT-19	08-OCT-19	R4862101
Potassium (K)-Total	0.0022		0.0012	mg/dm2.day	08-OCT-19	08-OCT-19	R4862101
Selenium (Se)-Total	<0.000025		0.000025	mg/dm2.day	08-OCT-19	08-OCT-19	R4862101
Silicon (Si)-Total	0.0388		0.0012	mg/dm2.day	08-OCT-19	08-OCT-19	R4862101
Silver (Ag)-Total	<0.00000025		0.00000025	mg/dm2.day	08-OCT-19	08-OCT-19	R4862101
Sodium (Na)-Total	0.0075		0.0012	mg/dm2.day	08-OCT-19	08-OCT-19	R4862101
Strontium (Sr)-Total	0.0000576		0.0000025	mg/dm2.day	08-OCT-19	08-OCT-19	R4862101
Thallium (Tl)-Total	<0.0000025		0.0000025	mg/dm2.day	08-OCT-19	08-OCT-19	R4862101
Tin (Sn)-Total	<0.0000025		0.0000025	mg/dm2.day	08-OCT-19	08-OCT-19	R4862101
Titanium (Ti)-Total	0.00148		0.00025	mg/dm2.day	08-OCT-19	08-OCT-19	R4862101
Uranium (U)-Total	0.00000036		0.00000025	mg/dm2.day	08-OCT-19	08-OCT-19	R4862101
Vanadium (V)-Total	0.000162		0.000025	mg/dm2.day	08-OCT-19	08-OCT-19	R4862101
Zinc (Zn)-Total	<0.00037	DLB	0.00037	mg/dm2.day	08-OCT-19	08-OCT-19	R4862101

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L2357380-8 M-DF08 Sampled By: BM/AT/SE on 26-SEP-19 Matrix: WATER							
Combined Dustfalls-Total, soluble, insol							
Total Dustfall	0.81		0.11	mg/dm2.day		10-OCT-19	R4867165
Total Insoluble Dustfall	0.50		0.11	mg/dm2.day		10-OCT-19	R4867165
Total Soluble Dustfall	0.31		0.11	mg/dm2.day		10-OCT-19	R4867165
Ammonia, Total (as N)	<0.00091		0.00091	mg/dm2.day	09-OCT-19	09-OCT-19	R4864730
Interval			1	days		09-OCT-19	R4862931
Chloride (Cl)	<0.16		0.16	mg/dm2.day	09-OCT-19	09-OCT-19	R4865318
Interval			1	days		09-OCT-19	R4862931
Interval			1	days		09-OCT-19	R4862931
Nitrate (as N)	<0.00091		0.00091	mg/dm2.day	09-OCT-19	09-OCT-19	R4865318
Interval			1	days		09-OCT-19	R4862931
Sulfate (SO4)	<0.011		0.011	mg/dm2.day	09-OCT-19	09-OCT-19	R4865318
Interval			1	days		07-OCT-19	R4861017
Mercury (Hg)-Total	<0.0000013		0.0000013	mg/dm2.day	07-OCT-19	08-OCT-19	R4861227
Total Metals in Dustfalls by ICPMS							
Aluminum (Al)-Total	0.0175		0.000075	mg/dm2.day	08-OCT-19	08-OCT-19	R4862101
Interval			1	days		08-OCT-19	R4861629
Antimony (Sb)-Total	<0.0000025		0.0000025	mg/dm2.day	08-OCT-19	08-OCT-19	R4862101
Arsenic (As)-Total	0.0000027		0.0000025	mg/dm2.day	08-OCT-19	08-OCT-19	R4862101
Barium (Ba)-Total	0.0000506		0.0000013	mg/dm2.day	08-OCT-19	08-OCT-19	R4862101
Beryllium (Be)-Total	<0.000013		0.000013	mg/dm2.day	08-OCT-19	08-OCT-19	R4862101
Bismuth (Bi)-Total	0.000019		0.000013	mg/dm2.day	08-OCT-19	08-OCT-19	R4862101
Boron (B)-Total	<0.00025		0.00025	mg/dm2.day	08-OCT-19	08-OCT-19	R4862101
Cadmium (Cd)-Total	<0.0000013		0.0000013	mg/dm2.day	08-OCT-19	08-OCT-19	R4862101
Calcium (Ca)-Total	0.0465		0.00050	mg/dm2.day	08-OCT-19	08-OCT-19	R4862101
Chromium (Cr)-Total	0.000063		0.000013	mg/dm2.day	08-OCT-19	08-OCT-19	R4862101
Cobalt (Co)-Total	0.0000160		0.0000025	mg/dm2.day	08-OCT-19	08-OCT-19	R4862101
Copper (Cu)-Total	0.000793		0.000013	mg/dm2.day	08-OCT-19	08-OCT-19	R4862101
Lead (Pb)-Total	0.0000125		0.0000013	mg/dm2.day	08-OCT-19	08-OCT-19	R4862101
Iron (Fe)-Total	0.0339		0.00075	mg/dm2.day	08-OCT-19	08-OCT-19	R4862101
Lithium (Li)-Total	<0.00013		0.00013	mg/dm2.day	08-OCT-19	08-OCT-19	R4862101
Magnesium (Mg)-Total	0.0152		0.00013	mg/dm2.day	08-OCT-19	08-OCT-19	R4862101
Manganese (Mn)-Total	0.000956		0.0000025	mg/dm2.day	08-OCT-19	08-OCT-19	R4862101
Molybdenum (Mo)-Total	<0.0000013		0.0000013	mg/dm2.day	08-OCT-19	08-OCT-19	R4862101
Nickel (Ni)-Total	0.000037		0.000013	mg/dm2.day	08-OCT-19	08-OCT-19	R4862101
Phosphorus (P)-Total	<0.0013		0.0013	mg/dm2.day	08-OCT-19	08-OCT-19	R4862101
Potassium (K)-Total	0.0015		0.0013	mg/dm2.day	08-OCT-19	08-OCT-19	R4862101
Selenium (Se)-Total	<0.000025		0.000025	mg/dm2.day	08-OCT-19	08-OCT-19	R4862101
Silicon (Si)-Total	0.0193		0.0013	mg/dm2.day	08-OCT-19	08-OCT-19	R4862101
Silver (Ag)-Total	0.00000027		0.00000025	mg/dm2.day	08-OCT-19	08-OCT-19	R4862101
Sodium (Na)-Total	0.0101		0.0013	mg/dm2.day	08-OCT-19	08-OCT-19	R4862101
Strontium (Sr)-Total	0.0000402		0.0000025	mg/dm2.day	08-OCT-19	08-OCT-19	R4862101
Thallium (Tl)-Total	<0.0000025		0.0000025	mg/dm2.day	08-OCT-19	08-OCT-19	R4862101
Tin (Sn)-Total	<0.0000025		0.0000025	mg/dm2.day	08-OCT-19	08-OCT-19	R4862101
Titanium (Ti)-Total	0.00066		0.00025	mg/dm2.day	08-OCT-19	08-OCT-19	R4862101
Uranium (U)-Total	0.00000042		0.00000025	mg/dm2.day	08-OCT-19	08-OCT-19	R4862101
Vanadium (V)-Total	0.000089		0.000025	mg/dm2.day	08-OCT-19	08-OCT-19	R4862101
Zinc (Zn)-Total	<0.00045	DLB	0.00045	mg/dm2.day	08-OCT-19	08-OCT-19	R4862101

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L2357380-9 M-DF09 Sampled By: BM/AT/SE on 26-SEP-19 Matrix: WATER							
Combined Dustfalls-Total, soluble, insol							
Total Dustfall	0.38		0.11	mg/dm2.day		10-OCT-19	R4867165
Total Insoluble Dustfall	0.14		0.11	mg/dm2.day		10-OCT-19	R4867165
Total Soluble Dustfall	0.24		0.11	mg/dm2.day		10-OCT-19	R4867165
Ammonia, Total (as N)	<0.0010		0.0010	mg/dm2.day	09-OCT-19	09-OCT-19	R4864730
Interval			1	days		09-OCT-19	R4862931
Chloride (Cl)	<0.18		0.18	mg/dm2.day	09-OCT-19	09-OCT-19	R4865318
Interval			1	days		09-OCT-19	R4862931
Interval			1	days		09-OCT-19	R4862931
Nitrate (as N)	<0.0010		0.0010	mg/dm2.day	09-OCT-19	09-OCT-19	R4865318
Interval			1	days		09-OCT-19	R4862931
Sulfate (SO4)	<0.013		0.013	mg/dm2.day	09-OCT-19	09-OCT-19	R4865318
Interval			1	days		07-OCT-19	R4861017
Mercury (Hg)-Total	<0.0000013		0.0000013	mg/dm2.day	07-OCT-19	08-OCT-19	R4861227
Total Metals in Dustfalls by ICPMS							
Aluminum (Al)-Total	0.00764		0.000075	mg/dm2.day	08-OCT-19	08-OCT-19	R4862101
Interval			1	days		08-OCT-19	R4861629
Antimony (Sb)-Total	<0.0000025		0.0000025	mg/dm2.day	08-OCT-19	08-OCT-19	R4862101
Arsenic (As)-Total	<0.0000025		0.0000025	mg/dm2.day	08-OCT-19	08-OCT-19	R4862101
Barium (Ba)-Total	0.0000257		0.0000013	mg/dm2.day	08-OCT-19	08-OCT-19	R4862101
Beryllium (Be)-Total	<0.000013		0.000013	mg/dm2.day	08-OCT-19	08-OCT-19	R4862101
Bismuth (Bi)-Total	0.000027		0.000013	mg/dm2.day	08-OCT-19	08-OCT-19	R4862101
Boron (B)-Total	<0.00025		0.00025	mg/dm2.day	08-OCT-19	08-OCT-19	R4862101
Cadmium (Cd)-Total	<0.0000013		0.0000013	mg/dm2.day	08-OCT-19	08-OCT-19	R4862101
Calcium (Ca)-Total	0.0184		0.00050	mg/dm2.day	08-OCT-19	08-OCT-19	R4862101
Chromium (Cr)-Total	0.000034		0.000013	mg/dm2.day	08-OCT-19	08-OCT-19	R4862101
Cobalt (Co)-Total	0.0000066		0.0000025	mg/dm2.day	08-OCT-19	08-OCT-19	R4862101
Copper (Cu)-Total	<0.00043	DLB	0.00043	mg/dm2.day	08-OCT-19	08-OCT-19	R4862101
Lead (Pb)-Total	0.0000096		0.0000013	mg/dm2.day	08-OCT-19	08-OCT-19	R4862101
Iron (Fe)-Total	0.0147		0.00075	mg/dm2.day	08-OCT-19	08-OCT-19	R4862101
Lithium (Li)-Total	<0.00013		0.00013	mg/dm2.day	08-OCT-19	08-OCT-19	R4862101
Magnesium (Mg)-Total	0.00669		0.00013	mg/dm2.day	08-OCT-19	08-OCT-19	R4862101
Manganese (Mn)-Total	0.000359		0.0000025	mg/dm2.day	08-OCT-19	08-OCT-19	R4862101
Molybdenum (Mo)-Total	<0.0000013		0.0000013	mg/dm2.day	08-OCT-19	08-OCT-19	R4862101
Nickel (Ni)-Total	0.000017		0.000013	mg/dm2.day	08-OCT-19	08-OCT-19	R4862101
Phosphorus (P)-Total	<0.0013		0.0013	mg/dm2.day	08-OCT-19	08-OCT-19	R4862101
Potassium (K)-Total	<0.0013		0.0013	mg/dm2.day	08-OCT-19	08-OCT-19	R4862101
Selenium (Se)-Total	<0.000025		0.000025	mg/dm2.day	08-OCT-19	08-OCT-19	R4862101
Silicon (Si)-Total	0.0079		0.0013	mg/dm2.day	08-OCT-19	08-OCT-19	R4862101
Silver (Ag)-Total	<0.00000025		0.00000025	mg/dm2.day	08-OCT-19	08-OCT-19	R4862101
			5				
Sodium (Na)-Total	0.0079		0.0013	mg/dm2.day	08-OCT-19	08-OCT-19	R4862101
Strontium (Sr)-Total	0.0000193		0.0000025	mg/dm2.day	08-OCT-19	08-OCT-19	R4862101
Thallium (Tl)-Total	<0.0000025		0.0000025	mg/dm2.day	08-OCT-19	08-OCT-19	R4862101
Tin (Sn)-Total	<0.0000025		0.0000025	mg/dm2.day	08-OCT-19	08-OCT-19	R4862101
Titanium (Ti)-Total	0.00029		0.00025	mg/dm2.day	08-OCT-19	08-OCT-19	R4862101
Uranium (U)-Total	0.00000072		0.00000025	mg/dm2.day	08-OCT-19	08-OCT-19	R4862101
			5				
Vanadium (V)-Total	0.000038		0.000025	mg/dm2.day	08-OCT-19	08-OCT-19	R4862101
Zinc (Zn)-Total	<0.00038	DLB	0.00038	mg/dm2.day	08-OCT-19	08-OCT-19	R4862101

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

Reference Information

Sample Parameter Qualifier Key:

Qualifier	Description
DLB	Detection Limit Raised. Analyte detected at comparable level in Method Blank.
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 specifically 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
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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
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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
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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 specifically 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.

Results are reported in units of nitrogen weight. To convert to units by weight of ammonium, multiply by 1.29.

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

Results are reported in units of nitrogen weight. To convert to units by weight of nitrate, multiply by 4.43.

SO4-IC-VA	Dustfall	Dustfall Sulfate by Ion Chromatography	BC LAB MAN. - PART. - SOLUBLE - ANIONS
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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 specifically 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
VA	ALS ENVIRONMENTAL - VANCOUVER, BRITISH COLUMBIA, CANADA

Chain of Custody Numbers:

Reference Information

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
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GLOSSARY OF REPORT TERMS

Surrogates are compounds that are similar in behaviour to target analyte(s), but that do not normally occur in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery. In reports that display the D.L. column, laboratory objectives for surrogates are listed there.

mg/kg - milligrams per kilogram based on dry weight of sample
mg/kg ww - milligrams per kilogram based on wet weight of sample
mg/kg lwt - milligrams per kilogram based on lipid-adjusted weight
mg/L - unit of concentration based on volume, parts per million.

< - Less than.

D.L. - The reporting limit.

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.

Quality Control Report

Workorder: L2357380

Report Date: 11-OCT-19

Page 1 of 6

Client: TMAC Resources Inc
 Hope Bay Project 95 Welliing St West P O Box 44
 Toronto ON M5J 2N7

Contact: Environmental Site Manager

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
CL-IC-VA Dustfall								
Batch	R4865318							
WG3182483-4 DUP		L2357380-1						
Chloride (Cl)		<0.18	<0.18	RPD-NA	mg/dm2.day	N/A	20	09-OCT-19
WG3182483-2 LCS								
Chloride (Cl)			97.8		%		90-110	09-OCT-19
WG3182483-1 MB								
Chloride (Cl)			<0.18		mg/dm2.day		0.18	09-OCT-19
WG3182483-3 MS		L2357380-7						
Chloride (Cl)			112.4		%		75-125	09-OCT-19
DUSTFALLS-COM-DM2-VA Dustfall								
Batch	R4867165							
WG3187001-2 LCS								
Total Dustfall			99.7		%		85-115	10-OCT-19
Total Insoluble Dustfall			94.4		%		85-115	10-OCT-19
Total Soluble Dustfall			100.6		%		85-115	10-OCT-19
WG3187001-1 MB								
Total Dustfall			<0.10		mg/dm2.day		0.1	10-OCT-19
Total Insoluble Dustfall			<0.10		mg/dm2.day		0.1	10-OCT-19
Total Soluble Dustfall			<0.10		mg/dm2.day		0.1	10-OCT-19
HG-DUST(DM2-CVAFS-VA Dustfall								
Batch	R4861227							
WG3182480-3 DUP		L2357380-1						
Mercury (Hg)-Total		<0.0000012	<0.0000012	RPD-NA	mg/dm2.day	N/A	20	08-OCT-19
WG3182480-2 LCS								
Mercury (Hg)-Total			81.6		%		70-130	08-OCT-19
WG3182480-1 MB								
Mercury (Hg)-Total			<0.0000013		mg/dm2.day		0.0000013	08-OCT-19
WG3182480-4 MS		L2357380-2						
Mercury (Hg)-Total			90.4		%		70-130	08-OCT-19
MET-DUST(DM2)-MS-VA Dustfall								
Batch	R4862101							
WG3182479-3 DUP		L2357380-1						
Aluminum (Al)-Total		0.00177	0.00173		mg/dm2.day	2.4	20	08-OCT-19
Antimony (Sb)-Total		<0.0000025	<0.0000025	RPD-NA	mg/dm2.day	N/A	20	08-OCT-19
Arsenic (As)-Total		0.0000034	0.0000030		mg/dm2.day	13	20	08-OCT-19
Barium (Ba)-Total		0.0000155	0.0000142		mg/dm2.day	8.6	20	08-OCT-19
Beryllium (Be)-Total		<0.000012	<0.000012	RPD-NA	mg/dm2.day	N/A	20	08-OCT-19
Bismuth (Bi)-Total		0.000015	0.000015		mg/dm2.day	1.4	20	08-OCT-19

Quality Control Report

Workorder: L2357380

Report Date: 11-OCT-19

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Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-DUST(DM2)-MS-VA		Dustfall						
Batch	R4862101							
WG3182479-3	DUP	L2357380-1						
Boron (B)-Total		<0.00025	<0.00025	RPD-NA	mg/dm2.day	N/A	20	08-OCT-19
Cadmium (Cd)-Total		<0.0000012	<0.0000012	RPD-NA	mg/dm2.day	N/A	20	08-OCT-19
Calcium (Ca)-Total		0.0131	0.0125		mg/dm2.day	5.1	20	08-OCT-19
Chromium (Cr)-Total		0.000015	0.000015		mg/dm2.day	4.0	20	08-OCT-19
Cobalt (Co)-Total		<0.0000025	<0.0000025	RPD-NA	mg/dm2.day	N/A	20	08-OCT-19
Copper (Cu)-Total		0.00039	<0.00039	RPD-NA	mg/dm2.day	N/A	20	08-OCT-19
Lead (Pb)-Total		<0.0000074	<0.0000074	RPD-NA	mg/dm2.day	N/A	20	08-OCT-19
Iron (Fe)-Total		0.00320	0.00320		mg/dm2.day	0.2	20	08-OCT-19
Lithium (Li)-Total		<0.00012	<0.00012	RPD-NA	mg/dm2.day	N/A	20	08-OCT-19
Magnesium (Mg)-Total		0.00252	0.00252		mg/dm2.day	0.1	20	08-OCT-19
Manganese (Mn)-Total		0.000136	0.000134		mg/dm2.day	1.6	20	08-OCT-19
Molybdenum (Mo)-Total		<0.0000012	<0.0000012	RPD-NA	mg/dm2.day	N/A	20	08-OCT-19
Nickel (Ni)-Total		<0.000012	<0.000012	RPD-NA	mg/dm2.day	N/A	20	08-OCT-19
Phosphorus (P)-Total		<0.0012	<0.0012	RPD-NA	mg/dm2.day	N/A	20	08-OCT-19
Potassium (K)-Total		<0.0012	<0.0012	RPD-NA	mg/dm2.day	N/A	20	08-OCT-19
Selenium (Se)-Total		<0.000025	<0.000025	RPD-NA	mg/dm2.day	N/A	20	08-OCT-19
Silicon (Si)-Total		0.0020	0.0018		mg/dm2.day	8.0	20	08-OCT-19
Silver (Ag)-Total		<0.00000025	<0.0000002	RPD-NA	mg/dm2.day	N/A	20	08-OCT-19
Sodium (Na)-Total		0.0074	0.0072		mg/dm2.day	2.7	20	08-OCT-19
Strontium (Sr)-Total		0.0000112	0.0000109		mg/dm2.day	2.7	20	08-OCT-19
Thallium (Tl)-Total		<0.0000025	<0.0000025	RPD-NA	mg/dm2.day	N/A	20	08-OCT-19
Tin (Sn)-Total		<0.0000025	<0.0000025	RPD-NA	mg/dm2.day	N/A	20	08-OCT-19
Titanium (Ti)-Total		<0.00025	<0.00025	RPD-NA	mg/dm2.day	N/A	20	08-OCT-19
Uranium (U)-Total		<0.00000025	<0.0000002	RPD-NA	mg/dm2.day	N/A	20	08-OCT-19
Vanadium (V)-Total		<0.000025	<0.000025	RPD-NA	mg/dm2.day	N/A	20	08-OCT-19
Zinc (Zn)-Total		<0.00029	<0.00029	RPD-NA	mg/dm2.day	N/A	20	08-OCT-19
WG3182479-2	LCS							
Aluminum (Al)-Total			105.6		%		80-120	08-OCT-19
Antimony (Sb)-Total			100.9		%		80-120	08-OCT-19
Arsenic (As)-Total			97.7		%		80-120	08-OCT-19
Barium (Ba)-Total			95.9		%		80-120	08-OCT-19
Beryllium (Be)-Total			103.3		%		80-120	08-OCT-19
Bismuth (Bi)-Total			96.0		%		80-120	08-OCT-19
Boron (B)-Total			101.6		%		80-120	08-OCT-19

Quality Control Report

Workorder: L2357380

Report Date: 11-OCT-19

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Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-DUST(DM2)-MS-VA Dustfall								
Batch	R4862101							
WG3182479-2 LCS								
Cadmium (Cd)-Total			98.4		%		80-120	08-OCT-19
Calcium (Ca)-Total			97.2		%		80-120	08-OCT-19
Chromium (Cr)-Total			101.4		%		80-120	08-OCT-19
Cobalt (Co)-Total			99.0		%		80-120	08-OCT-19
Copper (Cu)-Total			100.7		%		80-120	08-OCT-19
Lead (Pb)-Total			96.2		%		80-120	08-OCT-19
Iron (Fe)-Total			96.7		%		80-120	08-OCT-19
Lithium (Li)-Total			99.0		%		80-120	08-OCT-19
Magnesium (Mg)-Total			102.8		%		80-120	08-OCT-19
Manganese (Mn)-Total			99.9		%		80-120	08-OCT-19
Molybdenum (Mo)-Total			101.1		%		80-120	08-OCT-19
Nickel (Ni)-Total			97.4		%		80-120	08-OCT-19
Phosphorus (P)-Total			108.5		%		80-120	08-OCT-19
Potassium (K)-Total			102.1		%		80-120	08-OCT-19
Selenium (Se)-Total			99.4		%		80-120	08-OCT-19
Silicon (Si)-Total			98.7		%		80-120	08-OCT-19
Silver (Ag)-Total			101.1		%		80-120	08-OCT-19
Sodium (Na)-Total			102.4		%		80-120	08-OCT-19
Strontium (Sr)-Total			101.5		%		80-120	08-OCT-19
Thallium (Tl)-Total			94.1		%		80-120	08-OCT-19
Tin (Sn)-Total			99.1		%		80-120	08-OCT-19
Titanium (Ti)-Total			99.4		%		80-120	08-OCT-19
Uranium (U)-Total			95.2		%		80-120	08-OCT-19
Vanadium (V)-Total			100.6		%		80-120	08-OCT-19
Zinc (Zn)-Total			106.2		%		80-120	08-OCT-19
WG3182479-1 MB								
Aluminum (Al)-Total			<0.000079		mg/dm2.day		0.000079	08-OCT-19
Antimony (Sb)-Total			<0.0000026		mg/dm2.day		0.0000026	08-OCT-19
Arsenic (As)-Total			<0.0000026		mg/dm2.day		0.0000026	08-OCT-19
Barium (Ba)-Total			0.0000019	MB-LOR	mg/dm2.day		0.0000013	08-OCT-19
Beryllium (Be)-Total			<0.000013		mg/dm2.day		0.000013	08-OCT-19
Bismuth (Bi)-Total			<0.000013		mg/dm2.day		0.000013	08-OCT-19
Boron (B)-Total			<0.00026		mg/dm2.day		0.00026	08-OCT-19
Cadmium (Cd)-Total			<0.0000013		mg/dm2.day		0.0000013	08-OCT-19



Quality Control Report

Workorder: L2357380

Report Date: 11-OCT-19

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Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
NO3-IC-VA		Dustfall						
Batch	R4865318							
WG3182483-2	LCS							
Nitrate (as N)			98.4		%		90-110	09-OCT-19
WG3182483-1	MB							
Nitrate (as N)			<0.0010		mg/dm2.day		0.001	09-OCT-19
WG3182483-3	MS	L2357380-7	113.7		%		75-125	09-OCT-19
Nitrate (as N)								
SO4-IC-VA		Dustfall						
Batch	R4865318							
WG3182483-4	DUP	L2357380-1						
Sulfate (SO4)		<0.013	<0.013	RPD-NA	mg/dm2.day	N/A	20	09-OCT-19
WG3182483-2	LCS							
Sulfate (SO4)			99.8		%		90-110	09-OCT-19
WG3182483-1	MB							
Sulfate (SO4)			<0.013		mg/dm2.day		0.013	09-OCT-19
WG3182483-3	MS	L2357380-7	118.5		%		75-125	09-OCT-19
Sulfate (SO4)								

Quality Control Report

Workorder: L2357380

Report Date: 11-OCT-19

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Legend:

Limit	ALS Control Limit (Data Quality Objectives)
DUP	Duplicate
RPD	Relative Percent Difference
N/A	Not Available
LCS	Laboratory Control Sample
SRM	Standard Reference Material
MS	Matrix Spike
MSD	Matrix Spike Duplicate
ADE	Average Desorption Efficiency
MB	Method Blank
IRM	Internal Reference Material
CRM	Certified Reference Material
CCV	Continuing Calibration Verification
CVS	Calibration Verification Standard
LCSD	Laboratory Control Sample Duplicate

Sample Parameter Qualifier Definitions:

Qualifier	Description
MB-LOR	Method Blank exceeds ALS DQO. Limits of Reporting have been adjusted for samples with positive hits below 5x blank level.
RPD-NA	Relative Percent Difference Not Available due to result(s) being less than detection limit.

Hold Time Exceedances:

All test results reported with this submission were conducted within ALS recommended hold times.

ALS recommended hold times may vary by province. They are assigned to meet known provincial and/or federal government requirements. In the absence of regulatory hold times, ALS establishes recommendations based on guidelines published by the US EPA, APHA Standard Methods, or Environment Canada (where available). For more information, please contact ALS.

The ALS Quality Control Report is provided to ALS clients upon request. ALS includes comprehensive QC checks with every analysis to ensure our high standards of quality are met. Each QC result has a known or expected target value, which is compared against pre-determined data quality objectives to provide confidence in the accuracy of associated test results.

Please note that this report may contain QC results from anonymous Sample Duplicates and Matrix Spikes that do not originate from this Work Order.



L2357380-COFC



ALS Environmental

Custody / Analytical Request Form

Tada 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: TMAC Resources Ltd (Hope Bay)			<input checked="" type="checkbox"/> Standard <input type="checkbox"/> Other			<input checked="" type="radio"/> Regular (Standard Turnaround Times - Business Days)												
Contact: Environmental Site Manager			<input checked="" type="checkbox"/> PDF <input checked="" type="checkbox"/> Excel <input checked="" type="checkbox"/> Digital <input type="checkbox"/> Fax			<input checked="" type="radio"/> Priority (2-4 Business Days) - 50% Surcharge - Contact ALS to Confirm TAT												
Address: 95 Welling Street West, Suite 1010			Email 1: enviro@tmacresources.com			<input checked="" type="radio"/> Emergency (1-2 Bus. Days) - 100% Surcharge - Contact ALS to Confirm TAT												
P.O. Box 44, Toronto, ON, M5J 2N7			Email 2: enviro.tech@tmacresources.com			<input checked="" type="radio"/> Same Day or Weekend Emergency - Contact ALS to Confirm TAT												
Phone: 1-416-628-0216 Fax:			Email 3:			Analysis Request												
Invoice To: Same as Report? Y			Client / Project Information			Please indicate below Filtered, Preserved or both (F, P, F/P)												
Hardcopy of Invoice with Report?			Job #:															
Company:			PO / AFE: 4500011700															
Contact:			LSD:															
Address:			Job Ref: Madrid Dustfall															
Phone:			Quote #:															
Lab Work Order # (lab use only)			ALS Contact: Amber Springer			Sampler: BMAT/SE												
L2357380																		
Sample #	Sample Identification (This description will appear on the report)	Date In (dd-mm-yy)	Date Out (dd-mm-yy)	Sample Type	Total Particulate	Soluble particulate	Insoluble particulate	Sulphate	Nitrate	NH ₃ , NH ₄	Cl	Total Metals	Mg+	Ca+	K+	Number of Containers		
M-DF01		01-Sep-19	28-Sep-19	Water	X	X	X	X	X	X	X	X	X	X	X	2		
M-DF02		01-Sep-19	28-Sep-19	Water	X	X	X	X	X	X	X	X	X	X	X	2		
M-DF03		01-Sep-19	28-Sep-19	Water	X	X	X	X	X	X	X	X	X	X	X	2		
M-DF04		01-Sep-19	28-Sep-19	Water	X	X	X	X	X	X	X	X	X	X	X	2		
M-DF05		01-Sep-19	28-Sep-19	Water	X	X	X	X	X	X	X	X	X	X	X	1		
M-DF06		01-Sep-19	26-Sep-19	Water	X	X	X	X	X	X	X	X	X	X	X	2		
M-DF07		01-Sep-19	26-Sep-19	Water	X	X	X	X	X	X	X	X	X	X	X	2		
M-DF08		01-Sep-19	26-Sep-19	Water	X	X	X	X	X	X	X	X	X	X	X	2		
M-DF09		01-Sep-19	26-Sep-19	Water	X	X	X	X	X	X	X	X	X	X	X	2		
Special Instructions / Regulations with water or land use [CCME-Freshwater Aquatic Life/BC CSR - Commercial/AB Tier 1 - Natural, etc] / 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-mm-yy)	Time (hh-mm)	Received by:	Date:	Time:	Temperature:	Verified by:	Date:	Time:	Observations:								
Brian McCardle			JG	200919	11:20AM	7.7/19°C												
											If Yes add SIF							

GENF 18.01 Front

L2357380-COFC





TMAC Resources Inc
ATTN: Environmental Site Manager
Hope Bay Project
95 Wellington St West P O Box 44
Toronto ON M5J 2N7

Date Received: 01-OCT-19
Report Date: 11-OCT-19 13:00 (MT)
Version: FINAL

Client Phone: 416-628-0216

Certificate of Analysis

Lab Work Order #: L2357438
Project P.O. #: 4500011700
Job Reference: DORIS DUSTFALL
C of C Numbers:
Legal Site Desc:

Amber Springer, B.Sc
Account Manager

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ADDRESS: 8081 Lougheed Hwy, Suite 100, Burnaby, BC V5A 1W9 Canada | Phone: +1 604 253 4188 | Fax: +1 604 253 6700
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ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L2357438-1 CONTROLDF Sampled By: BM/AT/SE on 28-SEP-19 Matrix: WATER							
Combined Dustfalls-Total, soluble, insol							
Total Dustfall	0.47		0.11	mg/dm2.day		10-OCT-19	R4867165
Total Insoluble Dustfall	<0.11		0.11	mg/dm2.day		10-OCT-19	R4867165
Total Soluble Dustfall	0.39		0.11	mg/dm2.day		10-OCT-19	R4867165
Ammonia, Total (as N)	<0.00079		0.00079	mg/dm2.day	09-OCT-19	09-OCT-19	R4864730
Interval			1	days		09-OCT-19	R4862931
Chloride (Cl)	<0.14		0.14	mg/dm2.day	09-OCT-19	09-OCT-19	R4865318
Interval			1	days		09-OCT-19	R4862931
Interval			1	days		09-OCT-19	R4862931
Nitrate (as N)	<0.00079		0.00079	mg/dm2.day	09-OCT-19	09-OCT-19	R4865318
Interval			1	days		09-OCT-19	R4862931
Sulfate (SO4)	<0.0099		0.0099	mg/dm2.day	09-OCT-19	09-OCT-19	R4865318
Interval			1	days		07-OCT-19	R4861017
Mercury (Hg)-Total	<0.00000099		0.0000009	mg/dm2.day	07-OCT-19	08-OCT-19	R4861227
Total Metals in Dustfalls by ICPMS							
Aluminum (Al)-Total	0.00306		0.000059	mg/dm2.day	08-OCT-19	08-OCT-19	R4862101
Interval			1	days		08-OCT-19	R4861629
Antimony (Sb)-Total	<0.0000020		0.0000020	mg/dm2.day	08-OCT-19	08-OCT-19	R4862101
Arsenic (As)-Total	0.0000115		0.0000020	mg/dm2.day	08-OCT-19	08-OCT-19	R4862101
Barium (Ba)-Total	0.0000151		0.0000009	mg/dm2.day	08-OCT-19	08-OCT-19	R4862101
Beryllium (Be)-Total	<0.0000099		0.0000099	mg/dm2.day	08-OCT-19	08-OCT-19	R4862101
Bismuth (Bi)-Total	0.0000479		0.0000099	mg/dm2.day	08-OCT-19	08-OCT-19	R4862101
Boron (B)-Total	<0.00020		0.00020	mg/dm2.day	08-OCT-19	08-OCT-19	R4862101
Cadmium (Cd)-Total	<0.00000099		0.0000009	mg/dm2.day	08-OCT-19	08-OCT-19	R4862101
Calcium (Ca)-Total	0.00260		0.00040	mg/dm2.day	08-OCT-19	08-OCT-19	R4862101
Chromium (Cr)-Total	0.0000136		0.0000099	mg/dm2.day	08-OCT-19	08-OCT-19	R4862101
Cobalt (Co)-Total	0.0000029		0.0000020	mg/dm2.day	08-OCT-19	08-OCT-19	R4862101
Copper (Cu)-Total	0.000380		0.0000099	mg/dm2.day	08-OCT-19	08-OCT-19	R4862101
Lead (Pb)-Total	0.00000945		0.0000009	mg/dm2.day	08-OCT-19	08-OCT-19	R4862101
Iron (Fe)-Total	0.00596		0.00059	mg/dm2.day	08-OCT-19	08-OCT-19	R4862101
Lithium (Li)-Total	<0.000099		0.000099	mg/dm2.day	08-OCT-19	08-OCT-19	R4862101
Magnesium (Mg)-Total	0.00284		0.000099	mg/dm2.day	08-OCT-19	08-OCT-19	R4862101
Manganese (Mn)-Total	0.0000884		0.0000020	mg/dm2.day	08-OCT-19	08-OCT-19	R4862101
Molybdenum (Mo)-Total	<0.00000099		0.0000009	mg/dm2.day	08-OCT-19	08-OCT-19	R4862101
Nickel (Ni)-Total	0.0000104		0.0000099	mg/dm2.day	08-OCT-19	08-OCT-19	R4862101
Phosphorus (P)-Total	<0.00099		0.00099	mg/dm2.day	08-OCT-19	08-OCT-19	R4862101
Potassium (K)-Total	<0.00099		0.00099	mg/dm2.day	08-OCT-19	08-OCT-19	R4862101
Selenium (Se)-Total	<0.000020		0.000020	mg/dm2.day	08-OCT-19	08-OCT-19	R4862101
Silicon (Si)-Total	0.00442		0.00099	mg/dm2.day	08-OCT-19	08-OCT-19	R4862101
Silver (Ag)-Total	0.00000036		0.0000002	mg/dm2.day	08-OCT-19	08-OCT-19	R4862101
Sodium (Na)-Total	0.00583		0.00099	mg/dm2.day	08-OCT-19	08-OCT-19	R4862101
Strontium (Sr)-Total	0.0000103		0.0000020	mg/dm2.day	08-OCT-19	08-OCT-19	R4862101
Thallium (Tl)-Total	<0.0000020		0.0000020	mg/dm2.day	08-OCT-19	08-OCT-19	R4862101
Tin (Sn)-Total	<0.0000020		0.0000020	mg/dm2.day	08-OCT-19	08-OCT-19	R4862101
Titanium (Ti)-Total	<0.00020		0.00020	mg/dm2.day	08-OCT-19	08-OCT-19	R4862101
Uranium (U)-Total	0.00000034		0.0000002	mg/dm2.day	08-OCT-19	08-OCT-19	R4862101

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters		Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L2357438-1	CONTROLDF							
Sampled By:	BM/AT/SE on 28-SEP-19							
Matrix:	WATER							
Total Metals in Dustfalls by ICPMS								
Vanadium (V)-Total		<0.000020		0.000020	mg/dm2.day	08-OCT-19	08-OCT-19	R4862101
Zinc (Zn)-Total		<0.00036	DLB	0.00036	mg/dm2.day	08-OCT-19	08-OCT-19	R4862101
L2357438-2	TIADF1							
Sampled By:	BM/AT/SE on 26-SEP-19							
Matrix:	WATER							
Combined Dustfalls-Total, soluble, insol								
Total Dustfall		0.16		0.11	mg/dm2.day		10-OCT-19	R4867165
Total Insoluble Dustfall		<0.11		0.11	mg/dm2.day		10-OCT-19	R4867165
Total Soluble Dustfall		0.14		0.11	mg/dm2.day		10-OCT-19	R4867165
Ammonia, Total (as N)		0.00393		0.00098	mg/dm2.day	09-OCT-19	09-OCT-19	R4864730
Interval				1	days		09-OCT-19	R4862931
Chloride (Cl)		<0.17		0.17	mg/dm2.day	09-OCT-19	09-OCT-19	R4865318
Interval				1	days		09-OCT-19	R4862931
Interval				1	days		09-OCT-19	R4862931
Nitrate (as N)		<0.00098		0.00098	mg/dm2.day	09-OCT-19	09-OCT-19	R4865318
Interval				1	days		09-OCT-19	R4862931
Sulfate (SO4)		<0.012		0.012	mg/dm2.day	09-OCT-19	09-OCT-19	R4865318
Interval				1	days		07-OCT-19	R4861017
Mercury (Hg)-Total		<0.00000091		0.00000091	mg/dm2.day	07-OCT-19	08-OCT-19	R4861227
Total Metals in Dustfalls by ICPMS								
Aluminum (Al)-Total		0.00177		0.000055	mg/dm2.day	08-OCT-19	08-OCT-19	R4862101
Interval				1	days		08-OCT-19	R4861629
Antimony (Sb)-Total		<0.0000018		0.0000018	mg/dm2.day	08-OCT-19	08-OCT-19	R4862101
Arsenic (As)-Total		<0.0000018		0.0000018	mg/dm2.day	08-OCT-19	08-OCT-19	R4862101
Barium (Ba)-Total		0.0000122		0.00000091	mg/dm2.day	08-OCT-19	08-OCT-19	R4862101
Beryllium (Be)-Total		<0.00000091		0.00000091	mg/dm2.day	08-OCT-19	08-OCT-19	R4862101
Bismuth (Bi)-Total		0.0000127		0.00000091	mg/dm2.day	08-OCT-19	08-OCT-19	R4862101
Boron (B)-Total		<0.00018		0.00018	mg/dm2.day	08-OCT-19	08-OCT-19	R4862101
Cadmium (Cd)-Total		<0.00000091		0.00000091	mg/dm2.day	08-OCT-19	08-OCT-19	R4862101
Calcium (Ca)-Total		0.00553		0.00036	mg/dm2.day	08-OCT-19	08-OCT-19	R4862101
Chromium (Cr)-Total		0.0000117		0.00000091	mg/dm2.day	08-OCT-19	08-OCT-19	R4862101
Cobalt (Co)-Total		<0.0000018		0.0000018	mg/dm2.day	08-OCT-19	08-OCT-19	R4862101
Copper (Cu)-Total		<0.00020	DLB	0.00020	mg/dm2.day	08-OCT-19	08-OCT-19	R4862101
Lead (Pb)-Total		<0.00000055	DLB	0.00000055	mg/dm2.day	08-OCT-19	08-OCT-19	R4862101
Iron (Fe)-Total		0.00303		0.00055	mg/dm2.day	08-OCT-19	08-OCT-19	R4862101
Lithium (Li)-Total		<0.000091		0.000091	mg/dm2.day	08-OCT-19	08-OCT-19	R4862101
Magnesium (Mg)-Total		0.00214		0.000091	mg/dm2.day	08-OCT-19	08-OCT-19	R4862101
Manganese (Mn)-Total		0.0000767		0.0000018	mg/dm2.day	08-OCT-19	08-OCT-19	R4862101
Molybdenum (Mo)-Total		<0.00000091		0.00000091	mg/dm2.day	08-OCT-19	08-OCT-19	R4862101
Nickel (Ni)-Total		<0.00000091		0.00000091	mg/dm2.day	08-OCT-19	08-OCT-19	R4862101
Phosphorus (P)-Total		<0.00091		0.00091	mg/dm2.day	08-OCT-19	08-OCT-19	R4862101
Potassium (K)-Total		<0.00091		0.00091	mg/dm2.day	08-OCT-19	08-OCT-19	R4862101
Selenium (Se)-Total		<0.000018		0.000018	mg/dm2.day	08-OCT-19	08-OCT-19	R4862101
Silicon (Si)-Total		0.00199		0.00091	mg/dm2.day	08-OCT-19	08-OCT-19	R4862101
Silver (Ag)-Total		<0.00000018		0.00000001	mg/dm2.day	08-OCT-19	08-OCT-19	R4862101
Sodium (Na)-Total		0.00560		0.00091	mg/dm2.day	08-OCT-19	08-OCT-19	R4862101

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters		Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L2357438-2	TIADF1							
Sampled By:	BM/AT/SE on 26-SEP-19							
Matrix:	WATER							
Total Metals in Dustfalls by ICPMS								
Strontium (Sr)-Total		0.0000084		0.0000018	mg/dm2.day	08-OCT-19	08-OCT-19	R4862101
Thallium (Tl)-Total		<0.0000018		0.0000018	mg/dm2.day	08-OCT-19	08-OCT-19	R4862101
Tin (Sn)-Total		<0.0000018		0.0000018	mg/dm2.day	08-OCT-19	08-OCT-19	R4862101
Titanium (Ti)-Total		<0.00018		0.00018	mg/dm2.day	08-OCT-19	08-OCT-19	R4862101
Uranium (U)-Total		<0.00000018		0.00000018	mg/dm2.day	08-OCT-19	08-OCT-19	R4862101
Vanadium (V)-Total		<0.000018		0.0000018	mg/dm2.day	08-OCT-19	08-OCT-19	R4862101
Zinc (Zn)-Total		<0.00027	DLB	0.00027	mg/dm2.day	08-OCT-19	08-OCT-19	R4862101
L2357438-3	TIADF2							
Sampled By:	BM/AT/SE on 28-SEP-19							
Matrix:	WATER							
Combined Dustfalls-Total, soluble, insol								
Total Dustfall		0.19		0.11	mg/dm2.day		10-OCT-19	R4867165
Total Insoluble Dustfall		<0.11		0.11	mg/dm2.day		10-OCT-19	R4867165
Total Soluble Dustfall		0.19		0.11	mg/dm2.day		10-OCT-19	R4867165
Ammonia, Total (as N)		0.0012		0.0010	mg/dm2.day	09-OCT-19	09-OCT-19	R4864730
Interval				1	days		09-OCT-19	R4862931
Chloride (Cl)		<0.18		0.18	mg/dm2.day	09-OCT-19	09-OCT-19	R4865318
Interval				1	days		09-OCT-19	R4862931
Interval				1	days		09-OCT-19	R4862931
Nitrate (as N)		<0.0010		0.0010	mg/dm2.day	09-OCT-19	09-OCT-19	R4865318
Interval				1	days		09-OCT-19	R4862931
Sulfate (SO4)		<0.013		0.013	mg/dm2.day	09-OCT-19	09-OCT-19	R4865318
Interval				1	days		07-OCT-19	R4861017
Mercury (Hg)-Total		<0.0000010		0.0000010	mg/dm2.day	07-OCT-19	08-OCT-19	R4861227
Total Metals in Dustfalls by ICPMS								
Aluminum (Al)-Total		0.000870		0.000063	mg/dm2.day	08-OCT-19	08-OCT-19	R4862101
Interval				1	days		08-OCT-19	R4861629
Antimony (Sb)-Total		<0.00000021		0.00000021	mg/dm2.day	08-OCT-19	08-OCT-19	R4862101
Arsenic (As)-Total		<0.00000021		0.00000021	mg/dm2.day	08-OCT-19	08-OCT-19	R4862101
Barium (Ba)-Total		0.0000311		0.0000010	mg/dm2.day	08-OCT-19	08-OCT-19	R4862101
Beryllium (Be)-Total		<0.0000010		0.0000010	mg/dm2.day	08-OCT-19	08-OCT-19	R4862101
Bismuth (Bi)-Total		0.000014		0.0000010	mg/dm2.day	08-OCT-19	08-OCT-19	R4862101
Boron (B)-Total		<0.00021		0.00021	mg/dm2.day	08-OCT-19	08-OCT-19	R4862101
Cadmium (Cd)-Total		<0.00000010		0.00000010	mg/dm2.day	08-OCT-19	08-OCT-19	R4862101
Calcium (Ca)-Total		0.00262		0.00042	mg/dm2.day	08-OCT-19	08-OCT-19	R4862101
Chromium (Cr)-Total		<0.0000010		0.0000010	mg/dm2.day	08-OCT-19	08-OCT-19	R4862101
Cobalt (Co)-Total		<0.00000021		0.00000021	mg/dm2.day	08-OCT-19	08-OCT-19	R4862101
Copper (Cu)-Total		0.000411		0.0000010	mg/dm2.day	08-OCT-19	08-OCT-19	R4862101
Lead (Pb)-Total		<0.00000063	DLB	0.00000063	mg/dm2.day	08-OCT-19	08-OCT-19	R4862101
Iron (Fe)-Total		0.00122		0.00063	mg/dm2.day	08-OCT-19	08-OCT-19	R4862101
Lithium (Li)-Total		<0.000010		0.000010	mg/dm2.day	08-OCT-19	08-OCT-19	R4862101
Magnesium (Mg)-Total		0.00149		0.000010	mg/dm2.day	08-OCT-19	08-OCT-19	R4862101
Manganese (Mn)-Total		0.0000632		0.00000021	mg/dm2.day	08-OCT-19	08-OCT-19	R4862101
Molybdenum (Mo)-Total		<0.00000010		0.00000010	mg/dm2.day	08-OCT-19	08-OCT-19	R4862101
Nickel (Ni)-Total		<0.0000010		0.0000010	mg/dm2.day	08-OCT-19	08-OCT-19	R4862101
Phosphorus (P)-Total		<0.0010		0.0010	mg/dm2.day	08-OCT-19	08-OCT-19	R4862101
Potassium (K)-Total		<0.0010		0.0010	mg/dm2.day	08-OCT-19	08-OCT-19	R4862101
Selenium (Se)-Total		<0.0000021		0.0000021	mg/dm2.day	08-OCT-19	08-OCT-19	R4862101
Silicon (Si)-Total		<0.0010		0.0010	mg/dm2.day	08-OCT-19	08-OCT-19	R4862101

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters		Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L2357438-3 TIADF2								
Sampled By: BM/AT/SE on 28-SEP-19								
Matrix: WATER								
Total Metals in Dustfalls by ICPMS								
Silver (Ag)-Total		0.00000024		0.00000021	mg/dm2.day	08-OCT-19	08-OCT-19	R4862101
Sodium (Na)-Total		0.0071		0.0010	mg/dm2.day	08-OCT-19	08-OCT-19	R4862101
Strontium (Sr)-Total		0.0000090		0.0000021	mg/dm2.day	08-OCT-19	08-OCT-19	R4862101
Thallium (Tl)-Total		<0.0000021		0.0000021	mg/dm2.day	08-OCT-19	08-OCT-19	R4862101
Tin (Sn)-Total		<0.0000021		0.0000021	mg/dm2.day	08-OCT-19	08-OCT-19	R4862101
Titanium (Ti)-Total		<0.000021		0.00021	mg/dm2.day	08-OCT-19	08-OCT-19	R4862101
Uranium (U)-Total		<0.00000021		0.00000021	mg/dm2.day	08-OCT-19	08-OCT-19	R4862101
Vanadium (V)-Total		<0.000021		0.000021	mg/dm2.day	08-OCT-19	08-OCT-19	R4862101
Zinc (Zn)-Total		<0.00031	DLB	0.00031	mg/dm2.day	08-OCT-19	08-OCT-19	R4862101
L2357438-4 TIADF3								
Sampled By: BM/AT/SE on 28-SEP-19								
Matrix: WATER								
Combined Dustfalls-Total, soluble, insol								
Total Dustfall		0.21		0.11	mg/dm2.day		10-OCT-19	R4867165
Total Insoluble Dustfall		<0.11		0.11	mg/dm2.day		10-OCT-19	R4867165
Total Soluble Dustfall		0.20		0.11	mg/dm2.day		10-OCT-19	R4867165
Ammonia, Total (as N)		0.00109		0.00098	mg/dm2.day	09-OCT-19	09-OCT-19	R4864730
Interval				1	days		09-OCT-19	R4862931
Chloride (Cl)		<0.17		0.17	mg/dm2.day	09-OCT-19	09-OCT-19	R4865318
Interval				1	days		09-OCT-19	R4862931
Interval				1	days		09-OCT-19	R4862931
Nitrate (as N)		<0.00098		0.00098	mg/dm2.day	09-OCT-19	09-OCT-19	R4865318
Interval				1	days		09-OCT-19	R4862931
Sulfate (SO4)		<0.012		0.012	mg/dm2.day	09-OCT-19	09-OCT-19	R4865318
Interval				1	days		07-OCT-19	R4861017
Mercury (Hg)-Total		<0.0000011		0.0000011	mg/dm2.day	07-OCT-19	08-OCT-19	R4861227
Total Metals in Dustfalls by ICPMS								
Aluminum (Al)-Total		0.00524		0.000065	mg/dm2.day	08-OCT-19	08-OCT-19	R4862101
Interval				1	days		08-OCT-19	R4861629
Antimony (Sb)-Total		<0.0000022		0.0000022	mg/dm2.day	08-OCT-19	08-OCT-19	R4862101
Arsenic (As)-Total		<0.0000022		0.0000022	mg/dm2.day	08-OCT-19	08-OCT-19	R4862101
Barium (Ba)-Total		0.0000308		0.0000011	mg/dm2.day	08-OCT-19	08-OCT-19	R4862101
Beryllium (Be)-Total		<0.000011		0.000011	mg/dm2.day	08-OCT-19	08-OCT-19	R4862101
Bismuth (Bi)-Total		0.000068		0.000011	mg/dm2.day	08-OCT-19	08-OCT-19	R4862101
Boron (B)-Total		<0.00022		0.00022	mg/dm2.day	08-OCT-19	08-OCT-19	R4862101
Cadmium (Cd)-Total		<0.0000011		0.0000011	mg/dm2.day	08-OCT-19	08-OCT-19	R4862101
Calcium (Ca)-Total		0.00416		0.00043	mg/dm2.day	08-OCT-19	08-OCT-19	R4862101
Chromium (Cr)-Total		0.000016		0.000011	mg/dm2.day	08-OCT-19	08-OCT-19	R4862101
Cobalt (Co)-Total		0.0000032		0.0000022	mg/dm2.day	08-OCT-19	08-OCT-19	R4862101
Copper (Cu)-Total		0.000707		0.000011	mg/dm2.day	08-OCT-19	08-OCT-19	R4862101
Lead (Pb)-Total		0.0000075		0.0000011	mg/dm2.day	08-OCT-19	08-OCT-19	R4862101
Iron (Fe)-Total		0.00696		0.00065	mg/dm2.day	08-OCT-19	08-OCT-19	R4862101
Lithium (Li)-Total		<0.00011		0.00011	mg/dm2.day	08-OCT-19	08-OCT-19	R4862101
Magnesium (Mg)-Total		0.00440		0.00011	mg/dm2.day	08-OCT-19	08-OCT-19	R4862101
Manganese (Mn)-Total		0.0000940		0.0000022	mg/dm2.day	08-OCT-19	08-OCT-19	R4862101
Molybdenum (Mo)-Total		0.0000015		0.0000011	mg/dm2.day	08-OCT-19	08-OCT-19	R4862101
Nickel (Ni)-Total		0.000012		0.000011	mg/dm2.day	08-OCT-19	08-OCT-19	R4862101
Phosphorus (P)-Total		<0.0011		0.0011	mg/dm2.day	08-OCT-19	08-OCT-19	R4862101

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters		Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L2357438-4	TIADF3							
Sampled By:	BM/AT/SE on 28-SEP-19							
Matrix:	WATER							
Total Metals in Dustfalls by ICPMS								
Potassium (K)-Total	0.0013			0.0011	mg/dm2.day	08-OCT-19	08-OCT-19	R4862101
Selenium (Se)-Total	<0.000022			0.000022	mg/dm2.day	08-OCT-19	08-OCT-19	R4862101
Silicon (Si)-Total	0.0081			0.0011	mg/dm2.day	08-OCT-19	08-OCT-19	R4862101
Silver (Ag)-Total	0.00000087			0.0000002	mg/dm2.day	08-OCT-19	08-OCT-19	R4862101
				2				
Sodium (Na)-Total	0.0064			0.0011	mg/dm2.day	08-OCT-19	08-OCT-19	R4862101
Strontium (Sr)-Total	0.0000282			0.0000022	mg/dm2.day	08-OCT-19	08-OCT-19	R4862101
Thallium (Tl)-Total	<0.0000022			0.0000022	mg/dm2.day	08-OCT-19	08-OCT-19	R4862101
Tin (Sn)-Total	0.0000024			0.0000022	mg/dm2.day	08-OCT-19	08-OCT-19	R4862101
Titanium (Ti)-Total	0.00031			0.00022	mg/dm2.day	08-OCT-19	08-OCT-19	R4862101
Uranium (U)-Total	0.00000042			0.0000002	mg/dm2.day	08-OCT-19	08-OCT-19	R4862101
				2				
Vanadium (V)-Total	0.000030			0.000022	mg/dm2.day	08-OCT-19	08-OCT-19	R4862101
Zinc (Zn)-Total	<0.00045		DLB	0.00045	mg/dm2.day	08-OCT-19	08-OCT-19	R4862101
L2357438-5	DFA1							
Sampled By:	BM/AT/SE on 26-SEP-19							
Matrix:	WATER							
Combined Dustfalls-Total, soluble, insol								
Total Dustfall	0.57			0.11	mg/dm2.day		10-OCT-19	R4867165
Total Insoluble Dustfall	0.18			0.11	mg/dm2.day		10-OCT-19	R4867165
Total Soluble Dustfall	0.39			0.11	mg/dm2.day		10-OCT-19	R4867165
Ammonia, Total (as N)	0.0192			0.0043	mg/dm2.day	09-OCT-19	09-OCT-19	R4864730
Interval				1	days		09-OCT-19	R4862931
Chloride (Cl)	<0.15			0.15	mg/dm2.day	09-OCT-19	09-OCT-19	R4865318
Interval				1	days		09-OCT-19	R4862931
Interval				1	days		09-OCT-19	R4862931
Nitrate (as N)	<0.00086			0.00086	mg/dm2.day	09-OCT-19	09-OCT-19	R4865318
Interval				1	days		09-OCT-19	R4862931
Sulfate (SO4)	<0.011			0.011	mg/dm2.day	09-OCT-19	09-OCT-19	R4865318
Interval				1	days		07-OCT-19	R4861017
Mercury (Hg)-Total	<0.0000011			0.0000011	mg/dm2.day	07-OCT-19	08-OCT-19	R4861227
Total Metals in Dustfalls by ICPMS								
Aluminum (Al)-Total	0.00479			0.000068	mg/dm2.day	08-OCT-19	08-OCT-19	R4862101
Interval				1	days		08-OCT-19	R4861629
Antimony (Sb)-Total	<0.0000023			0.0000023	mg/dm2.day	08-OCT-19	08-OCT-19	R4862101
Arsenic (As)-Total	<0.0000023			0.0000023	mg/dm2.day	08-OCT-19	08-OCT-19	R4862101
Barium (Ba)-Total	0.0000094			0.0000011	mg/dm2.day	08-OCT-19	08-OCT-19	R4862101
Beryllium (Be)-Total	<0.000011			0.000011	mg/dm2.day	08-OCT-19	08-OCT-19	R4862101
Bismuth (Bi)-Total	<0.000011			0.000011	mg/dm2.day	08-OCT-19	08-OCT-19	R4862101
Boron (B)-Total	<0.00023			0.00023	mg/dm2.day	08-OCT-19	08-OCT-19	R4862101
Cadmium (Cd)-Total	<0.0000011			0.0000011	mg/dm2.day	08-OCT-19	08-OCT-19	R4862101
Calcium (Ca)-Total	0.0137			0.00045	mg/dm2.day	08-OCT-19	08-OCT-19	R4862101
Chromium (Cr)-Total	0.000021			0.000011	mg/dm2.day	08-OCT-19	08-OCT-19	R4862101
Cobalt (Co)-Total	0.0000053			0.0000023	mg/dm2.day	08-OCT-19	08-OCT-19	R4862101
Copper (Cu)-Total	<0.00029		DLB	0.00029	mg/dm2.day	08-OCT-19	08-OCT-19	R4862101
Lead (Pb)-Total	<0.0000068		DLB	0.0000068	mg/dm2.day	08-OCT-19	08-OCT-19	R4862101
Iron (Fe)-Total	0.00952			0.00068	mg/dm2.day	08-OCT-19	08-OCT-19	R4862101
Lithium (Li)-Total	<0.00011			0.00011	mg/dm2.day	08-OCT-19	08-OCT-19	R4862101
Magnesium (Mg)-Total	0.00472			0.00011	mg/dm2.day	08-OCT-19	08-OCT-19	R4862101
Manganese (Mn)-Total	0.000258			0.0000023	mg/dm2.day	08-OCT-19	08-OCT-19	R4862101

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters		Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L2357438-5	DFA1							
Sampled By:	BM/AT/SE on 26-SEP-19							
Matrix:	WATER							
Total Metals in Dustfalls by ICPMS								
Molybdenum (Mo)-Total	<0.0000011			0.0000011	mg/dm2.day	08-OCT-19	08-OCT-19	R4862101
Nickel (Ni)-Total	0.000012			0.000011	mg/dm2.day	08-OCT-19	08-OCT-19	R4862101
Phosphorus (P)-Total	<0.0011			0.0011	mg/dm2.day	08-OCT-19	08-OCT-19	R4862101
Potassium (K)-Total	<0.0011			0.0011	mg/dm2.day	08-OCT-19	08-OCT-19	R4862101
Selenium (Se)-Total	<0.000023			0.000023	mg/dm2.day	08-OCT-19	08-OCT-19	R4862101
Silicon (Si)-Total	0.0052			0.0011	mg/dm2.day	08-OCT-19	08-OCT-19	R4862101
Silver (Ag)-Total	<0.00000023			0.00000023	mg/dm2.day	08-OCT-19	08-OCT-19	R4862101
Sodium (Na)-Total	0.0059			0.0011	mg/dm2.day	08-OCT-19	08-OCT-19	R4862101
Strontium (Sr)-Total	0.0000129			0.0000023	mg/dm2.day	08-OCT-19	08-OCT-19	R4862101
Thallium (Tl)-Total	<0.0000023			0.0000023	mg/dm2.day	08-OCT-19	08-OCT-19	R4862101
Tin (Sn)-Total	<0.0000023			0.0000023	mg/dm2.day	08-OCT-19	08-OCT-19	R4862101
Titanium (Ti)-Total	<0.00023			0.00023	mg/dm2.day	08-OCT-19	08-OCT-19	R4862101
Uranium (U)-Total	<0.00000023			0.00000023	mg/dm2.day	08-OCT-19	08-OCT-19	R4862101
Vanadium (V)-Total	0.000023			0.000023	mg/dm2.day	08-OCT-19	08-OCT-19	R4862101
Zinc (Zn)-Total	<0.00034		DLB	0.00034	mg/dm2.day	08-OCT-19	08-OCT-19	R4862101
L2357438-6	CDF4							
Sampled By:	BM/AT/SE on 26-SEP-19							
Matrix:	WATER							
Combined Dustfalls-Total, soluble, insol								
Total Dustfall	0.48			0.11	mg/dm2.day		10-OCT-19	R4867165
Total Insoluble Dustfall	0.20			0.11	mg/dm2.day		10-OCT-19	R4867165
Total Soluble Dustfall	0.28			0.11	mg/dm2.day		10-OCT-19	R4867165
Ammonia, Total (as N)	0.00348			0.00098	mg/dm2.day	09-OCT-19	09-OCT-19	R4864730
Interval				1	days		09-OCT-19	R4862931
Chloride (Cl)	<0.17			0.17	mg/dm2.day	09-OCT-19	09-OCT-19	R4865318
Interval				1	days		09-OCT-19	R4862931
Interval				1	days		09-OCT-19	R4862931
Nitrate (as N)	<0.00098			0.00098	mg/dm2.day	09-OCT-19	09-OCT-19	R4865318
Interval				1	days		09-OCT-19	R4862931
Sulfate (SO4)	<0.012			0.012	mg/dm2.day	09-OCT-19	09-OCT-19	R4865318
Interval				1	days		07-OCT-19	R4861017
Mercury (Hg)-Total	<0.00000072			0.00000072	mg/dm2.day	07-OCT-19	08-OCT-19	R4861227
Total Metals in Dustfalls by ICPMS								
Aluminum (Al)-Total	0.00589			0.000043	mg/dm2.day	08-OCT-19	08-OCT-19	R4862101
Interval				1	days		08-OCT-19	R4861629
Antimony (Sb)-Total	<0.0000014			0.0000014	mg/dm2.day	08-OCT-19	08-OCT-19	R4862101
Arsenic (As)-Total	<0.0000014			0.0000014	mg/dm2.day	08-OCT-19	08-OCT-19	R4862101
Barium (Ba)-Total	0.0000125			0.00000072	mg/dm2.day	08-OCT-19	08-OCT-19	R4862101
Beryllium (Be)-Total	<0.0000072			0.0000072	mg/dm2.day	08-OCT-19	08-OCT-19	R4862101
Bismuth (Bi)-Total	0.0000078			0.0000072	mg/dm2.day	08-OCT-19	08-OCT-19	R4862101
Boron (B)-Total	<0.00014			0.00014	mg/dm2.day	08-OCT-19	08-OCT-19	R4862101
Cadmium (Cd)-Total	<0.00000072			0.00000072	mg/dm2.day	08-OCT-19	08-OCT-19	R4862101
Calcium (Ca)-Total	0.0111			0.00029	mg/dm2.day	08-OCT-19	08-OCT-19	R4862101
Chromium (Cr)-Total	0.0000184			0.0000072	mg/dm2.day	08-OCT-19	08-OCT-19	R4862101
Cobalt (Co)-Total	0.0000057			0.0000014	mg/dm2.day	08-OCT-19	08-OCT-19	R4862101
Copper (Cu)-Total	<0.00020		DLB	0.00020	mg/dm2.day	08-OCT-19	08-OCT-19	R4862101

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L2357438-6	CDF4						
Sampled By:	BM/AT/SE on 26-SEP-19						
Matrix:	WATER						
Total Metals in Dustfalls by ICPMS							
Lead (Pb)-Total	<0.0000043	DLB	0.0000043	mg/dm2.day	08-OCT-19	08-OCT-19	R4862101
Iron (Fe)-Total	0.0125		0.00043	mg/dm2.day	08-OCT-19	08-OCT-19	R4862101
Lithium (Li)-Total	<0.000072		0.000072	mg/dm2.day	08-OCT-19	08-OCT-19	R4862101
Magnesium (Mg)-Total	0.00535		0.000072	mg/dm2.day	08-OCT-19	08-OCT-19	R4862101
Manganese (Mn)-Total	0.000267		0.0000014	mg/dm2.day	08-OCT-19	08-OCT-19	R4862101
Molybdenum (Mo)-Total	0.00000101		0.00000072	mg/dm2.day	08-OCT-19	08-OCT-19	R4862101
Nickel (Ni)-Total	0.0000109		0.0000072	mg/dm2.day	08-OCT-19	08-OCT-19	R4862101
Phosphorus (P)-Total	<0.00072		0.00072	mg/dm2.day	08-OCT-19	08-OCT-19	R4862101
Potassium (K)-Total	<0.00072		0.00072	mg/dm2.day	08-OCT-19	08-OCT-19	R4862101
Selenium (Se)-Total	<0.000014		0.000014	mg/dm2.day	08-OCT-19	08-OCT-19	R4862101
Silicon (Si)-Total	0.00650		0.00072	mg/dm2.day	08-OCT-19	08-OCT-19	R4862101
Silver (Ag)-Total	<0.00000014		0.00000014	mg/dm2.day	08-OCT-19	08-OCT-19	R4862101
Sodium (Na)-Total	0.00528		0.00072	mg/dm2.day	08-OCT-19	08-OCT-19	R4862101
Strontium (Sr)-Total	0.0000114		0.0000014	mg/dm2.day	08-OCT-19	08-OCT-19	R4862101
Thallium (Tl)-Total	<0.0000014		0.0000014	mg/dm2.day	08-OCT-19	08-OCT-19	R4862101
Tin (Sn)-Total	<0.0000014		0.0000014	mg/dm2.day	08-OCT-19	08-OCT-19	R4862101
Titanium (Ti)-Total	0.00032		0.00014	mg/dm2.day	08-OCT-19	08-OCT-19	R4862101
Uranium (U)-Total	<0.00000014		0.00000014	mg/dm2.day	08-OCT-19	08-OCT-19	R4862101
Vanadium (V)-Total	0.000032		0.000014	mg/dm2.day	08-OCT-19	08-OCT-19	R4862101
Zinc (Zn)-Total	<0.00022	DLB	0.00022	mg/dm2.day	08-OCT-19	08-OCT-19	R4862101

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

Reference Information

Sample Parameter Qualifier Key:

Qualifier	Description
DLB	Detection Limit Raised. Analyte detected at comparable level in Method Blank.
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 specifically 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
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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
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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
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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 specifically 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.

Results are reported in units of nitrogen weight. To convert to units by weight of ammonium, multiply by 1.29.

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

Results are reported in units of nitrogen weight. To convert to units by weight of nitrate, multiply by 4.43.

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 specifically 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
VA	ALS ENVIRONMENTAL - VANCOUVER, BRITISH COLUMBIA, CANADA

Chain of Custody Numbers:

Reference Information

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
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GLOSSARY OF REPORT TERMS

Surrogates are compounds that are similar in behaviour to target analyte(s), but that do not normally occur in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery. In reports that display the D.L. column, laboratory objectives for surrogates are listed there.

mg/kg - milligrams per kilogram based on dry weight of sample
mg/kg ww - milligrams per kilogram based on wet weight of sample
mg/kg lwt - milligrams per kilogram based on lipid-adjusted weight
mg/L - unit of concentration based on volume, parts per million.

< - Less than.
D.L. - The reporting limit.
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.



Quality Control Report

Workorder: L2357438

Report Date: 11-OCT-19

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Client: TMAC Resources Inc
 Hope Bay Project 95 Wellington St West P O Box 44
 Toronto ON M5J 2N7

Contact: Environmental Site Manager

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
CL-IC-VA Dustfall								
Batch	R4865318							
WG3182483-2	LCS							
Chloride (Cl)			97.8		%		90-110	09-OCT-19
WG3182483-1	MB							
Chloride (Cl)			<0.18		mg/dm2.day		0.18	09-OCT-19
DUSTFALLS-COM-DM2-VA Dustfall								
Batch	R4867165							
WG3187001-2	LCS							
Total Dustfall			99.7		%		85-115	10-OCT-19
Total Insoluble Dustfall			94.4		%		85-115	10-OCT-19
Total Soluble Dustfall			100.6		%		85-115	10-OCT-19
WG3187001-1	MB							
Total Dustfall			<0.10		mg/dm2.day		0.1	10-OCT-19
Total Insoluble Dustfall			<0.10		mg/dm2.day		0.1	10-OCT-19
Total Soluble Dustfall			<0.10		mg/dm2.day		0.1	10-OCT-19
HG-DUST(DM2-CVAFS-VA Dustfall								
Batch	R4861227							
WG3182480-2	LCS							
Mercury (Hg)-Total			81.6		%		70-130	08-OCT-19
WG3182480-1	MB							
Mercury (Hg)-Total			<0.0000013		mg/dm2.day		0.0000013	08-OCT-19
MET-DUST(DM2)-MS-VA Dustfall								
Batch	R4862101							
WG3182479-2	LCS							
Aluminum (Al)-Total			105.6		%		80-120	08-OCT-19
Antimony (Sb)-Total			100.9		%		80-120	08-OCT-19
Arsenic (As)-Total			97.7		%		80-120	08-OCT-19
Barium (Ba)-Total			95.9		%		80-120	08-OCT-19
Beryllium (Be)-Total			103.3		%		80-120	08-OCT-19
Bismuth (Bi)-Total			96.0		%		80-120	08-OCT-19
Boron (B)-Total			101.6		%		80-120	08-OCT-19
Cadmium (Cd)-Total			98.4		%		80-120	08-OCT-19
Calcium (Ca)-Total			97.2		%		80-120	08-OCT-19
Chromium (Cr)-Total			101.4		%		80-120	08-OCT-19
Cobalt (Co)-Total			99.0		%		80-120	08-OCT-19
Copper (Cu)-Total			100.7		%		80-120	08-OCT-19
Lead (Pb)-Total			96.2		%		80-120	08-OCT-19

Quality Control Report

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Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-DUST(DM2)-MS-VA Dustfall								
Batch	R4862101							
WG3182479-2	LCS							
Iron (Fe)-Total			96.7		%		80-120	08-OCT-19
Lithium (Li)-Total			99.0		%		80-120	08-OCT-19
Magnesium (Mg)-Total			102.8		%		80-120	08-OCT-19
Manganese (Mn)-Total			99.9		%		80-120	08-OCT-19
Molybdenum (Mo)-Total			101.1		%		80-120	08-OCT-19
Nickel (Ni)-Total			97.4		%		80-120	08-OCT-19
Phosphorus (P)-Total			108.5		%		80-120	08-OCT-19
Potassium (K)-Total			102.1		%		80-120	08-OCT-19
Selenium (Se)-Total			99.4		%		80-120	08-OCT-19
Silicon (Si)-Total			98.7		%		80-120	08-OCT-19
Silver (Ag)-Total			101.1		%		80-120	08-OCT-19
Sodium (Na)-Total			102.4		%		80-120	08-OCT-19
Strontium (Sr)-Total			101.5		%		80-120	08-OCT-19
Thallium (Tl)-Total			94.1		%		80-120	08-OCT-19
Tin (Sn)-Total			99.1		%		80-120	08-OCT-19
Titanium (Ti)-Total			99.4		%		80-120	08-OCT-19
Uranium (U)-Total			95.2		%		80-120	08-OCT-19
Vanadium (V)-Total			100.6		%		80-120	08-OCT-19
Zinc (Zn)-Total			106.2		%		80-120	08-OCT-19
WG3182479-1	MB							
Aluminum (Al)-Total			<0.000079		mg/dm2.day		0.000079	08-OCT-19
Antimony (Sb)-Total			<0.0000026		mg/dm2.day		0.0000026	08-OCT-19
Arsenic (As)-Total			<0.0000026		mg/dm2.day		0.0000026	08-OCT-19
Barium (Ba)-Total			0.0000019	MB-LOR	mg/dm2.day		0.0000013	08-OCT-19
Beryllium (Be)-Total			<0.000013		mg/dm2.day		0.000013	08-OCT-19
Bismuth (Bi)-Total			<0.000013		mg/dm2.day		0.000013	08-OCT-19
Boron (B)-Total			<0.00026		mg/dm2.day		0.00026	08-OCT-19
Cadmium (Cd)-Total			<0.0000013		mg/dm2.day		0.0000013	08-OCT-19
Calcium (Ca)-Total			<0.00052		mg/dm2.day		0.00052	08-OCT-19
Chromium (Cr)-Total			<0.000013		mg/dm2.day		0.000013	08-OCT-19
Cobalt (Co)-Total			<0.0000026		mg/dm2.day		0.0000026	08-OCT-19
Copper (Cu)-Total			0.000086	MB-LOR	mg/dm2.day		0.000013	08-OCT-19
Lead (Pb)-Total			0.0000018	MB-LOR	mg/dm2.day		0.0000013	08-OCT-19
Iron (Fe)-Total			<0.00079		mg/dm2.day		0.00079	08-OCT-19



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Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-DUST(DM2)-MS-VA Dustfall								
Batch R4862101								
WG3182479-1 MB								
Lithium (Li)-Total			<0.00013		mg/dm2.day		0.00013	08-OCT-19
Magnesium (Mg)-Total			<0.00013		mg/dm2.day		0.00013	08-OCT-19
Manganese (Mn)-Total			<0.0000026		mg/dm2.day		0.0000026	08-OCT-19
Molybdenum (Mo)-Total			<0.0000013		mg/dm2.day		0.0000013	08-OCT-19
Nickel (Ni)-Total			<0.000013		mg/dm2.day		0.000013	08-OCT-19
Phosphorus (P)-Total			<0.0013		mg/dm2.day		0.0013	08-OCT-19
Potassium (K)-Total			<0.0013		mg/dm2.day		0.0013	08-OCT-19
Selenium (Se)-Total			<0.000026		mg/dm2.day		0.000026	08-OCT-19
Silicon (Si)-Total			<0.0013		mg/dm2.day		0.0013	08-OCT-19
Silver (Ag)-Total			<0.0000002		mg/dm2.day		0.00000026	08-OCT-19
Sodium (Na)-Total			<0.0013		mg/dm2.day		0.0013	08-OCT-19
Strontium (Sr)-Total			<0.0000026		mg/dm2.day		0.0000026	08-OCT-19
Thallium (Tl)-Total			<0.0000026		mg/dm2.day		0.0000026	08-OCT-19
Tin (Sn)-Total			<0.0000026		mg/dm2.day		0.0000026	08-OCT-19
Titanium (Ti)-Total			<0.00026		mg/dm2.day		0.00026	08-OCT-19
Uranium (U)-Total			<0.0000002		mg/dm2.day		0.00000026	08-OCT-19
Vanadium (V)-Total			<0.000026		mg/dm2.day		0.000026	08-OCT-19
Zinc (Zn)-Total			0.000137	MB-LOR	mg/dm2.day		0.000079	08-OCT-19
NH3-F-VA Dustfall								
Batch R4864730								
WG3182483-1 MB								
Ammonia, Total (as N)			<0.0010		mg/dm2.day		0.001	09-OCT-19
NO3-IC-VA Dustfall								
Batch R4865318								
WG3182483-2 LCS								
Nitrate (as N)			98.4		%		90-110	09-OCT-19
WG3182483-1 MB								
Nitrate (as N)			<0.0010		mg/dm2.day		0.001	09-OCT-19
SO4-IC-VA Dustfall								
Batch R4865318								
WG3182483-2 LCS								
Sulfate (SO4)			99.8		%		90-110	09-OCT-19
WG3182483-1 MB								
Sulfate (SO4)			<0.013		mg/dm2.day		0.013	09-OCT-19

Quality Control Report

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Legend:

Limit	ALS Control Limit (Data Quality Objectives)
DUP	Duplicate
RPD	Relative Percent Difference
N/A	Not Available
LCS	Laboratory Control Sample
SRM	Standard Reference Material
MS	Matrix Spike
MSD	Matrix Spike Duplicate
ADE	Average Desorption Efficiency
MB	Method Blank
IRM	Internal Reference Material
CRM	Certified Reference Material
CCV	Continuing Calibration Verification
CVS	Calibration Verification Standard
LCSD	Laboratory Control Sample Duplicate

Sample Parameter Qualifier Definitions:

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

Hold Time Exceedances:

All test results reported with this submission were conducted within ALS recommended hold times.

ALS recommended hold times may vary by province. They are assigned to meet known provincial and/or federal government requirements. In the absence of regulatory hold times, ALS establishes recommendations based on guidelines published by the US EPA, APHA Standard Methods, or Environment Canada (where available). For more information, please contact ALS.

The ALS Quality Control Report is provided to ALS clients upon request. ALS includes comprehensive QC checks with every analysis to ensure our high standards of quality are met. Each QC result has a known or expected target value, which is compared against pre-determined data quality objectives to provide confidence in the accuracy of associated test results.

Please note that this report may contain QC results from anonymous Sample Duplicates and Matrix Spikes that do not originate from this Work Order.



L2357438-COFC

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: TMAC Resources Ltd (Hope Bay)		<input checked="" type="checkbox"/> Standard <input type="checkbox"/> Other		<input checked="" type="radio"/> Regular (Standard Turnaround Times - Business Days)													
Contact: Environmental Site Manager		<input checked="" type="checkbox"/> PDF <input checked="" type="checkbox"/> Excel <input checked="" type="checkbox"/> Digital <input type="checkbox"/> Fax		<input checked="" type="radio"/> Priority (2-4 Business Days) - 50% Surcharge - Contact ALS to Confirm TAT													
Address: 95 Welling Street West, Suite 1010		Email 1: enviro@tmacresources.com		<input checked="" type="radio"/> Emergency (1-2 Bus. Days) - 100% Surcharge - Contact ALS to Confirm TAT													
P.O. Box 44, Toronto, ON, M5J 2N7		Email 2: enviro.tech@tmacresources.com		<input type="radio"/> Same Day or Weekend Emergency - Contact ALS to Confirm TAT													
Phone: 1-416-828-0216 Fax:		Email 3:		Analysis Request													
Invoice To: Same as Report? - Y		Client / Project Information		Please indicate below Filtered, Preserved or both (F, P, F/P)													
Hardcopy of Invoice with Report?		Job #:		P													
Company:		PO / AFE: 4500011700															
Contact:		LSD:															
Address:		Job Ref: Doris Dustfall															
Phone: Fax:		Quote #:															
Lab Work Order # (lab use only)		ALS Contact: Amber Springer		Sampler:		BM/AT/SE											
L2357438																	
Sample #	Sample Identification (This description will appear on the report)	Date In (dd-mm-yy)	Date Out (dd-mm-yy)	Sample Type	Total Particulate	Soluble particulate	Insoluble particulate	Sulphate	Nitrate	NH3, NH4	Cl	Total Metals	Mg+	Ca+	K+	Number of Containers	
	CONTROLDF	01-Sep-19	28-Sep-19	Water	X	X	X	X	X	X	X	X	X	X	X	2	
	TIADF1	01-Sep-19	26-Sep-19	Water	X	X	X	X	X	X	X	X	X	X	X	2	
	TIADF2	01-Sep-19	23-Sep-19	Water	X	X	X	X	X	X	X	X	X	X	X	2	
	TIADF3	01-Sep-19	23-Sep-19	Water	X	X	X	X	X	X	X	X	X	X	X	2	
	DFA1	01-Sep-19	26-Sep-19	Water	X	X	X	X	X	X	X	X	X	X	X	2	
	CDF4	01-Sep-19	26-Sep-19	Water	X	X	X	X	X	X	X	X	X	X	X	1	
Special Instructions / Regulations with water or land use (CCME-Freshwater Aquatic Life/BC CSR - Commercial/AB Tier 1 - Natural, etc) / 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-mm-yy)	Time (hr-mm)	Received by:	Date:	Time:	Temperature:	Verified by:	Date:	Time:	Observations:							
Brian McCordle			J			°C	Jh	2 Oct 19		Yes / No ?							
										If Yes add SIF							

7,7,10,10°C 11:20AM

GENF 18.01 Front

L2357438-COFC



APPENDIX C

Partisol Sampler Laboratory Analysis



TMAC Resources Inc
ATTN: Sara Warnock/Kyle Conway
Hope Bay Project
95 Wellington St West
Toronto ON M5J 2N7

Date Received: 12-MAR-19
Report Date: 21-MAR-19 12:45 (MT)
Version: FINAL

Client Phone: 867-988-102

Certificate of Analysis

Lab Work Order #: L2242676
Project P.O. #: 4500011700
Job Reference:
C of C Numbers:
Legal Site Desc:

Comments: The filter supplied for L2242676-9 has a post-weight significantly lower than the pre-weight recorded when deployed, and may have been damaged. This should be considered when reviewing this data.

Amber Springer, B.Sc
Account Manager

[This report shall not be reproduced except in full without the written authority of the Laboratory.]

ADDRESS: 8081 Lougheed Hwy, Suite 100, Burnaby, BC V5A 1W9 Canada | Phone: +1 604 253 4188 | Fax: +1 604 253 6700
ALS CANADA LTD Part of the ALS Group An ALS Limited Company

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L2242676-1 015127 Sampled By: TMAC on 10-DEC-18 @ 12:00 Matrix: AIR Miscellaneous Parameters Air Volume, Client Supplied Total Particulate (PM2.5) by Gravimetric Particulate - PM2.5 Particulate - PM2.5	 21600 3.5 77		 0 2.3 50	 L ug/m3 ug		 19-MAR-19 20-MAR-19 20-MAR-19	 R4571648 R4574262 R4574262
L2242676-2 41641 Sampled By: TMAC on 16-DEC-18 @ 12:00 Matrix: AIR Miscellaneous Parameters Air Volume, Client Supplied Total Particulate (PM2.5) by Gravimetric Particulate - PM2.5 Particulate - PM2.5	 21600 4.2 90		 0 2.3 50	 L ug/m3 ug		 19-MAR-19 20-MAR-19 20-MAR-19	 R4571648 R4574262 R4574262
L2242676-3 41657 Sampled By: TMAC on 22-DEC-18 @ 12:00 Matrix: AIR Miscellaneous Parameters Air Volume, Client Supplied Total Particulate (PM2.5) by Gravimetric Particulate - PM2.5 Particulate - PM2.5	 21600 <2.3 <50		 0 2.3 50	 L ug/m3 ug		 19-MAR-19 20-MAR-19 20-MAR-19	 R4571648 R4574262 R4574262
L2242676-4 25401 Sampled By: TMAC on 28-DEC-18 @ 12:00 Matrix: AIR Miscellaneous Parameters Air Volume, Client Supplied Total Particulate (PM2.5) by Gravimetric Particulate - PM2.5 Particulate - PM2.5	 21600 <2.3 <50		 0 2.3 50	 L ug/m3 ug		 19-MAR-19 20-MAR-19 20-MAR-19	 R4571648 R4574262 R4574262
L2242676-5 015106 Sampled By: TMAC on 03-JAN-19 @ 12:00 Matrix: AIR Miscellaneous Parameters Air Volume, Client Supplied Total Particulate (PM2.5) by Gravimetric Particulate - PM2.5 Particulate - PM2.5	 21600 <2.3 <50		 0 2.3 50	 L ug/m3 ug		 19-MAR-19 20-MAR-19 20-MAR-19	 R4571648 R4574262 R4574262
L2242676-6 015113 Sampled By: TMAC on 09-JAN-19 @ 12:00 Matrix: AIR Miscellaneous Parameters Air Volume, Client Supplied Total Particulate (PM2.5) by Gravimetric Particulate - PM2.5 Particulate - PM2.5	 21600 <2.3 <50		 0 2.3 50	 L ug/m3 ug		 19-MAR-19 20-MAR-19 20-MAR-19	 R4571648 R4574262 R4574262
L2242676-7 24925 Sampled By: TMAC on 15-JAN-19 @ 12:00 Matrix: AIR Miscellaneous Parameters Air Volume, Client Supplied	 21600		 0	 L		 19-MAR-19	 R4571648

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L2242676-7 24925 Sampled By: TMAC on 15-JAN-19 @ 12:00 Matrix: AIR Total Particulate (PM2.5) by Gravimetric Particulate - PM2.5 Particulate - PM2.5	<2.3 <50		2.3 50	ug/m3 ug		20-MAR-19 20-MAR-19	R4574262 R4574262
L2242676-8 27442 Sampled By: TMAC on 21-JAN-19 @ 12:00 Matrix: AIR Miscellaneous Parameters Air Volume, Client Supplied Total Particulate (PM2.5) by Gravimetric Particulate - PM2.5 Particulate - PM2.5	21600 <2.3 <50		0 2.3 50	L ug/m3 ug		19-MAR-19 20-MAR-19 20-MAR-19	R4571648 R4574262 R4574262
L2242676-9 041651 Sampled By: TMAC on 27-JAN-19 @ 12:00 Matrix: AIR Miscellaneous Parameters Air Volume, Client Supplied Total Particulate (PM2.5) by Gravimetric Particulate - PM2.5 Particulate - PM2.5	21600 <2.3 <50		0 2.3 50	L ug/m3 ug		19-MAR-19 20-MAR-19 20-MAR-19	R4571648 R4574262 R4574262
L2242676-10 107619 Sampled By: TMAC on 02-FEB-19 @ 12:00 Matrix: AIR Miscellaneous Parameters Air Volume, Client Supplied Total Particulate (PM2.5) by Gravimetric Particulate - PM2.5 Particulate - PM2.5	21600 4.0 87		0 2.3 50	L ug/m3 ug		19-MAR-19 20-MAR-19 20-MAR-19	R4571648 R4574262 R4574262
L2242676-11 27478 Sampled By: TMAC on 08-FEB-19 @ 12:00 Matrix: AIR Miscellaneous Parameters Air Volume, Client Supplied Total Particulate (PM2.5) by Gravimetric Particulate - PM2.5 Particulate - PM2.5	21600 <2.3 <50		0 2.3 50	L ug/m3 ug		19-MAR-19 20-MAR-19 20-MAR-19	R4571648 R4574262 R4574262
L2242676-12 041643 Sampled By: TMAC on 14-FEB-19 @ 12:00 Matrix: AIR Miscellaneous Parameters Air Volume, Client Supplied Total Particulate (PM2.5) by Gravimetric Particulate - PM2.5 Particulate - PM2.5	21600 <2.3 <50		0 2.3 50	L ug/m3 ug		19-MAR-19 20-MAR-19 20-MAR-19	R4571648 R4574262 R4574262
L2242676-13 27301 Sampled By: TMAC on 20-FEB-19 @ 12:00 Matrix: AIR Miscellaneous Parameters Air Volume, Client Supplied Total Particulate (PM2.5) by Gravimetric Particulate - PM2.5	21600 <2.3		0 2.3	L ug/m3		19-MAR-19 20-MAR-19	R4571648 R4574262

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L2242676-13 27301 Sampled By: TMAC on 20-FEB-19 @ 12:00 Matrix: AIR Total Particulate (PM2.5) by Gravimetric Particulate - PM2.5	<50		50	ug		20-MAR-19	R4574262
L2242676-14 RP 089020 Sampled By: TMAC on 26-FEB-19 @ 12:00 Matrix: AIR Miscellaneous Parameters Air Volume, Client Supplied Total Particulate (PM2.5) by Gravimetric Particulate - PM2.5 Particulate - PM2.5	21600 <2.3 <50		0 2.3 50	L ug/m3 ug		19-MAR-19 20-MAR-19 20-MAR-19	R4571648 R4574262 R4574262
L2242676-15 27308 Sampled By: TMAC on 04-MAR-19 @ 12:00 Matrix: AIR Miscellaneous Parameters Air Volume, Client Supplied Total Particulate (PM2.5) by Gravimetric Particulate - PM2.5 Particulate - PM2.5	21600 <2.3 <50		0 2.3 50	L ug/m3 ug		19-MAR-19 20-MAR-19 20-MAR-19	R4571648 R4574262 R4574262
L2242676-17 016180 Sampled By: TMAC on 10-DEC-18 @ 12:00 Matrix: AIR Miscellaneous Parameters Air Volume, Client Supplied Total Particulate (Dichot-PM10) by Grav. Particulate-Fine Particulate-Coarse Particulate-PM10 Particulate-Coarse	2400 3.5 2.56 6.1 70		0 2.3 0.41 2.4 50	L ug/m3 ug/m3 ug/m3 ug		19-MAR-19 20-MAR-19 20-MAR-19 20-MAR-19 20-MAR-19	R4571648 R4574207 R4574207 R4574207 R4574207
L2242676-18 015126 Sampled By: TMAC on 16-DEC-18 @ 12:00 Matrix: AIR Miscellaneous Parameters Air Volume, Client Supplied Total Particulate (Dichot-PM10) by Grav. Particulate-Fine Particulate-Coarse Particulate-PM10 Particulate-Coarse	2400 4.2 0.417 4.6 <50		0 2.3 0.058 2.3 50	L ug/m3 ug/m3 ug/m3 ug		19-MAR-19 20-MAR-19 20-MAR-19 20-MAR-19 20-MAR-19	R4571648 R4574207 R4574207 R4574207 R4574207
L2242676-19 034141 Sampled By: TMAC on 22-DEC-18 @ 12:00 Matrix: AIR Miscellaneous Parameters Air Volume, Client Supplied Total Particulate (Dichot-PM10) by Grav. Particulate-Fine Particulate-Coarse Particulate-PM10 Particulate-Coarse	2400 <2.3 <-0.0065 <2.3 <50		0 2.3 -0.0065 2.3 50	L ug/m3 ug/m3 ug/m3 ug		19-MAR-19 20-MAR-19 20-MAR-19 20-MAR-19 20-MAR-19	R4571648 R4574207 R4574207 R4574207 R4574207

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L2242676-20 27577 Sampled By: TMAC on 28-DEC-18 @ 12:00 Matrix: AIR Miscellaneous Parameters Air Volume, Client Supplied Total Particulate (Dichot-PM10) by Grav. Particulate-Fine Particulate-Coarse Particulate-PM10 Particulate-Coarse	 2400 <2.3 0.370 <2.3 <50		 0 2.3 0.0065 2.3 50	 L ug/m3 ug/m3 ug/m3 ug		 19-MAR-19 20-MAR-19 20-MAR-19 20-MAR-19 20-MAR-19	 R4571648 R4574207 R4574207 R4574207 R4574207
L2242676-21 034139 Sampled By: TMAC on 03-JAN-19 @ 12:00 Matrix: AIR Miscellaneous Parameters Air Volume, Client Supplied Total Particulate (Dichot-PM10) by Grav. Particulate-Fine Particulate-Coarse Particulate-PM10 Particulate-Coarse	 2400 <2.3 <0.015 <2.3 <50		 0 2.3 0.015 2.3 50	 L ug/m3 ug/m3 ug/m3 ug		 19-MAR-19 20-MAR-19 20-MAR-19 20-MAR-19 20-MAR-19	 R4571648 R4574207 R4574207 R4574207 R4574207
L2242676-22 24928 Sampled By: TMAC on 09-JAN-19 @ 12:00 Matrix: AIR Miscellaneous Parameters Air Volume, Client Supplied Total Particulate (Dichot-PM10) by Grav. Particulate-Fine Particulate-Coarse Particulate-PM10 Particulate-Coarse	 2400 <2.3 <0.0022 <2.3 <50		 0 2.3 0.0022 2.3 50	 L ug/m3 ug/m3 ug/m3 ug		 19-MAR-19 20-MAR-19 20-MAR-19 20-MAR-19 20-MAR-19	 R4571648 R4574207 R4574207 R4574207 R4574207
L2242676-23 27297 Sampled By: TMAC on 15-JAN-19 @ 12:00 Matrix: AIR Miscellaneous Parameters Air Volume, Client Supplied Total Particulate (Dichot-PM10) by Grav. Particulate-Fine Particulate-Coarse Particulate-PM10 Particulate-Coarse	 2400 <2.3 0.602 <2.3 <50		 0 2.3 -0.0065 2.3 50	 L ug/m3 ug/m3 ug/m3 ug		 19-MAR-19 20-MAR-19 20-MAR-19 20-MAR-19 20-MAR-19	 R4571648 R4574207 R4574207 R4574207 R4574207
L2242676-24 27780 Sampled By: TMAC on 21-JAN-19 @ 12:00 Matrix: AIR Miscellaneous Parameters Air Volume, Client Supplied Total Particulate (Dichot-PM10) by Grav. Particulate-Fine Particulate-Coarse Particulate-PM10 Particulate-Coarse	 2400 <2.3 <-0.013 <2.3 <50		 0 2.3 -0.013 2.3 50	 L ug/m3 ug/m3 ug/m3 ug		 19-MAR-19 20-MAR-19 20-MAR-19 20-MAR-19 20-MAR-19	 R4571648 R4574207 R4574207 R4574207 R4574207
L2242676-25 25412 Sampled By: TMAC on 27-JAN-19 @ 12:00 Matrix: AIR							

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L2242676-25 25412 Sampled By: TMAC on 27-JAN-19 @ 12:00 Matrix: AIR Miscellaneous Parameters Air Volume, Client Supplied Total Particulate (Dichot-PM10) by Grav. Particulate-Fine Particulate-Coarse Particulate-PM10 Particulate-Coarse	 2400 <2.3 <-0.12 <2.3 <50		 0 2.3 -0.12 2.3 50	 L ug/m3 ug/m3 ug/m3 ug		 19-MAR-19 20-MAR-19 20-MAR-19 20-MAR-19 20-MAR-19	 R4571648 R4574207 R4574207 R4574207 R4574207
L2242676-26 13097 Sampled By: TMAC on 02-FEB-19 @ 12:00 Matrix: AIR Miscellaneous Parameters Air Volume, Client Supplied Total Particulate (Dichot-PM10) by Grav. Particulate-Fine Particulate-Coarse Particulate-PM10 Particulate-Coarse	 2400 4.0 <0.056 3.3 <50		 0 2.3 0.056 2.3 50	 L ug/m3 ug/m3 ug/m3 ug		 19-MAR-19 20-MAR-19 20-MAR-19 20-MAR-19 20-MAR-19	 R4571648 R4574207 R4574207 R4574207 R4574207
L2242676-27 041645 Sampled By: TMAC on 08-FEB-19 @ 12:00 Matrix: AIR Miscellaneous Parameters Air Volume, Client Supplied Total Particulate (Dichot-PM10) by Grav. Particulate-Fine Particulate-Coarse Particulate-PM10 Particulate-Coarse	 2400 <2.3 <2.1 <3.1 <50		 0 2.3 2.1 3.1 50	 L ug/m3 ug/m3 ug/m3 ug		 19-MAR-19 20-MAR-19 20-MAR-19 20-MAR-19 20-MAR-19	 R4571648 R4574207 R4574207 R4574207 R4574207
L2242676-28 25416 Sampled By: TMAC on 14-FEB-19 @ 12:00 Matrix: AIR Miscellaneous Parameters Air Volume, Client Supplied Total Particulate (Dichot-PM10) by Grav. Particulate-Fine Particulate-Coarse Particulate-PM10 Particulate-Coarse	 2400 <2.3 <2.1 <3.1 <50		 0 2.3 2.1 3.1 50	 L ug/m3 ug/m3 ug/m3 ug		 19-MAR-19 20-MAR-19 20-MAR-19 20-MAR-19 20-MAR-19	 R4571648 R4574207 R4574207 R4574207 R4574207
L2242676-29 27450 Sampled By: TMAC on 20-FEB-19 @ 12:00 Matrix: AIR Miscellaneous Parameters Air Volume, Client Supplied Total Particulate (Dichot-PM10) by Grav. Particulate-Fine Particulate-Coarse Particulate-PM10 Particulate-Coarse	 2400 <2.3 <2.1 <3.1 <50		 0 2.3 2.1 3.1 50	 L ug/m3 ug/m3 ug/m3 ug		 19-MAR-19 20-MAR-19 20-MAR-19 20-MAR-19 20-MAR-19	 R4571648 R4574207 R4574207 R4574207 R4574207
L2242676-30 25068 Sampled By: TMAC on 26-FEB-19 @ 12:00 Matrix: AIR							

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L2242676-30 25068 Sampled By: TMAC on 26-FEB-19 @ 12:00 Matrix: AIR Miscellaneous Parameters Air Volume, Client Supplied Total Particulate (Dichot-PM10) by Grav. Particulate-Fine Particulate-Coarse Particulate-PM10 Particulate-Coarse	2400 <2.3 <2.1 <3.1 <50		0 2.3 2.1 3.1 50	L ug/m3 ug/m3 ug/m3 ug		19-MAR-19 20-MAR-19 20-MAR-19 20-MAR-19 20-MAR-19	R4571648 R4574207 R4574207 R4574207 R4574207
L2242676-31 27795 Sampled By: TMAC on 04-MAR-19 @ 12:00 Matrix: AIR Miscellaneous Parameters Air Volume, Client Supplied Total Particulate (Dichot-PM10) by Grav. Particulate-Fine Particulate-Coarse Particulate-PM10 Particulate-Coarse	2400 <2.3 <2.1 <3.1 <50		0 2.3 2.1 3.1 50	L ug/m3 ug/m3 ug/m3 ug		19-MAR-19 20-MAR-19 20-MAR-19 20-MAR-19 20-MAR-19	R4571648 R4574207 R4574207 R4574207 R4574207
L2242676-33 016188 Sampled By: TMAC on 10-DEC-18 @ 12:00 Matrix: AIR Miscellaneous Parameters Air Volume, Client Supplied Total Particulate (TSP) by Gravimetric Total Suspended Particulate Total Suspended Particulate	24000 24.6 590		0 2.1 50	L ug/m3 ug		19-MAR-19 20-MAR-19 20-MAR-19	R4571648 R4574263 R4574263
L2242676-34 27798 Sampled By: TMAC on 16-DEC-18 @ 12:00 Matrix: AIR Miscellaneous Parameters Air Volume, Client Supplied Total Particulate (TSP) by Gravimetric Total Suspended Particulate Total Suspended Particulate	24000 <2.1 <50		0 2.1 50	L ug/m3 ug		19-MAR-19 20-MAR-19 20-MAR-19	R4571648 R4574263 R4574263
L2242676-35 24944 Sampled By: TMAC on 22-DEC-18 @ 12:00 Matrix: AIR Miscellaneous Parameters Air Volume, Client Supplied Total Particulate (TSP) by Gravimetric Total Suspended Particulate Total Suspended Particulate	24000 3.9 93		0 2.1 50	L ug/m3 ug		19-MAR-19 20-MAR-19 20-MAR-19	R4571648 R4574263 R4574263
L2242676-36 27584 Sampled By: TMAC on 28-DEC-18 @ 12:00 Matrix: AIR Miscellaneous Parameters Air Volume, Client Supplied Total Particulate (TSP) by Gravimetric Total Suspended Particulate Total Suspended Particulate	24000 5.8 140		0 2.1 50	L ug/m3 ug		19-MAR-19 20-MAR-19 20-MAR-19	R4571648 R4574263 R4574263

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L2242676-37 25072 Sampled By: TMAC on 03-JAN-19 @ 12:00 Matrix: AIR Miscellaneous Parameters Air Volume, Client Supplied Total Particulate (TSP) by Gravimetric Total Suspended Particulate Total Suspended Particulate	24000 3.2 77		0 2.1 50	L ug/m3 ug		19-MAR-19 20-MAR-19 20-MAR-19	R4571648 R4574263 R4574263
L2242676-38 041642 Sampled By: TMAC on 09-JAN-19 @ 12:00 Matrix: AIR Miscellaneous Parameters Air Volume, Client Supplied Total Particulate (TSP) by Gravimetric Total Suspended Particulate Total Suspended Particulate	24000 9.0 217		0 2.1 50	L ug/m3 ug		19-MAR-19 20-MAR-19 20-MAR-19	R4571648 R4574263 R4574263
L2242676-39 27731 Sampled By: TMAC on 15-JAN-19 @ 12:00 Matrix: AIR Miscellaneous Parameters Air Volume, Client Supplied Total Particulate (TSP) by Gravimetric Total Suspended Particulate Total Suspended Particulate	24000 9.3 223		0 2.1 50	L ug/m3 ug		19-MAR-19 20-MAR-19 20-MAR-19	R4571648 R4574263 R4574263
L2242676-40 034136 Sampled By: TMAC on 21-JAN-19 @ 12:00 Matrix: AIR Miscellaneous Parameters Air Volume, Client Supplied Total Particulate (TSP) by Gravimetric Total Suspended Particulate Total Suspended Particulate	24000 3.9 93		0 2.1 50	L ug/m3 ug		19-MAR-19 20-MAR-19 20-MAR-19	R4571648 R4574263 R4574263
L2242676-41 041640 Sampled By: TMAC on 27-JAN-19 @ 12:00 Matrix: AIR Miscellaneous Parameters Air Volume, Client Supplied Total Particulate (TSP) by Gravimetric Total Suspended Particulate Total Suspended Particulate	24000 5.0 120		0 2.1 50	L ug/m3 ug		19-MAR-19 20-MAR-19 20-MAR-19	R4571648 R4574263 R4574263
L2242676-42 27810 Sampled By: TMAC on 02-FEB-19 @ 12:00 Matrix: AIR Miscellaneous Parameters Air Volume, Client Supplied Total Particulate (TSP) by Gravimetric Total Suspended Particulate Total Suspended Particulate	24000 4.7 113		0 2.1 50	L ug/m3 ug		19-MAR-19 20-MAR-19 20-MAR-19	R4571648 R4574263 R4574263
L2242676-43 27795 Sampled By: TMAC on 08-FEB-19 @ 12:00 Matrix: AIR Miscellaneous Parameters Air Volume, Client Supplied	24000		0	L		19-MAR-19	R4571648

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L2242676-43 27795 Sampled By: TMAC on 08-FEB-19 @ 12:00 Matrix: AIR Total Particulate (TSP) by Gravimetric Total Suspended Particulate Total Suspended Particulate	<2.1 <50		2.1 50	ug/m3 ug		20-MAR-19 20-MAR-19	R4574263 R4574263
L2242676-44 010326 Sampled By: TMAC on 14-FEB-19 @ 12:00 Matrix: AIR Miscellaneous Parameters Air Volume, Client Supplied Total Particulate (TSP) by Gravimetric Total Suspended Particulate Total Suspended Particulate	24000 4.3 103		0 2.1 50	L ug/m3 ug		19-MAR-19 20-MAR-19 20-MAR-19	R4571648 R4574263 R4574263
L2242676-45 27799 Sampled By: TMAC on 20-FEB-19 @ 12:00 Matrix: AIR Miscellaneous Parameters Air Volume, Client Supplied Total Particulate (TSP) by Gravimetric Total Suspended Particulate Total Suspended Particulate	24000 <2.1 <50		0 2.1 50	L ug/m3 ug		19-MAR-19 20-MAR-19 20-MAR-19	R4571648 R4574263 R4574263
L2242676-46 041648 Sampled By: TMAC on 26-FEB-19 @ 12:00 Matrix: AIR Miscellaneous Parameters Air Volume, Client Supplied Total Particulate (TSP) by Gravimetric Total Suspended Particulate Total Suspended Particulate	24000 9.4 227		0 2.1 50	L ug/m3 ug		19-MAR-19 20-MAR-19 20-MAR-19	R4571648 R4574263 R4574263
L2242676-47 041646 Sampled By: TMAC on 04-MAR-19 @ 12:00 Matrix: AIR Miscellaneous Parameters Air Volume, Client Supplied Total Particulate (TSP) by Gravimetric Total Suspended Particulate Total Suspended Particulate	24000 17.2 413		0 2.1 50	L ug/m3 ug		19-MAR-19 20-MAR-19 20-MAR-19	R4571648 R4574263 R4574263

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

Reference Information

Sample Parameter Qualifier Key:

Qualifier	Description
RRR	Refer to Report Remarks for issues regarding this analysis

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
AIR VOLUME-VA	Misc.	Air volume (L)	HYGIENE METHOD
PART-DICHOT-PM10-VA	Filter	Total Particulate (Dichot-PM10) by Grav.	BCMOE Method
Total Particulate Matter (PM10) Method analysis is carried out in accordance with the BCMOE Lab Manual, Section G Air Constituents - Inorganics, "Total Particulate - PM10/PM02 - 47mm - HiVol" method. ALS provides pre-weighed filters (Pallflex TX40 HI20-WW 47mm) and clients typically sample using a "Dichotomus Partisol sequential Air Sampler" equivalent sample (EQPS-0509-179, EQPS-0509-180, EQPS-0311-198) as per U.S. EPA Reference Method RFPS-0694-098, fitted with a PM10 inlet. The particulate matter is determined gravimetrically. Three formulas are required for the mass concentration(um/M3)computation of fine PM(PM-2.5) Course PM (PM-10 minus PM2.5) and PM-10.			
PART-PM2.5-VA	Filter	Total Particulate (PM2.5) by Gravimetric	BCMOE METHOD
Total Particulate Matter (PM2.5) Method analysis is carried out in accordance with the BCMOE Lab Manual, Section G Air Constituents - Inorganics, "Total Particulate - PM10/PM02 - 47mm - HiVol" method. ALS provides pre-weighed filters (Pallflex TX40 HI20-WW 47mm) and clients typically sample using a "Partisol Model 2000 Air Sampler" as per U.S. EPA Reference Method RFPS-0694-098, fitted with a PM2.5 inlet. The particulate matter is determined gravimetrically.			
PART-TSP-VA	Filter	Total Particulate (TSP) by Gravimetric	BCMOE METHOD
Total Suspended Particulate Matter (TSP) Method of analysis is modified from the BCMOE Lab Manual, Section G Air Constituents - Inorganics, "Total Particulate - PM10/PM02 - 47mm - HiVol" method. ALS provides pre-weighed filters (Pallflex TX40 HI20-WW 47mm) and clients typically sample using a "Partisol Model 2000 Air Sampler" as per U.S. EPA Reference Method RFPS-0694-098, fitted with a TSP inlet. The particulate matter is determined gravimetrically.			

** 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
VA	ALS ENVIRONMENTAL - VANCOUVER, BRITISH COLUMBIA, CANADA

Chain of Custody Numbers:

GLOSSARY OF REPORT TERMS

Surrogates are compounds that are similar in behaviour to target analyte(s), but that do not normally occur in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery. In reports that display the D.L. column, laboratory objectives for surrogates are listed there.

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

mg/L - unit of concentration based on volume, parts per million.

< - Less than.

D.L. - The reporting limit.

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.



Quality Control Report

Workorder: L2242676

Report Date: 21-MAR-19

Page 1 of 2

Client: TMAC Resources Inc
Hope Bay Project 95 Wellington St West
Toronto ON M5J 2N7

Contact: Sara Warnock/Kyle Conway

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
PART-PM2.5-VA		Filter						
Batch R4574262								
WG3010156-2 DUP		L2242676-1						
Particulate - PM2.5		77	60	J	ug	17	100	20-MAR-19
WG3010156-1 MB								
Particulate - PM2.5			<50		ug		50	20-MAR-19
PART-TSP-VA		Filter						
Batch R4574263								
WG3010158-2 DUP		L2242676-33						
Total Suspended Particulate		590	630		ug	6.6	25	20-MAR-19
WG3010158-1 MB								
Total Suspended Particulate			<50		ug		50	20-MAR-19

Quality Control Report

Workorder: L2242676

Report Date: 21-MAR-19

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Legend:

Limit	ALS Control Limit (Data Quality Objectives)
DUP	Duplicate
RPD	Relative Percent Difference
N/A	Not Available
LCS	Laboratory Control Sample
SRM	Standard Reference Material
MS	Matrix Spike
MSD	Matrix Spike Duplicate
ADE	Average Desorption Efficiency
MB	Method Blank
IRM	Internal Reference Material
CRM	Certified Reference Material
CCV	Continuing Calibration Verification
CVS	Calibration Verification Standard
LCSD	Laboratory Control Sample Duplicate

Sample Parameter Qualifier Definitions:

Qualifier	Description
J	Duplicate results and limits are expressed in terms of absolute difference.

Hold Time Exceedances:

All test results reported with this submission were conducted within ALS recommended hold times.

ALS recommended hold times may vary by province. They are assigned to meet known provincial and/or federal government requirements. In the absence of regulatory hold times, ALS establishes recommendations based on guidelines published by the US EPA, APHA Standard Methods, or Environment Canada (where available). For more information, please contact ALS.

The ALS Quality Control Report is provided to ALS clients upon request. ALS includes comprehensive QC checks with every analysis to ensure our high standards of quality are met. Each QC result has a known or expected target value, which is compared against pre-determined data quality objectives to provide confidence in the accuracy of associated test results.

Please note that this report may contain QC results from anonymous Sample Duplicates and Matrix Spikes that do not originate from this Work Order.



Environmental Division

Page ____ of ____

Report to:			Report Format / Distribution			Service Requested:		
Company: TMAC Resources Ltd (Hope Bay)						x Regular Service (Default)		
Contact: Sara Warnock/Kyle Conway						Rush Service (2-3 Days)		
Address: Hope Bay Mine Site			Email 1: Gregory.Crooks@stantec.com			Priority Service (1 Day or ASAP)		
			Email 2: enviro@tmacresources.com			Emergency Service (<1 Day / Wkend) - Contact ALS		
Phone: 867-988-6882 x 102 Fax:			Email 3:			Analysis Request		
Invoice To:			Indicate Bottles: Filtered / Preserved (F/P) →→→					
Company: TMAC Resources Ltd (Hope Bay)			Client / Project Information:					
Contact: Accounts Payable			Job #:					
Address: 95 Wellington St. W Suite 1010			PO/AFE: 4500011700					
P.O. Box 44 Toronto, ON M5J 2N7			Legal Site Description:					
Phone: 416-628-0216 Fax:			Quote #:					
Lab Work Order # (lab use only) L2242676			ALS Contact: Amber Springer		Sampler (Initials): TMAC			
Sample	Sample Identification		Date	Sample Exposure Duration	Sample Type	PM 2.5	dous?	Highly Contaminated?
#	(This description will appear on the report)		dd-mmm-yy	hh:mm	(Select from drop-down list)			
	015127	21.6 m ³	10-Dec-18	24:00	Air			
	41641	21.6 m ³	16-Dec-18	24:00	Air			
	41657	21.6 m ³	22-Dec-18	24:00	Air			
	25401	21.6 m ³	28-Dec-18	24:00	Air			
	015106	21.6 m ³	3-Jan-19	24:00	Air			
	015113	21.6 m ³	9-Jan-19	24:00	Air			
	24925	21.6 m ³	15-Jan-19	23:59	Air			
	27442	21.6 m ³	21-Jan-19	24:00	Air			
	041651	21.6 m ³	27-Jan-19	24:00	Air			
	107619	21.6 m ³	2-Feb-19	24:00	Air			
	27478	21.6 m ³	8-Feb-19	24:00	Air			
	041643	21.6 m ³	14-Feb-19	23:59	Air			
	27301	21.6 m ³	20-Feb-19	24:00	Air			
	RP 089020	21.6 m ³	26-Feb-19	24:00	Air			
	27308	21.6 m ³	4-Mar-19	24:00	Air			
	24910	Do Not Analyze	-	-	Air			
Guidelines / Regulations			Special Instructions / Hazardous Details					
NOTE: Please do not put the cubic metres of air sampled in the sample identification number, only use for analysis. Please send new cassettes upon receipt of samples (16 filters).								
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 specified on the adjacent worksheet.								
Relinquished By:	Cedar Metatawabin	Date & Time:	12-Mar-19	Received By:		Date & Time:		Sample Condition (lab use only)
Relinquished By:		Date & Time:		Received By:	WC	Date & Time:	03/13/19 8:30	Temperature
							Samples Received in Good Condition? Y / N (if no provided details)	



L2242676-COFC



Report to:				Report Format / Distribution				Service Requested:			
Company: TMAC Resources Ltd (Hope Bay)								x Regular Service (Default)			
Contact: Sara Warnock/Kyle Conway								Rush Service (2-3 Days)			
Address: Hope Bay Mine Site				Email 1: Gregory.Crooks@stantec.com				Priority Service (1 Day or ASAP)			
				Email 2: enviro@tmacresources.com				Emergency Service (<1 Day / Wkend) - Contact ALS			
Phone: 867-988-6882 x 102 Fax:				Email 3:				Analysis Request			
Invoice To:				Indicate Bottles: Filtered / Preserved (F/P) →→→							
Company: TMAC Resources Ltd (Hope Bay)				Client / Project Information:							
Contact: Accounts Payable				Job #:							
Address: 95 Wellington St. W Suite 1010				PO/AFE: 4500011700							
P.O. Box 44 Toronto, ON M5J 2N7				Legal Site Description:							
Phone: 416-628-0216 Fax:				Quote #:							
Lab Work Order # (lab use only) L2242676				ALS Contact: Amber Springer		Sampler (Initials): TMAC					
Sample #	Sample Identification (This description will appear on the report)		Date dd-mmm-yy	Sample Exposure Duration hh:mm	Sample Type (Select from drop-down list)	PM 10					
	016180	2.4 m³	10-Dec-18	24:00	Air	X					
	015126	2.4 m³	16-Dec-18	24:00	Air	X					
	034141	2.4 m³	22-Dec-18	24:00	Air	X					
	27577	2.4 m³	28-Dec-18	24:00	Air	X					
	034139	2.4 m³	3-Jan-19	24:00	Air	X					
	24928	2.4 m³	9-Jan-19	24:00	Air	X					
	27297	2.4 m³	15-Jan-19	23:59	Air	X					
	27780	2.4 m³	21-Jan-19	24:00	Air	X					
	25412	2.4 m³	27-Jan-19	24:00	Air	X					
	13097	2.4 m³	2-Feb-19	24:00	Air	X					
	041645	2.4 m³	8-Feb-19	24:00	Air	X					
	25416	2.4 m³	14-Feb-19	23:59	Air	X					
	27450	2.4 m³	20-Feb-19	24:00	Air	X					
	25068	2.4 m³	26-Feb-19	24:00	Air	X					
	27795	2.4 m³	4-Mar-19	24:00	Air	X					
	015132	Do Not Analyze	-	-	Air	X					
Guidelines / Regulations						Special Instructions / Hazardous Details					
NOTE: Please do not put the cubic metres of air sampled in the sample identification number, only use for analysis. Please send new cassettes upon receipt of samples (16 filters).											
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 specified on the adjacent worksheet.											
Relinquished By:	Cedar Metatawabin	Date & Time:	12-Mar-19	Received By:		Date & Time:		Sample Condition (lab use only)			
Relinquished By:		Date & Time:		Received By:	WC	Date & Time:	2/13/19 830	Temperature	Samples Received in Good Condition? Y / N (if no provided details)		



L2242676-COFC



Environmental Division

Report to:			Report Format / Distribution			Service Requested:		
Company: TMAC Resources Ltd (Hope Bay)			<input checked="" type="checkbox"/> Standard <input type="checkbox"/> Other			<input checked="" type="checkbox"/> Regular Service (Default)		
Contact: Sarah Warnock/Kyle Conway			<input checked="" type="checkbox"/> PDF <input checked="" type="checkbox"/> Excel <input type="checkbox"/> Fax			<input type="checkbox"/> Rush Service (2-3 Days)		
Address: Hope Bay Mine Site			Email 1: Gregory.Crooks@stantec.com			<input type="checkbox"/> Priority Service (1 Day or ASAP)		
			Email 2: enviro@tmacresources.com			<input type="checkbox"/> Emergency Service (<1 Day / Wkend) - Contact ALS		
Phone: 867-988-6882 x 102 Fax:			Email 3:			Analysis Request		
Invoice To: <input type="checkbox"/> Same as Report			Indicate Bottles: Filtered / Preserved (F/P) -----					
Company: TMAC Resources Ltd (Hope Bay)			Client / Project Information:					
Contact: Accounts Payable			Job #:					
Address: 95 Wellington St. W Suite 1010			PO/AFE: 4500011700					
P.O. Box 44 Toronto, ON M5J 2N7			Legal Site Description:					
Phone: 416-628-0216 Fax:			Quote #:					
Lab Work Order # (lab use only) L2242676			ALS Contact: Amber Springer		Sampler (Initials): TMAC			
Sample #	Sample Identification (This description will appear on the report)		Date dd-mmm-yy	Sample Exposure Duration hh:mm	Sample Type (Select from drop-down list)	TSP	Highly Contaminated?	Number of Containers
	016188	24.0 m ³	10-Dec-18	23:59	Air	X		
	27798	24.0 m ³	16-Dec-18	24.0	Air	X		
	24944	24.0 m ³	22-Dec-18	24.0	Air	X		
	27584	24.0 m ³	28-Dec-18	24.0	Air	X		
	25072	24.0 m ³	3-Jan-19	24.0	Air	X		
	041642	24.0 m ³	9-Jan-19	24.0	Air	X		
	27731	24.0 m ³	15-Jan-19	24.0	Air	X		
	034136	24.0 m ³	21-Jan-19	24.0	Air	X		
	041640	24.0 m ³	27-Jan-19	24.0	Air	X		
	27810	24.0 m ³	2-Feb-19	24.0	Air	X		
	27795	24.0 m ³	8-Feb-19	23:59	Air	X		
	010326	24.0 m ³	14-Feb-19	24.0	Air	X		
	27799	24.0 m ³	20-Feb-19	24.0	Air	X		
	041648	24.0 m ³	26-Feb-19	24.0	Air	X		
	041646	24.0 m ³	4-Mar-19	23:59	Air	X		
	27573	Do Not Analyze	-	-	Air	X		
Guidelines / Regulations					Special Instructions / Hazardous Details			
NOTE: Please do not put the cubic metres of air sampled in the sample identification number, only use for analysis. Please send new cassettes upon receipt of samples (16 filters).								
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 specified on the adjacent worksheet.								
Relinquished By:	Cedar Metatawabin	Date & Time:	12-Mar-19	Received By:		Date & Time:		Sample Condition (lab use only)
Relinquished By:		Date & Time:		Received By:	WC	Date & Time:	13/03/19 1830	Temperature
								Samples Received in Good Condition? Y / N (if no provided details)



L2242676-COFC



TMAC Resources Inc
ATTN: Sara Warnock/Kyle Conway
Hope Bay Project
95 Wellington St West
Toronto ON M5J 2N7

Date Received: 20-JUN-19
Report Date: 02-JUL-19 14:44 (MT)
Version: FINAL

Client Phone: 867-988-0569

Certificate of Analysis

Lab Work Order #: L2295544
Project P.O. #: 4500011700
Job Reference:
C of C Numbers:
Legal Site Desc:

Amber Springer, B.Sc
Account Manager

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ADDRESS: 8081 Lougheed Hwy, Suite 100, Burnaby, BC V5A 1W9 Canada | Phone: +1 604 253 4188 | Fax: +1 604 253 6700
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ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L2295544-1 24950 Sampled By: TMAC on 10-MAR-19 Matrix: AIR Miscellaneous Parameters Air Volume, Client Supplied Total Particulate (Dichot-PM10) by Grav. Particulate-Fine Particulate-Coarse Particulate-PM10 Particulate-Coarse	2400 2400 2400 2400 2400 2400		0 0 2.3 0.47 2.4 50	L L ug/m3 ug/m3 ug/m3 ug		28-JUN-19 30-JUN-19 30-JUN-19 30-JUN-19 30-JUN-19	R4690714 R4691870 R4691870 R4691870 R4691870
L2295544-2 27778 Sampled By: TMAC on 16-MAR-19 Matrix: AIR Miscellaneous Parameters Air Volume, Client Supplied Total Particulate (Dichot-PM10) by Grav. Particulate-Fine Particulate-Coarse Particulate-PM10 Particulate-Coarse	2400 2400 2400 2400 2400 2400		0 0 2.3 -0.019 2.3 50	L L ug/m3 ug/m3 ug/m3 ug		28-JUN-19 30-JUN-19 30-JUN-19 30-JUN-19 30-JUN-19	R4690714 R4691870 R4691870 R4691870 R4691870
L2295544-3 015124 Sampled By: TMAC on 22-MAR-19 Matrix: AIR Miscellaneous Parameters Air Volume, Client Supplied Total Particulate (Dichot-PM10) by Grav. Particulate-Fine Particulate-Coarse Particulate-PM10 Particulate-Coarse	2400 2400 2400 2400 2400 2400		0 0 2.3 0.043 2.3 50	L L ug/m3 ug/m3 ug/m3 ug		28-JUN-19 30-JUN-19 30-JUN-19 30-JUN-19 30-JUN-19	R4690714 R4691870 R4691870 R4691870 R4691870
L2295544-4 016165 Sampled By: TMAC on 26-MAR-19 Matrix: AIR Miscellaneous Parameters Air Volume, Client Supplied Total Particulate (Dichot-PM10) by Grav. Particulate-Fine Particulate-Coarse Particulate-PM10 Particulate-Coarse	2400 2400 2400 2400 2400 2400		0 0 2.3 0.052 2.3 50	L L ug/m3 ug/m3 ug/m3 ug		28-JUN-19 30-JUN-19 30-JUN-19 30-JUN-19 30-JUN-19	R4690714 R4691870 R4691870 R4691870 R4691870
L2295544-5 015129 Sampled By: TMAC on 03-APR-19 Matrix: AIR Miscellaneous Parameters Air Volume, Client Supplied Total Particulate (Dichot-PM10) by Grav. Particulate-Fine Particulate-Coarse Particulate-PM10 Particulate-Coarse	2400 2400 2400 2400 2400 2400		0 0 2.3 0.052 2.3 50	L L ug/m3 ug/m3 ug/m3 ug		28-JUN-19 30-JUN-19 30-JUN-19 30-JUN-19 30-JUN-19	R4690714 R4691870 R4691870 R4691870 R4691870
L2295544-6 014359 Sampled By: TMAC on 09-APR-19 Matrix: AIR							

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L2295544-6 014359 Sampled By: TMAC on 09-APR-19 Matrix: AIR Miscellaneous Parameters Air Volume, Client Supplied Total Particulate (Dichot-PM10) by Grav. Particulate-Fine Particulate-Coarse Particulate-PM10 Particulate-Coarse	 2400 4.9 1.31 6.3 <50		 0 2.3 0.069 2.3 50	 L ug/m3 ug/m3 ug/m3 ug		 28-JUN-19 30-JUN-19 30-JUN-19 30-JUN-19 30-JUN-19	 R4690714 R4691870 R4691870 R4691870 R4691870
L2295544-7 014370 Sampled By: TMAC on 15-APR-19 Matrix: AIR Miscellaneous Parameters Air Volume, Client Supplied Total Particulate (Dichot-PM10) by Grav. Particulate-Fine Particulate-Coarse Particulate-PM10 Particulate-Coarse	 2400 5.7 0.262 6.0 <50		 0 2.3 0.080 2.3 50	 L ug/m3 ug/m3 ug/m3 ug		 28-JUN-19 30-JUN-19 30-JUN-19 30-JUN-19 30-JUN-19	 R4690714 R4691870 R4691870 R4691870 R4691870
L2295544-8 015085 Sampled By: TMAC on 21-APR-19 Matrix: AIR Miscellaneous Parameters Air Volume, Client Supplied Total Particulate (Dichot-PM10) by Grav. Particulate-Fine Particulate-Coarse Particulate-PM10 Particulate-Coarse	 2400 4.0 0.432 4.4 <50		 0 2.3 0.056 2.3 50	 L ug/m3 ug/m3 ug/m3 ug		 28-JUN-19 30-JUN-19 30-JUN-19 30-JUN-19 30-JUN-19	 R4690714 R4691870 R4691870 R4691870 R4691870
L2295544-9 015119 Sampled By: TMAC on 27-APR-19 Matrix: AIR Miscellaneous Parameters Air Volume, Client Supplied Total Particulate (Dichot-PM10) by Grav. Particulate-Fine Particulate-Coarse Particulate-PM10 Particulate-Coarse	 2400 6.3 2.15 8.5 67		 0 2.3 0.089 2.3 50	 L ug/m3 ug/m3 ug/m3 ug		 28-JUN-19 30-JUN-19 30-JUN-19 30-JUN-19 30-JUN-19	 R4690714 R4691870 R4691870 R4691870 R4691870
L2295544-10 015116 Sampled By: TMAC on 03-MAY-19 Matrix: AIR Miscellaneous Parameters Air Volume, Client Supplied Total Particulate (Dichot-PM10) by Grav. Particulate-Fine Particulate-Coarse Particulate-PM10 Particulate-Coarse	 2400 2.8 1.94 4.7 53		 0 2.3 0.039 2.3 50	 L ug/m3 ug/m3 ug/m3 ug		 28-JUN-19 30-JUN-19 30-JUN-19 30-JUN-19 30-JUN-19	 R4690714 R4691870 R4691870 R4691870 R4691870
L2295544-11 015098 Sampled By: TMAC on 09-MAY-19 Matrix: AIR							

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L2295544-11 015098 Sampled By: TMAC on 09-MAY-19 Matrix: AIR Miscellaneous Parameters Air Volume, Client Supplied Total Particulate (Dichot-PM10) by Grav. Particulate-Fine Particulate-Coarse Particulate-PM10 Particulate-Coarse	2400 3.2 <2.1 4.3 <50		0 2.3 2.1 3.1 50	L ug/m3 ug/m3 ug/m3 ug		28-JUN-19 30-JUN-19 30-JUN-19 30-JUN-19 30-JUN-19	R4690714 R4691870 R4691870 R4691870 R4691870
L2295544-12 015103 Sampled By: TMAC on 15-MAY-19 Matrix: AIR Miscellaneous Parameters Air Volume, Client Supplied Total Particulate (Dichot-PM10) by Grav. Particulate-Fine Particulate-Coarse Particulate-PM10 Particulate-Coarse	2400 <2.3 <2.1 3.5 53		0 2.3 2.1 3.1 50	L ug/m3 ug/m3 ug/m3 ug		28-JUN-19 30-JUN-19 30-JUN-19 30-JUN-19 30-JUN-19	R4690714 R4691870 R4691870 R4691870 R4691870
L2295544-13 015114 Sampled By: TMAC on 21-MAY-19 Matrix: AIR Miscellaneous Parameters Air Volume, Client Supplied Total Particulate (Dichot-PM10) by Grav. Particulate-Fine Particulate-Coarse Particulate-PM10 Particulate-Coarse	2400 3.2 <2.1 3.8 <50		0 2.3 2.1 3.1 50	L ug/m3 ug/m3 ug/m3 ug		28-JUN-19 30-JUN-19 30-JUN-19 30-JUN-19 30-JUN-19	R4690714 R4691870 R4691870 R4691870 R4691870
L2295544-14 014361 Sampled By: TMAC on 27-MAY-19 Matrix: AIR Miscellaneous Parameters Air Volume, Client Supplied Total Particulate (Dichot-PM10) by Grav. Particulate-Fine Particulate-Coarse Particulate-PM10 Particulate-Coarse	2400 5.2 <2.1 7.1 57		0 2.3 2.1 3.1 50	L ug/m3 ug/m3 ug/m3 ug		28-JUN-19 30-JUN-19 30-JUN-19 30-JUN-19 30-JUN-19	R4690714 R4691870 R4691870 R4691870 R4691870
L2295544-15 015134 Sampled By: TMAC on 02-JUN-19 Matrix: AIR Miscellaneous Parameters Air Volume, Client Supplied Total Particulate (Dichot-PM10) by Grav. Particulate-Fine Particulate-Coarse Particulate-PM10 Particulate-Coarse	2400 <2.3 <2.1 <3.1 50		0 2.3 2.1 3.1 50	L ug/m3 ug/m3 ug/m3 ug		28-JUN-19 30-JUN-19 30-JUN-19 30-JUN-19 30-JUN-19	R4690714 R4691870 R4691870 R4691870 R4691870
L2295544-16 014369 Sampled By: TMAC on 08-JUN-19 Matrix: AIR							

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L2295544-16 014369 Sampled By: TMAC on 08-JUN-19 Matrix: AIR Miscellaneous Parameters Air Volume, Client Supplied Total Particulate (Dichot-PM10) by Grav. Particulate-Fine Particulate-Coarse Particulate-PM10 Particulate-Coarse	2400 2400 2400 2400 2400 2400		0 2.3 2.1 3.1 50	L ug/m3 ug/m3 ug/m3 ug		28-JUN-19 30-JUN-19 30-JUN-19 30-JUN-19 30-JUN-19	R4690714 R4691870 R4691870 R4691870 R4691870
L2295544-17 27809 Sampled By: TMAC on 10-MAR-19 Matrix: AIR Miscellaneous Parameters Air Volume, Client Supplied Total Particulate (PM2.5) by Gravimetric Particulate - PM2.5 Particulate - PM2.5	21600 21600 21600 21600		0 2.3 50	L ug/m3 ug		28-JUN-19 28-JUN-19 28-JUN-19	R4690714 R4691829 R4691829
L2295544-18 27309 Sampled By: TMAC on 16-MAR-19 Matrix: AIR Miscellaneous Parameters Air Volume, Client Supplied Total Particulate (PM2.5) by Gravimetric Particulate - PM2.5 Particulate - PM2.5	21600 21600 21600 21600		0 2.3 50	L ug/m3 ug		28-JUN-19 28-JUN-19 28-JUN-19	R4690714 R4691829 R4691829
L2295544-19 15128 Sampled By: TMAC on 22-MAR-19 Matrix: AIR Miscellaneous Parameters Air Volume, Client Supplied Total Particulate (PM2.5) by Gravimetric Particulate - PM2.5 Particulate - PM2.5	21600 21600 21600 21600		0 2.3 50	L ug/m3 ug		28-JUN-19 28-JUN-19 28-JUN-19	R4690714 R4691829 R4691829
L2295544-20 15130 Sampled By: TMAC on 28-MAR-19 Matrix: AIR Miscellaneous Parameters Air Volume, Client Supplied Total Particulate (PM2.5) by Gravimetric Particulate - PM2.5 Particulate - PM2.5	21600 21600 21600 21600		0 2.3 50	L ug/m3 ug		28-JUN-19 28-JUN-19 28-JUN-19	R4690714 R4691829 R4691829
L2295544-21 016187 Sampled By: TMAC on 03-APR-19 Matrix: AIR Miscellaneous Parameters Air Volume, Client Supplied Total Particulate (PM2.5) by Gravimetric Particulate - PM2.5 Particulate - PM2.5	21600 21600 21600 21600		0 2.3 50	L ug/m3 ug		28-JUN-19 28-JUN-19 28-JUN-19	R4690714 R4691829 R4691829
L2295544-22 015115 Sampled By: TMAC on 09-APR-19 Matrix: AIR							

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L2295544-22 015115 Sampled By: TMAC on 09-APR-19 Matrix: AIR Miscellaneous Parameters Air Volume, Client Supplied Total Particulate (PM2.5) by Gravimetric Particulate - PM2.5 Particulate - PM2.5	 21600 4.9 107		 0 2.3 50	 L ug/m3 ug		 28-JUN-19 28-JUN-19 28-JUN-19	 R4690714 R4691829 R4691829
L2295544-23 015123 Sampled By: TMAC on 15-APR-19 Matrix: AIR Miscellaneous Parameters Air Volume, Client Supplied Total Particulate (PM2.5) by Gravimetric Particulate - PM2.5 Particulate - PM2.5	 21600 5.7 123		 0 2.3 50	 L ug/m3 ug		 28-JUN-19 28-JUN-19 28-JUN-19	 R4690714 R4691829 R4691829
L2295544-24 016189 Sampled By: TMAC on 21-APR-19 Matrix: AIR Miscellaneous Parameters Air Volume, Client Supplied Total Particulate (PM2.5) by Gravimetric Particulate - PM2.5 Particulate - PM2.5	 21600 4.0 87		 0 2.3 50	 L ug/m3 ug		 28-JUN-19 28-JUN-19 28-JUN-19	 R4690714 R4691829 R4691829
L2295544-25 016184 Sampled By: TMAC on 27-APR-19 Matrix: AIR Miscellaneous Parameters Air Volume, Client Supplied Total Particulate (PM2.5) by Gravimetric Particulate - PM2.5 Particulate - PM2.5	 21600 6.3 137		 0 2.3 50	 L ug/m3 ug		 28-JUN-19 28-JUN-19 28-JUN-19	 R4690714 R4691829 R4691829
L2295544-26 016168 Sampled By: TMAC on 03-MAY-19 Matrix: AIR Miscellaneous Parameters Air Volume, Client Supplied Total Particulate (PM2.5) by Gravimetric Particulate - PM2.5 Particulate - PM2.5	 21600 2.8 60		 0 2.3 50	 L ug/m3 ug		 28-JUN-19 28-JUN-19 28-JUN-19	 R4690714 R4691829 R4691829
L2295544-27 016167 Sampled By: TMAC on 09-MAY-19 Matrix: AIR Miscellaneous Parameters Air Volume, Client Supplied Total Particulate (PM2.5) by Gravimetric Particulate - PM2.5 Particulate - PM2.5	 21600 3.2 70		 0 2.3 50	 L ug/m3 ug		 28-JUN-19 28-JUN-19 28-JUN-19	 R4690714 R4691829 R4691829
L2295544-28 016183 Sampled By: TMAC on 15-MAY-19 Matrix: AIR Miscellaneous Parameters Air Volume, Client Supplied	 21600		 0	 L		 28-JUN-19	 R4690714

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L2295544-28 016183 Sampled By: TMAC on 15-MAY-19 Matrix: AIR Total Particulate (PM2.5) by Gravimetric Particulate - PM2.5 Particulate - PM2.5	<2.3 <50		2.3 50	ug/m3 ug		28-JUN-19 28-JUN-19	R4691829 R4691829
L2295544-29 015094 Sampled By: TMAC on 21-MAY-19 @ 23:01 Matrix: AIR Miscellaneous Parameters Air Volume, Client Supplied Total Particulate (PM2.5) by Gravimetric Particulate - PM2.5 Particulate - PM2.5	21600 3.2 70		0 2.3 50	L ug/m3 ug		28-JUN-19 28-JUN-19 28-JUN-19	R4690714 R4691829 R4691829
L2295544-30 016182 Sampled By: TMAC on 27-MAY-19 @ 23:59 Matrix: AIR Miscellaneous Parameters Air Volume, Client Supplied Total Particulate (PM2.5) by Gravimetric Particulate - PM2.5 Particulate - PM2.5	21600 5.2 113		0 2.3 50	L ug/m3 ug		28-JUN-19 28-JUN-19 28-JUN-19	R4690714 R4691829 R4691829
L2295544-31 015086 Sampled By: TMAC on 02-JUN-19 Matrix: AIR Miscellaneous Parameters Air Volume, Client Supplied Total Particulate (PM2.5) by Gravimetric Particulate - PM2.5 Particulate - PM2.5	21600 <2.3 <50		0 2.3 50	L ug/m3 ug		28-JUN-19 28-JUN-19 28-JUN-19	R4690714 R4691829 R4691829
L2295544-32 016178 Sampled By: TMAC on 08-JUN-19 Matrix: AIR Miscellaneous Parameters Air Volume, Client Supplied Total Particulate (PM2.5) by Gravimetric Particulate - PM2.5 Particulate - PM2.5	21600 <2.3 <50		0 2.3 50	L ug/m3 ug		28-JUN-19 28-JUN-19 28-JUN-19	R4690714 R4691829 R4691829
L2295544-33 041650 Sampled By: TMAC on 10-MAR-19 @ 23:59 Matrix: AIR Miscellaneous Parameters Air Volume, Client Supplied Total Particulate (TSP) by Gravimetric Total Suspended Particulate Total Suspended Particulate	24000 121 2910		0 2.1 50	L ug/m3 ug		28-JUN-19 30-JUN-19 30-JUN-19	R4690714 R4691834 R4691834
L2295544-34 RP 027324 Sampled By: TMAC on 16-MAR-19 Matrix: AIR Miscellaneous Parameters Air Volume, Client Supplied Total Particulate (TSP) by Gravimetric Total Suspended Particulate	24000 46.7		0 2.1	L ug/m3		28-JUN-19 30-JUN-19	R4690714 R4691834

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L2295544-34 RP 027324 Sampled By: TMAC on 16-MAR-19 Matrix: AIR Total Particulate (TSP) by Gravimetric Total Suspended Particulate	1120		50	ug		30-JUN-19	R4691834
L2295544-35 014358 Sampled By: TMAC on 22-MAR-19 Matrix: AIR Miscellaneous Parameters Air Volume, Client Supplied Total Particulate (TSP) by Gravimetric Total Suspended Particulate Total Suspended Particulate	24000 44.6 1070		0 2.1 50	L ug/m3 ug		28-JUN-19 30-JUN-19 30-JUN-19	R4690714 R4691834 R4691834
L2295544-36 014368 Sampled By: TMAC on 28-MAR-19 Matrix: AIR Miscellaneous Parameters Air Volume, Client Supplied Total Particulate (TSP) by Gravimetric Total Suspended Particulate Total Suspended Particulate	24000 20.6 493		0 2.1 50	L ug/m3 ug		28-JUN-19 30-JUN-19 30-JUN-19	R4690714 R4691834 R4691834
L2295544-37 015121 Sampled By: TMAC on 03-APR-19 Matrix: AIR Miscellaneous Parameters Air Volume, Client Supplied Total Particulate (TSP) by Gravimetric Total Suspended Particulate Total Suspended Particulate	24000 37.6 903		0 2.1 50	L ug/m3 ug		28-JUN-19 30-JUN-19 30-JUN-19	R4690714 R4691834 R4691834
L2295544-38 014371 Sampled By: TMAC on 09-APR-19 Matrix: AIR Miscellaneous Parameters Air Volume, Client Supplied Total Particulate (TSP) by Gravimetric Total Suspended Particulate Total Suspended Particulate	24000 19.2 460		0 2.1 50	L ug/m3 ug		28-JUN-19 30-JUN-19 30-JUN-19	R4690714 R4691834 R4691834
L2295544-39 014360 Sampled By: TMAC on 15-APR-19 Matrix: AIR Miscellaneous Parameters Air Volume, Client Supplied Total Particulate (TSP) by Gravimetric Total Suspended Particulate Total Suspended Particulate	24000 28.5 683		0 2.1 50	L ug/m3 ug		28-JUN-19 30-JUN-19 30-JUN-19	R4690714 R4691834 R4691834
L2295544-40 015111 Sampled By: TMAC on 21-APR-19 Matrix: AIR Miscellaneous Parameters Air Volume, Client Supplied Total Particulate (TSP) by Gravimetric Total Suspended Particulate Total Suspended Particulate	24000 9.2 220		0 2.1 50	L ug/m3 ug		28-JUN-19 30-JUN-19 30-JUN-19	R4690714 R4691834 R4691834

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L2295544-40 015111 Sampled By: TMAC on 21-APR-19 Matrix: AIR							
L2295544-41 016190 Sampled By: TMAC on 27-APR-19 Matrix: AIR Miscellaneous Parameters Air Volume, Client Supplied Total Particulate (TSP) by Gravimetric Total Suspended Particulate Total Suspended Particulate	24000 23.3 560		0 2.1 50	L ug/m3 ug		28-JUN-19 30-JUN-19 30-JUN-19	R4690714 R4691834 R4691834
L2295544-42 016185 Sampled By: TMAC on 03-MAY-19 Matrix: AIR Miscellaneous Parameters Air Volume, Client Supplied Total Particulate (TSP) by Gravimetric Total Suspended Particulate Total Suspended Particulate	24000 12.2 293		0 2.1 50	L ug/m3 ug		28-JUN-19 30-JUN-19 30-JUN-19	R4690714 R4691834 R4691834
L2295544-43 015117 Sampled By: TMAC on 09-MAY-19 Matrix: AIR Miscellaneous Parameters Air Volume, Client Supplied Total Particulate (TSP) by Gravimetric Total Suspended Particulate Total Suspended Particulate	24000 4.9 117		0 2.1 50	L ug/m3 ug		28-JUN-19 30-JUN-19 30-JUN-19	R4690714 R4691834 R4691834
L2295544-44 016181 Sampled By: TMAC on 15-MAY-19 Matrix: AIR Miscellaneous Parameters Air Volume, Client Supplied Total Particulate (TSP) by Gravimetric Total Suspended Particulate Total Suspended Particulate	24000 4.9 117		0 2.1 50	L ug/m3 ug		28-JUN-19 30-JUN-19 30-JUN-19	R4690714 R4691834 R4691834
L2295544-45 015122 Sampled By: TMAC on 21-MAY-19 @ 23:01 Matrix: AIR Miscellaneous Parameters Air Volume, Client Supplied Total Particulate (TSP) by Gravimetric Total Suspended Particulate Total Suspended Particulate	24000 9.4 227		0 2.1 50	L ug/m3 ug		28-JUN-19 30-JUN-19 30-JUN-19	R4690714 R4691834 R4691834
L2295544-46 016186 Sampled By: TMAC on 27-MAY-19 @ 23:59 Matrix: AIR Miscellaneous Parameters Air Volume, Client Supplied Total Particulate (TSP) by Gravimetric Total Suspended Particulate Total Suspended Particulate	24000 4.6 110		0 2.1 50	L ug/m3 ug		28-JUN-19 30-JUN-19 30-JUN-19	R4690714 R4691834 R4691834

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L2295544-47 015133 Sampled By: TMAC on 02-JUN-19 Matrix: AIR Miscellaneous Parameters Air Volume, Client Supplied Total Particulate (TSP) by Gravimetric Total Suspended Particulate Total Suspended Particulate	 24000 5.0 120		 0 2.1 50	 L ug/m3 ug		 28-JUN-19 30-JUN-19 30-JUN-19	 R4690714 R4691834 R4691834
L2295544-48 016177 Sampled By: TMAC on 08-JUN-19 Matrix: AIR Miscellaneous Parameters Air Volume, Client Supplied Total Particulate (TSP) by Gravimetric Total Suspended Particulate Total Suspended Particulate	 24000 3.8 90		 0 2.1 50	 L ug/m3 ug		 28-JUN-19 30-JUN-19 30-JUN-19	 R4690714 R4691834 R4691834

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

Reference Information

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
AIR VOLUME-VA	Misc.	Air volume (L)	HYGIENE METHOD
PART-DICHOT-PM10-VA	Filter	Total Particulate (Dichot-PM10) by Grav.	BCMOE Method
Total Particulate Matter (PM10) Method analysis is carried out in accordance with the BCMOE Lab Manual, Section G Air Constituents - Inorganics, "Total Particulate - PM10/PM02 - 47mm - HiVol" method. ALS provides pre-weighed filters (Pallflex TX40 HI20-WW 47mm) and clients typically sample using a "Dichotomus Partisol sequential Air Sampler" equivalent sample (EQPS-0509-179, EQPS-0509-180, EQPS-0311-198) as per U.S. EPA Reference Method RFPS-0694-098, fitted with a PM10 inlet. The particulate matter is determined gravimetrically. Three formulas are required for the mass concentration(um/M3) computation of fine PM(PM-2.5) Course PM (PM-10 minus PM2.5) and PM-10.			
PART-PM2.5-VA	Filter	Total Particulate (PM2.5) by Gravimetric	BCMOE METHOD
Total Particulate Matter (PM2.5) Method analysis is carried out in accordance with the BCMOE Lab Manual, Section G Air Constituents - Inorganics, "Total Particulate - PM10/PM02 - 47mm - HiVol" method. ALS provides pre-weighed filters (Pallflex TX40 HI20-WW 47mm) and clients typically sample using a "Partisol Model 2000 Air Sampler" as per U.S. EPA Reference Method RFPS-0694-098, fitted with a PM2.5 inlet. The particulate matter is determined gravimetrically.			
PART-TSP-VA	Filter	Total Particulate (TSP) by Gravimetric	BCMOE METHOD
Total Suspended Particulate Matter (TSP) Method of analysis is modified from the BCMOE Lab Manual, Section G Air Constituents - Inorganics, "Total Particulate - PM10/PM02 - 47mm - HiVol" method. ALS provides pre-weighed filters (Pallflex TX40 HI20-WW 47mm) and clients typically sample using a "Partisol Model 2000 Air Sampler" as per U.S. EPA Reference Method RFPS-0694-098, fitted with a TSP inlet. The particulate matter is determined gravimetrically.			

** 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
VA	ALS ENVIRONMENTAL - VANCOUVER, BRITISH COLUMBIA, CANADA

Chain of Custody Numbers:

GLOSSARY OF REPORT TERMS

Surrogates are compounds that are similar in behaviour to target analyte(s), but that do not normally occur in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery. In reports that display the D.L. column, laboratory objectives for surrogates are listed there.

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

mg/L - unit of concentration based on volume, parts per million.

< - Less than.

D.L. - The reporting limit.

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.



Quality Control Report

Workorder: L2295544

Report Date: 02-JUL-19

Page 1 of 2

Client: TMAC Resources Inc
Hope Bay Project 95 Wellington St West
Toronto ON M5J 2N7

Contact: Sara Warnock/Kyle Conway

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
PART-PM2.5-VA		Filter						
Batch R4691829								
WG3093362-1 MB								
Particulate - PM2.5			<50		ug		50	28-JUN-19
PART-TSP-VA		Filter						
Batch R4691834								
WG3093365-1 MB								
Total Suspended Particulate			<50		ug		50	30-JUN-19

Quality Control Report

Workorder: L2295544

Report Date: 02-JUL-19

Page 2 of 2

Legend:

Limit	ALS Control Limit (Data Quality Objectives)
DUP	Duplicate
RPD	Relative Percent Difference
N/A	Not Available
LCS	Laboratory Control Sample
SRM	Standard Reference Material
MS	Matrix Spike
MSD	Matrix Spike Duplicate
ADE	Average Desorption Efficiency
MB	Method Blank
IRM	Internal Reference Material
CRM	Certified Reference Material
CCV	Continuing Calibration Verification
CVS	Calibration Verification Standard
LCSD	Laboratory Control Sample Duplicate

Hold Time Exceedances:

All test results reported with this submission were conducted within ALS recommended hold times.

ALS recommended hold times may vary by province. They are assigned to meet known provincial and/or federal government requirements. In the absence of regulatory hold times, ALS establishes recommendations based on guidelines published by the US EPA, APHA Standard Methods, or Environment Canada (where available). For more information, please contact ALS.

The ALS Quality Control Report is provided to ALS clients upon request. ALS includes comprehensive QC checks with every analysis to ensure our high standards of quality are met. Each QC result has a known or expected target value, which is compared against pre-determined data quality objectives to provide confidence in the accuracy of associated test results.

Please note that this report may contain QC results from anonymous Sample Duplicates and Matrix Spikes that do not originate from this Work Order.

Report to:			Report Format / Distribution			Service Requested:		
Company: TMAC Resources Ltd (Hope Bay)						x Regular Service (Default)		
Contact: Sara Warnock/Kyle Conway						Rush Service (2-3 Days)		
Address: Hope Bay Mine Site			Email 1: Gregory.Crooks@stantec.com			Priority Service (1 Day or ASAP)		
			Email 2: enviro@tmacresources.com			Emergency Service (<1 Day / Wkend) - Contact ALS		
Phone: 867-988-6882 x 102 Fax:			Email 3:			Analysis Request		
Invoice To:			Indicate Bottles: Filtered / Preserved (F/P) →					
Company: TMAC Resources Ltd (Hope Bay)			Client / Project Information:					
Contact: Accounts Payable			Job #:					
Address: 95 Wellington St. W Suite 1010			PO/AFE: 4500011700					
P.O. Box 44 Toronto, ON M5J 2N7			Legal Site Description:					
Phone: 416-628-0216 Fax:			Quote #:					
Lab Work Order # (lab use only)			ALS Contact: Amber Springer		Sampler (Initials): TMAC			
Sample Identification			Date		Sample Exposure Duration		Sample Type	
(This description will appear on the report)			dd-mm-yy		hh:mm		(Select from drop-down list)	
24950 2.4 m³ 1			10-Mar-19		23:59		Air	
27778 2.4 m³ 2			16-Mar-19		24:00		Air	
015124 2.4 m³ 3			22-Mar-19		24:00		Air	
016165 2.4 m³ 4			28-Mar-19		24:00		Air	
015129 2.4 m³ 5			3-Apr-19		24:00		Air	
014359 2.4 m³ 6			9-Apr-19		24:00		Air	
014370 2.4 m³ 7			15-Apr-19		24:00		Air	
015085 2.4 m³ 8			21-Apr-19		24:00		Air	
015119 2.4 m³ 9			27-Apr-19		24:00		Air	
015116 2.4 m³ 10			3-May-19		24:00		Air	
015098 2.4 m³ 11			9-May-19		24:00		Air	
015103 2.4 m³ 12			15-May-19		24:00		Air	
015114 2.4 m³ 13			21-May-19		23:01		Air	
014361 2.4 m³ 14			27-May-19		23:59		Air	
015134 2.4 m³ 15			2-Jun-19		24:00		Air	
014369 2.4 m³ 16			8-Jun-19		24:00		Air	
Guidelines / Regulations			Special Instructions / Hazardous Details					
NOTE: Please do not put the cubic metres of air sampled in the sample identification number, only use for analysis. Please send new cassettes upon receipt of samples (16 filters).								
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 specified on the adjacent worksheet.								
Relinquished By:	Patrick Jolliffe	Date & Time:	20-Jun-19	Received By:	HA	Date & Time:	6/25	Temperature
Relinquished By:		Date & Time:		Received By:		Date & Time:	11:58am	10
						Sample Condition (lab use only)		
						Samples Received in Good Condition? Y / N (if no provided details)		



Environmental Division

Page ____ of ____

Report to:				Report Format / Distribution				Service Requested:							
Company: TMAC Resources Ltd (Hope Bay)								x Regular Service (Default)							
Contact: Sara Warnock/Kyle Conway								Rush Service (2-3 Days)							
Address: Hope Bay Mine Site				Email 1: <u>Gregory.Crooks@stanec.com</u>				Priority Service (1 Day or ASAP)							
				Email 2: <u>enviro@tmacresources.com</u>				Emergency Service (<1 Day / Wkend) - Contact ALS							
Phone: 867-988-6882 x 102 Fax:				Email 3:				Analysis Request							
Invoice To:				Indicate Bottles: Filtered / Preserved (F/P) →											
Company: TMAC Resources Ltd (Hope Bay)				Client / Project Information:											
Contact: Accounts Payable				Job #:											
Address: 95 Wellington St. W Suite 1010				PO/AFE: 4500011700											
P.O. Box 44 Toronto, ON M5J 2N7				Legal Site Description:											
Phone: 416-628-0216 Fax:				Quote #:											
Lab Work Order # (lab use only) <u>L229544</u>				ALS Contact: Amber Springer		Sampler (Initials): TMAC									
Sample #	Sample Identification (This description will appear on the report)			Date dd-mmm-yy	Sample Exposure Duration hh:mm	Sample Type (Select from drop-down list)	PM 2.5								
	27809	21.6 m³	1	10-Mar-19	23:59	Air		X							
	27309	21.6 m³	2	16-Mar-19	24:00	Air		X							
	15128	21.6 m³	3	22-Mar-19	24:00	Air		X							
	15130	21.6 m³	4	28-Mar-19	24:00	Air		X							
	016187	21.6 m³	5	3-Apr-19	24:00	Air		X							
	015115	21.6 m³	6	9-Apr-19	24:00	Air		X							
	015123	21.6 m³	7	15-Apr-19	24:00	Air		X							
	016189	21.6 m³	8	21-Apr-19	24:00	Air		X							
	016184	21.6 m³	9	27-Apr-19	24:00	Air		X							
	016168	21.6 m³	10	3-May-19	24:00	Air		X							
	016167	21.6 m³	11	9-May-19	24:00	Air		X							
	016183	21.6 m³	12	15-May-19	24:00	Air		X							
	015094	21.6 m³	13	21-May-19	23:01	Air		X							
	016182	21.6 m³	14	27-May-19	23:59	Air		X							
	015086	21.6 m³	15	2-Jun-19	24:00	Air		X							
	016178	21.6 m³	16	8-Jun-19	24:00	Air	X								
Guidelines / Regulations				Special Instructions / Hazardous Details											
NOTE: Please do not put the cubic metres of air sampled in the sample identification number, only use for analysis. Please send new cassettes upon receipt of samples (16 filters).															
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 specified on the adjacent worksheet.															
Relinquished By:	Patrick Jolliffe	Date & Time:	20-Jun-19	Received By:	AD	Date & Time:	6/25	Sample Condition (lab use only)							
Relinquished By:		Date & Time:		Received By:		Date & Time:	11:58 am	Temperature	10	Samples Received in Good Condition? Y / N (if no provided details)					





Environmental Division

Report to:				Report Format / Distribution				Service Requested:			
Company: TMAC Resources Ltd (Hope Bay)				<input checked="" type="checkbox"/> Standard <input type="checkbox"/> Other				<input checked="" type="checkbox"/> Regular Service (Default)			
Contact: Sarah Warnock/Kyle Conway				<input checked="" type="checkbox"/> PDF <input checked="" type="checkbox"/> Excel <input type="checkbox"/> Fax				<input type="checkbox"/> Rush Service (2-3 Days)			
Address: Hope Bay Mine Site				Email 1: Gregory.Crooks@stantec.com				<input type="checkbox"/> Priority Service (1 Day or ASAP)			
				Email 2: enviro@tmacresources.com				<input type="checkbox"/> Emergency Service (<1 Day / Wkend) - Contact ALS			
Phone: 867-988-6882 x 102 Fax:				Email 3:				Analysis Request			
Invoice To: <input type="checkbox"/> Same as Report				Indicate Bottles: Filtered / Preserved (F/P) →							
Company: TMAC Resources Ltd (Hope Bay)				Client / Project Information:							
Contact: Accounts Payable				Job #:							
Address: 95 Wellington St. W Suite 1010				PO/AFE: 4500011700							
P.O. Box 44 Toronto, ON M5J 2N7				Legal Site Description:							
Phone: 416-628-0216 Fax:				Quote #:							
Lab Work Order # (lab use only)				ALS Contact: Amber Springer		Sampler (Initials): TMAC					
Sample #	Sample Identification (This description will appear on the report)			Date dd-mm-yy	Sample Exposure Duration hh:mm	Sample Type (Select from drop-down list)	TSP				
	041650	24.0 m³	1	10-Mar-19	23:59	Air	X				
	RP 027324	24.0 m³	2	16-Mar-19	24:00	Air	X				
	014358	24.0 m³	3	22-Mar-19	24:00	Air	X				
	014368	24.0 m³	4	28-Mar-19	24:00	Air	X				
	015121	24.0 m³	5	3-Apr-19	24:00	Air	X				
	014371	24.0 m³	6	9-Apr-19	24:00	Air	X				
	014360	24.0 m³	7	15-Apr-19	24:00	Air	X				
	015111	24.0 m³	8	21-Apr-19	24:00	Air	X				
	016190	24.0 m³	9	27-Apr-19	24:00	Air	X				
	016185	24.0 m³	10	3-May-19	24:00	Air	X				
	015117	24.0 m³	11	9-May-19	24:00	Air	X				
	016181	24.0 m³	12	15-May-19	24:00	Air	X				
	015122	24.0 m³	13	21-May-19	23:01	Air	X				
	016186	24.0 m³	14	27-May-19	23:59	Air	X				
	015133	24.0 m³	15	2-Jun-19	24:00	Air	X				
	016177	24.0 m³	16	8-Jun-19	24:00	Air	X				
Guidelines / Regulations				Special Instructions / Hazardous Details							
NOTE: Please do not put the cubic metres of air sampled in the sample identification number, only use for analysis. Please send new cassettes upon receipt of samples (16 filters).											
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 specified on the adjacent worksheet.											
Relinquished By:	Patrick Jolliffe	Date & Time:	20-Jun-19	Received By:	HA	Date & Time:	6/25	Sample Condition (lab use only)			
Relinquished By:		Date & Time:		Received By:		Date & Time:	11586	Temperature	10	Samples Received in Good Condition? Y / N (if no provided details)	



L229544-COFC



TMAC Resources Inc
ATTN: Environmental Site Manager
Hope Bay Project
95 Wellington St West
Toronto ON M5J 2N7

Date Received: 12-SEP-19
Report Date: 23-SEP-19 14:01 (MT)
Version: FINAL

Client Phone: 867-988-0569

Certificate of Analysis

Lab Work Order #: L2346892
Project P.O. #: 4500011700
Job Reference:
C of C Numbers:
Legal Site Desc:

Amber Springer, B.Sc
Account Manager

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ALS CANADA LTD Part of the ALS Group An ALS Limited Company

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L2346892-1 27814 Sampled By: TMAC on 14-JUN-19 @ 23:59 Matrix: AIR Miscellaneous Parameters Air Volume, Client Supplied Total Particulate (PM2.5) by Gravimetric Particulate - PM2.5 Particulate - PM2.5	21600 21600 <2.3 <50		0 2.3 50	L ug/m3 ug		18-SEP-19 18-SEP-19 18-SEP-19	R4821048 R4833650 R4833650
L2346892-2 041679 Sampled By: TMAC on 20-JUN-19 @ 23:59 Matrix: AIR Miscellaneous Parameters Air Volume, Client Supplied Total Particulate (PM2.5) by Gravimetric Particulate - PM2.5 Particulate - PM2.5	21600 2.6 57		0 2.3 50	L ug/m3 ug		18-SEP-19 18-SEP-19 18-SEP-19	R4821048 R4833650 R4833650
L2346892-3 01562 Sampled By: TMAC on 26-JUN-19 Matrix: AIR Miscellaneous Parameters Air Volume, Client Supplied Total Particulate (PM2.5) by Gravimetric Particulate - PM2.5 Particulate - PM2.5	21600 <2.3 <50		0 2.3 50	L ug/m3 ug		18-SEP-19 18-SEP-19 18-SEP-19	R4821048 R4833650 R4833650
L2346892-4 24917 Sampled By: TMAC on 02-JUL-19 Matrix: AIR Miscellaneous Parameters Air Volume, Client Supplied Total Particulate (PM2.5) by Gravimetric Particulate - PM2.5 Particulate - PM2.5	21600 2.8 60		0 2.3 50	L ug/m3 ug		18-SEP-19 18-SEP-19 18-SEP-19	R4821048 R4833650 R4833650
L2346892-5 27579 Sampled By: TMAC on 08-JUL-19 Matrix: AIR Miscellaneous Parameters Air Volume, Client Supplied Total Particulate (PM2.5) by Gravimetric Particulate - PM2.5 Particulate - PM2.5	21600 3.1 67		0 2.3 50	L ug/m3 ug		18-SEP-19 18-SEP-19 18-SEP-19	R4821048 R4833650 R4833650
L2346892-6 24924 Sampled By: TMAC on 14-JUL-19 Matrix: AIR Miscellaneous Parameters Air Volume, Client Supplied Total Particulate (PM2.5) by Gravimetric Particulate - PM2.5 Particulate - PM2.5	21600 3.1 67		0 2.3 50	L ug/m3 ug		18-SEP-19 18-SEP-19 18-SEP-19	R4821048 R4833650 R4833650
L2346892-7 010327 Sampled By: TMAC on 20-JUL-19 @ 23:59 Matrix: AIR Miscellaneous Parameters Air Volume, Client Supplied	21600		0	L		18-SEP-19	R4821048

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L2346892-7 010327 Sampled By: TMAC on 20-JUL-19 @ 23:59 Matrix: AIR Total Particulate (PM2.5) by Gravimetric Particulate - PM2.5 Particulate - PM2.5	 4.6 100		 2.3 50	 ug/m3 ug		 18-SEP-19 18-SEP-19	 R4833650 R4833650
L2346892-8 057298 Sampled By: TMAC on 26-JUL-19 Matrix: AIR Miscellaneous Parameters Air Volume, Client Supplied Total Particulate (PM2.5) by Gravimetric Particulate - PM2.5 Particulate - PM2.5	 21600 3.1 67		 0 2.3 50	 L ug/m3 ug		 18-SEP-19 18-SEP-19 18-SEP-19	 R4821048 R4833650 R4833650
L2346892-9 25064 Sampled By: TMAC on 01-AUG-19 Matrix: AIR Miscellaneous Parameters Air Volume, Client Supplied Total Particulate (PM2.5) by Gravimetric Particulate - PM2.5 Particulate - PM2.5	 21600 3.2 70		 0 2.3 50	 L ug/m3 ug		 18-SEP-19 18-SEP-19 18-SEP-19	 R4821048 R4833650 R4833650
L2346892-10 034120 Sampled By: TMAC on 07-AUG-19 Matrix: AIR Miscellaneous Parameters Air Volume, Client Supplied Total Particulate (PM2.5) by Gravimetric Particulate - PM2.5 Particulate - PM2.5	 21600 <2.3 <50		 0 2.3 50	 L ug/m3 ug		 18-SEP-19 18-SEP-19 18-SEP-19	 R4821048 R4833650 R4833650
L2346892-11 034131 Sampled By: TMAC on 13-AUG-19 Matrix: AIR Miscellaneous Parameters Air Volume, Client Supplied Total Particulate (PM2.5) by Gravimetric Particulate - PM2.5 Particulate - PM2.5	 21600 <2.3 <50		 0 2.3 50	 L ug/m3 ug		 18-SEP-19 18-SEP-19 18-SEP-19	 R4821048 R4833650 R4833650
L2346892-12 057304 Sampled By: TMAC on 19-AUG-19 Matrix: AIR Miscellaneous Parameters Air Volume, Client Supplied Total Particulate (PM2.5) by Gravimetric Particulate - PM2.5 Particulate - PM2.5	 21600 <2.3 <50		 0 2.3 50	 L ug/m3 ug		 18-SEP-19 18-SEP-19 18-SEP-19	 R4821048 R4833650 R4833650
L2346892-13 15172 Sampled By: TMAC on 25-AUG-19 @ 23:59 Matrix: AIR Miscellaneous Parameters Air Volume, Client Supplied Total Particulate (PM2.5) by Gravimetric Particulate - PM2.5	 21600 4.5		 0 2.3	 L ug/m3		 18-SEP-19 18-SEP-19	 R4821048 R4833650

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L2346892-13 15172 Sampled By: TMAC on 25-AUG-19 @ 23:59 Matrix: AIR Total Particulate (PM2.5) by Gravimetric Particulate - PM2.5	97		50	ug		18-SEP-19	R4833650
L2346892-14 034143 Sampled By: TMAC on 31-AUG-19 Matrix: AIR Miscellaneous Parameters Air Volume, Client Supplied Total Particulate (PM2.5) by Gravimetric Particulate - PM2.5 Particulate - PM2.5	21600 2.5 53		0 2.3 50	L ug/m3 ug		18-SEP-19 18-SEP-19 18-SEP-19	R4821048 R4833650 R4833650
L2346892-15 041654 Sampled By: TMAC on 06-SEP-19 Matrix: AIR Miscellaneous Parameters Air Volume, Client Supplied Total Particulate (PM2.5) by Gravimetric Particulate - PM2.5 Particulate - PM2.5	21600 <2.3 <50		0 2.3 50	L ug/m3 ug		18-SEP-19 18-SEP-19 18-SEP-19	R4821048 R4833650 R4833650
L2346892-16 16166 Sampled By: TMAC on 08-JUN-19 Matrix: AIR Miscellaneous Parameters Air Volume, Client Supplied Total Particulate (PM2.5) by Gravimetric Particulate - PM2.5 Particulate - PM2.5	21600 3.7 80		0 2.3 50	L ug/m3 ug		18-SEP-19 18-SEP-19 18-SEP-19	R4821048 R4833650 R4833650
L2346892-17 01560 Sampled By: TMAC on 14-JUN-19 @ 23:59 Matrix: AIR Miscellaneous Parameters Air Volume, Client Supplied Total Particulate (TSP) by Gravimetric Total Suspended Particulate Total Suspended Particulate	24000 6.0 143		0 2.1 50	L ug/m3 ug		18-SEP-19 18-SEP-19 18-SEP-19	R4821048 R4833670 R4833670
L2346892-18 01579 Sampled By: TMAC on 20-JUN-19 @ 23:59 Matrix: AIR Miscellaneous Parameters Air Volume, Client Supplied Total Particulate (TSP) by Gravimetric Total Suspended Particulate Total Suspended Particulate	24000 5.0 120		0 2.1 50	L ug/m3 ug		18-SEP-19 18-SEP-19 18-SEP-19	R4821048 R4833670 R4833670
L2346892-19 25077 Sampled By: TMAC on 26-JUN-19 Matrix: AIR Miscellaneous Parameters Air Volume, Client Supplied Total Particulate (TSP) by Gravimetric Total Suspended Particulate Total Suspended Particulate	24000 11.3 270		0 2.1 50	L ug/m3 ug		18-SEP-19 18-SEP-19 18-SEP-19	R4821048 R4833670 R4833670

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L2346892-19 25077 Sampled By: TMAC on 26-JUN-19 Matrix: AIR							
L2346892-20 041647 Sampled By: TMAC on 02-JUL-19 Matrix: AIR							
Miscellaneous Parameters							
Air Volume, Client Supplied	24000		0	L		18-SEP-19	R4821048
Total Particulate (TSP) by Gravimetric							
Total Suspended Particulate	4.3		2.1	ug/m3		18-SEP-19	R4833670
Total Suspended Particulate	103		50	ug		18-SEP-19	R4833670
L2346892-21 057305 Sampled By: TMAC on 08-JUL-19 Matrix: AIR							
Miscellaneous Parameters							
Air Volume, Client Supplied	24000		0	L		18-SEP-19	R4821048
Total Particulate (TSP) by Gravimetric							
Total Suspended Particulate	4.6		2.1	ug/m3		18-SEP-19	R4833670
Total Suspended Particulate	110		50	ug		18-SEP-19	R4833670
L2346892-22 27777 Sampled By: TMAC on 14-JUL-19 Matrix: AIR							
Miscellaneous Parameters							
Air Volume, Client Supplied	24000		0	L		18-SEP-19	R4821048
Total Particulate (TSP) by Gravimetric							
Total Suspended Particulate	2.8		2.1	ug/m3		18-SEP-19	R4833670
Total Suspended Particulate	67		50	ug		18-SEP-19	R4833670
L2346892-23 27806 Sampled By: TMAC on 20-JUL-19 @ 23:59 Matrix: AIR							
Miscellaneous Parameters							
Air Volume, Client Supplied	24000		0	L		18-SEP-19	R4821048
Total Particulate (TSP) by Gravimetric							
Total Suspended Particulate	15.3		2.1	ug/m3		18-SEP-19	R4833670
Total Suspended Particulate	367		50	ug		18-SEP-19	R4833670
L2346892-24 057312 Sampled By: TMAC on 26-JUL-19 Matrix: AIR							
Miscellaneous Parameters							
Air Volume, Client Supplied	24000		0	L		18-SEP-19	R4821048
Total Particulate (TSP) by Gravimetric							
Total Suspended Particulate	2.8		2.1	ug/m3		18-SEP-19	R4833670
Total Suspended Particulate	67		50	ug		18-SEP-19	R4833670
L2346892-25 009899 Sampled By: TMAC on 01-AUG-19 Matrix: AIR							
Miscellaneous Parameters							
Air Volume, Client Supplied	24000		0	L		18-SEP-19	R4821048
Total Particulate (TSP) by Gravimetric							
Total Suspended Particulate	10.7		2.1	ug/m3		18-SEP-19	R4833670
Total Suspended Particulate	257		50	ug		18-SEP-19	R4833670

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L2346892-26 22664 Sampled By: TMAC on 07-AUG-19 Matrix: AIR Miscellaneous Parameters Air Volume, Client Supplied Total Particulate (TSP) by Gravimetric Total Suspended Particulate Total Suspended Particulate	24000 6.5 157		0 2.1 50	L ug/m3 ug		18-SEP-19 18-SEP-19 18-SEP-19	R4821048 R4833670 R4833670
L2346892-27 034142 Sampled By: TMAC on 13-AUG-19 Matrix: AIR Miscellaneous Parameters Air Volume, Client Supplied Total Particulate (TSP) by Gravimetric Total Suspended Particulate Total Suspended Particulate	24000 13.9 333		0 2.1 50	L ug/m3 ug		18-SEP-19 18-SEP-19 18-SEP-19	R4821048 R4833670 R4833670
L2346892-28 27571 Sampled By: TMAC on 19-AUG-19 Matrix: AIR Miscellaneous Parameters Air Volume, Client Supplied Total Particulate (TSP) by Gravimetric Total Suspended Particulate Total Suspended Particulate	24000 10.8 260		0 2.1 50	L ug/m3 ug		18-SEP-19 18-SEP-19 18-SEP-19	R4821048 R4833670 R4833670
L2346892-29 041677 Sampled By: TMAC on 25-AUG-19 @ 23:59 Matrix: AIR Miscellaneous Parameters Air Volume, Client Supplied Total Particulate (TSP) by Gravimetric Total Suspended Particulate Total Suspended Particulate	24000 10.1 243		0 2.1 50	L ug/m3 ug		18-SEP-19 18-SEP-19 18-SEP-19	R4821048 R4833670 R4833670
L2346892-30 27774 Sampled By: TMAC on 31-AUG-19 Matrix: AIR Miscellaneous Parameters Air Volume, Client Supplied Total Particulate (TSP) by Gravimetric Total Suspended Particulate Total Suspended Particulate	24000 8.6 207		0 2.1 50	L ug/m3 ug		18-SEP-19 18-SEP-19 18-SEP-19	R4821048 R4833670 R4833670
L2346892-31 24943 Sampled By: TMAC on 06-SEP-19 Matrix: AIR Miscellaneous Parameters Air Volume, Client Supplied Total Particulate (TSP) by Gravimetric Total Suspended Particulate Total Suspended Particulate	24000 3.8 90		0 2.1 50	L ug/m3 ug		18-SEP-19 18-SEP-19 18-SEP-19	R4821048 R4833670 R4833670
L2346892-32 16179 Sampled By: TMAC on 08-JUN-19 Matrix: AIR Miscellaneous Parameters Air Volume, Client Supplied	24000		0	L		18-SEP-19	R4821048

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L2346892-32 16179 Sampled By: TMAC on 08-JUN-19 Matrix: AIR Total Particulate (TSP) by Gravimetric Total Suspended Particulate Total Suspended Particulate	6.5 157		2.1 50	ug/m3 ug		18-SEP-19 18-SEP-19	R4833670 R4833670
L2346892-33 27310 Sampled By: TMAC on 14-JUN-19 @ 23:59 Matrix: AIR Miscellaneous Parameters Air Volume, Client Supplied Total Particulate (Dichot-PM10) by Grav. Particulate-Fine Particulate-Coarse Particulate-PM10 Particulate-Coarse	2400 <2.3 <2.1 <3.1 <50		0 2.3 2.1 3.1 50	L ug/m3 ug/m3 ug/m3 ug		18-SEP-19 18-SEP-19 18-SEP-19 18-SEP-19 18-SEP-19	R4821048 R4833750 R4833750 R4833750 R4833750
L2346892-34 015524 Sampled By: TMAC on 20-JUN-19 @ 23:59 Matrix: AIR Miscellaneous Parameters Air Volume, Client Supplied Total Particulate (Dichot-PM10) by Grav. Particulate-Fine Particulate-Coarse Particulate-PM10 Particulate-Coarse	2400 2.6 <2.1 4.6 53		0 2.3 2.1 3.1 50	L ug/m3 ug/m3 ug/m3 ug		18-SEP-19 18-SEP-19 18-SEP-19 18-SEP-19 18-SEP-19	R4821048 R4833750 R4833750 R4833750 R4833750
L2346892-35 034160 Sampled By: TMAC on 26-JUN-19 Matrix: AIR Miscellaneous Parameters Air Volume, Client Supplied Total Particulate (Dichot-PM10) by Grav. Particulate-Fine Particulate-Coarse Particulate-PM10 Particulate-Coarse	2400 <2.3 5.5 7.5 137		0 2.3 2.1 3.1 50	L ug/m3 ug/m3 ug/m3 ug		18-SEP-19 18-SEP-19 18-SEP-19 18-SEP-19 18-SEP-19	R4821048 R4833750 R4833750 R4833750 R4833750
L2346892-36 27318 Sampled By: TMAC on 02-JUL-19 Matrix: AIR Miscellaneous Parameters Air Volume, Client Supplied Total Particulate (Dichot-PM10) by Grav. Particulate-Fine Particulate-Coarse Particulate-PM10 Particulate-Coarse	2400 2.8 2.1 4.9 57		0 2.3 2.1 3.1 50	L ug/m3 ug/m3 ug/m3 ug		18-SEP-19 18-SEP-19 18-SEP-19 18-SEP-19 18-SEP-19	R4821048 R4833750 R4833750 R4833750 R4833750
L2346892-37 009930 Sampled By: TMAC on 08-JUL-19 Matrix: AIR Miscellaneous Parameters Air Volume, Client Supplied Total Particulate (Dichot-PM10) by Grav. Particulate-Fine	2400 3.1		0 2.3	L ug/m3		18-SEP-19 18-SEP-19	R4821048 R4833750

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L2346892-37 009930 Sampled By: TMAC on 08-JUL-19 Matrix: AIR Total Particulate (Dichot-PM10) by Grav. Particulate-Coarse Particulate-PM10 Particulate-Coarse	<2.1 3.6 <50		2.1 3.1 50	ug/m3 ug/m3 ug		18-SEP-19 18-SEP-19 18-SEP-19	R4833750 R4833750 R4833750
L2346892-38 010347 Sampled By: TMAC on 14-JUL-19 Matrix: AIR Miscellaneous Parameters Air Volume, Client Supplied Total Particulate (Dichot-PM10) by Grav. Particulate-Fine Particulate-Coarse Particulate-PM10 Particulate-Coarse	2400 3.1 <2.1 3.9 <50		0 2.3 2.1 3.1 50	L ug/m3 ug/m3 ug/m3 ug		18-SEP-19 18-SEP-19 18-SEP-19 18-SEP-19 18-SEP-19	R4821048 R4833750 R4833750 R4833750 R4833750
L2346892-39 24901 Sampled By: TMAC on 20-JUL-19 @ 23:59 Matrix: AIR Miscellaneous Parameters Air Volume, Client Supplied Total Particulate (Dichot-PM10) by Grav. Particulate-Fine Particulate-Coarse Particulate-PM10 Particulate-Coarse	2400 4.6 <2.1 6.5 57		0 2.3 2.1 3.1 50	L ug/m3 ug/m3 ug/m3 ug		18-SEP-19 18-SEP-19 18-SEP-19 18-SEP-19 18-SEP-19	R4821048 R4833750 R4833750 R4833750 R4833750
L2346892-40 24542 Sampled By: TMAC on 26-JUL-19 Matrix: AIR Miscellaneous Parameters Air Volume, Client Supplied Total Particulate (Dichot-PM10) by Grav. Particulate-Fine Particulate-Coarse Particulate-PM10 Particulate-Coarse	2400 3.1 <2.1 4.7 <50		0 2.3 2.1 3.1 50	L ug/m3 ug/m3 ug/m3 ug		18-SEP-19 18-SEP-19 18-SEP-19 18-SEP-19 18-SEP-19	R4821048 R4833750 R4833750 R4833750 R4833750
L2346892-41 27298 Sampled By: TMAC on 01-AUG-19 Matrix: AIR Miscellaneous Parameters Air Volume, Client Supplied Total Particulate (Dichot-PM10) by Grav. Particulate-Fine Particulate-Coarse Particulate-PM10 Particulate-Coarse	2400 3.2 3.3 6.5 87		0 2.3 2.1 3.1 50	L ug/m3 ug/m3 ug/m3 ug		18-SEP-19 18-SEP-19 18-SEP-19 18-SEP-19 18-SEP-19	R4821048 R4833750 R4833750 R4833750 R4833750
L2346892-42 17831 Sampled By: TMAC on 07-AUG-19 Matrix: AIR Miscellaneous Parameters Air Volume, Client Supplied Total Particulate (Dichot-PM10) by Grav.	2400		0	L		18-SEP-19	R4821048

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L2346892-42 17831 Sampled By: TMAC on 07-AUG-19 Matrix: AIR Total Particulate (Dichot-PM10) by Grav. Particulate-Fine Particulate-Coarse Particulate-PM10 Particulate-Coarse	<2.3 <2.1 3.5 <50		2.3 2.1 3.1 50	ug/m3 ug/m3 ug/m3 ug		18-SEP-19 18-SEP-19 18-SEP-19 18-SEP-19	R4833750 R4833750 R4833750 R4833750
L2346892-43 015272 Sampled By: TMAC on 13-AUG-19 Matrix: AIR Miscellaneous Parameters Air Volume, Client Supplied Total Particulate (Dichot-PM10) by Grav. Particulate-Fine Particulate-Coarse Particulate-PM10 Particulate-Coarse	2400 <2.3 <2.1 <3.1 <50		0 2.3 2.1 3.1 50	L ug/m3 ug/m3 ug/m3 ug		18-SEP-19 18-SEP-19 18-SEP-19 18-SEP-19 18-SEP-19	R4821048 R4833750 R4833750 R4833750 R4833750
L2346892-44 27295 Sampled By: TMAC on 19-AUG-19 Matrix: AIR Miscellaneous Parameters Air Volume, Client Supplied Total Particulate (Dichot-PM10) by Grav. Particulate-Fine Particulate-Coarse Particulate-PM10 Particulate-Coarse	2400 <2.3 <2.1 <3.1 <50		0 2.3 2.1 3.1 50	L ug/m3 ug/m3 ug/m3 ug		18-SEP-19 18-SEP-19 18-SEP-19 18-SEP-19 18-SEP-19	R4821048 R4833750 R4833750 R4833750 R4833750
L2346892-45 13080 Sampled By: TMAC on 25-AUG-19 @ 23:59 Matrix: AIR Miscellaneous Parameters Air Volume, Client Supplied Total Particulate (Dichot-PM10) by Grav. Particulate-Fine Particulate-Coarse Particulate-PM10 Particulate-Coarse	2400 4.5 2.2 6.7 63		0 2.3 2.1 3.1 50	L ug/m3 ug/m3 ug/m3 ug		18-SEP-19 18-SEP-19 18-SEP-19 18-SEP-19 18-SEP-19	R4821048 R4833750 R4833750 R4833750 R4833750
L2346892-46 041678 Sampled By: TMAC on 31-AUG-19 Matrix: AIR Miscellaneous Parameters Air Volume, Client Supplied Total Particulate (Dichot-PM10) by Grav. Particulate-Fine Particulate-Coarse Particulate-PM10 Particulate-Coarse	2400 2.5 2.8 5.3 73		0 2.3 2.1 3.1 50	L ug/m3 ug/m3 ug/m3 ug		18-SEP-19 18-SEP-19 18-SEP-19 18-SEP-19 18-SEP-19	R4821048 R4833750 R4833750 R4833750 R4833750
L2346892-47 034146 Sampled By: TMAC on 06-SEP-19 Matrix: AIR Miscellaneous Parameters Air Volume, Client Supplied	2400		0	L		18-SEP-19	R4821048

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L2346892-47 034146 Sampled By: TMAC on 06-SEP-19 Matrix: AIR Total Particulate (Dichot-PM10) by Grav. Particulate-Fine Particulate-Coarse Particulate-PM10 Particulate-Coarse	 <2.3 <2.1 <3.1 <50	 	 2.3 2.1 3.1 50	 ug/m3 ug/m3 ug/m3 ug	 	 18-SEP-19 18-SEP-19 18-SEP-19 18-SEP-19	 R4833750 R4833750 R4833750 R4833750
L2346892-48 22670 Sampled By: TMAC on 08-JUN-19 Matrix: AIR Miscellaneous Parameters Air Volume, Client Supplied Total Particulate (Dichot-PM10) by Grav. Particulate-Fine Particulate-Coarse Particulate-PM10 Particulate-Coarse	 2400 3.7 2.5 6.3 70	 	 0 2.3 2.1 3.1 50	 L ug/m3 ug/m3 ug/m3 ug	 	 18-SEP-19 18-SEP-19 18-SEP-19 18-SEP-19 18-SEP-19	 R4821048 R4833750 R4833750 R4833750 R4833750

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

Reference Information

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
AIR VOLUME-VA	Misc.	Air volume (L)	HYGIENE METHOD
PART-DICHOT-PM10-VA	Filter	Total Particulate (Dichot-PM10) by Grav.	BCMOE Method
Total Particulate Matter (PM10) Method analysis is carried out in accordance with the BCMOE Lab Manual, Section G Air Constituents - Inorganics, "Total Particulate - PM10/PM02 - 47mm - HiVol" method. ALS provides pre-weighed filters (Pallflex TX40 HI20-WW 47mm) and clients typically sample using a "Dichotomus Partisol sequential Air Sampler" equivalent sample (EQPS-0509-179, EQPS-0509-180, EQPS-0311-198) as per U.S. EPA Reference Method RFPS-0694-098, fitted with a PM10 inlet. The particulate matter is determined gravimetrically. Three formulas are required for the mass concentration(um/M3) computation of fine PM(PM-2.5) Course PM (PM-10 minus PM2.5) and PM-10.			
PART-PM2.5-VA	Filter	Total Particulate (PM2.5) by Gravimetric	BCMOE METHOD
Total Particulate Matter (PM2.5) Method analysis is carried out in accordance with the BCMOE Lab Manual, Section G Air Constituents - Inorganics, "Total Particulate - PM10/PM02 - 47mm - HiVol" method. ALS provides pre-weighed filters (Pallflex TX40 HI20-WW 47mm) and clients typically sample using a "Partisol Model 2000 Air Sampler" as per U.S. EPA Reference Method RFPS-0694-098, fitted with a PM2.5 inlet. The particulate matter is determined gravimetrically.			
PART-TSP-VA	Filter	Total Particulate (TSP) by Gravimetric	BCMOE METHOD
Total Suspended Particulate Matter (TSP) Method of analysis is modified from the BCMOE Lab Manual, Section G Air Constituents - Inorganics, "Total Particulate - PM10/PM02 - 47mm - HiVol" method. ALS provides pre-weighed filters (Pallflex TX40 HI20-WW 47mm) and clients typically sample using a "Partisol Model 2000 Air Sampler" as per U.S. EPA Reference Method RFPS-0694-098, fitted with a TSP inlet. The particulate matter is determined gravimetrically.			

** 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
VA	ALS ENVIRONMENTAL - VANCOUVER, BRITISH COLUMBIA, CANADA

Chain of Custody Numbers:

GLOSSARY OF REPORT TERMS

Surrogates are compounds that are similar in behaviour to target analyte(s), but that do not normally occur in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery. In reports that display the D.L. column, laboratory objectives for surrogates are listed there.

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

mg/L - unit of concentration based on volume, parts per million.

< - Less than.

D.L. - The reporting limit.

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.



Quality Control Report

Workorder: L2346892

Report Date: 23-SEP-19

Page 1 of 2

Client: TMAC Resources Inc
Hope Bay Project 95 Wellington St West
Toronto ON M5J 2N7

Contact: Environmental Site Manager

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
PART-PM2.5-VA		Filter						
Batch R4833650								
WG3165650-2 DUP		L2346892-12						
Particulate - PM2.5		<50	<50	RPD-NA	ug	N/A	10	18-SEP-19
WG3165650-1 MB								
Particulate - PM2.5			<50		ug		50	18-SEP-19
PART-TSP-VA		Filter						
Batch R4833670								
WG3165655-1 MB								
Total Suspended Particulate			<50		ug		50	18-SEP-19

Quality Control Report

Workorder: L2346892

Report Date: 23-SEP-19

Page 2 of 2

Legend:

Limit	ALS Control Limit (Data Quality Objectives)
DUP	Duplicate
RPD	Relative Percent Difference
N/A	Not Available
LCS	Laboratory Control Sample
SRM	Standard Reference Material
MS	Matrix Spike
MSD	Matrix Spike Duplicate
ADE	Average Desorption Efficiency
MB	Method Blank
IRM	Internal Reference Material
CRM	Certified Reference Material
CCV	Continuing Calibration Verification
CVS	Calibration Verification Standard
LCSD	Laboratory Control Sample Duplicate

Sample Parameter Qualifier Definitions:

Qualifier	Description
RPD-NA	Relative Percent Difference Not Available due to result(s) being less than detection limit.

Hold Time Exceedances:

All test results reported with this submission were conducted within ALS recommended hold times.

ALS recommended hold times may vary by province. They are assigned to meet known provincial and/or federal government requirements. In the absence of regulatory hold times, ALS establishes recommendations based on guidelines published by the US EPA, APHA Standard Methods, or Environment Canada (where available). For more information, please contact ALS.

The ALS Quality Control Report is provided to ALS clients upon request. ALS includes comprehensive QC checks with every analysis to ensure our high standards of quality are met. Each QC result has a known or expected target value, which is compared against pre-determined data quality objectives to provide confidence in the accuracy of associated test results.

Please note that this report may contain QC results from anonymous Sample Duplicates and Matrix Spikes that do not originate from this Work Order.

Report to:				Report Format / Distribution				Service Requested:										
Company: TMAC Resources Ltd (Hope Bay)								<input checked="" type="checkbox"/>	Regular Service (Default)									
Contact: Sara Warnock/Kyle Conway									Rush Service (2-3 Days)									
Address: Hope Bay Mine Site				Email 1: Gregory.Crooks@stantec.com					Priority Service (1 Day or ASAP)									
				Email 2: enviro@tmacresources.com					Emergency Service (<1 Day / Wkend) - Contact ALS									
Phone: 867-988-6882 x 102 Fax:				Email 3:				Analysis Request										
Invoice To:				Indicate Bottles: Filtered / Preserved (F/P) →														
Company: TMAC Resources Ltd (Hope Bay)				Client / Project Information:														
Contact: Accounts Payable				Job #:														
Address: 95 Wellington St. W Suite 1010				PO/AFE: 450001170														
P.O. Box 44 Toronto, ON M5J 2N7				Legal Site Description:														
Phone: 416-628-0216 Fax:				Quote #:														
Lab Work Order # (lab use only)				ALS Contact: Amber Springer				Sampler (Initials): TMAC										
Sample	Sample Identification			Date	Sample Exposure Duration	Sample Type	PM 2.5										Hazardous?	Highly Contaminated?
#	(This description will appear on the report)			dd-mmm-yy	hh:mm	(Select from drop-down list)												
1	27814	21.6 m³		14-Jun-19	23:59	Air	X											
2	041679	21.6 m³		20-Jun-19	23:59	Air	X											
3	01562	21.6 m³		26-Jun-19	24:00	Air	X											
4	24917	21.6 m³		2-Jul-19	24:00	Air	X											
5	27579	21.6 m³		8-Jul-19	24:00	Air	X											
6	24924	21.6 m³		14-Jul-19	24:00	Air	X											
7	010327	21.6 m³		20-Jul-19	23:59	Air	X											
8	057298	21.6 m³		26-Jul-19	24:00	Air	X											
9	25064	21.6 m³		1-Aug-19	24:00	Air	X											
10	034120	21.6 m³		7-Aug-19	24:00	Air	X											
11	034131	21.6 m³		13-Aug-19	24:00	Air	X											
12	057304	21.6 m³		19-Aug-19	24:00	Air	X											
13	15172	21.6 m³		25-Aug-19	23:59	Air	X											
14	034143	21.6 m³		31-Aug-19	24:00	Air	X											
15	041654	21.6 m³		6-Sep-19	24:00	Air	X											
16	16166	21.6 m³		8-Jun-19	24:00	Air	X											
Guidelines / Regulations				Special Instructions / Hazardous Details														
NOTE: Please do not put the cubic metres of air sampled in the sample identification number, only use for analysis. Please send new cassettes upon receipt of samples (16 filters).																		
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 specified on the adjacent worksheet.																		
Relinquished By:	Patrick Jolliffe	Date & Time:	12-Sep-19	Received By:	M. Goy	Date & Time:	10/19/20 9/12/19 2:20 PM	Temperature										
Relinquished By:		Date & Time:		Received By:		Date & Time:		Samples Received in Good Condition? Y / N (if no provided details)										

Report to:						Report Format / Distribution						Service Requested:					
Company: TMAC Resources Ltd (Hope Bay)						<input checked="" type="checkbox"/> Standard <input type="checkbox"/> Other						<input checked="" type="checkbox"/> Regular Service (Default)					
Contact: Sarah Warnock/Kyle Conway						<input checked="" type="checkbox"/> PDF <input checked="" type="checkbox"/> Excel <input type="checkbox"/> Fax						<input type="checkbox"/> Rush Service (2-3 Days)					
Address: Hope Bay Mine Site						Email 1: Gregory.Crooks@stantec.com						<input type="checkbox"/> Priority Service (1 Day or ASAP)					
						Email 2: enviro@tmacresources.com						<input type="checkbox"/> Emergency Service (<1 Day / Wkend) - Contact ALS					
Phone: 867-988-6882 x 102 Fax:						Email 3:						Analysis Request					
Invoice To: <input type="checkbox"/> Same as Report						Indicate Bottles: Filtered / Preserved (F/P) →											
Company: TMAC Resources Ltd (Hope Bay)						Client / Project Information:						<div style="display: flex;"> <div style="flex: 1;"></div> <div style="flex: 1; writing-mode: vertical-rl; transform: rotate(180deg);"> Hazardous? Highly Contaminated? </div> </div>					
Contact: Accounts Payable						Job #:											
Address: 95 Wellington St. W Suite 1010						PO/AFE: 450001170											
P.O. Box 44 Toronto, ON M5J 2N7						Legal Site Description:											
Phone: 416-628-0216 Fax:						Quote #:											
Lab Work Order # (lab use only)						ALS Contact: Amber Springer		Sampler (Initials): TMAC									
Sample	Sample Identification					Date	Sample Exposure Duration		Sample Type		TSP						
#	(This description will appear on the report)					dd-mm-yy	hh:mm		(Select from drop-down list)								
17	01560	24.0 m³				14-Jun-19	23:59		Air	X							
21	01579	24.0 m³				20-Jun-19	23:59		Air	X							
31	25077	24.0 m³				26-Jun-19	24:00		Air	X							
42	041647	24.0 m³				2-Jul-19	24:00		Air	X							
52	057305	24.0 m³				8-Jul-19	24:00		Air	X							
62	27777	24.0 m³				14-Jul-19	24:00		Air	X							
72	27806	24.0 m³				20-Jul-19	23:59		Air	X							
82	057312	24.0 m³				26-Jul-19	24:00		Air	X							
92	009899	24.0 m³				1-Aug-19	24:00		Air	X							
102	22664	24.0 m³				7-Aug-19	24:00		Air	X							
112	034142	24.0 m³				13-Aug-19	24:00		Air	X							
122	27571	24.0 m³				19-Aug-19	24:00		Air	X							
132	041677	24.0 m³				25-Aug-19	23:59		Air	X							
142	27774	24.0 m³				31-Aug-19	24:00		Air	X							
152	24943	24.0 m³				6-Sep-19	24:00		Air	X							
162	16179	24.0 m³				8-Jun-19	24:00		Air	X							
Guidelines / Regulations						Special Instructions / Hazardous Details											
NOTE: Please do not put the cubic metres of air sampled in the sample identification number, only use for analysis. Please send new cassettes upon receipt of samples (16 filters).																	
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 specified on the adjacent worksheet.																	
Relinquished By:	Patrick Jolliffe	Date & Time:	12-Sep-19	Received By:		Date & Time:		Sample Condition (lab use only):									
Relinquished By:		Date & Time:		Received By:		Date & Time:		Temperature:	Samples Received in Good Condition? Y / N (if no provided details)								



Environmental Division

Report to:				Report Format / Distribution				Service Requested:											
Company: TMAC Resources Ltd (Hope Bay)								x Regular Service (Default)											
Contact: Sara Warnock/Kyle Conway								Rush Service (2-3 Days)											
Address: Hope Bay Mine Site				Email 1: Gregory.Crooks@stantec.com				Priority Service (1 Day or ASAP)											
				Email 2: enviro@tmacresources.com				Emergency Service (<1 Day / Wkend) - Contact ALS											
Phone: 867-988-6882 x 102 Fax:				Email 3:				Analysis Request											
Invoice To:				Indicate Bottles: Filtered / Preserved (F/P) _____															
Company: TMAC Resources Ltd (Hope Bay)				Client / Project Information:															
Contact: Accounts Payable				Job #:															
Address: 95 Wellington St. W Suite 1010				PO/AFE: 450001170															
P.O. Box 44 Toronto, ON M5J 2N7				Legal Site Description:															
Phone: 416-628-0216 Fax:				Quote #:															
Lab Work Order # (lab use only)				ALS Contact: Amber Springer		Sampler (Initials): TMAC													
Sample	Sample Identification			Date	Sample Exposure Duration	Sample Type	PM 10												
#	(This description will appear on the report)			dd-mmm-yy	hh:mm	(Select from drop-down list)													
33	27310	2.4 m³		14-Jun-19	23:59	Air	X												
34	015524	2.4 m³		20-Jun-19	23:59	Air	X												
35	034160	2.4 m³		26-Jun-19	24:00	Air	X												
36	27318	2.4 m³		2-Jul-19	24:00	Air	X												
37	009930	2.4 m³		8-Jul-19	24:00	Air	X												
38	010347	2.4 m³		14-Jul-19	24:00	Air	X												
39	24901	2.4 m³		20-Jul-19	23:59	Air	X												
40	24542	2.4 m³		26-Jul-19	24:00	Air	X												
41	27298	2.4 m³		1-Aug-19	24:00	Air	X												
42	17831	2.4 m³		7-Aug-19	24:00	Air	X												
43	015272	2.4 m³		13-Aug-19	24:00	Air	X												
44	27295	2.4 m³		19-Aug-19	24:00	Air	X												
45	13080	2.4 m³		25-Aug-19	23:59	Air	X												
46	041678	2.4 m³		31-Aug-19	24:00	Air	X												
47	034146	2.4 m³		6-Sep-19	24:00	Air	X												
48	22670	2.4 m³		8-Jun-19	24:00	Air	X												
Guidelines / Regulations				Special Instructions / Hazardous Details															
NOTE: Please do not put the cubic metres of air sampled in the sample identification number, only use for analysis. Please send new cassettes upon receipt of samples (16 filters).																			
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 specified on the adjacent worksheet.																			
Relinquished By:	Patrick Jolliffe	Date & Time:	12-Sep-19	Received By:		Date & Time:		Sample Condition (lab use only)											
Relinquished By:		Date & Time:		Received By:		Date & Time:		Temperature	Samples Received in Good Condition? Y / N (if no provided details)										



TMAC Resources Inc
ATTN: Sarah Warnick/Kyle Conway
Hope Bay Project
181 University Ave
Toronto ON M5H 3M7

Date Received: 19-DEC-19
Report Date: 02-JAN-20 16:57 (MT)
Version: FINAL

Client Phone: 416-628-0216

Certificate of Analysis

Lab Work Order #: L2398897
Project P.O. #: 4500011700
Job Reference:
C of C Numbers:
Legal Site Desc:

Amber Springer, B.Sc
Account Manager

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ADDRESS: 8081 Lougheed Hwy, Suite 100, Burnaby, BC V5A 1W9 Canada | Phone: +1 604 253 4188 | Fax: +1 604 253 6700
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ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L2398897-1 015121 Sampled By: TMAC on 12-SEP-19 @ 23:59 Matrix: AIR Miscellaneous Parameters Air Volume, Client Supplied Total Particulate (TSP) by Gravimetric Total Suspended Particulate Total Suspended Particulate	24000 12.2 293		0 2.1 50	L ug/m3 ug		27-DEC-19 31-DEC-19 31-DEC-19	R4955826 R4958530 R4958530
L2398897-2 014371 Sampled By: TMAC on 18-SEP-19 Matrix: AIR Miscellaneous Parameters Air Volume, Client Supplied Total Particulate (TSP) by Gravimetric Total Suspended Particulate Total Suspended Particulate	24000 2.2 53		0 2.1 50	L ug/m3 ug		27-DEC-19 31-DEC-19 31-DEC-19	R4955826 R4958530 R4958530
L2398897-3 014360 Sampled By: TMAC on 24-SEP-19 Matrix: AIR Miscellaneous Parameters Air Volume, Client Supplied Total Particulate (TSP) by Gravimetric Total Suspended Particulate Total Suspended Particulate	24000 3.2 77		0 2.1 50	L ug/m3 ug		27-DEC-19 31-DEC-19 31-DEC-19	R4955826 R4958530 R4958530
L2398897-4 015111 Sampled By: TMAC on 30-SEP-19 Matrix: AIR Miscellaneous Parameters Air Volume, Client Supplied Total Particulate (TSP) by Gravimetric Total Suspended Particulate Total Suspended Particulate	24000 <2.1 50		0 2.1 50	L ug/m3 ug		27-DEC-19 31-DEC-19 31-DEC-19	R4955826 R4958530 R4958530
L2398897-5 015122 Sampled By: TMAC on 06-OCT-19 Matrix: AIR Miscellaneous Parameters Air Volume, Client Supplied Total Particulate (TSP) by Gravimetric Total Suspended Particulate Total Suspended Particulate	24000 <2.1 <50		0 2.1 50	L ug/m3 ug		27-DEC-19 31-DEC-19 31-DEC-19	R4955826 R4958530 R4958530
L2398897-6 016181 Sampled By: TMAC on 12-OCT-19 Matrix: AIR Miscellaneous Parameters Air Volume, Client Supplied Total Particulate (TSP) by Gravimetric Total Suspended Particulate Total Suspended Particulate	24000 6.3 150		0 2.1 50	L ug/m3 ug		27-DEC-19 31-DEC-19 31-DEC-19	R4955826 R4958530 R4958530
L2398897-7 016190 Sampled By: TMAC on 18-OCT-19 @ 23:59 Matrix: AIR Miscellaneous Parameters Air Volume, Client Supplied	24000		0	L		27-DEC-19	R4955826

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L2398897-7 016190 Sampled By: TMAC on 18-OCT-19 @ 23:59 Matrix: AIR Total Particulate (TSP) by Gravimetric Total Suspended Particulate Total Suspended Particulate	28.3 680		2.1 50	ug/m3 ug		31-DEC-19 31-DEC-19	R4958530 R4958530
L2398897-8 016185 Sampled By: TMAC on 24-OCT-19 Matrix: AIR Miscellaneous Parameters Air Volume, Client Supplied Total Particulate (TSP) by Gravimetric Total Suspended Particulate Total Suspended Particulate	24000 12.9 310		0 2.1 50	L ug/m3 ug		27-DEC-19 31-DEC-19 31-DEC-19	R4955826 R4958530 R4958530
L2398897-9 016186 Sampled By: TMAC on 30-OCT-19 Matrix: AIR Miscellaneous Parameters Air Volume, Client Supplied Total Particulate (TSP) by Gravimetric Total Suspended Particulate Total Suspended Particulate	24000 13.1 313		0 2.1 50	L ug/m3 ug		27-DEC-19 31-DEC-19 31-DEC-19	R4955826 R4958530 R4958530
L2398897-10 015133 Sampled By: TMAC on 05-NOV-19 Matrix: AIR Miscellaneous Parameters Air Volume, Client Supplied Total Particulate (TSP) by Gravimetric Total Suspended Particulate Total Suspended Particulate	24000 6.1 147		0 2.1 50	L ug/m3 ug		27-DEC-19 31-DEC-19 31-DEC-19	R4955826 R4958530 R4958530
L2398897-11 015117 Sampled By: TMAC on 11-NOV-19 Matrix: AIR Miscellaneous Parameters Air Volume, Client Supplied Total Particulate (TSP) by Gravimetric Total Suspended Particulate Total Suspended Particulate	24000 4.6 110		0 2.1 50	L ug/m3 ug		27-DEC-19 31-DEC-19 31-DEC-19	R4955826 R4958530 R4958530
L2398897-12 041650 Sampled By: TMAC on 17-NOV-19 @ 23:59 Matrix: AIR Miscellaneous Parameters Air Volume, Client Supplied Total Particulate (TSP) by Gravimetric Total Suspended Particulate Total Suspended Particulate	24000 4.2 100		0 2.1 50	L ug/m3 ug		27-DEC-19 31-DEC-19 31-DEC-19	R4955826 R4958530 R4958530
L2398897-13 RP 027324 Sampled By: TMAC on 23-NOV-19 Matrix: AIR Miscellaneous Parameters Air Volume, Client Supplied Total Particulate (TSP) by Gravimetric Total Suspended Particulate	24000 <2.1		0 2.1	L ug/m3		27-DEC-19 31-DEC-19	R4955826 R4958530

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L2398897-13 RP 027324 Sampled By: TMAC on 23-NOV-19 Matrix: AIR Total Particulate (TSP) by Gravimetric Total Suspended Particulate	<50		50	ug		31-DEC-19	R4958530
L2398897-14 014358 Sampled By: TMAC on 29-NOV-19 Matrix: AIR Miscellaneous Parameters Air Volume, Client Supplied Total Particulate (TSP) by Gravimetric Total Suspended Particulate Total Suspended Particulate	24000 24.0 577		0 2.1 50	L ug/m3 ug		27-DEC-19 31-DEC-19 31-DEC-19	R4955826 R4958530 R4958530
L2398897-15 014368 Sampled By: TMAC on 05-DEC-19 Matrix: AIR Miscellaneous Parameters Air Volume, Client Supplied Total Particulate (TSP) by Gravimetric Total Suspended Particulate Total Suspended Particulate	24000 23.2 557		0 2.1 50	L ug/m3 ug		27-DEC-19 31-DEC-19 31-DEC-19	R4955826 R4958530 R4958530
L2398897-17 24950 Sampled By: TMAC on 12-SEP-19 @ 23:59 Matrix: AIR Miscellaneous Parameters Air Volume, Client Supplied Total Particulate (Dichot-PM10) by Grav. Particulate-Fine Particulate-Coarse Particulate-PM10 Particulate-Coarse	2400 5.2 3.8 9.0 103		0 2.3 2.1 3.1 50	L ug/m3 ug/m3 ug/m3 ug		27-DEC-19 31-DEC-19 31-DEC-19 31-DEC-19 31-DEC-19	R4955826 R4958536 R4958536 R4958536 R4958536
L2398897-18 27778 Sampled By: TMAC on 18-SEP-19 Matrix: AIR Miscellaneous Parameters Air Volume, Client Supplied Total Particulate (Dichot-PM10) by Grav. Particulate-Fine Particulate-Coarse Particulate-PM10 Particulate-Coarse	2400 <2.3 <2.1 <3.1 <50		0 2.3 2.1 3.1 50	L ug/m3 ug/m3 ug/m3 ug		27-DEC-19 31-DEC-19 31-DEC-19 31-DEC-19 31-DEC-19	R4955826 R4958536 R4958536 R4958536 R4958536
L2398897-19 014359 Sampled By: TMAC on 24-SEP-19 @ 23:59 Matrix: AIR Miscellaneous Parameters Air Volume, Client Supplied Total Particulate (Dichot-PM10) by Grav. Particulate-Fine Particulate-Coarse Particulate-PM10 Particulate-Coarse	2400 2.6 <2.1 4.2 <50		0 2.3 2.1 3.1 50	L ug/m3 ug/m3 ug/m3 ug		27-DEC-19 31-DEC-19 31-DEC-19 31-DEC-19 31-DEC-19	R4955826 R4958536 R4958536 R4958536 R4958536

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L2398897-20 015129 Sampled By: TMAC on 30-SEP-19 Matrix: AIR Miscellaneous Parameters Air Volume, Client Supplied Total Particulate (Dichot-PM10) by Grav. Particulate-Fine Particulate-Coarse Particulate-PM10 Particulate-Coarse	2400 <2.3 <2.1 <3.1 <50		0 2.3 2.1 3.1 50	L ug/m3 ug/m3 ug/m3 ug		27-DEC-19 31-DEC-19 31-DEC-19 31-DEC-19 31-DEC-19	R4955826 R4958536 R4958536 R4958536 R4958536
L2398897-21 016165 Sampled By: TMAC on 06-OCT-19 Matrix: AIR Miscellaneous Parameters Air Volume, Client Supplied Total Particulate (Dichot-PM10) by Grav. Particulate-Fine Particulate-Coarse Particulate-PM10 Particulate-Coarse	2400 <2.3 2.9 <3.1 70		0 2.3 2.1 3.1 50	L ug/m3 ug/m3 ug/m3 ug		27-DEC-19 31-DEC-19 31-DEC-19 31-DEC-19 31-DEC-19	R4955826 R4958536 R4958536 R4958536 R4958536
L2398897-22 015124 Sampled By: TMAC on 12-OCT-19 Matrix: AIR Miscellaneous Parameters Air Volume, Client Supplied Total Particulate (Dichot-PM10) by Grav. Particulate-Fine Particulate-Coarse Particulate-PM10 Particulate-Coarse	2400 <2.3 <2.1 <3.1 <50		0 2.3 2.1 3.1 50	L ug/m3 ug/m3 ug/m3 ug		27-DEC-19 31-DEC-19 31-DEC-19 31-DEC-19 31-DEC-19	R4955826 R4958536 R4958536 R4958536 R4958536
L2398897-23 015098 Sampled By: TMAC on 18-OCT-19 @ 23:59 Matrix: AIR Miscellaneous Parameters Air Volume, Client Supplied Total Particulate (Dichot-PM10) by Grav. Particulate-Fine Particulate-Coarse Particulate-PM10 Particulate-Coarse	2300 <2.3 8.8 9.4 213		0 2.3 2.1 3.1 50	L ug/m3 ug/m3 ug/m3 ug		27-DEC-19 31-DEC-19 31-DEC-19 31-DEC-19 31-DEC-19	R4955826 R4958536 R4958536 R4958536 R4958536
L2398897-24 015116 Sampled By: TMAC on 24-OCT-19 Matrix: AIR Miscellaneous Parameters Air Volume, Client Supplied Total Particulate (Dichot-PM10) by Grav. Particulate-Fine Particulate-Coarse Particulate-PM10 Particulate-Coarse	2400 <2.3 <2.1 <3.1 <50		0 2.3 2.1 3.1 50	L ug/m3 ug/m3 ug/m3 ug		27-DEC-19 31-DEC-19 31-DEC-19 31-DEC-19 31-DEC-19	R4955826 R4958536 R4958536 R4958536 R4958536
L2398897-25 015119 Sampled By: TMAC on 30-OCT-19 Matrix: AIR							

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L2398897-25 015119 Sampled By: TMAC on 30-OCT-19 Matrix: AIR Miscellaneous Parameters Air Volume, Client Supplied Total Particulate (Dichot-PM10) by Grav. Particulate-Fine Particulate-Coarse Particulate-PM10 Particulate-Coarse	 2400 <2.3 <2.1 <3.1 <50		 0 2.3 2.1 3.1 50	 L ug/m3 ug/m3 ug/m3 ug		 27-DEC-19 31-DEC-19 31-DEC-19 31-DEC-19 31-DEC-19	 R4955826 R4958536 R4958536 R4958536 R4958536
L2398897-26 015085 Sampled By: TMAC on 05-NOV-19 Matrix: AIR Miscellaneous Parameters Air Volume, Client Supplied Total Particulate (Dichot-PM10) by Grav. Particulate-Fine Particulate-Coarse Particulate-PM10 Particulate-Coarse	 2400 <2.3 <2.1 <3.1 <50		 0 2.3 2.1 3.1 50	 L ug/m3 ug/m3 ug/m3 ug		 27-DEC-19 31-DEC-19 31-DEC-19 31-DEC-19 31-DEC-19	 R4955826 R4958536 R4958536 R4958536 R4958536
L2398897-27 014370 Sampled By: TMAC on 11-NOV-19 Matrix: AIR Miscellaneous Parameters Air Volume, Client Supplied Total Particulate (Dichot-PM10) by Grav. Particulate-Fine Particulate-Coarse Particulate-PM10 Particulate-Coarse	 2400 <2.3 8.8 9.9 213		 0 2.3 2.1 3.1 50	 L ug/m3 ug/m3 ug/m3 ug		 27-DEC-19 31-DEC-19 31-DEC-19 31-DEC-19 31-DEC-19	 R4955826 R4958536 R4958536 R4958536 R4958536
L2398897-28 014369 Sampled By: TMAC on 17-NOV-19 Matrix: AIR Miscellaneous Parameters Air Volume, Client Supplied Total Particulate (Dichot-PM10) by Grav. Particulate-Fine Particulate-Coarse Particulate-PM10 Particulate-Coarse	 2400 <2.3 3.5 <3.1 83		 0 2.3 2.1 3.1 50	 L ug/m3 ug/m3 ug/m3 ug		 27-DEC-19 31-DEC-19 31-DEC-19 31-DEC-19 31-DEC-19	 R4955826 R4958536 R4958536 R4958536 R4958536
L2398897-29 015134 Sampled By: TMAC on 23-NOV-19 Matrix: AIR Miscellaneous Parameters Air Volume, Client Supplied Total Particulate (Dichot-PM10) by Grav. Particulate-Fine Particulate-Coarse Particulate-PM10 Particulate-Coarse	 2400 3.2 <2.1 3.2 <50		 0 2.3 2.1 3.1 50	 L ug/m3 ug/m3 ug/m3 ug		 27-DEC-19 31-DEC-19 31-DEC-19 31-DEC-19 31-DEC-19	 R4955826 R4958536 R4958536 R4958536 R4958536
L2398897-30 014361 Sampled By: TMAC on 29-NOV-19 Matrix: AIR							

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L2398897-30 014361 Sampled By: TMAC on 29-NOV-19 Matrix: AIR Miscellaneous Parameters Air Volume, Client Supplied Total Particulate (Dichot-PM10) by Grav. Particulate-Fine Particulate-Coarse Particulate-PM10 Particulate-Coarse	2400 5.1 <2.1 6.5 <50		0 2.3 2.1 3.1 50	L ug/m3 ug/m3 ug/m3 ug		27-DEC-19 31-DEC-19 31-DEC-19 31-DEC-19 31-DEC-19	R4955826 R4958536 R4958536 R4958536 R4958536
L2398897-31 015114 Sampled By: TMAC on 05-DEC-19 Matrix: AIR Miscellaneous Parameters Air Volume, Client Supplied Total Particulate (Dichot-PM10) by Grav. Particulate-Fine Particulate-Coarse Particulate-PM10 Particulate-Coarse	2400 7.3 <2.1 9.2 63		0 2.3 2.1 3.1 50	L ug/m3 ug/m3 ug/m3 ug		27-DEC-19 31-DEC-19 31-DEC-19 31-DEC-19 31-DEC-19	R4955826 R4958536 R4958536 R4958536 R4958536
L2398897-33 015115 Sampled By: TMAC on 12-SEP-19 @ 23:59 Matrix: AIR Miscellaneous Parameters Air Volume, Client Supplied Total Particulate (PM2.5) by Gravimetric Particulate - PM2.5 Particulate - PM2.5	21600 5.2 113		0 2.3 50	L ug/m3 ug		27-DEC-19 31-DEC-19 31-DEC-19	R4955826 R4958526 R4958526
L2398897-34 27309 Sampled By: TMAC on 18-SEP-19 Matrix: AIR Miscellaneous Parameters Air Volume, Client Supplied Total Particulate (PM2.5) by Gravimetric Particulate - PM2.5 Particulate - PM2.5	21600 <2.3 <50		0 2.3 50	L ug/m3 ug		27-DEC-19 31-DEC-19 31-DEC-19	R4955826 R4958526 R4958526
L2398897-35 015128 Sampled By: TMAC on 24-SEP-19 @ 23:59 Matrix: AIR Miscellaneous Parameters Air Volume, Client Supplied Total Particulate (PM2.5) by Gravimetric Particulate - PM2.5 Particulate - PM2.5	21600 2.6 57		0 2.3 50	L ug/m3 ug		27-DEC-19 31-DEC-19 31-DEC-19	R4955826 R4958526 R4958526
L2398897-36 015123 Sampled By: TMAC on 30-SEP-19 Matrix: AIR Miscellaneous Parameters Air Volume, Client Supplied Total Particulate (PM2.5) by Gravimetric Particulate - PM2.5 Particulate - PM2.5	21600 <2.3 <50		0 2.3 50	L ug/m3 ug		27-DEC-19 31-DEC-19 31-DEC-19	R4955826 R4958526 R4958526

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L2398897-37 016178 Sampled By: TMAC on 06-OCT-19 Matrix: AIR Miscellaneous Parameters Air Volume, Client Supplied Total Particulate (PM2.5) by Gravimetric Particulate - PM2.5 Particulate - PM2.5	 21600 <2.3 <50		 0 2.3 50	 L ug/m3 ug		 27-DEC-19 31-DEC-19 31-DEC-19	 R4955826 R4958526 R4958526
L2398897-38 015086 Sampled By: TMAC on 12-OCT-19 Matrix: AIR Miscellaneous Parameters Air Volume, Client Supplied Total Particulate (PM2.5) by Gravimetric Particulate - PM2.5 Particulate - PM2.5	 21600 <2.3 <50		 0 2.3 50	 L ug/m3 ug		 27-DEC-19 31-DEC-19 31-DEC-19	 R4955826 R4958526 R4958526
L2398897-39 015130 Sampled By: TMAC on 18-OCT-19 @ 23:59 Matrix: AIR Miscellaneous Parameters Air Volume, Client Supplied Total Particulate (PM2.5) by Gravimetric Particulate - PM2.5 Particulate - PM2.5	 21600 <2.3 <50		 0 2.3 50	 L ug/m3 ug		 27-DEC-19 31-DEC-19 31-DEC-19	 R4955826 R4958526 R4958526
L2398897-40 016187 Sampled By: TMAC on 24-OCT-19 Matrix: AIR Miscellaneous Parameters Air Volume, Client Supplied Total Particulate (PM2.5) by Gravimetric Particulate - PM2.5 Particulate - PM2.5	 21600 <2.3 <50		 0 2.3 50	 L ug/m3 ug		 27-DEC-19 31-DEC-19 31-DEC-19	 R4955826 R4958526 R4958526
L2398897-41 016182 Sampled By: TMAC on 30-OCT-19 Matrix: AIR Miscellaneous Parameters Air Volume, Client Supplied Total Particulate (PM2.5) by Gravimetric Particulate - PM2.5 Particulate - PM2.5	 21600 <2.3 <50		 0 2.3 50	 L ug/m3 ug		 27-DEC-19 31-DEC-19 31-DEC-19	 R4955826 R4958526 R4958526
L2398897-42 015094 Sampled By: TMAC on 05-NOV-19 Matrix: AIR Miscellaneous Parameters Air Volume, Client Supplied Total Particulate (PM2.5) by Gravimetric Particulate - PM2.5 Particulate - PM2.5	 21600 <2.3 <50		 0 2.3 50	 L ug/m3 ug		 27-DEC-19 31-DEC-19 31-DEC-19	 R4955826 R4958526 R4958526
L2398897-43 01617 Sampled By: TMAC on 11-NOV-19 Matrix: AIR Miscellaneous Parameters Air Volume, Client Supplied	 21600		 0	 L		 27-DEC-19	 R4955826

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L2398897-43 01617 Sampled By: TMAC on 11-NOV-19 Matrix: AIR Total Particulate (PM2.5) by Gravimetric Particulate - PM2.5 Particulate - PM2.5	<2.3 <50		2.3 50	ug/m3 ug		31-DEC-19 31-DEC-19	R4958526 R4958526
L2398897-44 016168 Sampled By: TMAC on 17-NOV-19 Matrix: AIR Miscellaneous Parameters Air Volume, Client Supplied Total Particulate (PM2.5) by Gravimetric Particulate - PM2.5 Particulate - PM2.5	21600 <2.3 <50		0 2.3 50	L ug/m3 ug		27-DEC-19 31-DEC-19 31-DEC-19	R4955826 R4958526 R4958526
L2398897-45 016184 Sampled By: TMAC on 23-NOV-19 Matrix: AIR Miscellaneous Parameters Air Volume, Client Supplied Total Particulate (PM2.5) by Gravimetric Particulate - PM2.5 Particulate - PM2.5	21600 3.2 70		0 2.3 50	L ug/m3 ug		27-DEC-19 31-DEC-19 31-DEC-19	R4955826 R4958526 R4958526
L2398897-46 016189 Sampled By: TMAC on 29-NOV-19 Matrix: AIR Miscellaneous Parameters Air Volume, Client Supplied Total Particulate (PM2.5) by Gravimetric Particulate - PM2.5 Particulate - PM2.5	21600 5.1 110		0 2.3 50	L ug/m3 ug		27-DEC-19 31-DEC-19 31-DEC-19	R4955826 R4958526 R4958526
L2398897-47 016183 Sampled By: TMAC on 05-DEC-19 Matrix: AIR Miscellaneous Parameters Air Volume, Client Supplied Total Particulate (PM2.5) by Gravimetric Particulate - PM2.5 Particulate - PM2.5	21600 7.3 157		0 2.3 50	L ug/m3 ug		27-DEC-19 31-DEC-19 31-DEC-19	R4955826 R4958526 R4958526

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

Reference Information

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
AIR VOLUME-VA	Misc.	Air volume (L)	HYGIENE METHOD
PART-DICHOT-PM10-VA	Filter	Total Particulate (Dichot-PM10) by Grav.	BCMOE Method
Total Particulate Matter (PM10) Method analysis is carried out in accordance with the BCMOE Lab Manual, Section G Air Constituents - Inorganics, "Total Particulate - PM10/PM02 - 47mm - HiVol" method. ALS provides pre-weighed filters (Pallflex TX40 HI20-WW 47mm) and clients typically sample using a "Dichotomus Partisol sequential Air Sampler" equivalent sample (EQPS-0509-179, EQPS-0509-180, EQPS-0311-198) as per U.S. EPA Reference Method RFPS-0694-098, fitted with a PM10 inlet. The particulate matter is determined gravimetrically. Three formulas are required for the mass concentration(um/M3) computation of fine PM(PM-2.5) Course PM (PM-10 minus PM2.5) and PM-10.			
PART-PM2.5-VA	Filter	Total Particulate (PM2.5) by Gravimetric	BCMOE METHOD
Total Particulate Matter (PM2.5) Method analysis is carried out in accordance with the BCMOE Lab Manual, Section G Air Constituents - Inorganics, "Total Particulate - PM10/PM02 - 47mm - HiVol" method. ALS provides pre-weighed filters (Pallflex TX40 HI20-WW 47mm) and clients typically sample using a "Partisol Model 2000 Air Sampler" as per U.S. EPA Reference Method RFPS-0694-098, fitted with a PM2.5 inlet. The particulate matter is determined gravimetrically.			
PART-TSP-VA	Filter	Total Particulate (TSP) by Gravimetric	BCMOE METHOD
Total Suspended Particulate Matter (TSP) Method of analysis is modified from the BCMOE Lab Manual, Section G Air Constituents - Inorganics, "Total Particulate - PM10/PM02 - 47mm - HiVol" method. ALS provides pre-weighed filters (Pallflex TX40 HI20-WW 47mm) and clients typically sample using a "Partisol Model 2000 Air Sampler" as per U.S. EPA Reference Method RFPS-0694-098, fitted with a TSP inlet. The particulate matter is determined gravimetrically.			

** 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
VA	ALS ENVIRONMENTAL - VANCOUVER, BRITISH COLUMBIA, CANADA

Chain of Custody Numbers:

GLOSSARY OF REPORT TERMS

Surrogates are compounds that are similar in behaviour to target analyte(s), but that do not normally occur in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery. In reports that display the D.L. column, laboratory objectives for surrogates are listed there.

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

mg/L - unit of concentration based on volume, parts per million.

< - Less than.

D.L. - The reporting limit.

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.



Quality Control Report

Workorder: L2398897

Report Date: 02-JAN-20

Page 1 of 2

Client: TMAC Resources Inc
Hope Bay Project 181 University Ave
Toronto ON M5H 3M7

Contact: Sarah Warnick/Kyle Conway

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
PART-PM2.5-VA		Filter						
Batch R4958526								
WG3252050-1 MB								
Particulate - PM2.5			<50		ug		50	31-DEC-19
PART-TSP-VA		Filter						
Batch R4958530								
WG3252051-1 MB								
Total Suspended Particulate			<50		ug		50	31-JAN-19

Quality Control Report

Workorder: L2398897

Report Date: 02-JAN-20

Page 2 of 2

Legend:

Limit	ALS Control Limit (Data Quality Objectives)
DUP	Duplicate
RPD	Relative Percent Difference
N/A	Not Available
LCS	Laboratory Control Sample
SRM	Standard Reference Material
MS	Matrix Spike
MSD	Matrix Spike Duplicate
ADE	Average Desorption Efficiency
MB	Method Blank
IRM	Internal Reference Material
CRM	Certified Reference Material
CCV	Continuing Calibration Verification
CVS	Calibration Verification Standard
LCSD	Laboratory Control Sample Duplicate

Hold Time Exceedances:

All test results reported with this submission were conducted within ALS recommended hold times.

ALS recommended hold times may vary by province. They are assigned to meet known provincial and/or federal government requirements. In the absence of regulatory hold times, ALS establishes recommendations based on guidelines published by the US EPA, APHA Standard Methods, or Environment Canada (where available). For more information, please contact ALS.

The ALS Quality Control Report is provided to ALS clients upon request. ALS includes comprehensive QC checks with every analysis to ensure our high standards of quality are met. Each QC result has a known or expected target value, which is compared against pre-determined data quality objectives to provide confidence in the accuracy of associated test results.

Please note that this report may contain QC results from anonymous Sample Duplicates and Matrix Spikes that do not originate from this Work Order.



Environmental Division

Report to:			Report Format / Distribution			Service Requested:		
Company: TMAC Resources Ltd (Hope Bay)			<input checked="" type="checkbox"/> Standard <input type="checkbox"/> Other			<input checked="" type="checkbox"/> Regular Service (Default)		
Contact: Sarah Warnick/Kyle Conway			<input checked="" type="checkbox"/> PDF <input checked="" type="checkbox"/> Excel <input type="checkbox"/> Fax			<input type="checkbox"/> Rush Service (2-3 Days)		
Address: 181 University Ave, Toronto, ON M5H 3M7			Email 1: Gregory.Crooks@stantec.com			<input type="checkbox"/> Priority Service (1 Day or ASAP)		
			Email 2: enviro.tmacresources.com			<input type="checkbox"/> Emergency Service (<1 Day / Wkend) - Contact ALS		
Phone: _____ Fax: _____						Analysis Request		
Invoice To: <input type="checkbox"/> Same as Report			Indicate Bottles: Filtered / Preserved (F/P) →					
Company: TMAC Resources Ltd (Hope Bay)			Client / Project Information:					
Contact: Accounts Payable			Job #:					
Address: 181 University Ave, Toronto, ON M5H 3M7			PO/AFE: 450001170					
			Legal Site Description:					
Phone: (416)628-0216 Fax: _____			Quote #:					
Lab Work Order # (lab use only) L2398897			ALS Contact: Amber Springer		Sampler (Initials): TMAC			
Sample #	Sample Identification (This description will appear on the report)	Date dd-mmm-yy	Sample Exposure Duration hh:mm	Sample Type (Select from drop-down list)	TSP			
	015121 24:0.m3	12-Sep-19	23:59	Air	X			
	014371 24:0.m3	18-Sep-19	24:00	Air	X			
	014360 24:0.m3	24-Sep-19	24:00	Air	X			
	015111 24:0.m3	30-Sep-19	24:00	Air	X			
	015122 24:0.m3	6-Oct-19	24:00	Air	X			
	016181 24:0.m3	12-Oct-19	24:00	Air	X			
	016190 24:0.m3	18-Oct-19	23:59	Air	X			
	016185 24:0.m3	24-Oct-19	24:00	Air	X			
	016186 24:0.m3	30-Oct-19	24:00	Air	X			
	015133 24:0.m3	5-Nov-19	24:00	Air	X			
	015117 24:0.m3	11-Nov-19	24:00	Air	X			
	041650 24:0.m3	17-Nov-19	23:59	Air	X			
	RP 027324 24:0.m3	23-Nov-19	24:00	Air	X			
	014358 24:0.m3	29-Nov-19	24:00	Air	X			
	014368 24:0.m3	5-Dec-19	24:00	Air	X			
NOTE!! Do not analyze any other filters not on the CoC								
	27578			DO NOT ANALYZE				
Guidelines / Regulations			Special Instructions / Hazardous Details					
			NOTE: Please do not put the cubic metres of air sampled on the sample identification, only use for analysis!!!!					
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 specified on the adjacent worksheet.								
Relinquished By:	Brian McCordle B	Date & Time:	2019-12-19 / 07:30	Received By:	WC	Date & Time:	12/20/19 1130	Sample Condition (lab use only)
Relinquished By:		Date & Time:		Received By:		Date & Time:		Temperature
Relinquished By:		Date & Time:		Received By:		Date & Time:		7.6
								Samples Received in Good Condition? Y / N (if no provided details)



L2398897-COFC

TH 27 DEC 19 11:05 AM 7°C
700 PCKY

Report to:			Report Format / Distribution			Service Requested:													
Company: TMAC Resources Ltd (Hope Bay)						<input checked="" type="checkbox"/> Regular Service (Default) <input type="checkbox"/> Rush Service (2-3 Days) <input type="checkbox"/> Priority Service (1 Day or ASAP) <input type="checkbox"/> Emergency Service (<1 Day / Wkend) - Contact ALS													
Contact: Sarah Warnick/Kyle Conway																			
Address: 181 University Ave, Toronto, ON M5H 3M7			Email 1: Gregory.Crooks@stantec.com																
			Email 2: enviro.tmacresources.com																
Phone: Fax:						Analysis Request													
Invoice To:			Indicate Bottles: Filtered / Preserved (F/P) →																
Company: TMAC Resources Ltd (Hope Bay)			Client / Project Information:																
Contact: Accounts Payable			Job #:																
Address: 181 University Ave, Toronto, ON M5H 3M7			PO/AFE: 450001170																
			Legal Site Description:																
Phone: (416)628-0216 Fax:			Quote #:																
Lab/Work/Order/ # (lab use only)			ALS Contact: Amber Springer		Sampler (Initials): TMAC														
Sample	Sample Identification		Date	Sample Exposure Duration	Sample Type	PM 10													
#	(This description will appear on the report)		dd-mmm-yy	hh:mm	(Select from drop-down list)														
	24950	2.4m ³	12-Sep-19	23:59	Air		X												
	27778	2.4m ³	18-Sep-19	24:00	Air		X												
	014359	2.4m ³	24-Sep-19	23:59	Air		X												
	015129	2.4m ³	30-Sep-19	24:00	Air		X												
	016165	2.4m ³	6-Oct-19	24:00	Air		X												
	015124	2.4m ³	12-Oct-19	24:00	Air		X												
	015098	2.3m ³	18-Oct-19	23:59	Air		X												
	015116	2.4m ³	24-Oct-19	24:00	Air		X												
	015119	2.4m ³	30-Oct-19	24:00	Air		X												
	015085	2.4m ³	5-Nov-19	24:00	Air		X												
	014370	2.4m ³	11-Nov-19	24:00	Air		X												
	014369	2.4m ³	17-Nov-19	24:00	Air		X												
	015134	2.4m ³	23-Nov-19	24:00	Air		X												
	014361	2.4m ³	29-Nov-19	24:00	Air		X												
	015114	2.4m ³	5-Dec-19	24:00	Air		X												
NOTE!! Do not analyze any other filters not on the CoC																			
	41655	2.4m ³	DO NOT ANALYZE																
Guidelines / Regulations			Special Instructions / Hazardous Details																
NOTE: Please do not put the cubic metres of air sampled on the sample identification, only use for analysis!!!!																			
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 specified on the adjacent worksheet.																			
Relinquished By:	Brian McCardle	Date & Time:	2019-12-19 / 07:30	Received By:		Date & Time:		Sample Condition (lab use only)											
Relinquished By:		Date & Time:		Received By:		Date & Time:		Temperature	Samples Received in Good Condition? Y / N (if no provided details)										

JK 27 Dec 19 11:05 AM 70°



Environmental Division

Report to:				Report Format / Distribution				Service Requested:			
Company: TMAC Resources Ltd (Hope Bay)								<input checked="" type="checkbox"/> Regular Service (Default)			
Contact: Sarah Warnick/Kyle Conway								Rush Service (2-3 Days)			
Address: 181 University Ave, Toronto, ON M5H 3M7				Email 1: <u>Gregory.Crooks@stantec.com</u>				Priority Service (1 Day or ASAP)			
				Email 2: <u>enviro.tmacresources.com</u>				Emergency Service (<1 Day / Wkend) - Contact ALS			
Phone: (416)628-0216 Fax:								Analysis Request			
Invoice To:				Indicate Bottles: Filtered / Preserved (F/P) →							
Company: TMAC Resources Ltd (Hope Bay)				Client / Project Information:							
Contact: Accounts Payable				Job #:							
Address: 181 University Ave, Toronto, ON M5H 3M7				PO/AFE: 450001170							
				Legal Site Description:							
Phone: (416)628-0216 Fax:				Quote #:							
Lab Work Order #				ALS Contact: Amber Springer		Sampler (Initials): TMAC					
(lab use only)											
Sample	Sample Identification			Date	Sample Exposure Duration	Sample Type					
#	(This description will appear on the report)			dd-mmm-yy	hh:mm	(Select from drop-down list)					
	015115	216.m43		12-Sep-19	23:59	Air	X				
	27309	216.m43		18-Sep-19	24:00	Air	X				
	015128	216.m43		24-Sep-19	23:59	Air	X				
	015123	216.m43		30-Sep-19	24:00	Air	X				
	016178	216.m43		6-Oct-19	24:00	Air	X				
	015086	216.m43		12-Oct-19	24:00	Air	X				
	015130	216.m43		18-Oct-19	23:59	Air	X				
	016187	216.m43		24-Oct-19	24:00	Air	X				
	016182	216.m43		30-Oct-19	24:00	Air	X				
	015094	216.m43		5-Nov-19	24:00	Air	X				
	016167	216.m43		11-Nov-19	24:00	Air	X				
	016168	216.m43		17-Nov-19	24:00	Air	X				
	016184	216.m43		23-Nov-19	24:00	Air	X				
	016189	216.m43		29-Nov-19	24:00	Air	X				
	016183	216.m43		5-Dec-19	24:00	Air	X				
NOTE!! Do not analyze any other filters not on the CoC											
	10070		DO NOT ANALYZE								
Guidelines / Regulations						Special Instructions / Hazardous Details					
NOTE: Please do not put the cubic metres of air sampled on the sample identification, only use for analysis!!!!											
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 specified on the adjacent worksheet.											
Relinquished By:	Brian McCardle	Date & Time:	2019-12-19 / 07:30	Received By:		Date & Time:		Sample Condition (lab use only)			
Relinquished By:		Date & Time:		Received By:		Date & Time:		Temperature	Samples Received in Good Condition? Y / N (if no provided details)		



L2398897-COFC

APPENDIX D

Partisol Sampler Calibration Records

2025D (PM10/PM2.5) Partisol Calibration Inspection

Instrument Serial Number 202DA202970801

Date 21-Jul-19
Time 13:08
Partisol Sampler Date 21-Jul-19
Partisol Sampler Time 13:19

Error Codes (Top Left Hand Corner) OK
Mode (Top Right Hand Corner) WAIT

Next sampling date 26-Jul-19
PM10 Low Flow (front) PM2.5 (back)
Top Filter in Supply Magazine 27218
Top Filter in Receiving Magazine 24901
Filter in Sample Position 24542

Top Filter in Supply Magazine 25064
Top Filter in Receiving Magazine O10327
Filter in Sample Position O57298

Description	As found on Audit Screen	Standard as Measured	Variance	Allowable variance	Adjusted to	Final variance
Ambient Air Temperature	27.5	26	-1.50	+/- 2°C		26.00
Ambient Pressure	756	755	1.00	+/- 10 mmHg		-755.00
Filter Compartment Temp #1	27.6	27.5	-0.10	+/- 2°C		27.50
Filter Compartment Temp #2	27.5	27.6	0.10	+/- 2°C		27.60
External Leak Check	9		Pass	25 mmHg		Pass
Ambient Relative Humidity			#DIV/0!	+/- 1.5%		#DIV/0!
Initial Flow #1 Verification (before Calibration)	14.69	15	2.11%	+/- 5%		
Flow #1 Calibration, point 1	14.4	15	4.17%	+/- 5%		-100.00%
Flow #1 Calibration, point 2	13.47	13.5	0.22%	+/- 5%		-100.00%
Flow #1 Calibration, point 3	16.35	16.5	0.92%	+/- 5%		-100.00%
Final Flow #1 Verification (after Calibration)	14.97	15	0.20%	+/- 5%		0.20%
Initial Flow #2 Verification (before Calibration)	1.9	1.67	-12.11%	+/- 5%		
Flow #2 Calibration, point 1	1.77	1.67	-5.65%	+/- 5%		-100.00%
Flow #2 Calibration, point 2	1.5	1.5	0.00%	+/- 5%		-100.00%
Flow #2 Calibration, point 3	1.95	1.84	-5.64%	+/- 5%		-100.00%
Final Flow #2 Verification (after Calibration)	1.71	1.67	-2.34%	+/- 5%		-2.34%

Loud vibration noise when valve closed to perform flow verification
Performed 3 calibrations of flow #2

Standards Used	Description	S/N	Calibration Date
Flow	Flow Transfer Standard	70519	14-Dec-16
Temperature	Hygro/Therm/Baro/Dew Point Pen	160371938	15-Apr-16
Pressure	Hygro/Therm/Baro/Dew Point Pen	160371938	15-Apr-16
Relative Humidity	Hygro/Therm/Baro/Dew Point Pen	160371938	15-Apr-16
Technical Data			

Calibration Complete By

Signature: _____

Maintenance Work

Inspect and Clean "V" Seals and O-Rings
Exchange Particle Trap filter
Replace Batteries
Exchange Fuses
Cleaning Air Intake Filters
Rebuild Pumps
Clean TSP Sample Inlet and Tube

Frequency

Every 3 months
Every 6 months
Every 6-12 months
As needed
Every 6 months
Every 6 months
Every 3 months

Sensor Calibration

Current	Actual	Offset
Amb Temp		
Amb Pres		
Amb RH		
Filt Comp		
Filter 1		
Filter 2		

2025D (PM10/PM2.5) Partisol Calibration Inspection
Instrument Serial Number 202DA202970801
Date 24-Aug-19
Time 11:00 CLEAN AND CHECK V-SEALS. CLEAN SAMPLE TUBES
Partisol Sampler Date 24-Aug-19
Partisol Sampler Time 11:10
Error Codes (Top Left Hand Corner) OK
Mode (Top Right Hand Corner) WAIT
Next sampling date
PM10 Low Flow (front) PM2.5 (back)
Top Filter in Supply Magazine O41678 Top Filter in Supply Magazine O34143
Top Filter in Receiving Magazine 27295 Top Filter in Receiving Magazine O57304
Filter in Sample Position 13080 Filter in Sample Position 15172

Description	As found on Audit Screen	Standard as Measured	Variance	Allowable variance	Adjusted to	Final variance
Ambient Air Temperature	15.4	10.7	10.7	-4.70 +/- 2°C		10.70
Ambient Pressure	750	749		-1.00 +/- 10 mmHg		#REF!
Filter Compartment Temp #1	14.3	14.5	14.5	0.20 +/- 2°C		14.50
Filter Compartment Temp #2	14.5	14.4	14.4	-0.10 +/- 2°C		14.40
External Leak Check	6			Pass 25 mmHg		Pass
Ambient Relative Humidity	30.5	64.7	112.13%	+/- 1.5%		-100.00%
Initial Flow #1 Verification (before Calibration)	14.97	15	0.20%	+/- 5%		
Flow #1 Calibration, point 1			#DIV/0!	+/- 5%		#DIV/0!
Flow #1 Calibration, point 2			#DIV/0!	+/- 5%		#DIV/0!
Flow #1 Calibration, point 3			#DIV/0!	+/- 5%		#DIV/0!
Final Flow #1 Verification (after Calibration)			#DIV/0!	+/- 5%		#DIV/0!
Initial Flow #2 Verification (before Calibration)	1.6	1.67	4.38%	+/- 5%		
Flow #2 Calibration, point 1			#DIV/0!	+/- 5%		#DIV/0!
Flow #2 Calibration, point 2			#DIV/0!	+/- 5%		#DIV/0!
Flow #2 Calibration, point 3			#DIV/0!	+/- 5%		#DIV/0!
Final Flow #2 Verification (after Calibration)			#DIV/0!	+/- 5%		#DIV/0!

Standards Used	Description	S/N	Calibration Date
Flow	Flow Transfer Standard	70519	14-Dec-16
Temperature	Hygro/Therm/Baro/Dew Point Pen	160371938	15-Apr-16
Pressure	Hygro/Therm/Baro/Dew Point Pen	160371938	15-Apr-16
Relative Humidity	Hygro/Therm/Baro/Dew Point Pen	160371938	15-Apr-16
Technical Data			

Calibration Complete By

Signature: _____

Maintenance Work	Frequency	
Inspect and Clean "V" Seals and O-Rings	Every 3 months	Completed
Exchange Particle Trap filter	Every 6 months	
Replace Batteries	Every 6-12 months	
Exchange Fuses	As needed	
Cleaning Air Intake Filters	Every 6 months	
Rebuild Pumps	Every 6 months	
Clean Sample Inlet and Tube	Every 3 months	Completed

Sensor Calibration	Current	Actual	Offset
Amb Temp	15.4	10.7	1.92
Amb Pres	750	749	-4.1
Amb RH	30.5	64.7	Too far outside range to calibrate
Filt Comp	19.1	18.4	-1.41
Filter 1	14.3	14.5	1.19
Filter 2	14.7	14.4	0.47

2025D (PM10/PM2.5) Partisol Calibration Inspection

Instrument Serial Number 202DA202970801

Date 21-Sep-19

Time 15:45

Partisol Sampler Date 21-Sep-19

Partisol Sampler Time 16:00

Error Codes (Top Left Hand Corner) RR

Mode (Top Right Hand Corner) WAIT

Next sampling date 24-Sep-19

PM10 Low Flow (front) PM2.5 (back)

Top Filter in Supply Magazine O15129

Top Filter in Receiving Magazine 27778

Filter in Sample Position O14359

Top Filter in Supply Magazine O15123

Top Filter in Receiving Magazine 27309

Filter in Sample Position O15128

Description	As found on Audit Screen	Standard as Measured	Variance	Allowable variance	Adjusted to	Final variance
Ambient Air Temperature	3.3	4.5	1.20	+/- 2°C		4.50
Ambient Pressure	752	753	-1.00	+/- 10 mmHg		-753.00
Filter Compartment Temp #1	23.5	23.2	-0.30	+/- 2°C		23.20
Filter Compartment Temp #2	23.3	23.1	-0.20	+/- 2°C		23.10
External Leak Check	9		Pass	25 mmHg		Pass
Ambient Relative Humidity			#DIV/0!	+/- 1.5%		#DIV/0!
Initial Flow #1 Verification (before Calibration)	15.38	15	-2.47%	+/- 5%		
Flow #1 Calibration, point 1	14.83	15	1.15%	+/- 5%		-100.00%
Flow #1 Calibration, point 2	13.47	13.5	0.22%	+/- 5%		-100.00%
Flow #1 Calibration, point 3	16.47	16.5	0.18%	+/- 5%		-100.00%
Final Flow #1 Verification (after Calibration)	14.94	15	0.40%	+/- 5%		0.40%
Initial Flow #2 Verification (before Calibration)	1.44	1.67	15.97%	+/- 5%		
Flow #2 Calibration, point 1	1.7	1.67	-1.76%	+/- 5%		-100.00%
Flow #2 Calibration, point 2	1.44	1.5	4.17%	+/- 5%		-100.00%
Flow #2 Calibration, point 3	1.81	1.84	1.66%	+/- 5%		-100.00%
Final Flow #2 Verification (after Calibration)	1.7	1.67	-1.76%	+/- 5%		-1.76%
Standards Used	Description	S/N	Calibration Date			
Flow	Flow Transfer Standard	70519	14-Dec-16			
Temperature	Hygro/Therm/Baro/Dew Point Pen	160371938	15-Apr-16			
Pressure	Hygro/Therm/Baro/Dew Point Pen	160371938	15-Apr-16			
Relative Humidity	Hygro/Therm/Baro/Dew Point Pen	160371938	15-Apr-16			
Technical Data						

Calibration Complete By

Signature: _____

Maintenance Work

Inspect and Clean "V" Seals and O-Rings

Exchange Particle Trap filter

Replace Batteries

Exchange Fuses

Cleaning Air Intake Filters

Rebuild Pumps

Clean TSP Sample Inlet and Tube

Frequency

Every 3 months

Every 6 months

Every 6-12 months

As needed

Every 6 months

Every 6 months

Every 3 months

Sensor Calibration**Current****Actual****Offset**

Amb Temp

Amb Pres

Amb RH

Filt Comp

Filter 1

Filter 2

2025D (PM10/PM2.5) Partisol Calibration Inspection

Instrument Serial Number 202DA202970801

Date 14-Oct-19
 Time 10:05
 Partisol Sampler Date 14-Oct-19
 Partisol Sampler Time 10:15
 Error Codes (Top Left Hand Corner) RR
 Mode (Top Right Hand Corner) WAIT
 Next sampling date 18-Oct-19
 PM10 Low Flow (front)
 Top Filter in Supply Magazine O15116
 Top Filter in Receiving Magazine O15124
 Filter in Sample Position O15098

PM2.5 (back)
 Top Filter in Supply Magazine O16187
 Top Filter in Receiving Magazine O15086
 Filter in Sample Position O15130

Description	As found on Audit Screen	Standard as Measured	Variance	Allowable variance	Adjusted to	Final variance
Ambient Air Temperature	-2.7	-1.3	1.40	+/- 2°C		-1.30
Ambient Pressure	763	764	-1.00	+/- 10 mmHg		-764.00
Filter Compartment Temp #1	14.6	14.5	-0.10	+/- 2°C		14.50
Filter Compartment Temp #2	14.6	14.5	-0.10	+/- 2°C		14.50
External Leak Check	10		Pass	25 mmHg		Pass
Ambient Relative Humidity	18.5	38	105.41%	+/- 1.5%		-100.00%
Initial Flow #1 Verification (before Calibration)	14.76	15	1.63%	+/- 5%		
Flow #1 Calibration, point 1	14.64	15	2.46%	+/- 5%		-100.00%
Flow #1 Calibration, point 2	13.5	13.5	0.00%	+/- 5%		-100.00%
Flow #1 Calibration, point 3	16.54	16.5	-0.24%	+/- 5%		-100.00%
Final Flow #1 Verification (after Calibration)	14.98	15	0.13%	+/- 5%		0.13%
Initial Flow #2 Verification (before Calibration)	1.67	1.67	0.00%	+/- 5%		
Flow #2 Calibration, point 1	1.67	1.67	#REF!	+/- 5%		-100.00%
Flow #2 Calibration, point 2	1.55	1.5	7.74%	+/- 5%		-100.00%
Flow #2 Calibration, point 3	1.89	1.84	-2.65%	+/- 5%		-100.00%
Final Flow #2 Verification (after Calibration)	1.67	1.67	0.00%	+/- 5%		0.00%

Standards Used	Description	S/N	Calibration Date
Flow	Flow Transfer Standard	70519	14-Dec-16
Temperature	Hygro/Therm/Baro/Dew Point Pen	160371938	15-Apr-16
Pressure	Hygro/Therm/Baro/Dew Point Pen	160371938	15-Apr-16
Relative Humidity	Hygro/Therm/Baro/Dew Point Pen	160371938	15-Apr-16
Technical Data			

Calibration Complete By

Signature: _____

Maintenance Work

	Frequency	
Inspect and Clean "V" Seals and O-Rings	Every 3 months	
Exchange Particle Trap filter	Every 6 months	
Replace Batteries	Every 6-12 months	Completed
Exchange Fuses	As needed	
Cleaning Air Intake Filters	Every 6 months	
Rebuild Pumps	Every 6 months	Completed. Plastic of pump intake filter snapped at thread.
Clean TSP Sample Inlet and Tube	Every 3 months	

Sensor Calibration

	Current	Actual	Offset	
Amb Temp	-2.7	-1.3	3.23	
Amb Pres	763	764	-3.3	
Amb RH	18.5	38		Constant out of range. Will not calibrate
Filt Comp	12.4	14.2	0.32	
Filter 1	14.6	14.5	1.15	
Filter 2	14.6	14.5	0.51	

2025D (PM10/PM2.5) Partisol Calibration Inspection

Instrument Serial Number 202DA202970801

Date 16-Nov-19

Time 14:10

Partisol Sampler Date 16-Nov-19

Partisol Sampler Time 15:20

Error Codes (Top Left Hand Corner) RR

Mode (Top Right Hand Corner) WAIT

Next sampling date 17-Nov-19

PM10 Low Flow (front)

Top Filter in Supply Magazine O15134

Top Filter in Receiving Magazine O14370

Filter in Sample Position O14369

PM2.5 (back)

Top Filter in Supply Magazine O16184

Top Filter in Receiving Magazine O16167

Filter in Sample Position O16168

Description	As found on Audit Screen	Standard as Measured	Variance	Allowable variance	Adjusted to	Final variance
Ambient Air Temperature	-17	-15.7	1.30	+/- 2°C		-15.70
Ambient Pressure	759	759.7	-0.70	+/- 10 mmHg		-759.70
Filter Compartment Temp #1	8	8.3	0.30	+/- 2°C		8.30
Filter Compartment Temp #2	7.9	8.4	0.50	+/- 2°C		8.40
External Leak Check	13		Pass	25 mmHg		Pass
Ambient Relative Humidity			#DIV/0!	+/- 1.5%		#DIV/0!
Initial Flow #1 Verification (before Calibration)	15.23	15	-1.51%	+/- 5%		
Flow #1 Calibration, point 1			#DIV/0!	+/- 5%		#DIV/0!
Flow #1 Calibration, point 2			#DIV/0!	+/- 5%		#DIV/0!
Flow #1 Calibration, point 3			#DIV/0!	+/- 5%		#DIV/0!
Final Flow #1 Verification (after Calibration)			#DIV/0!	+/- 5%		#DIV/0!
Initial Flow #2 Verification (before Calibration)	1.62	1.67	3.09%	+/- 5%		
Flow #2 Calibration, point 1			#DIV/0!	+/- 5%		#DIV/0!
Flow #2 Calibration, point 2			#DIV/0!	+/- 5%		#DIV/0!
Flow #2 Calibration, point 3			#DIV/0!	+/- 5%		#DIV/0!
Final Flow #2 Verification (after Calibration)			#DIV/0!	+/- 5%		#DIV/0!

Standards Used	Description	S/N	Calibration Date
Flow	Flow Transfer Standard	70519	14-Dec-16
Temperature	Hygro/Therm/Baro/Dew Point Pen	160371938	15-Apr-16
Pressure	Hygro/Therm/Baro/Dew Point Pen	160371938	15-Apr-16
Relative Humidity	Hygro/Therm/Baro/Dew Point Pen	160371938	15-Apr-16
Technical Data			

Calibration Complete By

Signature: _____

Maintenance Work

Inspect and Clean "V" Seals and O-Rings
 Exchange Particle Trap filter
 Replace Batteries
 Exchange Fuses
 Cleaning Air Intake Filters
 Rebuild Pumps
 Clean TSP Sample Inlet and Tube

Frequency

Every 3 months
 Every 6 months
 Every 6-12 months
 As needed
 Every 6 months
 Every 6 months
 Every 3 months

Sensor Calibration**Current****Actual****Offset**

Amb Temp
 Amb Pres
 Amb RH
 Filt Comp
 Filter 1
 Filter 2

2025D (PM10/PM2.5) Partisol Calibration Inspection

Instrument Serial Number 202DA202970801

Date	7-Dec-19
Time	1:35
Partisol Sampler Date	7-Dec-19
Partisol Sampler Time	14:50
Error Codes (Top Left Hand Corner) RRX	Filter exchange mechanism error. Last filter of sample set moved into sample position after last sample and entered error mode.
Mode (Top Right Hand Corner) ERR	Put into STOP mode. Cleared error codes. Completed audit from STOP mode.
Next sampling date	11-Dec-19
PM10 Low Flow (front)	PM2.5 (back)
Top Filter in Supply Magazine Empty	Top Filter in Supply Magazine Empty
Top Filter in Receiving Magazine O15114	Top Filter in Receiving Magazine O16183
Filter in Sample Position O15103	Filter in Sample Position 27809

Description	As found on Audit Screen	Standard as Measured	Variance	Allowable variance	Adjusted to	Final variance
Ambient Air Temperature	-23.7	-21.5	-2.20	+/- 2°C		-21.50 Calibrated
Ambient Pressure	756	757.1	-1.10	+/- 10 mmHg		-757.10
Filter Compartment Temp #1	4.2	4.1	-0.10	+/- 2°C		4.10
Filter Compartment Temp #2	4.1	4	-0.10	+/- 2°C		4.00
External Leak Check	13		Pass	25 mmHg		Pass
Ambient Relative Humidity			#DIV/0!	+/- 1.5%		#DIV/0!
Initial Flow #1 Verification (before Calibration)	15.28	15	-1.83%	+/- 5%		
Flow #1 Calibration, point 1	14.96	15	0.27%	+/- 5%		-100.00%
Flow #1 Calibration, point 2	13.43	13.5	0.52%	+/- 5%		-100.00%
Flow #1 Calibration, point 3	16.42	16.5	0.49%	+/- 5%		-100.00%
Final Flow #1 Verification (after Calibration)	14.92	15	0.54%	+/- 5%		0.54%
Initial Flow #2 Verification (before Calibration)	1.82	1.67	-8.24%	+/- 5%		
Flow #2 Calibration, point 1	1.6	1.67	4.38%	+/- 5%		-100.00%
Flow #2 Calibration, point 2	1.48	1.5	1.35%	+/- 5%		-100.00%
Flow #2 Calibration, point 3	1.82	1.84	1.10%	+/- 5%		-100.00%
Final Flow #2 Verification (after Calibration)	1.6	1.67	4.38%	+/- 5%		4.38%

Standards Used	Description	S/N	Calibration Date
Flow	Flow Transfer Standard	70519	14-Dec-16
Temperature	Hygro/Therm/Baro/Dew Point Pen	160371938	15-Apr-16
Pressure	Hygro/Therm/Baro/Dew Point Pen	160371938	15-Apr-16
Relative Humidity	Hygro/Therm/Baro/Dew Point Pen	160371938	15-Apr-16
Technical Data			

Calibration Complete By

Signature: _____

Maintenance Work

Inspect and Clean "V" Seals and O-Rings	Frequency
Exchange Particle Trap filter	Every 3 months
Replace Batteries	Every 6 months
Exchange Fuses	Every 6-12 months
Cleaning Air Intake Filters	As needed
Rebuild Pumps	Every 6 months
Clean TSP Sample Inlet and Tube	Every 6 months
	Every 3 months

Sensor Calibration

Current	Actual	Offset
Amb Temp	-23.7	-21.5 5.34
Amb Pres		
Amb RH		
Filt Comp		
Filter 1		
Filter 2		

2025 (TSP) Partisol Calibration Inspection

Instrument Serial Number 2025B221230801

Date 21-Jul-19

Time 13:00

Partisol Sampler Date 21-Jul-19

Partisol Sampler Time 11:22

Error Codes (Top Left Hand Corner) OK

Mode (Top Right Hand Corner) WAIT

Next sampling date 26-Jul-19

Top Filter in Supply Magazine 009899

Top Filter in Receiving Magazine 27806

Filter in Sample Position 057312

Description	As found	Standard	As found variance	Allowable variance	Adjusted to	Final variance	Comments
Ambient Air Temperature		24.4	24.6	0.20 +/- 2°C		24.60	
Ambient Pressure		755	754.9	0.10 +/- 10 mmHg		-754.90	
Filter Compartment Temp		25	25.1	0.10 +/- 2°C		25.10	
External Leak Check		31		25 mmHg		Pass	Continues to fail leak check but leak does not appear to be getting worse
Ambient Relative Humidity		11.9	50	320.17% +/- 1.5%		-100.00%	No calibration completed. Outside range
Initial Flow Verification (before Calibration)		16.35	16.7	2.14% +/- 5%			
Flow Calibration, point 1				#DIV/0! +/- 5%		#DIV/0!	
Flow Calibration, point 2				#DIV/0! +/- 5%		#DIV/0!	
Flow Calibration, point 3				#DIV/0! +/- 5%		#DIV/0!	
Final Flow Verification (after Calibration)				#DIV/0! +/- 5%		#DIV/0!	
Internal Leak Check		106		140 mmHg		Pass	

Standards Used	Description	S/N	Calibration Date
Flow	FTS Standard	70519	14-Dec-16
Temperature	Hygro/Therm/Baro/Dew Point Per	1.6E+08	15-Apr-16
Pressure	Hygro/Therm/Baro/Dew Point Per	1.6E+08	15-Apr-16
Relative Humidity	Hygro/Therm/Baro/Dew Point Per	1.6E+08	15-Apr-16
Technical Data			

Firmware updated to file

Calibration Complete By

Signature: _____

Maintenance Work**Frequency**

Inspect and Clean "V" Seals and O-Rings	Every 3 months
Exchange Particle Trap filter	Every 6 months
Replace Batteries	Every 6-12 months
Exchange Fuses	As needed
Cleaning Air Intake Filters	Every 6 months
Rebuild Pumps	Every 6 months
Clean TSP Sample Inlet and Tube	Every 3 months

Sensor Calibration Information**Current****Actual****Offset**

Amb Temp
Amb Pres
Amb RH
Filt Comp
Filter

2025 (TSP) Partisol Calibration Inspection
Instrument Serial Number 2025B221230801

Date 24-Aug-19
Time 10:40 CLEAN AND CHECK VSEALS. CLEAN SAMPLE TUBE
Partisol Sampler Date 24-Aug-19
Partisol Sampler Time 9:00
Error Codes (Top Left Hand Corner) OK
Mode (Top Right Hand Corner) WAIT
Next sampling date 25-Aug-19
Top Filter in Supply Magazine 27774
Top Filter in Receiving Magazine 27571
Filter in Sample Position O41677

Description	As found	Standard	As found variance	Allowable variance	Adjusted to	Final variance	Comments
Ambient Air Temperature	14.5	10.7	-3.80	+/- 2°C		10.70	
Ambient Pressure	750	749.3	0.70	+/- 10 mmHg		-749.30	
Filter Compartment Temp	13.5	14.2	0.70	+/- 2°C		14.20	
External Leak Check	32			25 mmHg		Pass	Continues to fail leak check but leak does not appear to be getting worse
Ambient Relative Humidity			#DIV/0!	+/- 1.5%		#DIV/0!	
Initial Flow Verification (before Calibration)	16.32	16.7	2.33%	+/- 5%			
Flow Calibration, point 1			#DIV/0!	+/- 5%		#DIV/0!	
Flow Calibration, point 2			#DIV/0!	+/- 5%		#DIV/0!	
Flow Calibration, point 3			#DIV/0!	+/- 5%		#DIV/0!	
Final Flow Verification (after Calibration)			#DIV/0!	+/- 5%		#DIV/0!	
Internal Leak Check	83			140 mmHg		Pass	

Standards Used	Description	S/N	Calibration Date
Flow	FTS Standard	70519	14-Dec-16
Temperature	Hygro/Therm/Baro/Dew Point Pen	160371938	15-Apr-16
Pressure	Hygro/Therm/Baro/Dew Point Pen	160371938	15-Apr-16
Relative Humidity	Hygro/Therm/Baro/Dew Point Pen	160371938	15-Apr-16
Technical Data			

Firmware updated to file
Calibration Complete By

Signature: _____

Maintenance Work

Frequency	
Inspect and Clean "V" Seals and O-Rings	Completed
Exchange Particle Trap filter	
Replace Batteries	
Exchange Fuses	As needed
Cleaning Air Intake Filters	Every 6 months
Rebuild Pumps	Every 6 months
Clean TSP Sample Inlet and Tube	Completed

Sensor Calibration Information

Current	Actual	Offset
Amb Temp	14.5	10.7
Amb Pres	750	749
Amb RH	13.7	64
Filt Comp	16.9	17.9
Filter	13.5	14.2

2.65
1.9
Too far outside range to calibrate
0.66
0.56

2025 (TSP) Partisol Calibration Inspection
Instrument Serial Number 2025B221230801
Date 21-Sep-19
Time 15:45
Partisol Sampler Date 21-Sep-19
Partisol Sampler Time 14:00
Error Codes (Top Left Hand Corner) R
Mode (Top Right Hand Corner) WAIT
Next sampling date 24-Sep-19
Top Filter in Supply Magazine O15111
Top Filter in Receiving Magazine O14371
Filter in Sample Position O14360

Description	As found	Standard	As found variance	Allowable variance	Adjusted to	Final variance	Comments
Ambient Air Temperature		3.7	4.5	0.80 +/- 2°C		4.50	
Ambient Pressure		752	753	-1.00 +/- 10 mmHg		-753.00	
Filter Compartment Temp		23.2	22.6	-0.60 +/- 2°C		22.60	
External Leak Check		26		25 mmHg		Pass	Continues to fail leak check, although leak rate less than previous month
Ambient Relative Humidity				#DIV/0! +/- 1.5%		#DIV/0!	
Initial Flow Verification (before Calibration)	16.84	16.7		-0.83%			
Flow Calibration, point 1				#DIV/0! +/- 5%		#DIV/0!	
Flow Calibration, point 2				#DIV/0! +/- 5%		#DIV/0!	
Flow Calibration, point 3				#DIV/0! +/- 5%		#DIV/0!	
Final Flow Verification (after Calibration)				#DIV/0! +/- 5%		#DIV/0!	
Internal Leak Check		67		140 mmHg		Pass	

Standards Used	Description	S/N	Calibration Date
Flow	FTS Standard	70519	14-Dec-16
Temperature	Hygro/Therm/Baro/Dew Point Pen	160371938	15-Apr-16
Pressure	Hygro/Therm/Baro/Dew Point Pen	160371938	15-Apr-16
Relative Humidity	Hygro/Therm/Baro/Dew Point Pen	160371938	15-Apr-16
Technical Data			

Firmware updated to file
Calibration Complete By

Signature: _____

Maintenance Work

Inspect and Clean "V" Seals and O-Rings	Frequency
Exchange Particle Trap filter	Every 3 months
Replace Batteries	Every 6 months
Exchange Fuses	Every 6-12 months
Cleaning Air Intake Filters	As needed
Rebuild Pumps	Every 6 months
Clean TSP Sample Inlet and Tube	Every 6 months
	Every 3 months

Sensor Calibration Information

Current	Actual	Offset
Amb Temp		
Amb Pres		
Amb RH		
Filt Comp		
Filter		

2025 (TSP) Partisol Calibration Inspection
Instrument Serial Number 2025B221230801
Date 14-Oct-19
Time 9:45
Partisol Sampler Date 14-Oct-19
Partisol Sampler Time 8:00
Error Codes (Top Left Hand Corner) R
Mode (Top Right Hand Corner) WAIT
Next sampling date 18-Oct-19
Top Filter in Supply Magazine O16185
Top Filter in Receiving Magazine O16181
Filter in Sample Position O16190

Description	As found	Standard	As found variance	Allowable variance	Adjusted to	Final variance	Comments
Ambient Air Temperature		-2.5	-1.3	1.20 +/- 2°C		-1.30	
Ambient Pressure		763	764	-1.00 +/- 10 mmHg		-764.00	
Filter Compartment Temp		13.3	13.7	0.40 +/- 2°C		13.70	
External Leak Check		25		25 mmHg		Pass	Now passing. Possibly issue with filter cassette in previous tests
Ambient Relative Humidity		14	41.5	196.43% +/- 1.5%		-100.00%	Constant out of range. Will not calibrate
Initial Flow Verification (before Calibration)		16.58	16.7	0.72%			Completed after pump rebuild
Flow Calibration, point 1		16.79	16.7	-0.54% +/- 5%		-100.00%	
Flow Calibration, point 2		14.94	15	0.40% +/- 5%		-100.00%	
Flow Calibration, point 3		18.31	18.4	0.49% +/- 5%		-100.00%	
Final Flow Verification (after Calibration)		16.6	16.7	0.60% +/- 5%		0.60%	
Internal Leak Check		66		140 mmHg		Pass	

Standards Used	Description	S/N	Calibration Date
Flow	FTS Standard	70519	14-Dec-16
Temperature	Hygro/Therm/Baro/Dew Point Pen	160371938	15-Apr-16
Pressure	Hygro/Therm/Baro/Dew Point Pen	160371938	15-Apr-16
Relative Humidity	Hygro/Therm/Baro/Dew Point Pen	160371938	15-Apr-16
Technical Data			

Firmware updated to file
Calibration Complete By

Signature: _____

Maintenance Work

	Frequency	
Inspect and Clean "V" Seals and O-Rings	Every 3 months	Completed
Exchange Particle Trap filter	Every 6 months	Not completed. Filter does not appear dirty
Replace Batteries	Every 6-12 months	Completed
Exchange Fuses	As needed	Not required
Cleaning Air Intake Filters	Every 6 months	Completed
Rebuild Pumps	Every 6 months	Completed
Clean TSP Sample Inlet and Tube	Every 3 months	Completed

Sensor Calibration Information

Current	Actual	Offset
Amb Temp	-2.5	-1.3 3.81
Amb Pres	763	764 2.5
Amb RH	14	41.5 Constant out of range. Will not calibrate
Filt Comp	14.6	14 -0.03
Filter	13.3	13.7 1.08

2025 (TSP) Partisol Calibration Inspection
Instrument Serial Number 2025B221230801

Date 16-Nov-19
Time 14:00
Partisol Sampler Date 16-Nov-19
Partisol Sampler Time 13:10
Error Codes (Top Left Hand Corner) R
Mode (Top Right Hand Corner) WAIT
Next sampling date 17-Nov-19
Top Filter in Supply Magazine RP027324
Top Filter in Receiving Magazine O15117
Filter in Sample Position O41650

Description	As found	Standard	As found variance	Allowable variance	Adjusted to	Final variance	Comments
Ambient Air Temperature	-16.9	-15.7	1.20	+/- 2°C		-15.70	
Ambient Pressure	759	759.8	-0.80	+/- 10 mmHg		-759.80	
Filter Compartment Temp	8.3	7.2	-1.10	+/- 2°C		7.20	
External Leak Check	27			25 mmHg		Pass	
Ambient Relative Humidity	15.3		-100.00%	+/- 1.5%		#DIV/0!	
Initial Flow Verification (before Calibration)	16.96	16.7	-1.53%				
Flow Calibration, point 1			#DIV/0!	+/- 5%		#DIV/0!	
Flow Calibration, point 2			#DIV/0!	+/- 5%		#DIV/0!	
Flow Calibration, point 3			#DIV/0!	+/- 5%		#DIV/0!	
Final Flow Verification (after Calibration)			#DIV/0!	+/- 5%		#DIV/0!	
Internal Leak Check	65			140 mmHg		Pass	

Standards Used	Description	S/N	Calibration Date
Flow	FTS Standard	70519	14-Dec-16
Temperature	Hygro/Therm/Baro/Dew Point Pen	160371938	15-Apr-16
Pressure	Hygro/Therm/Baro/Dew Point Pen	160371938	15-Apr-16
Relative Humidity	Hygro/Therm/Baro/Dew Point Pen	160371938	15-Apr-16
Technical Data			

Firmware updated to file
Calibration Complete By

Signature: _____

Maintenance Work	Frequency
Inspect and Clean "V" Seals and O-Rings	Every 3 months
Exchange Particle Trap filter	Every 6 months
Replace Batteries	Every 6-12 months
Exchange Fuses	As needed
Cleaning Air Intake Filters	Every 6 months
Rebuild Pumps	Every 6 months
Clean TSP Sample Inlet and Tube	Every 3 months

Sensor Calibration Information	Current	Actual	Offset
Amb Temp			
Amb Pres			
Amb RH			
Filt Comp			
Filter			

2025 (TSP) Partisol Calibration Inspection
Instrument Serial Number 2025B221230801

Date 7-Dec-19
Time 13:30
Partisol Sampler Date 7-Dec-19
Partisol Sampler Time 12:45
Error Codes (Top Left Hand Corner) RX Filter exchange mechanism error. Last filter of sample set moved into sample position after last sample and entered error mode.
Mode (Top Right Hand Corner) ERR Put into STOP mode. Cleared error codes. Completed audit from STOP mode.
Next sampling date 11-Dec-19
Top Filter in Supply Magazine Empty
Top Filter in Receiving Magazine O14368
Filter in Sample Position O16177

Description	As found	Standard	As found variance	Allowable variance	Adjusted to	Final variance	Comments
Ambient Air Temperature	-23.4	-21.5	1.90	+/- 2°C		-21.50	Calibrated
Ambient Pressure	757	757.4	-0.40	+/- 10 mmHg		-757.40	
Filter Compartment Temp	4.4	3.9	-0.50	+/- 2°C		3.90	
External Leak Check	26			25 mmHg		Pass	
Ambient Relative Humidity			#DIV/0!	+/- 1.5%		#DIV/0!	
Initial Flow Verification (before Calibration)	17.02	16.7	-1.88%				
Flow Calibration, point 1			#DIV/0!	+/- 5%		#DIV/0!	
Flow Calibration, point 2			#DIV/0!	+/- 5%		#DIV/0!	
Flow Calibration, point 3			#DIV/0!	+/- 5%		#DIV/0!	
Final Flow Verification (after Calibration)			#DIV/0!	+/- 5%		#DIV/0!	
Internal Leak Check	66			140 mmHg		Pass	

Standards Used	Description	S/N	Calibration Date
Flow	FTS Standard	70519	14-Dec-16
Temperature	Hygro/Therm/Baro/Dew Point Pen	160371938	15-Apr-16
Pressure	Hygro/Therm/Baro/Dew Point Pen	160371938	15-Apr-16
Relative Humidity	Hygro/Therm/Baro/Dew Point Pen	160371938	15-Apr-16
Technical Data			

Firmware updated to file
Calibration Complete By

Signature: _____

Maintenance Work

	Frequency
Inspect and Clean "V" Seals and O-Rings	Every 3 months
Exchange Particle Trap filter	Every 6 months
Replace Batteries	Every 6-12 months
Exchange Fuses	As needed
Cleaning Air Intake Filters	Every 6 months
Rebuild Pumps	Every 6 months
Clean TSP Sample Inlet and Tube	Every 3 months

Sensor Calibration Information

Current	Actual	Offset
Amb Temp	-23.4	-21.5
Amb Pres		5.81
Amb RH		
Filt Comp		
Filter		

APPENDIX E

Meteorological Data Summary

Date	Average Temperature	Minimum Temperature	Maximum Temperature	Average Wind Speed	Maximum Instantaneous Wind Speed	Timestamp for Max Wind	Average Relative Humidity	Average Solar Radiation	Bright Sunshine Hours	TBRG Precip	Station pressure	Final Adjusted Total Precip	Final Adjusted Rainfall	Final Adjusted SWE
mm/dd/yyyy	(°C)	(°C)	(°C)	(m/s)	(m/s)	mm	(%)	(W/m2)	(hours)	(mm)	(kpa)	(mm)	(mm)	(mm)
1/1/2019	-25.3	-28.1	-20.1	1.5	9.6	1/1/2019 0:02	79.2	0.4	0.0	M	99.6	0.2	0.0	0.2
1/2/2019	-24.4	-25.2	-20.7	4.6	11.7	1/2/2019 21:05	80.6	0.2	0.0	M	98.5	0.5	0.0	0.5
1/3/2019	-21.8	-25.0	-18.5	4.6	8.9	1/3/2019 3:56	83.4	0.4	0.0	M	99.0	0.2	0.0	0.2
1/4/2019	-22.0	-22.9	-20.9	2.6	7.0	1/4/2019 12:50	82.6	0.3	0.0	M	100.3	0.5	0.0	0.5
1/5/2019	-23.6	-26.3	-21.0	2.7	10.9	1/5/2019 22:49	81.0	0.4	0.0	M	100.4	0.4	0.0	0.4
1/6/2019	-31.2	-35.2	-25.9	5.0	10.6	1/6/2019 9:07	74.4	0.7	0.0	M	100.6	0.3	0.0	0.3
1/7/2019	-33.5	-37.0	-26.0	8.1	14.7	1/7/2019 23:19	71.9	0.7	0.0	M	101.3	1.4	0.0	1.4
1/8/2019	-32.1	-33.7	-30.3	10.1	16.1	1/8/2019 4:46	73.0	0.5	0.0	M	102.2	0.0	0.0	0.0
1/9/2019	-31.5	-36.0	-29.9	5.5	11.9	1/9/2019 0:20	73.7	0.6	0.0	M	102.8	0.0	0.0	0.0
1/10/2019	-37.8	-39.0	-35.8	0.5	2.4	1/10/2019 23:59	67.5	0.7	0.0	M	97.5	0.8	0.0	0.8
1/11/2019	-37.6	-39.4	-33.1	3.3	11.4	1/11/2019 23:50	67.6	0.5	0.0	M	98.6	0.0	0.0	0.0
1/12/2019	-28.3	-33.6	-26.5	8.0	13.3	1/12/2019 9:31	76.9	0.6	0.0	M	101.0	0.8	0.0	0.8
1/13/2019	-33.8	-38.8	-28.9	6.1	10.9	1/13/2019 23:27	71.7	1.2	0.0	M	102.1	0.7	0.0	0.7
1/14/2019	-36.1	-39.1	-31.2	9.5	15.6	1/14/2019 20:27	69.3	1.3	0.0	M	100.8	0.0	0.0	0.0
1/15/2019	-28.9	-31.6	-26.8	10.6	16.5	1/15/2019 7:44	76.4	1.4	0.0	M	102.3	0.0	0.0	0.0
1/16/2019	-26.9	-29.9	-23.9	7.1	14.1	1/16/2019 15:19	78.5	1.4	0.0	M	102.0	0.5	0.0	0.5
1/17/2019	-26.5	-28.5	-22.1	5.6	11.4	1/17/2019 1:02	79.1	1.4	0.0	M	102.3	0.3	0.0	0.3
1/18/2019	-25.2	-28.8	-22.2	7.3	16.3	1/18/2019 23:43	80.3	1.8	0.0	M	102.7	0.0	0.0	0.0
1/19/2019	-22.4	-24.2	-20.7	12.6	19.2	1/19/2019 2:52	75.0	2.7	0.0	M	101.7	0.0	0.0	0.0
1/20/2019	-28.2	-33.0	-23.6	4.7	11.4	1/20/2019 1:10	75.2	3.2	0.0	M	100.8	0.5	0.0	0.5
1/21/2019	-31.5	-36.7	-29.1	4.7	10.0	1/21/2019 1:12	74.1	2.4	0.0	M	100.7	0.0	0.0	0.0
1/22/2019	-37.9	-39.7	-35.6	4.7	12.6	1/22/2019 23:07	67.5	3.2	0.0	M	96.1	1.0	0.0	1.0
1/23/2019	-35.9	-37.1	-34.8	8.1	13.3	1/23/2019 5:38	69.4	3.4	0.0	M	101.5	0.0	0.0	0.0
1/24/2019	-36.1	-39.4	-33.4	3.0	9.6	1/24/2019 3:35	68.9	3.7	0.0	M	99.7	0.0	0.0	0.0
1/25/2019	-38.3	-40.2	-35.9	1.5	4.1	1/25/2019 19:23	66.7	4.2	0.0	M	96.1	0.7	0.0	0.7
1/26/2019	-37.1	-38.8	-34.6	1.1	4.5	1/26/2019 22:30	67.7	5.0	0.0	M	98.0	0.0	0.0	0.0
1/27/2019	-37.3	-38.4	-34.5	8.4	14.1	1/27/2019 15:35	67.7	3.3	0.0	M	99.5	0.0	0.0	0.0
1/28/2019	-34.7	-36.7	-33.7	9.5	14.7	1/28/2019 8:07	70.2	4.1	0.0	M	103.0	0.5	0.0	0.5
1/29/2019	-35.7	-37.2	-34.7	5.3	10.6	1/29/2019 3:15	69.2	4.7	0.0	M	102.5	0.0	0.0	0.0
1/30/2019	-39.8	-41.3	-36.8	0.9	3.5	1/30/2019 23:53	64.9	7.2	0.0	M	93.1	0.6	0.0	0.6
1/31/2019	-39.7	-41.0	-36.5	1.2	4.0	1/31/2019 22:28	64.9	7.5	0.0	M	93.3	0.0	0.0	0.0
2/1/2019	-34.9	-38.8	-32.6	6.5	12.6	2/1/2019 14:39	69.8	4.6	0.0	M	101.9	0.0	0.0	0.0
2/2/2019	-36.3	-38.4	-34.4	6.3	11.3	2/2/2019 11:45	68.4	7.7	0.0	M	101.5	0.2	0.0	0.2
2/3/2019	-34.7	-36.0	-33.5	6.9	10.3	2/3/2019 9:23	70.0	7.0	0.0	M	102.7	0.4	0.0	0.4
2/4/2019	-32.6	-35.1	-29.2	6.0	10.2	2/4/2019 13:36	72.1	7.4	0.0	M	102.7	0.0	0.0	0.0
2/5/2019	-31.8	-36.6	-29.2	5.7	11.6	2/5/2019 23:56	73.0	8.8	0.0	M	102.4	0.0	0.0	0.0
2/6/2019	-29.1	-29.9	-27.9	8.0	11.5	2/6/2019 0:03	75.9	9.9	0.0	M	103.1	0.0	0.0	0.0
2/7/2019	-29.3	-29.8	-28.7	10.9	14.9	2/7/2019 13:15	75.9	7.6	0.0	M	103.3	0.0	0.0	0.0
2/8/2019	-26.8	-30.0	-23.4	6.8	13.0	2/8/2019 0:09	78.4	5.8	0.0	M	103.1	0.0	0.0	0.0
2/9/2019	-19.2	-28.8	-13.9	6.3	13.3	2/9/2019 7:30	84.0	8.7	0.0	M	100.9	0.0	0.0	0.0
2/10/2019	-20.5	-29.5	-12.4	5.4	13.1	2/10/2019 8:19	83.4	13.9	0.0	M	100.8	0.0	0.0	0.0
2/11/2019	-26.9	-31.3	-23.3	4.7	10.5	2/11/2019 19:58	79.0	11.0	0.0	M	101.9	0.3	0.0	0.3

Date	Average Temperature	Minimum Temperature	Maximum Temperature	Average Wind Speed	Maximum Instantaneous Wind Speed	Timestamp for Max Wind	Average Relative Humidity	Average Solar Radiation	Bright Sunshine Hours	TBRG Precip	Station pressure	Final Adjusted Total Precip	Final Adjusted Rainfall	Final Adjusted SWE
mm/dd/yyyy	(°C)	(°C)	(°C)	(m/s)	(m/s)	mm	(%)	(W/m2)	(hours)	(mm)	(kpa)	(mm)	(mm)	(mm)
2/12/2019	-26.6	-30.1	-22.1	1.7	6.7	2/12/2019 9:48	78.8	19.8	0.0	M	101.1	0.6	0.0	0.6
2/13/2019	-22.9	-25.9	-20.4	1.2	6.7	2/13/2019 0:37	79.4	24.3	2.0	M	100.0	0.0	0.0	0.0
2/14/2019	-20.6	-23.8	-17.9	4.3	10.6	2/14/2019 17:55	83.2	14.0	0.0	M	101.1	0.0	0.0	0.0
2/15/2019	-29.9	-34.5	-21.1	5.0	10.4	2/15/2019 0:41	74.1	27.6	2.0	M	102.7	1.0	0.0	1.0
2/16/2019	-33.2	-35.8	-31.3	8.8	14.6	2/16/2019 18:41	68.8	32.8	3.0	M	103.6	0.6	0.0	0.6
2/17/2019	-31.6	-34.7	-27.7	3.3	10.3	2/17/2019 4:44	69.5	36.2	4.0	M	103.3	0.0	0.0	0.0
2/18/2019	-32.9	-36.9	-27.8	0.6	4.3	2/18/2019 3:08	70.6	41.0	5.0	M	101.1	0.0	0.0	0.0
2/19/2019	-35.8	-38.1	-29.9	0.4	1.6	2/19/2019 17:48	67.9	41.5	5.0	M	98.9	0.0	0.0	0.0
2/20/2019	-36.8	-39.9	-31.4	0.7	3.5	2/20/2019 22:27	66.6	42.6	5.0	M	98.2	0.6	0.0	0.6
2/21/2019	-25.8	-36.9	-21.1	7.5	15.6	2/21/2019 21:44	79.0	24.5	2.0	M	101.0	0.0	0.0	0.0
2/22/2019	-24.3	-33.4	-20.9	9.2	20.0	2/22/2019 1:51	79.5	24.5	1.0	M	100.8	0.4	0.0	0.4
2/23/2019	-30.9	-35.7	-25.6	7.2	12.2	2/23/2019 16:35	73.8	38.2	4.0	M	102.3	0.0	0.0	0.0
2/24/2019	-31.0	-33.7	-28.0	4.7	10.3	2/24/2019 11:32	74.0	39.9	5.0	M	102.3	0.5	0.0	0.5
2/25/2019	-25.6	-32.5	-20.2	4.9	14.0	2/25/2019 14:25	78.7	25.5	0.0	M	101.1	0.0	0.0	0.0
2/26/2019	-19.9	-28.3	-14.1	1.8	7.1	2/26/2019 18:07	84.6	27.5	0.0	M	100.3	0.7	0.0	0.7
2/27/2019	-28.7	-36.7	-22.3	2.5	7.2	2/27/2019 10:57	76.4	43.6	5.0	M	101.6	0.6	0.0	0.6
2/28/2019	-35.6	-38.2	-33.7	6.3	12.6	2/28/2019 16:18	69.5	61.9	7.0	M	102.7	1.2	0.0	1.2
3/1/2019	-31.0	-34.5	-25.9	9.3	14.7	3/1/2019 17:50	73.7	59.0	7.0	M	103.9	0.0	0.0	0.0
3/2/2019	-19.8	-26.1	-15.2	10.6	18.9	3/2/2019 4:05	82.4	35.6	4.0	M	103.1	0.0	0.0	0.0
3/3/2019	-18.1	-21.4	-14.6	10.7	18.4	3/3/2019 8:20	80.8	48.8	6.0	M	102.1	0.0	0.0	0.0
3/4/2019	-18.8	-21.9	-13.7	9.4	15.6	3/4/2019 20:59	80.9	58.9	6.0	M	101.8	3.3	0.0	3.3
3/5/2019	-19.3	-22.8	-15.5	7.1	14.8	3/5/2019 1:17	82.9	64.6	7.0	M	102.2	0.0	0.0	0.0
3/6/2019	-20.1	-25.3	-15.0	4.4	13.1	3/6/2019 7:29	83.7	46.8	5.0	M	100.7	0.0	0.0	0.0
3/7/2019	-20.4	-25.9	-17.2	1.9	6.3	3/7/2019 23:34	84.6	49.0	6.0	M	100.8	0.5	0.0	0.5
3/8/2019	-19.3	-22.7	-16.8	3.3	8.9	3/8/2019 3:33	82.0	49.8	5.0	M	100.9	0.0	0.0	0.0
3/9/2019	-23.4	-27.7	-20.3	3.7	12.8	3/9/2019 23:34	76.3	79.5	7.0	M	101.2	0.0	0.0	0.0
3/10/2019	-18.5	-22.1	-13.6	4.6	13.3	3/10/2019 0:05	78.7	64.9	6.0	M	99.7	0.0	0.0	0.0
3/11/2019	-23.3	-26.1	-20.0	1.5	4.3	3/11/2019 14:57	81.0	87.5	8.0	M	99.2	0.2	0.0	0.2
3/12/2019	-23.8	-27.0	-17.1	1.5	3.8	3/12/2019 22:39	81.2	67.6	8.0	M	99.7	0.0	0.0	0.0
3/13/2019	-22.3	-24.6	-19.4	3.3	7.6	3/13/2019 20:14	82.9	65.4	6.0	M	101.2	0.0	0.0	0.0
3/14/2019	-23.9	-31.3	-19.2	2.2	6.0	3/14/2019 20:06	80.0	79.3	8.0	M	102.2	0.7	0.0	0.7
3/15/2019	-30.8	-34.9	-26.0	3.4	10.0	3/15/2019 22:39	72.0	91.6	8.0	M	102.2	0.2	0.0	0.2
3/16/2019	-20.3	-29.2	-13.7	4.9	9.9	3/16/2019 2:57	81.9	73.5	7.0	M	101.3	0.0	0.0	0.0
3/17/2019	-25.0	-28.8	-18.4	2.9	7.0	3/17/2019 2:25	76.9	115.8	9.0	M	101.6	0.6	0.0	0.6
3/18/2019	-16.7	-27.5	-11.0	5.8	13.5	3/18/2019 23:47	85.3	62.8	7.0	M	100.4	0.0	0.0	0.0
3/19/2019	-19.5	-26.0	-14.3	6.0	12.4	3/19/2019 15:09	84.3	79.0	7.0	M	100.5	0.5	0.0	0.5
3/20/2019	-13.3	-16.3	-10.9	7.4	16.5	3/20/2019 15:43	88.9	68.6	5.0	M	100.2	1.6	0.0	1.6
3/21/2019	-17.5	-22.2	-12.0	6.7	15.9	3/21/2019 21:27	82.4	100.9	9.0	M	101.2	0.0	0.0	0.0
3/22/2019	-19.3	-26.6	-10.9	7.6	14.3	3/22/2019 8:09	80.0	113.6	9.0	M	100.8	2.2	0.0	2.2
3/23/2019	-27.2	-30.9	-24.1	8.0	14.1	3/23/2019 13:01	73.8	128.9	9.0	M	103.1	0.3	0.0	0.3
3/24/2019	-24.1	-27.0	-20.7	3.8	10.6	3/24/2019 4:09	71.8	130.1	10.0	M	102.9	0.0	0.0	0.0
3/25/2019	-13.6	-22.9	-8.3	5.2	11.8	3/25/2019 5:03	83.3	72.8	9.0	M	100.5	0.0	0.0	0.0

Date	Average Temperature	Minimum Temperature	Maximum Temperature	Average Wind Speed	Maximum Instantaneous Wind Speed	Timestamp for Max Wind	Average Relative Humidity	Average Solar Radiation	Bright Sunshine Hours	TBRG Precip	Station pressure	Final Adjusted Total Precip	Final Adjusted Rainfall	Final Adjusted SWE
mm/dd/yyyy	(°C)	(°C)	(°C)	(m/s)	(m/s)	mm	(%)	(W/m2)	(hours)	(mm)	(kpa)	(mm)	(mm)	(mm)
3/26/2019	-17.0	-24.0	-12.6	6.8	13.2	3/26/2019 9:01	81.3	106.4	8.0	M	100.5	0.7	0.0	0.7
3/27/2019	-24.2	-27.6	-21.5	7.4	13.0	3/27/2019 14:43	77.0	142.8	10.0	M	101.4	0.8	0.0	0.8
3/28/2019	-21.7	-26.8	-13.5	2.8	11.2	3/28/2019 22:08	82.1	119.7	9.0	M	101.4	0.0	0.0	0.0
3/29/2019	-8.2	-13.5	-5.1	9.0	14.4	3/29/2019 13:41	90.7	130.7	10.0	M	101.3	0.0	0.0	0.0
3/30/2019	-10.7	-16.9	-6.7	9.8	14.8	3/30/2019 15:47	89.1	132.2	9.0	M	101.3	1.1	0.0	1.1
3/31/2019	-14.7	-20.9	-9.4	2.7	13.8	3/31/2019 0:00	86.7	142.7	10.0	M	100.6	1.4	0.0	1.4
4/1/2019	-15.1	-19.1	-11.0	5.4	10.7	4/1/2019 13:31	86.2	118.9	10.0	M	100.4	2.4	0.0	2.4
4/2/2019	-22.4	-26.8	-19.0	6.5	12.1	4/3/2019 0:00	80.0	159.2	11.0	M	101.1	1.6	0.0	1.6
4/3/2019	-27.7	-31.2	-24.8	9.0	15.7	4/3/2019 23:47	76.3	159.0	11.0	M	101.1	0.4	0.0	0.4
4/4/2019	-19.1	-24.9	-13.5	7.5	16.7	4/4/2019 6:46	80.8	140.6	10.0	M	100.2	0.0	0.0	0.0
4/5/2019	-24.7	-30.8	-19.0	1.6	7.2	4/5/2019 0:25	78.2	178.2	11.0	M	101.2	0.5	0.0	0.5
4/6/2019	-26.9	-33.4	-19.4	0.6	2.3	4/6/2019 16:29	71.2	181.6	11.0	M	101.7	0.0	0.0	0.0
4/7/2019	-23.7	-31.2	-16.8	3.8	11.0	4/7/2019 19:15	77.5	172.4	10.0	M	101.3	0.0	0.0	0.0
4/8/2019	-10.9	-17.3	-4.2	2.6	8.8	4/8/2019 1:18	85.8	127.7	10.0	M	100.7	0.0	0.0	0.0
4/9/2019	-9.5	-12.7	-6.0	2.9	7.4	4/9/2019 14:02	91.5	119.9	10.0	M	100.9	0.2	0.0	0.2
4/10/2019	-9.3	-13.1	-6.6	2.7	5.7	4/10/2019 19:52	88.3	141.0	10.0	M	101.5	0.5	0.0	0.5
4/11/2019	-13.5	-14.9	-12.0	5.0	8.3	4/11/2019 21:49	87.3	125.6	10.0	M	101.9	0.3	0.0	0.3
4/12/2019	-13.2	-16.2	-10.9	7.6	12.9	4/12/2019 20:06	89.3	131.6	10.0	M	101.2	2.1	0.0	2.1
4/13/2019	-20.1	-26.0	-16.1	8.1	12.1	4/13/2019 5:05	83.2	158.4	11.0	M	101.1	4.5	0.0	4.5
4/14/2019	-23.7	-28.1	-16.8	3.2	10.1	4/14/2019 0:37	79.0	185.5	11.0	M	101.6	1.1	0.0	1.1
4/15/2019	-25.2	-33.0	-15.6	0.8	3.8	4/15/2019 17:33	76.0	210.5	12.0	M	101.8	0.0	0.0	0.0
4/16/2019	-23.9	-31.7	-17.6	0.9	4.1	4/16/2019 22:29	74.7	217.1	13.0	M	101.6	0.0	0.0	0.0
4/17/2019	-21.2	-25.2	-16.2	2.1	5.5	4/17/2019 13:54	80.5	204.3	13.0	M	101.3	0.0	0.0	0.0
4/18/2019	-21.3	-28.3	-10.2	0.7	2.7	4/18/2019 12:02	75.2	219.3	13.0	M	101.1	0.0	0.0	0.0
4/19/2019	-23.1	-29.2	-14.3	0.9	3.8	4/19/2019 12:45	78.3	222.1	13.0	M	100.9	0.3	0.0	0.3
4/20/2019	-22.0	-31.2	-16.3	1.1	3.9	4/20/2019 16:04	78.6	162.8	11.0	M	101.5	0.0	0.0	0.0
4/21/2019	-19.5	-25.0	-13.3	1.3	6.4	4/21/2019 16:18	80.1	227.9	13.0	M	101.6	0.0	0.0	0.0
4/22/2019	-20.8	-26.9	-14.5	3.6	10.1	4/22/2019 15:38	82.0	233.6	13.0	M	101.6	0.0	0.0	0.0
4/23/2019	-19.7	-24.7	-14.7	6.4	10.3	4/23/2019 6:24	82.5	195.5	11.0	M	101.2	0.0	0.0	0.0
4/24/2019	-21.0	-25.0	-17.2	6.8	15.8	4/24/2019 22:49	82.0	235.1	14.0	M	101.5	0.0	0.0	0.0
4/25/2019	-18.5	-23.9	-15.6	5.7	13.6	4/25/2019 0:11	80.3	237.8	13.0	M	101.1	0.4	0.0	0.4
4/26/2019	-19.2	-27.5	-13.2	6.3	14.8	4/26/2019 15:53	80.8	198.1	12.0	M	101.0	0.0	0.0	0.0
4/27/2019	-17.3	-24.8	-12.2	4.0	8.5	4/27/2019 20:52	79.7	237.5	13.0	M	101.4	1.5	0.0	1.5
4/28/2019	-22.0	-27.8	-18.7	2.6	6.2	4/28/2019 23:34	78.1	238.8	12.0	M	102.0	0.0	0.0	0.0
4/29/2019	-21.8	-28.5	-17.3	6.7	11.8	4/29/2019 19:09	78.8	236.0	13.0	M	102.3	0.3	0.0	0.3
4/30/2019	-16.6	-22.6	-11.4	4.7	9.3	4/30/2019 6:24	79.2	251.1	13.0	M	102.1	1.7	0.0	1.7
5/1/2019	-15.4	-24.7	-7.6	4.0	11.9	5/1/2019 15:50	84.0	164.9	13.0	M	102.2	0.5	0.0	0.5
5/2/2019	-9.1	-15.1	-6.3	6.2	15.3	5/2/2019 15:19	88.6	251.7	13.0	M	102.7	0.0	0.0	0.0
5/3/2019	-11.7	-13.9	-9.2	6.8	14.2	5/3/2019 10:50	87.0	273.2	14.0	M	102.9	1.3	0.0	1.3
5/4/2019	-11.3	-14.5	-4.7	1.7	6.2	5/4/2019 1:19	88.3	230.5	13.0	M	102.6	0.6	0.0	0.6
5/5/2019	-13.4	-19.7	-7.5	0.7	2.3	5/5/2019 18:54	80.9	275.3	14.0	M	102.1	0.7	0.0	0.7
5/6/2019	-10.7	-13.3	-8.5	4.0	8.9	5/6/2019 20:51	87.5	256.3	13.0	M	102.0	0.2	0.0	0.2

Date	Average Temperature	Minimum Temperature	Maximum Temperature	Average Wind Speed	Maximum Instantaneous Wind Speed	Timestamp for Max Wind	Average Relative Humidity	Average Solar Radiation	Bright Sunshine Hours	TBRG Precip	Station pressure	Final Adjusted Total Precip	Final Adjusted Rainfall	Final Adjusted SWE
mm/dd/yyyy	(°C)	(°C)	(°C)	(m/s)	(m/s)	mm	(%)	(W/m2)	(hours)	(mm)	(kpa)	(mm)	(mm)	(mm)
5/7/2019	-8.4	-11.7	-6.4	6.8	11.1	5/7/2019 15:38	89.6	285.7	14.0	M	102.3	0.4	0.0	0.4
5/8/2019	-9.2	-14.5	-5.5	5.9	9.5	5/8/2019 16:12	90.0	271.8	14.0	M	102.1	0.0	0.0	0.0
5/9/2019	-8.6	-11.4	-5.7	6.8	11.4	5/9/2019 11:15	87.9	271.5	14.0	M	101.1	0.0	0.0	0.0
5/10/2019	-4.1	-9.8	-0.9	7.7	11.5	5/10/2019 23:40	93.8	184.7	13.0	M	100.9	1.5	0.0	1.5
5/11/2019	-4.2	-5.5	-3.3	6.8	11.0	5/11/2019 0:08	90.5	213.8	13.0	M	101.3	0.0	0.0	0.0
5/12/2019	-4.6	-6.0	-2.3	4.2	10.0	5/12/2019 23:42	88.8	178.0	13.0	M	101.3	0.0	0.0	0.0
5/13/2019	-2.2	-4.8	0.0	8.1	13.7	5/13/2019 2:34	89.0	208.3	12.0	M	100.9	2.8	0.0	2.8
5/14/2019	-3.1	-4.7	-1.9	6.8	11.6	5/14/2019 4:13	87.4	240.4	13.0	M	101.8	1.0	0.0	1.0
5/15/2019	-1.5	-4.8	0.4	5.5	11.0	5/15/2019 23:40	89.1	206.2	13.0	M	102.4	0.0	0.0	0.0
5/16/2019	-7.4	-10.3	-4.3	2.9	10.1	5/16/2019 0:21	87.2	268.7	16.0	M	102.5	0.6	0.0	0.6
5/17/2019	-8.5	-13.3	-5.3	4.4	10.1	5/17/2019 21:31	88.5	288.7	15.0	M	102.5	0.2	0.0	0.2
5/18/2019	-6.0	-12.6	0.4	4.9	8.2	5/18/2019 15:18	83.3	310.9	15.0	M	102.3	0.0	0.0	0.0
5/19/2019	-2.0	-7.6	2.2	3.1	7.6	5/19/2019 22:33	85.1	243.6	15.0	M	101.9	0.4	0.0	0.4
5/20/2019	-6.9	-11.5	-2.9	6.7	12.2	5/20/2019 11:00	89.7	285.5	16.0	M	102.0	0.8	0.0	0.8
5/21/2019	-9.0	-15.3	-5.8	5.3	11.0	5/21/2019 13:26	86.5	211.8	13.0	M	102.7	0.3	0.0	0.3
5/22/2019	-8.3	-9.8	-6.9	3.2	6.3	5/22/2019 14:32	87.6	246.9	13.0	M	102.9	0.3	0.0	0.3
5/23/2019	-9.2	-11.6	-6.4	3.5	6.7	5/23/2019 16:50	89.6	312.7	16.0	M	102.4	0.0	0.0	0.0
5/24/2019	-8.7	-12.3	-5.9	4.4	7.6	5/24/2019 10:20	90.4	317.1	15.0	M	102.0	0.7	0.0	0.7
5/25/2019	-4.8	-11.4	3.6	3.1	6.8	5/25/2019 8:19	84.5	326.3	15.0	M	101.3	0.0	0.0	0.0
5/26/2019	-0.2	-2.0	1.7	7.1	12.7	5/26/2019 3:22	92.5	217.2	14.0	M	99.9	0.5	0.0	0.5
5/27/2019	-2.5	-4.1	0.0	4.9	9.8	5/27/2019 4:01	89.0	224.0	13.0	M	100.7	0.0	0.0	0.0
5/28/2019	-3.1	-4.3	-1.5	4.5	8.9	5/28/2019 23:15	86.5	224.7	14.0	M	101.0	0.3	0.0	0.3
5/29/2019	-1.8	-4.9	0.5	3.9	8.3	5/29/2019 12:04	87.8	233.4	14.0	M	101.4	0.0	0.0	0.0
5/30/2019	-0.8	-1.6	0.6	4.9	8.6	5/30/2019 16:34	88.2	225.6	13.0	M	101.7	0.0	0.0	0.0
5/31/2019	-1.2	-2.5	0.5	4.4	9.4	5/31/2019 14:05	91.3	272.2	15.0	M	102.0	0.4	0.0	0.4
6/1/2019	-0.2	-5.0	2.5	3.5	8.6	6/1/2019 23:25	91.2	217.9	15.0	M	101.8	0.0	0.0	0.0
6/2/2019	0.5	0.1	1.0	6.2	9.4	6/2/2019 16:47	94.2	186.9	13.0	M	101.5	0.0	0.0	0.0
6/3/2019	0.1	-0.6	0.9	7.3	11.3	6/3/2019 16:51	97.1	144.2	10.0	M	101.3	1.3	0.0	1.3
6/4/2019	-0.2	-2.0	0.7	7.6	17.0	6/4/2019 11:46	95.8	124.1	11.0	M	101.4	1.9	0.0	1.9
6/5/2019	-0.2	-3.1	1.5	7.9	13.2	6/5/2019 2:49	85.7	336.2	15.0	M	102.0	0.2	0.2	0.0
6/6/2019	-0.9	-2.8	1.0	3.6	8.0	6/6/2019 17:37	85.1	252.4	13.0	M	102.0	0.0	0.0	0.0
6/7/2019	0.1	-0.9	1.6	3.3	7.7	6/7/2019 23:00	82.0	196.4	14.0	M	101.8	0.0	0.0	0.0
6/8/2019	-1.4	-2.6	0.5	3.5	7.6	6/8/2019 14:26	88.0	253.8	14.0	M	101.6	0.6	0.0	0.6
6/9/2019	0.4	-1.5	2.0	7.4	15.8	6/9/2019 19:01	94.5	176.8	13.0	M	101.1	1.6	0.0	1.6
6/10/2019	0.9	-0.1	2.1	11.3	18.5	6/10/2019 13:11	91.5	121.1	11.0	M	100.1	4.7	0.0	4.7
6/11/2019	1.2	-0.3	2.7	9.3	15.6	6/11/2019 5:00	89.9	314.9	17.0	M	100.3	1.3	0.5	0.8
6/12/2019	2.1	-2.4	5.2	4.1	9.2	6/12/2019 20:21	81.7	356.2	18.0	M	100.6	0.0	0.0	0.0
6/13/2019	4.0	0.0	10.6	4.3	7.9	6/13/2019 17:39	81.8	344.2	17.0	M	100.4	0.0	0.0	0.0
6/14/2019	2.4	0.9	3.3	2.7	7.1	6/14/2019 12:31	96.5	60.6	0.0	M	100.8	9.7	9.7	0.0
6/15/2019	4.5	1.4	9.6	4.0	11.6	6/15/2019 19:03	90.3	195.7	13.0	M	100.8	0.6	0.6	0.0
6/16/2019	1.7	0.3	3.2	4.2	8.6	6/16/2019 15:57	86.5	193.0	11.0	M	101.3	8.6	8.6	0.0
6/17/2019	1.9	-0.6	3.6	4.8	11.8	6/17/2019 12:31	88.2	131.6	11.0	M	100.9	6.0	6.0	0.0

Date	Average Temperature	Minimum Temperature	Maximum Temperature	Average Wind Speed	Maximum Instantaneous Wind Speed	Timestamp for Max Wind	Average Relative Humidity	Average Solar Radiation	Bright Sunshine Hours	TBRG Precip	Station pressure	Final Adjusted Total Precip	Final Adjusted Rainfall	Final Adjusted SWE
mm/dd/yyyy	(°C)	(°C)	(°C)	(m/s)	(m/s)	mm	(%)	(W/m2)	(hours)	(mm)	(kpa)	(mm)	(mm)	(mm)
6/18/2019	3.3	1.1	5.8	5.1	10.1	6/18/2019 3:15	87.3	203.5	16.0	M	100.8	0.0	0.0	0.0
6/19/2019	5.5	1.0	8.6	4.1	8.9	6/19/2019 21:48	71.5	290.3	15.0	M	101.1	0.0	0.0	0.0
6/20/2019	4.0	1.7	6.7	4.1	7.9	6/20/2019 13:57	79.9	223.6	14.0	M	101.7	0.0	0.0	0.0
6/21/2019	4.9	1.9	7.1	3.9	8.0	6/21/2019 11:52	71.1	305.5	16.0	M	102.3	0.0	0.0	0.0
6/22/2019	10.9	2.0	16.7	3.2	8.5	6/22/2019 14:40	55.3	321.2	17.0	M	101.5	0.0	0.0	0.0
6/23/2019	12.7	3.3	18.9	2.8	7.4	6/23/2019 14:49	51.6	316.0	18.0	M	100.6	0.2	0.2	0.0
6/24/2019	6.8	3.9	9.9	4.1	7.4	6/24/2019 2:05	72.1	215.8	15.0	M	100.8	0.2	0.2	0.0
6/25/2019	10.0	1.5	20.5	6.0	11.4	6/25/2019 13:25	66.8	338.2	16.0	M	100.7	0.0	0.0	0.0
6/26/2019	3.6	0.9	9.5	6.7	12.5	6/26/2019 1:39	91.8	110.6	8.0	M	101.3	6.6	6.6	0.0
6/27/2019	8.1	1.5	13.8	2.4	7.2	6/27/2019 23:37	61.4	353.2	17.0	M	101.9	0.0	0.0	0.0
6/28/2019	12.1	3.8	19.4	5.1	9.4	6/28/2019 12:46	52.6	328.0	18.0	M	101.6	0.0	0.0	0.0
6/29/2019	10.1	4.7	17.6	4.3	9.5	6/29/2019 17:49	69.3	222.4	14.0	M	100.8	0.3	0.3	0.0
6/30/2019	3.7	1.6	8.7	7.0	13.3	6/30/2019 10:49	98.3	94.5	8.0	M	100.0	3.0	3.0	0.0
7/1/2019	10.9	6.3	15.9	9.0	15.7	7/1/2019 4:20	77.9	230.6	14.0	M	100.5	0.0	0.0	0.0
7/2/2019	10.8	7.7	13.9	5.9	12.0	7/2/2019 0:21	70.2	175.7	14.0	M	100.7	0.0	0.0	0.0
7/3/2019	12.7	6.9	18.5	3.9	10.7	7/3/2019 3:58	61.5	237.4	15.0	M	101.1	0.9	0.9	0.0
7/4/2019	11.1	7.5	15.0	5.2	10.1	7/4/2019 15:55	73.6	266.1	14.0	M	101.4	0.0	0.0	0.0
7/5/2019	7.9	3.6	14.2	6.9	16.2	7/5/2019 13:13	85.3	176.7	14.0	M	101.0	0.3	0.3	0.0
7/6/2019	7.3	3.7	12.5	5.6	10.6	7/6/2019 18:36	91.8	106.1	11.0	M	100.7	1.1	1.1	0.0
7/7/2019	3.4	1.7	6.3	6.1	9.9	7/7/2019 8:08	95.2	143.3	13.0	M	100.3	7.7	7.7	0.0
7/8/2019	8.1	3.0	11.8	6.1	12.6	7/8/2019 11:57	89.9	159.5	11.0	M	100.2	1.8	1.8	0.0
7/9/2019	7.6	5.0	11.5	6.5	13.0	7/9/2019 8:42	92.4	194.5	13.0	M	100.2	7.0	7.0	0.0
7/10/2019	6.7	5.0	8.6	5.4	10.6	7/10/2019 19:58	93.0	148.6	12.0	M	100.1	0.0	0.0	0.0
7/11/2019	8.2	3.3	12.0	6.8	12.0	7/11/2019 17:51	83.5	204.2	13.0	M	99.3	0.7	0.7	0.0
7/12/2019	4.5	2.2	8.3	8.8	14.5	7/12/2019 3:47	96.4	123.1	9.0	M	99.2	2.6	2.6	0.0
7/13/2019	3.9	2.2	5.5	10.3	14.7	7/13/2019 2:44	97.4	106.6	11.0	M	99.6	1.8	1.8	0.0
7/14/2019	5.2	3.3	7.4	7.4	11.6	7/14/2019 11:39	90.4	168.1	12.0	M	99.9	0.0	0.0	0.0
7/15/2019	9.0	7.2	11.0	4.2	3.9	7/15/2019 20:29	81.3	198.8	13.0	M	99.8	0.9	0.9	0.0
7/16/2019	8.1	2.9	14.9	6.2	14.3	7/16/2019 12:47	88.3	137.2	10.0	M	99.3	2.7	2.7	0.0
7/17/2019	5.3	2.8	8.4	8.3	13.1	7/17/2019 13:09	90.9	188.3	13.0	M	99.6	0.1	0.1	0.0
7/18/2019	9.2	5.3	12.4	4.4	7.7	7/18/2019 9:19	83.1	198.4	12.0	M	100.3	0.0	0.0	0.0
7/19/2019	11.7	7.1	15.4	3.8	8.8	7/19/2019 20:47	64.8	212.3	13.0	M	100.4	0.0	0.0	0.0
7/20/2019	12.6	8.4	16.4	3.7	8.4	7/20/2019 6:56	78.3	182.3	13.0	M	100.6	1.3	1.3	0.0
7/21/2019	12.3	5.7	21.6	5.7	16.0	7/21/2019 17:01	84.9	180.1	10.0	M	100.6	2.6	2.6	0.0
7/22/2019	7.4	5.1	10.2	5.6	11.8	7/22/2019 0:06	81.2	212.4	13.0	M	101.1	0.0	0.0	0.0
7/23/2019	7.2	4.6	9.6	6.8	13.0	7/23/2019 19:09	76.6	204.1	16.0	M	101.0	0.0	0.0	0.0
7/24/2019	6.0	4.1	8.3	6.6	12.1	7/24/2019 10:38	74.9	180.3	13.0	M	100.9	0.0	0.0	0.0
7/25/2019	6.2	4.7	8.0	3.9	9.5	7/25/2019 18:10	70.8	212.7	14.0	M	100.8	0.0	0.0	0.0
7/26/2019	5.4	4.1	7.2	4.6	9.8	7/26/2019 17:21	80.3	151.4	11.0	M	100.8	0.7	0.7	0.0
7/27/2019	7.0	2.6	10.3	5.2	10.8	7/27/2019 12:51	72.1	271.0	15.0	M	100.8	0.0	0.0	0.0
7/28/2019	9.0	3.9	12.0	2.2	5.6	7/28/2019 17:50	69.3	170.4	15.0	M	100.3	0.0	0.0	0.0
7/29/2019	8.9	6.0	12.2	4.7	11.7	7/29/2019 17:32	80.8	255.2	15.0	M	99.8	0.2	0.2	0.0

Date	Average Temperature	Minimum Temperature	Maximum Temperature	Average Wind Speed	Maximum Instantaneous Wind Speed	Timestamp for Max Wind	Average Relative Humidity	Average Solar Radiation	Bright Sunshine Hours	TBRG Precip	Station pressure	Final Adjusted Total Precip	Final Adjusted Rainfall	Final Adjusted SWE
mm/dd/yyyy	(°C)	(°C)	(°C)	(m/s)	(m/s)	mm	(%)	(W/m2)	(hours)	(mm)	(kpa)	(mm)	(mm)	(mm)
7/30/2019	7.0	5.1	9.4	5.3	10.5	7/30/2019 5:57	80.9	209.0	13.0	M	100.1	0.0	0.0	0.0
7/31/2019	8.4	5.0	12.7	4.7	9.2	7/31/2019 0:07	72.7	189.4	15.0	M	100.5	0.0	0.0	0.0
8/1/2019	13.0	4.8	21.1	3.0	6.8	8/1/2019 11:56	64.9	201.4	15.0	M	101.0	0.2	0.2	0.0
8/2/2019	18.4	12.1	24.9	3.8	9.5	8/2/2019 0:39	51.2	167.1	10.0	M	100.9	0.0	0.0	0.0
8/3/2019	13.1	11.3	16.3	7.7	19.5	8/3/2019 11:25	85.8	44.5	0.0	M	99.8	3.1	3.1	0.0
8/4/2019	10.5	9.0	12.2	3.8	8.7	8/4/2019 18:01	97.2	105.5	11.0	M	99.2	0.4	0.4	0.0
8/5/2019	10.1	9.0	9.2	5.1	7.4	8/5/2019 23:39	95.2	144.2	10.0	M	99.7	0.0	0.0	0.0
8/6/2019	10.4	8.9	12.0	4.3	6.9	8/6/2019 3:12	92.7	70.0	6.0	M	100.7	0.4	0.4	0.0
8/7/2019	10.2	10.1	10.2	4.5	7.1	8/7/2019 23:56	89.3	119.3	10.0	M	101.4	0.0	0.0	0.0
8/8/2019	10.0	9.3	10.8	5.1	9.4	8/8/2019 11:04	92.5	52.9	3.0	M	101.5	5.8	5.8	0.0
8/9/2019	9.5	8.4	11.2	4.9	8.5	8/9/2019 10:12	86.9	71.7	8.0	M	101.3	0.9	0.9	0.0
8/10/2019	8.5	6.9	10.1	4.7	9.6	8/10/2019 1:00	81.2	123.4	11.0	M	101.3	0.0	0.0	0.0
8/11/2019	9.2	5.0	13.8	3.2	8.2	8/11/2019 16:10	76.5	210.9	12.0	M	101.1	0.2	0.2	0.0
8/12/2019	10.7	6.6	16.1	5.2	10.2	8/12/2019 5:54	77.1	187.1	10.0	M	100.7	2.1	2.1	0.0
8/13/2019	7.8	5.7	9.7	4.8	10.8	8/13/2019 1:02	75.2	183.7	12.0	M	100.6	0.0	0.0	0.0
8/14/2019	8.8	5.1	11.9	3.5	10.9	8/14/2019 14:40	89.8	67.5	7.0	M	100.2	1.5	1.5	0.0
8/15/2019	8.5	7.2	9.9	2.5	7.5	8/15/2019 0:25	87.9	88.8	8.0	M	100.2	0.3	0.3	0.0
8/16/2019	8.7	6.8	10.3	3.8	9.5	8/16/2019 23:52	88.9	72.0	8.0	M	100.4	3.2	3.2	0.0
8/17/2019	8.2	6.0	10.9	3.7	8.8	8/17/2019 0:05	78.4	166.9	12.0	M	101.0	0.0	0.0	0.0
8/18/2019	9.4	6.7	12.5	2.6	5.8	8/18/2019 17:02	78.8	94.3	7.0	M	101.5	0.0	0.0	0.0
8/19/2019	7.5	4.4	9.7	3.2	7.6	8/19/2019 16:27	84.4	153.1	12.0	M	101.7	0.4	0.4	0.0
8/20/2019	8.5	5.8	10.9	4.6	7.9	8/20/2019 4:15	88.3	68.6	6.0	M	101.7	1.4	1.4	0.0
8/21/2019	12.2	8.3	16.3	5.3	11.4	8/21/2019 23:20	80.3	109.8	9.0	M	100.8	0.2	0.2	0.0
8/22/2019	12.5	7.2	17.2	7.3	16.8	8/22/2019 23:40	82.5	85.0	6.0	M	98.6	8.2	8.2	0.0
8/23/2019	5.9	3.5	7.3	14.5	25.8	8/23/2019 11:06	85.1	73.3	4.0	M	98.9	2.6	2.6	0.0
8/24/2019	8.5	3.7	14.2	5.5	11.3	8/24/2019 9:35	84.7	91.9	10.0	M	99.7	0.4	0.4	0.0
8/25/2019	6.5	3.7	9.6	5.4	11.5	8/25/2019 16:09	75.4	196.4	12.0	M	100.4	0.0	0.0	0.0
8/26/2019	12.1	4.8	17.8	5.4	10.7	8/26/2019 14:12	61.9	191.2	12.0	M	100.7	0.0	0.0	0.0
8/27/2019	12.0	9.2	15.0	5.8	11.1	8/27/2019 12:51	72.4	174.1	12.0	M	100.3	0.2	0.2	0.0
8/28/2019	10.1	3.2	13.6	5.8	14.2	8/28/2019 20:37	77.4	123.7	11.0	M	100.2	4.9	4.9	0.0
8/29/2019	2.8	1.3	4.1	6.8	12.5	8/29/2019 4:16	69.7	63.1	7.0	M	100.9	0.2	0.2	0.0
8/30/2019	2.4	0.6	4.4	7.0	14.6	8/30/2019 14:25	78.0	95.1	8.0	M	100.9	1.1	1.1	0.0
8/31/2019	2.2	1.3	3.5	7.1	12.4	8/31/2019 15:04	79.5	80.1	7.0	M	101.2	0.0	0.0	0.0
9/1/2019	1.8	-0.2	3.4	8.2	13.2	9/1/2019 4:53	77.7	101.2	8.0	M	101.1	1.2	0.5	0.6
9/2/2019	2.5	1.5	3.7	6.4	11.5	9/2/2019 0:07	75.3	70.5	8.0	M	100.9	0.0	0.0	0.0
9/3/2019	2.4	0.9	3.8	5.0	9.1	9/3/2019 16:42	81.0	94.8	9.0	M	100.8	0.0	0.0	0.0
9/4/2019	2.1	0.3	5.0	3.1	6.9	9/4/2019 0:53	83.5	118.7	9.0	M	101.0	0.0	0.0	0.0
9/5/2019	1.8	-2.2	6.5	3.0	5.6	9/5/2019 9:39	89.2	135.2	10.0	M	101.3	0.3	0.3	0.0
9/6/2019	1.3	-1.1	5.3	2.8	7.3	9/6/2019 22:36	92.2	113.9	11.0	M	101.6	0.0	0.0	0.0
9/7/2019	3.2	-0.3	6.2	3.3	8.0	9/7/2019 12:15	84.6	131.4	10.0	M	101.8	0.3	0.0	0.3
9/8/2019	5.2	-1.0	12.0	1.1	3.8	9/8/2019 17:44	74.2	152.9	11.0	M	101.9	0.8	0.0	0.8
9/9/2019	9.5	3.7	15.5	7.1	14.1	9/9/2019 21:51	72.8	95.2	9.0	M	101.0	0.0	0.0	0.0

Date	Average Temperature	Minimum Temperature	Maximum Temperature	Average Wind Speed	Maximum Instantaneous Wind Speed	Timestamp for Max Wind	Average Relative Humidity	Average Solar Radiation	Bright Sunshine Hours	TBRG Precip	Station pressure	Final Adjusted Total Precip	Final Adjusted Rainfall	Final Adjusted SWE
mm/dd/yyyy	(°C)	(°C)	(°C)	(m/s)	(m/s)	mm	(%)	(W/m2)	(hours)	(mm)	(kpa)	(mm)	(mm)	(mm)
9/10/2019	6.5	5.6	7.2	6.1	14.3	9/10/2019 5:36	89.6	63.3	9.0	M	101.0	0.2	0.2	0.0
9/11/2019	9.9	3.4	17.6	5.3	10.0	9/11/2019 15:28	74.2	133.3	9.0	M	100.6	0.0	0.0	0.0
9/12/2019	8.1	4.4	12.3	5.0	11.6	9/12/2019 10:52	83.1	57.3	5.0	M	100.1	0.4	0.4	0.0
9/13/2019	5.6	3.7	7.6	4.7	9.8	9/13/2019 15:25	97.1	33.6	1.0	M	100.1	0.0	0.0	0.0
9/14/2019	6.8	4.7	11.5	5.5	11.6	9/14/2019 21:05	96.2	50.2	3.0	M	99.7	3.1	3.1	0.0
9/15/2019	4.1	1.5	5.7	8.6	18.4	9/15/2019 23:57	92.8	58.7	5.0	M	99.6	5.0	5.0	0.0
9/16/2019	1.9	0.9	3.1	10.0	20.0	9/16/2019 6:23	87.3	32.0	1.0	M	100.2	0.0	0.0	0.0
9/17/2019	1.3	0.9	2.2	3.7	7.1	9/17/2019 21:56	90.9	43.0	3.0	M	100.7	1.2	1.2	0.0
9/18/2019	2.3	0.8	4.1	3.4	6.4	9/18/2019 14:52	94.7	48.8	3.0	M	100.4	0.2	0.2	0.0
9/19/2019	1.6	-0.8	3.9	2.5	6.4	9/19/2019 17:23	90.7	68.4	5.0	M	100.3	0.4	0.2	0.2
9/20/2019	0.8	-1.2	3.2	5.6	11.6	9/20/2019 15:10	91.2	53.4	5.0	M	100.4	0.0	0.0	0.0
9/21/2019	1.8	0.8	2.4	7.9	13.9	9/21/2019 20:05	88.8	51.9	5.0	M	100.0	0.0	0.0	0.0
9/22/2019	1.3	-0.5	2.3	9.8	14.7	9/22/2019 15:33	94.3	29.2	0.0	M	99.1	1.3	1.1	0.2
9/23/2019	-1.2	-2.1	-0.4	7.7	13.0	9/23/2019 4:11	91.2	28.2	1.0	M	98.6	0.1	0.0	0.1
9/24/2019	-3.5	-4.6	-1.8	4.6	8.0	9/24/2019 3:00	87.8	41.1	2.0	M	99.7	0.0	0.0	0.0
9/25/2019	-4.9	-6.0	-4.2	5.0	9.9	9/25/2019 11:54	86.7	26.6	0.0	M	100.1	0.0	0.0	0.0
9/26/2019	-2.6	-5.5	1.1	5.2	11.3	9/26/2019 23:04	86.7	48.8	5.0	M	100.2	0.8	0.0	0.8
9/27/2019	-1.5	-3.7	0.3	7.9	14.6	9/27/2019 10:02	80.1	69.2	7.0	M	100.8	0.0	0.0	0.0
9/28/2019	-3.1	-4.4	-1.3	6.4	12.8	9/28/2019 3:23	78.2	36.8	3.0	M	101.1	0.0	0.0	0.0
9/29/2019	-2.7	-4.0	-1.0	3.4	8.9	9/29/2019 8:54	76.3	38.2	2.0	M	101.6	0.0	0.0	0.0
9/30/2019	0.8	-4.2	6.9	4.2	9.4	9/30/2019 3:47	84.8	77.6	7.0	M	100.7	0.0	0.0	0.0

APPENDIX F

Stack Testing Report

Incinerator Source Emissions Testing 2019

Final Report

December 20, 2019

Prepared for:
TMAC Resources Inc.

Prepared by:
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File No: 160930343





NUNAMI STANTEC



NUNAMI STANTEC

Executive Summary

TMAC Resources Inc. (TMAC) retained Nunami Stantec Limited Partnership (Nunami Stantec) to conduct dioxins and furans and mercury source emissions testing on the waste incinerator currently in operation at the Hope Bay Mine/Mill site in Nunavut. The testing was conducted to assess compliance of the emissions concentrations of mercury and dioxins and furans with the standards set out in the Nunavut Water Board, Water Licence 2AM-DOH1323 Amendment No. 1, Part G-5, and the Government of Nunavut's "Environmental Guideline for the Burning and Incineration of Solid Waste", based on the Canadian Council of Ministers of the Environment (CCME) Canada Wide Standards (CWS). Particulate matter analysis was also completed concurrently with mercury testing.

The source emission testing was conducted during the period of September 15 to September 18, 2019. Source emission testing was completed with the incinerator operating under normal steady state conditions (i.e. after the primary chamber burner ignited and stabilized) for the duration of the sampling period.

The average concentration of particulate matter was 57.2 mg/Rm³, corrected to 11% oxygen. There are no limits specified for particulate matter emissions in the "Guideline for the Burning and Incineration of Solid Waste".

The average concentration of mercury for the three tests was 0.26 µg/Rm³, which is below the CWS/Nunavut stack limit of 20 µg/Rm³, corrected to 11% oxygen.

The average stack concentrations of dioxins and furans was 1.27 ng TEQ/m³ which is above the CWS/Nunavut stack limit of 0.08 ng TEQ/Rm³ (dry, reference conditions of 25°C and 1 atm, corrected to 11% oxygen).

Based on the results of the dioxins and furans testing, it is recommended that TMAC review potential options to reduce these emissions. Options could include:

- Reviewing the incinerator emissions performance with the manufacturer,
- Ensuring manufacturer recommended operational procedures for the incinerator have been implemented and ensuring all operators are adequately trained and,
- Reviewing TMAC's waste segregation practices.

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1.0 INTRODUCTION

TMAC Resources Inc. (TMAC) retained Nunami Stantec Limited Partnership (Nunami Stantec) to conduct mercury and dioxins and furans source emissions testing of one of the waste Incinerator located at the Hope Bay Mine/Mill site. The testing was conducted to assess compliance of the emissions concentrations of mercury, and dioxins and furans with the standards set out in the Nunavut Water Board, Water Licence 2AM-DOH1323 Amendment No. 1, Part G-5, and the Government of Nunavut's "Environmental Guideline for the Burning and Incineration of Solid Waste", based on the Canadian Council of Ministers of the Environment (CCME) Canada Wide Standards (CWS). Particulate matter analysis was also completed concurrently with mercury testing.

The source emission testing was conducted during the period of September 15, 2019 to September 18, 2019. The testing was conducted in accordance with the Environment and Climate Change Canada (ECCC) reference methods EPS 1/RM/2, 1/RM/3, EPS 1/RM/15, and US EPA Method 29.

The source emissions testing campaign and results are outlined in this report in five sections. A brief introduction to the report, including the scope and objectives of the project, is in Section 1. The source emissions testing locations are described in Section 2. The methodology is outlined in Section 3 and results of the source emissions testing program are in Section 4. Closing remarks are in Section 5. Supporting information, field sheets, raw data, calculations and laboratory data are provided in the Appendices.

2.0 SOURCE DESCRIPTION AND SAMPLING LOCATION DETAILS

2.1 INCINERATOR

The process parameters associated with the incinerator are provided in Table 2.1, and the parameters associated with the stacks tested are presented in Table 2.2.

Testing for dioxins and furans, particulate matter and mercury was conducted on the incinerator.

Table 2.1 Process Parameters - Incinerator

Process Parameter	Incinerator
Model ID:	CY-100-CA
Mode of operation	Batch Process 3 cycles per 24 hours @ 4-5 hrs, cool time = 8 hrs
Material feed rate & composition	150-185 kg/batch (food and paper waste)
Supplementary fuel	Diesel, liquefied petroleum gas, natural gas
Normal operating temperatures (°C)	650 (primary chamber), 1000 (secondary chamber)
Process parameters affecting emissions	waste generation and composition
Data verifying operating conditions	Mass of material processed

Table 2.2 Stack Parameters - Incinerators

Stack Parameter	Incinerator
Stack Height - Above Grade (m)	8.9
Stack / Duct Description	Vertical Circular
Stack Diameter (m)	0.508
Number of Sample Ports	2
Sample Port Configuration	2@90°
Sample Port Diameters (m)	0.10
Location Downstream from any Disturbance (m)	6
Location Upstream from any Disturbance (m)	>2
Ideal or Non-ideal	Non-ideal
Sampling Time for DF testing (min)	188
Sampling time for Hg testing (min)	120

Table 2.2 Stack Parameters - Incinerators

Stack Parameter	Incinerator
Total Number of Sample Points	24
Number of Readings per Point	2
Sample Time per Point – DF testing (min)	8
Sample Time per Point – Hg testing (min)	5
Time per Reading – DF testing (min)	4
Time per Reading – Hg testing (min)	2.5
Physical and Chemical Nature of Pollutants	Products of waste combustion and diesel combustion

3.0 STUDY METHODOLOGY

3.1 SCOPE OF WORK AND OVERVIEW OF METHODOLOGY

Nunami Stantec conducted the source emissions testing at the incinerator over the period of September 15 – September 18, 2019. Source emission testing was completed with the incinerator operating under normal steady state conditions (i.e. after the primary chamber burner ignited and stabilized) for the duration of the sampling period.

The testing was conducted in accordance with the ECCC reference methods EPS 1/RM/2 and 1/RM/3 (for dioxins and furans), US EPA Method 29 (for particulate and mercury) and EPS 1/RM/15 (combustion gases). Three replicate tests were conducted for each contaminant from each incinerator exhaust stack. The specific contaminants tested and their associated source emissions testing reference methods used in the campaign are presented in Table 3.1.

Table 3.1 Test Methods

Source	Contaminant	Reference Method	No. of Tests
Incinerator	Velocity Traverse / Flowrate, Molecular Weight, Moisture Content	EPS 1/RM/8 Methods B, C and D	3
	Oxygen (O ₂)	EPS 1/RM/15	3
	Carbon Dioxide (CO ₂)	EPS 1/RM/15	3
	Polychlorinated dibenzo- <i>para</i> -dioxins and Polychlorinated dibenzofurans	EPS 1/RM/2 and 1/RM/3	3
	Total Particulate Matter and Mercury (Hg)	US EPA Method 29	3

The testing methodology and specific work-task breakdown is described in the following subsections.

3.2 TASK 1 – INITIAL PREPARATION

Following award of the contract, Nunami Stantec made initial preparations for the work, including ensuring the preparation of the sampling locations and the ordering of equipment and reagents. Equipment was shipped to site in preparation for the arrival of the source testing crew.

3.3 TASK 2 – ON-SITE SOURCE EMISSIONS TESTING

Source testing was conducted while the process was under normal operation, in accordance with the applicable source testing reference methods. Three repetitions of each test method were completed.

Details of each of the source emissions testing reference methods used as part of the testing campaign are provided in the following subsections.

3.3.1 Preliminary Testing

Upon arrival at the stack sampling location, the source emissions testing equipment was set up and a preliminary survey conducted to measure the average flue gas velocity, moisture content, and flue gas composition in the stack in accordance with the ECCC Reference Method EPS 1/RM/8 Methods B, C, and D entitled “Reference Method for Source Testing: Measurement of Releases of Particulate from Stationary Sources”.

The data from the preliminary survey was used to determine the appropriate nozzle size to conduct isokinetic sampling (where the velocity of the gas entering the nozzle is equal to the gas velocity in the stack) during the source emissions testing, and in calculations for reporting emission rates and concentrations of the sampled contaminants. Verification for cyclonic or reverse flow was also conducted during the preliminary survey, according to procedures outlined in EPS 1/RM/8.

3.3.2 Dioxins and Furans

The emissions of dioxins and furans from the exhaust stacks were measured in accordance with the ECCC reference methods EPS 1/RM/2 and 1/RM/3, entitled “Method for Source Testing: Measurement of Releases Selected Semi-volatile Organic Compounds from Stationary Sources” and “Method for the Analysis of Polychlorinated Dibenzo-Para-Dioxins (PCDDs), Polychlorinated Dibenzofurans (PCDFs), and Polychlorinated Biphenyls (PCBs) in Samples from the Incineration of PCB Waste”, respectively. A schematic of the sampling train is provided in Figure 3-1.

The sampling train has several components which include: a heated sampling probe (a nozzle, glass liner, thermocouple, and pitot tube assembly); a heated sample case containing a filter; an ice box containing a condenser; an XAD-2 solid sorbent trap; a condensate trap; impinger glassware (consisting of 3 impingers); and an umbilical cord leading to the pump and control console. Its operation can be generally described as follows:

- Stack gases are drawn through the probe nozzle at or near isokinetic conditions (where the gas velocity in the nozzle is at the same velocity as the gas in the stack). The gases then flow through the inner liner of the electrically heated sampling probe.
- A pitot tube assembly is located on the probe and next to the nozzle to measure the stack gas velocity in the area of the probe nozzle. Using the differential pressure reading on the control console, the desired nozzle flowrate is determined from the differential pressure across the calibrated orifice.
- The stack gases are drawn from the probe liner through a quartz fibre filter (in the hot side of the sampling train), and then through a condenser to cool the gas prior to contacting the XAD-2 sorbent media. The gas then travels through a condensate trap prior to entering the first pre-weighed impinger (empty). The second impinger contains ethylene glycol, the third is also empty and the fourth impinger contains silica gel. The glassware is placed and operated in an ice bath to cool the gases and condense the moisture in the exhaust gas before the gas enters the umbilical cord.
- The umbilical cord carries the filtered, cooled stack gases from the sampling site to the control console. The control console contains a fibre vane vacuum pump, which is used to draw the stack gases through the sampling train. A calibrated dry gas meter measures the volume of gas sampled.

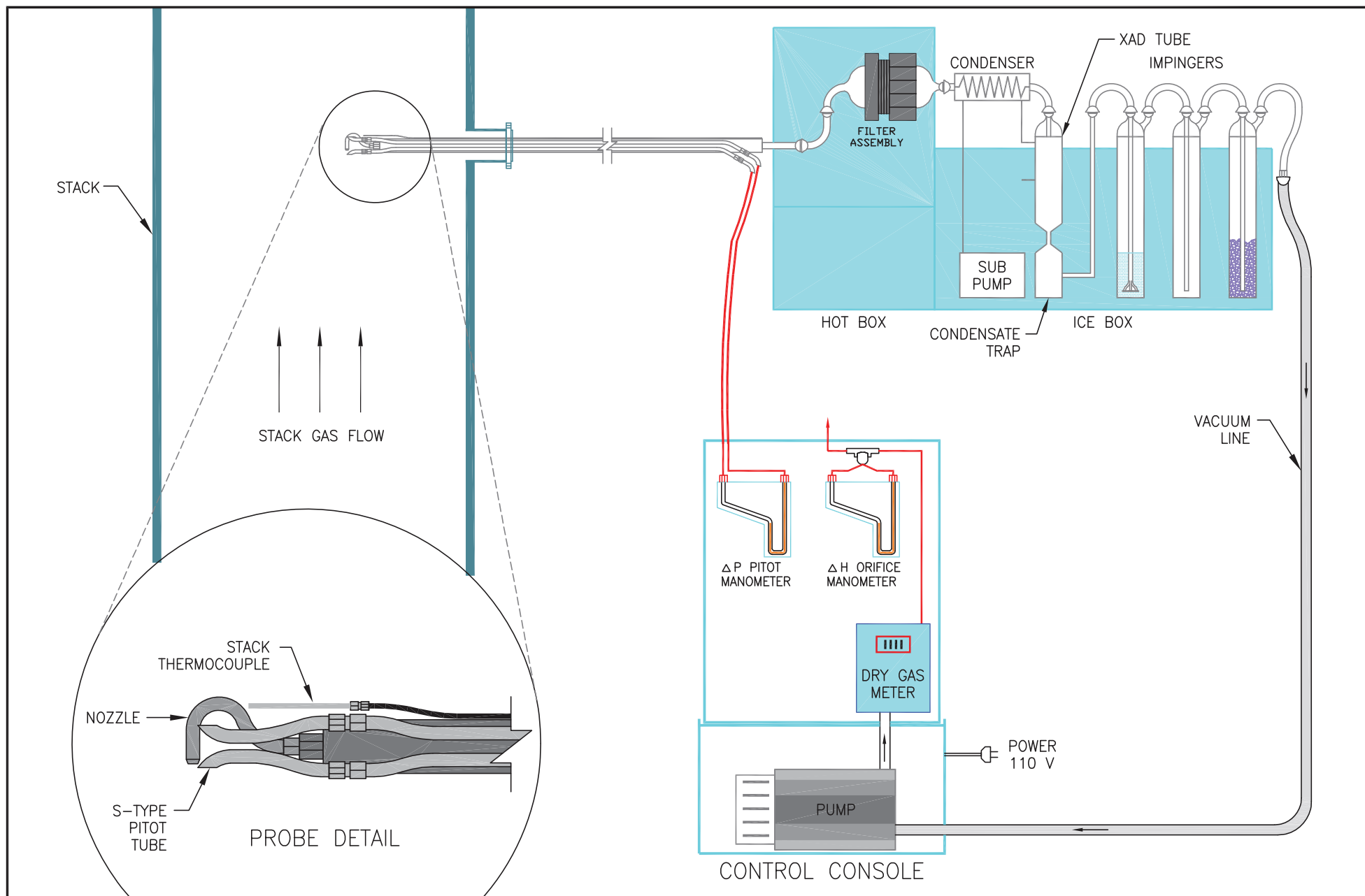
- After the completion of the test, the glassware is re-weighed and the differences in weight are used to calculate the stack gas moisture content. The glassware is rinsed with hexane and acetone, and the rinses are added to the recovered samples prior to being sent to the laboratory for analysis. Front and back half recoveries were combined for analysis.
- A field blank is also recovered onsite to take into account any dioxins and furans that may be present in the atmosphere where the leak checks are being conducted. The total volume of gas that is obtained during the leak pre- and post-leak checks is calculated, and that volume of ambient air is then sampled using a fourth sampling train. This train is then recovered following the same process outlined above and sent to the lab for analysis.

The pre-cleaning and proofing of glassware, preparation of capture solutions, and post-test sample analysis was conducted by ALS Global Laboratories. The laboratory proofing report is provided in Appendix C. The test results for dioxins and furans are expressed as international total equivalent concentrations (I-TEQ).

3.3.3 Particulate Matter/Mercury Testing

Total particulate matter and mercury emissions were determined using concurrent sampling in accordance with US EPA Method 29, entitled *Determination of Metals Emissions from Stationary Sources*. The sampling train, used specifically for isokinetic sampling, is described in detail in US EPA Method 29 and EPS 1/RM/8. Seven impingers were connected in series and contained a variety of reagents to capture trace metals. A schematic of the sampling train is provided in Figure 3-2.

Following testing, the amount of particulate matter present on the filter and in the probe rinse was measured gravimetrically in the laboratory and used in the determination of total particulate matter emissions from the sources tested. The particulate matter samples captured in the probe and filter, and the impinger solutions were analyzed for mercury.

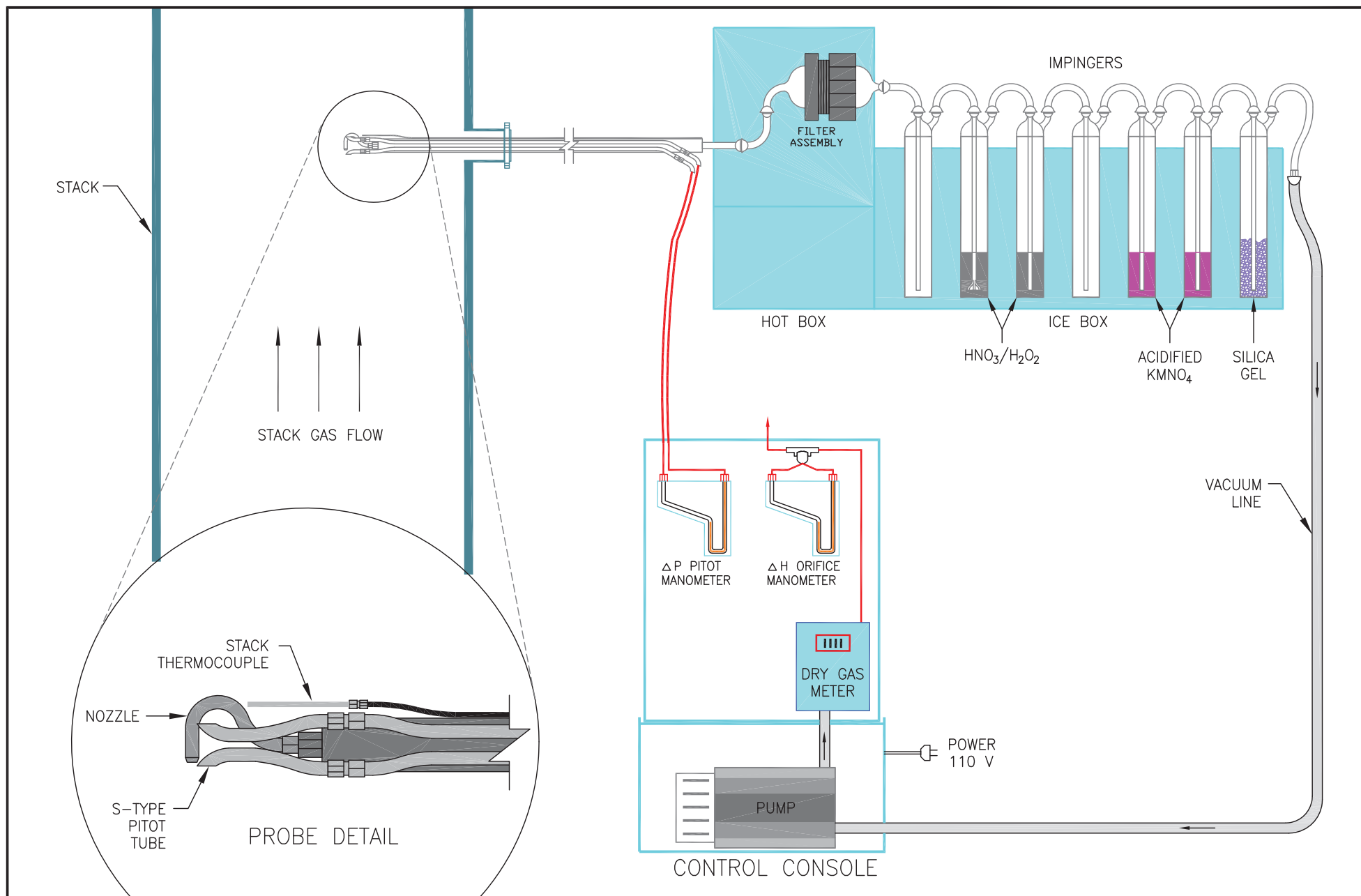


SOURCE EMISSIONS TESTING
EPS 1/RM/2 SAMPLING TRAIN

Scale:

N.T.S.

Fig. No.: 3-1



3.3.4 Combustion Gas Testing

The combustion gases (O_2 , CO_2) were sampled according to the ECCC reference method EPS 1/RM/15, entitled *Reference Method for the Monitoring of Gaseous Emissions from Fossil Fuel-fired Burners*. In this method, samples of flue gas are drawn through a probe, non-isokinetically, from a single point near the centre of the stack.

The combustion gases for the incinerator were analyzed using an Enerac 500 portable Gas Analyzer, manufactured by Enerac Co. This unit is equipped with electrochemical cells that are used to measure the concentrations of oxygen in accordance with EPS 1/RM/15. CO_2 is then calculated based on the oxygen concentrations and the fuel being consumed. This system is equipped with a flue gas probe that has an integrated filter trap and condensate trap and a housing unit that contains the pump and the electrochemical cells.

Calibration data for the Enerac 500 are included in Appendix A.

3.4 TASK 3 - LABORATORY ANALYSIS OF COLLECTED SAMPLES

The recoveries and analyses for dioxins and furans were performed by the ALS Global Laboratories laboratory in Burlington, Ontario, in accordance with the ECCC reference methods EPS 1/RM/2 and 1/RM/3, entitled “Method for Source Testing: Measurement of Releases Selected Semi-volatile Organic Compounds from Stationary Sources” and “Method for the Analysis of Polychlorinated Dibenzo-Para-Dioxins (PCDDs), Polychlorinated Dibenzofurans (PCDFs), and Polychlorinated Biphenyls (PCBs) in Samples from the Incineration of PCB Waste”.

The recoveries and analyses for total particulate matter and mercury were performed by the ALS Global laboratory in Burlington, Ontario, in accordance with the US EPA Method 29, entitled “Determination of Metals Emissions from Stationary Sources”.

ALS Global is accredited by the National Environmental Laboratory Accreditation Program.

Detailed laboratory reports are provided in Appendix C.

3.5 TASK 4 - DATA ANALYSIS AND EMISSION CALCULATIONS

After the source emissions testing work and the laboratory analyses were completed, the Nunami Stantec team reviewed and analyzed the data and calculated the concentrations and emission rates for the contaminants described above. The data and calculations have been subjected to quality assurance and quality control protocols to confirm their accuracy.

3.6 TASK 5 - REPORTING

Following the laboratory and data analysis, the results of the source emissions testing program described above were summarized and described in this report.

Emission concentrations are reported in ng I-TEQ/Rm³ (calculated using the Toxic equivalency factors from the World Health Organization, 2005) for dioxins and furans, corrected to reference conditions (25°C and 101.3 kPa) and the corresponding mass emission rates are reported in pg/s. Concentrations have been corrected to 11% oxygen for comparison with the CWS/Nunavut limits.

3.7 QUALITY ASSURANCE AND QUALITY CONTROL

Throughout the source emissions testing program, quality assurance and quality control procedures were applied to confirm the collection of reliable and accurate emissions data. Quality control checks were performed at several stages during the testing program to confirm the collection of representative samples and the generation of valid results.

The Quality Control (QC) checks included the following:

- use of standardized checklists and field notebooks to confirm completeness, traceability, and comparability of the process information and samples;
- field checking of standardized forms by a second person to confirm accuracy and completeness;
- adherence to sample chain-of-custody procedures;
- testing for cyclonic or reverse flow, as well as stratified flow conditions; and
- leak checks of sampling trains.

Field equipment was calibrated according to the ECCC and US EPA protocols. These calibrations include the following:

Pitot tubes: Calibrated in a wind tunnel with probe and nozzles attached.

Gas meters: Calibrated using a critical orifice calibration set.

Nozzle: Four diameter measurements made using a micrometer across the sharpened edges.

Thermocouples: Calibrated using a potentiometric technique.

Gas Analyzers: Zeroed using nitrogen and calibrated against reference gases (US EPA protocol 1 calibration gases)

Calibration data for all equipment is provided in Appendix A.

Additional information may be found in the description of the reference test methods for stationary source emissions testing published by ECCC (EPS 1/RM/2, 1/RM/3, 1/RM/15) and US EPA (Method 29). Copies of these documents are available upon request from Nunami Stantec.

4.0 RESULTS AND DISCUSSION

Tables 4.1 and 4.2 present the measured stack parameters, concentrations and emission rates of particulate matter, mercury, and dioxins and furans from the incinerator.

Table 4.1 Total Particulate Matter, Mercury Source Testing Results

Parameter	Test 1	Test 2	Test 3	Average	Method Criteria/CWS Limits
Test Date	Sept 17, 2019	Sept 17, 2019	Sept 18, 2019	NA	-
Test Period	12:34 – 14:34	16:06 – 18:06	10:48 – 12:48	NA	-
Test Duration (min)	120	120	120	120	-
Stack Gas Static Pressure (kPa)	0.005	0.005	0.005	0.005	-
Volume of Gas Sampled (m ³)	1.58	1.69	1.66	1.64	-
Average Isokineticity (%)	102	103	101	102	90 - 110
Total Particulate Matter not including Impingers (mg)	97.9	101	82.7	93.9	-
Total Mass of waste combusted (kg)	191	191	161	181	-
Exhaust Gas Parameters					
Stack Gas Temperature (°C)	600	646	633	626	-
Stack Gas Moisture Content (%)	12.8	9.83	11.9	11.5	-
Stack Gas Velocity (m/s)	5.03	5.45	5.48	5.32	-
Stack Gas Flow Rate (Rm ³ /s)	0.24	0.26	0.26	0.25	-
Oxygen - O ₂ Concentration (%)	5.93	9.64	6.96	7.51	-
Carbon Dioxide CO ₂ Concentration (%)	18.5	13.9	17.1	16.5	-
<u>Particulate Matter (PM)</u>					
Concentration (mg/Rm ³)	61.9	59.8	49.9	57.2	-
Concentration at 11% O ₂ (mg/Rm ³)	40.9	52.6	35.4	43.0	-
Emission Rate (kg/hr)	0.05	0.06	0.05	0.05	-
<u>Mercury (Hg)</u>					
Concentration (µg/Rm ³)	0.33	0.31	0.39	0.35	-
Concentration at 11% O ₂ (µg/Rm ³)	0.22	0.28	0.28	0.26	20
Emission Rate (kg/hr)	2.92E-07	2.91E-07	3.61E-07	3.15E-07	-
Notes: Rm ³ Cubic meters (corrected to 25° C and 101.3 kPa). mg/Rm ³ Milligrams per reference cubic meter. µg/Rm ³ Micrograms per reference cubic meter kg/hr Kilograms per hour.					

The average concentration of mercury for the three tests was 0.26 µg/Rm³, which is below the CWS/Nunavut stack limit of 20 µg/Rm³ (corrected to 11% oxygen).

There are no limits specified for particulate matter emissions in the Nunavut Department of the Environment's "Guideline for the Burning and Incineration of Solid Waste".

Table 4.2 Dioxins and Furans Source Testing Results

Parameter	Test 1	Test 2	Test 3	Average	Method Criteria/CWS Limits
Test Date	15-Sep-19	16-Sep-19	16-Sep-19	-	-
Test Period	10:55 – 14:05	10:00 – 12:00	14:18 – 16:18	-	-
Test Duration (min)	188	188	188	188	240
Stack Gas Static Pressure (kPa)	0.005	0.005	0.005	0.005	-
Volume of Gas Sampled (Rm ³)	2.72	1.83	2.27	2.27	3
Average Isokineticity (%)	107	99.7	99.6	102.1	90-110
Total Mass of waste combusted (kg)*	181	181	181	181	-
Stack Gas Temperature (°C)	827	811	804	814	-
Stack Gas Moisture Content (%)	15.1	12.7	10.9	12.9	-
Stack Gas Velocity (m/s)	6.84	4.70	5.65	5.73	-
Stack Gas Flow Rate (Rm ³ /s)	0.25	0.18	0.23	0.22	-
Oxygen - O ₂ Concentration (%)	3.73	4.76	9.87	6.12	-
Carbon Dioxide - CO ₂ Concentration (%)	18.5	19.5	14.2	17.4	-
2,3,7,8-Tetra CDD (pg/TEQ pg)**	448	87.0	42.9	193	-
1,2,3,7,8-Penta CDD (pg/TEQ pg)**	1,730	289	314	778	-
1,2,3,4,7,8-Hexa CDD (pg/TEQ pg)**	1,800	330	756	96.2	-
1,2,3,6,7,8-Hexa CDD (pg/TEQ pg)**	2,420	556	2,160	171	-
1,2,3,7,8,9-Hexa CDD (pg/TEQ pg)**	1,980	422	1,360	125	-
1,2,3,4,6,7,8-Hepta CDD (pg/TEQ pg)**	21,300	6,940	37,200	218	-
Octa CDD (pg/TEQ pg)**	28,500	12,400	95,500	13.6	-
2,3,7,8-Tetra CDF (pg/TEQ pg)**	2,310	359	249	97.3	-
1,2,3,7,8-Penta CDF (pg/TEQ pg)**	4,400	676	879	59.6	-
2,3,4,7,8-Penta CDF (pg/TEQ pg)**	5,760	1,280	2,310	935	-
1,2,3,4,7,8-Hexa CDF (pg/TEQ pg)**	5,240	1,220	2,970	314	-
1,2,3,6,7,8-Hexa CDF (pg/TEQ pg)**	5,930	1,320	4,080	378	-
2,3,4,6,7,8-Hexa CDF (pg/TEQ pg)**	4,780	2,340	11,200	611	-

Table 4.2 Dioxins and Furans Source Testing Results

Parameter	Test 1	Test 2	Test 3	Average	Method Criteria/CWS Limits
1,2,3,7,8,9-Hexa CDF (pg/TEQ pg)**	1,190	668	3,170	168	-
1,2,3,4,6,7,8-Hepta CDF (pg/TEQ pg)**	10,300	6480	28,300	150	-
1,2,3,4,7,8,9-Hepta CDF (pg/TEQ pg)**	1,680	1,470	10,300	44.8	-
Octa CDF (pg/TEQ pg)**	2,200	8,370	69,700	8.03	-
Total TEQ (pg TEQ)	6,945.01	1,656.91	4,478.33	4,360	-
Concentration uncorrected (pg TEQ/Rm ³)	2,553	907	1,972	1,811	-
Concentration corrected to 11 % O ₂ (pg TEQ/Rm ³)	1,472	556	1,769	1,266	
Concentration corrected to 11 % O ₂ (ng/TEQ/Rm ³)	1.47	0.56	1.77	1.27	0.08
Emission Rate (pg TEQ/s)	651	166	449	422	--
Legend: CDD Chloro Dibenzo-p-Dioxin. CDF Chloro Dibenzofuran. TEF Toxic equivalency factor (2005 World Health Organization) TEQ Tetrachlorodibenzo-para-dioxin equivalent (TEQ). pg TEQ Picograms tetrachlorodibenzo-para-dioxin equivalent. pg TEQ/Rm ³ Picograms tetrachlorodibenzo-para-dioxin equivalent per dry cubic meter at reference conditions. pg TEQ/s Picograms tetrachlorodibenzo-para-dioxin equivalent per second.					
*Total mass of waste combusted for September 15 and 16, 2019 was estimated by taking an average of the mass of waste combusted on September 17 and 18, 2019, as the site records for the mass of waste combusted on September 15 and 16 were not available. **Individual test results reported in pg. Average reported in TEQ pg.					

The average concentration of dioxins and furans for the three tests was 1.27 ng/TEQ/Rm³, which is above the CWS/Nunavut stack limit of 0.08 ng TEQ/Rm³, corrected to 11% oxygen.

The sample volumes collected were slightly below the method recommended sample size of 3 to 4 m³, and test times were shorter than the 4-hour sample specified in the methodology. The shorter test times and lower sample volumes were required due to the relatively short batch runs of 3 hours and method dictated sample rates. Laboratory results show measurable amounts of target analytes, therefore, the lower sample volume and shorter test times is not considered to have materially affected the validity of the testing. The source testing raw data, laboratory analytical results, and detailed calculations are provided in Appendices B, C, and D, respectively.

The velocity profiles across the exhaust stack, as shown in Appendix D, were consistent between tests and did not indicate the presence of cyclonic or reverse flow.

December 20, 2019

Based on the results of the dioxins and furans testing, it is recommended that TMAC review potential options to reduce these emissions. Options could include:

- Reviewing the incinerator emissions performance with the manufacturer,
- Ensuring manufacturer recommended operational procedures for the incinerator have been implemented and ensuring all operators are adequately trained and,
- Reviewing TMAC's waste segregation practices.

5.0 CLOSING REMARKS

This report has been prepared by Nunami Stantec for the sole benefit of TMAC Resources Inc. The report may not be relied upon by any other person or entity, other than for its intended purposes, without the express written consent of Nunami Stantec and TMAC Resources Inc. This report was undertaken exclusively for the purpose outlined herein and was limited to the scope and purpose specifically expressed in this report. This report cannot be used or applied under any circumstances to another location or situation or for any other purpose without further evaluation of the data and related limitations. Any use of this report by a third party, or any reliance on decisions made based upon it, are the responsibility of such third parties. Nunami Stantec accepts no responsibility for damages, if any, suffered by any third party as a result of decisions made or actions taken based on this report.

Nunami Stantec makes no representation or warranty with respect to this report, other than the work was undertaken by trained professional and technical staff in accordance with generally accepted engineering and scientific practices current at the time the work was performed. Any information or facts provided by others and used in the preparation of this report were assumed by Nunami Stantec to be accurate. Conclusions presented in this report should not be construed as legal advice.

The source testing measurements for each stack were taken over short periods of time and the emissions results are considered representative for the conditions present at the time of testing. The information provided in this report was compiled from such on-site measurements and by applying currently accepted industry standard mitigation and prevention principles. This report represents the best professional judgment of Nunami Stantec personnel available at the time of its preparation. Nunami Stantec reserves the right to modify the contents of this report, in whole or in part, to reflect the any new information that becomes available. If any conditions become apparent that differ significantly from our understanding of conditions as presented in this report, we request that we be notified immediately to reassess the conclusions provided herein.

This report was prepared by Julie Reid, P.Eng., quality reviewed by Vicki Corning, P.Eng., and independently reviewed by Mike Murphy, PhD, P.Eng, on behalf of TMAC Resources Inc. If you have any questions or concerns about this report, please do not hesitate to contact the undersigned.

Respectfully Submitted,

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APPENDIX A

Calibration Data

VALLEY ENVIRONMENTAL CALIBRATION SERVICES

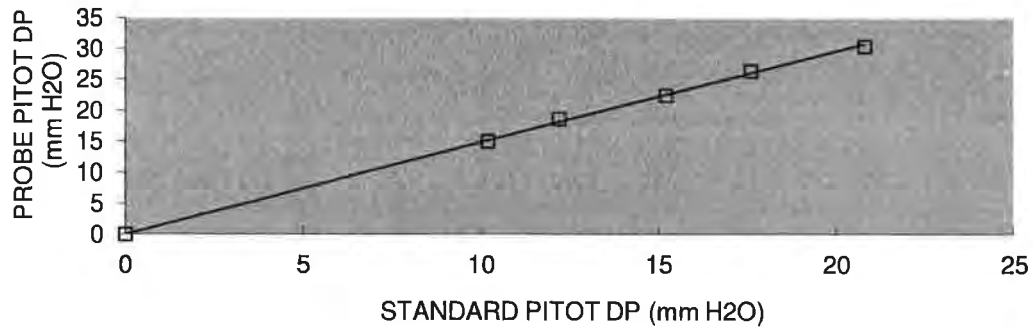
PITOT TUBE CALIBRATION REPORT

CLIENT - Stantech
PROBE ID - M5-2
NOZZLE - #16- 0.500"
DATE - 4-Mar-19

FAN SPEED	STANDARD	PROBE
	PITOT	PITOT
m/s	(mm H ₂ O)	(mm H ₂ O)
0.00	0.00	0.00
13.1	10.20	15.00
14.3	12.20	18.60
16.0	15.20	22.40
17.2	17.60	26.40
18.7	20.80	30.40

PITOT FACTOR C_p = 0.821

PITOT - M5-2 NOZZLE - #16- 0.500"
4-Mar-19



Technician: Andrew Murphy

Signature *Andrew Murphy*

VALLEY ENVIRONMENTAL SERVICES
160 Pony Drive #1
Newmarket, Ontario L3Y 7B6
PH: (905) 830 0136
FAX: (905) 830 0137

Tunnel	VES
Std. Pitot C_p	0.999
Static	-0.25
Barometric	29.25
Temperature	70
Abs Static	29.23

Pre-Test Dry Gas Meter - Control Unit Calibration

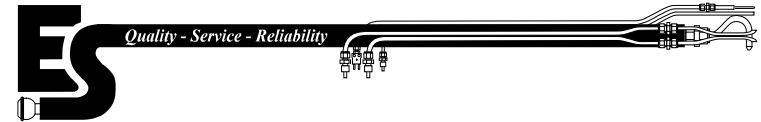
Date : 1/4/2019
 Barometric Pressure, Pb : 30
 Model Number : 2203
 Calibrated By : JJC
 Job #: 121899000

Orifice Manometer Setting, deltaH (in. H2O)				Dry Gas Meter Volume, Vm (cu.ft)			Temperatures (F)			Time, theta (min)	
							Dry Gas Meter				
						Total		Outlet, to	Average, tm		
1.0						5.500			66	66	10
1.5						5.403			69	69	8
2.2						5.850			70	70	7

Calculations

Orifice Manometer Setting, deltaH (in. H2O)	Dry Gas Correction Factor, gamma (Tolerance = 0.95 - 1.05, +/-1.5% of avg)	Orifice Pressure Differential (delta H@) yielding 0.75 cfm of air at 68F and 29.92 in.Hg as in. H2O (Tolerance = +/- 0.15 in.)	Orifice Coefficient Ko
1.0	0.979	1.842	0.710
1.5	0.978	1.945	0.693
2.2	0.980	1.853	0.708
Average	0.979	1.880	0.704

METHOD 5 DRY GAS METER CALIBRATION USING CRITICAL ORIFICES



- 1) Select three critical orifices to calibrate the dry gas meter which bracket the expected operating range.
- 2) Record barometric pressure before and after calibration procedure.
- 3) Run at tested vacuum (from Orifice Calibration Report), for a period of time necessary to achieve a minimum total volume of 5 cubic feet.
- 4) Record data and information in the **GREEN** cells, YELLOW cells are calculated.

DATE:		METER SERIAL #:		BAROMETRIC PRESSURE (in Hg):		INITIAL		FINAL		AVG (P _{bar})		IF Y VARIATION EXCEEDS 2.00%, ORIFICE SHOULD BE RECALIBRATED						
METER PART #:		CRITICAL ORIFICE SET SERIAL #:																
ORIFICE #	RUN #	K' FACTOR (AVG)	TESTED VACUUM (in Hg)	DGM READINGS (FT ³)			TEMPERATURES °F				ELAPSED TIME (MIN) θ	DGM ΔH (in H ₂ O)	(1) V _m (STD)	(2) V _{cr} (STD)	(3) Y	Y VARIATION (%)	ΔH _@	
				INITIAL	FINAL	NET (V _m)	AMBIENT	DGM INLET INITIAL FINAL	DGM OUTLET INITIAL FINAL	DGM AVG								
15	1	0.4164	18	179.70	185.19	5.490	69.1	65	65	65	65	10.00	0.95	5.5058	5.3889	0.979		1.85
	2	0.4164	18	196.19	201.70	5.510	69.6	67	68	67	68	10.00	0.95	5.4996	5.3864	0.979		1.84
	3	0.4164	18	190.69	196.19	5.50	69.4	66	67	66	67	10.00	0.95	5.5001	5.3874	0.980		1.84
													AVG =		0.979	0.05		
18	1	0.5085	18	202.10	207.69	5.590	69.6	67	69	67	69	8.00	1.50	5.5818	5.2622	0.943		1.95
	2	0.5085	18	207.69	212.91	5.220	69.8	69	69	69	69	8.00	1.50	5.2024	5.2612	1.011		1.94
	3	0.5085	18	212.91	218.31	5.40	69.8	69	70	69	70	8.00	1.50	5.3768	5.2612	0.979		1.94
													AVG =		0.978	-0.13		
23	1	0.6307	18	218.43	224.27	5.840	69.8	70	70	70	70	7.00	2.20	5.8194	5.7099	0.981		1.85
	2	0.6307	18	224.27	230.12	5.850	69.8	70	70	70	70	7.00	2.20	5.8293	5.7099	0.980		1.85
	3	0.6307	18	239.08	244.94	5.860	69.8	70	70	70	70	7.00	2.20	5.8393	5.7099	0.978		1.85
													AVG =		0.980	0.08		

USING THE CRITICAL ORIFICES AS CALIBRATION STANDARDS:

The following equations are used to calculate the standard volumes of air passed through the DGM, V_m (std), and the critical orifice, V_{cr} (std), and the DGM calibration factor, Y. These equations are automatically calculated in the spreadsheet above.

AVERAGE DRY GAS METER CALIBRATION FACTOR, Y = **0.979**

AVERAGE ΔH_@ = **1.88**

$$(1) \quad V_{m(std)} = K_1 * V_m * \frac{P_{bar} + (\Delta H / 13.6)}{T_m}$$

= Net volume of gas sample passed through DGM, corrected to standard conditions

K₁ = 17.64 °R/in. Hg (English), 0.3858 °K/mm Hg (Metric)
T_m = Absolute DGM avg. temperature (°R - English, °K - Metric)

$$(2) \quad V_{cr(std)} = K' * \frac{P_{bar} * \Theta}{\sqrt{T_{amb}}}$$

= Volume of gas sample passed through the critical orifice, corrected to standard conditions

T_{amb} = Absolute ambient temperature (°R - English, °K - Metric)
K' = Average K' factor from Critical Orifice Calibration

$$(3) \quad Y = \frac{V_{cr(std)}}{V_{m(std)}} \quad = \text{DGM calibration factor}$$

$$\Delta H_{@} = \left(\frac{0.75 \theta}{V_{cr(std)}} \right)^2 \Delta H \left(\frac{V_m(std)}{V_m} \right)$$



CALIBRATION CERTIFICATE

CALIBRATION DATE 08/23/19

MODEL 500

TESTED BY RD

SERIAL # 511458

THIS ANALYZER WAS SUCCESFULLY ZEROED IN CLEAN AIR AND SUCCESFULLY CALIBRATED USING 2% CERTIFIED ACCURACY NIST TRACEABLE SPAN GAS FOR THE MEASUREMENT OF THE FOLLOWING PARAMETERS AS NEEDED:

CALIBRATED SENSORS

CONCENTRATION

OXYGEN

☒

0.00/20.9 %

O₂ balance NITROGEN

COMBUSTIBLES

☒

1.01 %

CH₄ balance NITROGEN

CARBON MONOXIDE

☒

204 PPM

CO balance NITROGEN

NITRIC OXIDE

☒

198 PPM

NO balance NITROGEN

NITROGEN DIOXIDE

☒

104 PPM

NO₂ balance NITROGEN

SULFUR DIOXIDE

☒

203 PPM

SO₂ balance NITROGEN

DRAFT

☒

5.00 "

W.C.

1320 LINCOLN AVE., HOLBROOK, NY 11741

TEL: (516) 997-2100 (800) 695-3637

FAX: (516) 997-2129

www.enerac.com

EMAIL: info@enerac.com

Probe Stack Thermocouple Calibration

Calibration Date: 8-Feb-18

Calibrated By: JJC

Reference ID Fisher Scientific catalog #150414E

Ice Bath

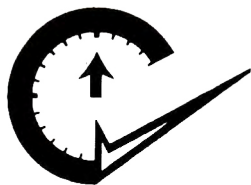
Thermocouple #	Reference Temp (F)	Observed Temp (F)
#1 -2' probe	32	32
#1 -3' probe	32	32
#1 -4' probe	32	32
#1 -5' probe	32	32
#1 - 6' probe	32	32
#1 - 8'-1 probe	NA	NA
#1 -8'-2 probe	32	32
#1 -10'-1 probe	NA	NA
#1 -10'-2 probe	32	32
#6 -1848	32	32
#7 -1848	32	32
#6 - 2203	32	32
#6 - 2257	32	32
3FT Pitot - no fittings	32	32
3FT Pitot - fittings	32	32
5ft Pitot	32	34

[illegible]

Boiling Water

Thermocouple #	Reference Temp (F)	Observed Temp (F)
#1 -2' probe	212	210
#1 -3' probe	212	212
#1 -4' probe	212	212
#1 -5' probe	212	210
#1 -6' probe	212	213
#1 -8'-1 probe	NA	NA
#1 -8'-2 probe	212	212
#1 -10'-1 probe	NA	NA
#1 -10'-2 probe	212	212
#6 -1848	212	212
#7 -1848	212	212
#6 -2203	212	212
#6 -2257	212	212
3FT Pitot - no fittings	212	212
3FT Pitot - fittings	212	212
5ft Pitot	212	212

[illegible]



CAL-CHEK CANADA INC.

250 Governors Road - Dundas ON L9H 3K3

Telephone: (905) 628-4636

www.calchek.ca

Scale / Balance Certification

Date: February 12, 2019

Certificate Number: S190327

Customer: Stantec Consulting Ltd.
845 Prospect Street
Fredericton, New Brunswick E3B 2T7

Room Temperature: 19.7°C

Calibration Location: 10 Timothy Drive, Hanwell - North Kingsclear Lab

Scale / Balance Manufacturer: Mettler Toledo

Resolution: 0.1g

Model Number: PB8001

Serial Number: 1116222054

Capacity: 8,100 g

Capacity Calibrated To: 8,100 g

<u>ACTUAL WEIGHT</u>			<u>ACTUAL WEIGHT</u>		
<u>APPLIED</u>	<u>SCALE</u>	<u>ERROR</u>	<u>APPLIED</u>	<u>SCALE</u>	<u>ERROR</u>
<u>GRAMS</u>	<u>READINGS</u>	<u>AS FOUND</u>	<u>GRAMS</u>	<u>READINGS</u>	<u>AS LEFT</u>
0.5	0.5	0.0	0.5	0.5	0.0
1.0	1.0	0.0	1.0	1.0	0.0
5.0	5.0	0.0	5.0	5.0	0.0
10.0	10.0	0.0	10.0	10.0	0.0
20.0	20.0	0.0	20.0	20.0	0.0
50.0	50.0	0.0	50.0	50.0	0.0
100.0	100.0	0.0	100.0	100.0	0.0
200.0	200.0	0.0	200.0	200.0	0.0
500.0	500.0	0.0	500.0	500.0	0.0
1000.0	999.9	0.1	1000.0	1000.0	0.0
2000.0	1999.9	0.1	2000.0	2000.0	0.0
4000.0	3999.7	0.3	4000.0	4000.0	0.0
6000.0	5999.6	0.4	6000.0	6000.0	0.0
8000.0	7999.4	0.6	8000.0	8000.0	0.0
8100.0	8099.4	0.6	8100.0	8100.0	0.0

The above mentioned Scale / Balance has been checked for accuracy using the following N.I.S.T. calibrated dead weights as per the CSA method.

<u>STANDARD</u>	<u>CAL DATE</u>	<u>TRACEABLE #</u>
CCC-800	15/06/16	2449326

Obtained results are within the manufacturer's stated accuracy and/or are within +/-0.01% or 1 division whichever is greater at any point of the calibrated range.

Pass/Fail statements are based on data from measurements made, procedures utilized, professional experience and the uncertainty associated with this calibration. It is the responsibility of the user of this equipment to determine if the results identified meet specific requirements for its intended application.

Calibration Technician: Mike Gambicourt

Suggested Calibration Due Date: February 2020


Authorized Signatory: Roni Newitt

Due dates appearing on the certificate of calibration and label are determined by client for administrative purposes and do not imply continued conformance to specifications. All calibrations performed at customer location unless otherwise noted.

This certificate shall not be reproduced except in full, without the written approval of Cal-Chek Canada

APPENDIX B

Field Sheets

MOISTURE FIELD DATA SHEET - DIOXINS/FURANS/SVOC's

Client: TMAC
 Job No.: 1609 30343
 Plant: Incinerator
 Location: Hoppe Bay
 Test: SVOC - 1
 Date: 15 Sep.
 Analyst: B. Cole



Filter QZ6686

Moisture Data

Component	Contents	Final Weight (g)	Tare Weight (g)	Weight of Moisture (g)
Condenser	Empty	306.4	304.7	1.7
Resin Trap	XAD-2	350.6	347.9	2.7
Condensate Trap	Empty	817.5	490.1	327.4
First Impinger	100 ml Ethylene Glycol	770.2	752.8	17.4
Second Impinger	Empty	647.1	646.5	0.6
Third Impinger	200g Silica Gel	918.5	911.6	6.9
Total Weight Gain (g)				356.7
Moisture Volume (mL)				

#3

DGM Final - Initial
 = 326.26 - 231.45
 = 94.81 cu. ft
 x 0.01
 = 4.5052

356.7
 x 0.048
 = 17.1216 cu ft

17.1216
 111.9316
 = 0.152965
 = 15.3 %

SOURCE TESTING FIELD DATA SHEET

Job No.: 160930343
 Client: T MAC
 Plant: Incinerator
 Location: Hoppe Rd
 Test: 3000-1
 Date: 15 Sep
 Operators: BC/KW
 Gamma: .979
 Delta H@: 1.880
 Pitot Coeff.: .821
 Ko Coeff.: .704
 Start: 10:55
 Finish: 2:05

Barometric Pressure (in.Hg):
 Static Pressure (in.H2O): 0.02
 Assumed Moisture (%): 0.098 9.8%
 Filter ID: Q26686
 Initial Filter Weight (g):
 Stack Dia. (in.): 20
 Probe Length (ft): 2
 Nozzle ID (in.): 1.536
 Ambient Temp. (F): 41

Test Traverses

Leak Checks:
 Before Traverse: 231.19 > 231.45
 Vacuum Pressure: -19
 After Traverse:
 Vacuum Pressure:

Fuel Type: diesel / garbage
 Steam Load:

Combustion Gases:
 O2 (%):
 CO2 (%):
 CO (ppm):
 SO2 (ppm):
 NO2 (ppm):
 NOx (ppm):
 Tamb (F):
 Tstack (F):

Traverse Point	Time (min)	Stack Gas Temp., Ts (F)	Velocity Head, dP (in.H2O)	Orifice dH (in.H2O)	Gas Meter Volume (cu.ft)	Probe Temp. (F)	Oven Temp. (F)	XAD-2 Inlet Temp. (F)	Impinger Outlet Temp. (F)	Gas Meter Temp. (F)		Pump Vacuum (in.Hg)
										In	Out	
	0	1355	0.01		231.45			41	38	56		
	4	1355	0.02	0.42	231.92	250	251	41	38	58		-1
	8	1382	0.02	0.42	233.26		250	41	36	56		-1
	12	1418	0.02	0.41	234.66		250	40	36	55		-1
	16	1430	0.03	0.61	236.35		250	40	37	56		-2
	20	1462	0.04	0.80	238.29		252	40	36	56		-3
	24	1488	0.04	0.79	240.20		255	41	36	57		-4
	28	1493	0.04	0.79	242.14		249	42	36	58		-5
	32	1515	0.05	0.97	244.25		253	44	36	59		-6
	36	1533	0.05	0.96	246.42		248	45	36	59		-6
	40	1550	0.06	1.15	248.80		252	46	36	59		-6
	44	1562	0.06	1.14	251.17		251	48	37	60		-5
	48	1562	0.06	1.14	253.54		250	49	37	60		-5
	52	1561	0.06	1.14	253.54		250	49	37	60		-5
	56	1575	0.05	0.95	255.68		249	47	36	60		-5
	60	1580	0.05	0.94	257.76		249	45	36	59		-5
	64	1591	0.04	0.75	259.65		250	44	36	59		-5
	68	1608	0.04	0.74	261.55		251	45	36	59		-6
	72	1540	0.03	0.58	263.20		251	44	36	58		-6
	76	1547	0.03	0.57	264.82		249	42	36	58		-6
	80	1561	0.03	0.57	266.48		250	42	36	56		-6
	84	1512	0.03	0.58	268.15		249	42	36	56		-7
	88	1531	0.03	0.58	269.82		249	42	36	56		-7
	92	1524	0.03	0.58	271.48		250	42	36	56		-7
	96	1519	0.04	0.77	273.41		248	42	36	56		-9
	100	1530	0.04	0.77	275.34		249	43	36	56		-9
	100	1518	0.04	0.77			252	44	36	57		

* 52 min - Unit primary opened for stirring

1/2

SOURCE TESTING FIELD DATA SHEET

Job No.: 1609 303 43
 Client: T MAC
 Plant: Incinerator
 Location: Haze Bay NU
 Test: SVOL-1
 Date: 15 Sep 2019
 Operators: BC/RW
 Gamma: 0.979
 Delta H@: 1.880
 Pitot Coeff.: 0.821
 Ko Coeff.: 0.704
 Start: 10:55
 Finish: 2:05

Barometric Pressure (in.Hg): _____
 Static Pressure (in.H2O): 0.02
 Assumed Moisture (%): 9.8
 Filter ID: Q7 6686
 Initial Filter Weight (g): _____
 Stack Dia. (in.): 20
 Probe Length (ft): 2
 Nozzle ID (in.): (.536)
 Ambient Temp. (F): _____

Test Traverses

Leak Checks:
 Before Traverse: _____
 Vacuum Pressure: _____
 After Traverse: 326.42
 Vacuum Pressure: -20
 Fuel Type: diesel/garbage
 Steam Load: _____

Combustion Gases:
 O2 (%): _____
 CO2 (%): _____
 CO (ppm): _____
 SO2 (ppm): _____
 NO2 (ppm): _____
 NOx (ppm): _____
 Tamb (F): _____
 Tstack (F): _____

Traverse Point	Time (min)	Stack Gas Temp., Ts (F)	Velocity Head, dP (in.H2O)	Orifice dH (in.H2O)	Gas Meter Volume (cu.ft)	Probe Temp. (F)	Oven Temp. (F)	XAD-2 Inlet Temp. (F)	Impinger Outlet Temp. (F)	Gas Meter Temp. (F)		Pump Vacuum (in.Hg)
										In	Out	
	100	1518	0.04	0.77	277.29		252	44	36	57		-9
	104	1517	0.04	0.78	279.22		250	44	36	57		-9
	108	1530	0.04	0.77	281.17		252	36	35	57		-9
	112	1515	0.05	0.97	283.41		249	35	35	58		-11
	116	1508	0.05	0.98	285.56		250	42	35	58		-7
	120	1518	0.05	0.97	287.69		252	43	35	58		-8
	124	1504	0.05	0.98	289.87		251	44	36	58		-9
	128	1507	0.05	0.98	292.05		252	43	36	58		-9
	132	1520	0.05	0.97	294.20		247	43	36	58		-9
	136	1507	0.05	0.98	296.34		251	42	35	58		-10
	140	1515	0.05	0.97	298.54		252	42	35	59		-10
	144	1508	0.05	0.98	300.71		252	43	35	59		-10
	148	1514	0.05	0.97	302.93		246	43	35	59		-10
	152	1580	0.05	0.94	305.10		249	43	36	60		-7
	156	1565	0.05	0.95	307.23		251	44	36	60		-7
	160	1547	0.06	1.15	309.69		248	45	37	60		-9
	164	1545	0.06	1.15	312.05		251	45	37	60		-7
	168	1538	0.06	1.16	314.42		247	46	37	60		-8
	172	1535	0.06	1.16	316.80		251	46	37	60		-8
	176	1540	0.06	1.16	319.15		252	46	37	60		-8
	180	1535	0.06	1.16	321.52		247	46	37	60		-9
	184	1532	0.06	1.16	323.91		250	46	37	60		-9
	188	1535	0.06	1.16	326.26		249	46	38	61		-10

#146 Unit opened for stirring
 - CO shoots up temporarily after stir

MOISTURE FIELD DATA SHEET - DIOXINS/FURANS/SVOC's

Client: TMAC
Job No.: 1609 30343



Plant: Incinerator
Location: Hope Bay NU
Test: SVOC-2
Date: 16 Sep 2019
Analyst: B. Cole

QZ 6687

Moisture Data

Component	Contents	Final Weight (g)	Tare Weight (g)	Weight of Moisture (g)
Condenser	Empty	229.6	227.1	2.5
Resin Trap	XAD-2	342.2	339.4	2.8
Condensate Trap	Empty	763.4	540.9	222.5
First Impinger	100 ml Ethylene Glycol	742.5	778.3	-35.8
Second Impinger	Empty	620.0	619.8	0.2
Third Impinger	200g Silica Gel	922.2	918.1	4.1
Total Weight Gain (g)				196.3
Moisture Volume (mL)				

39225
-326.60
65.65

196.3
x 0.048 = 9.4224
+ 65.65
75.0724

9.4224
75.0724
= 0.125511
= 12.5%

SOURCE TESTING FIELD DATA SHEET

Job No.: 1609 30343
 Client: TMAC
 Plant: Incinerator
 Location: Free Ry NV
 Test: SVC-2
 Date: 16 Sep 2019
 Operators: BC/KW
 Gamma: .979
 Delta H@: 1.880
 Pitot Coeff.: .821
 Ko Coeff.: .704
 Start: 10:00
 Finish:

Barometric Pressure (in.Hg):
 Static Pressure (in.H2O): 0.02
 Assumed Moisture (%): 15.3
 Filter ID: Q2 6687
 Initial Filter Weight (g):
 Stack Dia. (in.): 20
 Probe Length (ft): 2
 Nozzle ID (in.): (.536)
 Ambient Temp. (F): 35

Test Traverses

Leak Checks: ☒
 Before Traverse: (326.42 → 326.60)
 Vacuum Pressure: -20
 After Traverse:
 Vacuum Pressure:
 Fuel Type: diesel/gas
 Steam Load:

Combustion Gases :
 O2 (%) :
 CO2 (%) :
 CO (ppm) :
 SO2 (ppm) :
 NO2 (ppm) :
 NOx (ppm) :
 Tamb (F) : 35
 Tstack (F) :

Traverse Point	Time (min)	Stack Gas Temp., Ts (F)	Velocity Head, dP (in.H2O)	Orifice dH (in.H2O)	Gas Meter Volume (cu.ft)	Probe Temp. (F)	Oven Temp. (F)	XAD-2 Inlet Temp. (F)	Impinger Outlet Temp. (F)	Gas Meter Temp. (F)		Pump Vacuum (in.Hg)
										In	Out	
	0				326.60							
	4	1420	0.03	0.57	328.31	252	35	35	33	73		-1
	8	1427	0.03	0.57	329.91	248	35	35	33	73		-2
	12	1464	0.03	0.56	331.56	251	36	36	34	73		-3
	16	1480	0.03	0.55	333.19	252	36	36	34	73		-4
	20	1474	0.02	0.37	334.55	251	36	36	34	72		-4
	24	1480	0.02	0.37	335.87	250	36	37	34	73		-4
	28	1475	0.02	0.37	337.20	250	37	37	34	72		-4
	32	1478	0.02	0.37	338.55	250	37	37	34	73		-5
	36	1455	0.03	0.56	340.19	249	36	36	34	72		-6
	40	1447	0.03	0.56	341.87	250	36	36	34	72		-7
	44	1455	0.02	0.37	343.32	250	37	37	34	72		-5
	48	1430	0.02	0.38	344.64	247	37	37	34	72		-6
	52	1508	0.03	0.54	346.22	252	36	36	34	72		-9
	56	1580	0.03	0.52	347.82	249	36	36	37	72		-10
	60	1584	0.03	0.52	349.42	251	37	37	34	72		-10
	64	1536	0.02	0.36	350.77	247	38	38	34	72		-9
	68	1507	0.02	0.36	352.08	248	38	38	34	72		-8
	72	1505	0.02	0.36	353.42	251	37	37	34	71		-9
	76	1494	0.02	0.37	354.78	251	37	37	34	70		-9
	80	1520	0.02	0.36	356.12	249	37	37	34	72		-9
	84	1510	0.02	0.36	357.44	248	38	38	34	72		-9
	88	1499	0.02	0.36	358.79	254	37	37	34	71		-10
	92	1503	0.02	0.36	360.17	250	37	37	34	71		-10
	96	1506	0.02	0.36	361.51	251	38	38	34	71		-10
	100	1499	0.02	0.36		249	38	38	34	70		

*Primary unit opened for stirring @ 44 mins.

1/2

SOURCE TESTING FIELD DATA SHEET

Job No.: 160930343
Client: TMAC
Plant: Incinerator
Location: Hope Bay NM.
Test: SVOC-2
Date: 16 Sep 2019
Operators: BC/KW
Gamma: .479
Delta H@: 1.880
Pitot Coeff.: .821
Ko Coeff.: .704
Start: 10:00
Finish: 13:09

Barometric Pressure (in.Hg): _____
 Static Pressure (in.H2O): 0.02
 Assumed Moisture (%): 15.3
 Filter ID: QZ 6687
 Initial Filter Weight (g): _____
 Stack Dia. (in.): 20
 Probe Length (ft): 2
 Nozzle ID (in.): _____
 Ambient Temp. (F): 536

Test Traverses

Leak Checks:
Before Traverse: _____
Vacuum Pressure: _____
After Traverse: 392.48
Vacuum Pressure: -20
Fuel Type: diesel/garbage
Steam Load: _____

Combustion Gases :
O2 (%) : _____
CO2 (%) : _____
CO (ppm) : _____
SO2 (ppm) : _____
NO2 (ppm) : _____
NOx (ppm) : _____
Tamb (F) : _____
Tstack (F) : _____

[illegible]

MOISTURE FIELD DATA SHEET - DIOXINS/FURANS/SVOC's

Client: TMAC
Job No.: 60930343



Plant: Incinerator
Location: Hope Bay
Test: SVOC-3
Date: Sept 16/19
Analyst: P.C./K.W.

Q2 6688

Moisture Data

Component	Contents	Final Weight (g)	Tare Weight (g)	Weight of Moisture (g)
Condenser	Empty	264.1	262.1	2.0
Resin Trap	XAD-2	338.6	341.4	-2.8
Condensate Trap	Empty	692.8	504.8	188.0
First Impinger	100 ml Ethylene Glycol	741.1	727.4	13.7
Second Impinger	Empty	634.3	634.3	0
Third Impinger	200g Silica Gel	925.3	922.2	3.1
Total Weight Gain (g)				206.8
Moisture Volume (mL)				206.8

473.00
-392.78
80.22

$$206.8 \times 0.048 = 9.9264$$

$$80.22 + 9.9264 = 90.1464 = 0.110114 = 11.0\%$$

SOURCE TESTING FIELD DATA SHEET

Job No.: 160930343
 Client: TMA
 Plant: Incinerator
 Location: Hope Bay
 Test: SVOC-3
 Date: 16 Sep
 Operators: BC/KW
 Gamma: 979
 Delta H@: 1.880
 Pitot Coeff.: .821
 Ko Coeff.: .704
 Start: 2:18 pm
 Finish:

Barometric Pressure (in.Hg):
 Static Pressure (in.H2O): 0.02
 Assumed Moisture (%): 12.5
 Filter ID: Q2 6688
 Initial Filter Weight (g):
 Stack Dia. (in.): 20
 Probe Length (ft): 2
 Nozzle ID (in.): .536
 Ambient Temp. (F): 40

Test Traverses

Leak Checks: V-20
 Before Traverse:
 Vacuum Pressure: 392.78 - 392.48
 After Traverse:
 Vacuum Pressure:
 Fuel Type: diesel/garbage
 Steam Load:

Combustion Gases :
 O2 (%) :
 CO2 (%) :
 CO (ppm) :
 SO2 (ppm) :
 NO2 (ppm) :
 NOx (ppm) :
 Tamb (F) :
 Tstack (F) :

Traverse Point	Time (min)	Stack Gas Temp., Ts (F)	Velocity Head, dP (in.H2O)	Orifice dH (in.H2O)	Gas Meter Volume (cu.ft)	Probe Temp. (F)	Oven Temp. (F)	XAD-2 Inlet Temp. (F)	Impinger Outlet Temp. (F)	Gas Meter Temp. (F)		Pump Vacuum (in.Hg)
										In	Out	
	0				392.78							
	4	1650	0.04	0.70	394.57	252	252	38	35	59		-2
	8	1560	0.04	0.73	396.44		248	37	35	60		-3
	12	1538	0.04	0.74	398.30		250	36	35	60		-4
	16	1480	0.04	0.76	400.20		254	37	35	61		-5
	20	1430	0.04	0.78	402.14		251	37	34	61		-5
	24	1460	0.04	0.77	404.06		249	36	35	62		-5
	28	1400	0.03	0.66	405.77		244	37	34	62		-5
	32	1480	0.03	0.57	407.44		249	37	34	62		-5
	36	1495	0.03	0.57	409.08		247	37	34	63		-5
	40	1450	0.03	0.58	410.71		250	37	34	64		-5
	44	1495	0.03	0.57	412.41		249	37	34	64		-6
	48	1480	0.03	0.57	414.07		250	37	34	64		-6
	52	1510	0.02	0.38	415.45		248	38	34	63		-5
	56	1520	0.02	0.37	416.81		249	37	34	63		-5
	60	1460	0.03	0.58	418.42		250	37	34	64		-17
	64	1520	0.03	0.56	420.05		252	37	34	64		-8
	68	1470	0.03	0.58	421.69		250	37	34	65		-8
	72	1520	0.02	0.37	423.14		257	38	34	65		-7
	76	1500	0.03	0.57	424.79		251	38	35	65		-9
	80	1590	0.03	0.54	426.40		246	38	34	65		-9
	84	1470	0.02	0.38	427.82		247	38	34	65		-8
	88	1510	0.02	0.38	429.19		250	38	34	65		-7
	92	1515	0.02	0.38	430.56		248	38	35	65		-7
	96	1510	0.02	0.38	431.89		250	38	35	65		
	100	1490	0.03	0.57			250	38	35	65		

* primary unit opened @ 55 mins for stirring

SOURCE TESTING FIELD DATA SHEET

Job No.: 1609 30343
 Client: T.M.A.C.
 Plant: Incinerator
 Location: Hope Bay
 Test: SVOC - 3
 Date: 16 Sep 2019
 Operators: BC/KW
 Gamma: .979
 Delta H@: 1.880
 Pitot Coeff.: .821
 Ko Coeff.: .704
 Start:
 Finish:

Barometric Pressure (in.Hg):
 Static Pressure (in.H2O):
 Assumed Moisture (%): 12.5
 Filter ID:
 Initial Filter Weight (g):
 Stack Dia. (in.):
 Probe Length (ft):
 Nozzle ID (in.):
 Ambient Temp. (F):

Test Traverses

Leak Checks:
 Before Traverse:
 Vacuum Pressure:
 After Traverse: 473.25
 Vacuum Pressure: -20

Fuel Type:
 Steam Load:

Combustion Gases:
 O2 (%):
 CO2 (%):
 CO (ppm):
 SO2 (ppm):
 NO2 (ppm):
 NOx (ppm):
 Tamb (F):
 Tstack (F):

Traverse Point	Time (min)	Stack Gas Temp., Ts (F)	Velocity Head, dP (in.H2O)	Orifice dH (in.H2O)	Gas Meter Volume (cu.ft)	Probe Temp. (F)	Oven Temp. (F)	XAD-2 Inlet Temp. (F)	Impinger Outlet Temp. (F)	Gas Meter Temp. (F)		Pump Vacuum (in.Hg)
										In	Out	
	100	1490	.03	0.57	433.51		250	38	35	65		-10
	104	1450	0.03	0.58	435.20		252	38	35	66		-10
	108	1520	0.03	0.56	436.86		250	38	35	65		-11
	112	1535	0.03	0.56	438.53		249	38	35	66		-11
	116	1530	0.03	0.56	440.17		250	39	35	66		-11
	120	1530	0.03	0.56	441.83		249	39	35	66		-11
	124	1520	0.03	0.56	443.47		249	39	35	66		-11
	128	1505	0.03	0.57	445.15		251	40	36	66		-12
	132	1500	0.03	0.57	446.82		249	39	36	66		-12
	136	1460	0.03	0.58	448.53		251	37	35	66		-12
	140	1400	0.03	0.60	450.18		251	36	34	66		-12
	144	1475	0.03	0.58	451.81		248	37	34	66		-14
	148	1400	0.04	0.80	453.68		244	37	34	66		-15
	152	1440	0.04	0.78	455.58		253	36	34	66		-13
	156	1460	0.03	0.58	457.29		243	37	34	66		-15
	160	1390	0.04	0.80	459.20		249	37	34	66		-16
	164	1300	0.04	0.85	461.21		252	37	34	67		-16
	168	1370	0.04	0.81	463.22		253	37	34	66		-15
	172	1420	0.04	0.79	465.20		247	37	34	66		-15
	176	1375	0.04	0.81	467.20		252	37	35	67		-15
	180	1470	0.04	0.77	469.17		250	37	35	67		-15
	184	1480	0.04	0.77	471.10		254	37	35	67		
	188	1515	0.04	0.75	473.00		246	38	35	67		

* Primary unit opened @ 137 Per starting

MOISTURE FIELD DATA SHEET - DIOXINS/FURANS/SVOC's

Client: TMAC
Job No.: 1609 30343



Plant: Incinerator
Location: Hope Bay NV
Test: SVOC-4 - Blank train
Date: 17 Sep 2019
Analyst: BC/kw

filter
QZ 6689

Moisture Data

Component	Contents	Final Weight (g)	Tare Weight (g)	Weight of Moisture (g)
Condenser	Empty	273.3	271.9	
Resin Trap	XAD-2	346.0	347.5	
Condensate Trap	Empty	496.4	496.4	
First Impinger	100 ml Ethylene Glycol	732.9	732.4	
Second Impinger	Empty	666.2	666.1	
Third Impinger	200g Silica Gel	926.5	924.7	
Total Weight Gain (g)				
Moisture Volume (mL)				

1.38 cu. ft
Leak Check ✓ - 20
473.70
+ 1.38
475.08 ✓

Combustion Gases, T Moc Incinerator Hope Bay Nu.
B Cole 17 Sep '19 Enerac 1609 30343.

<u>Time</u>	<u>O₂</u>	<u>CO₂</u>	<u>CO</u>	<u>SO₂</u>	<u>NO_x</u>	<u>NO</u>	<u>NO₂</u>
	5.0 6.0	19.2	0	0	115	115	0
1:04							
	5.5	19.4	0	0	102	102	0
1:09							
	6.1	18.2	0	0	107	107	0
1:14							
	6.2	19.0	0	0	107	107	0
1:19							
	6.2	18.3	0	0	116	116	0
1:24							
	6.5	17.3	0	0	109	109	0
1:29							
	6.0	18.1	0	0	110	110	0
1:34							

Combustion Gases - TMAC Indicator Hope Bay

BC/KW 17 Sep'19 Enerac 1609 303 43

<u>Time</u>	<u>O₂</u>	<u>CO₂</u>	<u>CO</u>	<u>SO₂</u>	<u>NO_x</u>	<u>NO</u>	<u>NO₂</u>
4:25	10.1	12.4	0	0	76	76	0
4:30	9.4	15.9	0	0	85	85	0
4:35	8.2	15.5	0	0	90	90	0
4:40	10.6	12.7	0	0	91	91	0
4:45	11.1	11.6	0	0	94	94	0
4:50	9.9	13.5	0	0	93	93	0
4:55	8.2	15.5	0	0	95	95	0

Combustion Gases - T Mac Incinerator Hope Bay

BC/KW 18 Sep 2019

Enercc

160930343

<u>Time</u>	<u>O₂</u>	<u>CO₂</u>	<u>CO</u>	<u>SO₂</u>	<u>NO_x</u>	<u>NO</u>	<u>NO₂</u>
11:05	5.1	19.4	0	0	47	47	0
11:10	5.2	19.3	0	0	58	58	0
11:15	8.8	14.9	0	0	60	60	0
11:20	8.3	15.6	0	0	65	65	0
11:25	6.4	17.8	0	0	72	72	0
11:30	8.2	15.6	0	0	78	73	5
11:35	6.7	17.4	0	0	82	76	6

Combustion Gases, T-Mac Incinerator JVOC-3

16 Sep	BC/KW	160930343	Enerac				
	O ₂	CO ₂	CO	SO ₂	NO _x	NO ₂	NO
2:43	10.9	14.4	0	0	106	106	0
2:50	10.6	14.7	0	0	111	111	0
2:55	8.5	15.2	0	0	119	119	0
3:00	9.4	13.3	0	0	111	111	0
3:05	8.9	14.4	0	0	112	112	0
3:10	10.9	13.3	0	0	116	116	0

Combustion Gases,
T-MAC Hope Bay Incinerator

16 Sep. 2019
B. Cole / K. Wood
Enerco

<u>Time</u>	O_2 (%)	CO_2	CO	SO_2	NO_x	NO	NO_2
10:48	1.4	24.2	501	19	200	200	*
10:53	1.7	23.6	9	7	222	222	
10:58	3.2	20.8	6	8	186	186	
11:03	7.0	18.8	6	9	133	133	
11:08	6.0	16.6	3	10	145	145	
11:13	6.7	17.6	5	10	150	150	
11:20	7.3	15.2	5	11	133	133	

SUOC-1

Combustion Gases

Time	O ₂ %	CO ₂ %	SO ₂	CO	NO _x	NO	NO ₂
		18.2	6	4	219	219	0
11:30	2.2						
		18.3	9	1	230	230	0
11:35	2.1						
		18.8	351	over (2000+)	159	159	0
11:40	3.0						
		18.5	33	1337	122	122	0
	2.5						
11:45		18.8	35	174	188	188	0
	3.3						
11:50		14.5	36	69	132	132	0
	6.4						
11:55		14.9	36	46	126	126	0
	6.6						
12:00							
		16.6	14	12	125		
1:00	8.8						
		15.3	12	10	151	151	0
1:10	9.9						
		17.5	11	9	131		
1:15	6.6						
		8.8	7	10	125		
1:23(stir)	13.7						

MOISTURE FIELD DATA SHEET - METALS

Client: TMAC
Job No.: 160930343



Plant: Incinerator
Location: Hope Bay, NV.
Test: Metals-2
Date: Sept 18/19
Analyst: BC/kw

filter
QZ 6110

Moisture Data

Impinger No.	Impinger Contents	Final Weight (g)	Tare Weight (g)	Weight of Moisture (g)
1	100 mL H ₂ O	866.0	736.3	129.7
2	50 ml 10% HNO ₃ 50 ml 20% H ₂ O ₂	750.9	727.7	23.2
3	50 ml 10% HNO ₃ 50 ml 20% H ₂ O ₂	733.8	730.8	3
4	Blank	612.3	612.0	0.3
5	50 ml 8% KMnO ₄ 50 ml 20% H ₂ SO ₄	766.8	766.5	0.3
6	50 ml 8% KMnO ₄ 50 ml 20% H ₂ SO ₄	755.3	755.3	0
7	200g Silica Gel	973.7	964.9	8.8
Total Weight Gain (g)				165.3
Moisture Volume (mL)				

652.68
- 593.50
59.18 ft²

165.3 x 0.048 = 7.9344
67.1144 = 0.118222
= 11.8%

SOURCE TESTING FIELD DATA SHEET

Job No.: 160930343
 Client: T Mac
 Plant: Incinerator
 Location: Hoppe Bay No.
 Test: Metals L3
 Date: 18 Sep 2019
 Operators: BC/KW
 Gamma: .979
 Delta H@: 1.820
 Pitot Coeff.: .821
 Start: 10:48
 Finish:

Static Pressure (in.H2O): 0.02
 Port Length (in): 6
 Stack Dia. (in.): 20
 Probe Length (ft): 2
 Nozzle ID (in.): (.536)
 Console S/N: 2203

Pre-Test Leak Check: ✓
 Vacuum Pressure: -20
 Post-Test Leak Check:
 Vacuum Pressure:

K: 72.02

Traverse Point	Time (min)	Stack Gas Temp., Ts (F)	Velocity Head, dP (in.H2O)	Orifice dH (in.H2O)	Gas Meter Volume (cu.ft)	Probe Temp. (F)	Oven Temp. (F)	Impinger Outlet Temp. (F)	Gas Meter Temp. (F)		Pump Vacuum (in.Hg)
									In	Out	
	0				593.50						
	2.5	1115	0.03	0.72	594.66	250	250	35	64		-1
	25	1160	0.03	0.70	595.81		250	35	64		-1
	7.5	1160	0.03	0.70	596.95		251	35	64		-1
	10	1165	0.03	0.70	598.09		252	36	64		-1
	12.5	1100	0.03	0.73	599.25		252	35	64		-1
	15	1120	0.03	0.72	600.40		251	35	64		-1
	17.5	1090	0.03	0.73	601.54		250	35	64		-1
	20	1140	0.03	0.71	602.69		249	35	65		-1
	22.5	1070	0.03	0.74	603.86		250	35	65		-1
	25	1080	0.03	0.74	605.04		250	35	64		-1
	27.5	1100	0.04	0.97	606.41		250	35	65		-1
	30	1140	0.04	0.95	607.72		251	35	65		-1
	32.5	1130	0.03	0.71	608.89		250	35	65		-1
	35	1200	0.03	0.68	610.05		250	35	65		-1
	37.5	1200	0.04	0.91	611.33		249	35	65		-1
	40	1220	0.04	0.90	612.65		249	35	65		-1
	42.5	1100	0.04	0.97	613.99		250	35	65		-1
	45	1230	0.03	0.67	615.13		249	35	65		-1
	47.5	1210	0.03	0.68	616.26		250	36	65		-1
	50	1220	0.03	0.68	617.36		250	36	65		-1
	52.5	1160	0.03	0.73	618.54		250	36	65		-1
	55	1240	0.03	0.67	619.67		251	36	66		-1
	57.5	1200	0.03	0.68	620.80		250	36	66		-1
	60	1230	0.03	0.67			251	36	66		

SOURCE TESTING FIELD DATA SHEET

Job No.: 160930343
 Client: T M Co
 Plant: Incinerator
 Location: Hop Bay
 Test: Metals
 Date: 18 Sep 2019
 Operators: BC/KW
 Gamma: 0.979
 Delta H@: 1.880
 Pitot Coeff.: 0.821
 Start: 10:48
 Finish:

Static Pressure (in.H2O): 0.02
 Port Length (in): 6
 Stack Dia. (in.): 20
 Probe Length (ft): 2
 Nozzle ID (in.): (536)
 Console S/N: 2203

Pre-Test Leak Check: ✓
 Vacuum Pressure: -20
 Post-Test Leak Check:
 Vacuum Pressure:

K': 72.02

Traverse Point	Time (min) (60+)	Stack Gas Temp., Ts (F)	Velocity Head, dP (in.H2O)	Orifice dH (in.H2O)	Gas Meter Volume (cu.ft)	Probe Temp. (F)	Oven Temp. (F)	Impinger Outlet Temp. (F)	Gas Meter Temp. (F)		Pump Vacuum (in.Hg)
									In	Out	
	0				621.93						-1
	2.5	1160	0.04	0.94	623.26		250	36	66		-2
	5	1240	0.04	0.89	624.55		250	36	66		-2
	7.5	1130	0.04	0.95	625.84		249	36	66		-2
	10	1130	0.03	0.71	627.10		250	35	65		-1
	12.5	1180	0.03	0.69	628.16		250	35	65		-1
	15	1140	0.03	0.71	629.29		250	35	65		-1
	17.5	1140	0.03	0.71	630.43		249	35	66		-1
	20	1160	0.03	0.70	631.57		250	35	66		-1
	22.5	1175	0.03	0.70	632.70		251	35	66		-1
	25	1130	0.03	0.71	633.85		251	35	66		-1
	27.5	1180	0.04	0.92	635.18		249	35	66		-2
	30	1170	0.04	0.93	636.48		250	35	65		-2
	32.5	1170	0.04	0.93	637.80		251	35	66		-2
	35	1165	0.04	0.93	639.11		251	35	66		-2
	37.5	1200	0.04	0.91	640.43		250	35	66		-2
	40	1200	0.04	0.91	641.71		249	35	66		-2
	42.5	1240	0.04	0.89	643.03		250	35	66		-2
	45	1240	0.04	0.89	644.31		250	35	66		-2
	47.5	1210	0.06	1.36	645.89		248	35	66		-3
	50	1225	0.05	1.13	647.33		250	36	67		-2
	52.5	1210	0.05	1.14	648.78		252	36	67		-3
	55	1250	0.04	0.89	650.07		250	36	67		-2
	57.5	1270	0.04	0.88	651.36		250	37	67		-2
	60	1200	0.04	0.91	652.68		250	37	67		-2

*unit opened for raking @ 1:41

2/2

MOISTURE FIELD DATA SHEET - METALS

Client: T MAC
 Job No.: 160930343
 Plant: Incinerator
 Location: Hope Bay NW
 Test: Metals - 2
 Date: 17 Sep 2019
 Analyst: BC/KW



Filter
QZ6117

Moisture Data

Impinger No.	Impinger Contents	Final Weight (g)	Tare Weight (g)	Weight of Moisture (g)
1	100 mL H ₂ O	835.9	741.8	94.1
2	50 ml 10% HNO ₃ 50 ml 20% H ₂ O ₂	754.7	728.5	26.2
3	50 ml 10% HNO ₃ 50 ml 20% H ₂ O ₂	735.7	731.3	4.4
4	Blank	611.4	611.0	0.4
5	50 ml 8% KMnO ₄ 50 ml 20% H ₂ SO ₄	763.9	763.3	0.6
6	50 ml 8% KMnO ₄ 50 ml 20% H ₂ SO ₄	757.2	756.5	0.5 0.7
7	200g Silica Gel	965.6	956.4	9.2
Total Weight Gain (g)				144.8
Moisture Volume (mL)				

$$\begin{array}{r}
 593.16 \\
 - 532.30 \\
 \hline
 60.86
 \end{array}$$

$$\begin{array}{r}
 144.8 \times 0.048 \\
 = 6.9504
 \end{array}$$

$$\begin{array}{r}
 6.9504 \\
 67.8104 \\
 \hline
 = 0.102497 \\
 = 10.2\% \text{ Moisture}
 \end{array}$$

SOURCE TESTING FIELD DATA SHEET

Job No.: 1609 30343
 Client: T-Mac
 Plant: Inverter
 Location: Hope Bay
 Test: Metals-2L
 Date: 17 Sep 2019
 Operators: BC/KW
 Gamma: .979
 Delta H@: 1.880
 Pitot Coeff.: .821
 Start: 4.06
 Finish:

Static Pressure (in.H2O): 0.02
 Port Length (in): 6
 Stack Dia. (in.): 20
 Probe Length (ft): 2
 Nozzle ID (in.): .5361
 Console S/N: 2203

Pre-Test Leak Check: ✓
 Vacuum Pressure: -20
 Post-Test Leak Check:
 Vacuum Pressure:

K': 70.71

Traverse Point	Time (min) (60+)	Stack Gas Temp., Ts (F)	Velocity Head, dP (in.H2O)	Orifice dH (in.H2O)	Gas Meter Volume (cu.ft)	Probe Temp. (F)	Oven Temp. (F)	Impinger Outlet Temp. (F)	Gas Meter Temp. (F)		Pump Vacuum (in.Hg)
									In	Out	
	0				561.82						-4
	2.5	1175	0.04	0.91	563.13		250	36	68		-4
	5	1190	0.04	0.91	564.44		249	36	68		-4
	7.5	1190	0.04	0.91	565.73		250	36	68		-4
	10	1210	0.04	0.90	567.05		250	36	69		-5
	12.5	1190	0.04	0.91	568.35		251	36	69		-5
	15	1200	0.04	0.90	569.66		250	36	69		-5
	17.5	1195	0.04	0.90	570.95		250	37	69		-5
	20	1200	0.04	0.90	572.26		250	37	69		-5
	22.5	1200	0.04	0.90	573.56		250	37	69		-5
	25	1190	0.04	0.91	574.88		250	37	69		-5
	27.5	1200	0.04	0.90	576.19		250	38	69		-5
	30	1180	0.05	1.14	577.65		250	38	69		-6
	32.5	1230	0.04	0.89	578.94		251	38	69		-5
	35	1230	0.04	0.89	580.22		251	38	69		-5
	37.5	1230	0.04	0.89	581.51		249	39	69		-6
	40	1230	0.04	0.89	582.71	*	250	39	70		-6
	42.5	1230	0.04	0.89	584.08		250	39	70		-6
	45	1250	0.04	0.89	585.38		250	39	70		-6
	47.5	1230	0.04	0.89	586.68		250	39	70		-6
	50	1230	0.04	0.89	587.98		249	39	70		-7
	52.5	1230	0.04	0.89	589.28		250	39	70		-7
	55	1230	0.04	0.89	590.57		250	39	70		-7
	57.5	1220	0.04	0.89	591.87		250	39	70		-7
	60	1220	0.04	0.89	593.16		250	39	70		-7

*Unit opened for recovery @ 1:27 mins.

SOURCE TESTING FIELD DATA SHEET

Job No.: 160930343
 Client: T.M.C.
 Plant: Tramador
 Location: Hape Bay
 Test: Metals-2
 Date: 17 Sep/19
 Operators: BC/KW
 Gamma: .979
 Delta H@: 1.880
 Pitot Coeff.: .821
 Start: 4:06
 Finish:

Static Pressure (in.H2O): 0.02
 Port Length (in): 6
 Stack Dia. (in.): 20
 Probe Length (ft): 2
 Nozzle ID (in.): .5361
 Console S/N: 2203

Pre-Test Leak Check: ✓
 Vacuum Pressure: -20
 Post-Test Leak Check:
 Vacuum Pressure:

K: 70.71

Traverse Point	Time (min)	Stack Gas Temp., Ts (F)	Velocity Head, dP (in.H2O)	Orifice dH (in.H2O)	Gas Meter Volume (cu.ft)	Probe Temp. (F)	Oven Temp. (F)	Impinger Outlet Temp. (F)	Gas Meter Temp. (F)		Pump Vacuum (in.Hg)
									In	Out	
	0				532.30						
	2.5	1200	0.03	0.67	533.43		225	46	66		-1
	5	1230	0.03	0.66	534.55		234	41	66		-1
	7.5	1250	0.03	0.65	535.66		248	43	65		-1
	10	1240	0.03	0.66	536.77		253	41	66		-1
	12.5	1150	0.03	0.69	537.91		252	39	66		-1
	15	1150	0.03	0.69	539.03		251	37	65		-1
	17.5	1150	0.03	0.69	540.16		251	36	65		-1
	20	1150	0.03	0.69	541.29		250	36	65		-2
	22.5	1150	0.03	0.69	542.43		251	34	66		-2
	25	1160	0.03	0.69	543.56		251	34	66		-2
	27.5	1190	0.04	0.90	544.86		250	35	66		-3
	30	1170	0.04	0.91	546.18		250	35	66		-3
	32.5	1190	0.04	0.90	547.47		251	36	66		-3
	35	1165	0.04	0.92	548.77		250	36	66		-3
	37.5	1165	0.04	0.92	550.07		249	36	66		-4
	40	1170	0.04	0.91	551.36		250	36	67		-4
	42.5	1160	0.04	0.92	552.68		250	36	67		-4
	45	1160	0.04	0.92	553.98		250	36	67		-4
	47.5	1170	0.04	0.91	555.29		250	36	67		-4
	50	1165	0.04	0.92	556.59		250	36	67		-4
	52.5	1180	0.04	0.91	557.91		250	36	68		-4
	55	1160	0.04	0.92	559.20		250	36	68		-4
	57.5	1190	0.04	0.91	560.51		250	36	68		-4
	60	1170	0.04	0.92			249	36	68		

MOISTURE FIELD DATA SHEET - METALS

Client: TMAC
 Job No.: 160930343
 Plant: Incinerator
 Location: Hope Bay NW
 Test: Metals - 1
 Date: 17 Sep 2019
 Analyst: BC/KW

 **Stantec**
 Filter.
 QZ6690

Moisture Data

Impinger No.	Impinger Contents	Final Weight (g)	Tare Weight (g)	Weight of Moisture (g)
1	100 mL H ₂ O	862.4	740.6	121.8
2	50 ml 10% HNO ₃ 50 ml 20% H ₂ O ₂	747.8	722.8	25.0
3	50 ml 10% HNO ₃ 50 ml 20% H ₂ O ₂	731.6	727.4	4.2
4	Blank	607.5	607.0	0.5
5	50 ml 8% KMnO ₄ 50 ml 20% H ₂ SO ₄	769.3	760.3	9.0
6	50 ml 8% KMnO ₄ 50 ml 20% H ₂ SO ₄	754.2	753.7	0.5
7	200g Silica Gel	956.5	946.0	10.5
Total Weight Gain (g)				171.5
Moisture Volume (mL)				

$$\begin{array}{r} 531.90 \\ - 475.40 \\ \hline 56.5 \text{ H}_2\text{O} \end{array}$$

$$\begin{array}{r} 171.5 \\ \times 0.048 \\ \hline 8.232 \end{array}$$

$$\frac{8.232}{64.732} = 0.12717 = 12.7\%$$

SOURCE TESTING FIELD DATA SHEET

Job No.: 1609 30343
 Client: T Mac
 Plant: Incinerator
 Location: Hoppe Bay
 Test: Metals 21
 Date: 17 Sep 19
 Operators: BC/RW
 Gamma: 0.979
 Delta H@: 1.880
 Pitot Coeff.: 0.821
 Start: 12:34
 Finish: 2:34

Static Pressure (in.H2O): _____
 Port Length (in): 6
 Stack Dia. (in.): 20
 Probe Length (ft): 2
 Nozzle ID (in.): (536)
 Console S/N: 2203

Pre-Test Leak Check: ✓
 Vacuum Pressure: -20
 Post-Test Leak Check: _____
 Vacuum Pressure: _____

K': 70.71

Traverse Point	Time (min)	Stack Gas Temp., Ts (F)	Velocity Head, dP (in.H2O)	Orifice dH (in.H2O)	Gas Meter Volume (cu.ft)	Probe Temp. (F)	Oven Temp. (F)	Impinger Outlet Temp. (F)	Gas Meter Temp. (F)		Pump Vacuum (in.Hg)
									In	Out	
	60				504.19						-8
	0				505.36		268	35	67		-8
	2.5	1120	0.03	0.71	506.55		266	36	67		-8
	5	1100	0.03	0.72	507.70		261	37	67		-8
	7.5	1105	0.03	0.71	508.85		257	37	67		-8
	10	1120	0.03	0.71	510.02		252	36	67		-8
	12.5	1120	0.03	0.71	511.19		248	36	67		-8
	15	1120	0.03	0.71	512.33		245	36	67		-8
	17.5	1120	0.03	0.71	513.48		246	36	67		-9
	20	1120	0.03	0.71	514.65		249	36	68		-9
	22.5	1120	0.03	0.71	515.80		254	36	67		-9
	25	1130	0.03	0.70	516.94		260	36	67		-9
	27.5	1130	0.03	0.70	518.09		265	36	67		-9
	30	1130	0.03	0.70	519.25		267	36	68		-10
	32.5	1120	0.03	0.71	520.42		268	36	68		-10
	35	1130	0.03	0.70	521.56		266	36	68		-10
	37.5	1170	0.03	0.69	522.70		263	36	68		-10
	40	1140	0.03	0.70	523.85		258	36	68		-10
	42.5	1150	0.03	0.70	525.00		255	36	68		-10
	45	1140	0.03	0.70	526.16		249	36	68		-10
	47.5	1160	0.03	0.69	527.30		246	36	69		-10
	50	1150	0.03	0.70	528.45		245	36	69		-10
	52.5	1150	0.03	0.70	529.60		247	36	69		-10
	55	1160	0.03	0.69	530.75		252	36	69		-10
	57.5	1150	0.03	0.70	531.90		259	36	69		-11
	60	1140	0.03	0.70							

SOURCE TESTING FIELD DATA SHEET

Job No.: 1609 30343
 Client: T. Mac
 Plant: Incinerator
 Location: Hope Bay, N.S.
 Test: Metals L1
 Date: 17 Sep '19
 Operators: BC/KW
 Gamma: .979
 Delta H@: 1.880
 Pitot Coeff.: .821
 Start: 12:34
 Finish:

Static Pressure (in.H2O): 0.02
 Port Length (in): 6
 Stack Dia. (in.): 20
 Probe Length (ft): 2
 Nozzle ID (in.): (.536)
 Console S/N: 2203

Pre-Test Leak Check: ☒
 Vacuum Pressure: -20
 Post-Test Leak Check: ☐
 Vacuum Pressure:

K: 70.71

Traverse Point	Time (min)	Stack Gas Temp., Ts (F)	Velocity Head, dP (in.H2O)	Orifice dH (in.H2O)	Gas Meter Volume (cu.ft)	Probe Temp. (F)	Oven Temp. (F)	Impinger Outlet Temp. (F)	Gas Meter Temp. (F)		Pump Vacuum (in.Hg)
									In	Out	
	0				475.40						
	2.5	1180	0.03	0.71	476.56		242	35	65		-1
	5	1090	0.03	0.72	477.71		237	35	65		-1
	7.5	1040	0.03	0.74	478.90		238	35	65		-2
	10	1080	0.03	0.72	480.06		245	35	65		-2
	12.5	1070	0.03	0.73	481.23		250	35	65		-3
	15	1050	0.03	0.74	482.43		269	35	65		-4
	17.5	1090	0.03	0.72	483.57		275	35	65		-4
	20	1070	0.03	0.73	484.77		280	35	65		-5
	22.5	1100	0.03	0.72	485.94		280	35	66		-5
	25	1070	0.03	0.73	487.12		278	35	66		-5
	27.5	1070	0.03	0.73	488.32		273	35	66		-5
	30	1070	0.03	0.73	489.49		270	35	66		-5
	32.5	1060	0.03	0.73	490.67		263	35	66		-6
	35	1080	0.03	0.72	491.82		258	35	66		-6
	37.5	1060	0.03	0.73	493.02		255	35	66		-7
	40	1090	0.03	0.72	494.19		249	35	66		-7
	42.5	1080	0.03	0.72	495.36		247	35	66		-7
	45	1110	0.03	0.71	496.54		246	35	66		-7
	47.5	1100	0.04	0.95	497.85		248	35	66		-9
	50	1160	0.04	0.92	499.17		253	35	67		-9
	52.5	1120	0.04	0.94	500.53		259	35	67		-9
	55	1140	0.04	0.93	501.84		264	35	67		-9
	57.5	1130	0.03	0.70	503.04		268	35	67		-8
	60	1130	0.03	0.70			269	35	67		-8

APPENDIX C

Lab Analysis



1435 Norjohn Court, Unit 1, Burlington ON, L7L 0E6
Phone: 905-331-3111, FAX: 905-331-4567

Certificate of Analysis

ALS Project Contact: Claire Kocharakkal
ALS Project ID: 25282
ALS WO#: L2355428
Date of Report: 18-Oct-19
Date of Sample Receipt: 27-Sep-19

Client Name: Stantec Consulting, Ltd.
Client Address: 845 Prospect Street
Fredricton, NB E3B 2T7
Canada
Client Contact: Tristan Blair-Hicks
Client Project ID: 160930343 TASK 519.006 HOPE BAY

COMMENTS:

Sample Particulate Analysis via Gravimetric USEPA Method 5 (PE/TP 11-Oct-19)

REPORT FLAGS:

J - The value is uncertain and below what can be reliably identified as positive with a $\geq 99\%$ confidence limit (i.e. below the laboratory determined MDL).

LCB = Laboratory Control Blank

CVS = Continuing Verification Standard Sample (limits: ± 2 in the last decimal)

LOR = Limit of Reporting

Certified by: _____

Claire Kocharakkal
Project Manager

Results in this certificate relate only to the samples as submitted to the laboratory.

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ALS Environmental

Sample Analysis Summary Report

Sample Name	METALS-1 (TS1 THRU TS5C)	METALS-2 (TS1 THRU TS5C)	METALS-3 (TS1 THRU TS5C)	METALS-BLANK (TS7 THRU TS12)	MB
ALS Sample ID	L2355428-1	L2355428-2	L2355428-3	L2355428-4	L2355428-MB
Matrix	Stack	Stack	Stack	Stack	n/a
Analysis type	Sample	Sample	Sample	Sample	Sample
Sampling Date/Time	17-Sep-19	17-Sep-19	18-Sep-19	17-Sep-19	n/a
Date of Receipt	27-Sep-19	27-Sep-19	27-Sep-19	27-Sep-19	n/a
PM via Gravimetric Analysis					
Method 5	LOR				
	mg	mg	mg	mg	mg
Filter Particulate Matter	0.8	62.0	68.5	57.1	<0.1
Acetone Particulate Matter	0.4	35.9	32.6	25.6	0.2 J
	g	g	g	g	g
Acetone Mass	0.02	63.0	73.2	67.1	74.6
					31.8



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Certificate of Analysis

ALS Project Contact: Claire Kocharakkal
ALS Project ID: 25282
ALS WO#: L2355428
Date of Report: 18-Oct-19
Date of Sample Receipt: 27-Sep-19


Client Name: Stantec Consulting Ltd.
Client Address: 845 Prospect Street
Fredericton, NB E3B 2T7
Canada
Client Contact: Tristan Blair-Hicks
Client Project ID: 160930343 TASK 519.006 HOPE BAY

COMMENTS:

Sample Preparation via USEPA Method 29 (AB 07,17-OCT-2019)
Mercury Analysis via CVAA using Method USEPA 7470A (AB 08,17-OCT-2019)

LOR = Limit of Reporting
LCB = Laboratory Control Blank (limits: <LOR)
LCS = Laboratory Control Sample (limits: hivol, solids: 85-115%, stack: 90-110%)
MS = Matrix Spike Sample (limits: 75-125%)
RPD = Relative Percent Difference (limits: <20%)
CCV/CVS = Calibration Verification Standard (limits: 85-115%)

Certified by: _____



Claire Kocharakkal
Project Manager

Results in this certificate relate only to the samples as submitted to the laboratory.

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ALS Environmental

Sample Analysis Summary Report

Sample Name	METALS-1 (TS1 THRU TS5C)	METALS-2 (TS1 THRU TS5C)	METALS-3 (TS1 THRU TS5C)	METALS-BLANK (TS7 THRU TS12)
ALS Sample ID	L2355428-1	L2355428-2	L2355428-3	L2355428-4
Matrix	Stack	Stack	Stack	Stack
Analysis type	Sample	Sample	Sample	Sample
Sampling Date/Time	17-Sep-19	17-Sep-19	18-Sep-19	17-Sep-19
Date of Receipt	27-Sep-19	27-Sep-19	27-Sep-19	27-Sep-19
Mercury via CVAA				
	Method 29	LOR		
		ug	ug	ug
Analytical Fraction 1B	0.015	<0.015	<0.015	0.0549
Analytical Fraction 2B	0.050	0.340	0.354	0.435
Analytical Fraction 3A	0.005	<0.01	<0.0095	<0.0097
Analytical Fraction 3B	0.025	<0.025	0.0270	0.0216
Analytical Fraction 3C	0.25	0.138	<0.125	<0.125

ALS Environmental

Sample QC Summary Report

Sample Name	LCB	LCS	LCS	LCSD	LCSD	
ALS Sample ID	LCB	LCS	LCS	LCSD	LCSD	
Analysis type	Method Blank	Blank Spike	Blank Spike	Blank Spike Dup	Blank Spike Dup	
Sampling Date/Time	N/A	N/A	N/A	N/A	N/A	
Date of Receipt	N/A	N/A	N/A	N/A	N/A	
Mercury via CVAA						
	Method 29	LOR ug	ug	% Rec	ug	% Rec
Analytical Fraction 1B	0.015	<0.015	0.291	97%	0.292	97%
Analytical Fraction 2B	0.050	<0.1	1.87	94%	1.92	96%
Analytical Fraction 3A	0.005	<0.01	0.197	98%	0.197	98%
Analytical Fraction 3B	0.025	<0.025	0.465	91%	0.461	90%
Analytical Fraction 3C	0.25	<0.125	2.45	97%	2.46	97%

ALS Environmental

Sample QC Summary Report

Sample Name		METALS-1 (TS1 THRU TS5C)	METALS-1 (TS1 THRU TS5C)	METALS-1 (TS1 THRU TS5C)	METALS-1 (TS1 THRU TS5C)	METALS-1 (TS1 THRU TS5C)	METALS-1 (TS1 THRU TS5C)
ALS Sample ID		L2355428-1	L2355428-1DUP	L2355428-1MS	L2355428-1MS	L2355428-1MSD	L2355428-1MSD
Matrix		Stack	Stack	Stack	Stack	Stack	Stack
Analysis type		Sample	Duplicate	Matrix Spike	Matrix Spike	Matrix Spike Dup	Matrix Spike Dup
Sampling Date/Time		17-Sep-19	17-Sep-19	17-Sep-19	17-Sep-19	17-Sep-19	17-Sep-19
Date of Receipt		27-Sep-19	27-Sep-19	27-Sep-19	27-Sep-19	27-Sep-19	27-Sep-19
Mercury via CVAA							
	Method 29	LOR ug	ug	ug	% Rec	ug	% Rec
Analytical Fraction 1B	0.015	<0.015	<0.015	0.309	102%	0.306	101%
Analytical Fraction 2B	0.050	0.340	0.378	5.56	97%	5.35	93%
Analytical Fraction 3A	0.005	<0.01	<0.01	0.193	96%	0.193	95%
Analytical Fraction 3B	0.025	<0.025	<0.025	0.444	87%	0.435	85%
Analytical Fraction 3C	0.250	0.138	0.125	2.50	95%	2.48	94%



1435 Norjohn Court, Unit 1, Burlington, ON, Canada L7L 0E6
Phone: 905-331-3111, FAX: 905-331-4567

Certificate of Analysis

ALS Project Contact: Claire Kocharakkal
ALS Project ID: 25282
ALS WO#: L2355437
Date of Report: 24-Oct-19
Date of Sample Receipt: 27-Sep-19

Client Name: Stantec Consulting Ltd
Client Address: 845 Prospect Street
Fredericton, NB E3B 2T7
Canada
Client Contact: Tristan Blair-Hicks
Client Project ID: 160930343 TASK 519.006 HOPE BAY

COMMENTS: PCDD/F by EPA M23

Certified by:

A handwritten signature in black ink, appearing to read "Steve Kennedy", is written over a horizontal line.

Steve Kennedy
Technical Supervisor

Results in this certificate relate only to the samples as submitted to the laboratory.

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ALS Life Sciences

Sample Analysis Summary Report

Sample Name	SVOC-1 (TS1 THRU TS6)	SVOC-2 (TS1 THRU TS6)	SVOC-3 (TS1 THRU TS6)	SVOC-BLANK (TS1 THRU TS6)	TRIP BLANK (TS7 THRU TS10)
ALS Sample ID	L2355437-1	L2355437-2	L2355437-3	L2355437-4	L2355437-5
Sample Size	1	1	1	1	1
Sample size units	Train	Train	Train	Train	Train
Percent Moisture	n/a	n/a	n/a	n/a	n/a
Sample Matrix	Stack	Stack	Stack	Stack	Stack
Sampling Date	15-Sep-19	16-Sep-19	16-Sep-19	17-Sep-19	17-Sep-19
Extraction Date	8-Oct-19	8-Oct-19	8-Oct-19	8-Oct-19	8-Oct-19
Target Analytes	pg	pg	pg	pg	pg
2,3,7,8-TCDD	448	87.0	42.9	<0.83	<1.6
1,2,3,7,8-PeCDD	1730	289	314	0.840	<0.89
1,2,3,4,7,8-HxCDD	1800	330	756	<2.0	<1.2
1,2,3,6,7,8-HxCDD	2420	556	2160	2.73	<1.1
1,2,3,7,8,9-HxCDD	1980	422	1360	1.92	<1.1
1,2,3,4,6,7,8-HpCDD	21300	6940	37200	22.1	<2.6
OCDD	28500	12400	95500	62.2	16.6
2,3,7,8-TCDF	2310	359	249	<1.2	<1.2
1,2,3,7,8-PeCDF	4400	676	879	1.97	<1.1
2,3,4,7,8-PeCDF	5760	1280	2310	2.32	<0.55
1,2,3,4,7,8-HxCDF	5240	1220	2970	2.69	<0.75
1,2,3,6,7,8-HxCDF	5930	1320	4080	3.08	<0.70
2,3,4,6,7,8-HxCDF	4780	2340	11200	<5.0	<0.75
1,2,3,7,8,9-HxCDF	1190	668	3170	3.00	<0.94
1,2,3,4,6,7,8-HpCDF	10300	6480	28300	18.2	<0.77
1,2,3,4,7,8,9-HpCDF	1680	1470	10300	3.28	<0.91
OCDF	2200	8370	69700	24.1	<3.0
Field Spike Standards	% Rec	% Rec	% Rec	% Rec	% Rec
37Cl4-2,3,7,8-TCDD	87	92	91	92	NS
13C12-1,2,3,4,7,8-HxCDD	94	92	94	92	NS
13C12-2,3,4,7,8-PeCDF	99	105	97	97	NS
13C12-1,2,3,4,7,8-HxCDF	95	98	94	94	NS
13C12-1,2,3,4,7,8,9-HpCDF	86	91	86	91	NS
Extraction Standards					
13C12-2,3,7,8-TCDD	71	75	63	82	54
13C12-1,2,3,7,8-PeCDD	78	80	56	69	64
13C12-1,2,3,6,7,8-HxCDD	75	79	54	69	60
13C12-1,2,3,4,6,7,8-HpCDD	79	78	61	68	64
13C12-OCDD	75	75	61	70	59
13C12-2,3,7,8-TCDF	81	84	63	79	59
13C12-1,2,3,7,8-PeCDF	82	83	61	76	62
13C12-1,2,3,6,7,8-HxCDF	86	87	62	79	62
13C12-1,2,3,4,6,7,8-HpCDF	81	83	63	74	66
Cleanup Standard					
13C12-1,2,3,7,8,9-HxCDF	75	71	61	64	64
Homologue Group Totals	pg	pg	pg	pg	pg
Total-TCDD	11900	2020	1350	<0.83	<1.6
Total-PeCDD	21200	3390	5760	7.84	<0.89
Total-HxCDD	31700	6670	24100	11.3	<1.2
Total-HpCDD	41800	13500	68800	43.1	<1.1
Total-TCDF	81500	13000	15600	8.49	<1.2
Total-PeCDF	83300	14600	30000	19.0	<0.61
Total-HxCDF	52300	16500	51700	22.9	1.08
Total-HpCDF	18400	15100	80400	35.8	<0.91
Toxic Equivalency - (WHO 2005)					
Lower Bound PCDD/F TEQ (WHO 2005)	6950	1660	4480	3.40	0.00498
Mid Point PCDD/F TEQ (WHO 2005)	6950	1660	4480	4.63	1.83
Upper Bound PCDD/F TEQ (WHO 2005)	6950	1660	4480	5.05	3.51

ALS Life Sciences			
Quality Control Summary Report			
Sample Name	Method Blank	Method Blank	Laboratory Control Sample
ALS Sample ID	WG3174994-1	WG3174994-4	WG3174994-2
Sample Size	1	1	1
Sample size units	Train	Train	n/a
Percent Moisture	n/a	n/a	n/a
Sample Matrix	MEDIA	REAGENT	QC
Sampling Date	n/a	n/a	n/a
Extraction Date	8-Oct-19	8-Oct-19	8-Oct-19
Target Analytes	pg	pg	% Rec
2,3,7,8-TCDD	<0.69	<0.79	100
1,2,3,7,8-PeCDD	1.22	<0.42	107
1,2,3,4,7,8-HxCDD	<0.73	<0.79	103
1,2,3,6,7,8-HxCDD	<0.72	<0.72	103
1,2,3,7,8,9-HxCDD	2.06	<0.75	106
1,2,3,4,6,7,8-HpCDD	3.00	<1.9	102
OCDD	17.0	<11	98
2,3,7,8-TCDF	<0.47	<0.50	98
1,2,3,7,8-PeCDF	1.37	<1.1	110
2,3,4,7,8-PeCDF	<0.30	<0.38	96
1,2,3,4,7,8-HxCDF	<0.67	<0.57	107
1,2,3,6,7,8-HxCDF	<0.55	<0.53	104
2,3,4,6,7,8-HxCDF	<0.74	<0.57	102
1,2,3,7,8,9-HxCDF	<0.97	<1.7	100
1,2,3,4,6,7,8-HpCDF	<1.3	1.41	102
1,2,3,4,7,8,9-HpCDF	<1.9	<0.46	100
OCDF	<3.4	2.08	95
Field Spike Standards	% Rec	% Rec	% Rec
37Cl4-2,3,7,8-TCDD	NS	NS	NS
13C12-1,2,3,4,7,8-HxCDD	NS	NS	NS
13C12-2,3,4,7,8-PeCDF	NS	NS	NS
13C12-1,2,3,4,7,8-HxCDF	NS	NS	NS
13C12-1,2,3,4,7,8,9-HpCDF	NS	NS	NS
Extraction Standards			
13C12-2,3,7,8-TCDD	75	66	55
13C12-1,2,3,7,8-PeCDD	70	69	54
13C12-1,2,3,6,7,8-HxCDD	71	65	61
13C12-1,2,3,4,6,7,8-HpCDD	73	69	62
13C12-OCDD	85	66	60
13C12-2,3,7,8-TCDF	77	71	64
13C12-1,2,3,7,8-PeCDF	73	72	57
13C12-1,2,3,6,7,8-HxCDF	78	72	67
13C12-1,2,3,4,6,7,8-HpCDF	82	71	69
Cleanup Standard			
13C12-1,2,3,7,8,9-HxCDF	79	74	71
Homologue Group Totals	pg	pg	
Total-TCDD	<0.69	<0.79	
Total-PeCDD	1.22	<0.42	
Total-HxCDD	2.06	<0.79	
Total-HpCDD	4.84	<0.74	
Total-TCDF	<0.47	<0.50	
Total-PeCDF	1.37	<0.42	
Total-HxCDF	<0.65	<0.65	
Total-HpCDF	<0.38	1.41	
Toxic Equivalency - (WHO 2005)			
Lower Bound PCDD/F TEQ (WHO 2005)	1.50	0.0147	
Mid Point PCDD/F TEQ (WHO 2005)	2.35	1.13	
Upper Bound PCDD/F TEQ (WHO 2005)	2.80	2.01	

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Sample Analysis Report

Sample Name	SVOC-1 (TS1 THRU TS6)	Sampling Date	15-Sep-19	<div>Approved:</div> <div>T.Patterson</div> <div>--e-signature--</div> <div>22-Oct-2019</div>
ALS Sample ID	L2355437-1	Extraction Date	8-Oct-19	
Analysis Method	EPA M23	Sample Size	1	
Analysis Type	Sample	Percent Moisture	n/a	
Sample Matrix	Stack	Split Ratio	2	

Run Information	Run 1
Filename	7-191019A23
Run Date	19-Oct-19 21:34
Final Volume	20 uL
Dilution Factor	1
Analysis Units	pg
Instrument - Column	HRMS-7 DB5MSUST470134H

Target Analytes	TEF (WHO 2005)	Ret. Time	Conc. pg	EDL pg	Flags	EMPC pg	LQL
2,3,7,8-TCDD	1	27.96	448	1.5			20
1,2,3,7,8-PeCDD	1	32.06	1730	2.3			100
1,2,3,4,7,8-HxCDD	0.1	34.10	1800	5.2			100
1,2,3,6,7,8-HxCDD	0.1	34.15	2420	4.8			100
1,2,3,7,8,9-HxCDD	0.1	34.27	1980	5.0			100
1,2,3,4,6,7,8-HpCDD	0.01	35.75	21300	5.1			100
OCDD	0.0003	37.24	28500	3.2			200
2,3,7,8-TCDF	0.1	27.04	2310	1.5			20
1,2,3,7,8-PeCDF	0.03	31.13	4400	410			100
2,3,4,7,8-PeCDF	0.3	31.85	5760	370			100
1,2,3,4,7,8-HxCDF	0.1	33.61	5240	6.0			100
1,2,3,6,7,8-HxCDF	0.1	33.68	5930	5.5			100
2,3,4,6,7,8-HxCDF	0.1	34.00	4780	5.9			100
1,2,3,7,8,9-HxCDF	0.1	34.44	1190	6.8			100
1,2,3,4,6,7,8-HpCDF	0.01	35.19	10300	2.8			100
1,2,3,4,7,8,9-HpCDF	0.01	36.00	1680	3.4			100
OCDF	0.0003	37.33	2200	1.4			200
Field Spike Standards	pg	% Rec	Limits				
37C14-2,3,7,8-TCDD	400	27.96	87	70-130			
13C12-1,2,3,4,7,8-HxCDD	4000	34.09	94	70-130			
13C12-2,3,4,7,8-PeCDF	4000	31.84	99	70-130			
13C12-1,2,3,4,7,8-HxCDF	4000	33.60	95	70-130			
13C12-1,2,3,4,7,8,9-HpCDF	4000	35.99	86	70-130			
Extraction Standards							
13C12-2,3,7,8-TCDD	4000	27.93	71	40-130			
13C12-1,2,3,7,8-PeCDD	4000	32.05	78	40-130			
13C12-1,2,3,6,7,8-HxCDD	4000	34.14	75	40-130			
13C12-1,2,3,4,6,7,8-HpCDD	4000	35.74	79	25-130			
13C12-OCDD	8000	37.23	75	25-130			
13C12-2,3,7,8-TCDF	4000	27.02	81	40-130			
13C12-1,2,3,7,8-PeCDF	4000	31.12	82	40-130			
13C12-1,2,3,6,7,8-HxCDF	4000	33.67	86	40-130			
13C12-1,2,3,4,6,7,8-HpCDF	4000	35.18	81	25-130			
Cleanup Standard	pg						
13C12-1,2,3,7,8,9-HxCDF	4000	34.41	75	40-130			
Homologue Group Totals	# peaks	Conc. pg	EDL pg				
Total-TCDD	17	11900	1.5				20
Total-PeCDD	9	21200	2.3				100
Total-HxCDD	8	31700	5.2				100
Total-HpCDD	2	41800	5.1				100
Total-TCDF	26	81500	1.5				20
Total-PeCDF	22	83300	410				100
Total-HxCDF	14	52300	6.8				100
Total-HpCDF	4	18400	3.4				100

Toxic Equivalency - (WHO 2005)	pg
Lower Bound PCDD/F TEQ (WHO 2005)	6950
Mid Point PCDD/F TEQ (WHO 2005)	6950
Upper Bound PCDD/F TEQ (WHO 2005)	6950

EDL Indicates the Estimated Detection Limit, based on the measured background noise for this target in this sample.
TEF Indicates the Toxic Equivalency Factor TEQ Indicates the Toxic Equivalency

LQL Lower Quantification Limit, based on the lowest calibration level corrected for sample size, splits and dilutions.
EMPC Estimated Maximum Possible Concentration – elevated detection limit due to interference or positive id criterion failure

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Sample Analysis Report

Sample Name	SVOC-2 (TS1 THRU TS6)	Sampling Date	16-Sep-19	<div>Approved:</div> <div>T.Patterson</div> <div>--e-signature--</div> <div>22-Oct-2019</div>
ALS Sample ID	L2355437-2	Extraction Date	8-Oct-19	
Analysis Method	EPA M23	Sample Size	1	
Analysis Type	Sample	Percent Moisture	n/a	
Sample Matrix	Stack	Split Ratio	2	

Run Information	Run 1
Filename	7-191019A24
Run Date	19-Oct-19 22:17
Final Volume	20 uL
Dilution Factor	1
Analysis Units	pg
Instrument - Column	HRMS-7 DB5MSUST470134H

Target Analytes	TEF (WHO 2005)	Ret. Time	Conc. pg	EDL pg	Flags	EMPC pg	LQL
2,3,7,8-TCDD	1	27.96	87.0	1.4			20
1,2,3,7,8-PeCDD	1	32.06	289	1.1			100
1,2,3,4,7,8-HxCDD	0.1	34.10	330	3.4			100
1,2,3,6,7,8-HxCDD	0.1	34.15	556	3.1			100
1,2,3,7,8,9-HxCDD	0.1	34.28	422	3.2			100
1,2,3,4,6,7,8-HpCDD	0.01	35.75	6940	3.3			100
OCDD	0.0003	37.24	12400	2.3			200
2,3,7,8-TCDF	0.1	27.04	359	1.1			20
1,2,3,7,8-PeCDF	0.03	31.13	676	3.0			100
2,3,4,7,8-PeCDF	0.3	31.85	1280	2.7			100
1,2,3,4,7,8-HxCDF	0.1	33.61	1220	2.7			100
1,2,3,6,7,8-HxCDF	0.1	33.68	1320	2.5			100
2,3,4,6,7,8-HxCDF	0.1	34.01	2340	2.7			100
1,2,3,7,8,9-HxCDF	0.1	34.44	668	3.1			100
1,2,3,4,6,7,8-HpCDF	0.01	35.19	6480	2.6			100
1,2,3,4,7,8,9-HpCDF	0.01	36.00	1470	3.0			100
OCDF	0.0003	37.33	8370	1.8			200
Field Spike Standards	pg	% Rec	Limits				
37Cl4-2,3,7,8-TCDD	400	27.96	92	70-130			
13C12-1,2,3,4,7,8-HxCDD	4000	34.09	92	70-130			
13C12-2,3,4,7,8-PeCDF	4000	31.84	105	70-130			
13C12-1,2,3,4,7,8-HxCDF	4000	33.60	98	70-130			
13C12-1,2,3,4,7,8,9-HpCDF	4000	35.99	91	70-130			
Extraction Standards							
13C12-2,3,7,8-TCDD	4000	27.93	75	40-130			
13C12-1,2,3,7,8-PeCDD	4000	32.05	80	40-130			
13C12-1,2,3,6,7,8-HxCDD	4000	34.14	79	40-130			
13C12-1,2,3,4,6,7,8-HpCDD	4000	35.75	78	25-130			
13C12-OCDD	8000	37.23	75	25-130			
13C12-2,3,7,8-TCDF	4000	27.02	84	40-130			
13C12-1,2,3,7,8-PeCDF	4000	31.12	83	40-130			
13C12-1,2,3,6,7,8-HxCDF	4000	33.67	87	40-130			
13C12-1,2,3,4,6,7,8-HpCDF	4000	35.19	83	25-130			
Cleanup Standard	pg						
13C12-1,2,3,7,8,9-HxCDF	4000	34.41	71	40-130			
Homologue Group Totals	# peaks	Conc. pg	EDL pg				
Total-TCDD	14	2020	1.4				20
Total-PeCDD	9	3390	1.1				100
Total-HxCDD	7	6670	3.4				100
Total-HpCDD	2	13500	3.3				100
Total-TCDF	25	13000	1.1				20
Total-PeCDF	20	14600	3.0				100
Total-HxCDF	15	16500	3.1				100
Total-HpCDF	4	15100	3.0				100

Toxic Equivalency - (WHO 2005)	pg
Lower Bound PCDD/F TEQ (WHO 2005)	1660
Mid Point PCDD/F TEQ (WHO 2005)	1660
Upper Bound PCDD/F TEQ (WHO 2005)	1660

EDL Indicates the Estimated Detection Limit, based on the measured background noise for this target in this sample.
TEF Indicates the Toxic Equivalency Factor TEQ Indicates the Toxic Equivalency

LQL Lower Quantification Limit, based on the lowest calibration level corrected for sample size, splits and dilutions.
EMPC Estimated Maximum Possible Concentration – elevated detection limit due to interference or positive id criterion failure

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Sample Analysis Report

Sample Name	SVOC-3 (TS1 THRU TS6)	Sampling Date	16-Sep-19	<div>Approved:</div> <div>T.Patterson</div> <div>--e-signature--</div> <div>22-Oct-2019</div>
ALS Sample ID	L2355437-3	Extraction Date	8-Oct-19	
Analysis Method	EPA M23	Sample Size	1 Train	
Analysis Type	Sample	Percent Moisture	n/a	
Sample Matrix	Stack	Split Ratio	2	

Run Information	Run 1
Filename	7-191019A25
Run Date	19-Oct-19 22:59
Final Volume	20 uL
Dilution Factor	1
Analysis Units	pg
Instrument - Column	HRMS-7 DB5MSUST470134H

Target Analytes	TEF (WHO 2005)	Ret. Time	Conc. pg	EDL pg Flags	EMPC pg	LQL
2,3,7,8-TCDD	1	27.98	42.9	1.4		20
1,2,3,7,8-PeCDD	1	32.06	314	2.4		100
1,2,3,4,7,8-HxCDD	0.1	34.10	756	7.6		100
1,2,3,6,7,8-HxCDD	0.1	34.15	2160	6.9		100
1,2,3,7,8,9-HxCDD	0.1	34.28	1360	7.2		100
1,2,3,4,6,7,8-HpCDD	0.01	35.76	37200	12		100
OCDD	0.0003	37.25	95500	5.0		200
2,3,7,8-TCDF	0.1	27.05	249	1.1		20
1,2,3,7,8-PeCDF	0.03	31.13	879	4.5		100
2,3,4,7,8-PeCDF	0.3	31.85	2310	4.1		100
1,2,3,4,7,8-HxCDF	0.1	33.62	2970	12		100
1,2,3,6,7,8-HxCDF	0.1	33.69	4080	11		100
2,3,4,6,7,8-HxCDF	0.1	34.01	11200	12		100
1,2,3,7,8,9-HxCDF	0.1	34.45	3170	14		100
1,2,3,4,6,7,8-HpCDF	0.01	35.20	28300	6.2		100
1,2,3,4,7,8,9-HpCDF	0.01	36.00	10300	7.3		100
OCDF	0.0003	37.34	69700	5.5		200
Field Spike Standards	pg	% Rec	Limits			
37Cl4-2,3,7,8-TCDD	400	27.98	91	70-130		
13C12-1,2,3,4,7,8-HxCDD	4000	34.10	94	70-130		
13C12-2,3,4,7,8-PeCDF	4000	31.84	97	70-130		
13C12-1,2,3,4,7,8-HpCDF	4000	33.60	94	70-130		
13C12-1,2,3,4,7,8,9-HpCDF	4000	36.00	86	70-130		
Extraction Standards						
13C12-2,3,7,8-TCDD	4000	27.95	63	40-130		
13C12-1,2,3,7,8-PeCDD	4000	32.05	56	40-130		
13C12-1,2,3,6,7,8-HxCDD	4000	34.15	54	40-130		
13C12-1,2,3,4,6,7,8-HpCDD	4000	35.75	61	25-130		
13C12-OCDD	8000	37.24	61	25-130		
13C12-2,3,7,8-TCDF	4000	27.02	63	40-130		
13C12-1,2,3,7,8-PeCDF	4000	31.12	61	40-130		
13C12-1,2,3,6,7,8-HxCDF	4000	33.68	62	40-130		
13C12-1,2,3,4,6,7,8-HpCDF	4000	35.19	63	25-130		
Cleanup Standard	pg					
13C12-1,2,3,7,8,9-HxCDF	4000	34.41	61	40-130		
Homologue Group Totals	# peaks	Conc. pg	EDL pg			
Total-TCDD	15	1350	1.4		20	
Total-PeCDD	9	5760	2.4		100	
Total-HxCDD	8	24100	7.6		100	
Total-HpCDD	2	68800	12		100	
Total-TCDF	26	15600	1.1		20	
Total-PeCDF	24	30000	4.5		100	
Total-HxCDF	15	51700	14		100	
Total-HpCDF	4	80400	7.3		100	

Toxic Equivalency - (WHO 2005)	pg
Lower Bound PCDD/F TEQ (WHO 2005)	4480
Mid Point PCDD/F TEQ (WHO 2005)	4480
Upper Bound PCDD/F TEQ (WHO 2005)	4480

EDL Indicates the Estimated Detection Limit, based on the measured background noise for this target in this sample.
TEF Indicates the Toxic Equivalency Factor TEQ Indicates the Toxic Equivalency

LQL Lower Quantification Limit, based on the lowest calibration level corrected for sample size, splits and dilutions.
EMPC Estimated Maximum Possible Concentration – elevated detection limit due to interference or positive id criterion failure

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Sample Analysis Report

Sample Name	SVOC-BLANK (TS1 THRU TS6)	Sampling Date	17-Sep-19	<div>Approved:</div> <div>T.Patterson</div> <div>--e-signature--</div> <div>22-Oct-2019</div>
ALS Sample ID	L2355437-4	Extraction Date	8-Oct-19	
Analysis Method	EPA M23	Sample Size	1	
Analysis Type	Sample	Percent Moisture	n/a	
Sample Matrix	Stack	Split Ratio	2	

Run Information	Run 1
Filename	7-191019A21
Run Date	19-Oct-19 20:10
Final Volume	20 uL
Dilution Factor	1
Analysis Units	pg
Instrument - Column	HRMS-7 DB5MSUST470134H

Target Analytes	TEF (WHO 2005)	Ret. Time	Conc. pg	EDL pg	Flags	EMPC pg	LQL
2,3,7,8-TCDD	1	NotFnd	<0.83	0.83	U		20
1,2,3,7,8-PeCDD	1	32.07	0.840	0.57	M,J,B		100
1,2,3,4,7,8-HxCDD	0.1	34.10	<2.0	1.3	M,J,R	2.0	100
1,2,3,6,7,8-HxCDD	0.1	34.15	2.73	1.2	M,J		100
1,2,3,7,8,9-HxCDD	0.1	34.27	1.92	1.2	M,J,B		100
1,2,3,4,6,7,8-HpCDD	0.01	35.75	22.1	0.85	J,B		100
OCDD	0.0003	37.24	62.2	0.70	J,B		200
2,3,7,8-TCDF	0.1	26.99	<1.2	0.75	M,J,R	1.2	20
1,2,3,7,8-PeCDF	0.03	31.12	1.97	0.70	M,J,B		100
2,3,4,7,8-PeCDF	0.3	31.84	2.32	0.63	M,J		100
1,2,3,4,7,8-HxCDF	0.1	33.60	2.69	0.72	J		100
1,2,3,6,7,8-HxCDF	0.1	33.68	3.08	0.67	J		100
2,3,4,6,7,8-HxCDF	0.1	34.01	<5.0	0.71	M,J,R	5.0	100
1,2,3,7,8,9-HxCDF	0.1	34.43	3.00	0.82	J		100
1,2,3,4,6,7,8-HpCDF	0.01	35.19	18.2	0.40	J		100
1,2,3,4,7,8,9-HpCDF	0.01	36.00	3.28	0.48	J		100
OCDF	0.0003	37.33	24.1	0.45	J		200
Field Spike Standards	pg		% Rec	Limits			
37Cl4-2,3,7,8-TCDD	400	27.96	92	70-130			
13C12-1,2,3,4,7,8-HxCDD	4000	34.09	92	70-130			
13C12-2,3,4,7,8-PeCDF	4000	31.84	97	70-130			
13C12-1,2,3,4,7,8-HxCDF	4000	33.60	94	70-130			
13C12-1,2,3,4,7,8,9-HpCDF	4000	35.99	91	70-130			
Extraction Standards							
13C12-2,3,7,8-TCDD	4000	27.95	82	40-130			
13C12-1,2,3,7,8-PeCDD	4000	32.05	69	40-130			
13C12-1,2,3,6,7,8-HxCDD	4000	34.14	69	40-130			
13C12-1,2,3,4,6,7,8-HpCDD	4000	35.74	68	25-130			
13C12-OCDD	8000	37.23	70	25-130			
13C12-2,3,7,8-TCDF	4000	27.02	79	40-130			
13C12-1,2,3,7,8-PeCDF	4000	31.12	76	40-130			
13C12-1,2,3,6,7,8-HxCDF	4000	33.67	79	40-130			
13C12-1,2,3,4,6,7,8-HpCDF	4000	35.18	74	25-130			
Cleanup Standard	pg						
13C12-1,2,3,7,8,9-HxCDF	4000	34.41	64	40-130			
Homologue Group Totals		# peaks	Conc. pg	EDL pg			
Total-TCDD		0	<0.83	0.83	U		20
Total-PeCDD		3	7.84	0.57			100
Total-HxCDD		3	11.3	1.3			100
Total-HpCDD		2	43.1	0.85			100
Total-TCDF		4	8.49	0.75			20
Total-PeCDF		6	19.0	0.70			100
Total-HxCDF		6	22.9	0.82			100
Total-HpCDF		4	35.8	0.48			100

Toxic Equivalency - (WHO 2005)	pg
Lower Bound PCDD/F TEQ (WHO 2005)	3.40
Mid Point PCDD/F TEQ (WHO 2005)	4.63
Upper Bound PCDD/F TEQ (WHO 2005)	5.05

EDL	Indicates the Estimated Detection Limit, based on the measured background noise for this target in this sample.
TEF	Indicates the Toxic Equivalency Factor
M	Indicates that a peak has been manually integrated.
U	Indicates that this compound was not detected above the EDL.
J	Indicates that a target analyte was detected below the calibrated range.
R	Indicates that the ion abundance ratio for this compound did not meet the acceptance criterion.
B	Indicates that this target was detected in the blank at greater than 10% of the sample concentration.
LQL	Lower Quantification Limit, based on the lowest calibration level corrected for sample size, splits and dilutions.
EMPC	Estimated Maximum Possible Concentration – elevated detection limit due to interference or positive id criterion failure

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Sample Analysis Report

Sample Name TRIP BLANK (TS7 THRU TS10)
ALS Sample ID L2355437-5
Analysis Method EPA M23
Analysis Type Sample
Sample Matrix Stack

Sampling Date 17-Sep-19
Extraction Date 8-Oct-19
Sample Size 1 Train
Percent Moisture n/a
Split Ratio 2

Approved:
T. Patterson
 --e-signature--
 22-Oct-2019

Run Information

Run 1

Filename 7-191019A22
Run Date 19-Oct-19 20:52
Final Volume 20 uL
Dilution Factor 1
Analysis Units pg
Instrument - Column HRMS-7 DB5MSUST470134H

Target Analytes	TEF (WHO 2005)	Ret. Time	Conc. pg	EDL pg	Flags	EMPC pg	LQL
2,3,7,8-TCDD	1	NotFnd	<1.6	1.6	U		20
1,2,3,7,8-PeCDD	1	NotFnd	<0.89	0.89	U		100
1,2,3,4,7,8-HxCDD	0.1	NotFnd	<1.2	1.2	U		100
1,2,3,6,7,8-HxCDD	0.1	NotFnd	<1.1	1.1	U		100
1,2,3,7,8,9-HxCDD	0.1	NotFnd	<1.1	1.1	U		100
1,2,3,4,6,7,8-HpCDD	0.01	35.75	<2.6	1.1	M,J,R	2.6	100
OCDD	0.0003	37.23	16.6	0.98	M,J,B		200
2,3,7,8-TCDF	0.1	NotFnd	<1.2	1.2	U		20
1,2,3,7,8-PeCDF	0.03	31.14	<1.1	0.61	M,J,R	1.1	100
2,3,4,7,8-PeCDF	0.3	NotFnd	<0.55	0.55	U		100
1,2,3,4,7,8-HxCDF	0.1	NotFnd	<0.75	0.75	U		100
1,2,3,6,7,8-HxCDF	0.1	NotFnd	<0.70	0.70	U		100
2,3,4,6,7,8-HxCDF	0.1	34.00	<0.75	0.75	M,U	0.60	100
1,2,3,7,8,9-HxCDF	0.1	34.41	<0.94	0.86	M,J,R	0.94	100
1,2,3,4,6,7,8-HpCDF	0.01	NotFnd	<0.77	0.77	U		100
1,2,3,4,7,8,9-HpCDF	0.01	NotFnd	<0.91	0.91	U		100
OCDF	0.0003	37.33	<3.0	0.84	M,J,R	3.0	200

Field Spike Standards

% Rec

37Cl4-2,3,7,8-TCDD
 13C12-1,2,3,4,7,8-HxCDD
 13C12-2,3,4,7,8-PeCDF
 13C12-1,2,3,4,7,8-HxCDF
 13C12-1,2,3,4,7,8,9-HpCDF

NS
 NS
 NS
 NS
 NS

Extraction Standards

13C12-2,3,7,8-TCDD	4000	27.96	54	40-130
13C12-1,2,3,7,8-PeCDD	4000	32.05	64	40-130
13C12-1,2,3,6,7,8-HxCDD	4000	34.14	60	40-130
13C12-1,2,3,4,6,7,8-HpCDD	4000	35.74	64	25-130
13C12-OCDD	8000	37.23	59	25-130
13C12-2,3,7,8-TCDF	4000	27.04	59	40-130
13C12-1,2,3,7,8-PeCDF	4000	31.12	62	40-130
13C12-1,2,3,6,7,8-HxCDF	4000	33.67	62	40-130
13C12-1,2,3,4,6,7,8-HpCDF	4000	35.18	66	25-130

Cleanup Standard

pg

13C12-1,2,3,7,8,9-HxCDF	4000	34.41	64	40-130
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Homologue Group Totals	# peaks	Conc. pg	EDL pg		
Total-TCDD	0	<1.6	1.6	U	20
Total-PeCDD	0	<0.89	0.89	U	100
Total-HxCDD	0	<1.2	1.2	U	100
Total-HpCDD	0	<1.1	1.1	U	100
Total-TCDF	0	<1.2	1.2	U	20
Total-PeCDF	0	<0.61	0.61	U	100
Total-HxCDF	1	1.08	0.86		100
Total-HpCDF	0	<0.91	0.91	U	100

Toxic Equivalency - (WHO 2005)

pg

Lower Bound PCDD/F TEQ (WHO 2005) 0.00498
Mid Point PCDD/F TEQ (WHO 2005) 1.83
Upper Bound PCDD/F TEQ (WHO 2005) 3.51

EDL	Indicates the Estimated Detection Limit, based on the measured background noise for this target in this sample.
TEF	Indicates the Toxic Equivalency Factor
M	Indicates that a peak has been manually integrated.
U	Indicates that this compound was not detected above the EDL.
J	Indicates that a target analyte was detected below the calibrated range.
R	Indicates that the ion abundance ratio for this compound did not meet the acceptance criterion.
B	Indicates that this target was detected in the blank at greater than 10% of the sample concentration.
LQL	Lower Quantification Limit, based on the lowest calibration level corrected for sample size, splits and dilutions.
EMPC	Estimated Maximum Possible Concentration – elevated detection limit due to interference or positive id criterion failure
NS	Indicates that this standard was not spiked to sample

ALS Life Sciences

Laboratory Method Blank Analysis Report

Sample Name	Method Blank	Sampling Date	n/a	
ALS Sample ID	WG3174994-1	Extraction Date	8-Oct-19	
Analysis Method	EPA M23	Sample Size	1	Train
Analysis Type	Blank	Percent Moisture	n/a	
Sample Matrix	MEDIA	Split Ratio	2	
				Approved: T.Patterson --e-signature-- 22-Oct-2019

Run Information	Run 1
Filename	7-191019A19
Run Date	19-Oct-19 18:46
Final Volume	20 uL
Dilution Factor	1
Analysis Units	pg
Instrument - Column	HRMS-7 DB5MSUST470134H

Target Analytes	TEF (WHO 2005)	Ret. Time	Conc. pg	EDL pg	Flags	EMPC pg	LQL
2,3,7,8-TCDD	1	NotFnd	<0.69	0.69	U		20
1,2,3,7,8-PeCDD	1	32.05	1.22	0.60	M,J		100
1,2,3,4,7,8-HxCDD	0.1	NotFnd	<0.73	0.73	U		100
1,2,3,6,7,8-HxCDD	0.1	34.14	<0.72	0.67	M,J,R	0.72	100
1,2,3,7,8,9-HxCDD	0.1	34.26	2.06	0.69	M,J		100
1,2,3,4,6,7,8-HpCDD	0.01	35.74	3.00	1.4	M,J		100
OCDD	0.0003	37.23	17.0	0.63	J		200
2,3,7,8-TCDF	0.1	NotFnd	<0.47	0.47	U		20
1,2,3,7,8-PeCDF	0.03	31.12	1.37	0.33	M,J		100
2,3,4,7,8-PeCDF	0.3	NotFnd	<0.30	0.30	U		100
1,2,3,4,7,8-HxCDF	0.1	33.61	<0.67	0.57	M,J,R	0.67	100
1,2,3,6,7,8-HxCDF	0.1	33.68	<0.55	0.53	M,J,R	0.55	100
2,3,4,6,7,8-HxCDF	0.1	33.99	<0.74	0.57	M,J,R	0.74	100
1,2,3,7,8,9-HxCDF	0.1	34.41	<0.97	0.65	M,J,R	0.97	100
1,2,3,4,6,7,8-HpCDF	0.01	35.18	<1.3	0.32	M,J,R	1.3	100
1,2,3,4,7,8,9-HpCDF	0.01	35.99	<1.9	0.38	M,J,R	1.9	100
OCDF	0.0003	37.32	<3.4	0.44	M,J,R	3.4	200

Field Spike Standards % Rec

37C14-2,3,7,8-TCDD	NS
13C12-1,2,3,4,7,8-HxCDD	NS
13C12-2,3,4,7,8-PeCDF	NS
13C12-1,2,3,4,7,8-HxCDF	NS
13C12-1,2,3,4,7,8,9-HpCDF	NS

Extraction Standards

13C12-2,3,7,8-TCDD	4000	27.93	75	40-130
13C12-1,2,3,7,8-PeCDD	4000	32.04	70	40-130
13C12-1,2,3,6,7,8-HxCDD	4000	34.13	71	40-130
13C12-1,2,3,4,6,7,8-HpCDD	4000	35.73	73	25-130
13C12-OCDD	8000	37.22	85	25-130
13C12-2,3,7,8-TCDF	4000	27.01	77	40-130
13C12-1,2,3,7,8-PeCDF	4000	31.10	73	40-130
13C12-1,2,3,6,7,8-HxCDF	4000	33.66	78	40-130
13C12-1,2,3,4,6,7,8-HpCDF	4000	35.17	82	25-130

Cleanup Standard

13C12-1,2,3,7,8,9-HxCDF	4000	34.40	79	40-130
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Homologue Group Totals	# peaks	Conc. pg	EDL pg	
Total-TCDD	0	<0.69	0.69	U
Total-PeCDD	1	1.22	0.60	
Total-HxCDD	1	2.06	0.73	
Total-HpCDD	2	4.84	1.4	
Total-TCDF	0	<0.47	0.47	U
Total-PeCDF	1	1.37	0.33	
Total-HxCDF	0	<0.65	0.65	U
Total-HpCDF	0	<0.38	0.38	U

Toxic Equivalency - (WHO 2005)

	pg
Lower Bound PCDD/F TEQ (WHO 2005)	1.50
Mid Point PCDD/F TEQ (WHO 2005)	2.35
Upper Bound PCDD/F TEQ (WHO 2005)	2.80

EDL	Indicates the Estimated Detection Limit, based on the measured background noise for this target in this sample.
TEF	Indicates the Toxic Equivalency Factor
M	Indicates that a peak has been manually integrated.
U	Indicates that this compound was not detected above the EDL.
J	Indicates that a target analyte was detected below the calibrated range.
R	Indicates that the ion abundance ratio for this compound did not meet the acceptance criterion.
LQL	Lower Quantification Limit, based on the lowest calibration level corrected for sample size, splits and dilutions.
EMPC	Estimated Maximum Possible Concentration – elevated detection limit due to interference or positive id criterion failure
NS	Indicates that this standard was not spiked to sample

ALS Life Sciences

Laboratory Method Blank Analysis Report

Sample Name	Method Blank	Sampling Date	n/a	Train	Approved: <i>T.Patterson</i> --e-signature-- 22-Oct-2019
ALS Sample ID	WG3174994-4	Extraction Date	8-Oct-19		
Analysis Method	EPA M23	Sample Size	1		
Analysis Type	Blank	Percent Moisture	n/a		
Sample Matrix	REAGENT	Split Ratio	2		

Run Information	Run 1
Filename	7-191019A20
Run Date	19-Oct-19 19:28
Final Volume	20 uL
Dilution Factor	1
Analysis Units	pg
Instrument - Column	HRMS-7 DB5MSUST470134H

Target Analytes	TEF (WHO 2005)	Ret. Time	Conc. pg	EDL pg	Flags	EMPC pg	LQL
2,3,7,8-TCDD	1	NotFnd	<0.79	0.79	U		20
1,2,3,7,8-PeCDD	1	NotFnd	<0.42	0.42	U		100
1,2,3,4,7,8-HxCDD	0.1	NotFnd	<0.79	0.79	U		100
1,2,3,6,7,8-HxCDD	0.1	NotFnd	<0.72	0.72	U		100
1,2,3,7,8,9-HxCDD	0.1	NotFnd	<0.75	0.75	U		100
1,2,3,4,6,7,8-HpCDD	0.01	35.75	<1.9	0.74	M,J,R	1.9	100
OCDD	0.0003	37.24	<11	0.50	M,J,R	11	200
2,3,7,8-TCDF	0.1	NotFnd	<0.50	0.50	U		20
1,2,3,7,8-PeCDF	0.03	31.13	<1.1	0.42	M,J,R	1.1	100
2,3,4,7,8-PeCDF	0.3	NotFnd	<0.38	0.38	U		100
1,2,3,4,7,8-HxCDF	0.1	33.60	<0.57	0.57	M,U		100
1,2,3,6,7,8-HxCDF	0.1	NotFnd	<0.53	0.53	U		100
2,3,4,6,7,8-HxCDF	0.1	NotFnd	<0.57	0.57	U		100
1,2,3,7,8,9-HxCDF	0.1	34.43	<1.7	0.65	M,J,R	1.7	100
1,2,3,4,6,7,8-HpCDF	0.01	35.19	1.41	0.39	M,J		100
1,2,3,4,7,8,9-HpCDF	0.01	NotFnd	<0.46	0.46	U		100
OCDF	0.0003	37.33	2.08	0.63	M,J		200

Field Spike Standards % Rec

37C14-2,3,7,8-TCDD	NS
13C12-1,2,3,4,7,8-HxCDD	NS
13C12-2,3,4,7,8-PeCDF	NS
13C12-1,2,3,4,7,8-HxCDF	NS
13C12-1,2,3,4,7,8,9-HpCDF	NS

Extraction Standards

13C12-2,3,7,8-TCDD	4000	27.95	66	40-130
13C12-1,2,3,7,8-PeCDD	4000	32.05	69	40-130
13C12-1,2,3,6,7,8-HxCDD	4000	34.15	65	40-130
13C12-1,2,3,4,6,7,8-HpCDD	4000	35.75	69	25-130
13C12-OCDD	8000	37.23	66	25-130
13C12-2,3,7,8-TCDF	4000	27.02	71	40-130
13C12-1,2,3,7,8-PeCDF	4000	31.12	72	40-130
13C12-1,2,3,6,7,8-HxCDF	4000	33.67	72	40-130
13C12-1,2,3,4,6,7,8-HpCDF	4000	35.19	71	25-130

Cleanup Standard

13C12-1,2,3,7,8,9-HxCDF	4000	34.41	74	40-130
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Homologue Group Totals	# peaks	Conc. pg	EDL pg		
Total-TCDD	0	<0.79	0.79	U	20
Total-PeCDD	0	<0.42	0.42	U	100
Total-HxCDD	0	<0.79	0.79	U	100
Total-HpCDD	0	<0.74	0.74	U	100
Total-TCDF	0	<0.50	0.50	U	20
Total-PeCDF	0	<0.42	0.42	U	100
Total-HxCDF	0	<0.65	0.65	U	100
Total-HpCDF	1	1.41	0.46		100

Toxic Equivalency - (WHO 2005)

	pg
Lower Bound PCDD/F TEQ (WHO 2005)	0.0147
Mid Point PCDD/F TEQ (WHO 2005)	1.13
Upper Bound PCDD/F TEQ (WHO 2005)	2.01

EDL	Indicates the Estimated Detection Limit, based on the measured background noise for this target in this sample.
TEF	Indicates the Toxic Equivalency Factor
M	Indicates that a peak has been manually integrated.
U	Indicates that this compound was not detected above the EDL.
J	Indicates that a target analyte was detected below the calibrated range.
R	Indicates that the ion abundance ratio for this compound did not meet the acceptance criterion.
LQL	Lower Quantification Limit, based on the lowest calibration level corrected for sample size, splits and dilutions.
EMPC	Estimated Maximum Possible Concentration – elevated detection limit due to interference or positive id criterion failure
NS	Indicates that this standard was not spiked to sample

ALS Life Sciences

Laboratory Control Sample Analysis Report

Sample Name	Laboratory Control Sample	Sampling Date	n/a	
ALS Sample ID	WG3174994-2	Extraction Date	8-Oct-19	
Analysis Method	EPA M23	Sample Size	1	n/a
Analysis Type	LCS	Percent Moisture	n/a	
Sample Matrix	QC	Split Ratio	2	
				Approved: T. Patterson --e-signature-- 22-Oct-2019

Run Information	Run 1
Filename	7-191019A16
Run Date	19-Oct-19 16:40
Final Volume	20 uL
Dilution Factor	1
Analysis Units	%
Instrument - Column	HRMS-7 DB5MSUST470134H

Target Analytes	pg	Ret.		Limits	
		Time	% Rec	Flags	
2,3,7,8-TCDD	400	27.95	100	70-130	
1,2,3,7,8-PeCDD	2000	32.05	107	70-130	
1,2,3,4,7,8-HxCDD	2000	34.08	103	70-130	
1,2,3,6,7,8-HxCDD	2000	34.13	103	70-130	
1,2,3,7,8,9-HxCDD	2000	34.26	106	70-130	
1,2,3,4,6,7,8-HpCDD	2000	35.74	102	70-130	
OCDD	4000	37.22	98	70-130	
2,3,7,8-TCDF	400	27.04	98	70-130	
1,2,3,7,8-PeCDF	2000	31.12	110	70-130	
2,3,4,7,8-PeCDF	2000	31.84	96	70-130	
1,2,3,4,7,8-HxCDF	2000	33.60	107	70-130	
1,2,3,6,7,8-HxCDF	2000	33.66	104	70-130	
2,3,4,6,7,8-HxCDF	2000	33.99	102	70-130	
1,2,3,7,8,9-HxCDF	2000	34.41	100	70-130	
1,2,3,4,6,7,8-HpCDF	2000	35.18	102	70-130	
1,2,3,4,7,8,9-HpCDF	2000	35.99	100	70-130	
OCDF	4000	37.31	95	70-130	
Field Spike Standards		% Rec			
37Cl4-2,3,7,8-TCDD			NS		
13C12-1,2,3,4,7,8-HxCDD			NS		
13C12-2,3,4,7,8-PeCDF			NS		
13C12-1,2,3,4,7,8-HxCDF			NS		
13C12-1,2,3,4,7,8,9-HpCDF			NS		
Extraction Standards					
13C12-2,3,7,8-TCDD	4000	27.93	55	40-130	
13C12-1,2,3,7,8-PeCDD	4000	32.04	54	40-130	
13C12-1,2,3,6,7,8-HxCDD	4000	34.13	61	40-130	
13C12-1,2,3,4,6,7,8-HpCDD	4000	35.73	62	25-130	
13C12-OCDD	8000	37.22	60	25-130	
13C12-2,3,7,8-TCDF	4000	27.01	64	40-130	
13C12-1,2,3,7,8-PeCDF	4000	31.10	57	40-130	
13C12-1,2,3,6,7,8-HxCDF	4000	33.66	67	40-130	
13C12-1,2,3,4,6,7,8-HpCDF	4000	35.17	69	25-130	
Cleanup Standard	pg				
13C12-1,2,3,7,8,9-HxCDF	4000	34.40	71	40-130	

NS

Indicates that this standard was not spiked to sample

APPENDIX D

Calculated Data

GAS CALCULATIONS

Client: TMAC
 Plant: Incinerator
 Location: Hope Bay Nunavut

	O ₂ (%)	CO ₂ (%)	CO (ppm)	SO ₂ (ppm)	NO _x (ppm)
Gas 1	4.8	19.5	76.4	10.6	167.0
Gas 2	3.7	17.4	518.7	72.3	168.0
Gas 3	9.9	14.2	0.0	0.0	112.5

	O ₂ (%)	CO ₂ (%)	CO (ppm)	SO ₂ (ppm)	NO _x (ppm)
0	1.4	24.2	501	19	200
5	1.7	23.6	9	7	222
10	3.2	20.8	6	8	186
15	7	18.8	6	9	133
20	6	16.6	3	10	145
25	6.7	17.6	5	10	150
30	7.3	15.2	5	11	133

	O ₂ (%)	CO ₂ (%)	CO (ppm)	SO ₂ (ppm)	NO _x (ppm)
0	2.2	18.2	4	6	219
5	2.1	18.3	1	9	230
10	3	18.8	2000	351	159
15	2.5	18.5	1337	33	122
20	3.3	18.8	174	35	188
25	6.4	14.5	69	36	132
30	6.6	14.9	46	36	126

	O ₂ (%)	CO ₂ (%)	CO (ppm)	SO ₂ (ppm)	NO _x (ppm)
0	10.9	14.4	0	0	106
5	10.6	14.7	0	0	111
10	8.5	15.2	0	0	119
15	9.4	13.3	0	0	111
20	8.9	14.4	0	0	112
25	10.9	13.3	0	0	116
30					

GAS CALCULATIONS
TMAC
Incinerator
Hope Bay Nunavut

Variable	Symbol	Units	Calculation	Test 1	Test 2	Test 3	Average
Corresponding PM Test							n/a
Dry Stack Gas Flow Rate	Qs	dscfm dscms	(Entered from PM Test Data) $Qs \text{ (dscms)} = 0.000472 \times Qs \text{ (dscfm)}$	0.00	0.00	0.00	n/a n/a
Stack Gas Oxygen Content	Co2	%	Measurement from Flue Gas Analyzer	4.8	3.7	9.9	6.1
Stack Gas Carbon Dioxide Content	Cco2	%	Measurement from Flue Gas Analyzer	19.5	17.4	14.2	17.1
Sulphur Dioxide - SO2							
SO2 Measured Concentration	Cso2	ppm	Measurement from Flue Gas Analyzer	10.6	72.3	0.0	27.62
Uncorrected @ STP	Cso2	mg/dscm	$Cso2 \text{ (mg/dscm)} = Cso2 \text{ (ppm)} \times 2.62$	27.70	189.39	0.00	72.36
SO2 Emission Rate	ERso2	g/s kg/hr	$ERso2 = Cso2/1000 \times Qs$ $ERso2 \text{ (kg/hr)} = 3.6 \times ERso2 \text{ (g/s)}$	0.00 0.00	0.00 0.00	0.00 0.00	0.00 0.00
SO2 Concentration							
Corrected to 11% O2	Cso2	mg/dscm	$Cso2 \text{ (11% O2)} = Cso2 \text{ (mg/dscm)} \times (20.9-11) / (20.9-Co2)$	16.99	109.19	0.00	42.06
Corrected to 3% O2	Cso2	mg/dscm	$Cso2 \text{ (3% O2)} = Cso2 \text{ (mg/dscm)} \times (20.9-3) / (20.9-Co2)$	30.71	197.42	0.00	76.05
Corrected to 12% CO2	Cso2	mg/dscm	$Cso2 \text{ (12% CO2)} = Cso2 \text{ (mg/dscm)} \times (12/Cco2)$	17.01	130.40	0.00	49.14
Nitrogen Oxides - NOx							
NOx Measured Concentration	Cnox	ppm	Measurement from Flue Gas Analyzer	167.0	168.0	112.5	149.17
Uncorrected @ STP	Cnox	mg/dscm	$Cnox \text{ (mg/dscm)} = Cnox \text{ (ppm)} \times 1.882$	314.29	316.18	211.73	280.73
NOx Emission Rate	ERnox	g/s kg/hr	$ERnox = Cnox/1000 \times Qs$ $ERnox \text{ (kg/hr)} = 3.6 \times ERnox \text{ (g/s)}$	0.00 0.00	0.00 0.00	0.00 0.00	0.00 0.00
NOx Concentration							
Corrected to 11% O2	Cnox	mg/dscm	$Cnox \text{ (11% O2)} = Cnox \text{ (mg/dscm)} \times (20.9-11) / (20.9-Co2)$	192.75	182.29	189.98	188.34
Corrected to 3% O2	Cnox	mg/dscm	$Cnox \text{ (3% O2)} = Cnox \text{ (mg/dscm)} \times (20.9-3) / (20.9-Co2)$	348.50	329.59	343.49	340.53
Corrected to 12% CO2	Cnox	mg/dscm	$Cnox \text{ (12% CO2)} = Cnox \text{ (mg/dscm)} \times (12/Cco2)$	192.99	217.69	178.71	196.47
Carbon Monoxide - CO							
CO Measured Concentration	Cco	ppm	Measurement from Flue Gas Analyzer	76.4	518.7	0.0	198.38
Uncorrected @ STP	Cco	mg/dscm	$Cco \text{ (mg/dscm)} = Cco \text{ (ppm)} \times 1.145$	87.51	593.93	0.00	227.15
CO Emission Rate	ERco	g/s kg/hr	$ERco = Cco/1000 \times Qs$ $ERco \text{ (kg/hr)} = 3.6 \times ERco \text{ (g/s)}$	0.00 0.00	0.00 0.00	0.00 0.00	0.00 0.00
CO Concentration							
Corrected to 11% O2	Cco	mg/dscm	$Cco \text{ (11% O2)} = Cco \text{ (mg/dscm)} \times (20.9-11) / (20.9-Co2)$	53.67	342.42	0.00	132.03
Corrected to 3% O2	Cco	mg/dscm	$Cco \text{ (3% O2)} = Cco \text{ (mg/dscm)} \times (20.9-3) / (20.9-Co2)$	97.04	619.13	0.00	238.72
Corrected to 12% CO2	Cco	mg/dscm	$Cco \text{ (12% CO2)} = Cco \text{ (mg/dscm)} \times (12/Cco2)$	53.73	408.93	0.00	154.22

Legend: sq.ft - square feet
sq.m - square metres
Pi - 3.142
R - degrees Rankin
ppm - parts per million

in.Hg - inches of mercury
cu.ft - cubic feet
cu.m - cubic metres
STP - standard temperature and pressure (25 C and 101.3 kPa)
dscms - dry standard cubic metres per second
dscfm - dry standard cubic feet per minute

mg/dscm - milligrams per dry standard cubic metre
g/s - grams per second
NOx - as NO2
acfm - actual cubic feet per minute

STACK TESTING RESULTS

GAS CALCULATIONS

TMAC

Incinerator

Hope Bay Nunavut

Parameter	Test 1	Test 2	Test 3	Average	Limits
Oxygen - O2 (%)	4.76	3.73	9.87	6.12	-
Carbon Dioxide - CO2 (%)	19.5	17.4	14.2	17.1	-
Sulphur Dioxide - SO2					
SO2 Measured Concentration (ppm)	10.6	72.3	0.0	27.6	-
Uncorrected at STP (mg/dscm)	27.7	189.4	0.0	72.4	-
Emission Rate (kg/hr)	0.00	0.00	0.00	0.00	-
Nitrogen Oxides - NOx					
NOx Measured Concentration (ppm)	167.0	168.0	112.5	149.2	-
Uncorrected at STP (mg/dscm)	314.3	316.2	211.7	280.7	-
Emission Rate (kg/hr)	0.00	0.00	0.00	0.00	-
Carbon Monoxide - CO					
CO Measured Concentration (ppm)	76.4	518.7	0.0	198.4	-
Uncorrected at STP (mg/dscm)	87.5	593.9	0.0	227.1	-
Emission Rate (kg/hr)	0.00	0.00	0.00	0.00	-

Legend:
C - degrees Celsius
m/s - metres per second
dscms - dry standard cubic metres per second
ppm - parts per million

STP - standard temperature and pressure (25 C and 101.3 kPa)
mg/dscm - miligrams per dry standard cubic metre
NOx - as NO2
ND - non-detectable

GAS CALCULATIONS

Client: TMAC
 Plant: Incinerator
 Location: Hope Bay, Nunavut

	O ₂ (%)	CO ₂ (%)	CO (ppm)	SO ₂ (ppm)	NO _x (ppm)
Gas 1	5.9	18.5	0.0	0.0	109.4
Gas 2	9.6	13.9	0.0	0.0	89.1
Gas 3	7.0	17.1	0.0	0.0	66.0

	O ₂ (%)	CO ₂ (%)	CO (ppm)	SO ₂ (ppm)	NO _x (ppm)
0	5	19.2	0	0	115
5	5.5	19.4	0	0	102
10	6.1	18.2	0	0	107
15	6.2	19	0	0	107
20	6.2	18.3	0	0	116
25	6.5	17.3	0	0	109
30	6	18.1	0	0	110

	O ₂ (%)	CO ₂ (%)	CO (ppm)	SO ₂ (ppm)	NO _x (ppm)
0	10.1	12.4	0	0	76
5	9.4	15.9	0	0	85
10	8.2	15.5	0	0	90
15	10.6	12.7	0	0	91
20	11.1	11.6	0	0	94
25	9.9	13.5	0	0	93
30	8.2	15.5	0	0	95

	O ₂ (%)	CO ₂ (%)	CO (ppm)	SO ₂ (ppm)	NO _x (ppm)
0	5.1	19.4	0	0	47
5	5.2	19.3	0	0	58
10	8.8	14.9	0	0	60
15	8.3	15.6	0	0	65
20	6.4	17.8	0	0	72
25	8.2	15.6	0	0	78
30	6.7	17.4	0	0	82

GAS CALCULATIONS
TMAC
Incinerator
Hope Bay, Nunavut

Variable	Symbol	Units	Calculation	Test 1	Test 2	Test 3	Average
Corresponding PM Test							n/a
Dry Stack Gas Flow Rate	Qs	dscfm dscms	(Entered from PM Test Data) $Qs \text{ (dscms)} = 0.000472 \times Qs \text{ (dscfm)}$	0.00	0.00	0.00	n/a n/a
Stack Gas Oxygen Content	Co2	%	Measurement from Flue Gas Analyzer	5.9	9.6	7.0	7.5
Stack Gas Carbon Dioxide Content	Cco2	%	Measurement from Flue Gas Analyzer	18.5	13.9	17.1	16.5
Sulphur Dioxide - SO2							
SO2 Measured Concentration	Cso2	ppm	Measurement from Flue Gas Analyzer	0.0	0.0	0.0	0.00
Uncorrected @ STP	Cso2	mg/dscm	$Cso2 \text{ (mg/dscm)} = Cso2 \text{ (ppm)} \times 2.62$	0.00	0.00	0.00	0.00
SO2 Emission Rate	ERso2	g/s kg/hr	$ERso2 = Cso2/1000 \times Qs$ $ERso2 \text{ (kg/hr)} = 3.6 \times ERso2 \text{ (g/s)}$	0.00	0.00	0.00	0.00
SO2 Concentration							
Corrected to 11% O2	Cso2	mg/dscm	$Cso2 \text{ (11% O2)} = Cso2 \text{ (mg/dscm)} \times (20.9-11) / (20.9-Co2)$	0.00	0.00	0.00	0.00
Corrected to 3% O2	Cso2	mg/dscm	$Cso2 \text{ (3% O2)} = Cso2 \text{ (mg/dscm)} \times (20.9-3) / (20.9-Co2)$	0.00	0.00	0.00	0.00
Corrected to 12% CO2	Cso2	mg/dscm	$Cso2 \text{ (12% CO2)} = Cso2 \text{ (mg/dscm)} \times (12/Cco2)$	0.00	0.00	0.00	0.00
Nitrogen Oxides - NOx							
NOx Measured Concentration	Cnox	ppm	Measurement from Flue Gas Analyzer	109.4	89.1	66.0	88.19
Uncorrected @ STP	Cnox	mg/dscm	$Cnox \text{ (mg/dscm)} = Cnox \text{ (ppm)} \times 1.882$	205.94	167.77	124.21	165.97
NOx Emission Rate	ERnox	g/s kg/hr	$ERnox = Cnox/1000 \times Qs$ $ERnox \text{ (kg/hr)} = 3.6 \times ERnox \text{ (g/s)}$	0.00	0.00	0.00	0.00
NOx Concentration							
Corrected to 11% O2	Cnox	mg/dscm	$Cnox \text{ (11% O2)} = Cnox \text{ (mg/dscm)} \times (20.9-11) / (20.9-Co2)$	136.18	147.54	88.20	123.97
Corrected to 3% O2	Cnox	mg/dscm	$Cnox \text{ (3% O2)} = Cnox \text{ (mg/dscm)} \times (20.9-3) / (20.9-Co2)$	246.23	266.77	159.46	224.15
Corrected to 12% CO2	Cnox	mg/dscm	$Cnox \text{ (12% CO2)} = Cnox \text{ (mg/dscm)} \times (12/Cco2)$	133.59	145.13	86.95	121.89
Carbon Monoxide - CO							
CO Measured Concentration	Cco	ppm	Measurement from Flue Gas Analyzer	0.0	0.0	0.0	0.00
Uncorrected @ STP	Cco	mg/dscm	$Cco \text{ (mg/dscm)} = Cco \text{ (ppm)} \times 1.145$	0.00	0.00	0.00	0.00
CO Emission Rate	ERco	g/s kg/hr	$ERco = Cco/1000 \times Qs$ $ERco \text{ (kg/hr)} = 3.6 \times ERco \text{ (g/s)}$	0.00	0.00	0.00	0.00
CO Concentration							
Corrected to 11% O2	Cco	mg/dscm	$Cco \text{ (11% O2)} = Cco \text{ (mg/dscm)} \times (20.9-11) / (20.9-Co2)$	0.00	0.00	0.00	0.00
Corrected to 3% O2	Cco	mg/dscm	$Cco \text{ (3% O2)} = Cco \text{ (mg/dscm)} \times (20.9-3) / (20.9-Co2)$	0.00	0.00	0.00	0.00
Corrected to 12% CO2	Cco	mg/dscm	$Cco \text{ (12% CO2)} = Cco \text{ (mg/dscm)} \times (12/Cco2)$	0.00	0.00	0.00	0.00

Legend:

sq.ft - square feet
sq.m - square metres
Pi - 3.142
R - degrees Rankin
ppm - parts per million

in.Hg - inches of mercury
cu.ft - cubic feet
cu.m - cubic metres
STP - standard temperature and pressure (25 C and 101.3 kPa)
dscms - dry standard cubic metres per second
dscfm - dry standard cubic feet per minute

mg/dscm - milligrams per dry standard cubic metre
g/s - grams per second
NOx - as NO2
acfm - actual cubic feet per minute

STACK TESTING RESULTS
GAS CALCULATIONS
TMAC
Incinerator
Hope Bay, Nunavut

Parameter	Test 1	Test 2	Test 3	Average	Limits
Oxygen - O2 (%)	5.93	9.64	6.96	7.51	-
Carbon Dioxide - CO2 (%)	18.5	13.9	17.1	16.5	-
Sulphur Dioxide - SO2					
SO2 Measured Concentration (ppm)	0.0	0.0	0.0	0.0	-
Uncorrected at STP (mg/dscm)	0.0	0.0	0.0	0.0	-
Emission Rate (kg/hr)	0.00	0.00	0.00	0.00	-
Nitrogen Oxides - NOx					
NOx Measured Concentration (ppm)	109.4	89.1	66.0	88.2	-
Uncorrected at STP (mg/dscm)	205.9	167.8	124.2	166.0	-
Emission Rate (kg/hr)	0.00	0.00	0.00	0.00	-
Carbon Monoxide - CO					
CO Measured Concentration (ppm)	0.0	0.0	0.0	0.0	-
Uncorrected at STP (mg/dscm)	0.0	0.0	0.0	0.0	-
Emission Rate (kg/hr)	0.00	0.00	0.00	0.00	-

Legend:

C - degrees Celsius
m/s - metres per second
dscms - dry standard cubic metres per second
ppm - parts per million

STP - standard temperature and pressure (25 C and 101.3 kPa)
mg/dscm - milligrams per dry standard cubic metre
NOx - as NO2
ND - non-detectable

Raw Data for: **TMAC Resources**

Client:	TMAC
Job Number:	160930343
Plant:	Incinerator
Location:	Hope Bay, NU
Test:	M-1
Date:	17-Sep-19
Personnel:	BC/KW
Test Start:	12:34 PM
Test Finish:	2:34 PM

	Particulate Matter
Collected from Filter (mg):	62.00
Collected from Probe Wash (mg):	35.90
Total Collected (mg):	97.90

Impinger No.	Final Weight (g)	Tare Weight (g)	Weight of Moisture (g)
1	862.4	740.6	121.8
2	747.8	722.8	25.0
3	731.6	727.4	4.2
4	607.5	607.0	0.5
5	769.3	760.3	9.0
6	754.2	753.7	0.5
7	956.5	946.0	10.5
	Moisture Volume (mL)		171.5

Parameters

Barometric Pressure, Pbar (in. Hg)	29.60	O2, (%)	5.9	Stack Diameter, (in.)	18
Stack Static Pressure, Pstatic (in. H2O)	0.02	CO2, (%)	18.5	Stack Area, (sq. ft.)	1.77
Ambient Temp, (°F)	45	N2, (%)	75.6	Probe Length, (in)	24
H2O Volume Collected, Vw (mL)	171.5			Nozzle Diameter, (in.)	0.536
Total # Sampling Points,	24			Pitot Coefficient, (Cp)	0.821
Sampling Time per Point, (min)	5			Gamma, meter constant	0.979
Readings Taken Every __ mins	2.5				

	Traverse Point	Time (min)	Stack Gas Temp, Ts (°F)	S-type Pitot delta P (in. H2O)	Orifice delta H (in. H2O)	Gas Meter Volume (cu. ft.)	Gas Meter Temp (°F)
Traverse 1	1	2.5	1100	0.03	0.71	475.40	
		5	1090	0.03	0.72	477.71	65
	2	7.5	1040	0.03	0.74	478.90	65
		10	1080	0.03	0.72	480.06	65
	3	12.5	1070	0.03	0.73	481.23	65
		15	1050	0.03	0.74	482.43	65
	4	17.5	1090	0.03	0.72	483.57	65
		20	1070	0.03	0.73	484.77	65
	5	22.5	1100	0.03	0.72	485.94	66
		25	1070	0.03	0.73	487.12	66
	6	27.5	1070	0.03	0.73	488.32	66
		30	1070	0.03	0.73	489.49	66
	7	32.5	1060	0.03	0.73	490.67	66
		35	1080	0.03	0.72	491.82	66
	8	37.5	1060	0.03	0.73	493.02	66
		40	1090	0.03	0.72	494.19	66
	9	42.5	1080	0.03	0.72	495.36	66
		45	1110	0.03	0.71	496.54	66
	10	47.5	1100	0.04	0.95	497.85	66
		50	1160	0.04	0.92	499.17	67
	11	52.5	1120	0.04	0.94	500.53	67
		55	1140	0.04	0.93	501.84	67
	12	57.5	1130	0.03	0.70	503.04	67
		60	1130	0.03	0.70	504.19	67
Traverse 2	1	62.5	1120	0.03	0.71	504.19	
		65	1100	0.03	0.72	505.36	67
	2	67.5	1105	0.03	0.71	506.55	67
		70	1120	0.03	0.71	507.70	67
	3	72.5	1120	0.03	0.71	508.85	67
		75	1120	0.03	0.71	510.02	67
	4	77.5	1120	0.03	0.71	511.19	67
		80	1120	0.03	0.71	512.33	67
	5	82.5	1120	0.03	0.71	513.48	67
		85	1130	0.03	0.70	514.65	68
	6	87.5	1130	0.03	0.70	515.80	67
		90	1130	0.03	0.70	516.94	67
	7	92.5	1130	0.03	0.71	518.09	67
		95	1120	0.03	0.71	519.25	68
	8	97.5	1130	0.03	0.70	520.42	68
		100	1170	0.03	0.69	521.56	68
	9	102.5	1140	0.03	0.70	522.70	68
		105	1150	0.03	0.70	523.85	68
	10	107.5	1140	0.03	0.70	525.00	68
		110	1160	0.03	0.69	526.16	68
	11	112.5	1150	0.03	0.70	527.30	69
		115	1150	0.03	0.70	528.45	69
	12	117.5	1160	0.03	0.69	529.60	69
		120	1150	0.03	0.70	530.75	69
			1140	0.03	0.70	531.90	69

Calculations for: TMAC Resources
Test #1

Client: TMAC
Job Number: 160930343

Plant: Incinerator
Location: Hope Bay, NU
Test: M-1
Date: 17-Sep-19
Personnel: BC/KW

Calculated Parameters

Stack Gas Pressure, Ps (in.Hg)	29.60
Stack Gas Molecular Weight, Dry Basis, Md (lb/lb-mole)	31.20
Volume of Water Vapour Collected, Vwc (cu.ft)	8.232
Stack Gas Moisture Content (% as decimal)	0.128
Stack Gas Molecular Weight, Wet Basis, Ms (lb/lb-mole)	29.50

Isokineticity Checks

Check range	Within Criteria
Check average	Within Criteria

0

	Traverse Point	Time	Stack Gas	S-type Pitot,	Orifice	Stack Gas	Meter Press.,	Gas Meter			Isokinetics
		(min)	Temp, Ts (R)	delta P (in. H2O)	delta H (in. H2O)	Velocity, Us (ft/s)		Avg. Temp, Tm (R)	Volume, Vm (cu. ft.)	Vol. @ Ref., Vmc (cu. ft.)	
Traverse 1	1	2.5	1560	0.03	0.71	16.22	29.65	525	1.160	1.151	101.76
		5	1550	0.03	0.72	16.17	29.65	525	1.150	1.141	100.56
	2	7.5	1500	0.03	0.74	15.90	29.65	525	1.190	1.181	102.37
		10	1540	0.03	0.72	16.11	29.65	525	1.160	1.151	101.11
	3	12.5	1530	0.03	0.73	16.06	29.65	525	1.170	1.161	101.65
		15	1510	0.03	0.74	15.96	29.65	525	1.200	1.191	103.57
	4	17.5	1550	0.03	0.72	16.17	29.65	525	1.140	1.131	99.68
		20	1530	0.03	0.73	16.06	29.65	525	1.200	1.191	104.25
	5	22.5	1560	0.03	0.72	16.22	29.65	526	1.170	1.159	102.44
		25	1530	0.03	0.73	16.06	29.65	526	1.180	1.169	102.32
	6	27.5	1530	0.03	0.73	16.06	29.65	526	1.200	1.189	104.06
		30	1530	0.03	0.73	16.06	29.65	526	1.170	1.159	101.45
	7	32.5	1520	0.03	0.73	16.01	29.65	526	1.180	1.169	101.99
		35	1540	0.03	0.72	16.11	29.65	526	1.150	1.139	100.04
	8	37.5	1520	0.03	0.73	16.01	29.65	526	1.200	1.189	103.72
		40	1550	0.03	0.72	16.17	29.65	526	1.170	1.159	102.11
	9	42.5	1540	0.03	0.72	16.11	29.65	526	1.170	1.159	101.78
		45	1570	0.03	0.71	16.27	29.65	526	1.180	1.169	103.65
	10	47.5	1560	0.04	0.95	18.73	29.67	526	1.310	1.298	99.39
		50	1620	0.04	0.92	19.08	29.67	527	1.320	1.306	101.86
	11	52.5	1580	0.04	0.94	18.85	29.67	527	1.360	1.345	103.64
		55	1600	0.04	0.93	18.96	29.67	527	1.310	1.296	100.46
	12	57.5	1590	0.03	0.70	16.37	29.65	527	1.200	1.186	105.87
		60	1590	0.03	0.70	16.37	29.65	527	1.150	1.137	101.46
Traverse 2	1	62.5	1580	0.03	0.71	16.32	29.65	527	1.170	1.157	102.90
		65	1560	0.03	0.72	16.22	29.65	527	1.190	1.177	103.99
	2	67.5	1565	0.03	0.71	16.24	29.65	527	1.150	1.137	100.66
		70	1580	0.03	0.71	16.32	29.65	527	1.150	1.137	101.14
	3	72.5	1580	0.03	0.71	16.32	29.65	527	1.170	1.157	102.90
		75	1580	0.03	0.71	16.32	29.65	527	1.170	1.157	102.90
	4	77.5	1580	0.03	0.71	16.32	29.65	527	1.140	1.127	100.26
		80	1580	0.03	0.71	16.32	29.65	527	1.150	1.137	101.14
	5	82.5	1580	0.03	0.71	16.32	29.65	528	1.170	1.155	102.70
		85	1590	0.03	0.70	16.37	29.65	527	1.150	1.137	101.46
	6	87.5	1590	0.03	0.70	16.37	29.65	527	1.140	1.127	100.58
		90	1590	0.03	0.70	16.37	29.65	527	1.150	1.137	101.46
	7	92.5	1580	0.03	0.71	16.32	29.65	528	1.160	1.145	101.83
		95	1590	0.03	0.70	16.37	29.65	528	1.170	1.155	103.03
	8	97.5	1630	0.03	0.69	16.58	29.65	528	1.140	1.125	101.64
		100	1600	0.03	0.70	16.42	29.65	528	1.140	1.125	100.70
	9	102.5	1610	0.03	0.70	16.48	29.65	528	1.150	1.135	101.90
		105	1600	0.03	0.70	16.42	29.65	528	1.150	1.135	101.58
	10	107.5	1620	0.03	0.69	16.53	29.65	528	1.160	1.145	103.10
		110	1610	0.03	0.70	16.48	29.65	529	1.140	1.123	100.82
	11	112.5	1610	0.03	0.70	16.48	29.65	529	1.150	1.133	101.71
		115	1620	0.03	0.69	16.53	29.65	529	1.150	1.133	102.02
	12	117.5	1610	0.03	0.70	16.48	29.65	529	1.150	1.133	101.71
		120	1600	0.03	0.70	16.42	29.65	529	1.150	1.133	101.39
		Total	Average	Average	Average	Average	Average	Average	Total	Total	Average
		120	1,572	0.03	0.73	16.49	29.65	527	56.500	55.883	101.97

Raw Data for: TMAC Resources
Test #2

Client: TMAC
Job Number: 160930343
Incinerator
Plant: Incinerator
Location: Hope Bay, NU
Test: M-2
Date: 17-Sep-19
Personnel: BC / KW

Test Start: 4:06 PM
Test Finish: 6:06 PM

	Particulate
	Matter
Collected from Filter (mg):	68.50
Collected from Probe Wash (mg):	32.60
Total Collected (mg):	101.10

Impinger No.	Final Weight	Tare Weight	Weight of Moisture (g)
1	835.9	741.8	94.1
2	754.7	728.5	26.2
3	735.7	731.3	4.4
4	611.4	611.0	0.4
5	763.9	763.3	0.6
6	757.2	756.5	0.7
7	965.6	956.4	9.2
Moisture Volume (mL)			135.6

Parameters
Barometric Pressure, Pbar (in. Hg)
Stack Static Pressure, Pstatic (in. H2O)
Ambient Temp, (°F)
H2O Volume Collected, Vw (mL)
Total # Sampling Points,
Sampling Time per Point, (min)
Readings Taken Every __ mins

29.40	O2, (%)	9.6
0.02	CO2, (%)	13.9
27	N2, (%)	90.4
135.6		
24		
5		
2.5		

Stack Diameter, (in.) 18
Stack Area, (sq. ft.) 1.76715
Probe Length, (in.) 24
Nozzle Diameter, (in.) 0.536
Pitot Coefficient, (Cp) 0.821
Gamma, meter constant 0.979

	Traverse Point	Time (min)	Stack Gas Temp, Ts (°F)	S-type Pitot delta P (in. H2O)	Orifice delta H (in. H2O)	Gas Meter Volume (cu. ft.)	Gas Meter Temp (°F)
Traverse 1	1	2.5	1200	0.03	0.67	532.30	
		5	1230	0.03	0.66	533.43	66
		7.5	1250	0.03	0.65	534.55	66
	2	10	1240	0.03	0.66	535.66	65
		12.5	1150	0.03	0.66	536.77	66
		15	1150	0.03	0.69	537.91	66
	3	17.5	1150	0.03	0.69	539.03	65
		20	1150	0.03	0.69	540.16	65
		22.5	1150	0.03	0.69	541.29	65
	4	25	1160	0.03	0.69	542.43	66
		27.5	1160	0.03	0.69	543.56	66
		30	1190	0.04	0.90	544.86	66
	5	32.5	1170	0.04	0.91	546.18	66
		35	1190	0.04	0.90	547.47	66
		37.5	1165	0.04	0.92	548.77	66
	6	40	1165	0.04	0.92	550.07	66
		42.5	1170	0.04	0.91	551.36	67
		45	1160	0.04	0.92	552.68	67
	7	47.5	1160	0.04	0.92	553.98	67
		50	1170	0.04	0.91	555.29	67
		52.5	1165	0.04	0.92	556.59	67
	8	55	1180	0.04	0.91	557.91	68
		57.5	1160	0.04	0.92	559.20	68
		60	1190	0.04	0.91	560.51	68
	9		1170	0.04	0.92	561.82	68
Traverse 2	1	62.5	1175	0.04	0.91	561.82	
		65	1190	0.04	0.91	563.13	68
		67.5	1190	0.04	0.91	564.44	68
	2	70	1190	0.04	0.91	565.73	68
		72.5	1210	0.04	0.90	566.05	69
		75	1190	0.04	0.91	568.35	69
	3	77.5	1200	0.04	0.90	569.66	69
		80	1195	0.04	0.90	570.95	69
		82.5	1200	0.04	0.90	572.26	69
	4	85	1200	0.04	0.90	573.56	69
		87.5	1190	0.04	0.91	574.88	69
		90	1200	0.04	0.90	576.19	69
	5	92.5	1180	0.05	1.14	577.65	69
		95	1230	0.04	0.89	578.94	69
		97.5	1230	0.04	0.89	580.22	69
	6	100	1230	0.04	0.89	581.51	69
		102.5	1230	0.04	0.89	582.71	70
		105	1230	0.04	0.89	584.08	70
	7	107.5	1250	0.04	0.89	585.38	70
		110	1230	0.04	0.89	586.68	70
		112.5	1230	0.04	0.89	587.98	70
	8	115	1230	0.04	0.89	589.28	70
		117.5	1230	0.04	0.89	590.57	70
		120	1220	0.04	0.89	591.87	70
	9		1220	0.04	0.89	593.16	70

Calculations for: **TMAC Resources**
Test #2

Client: TMAC
Job Number: 160930343

Plant: Incinerator
Location: Hope Bay, NU
Test: M-2
Date: 17-Sep-19
Personnel: BC / KW

Calculated Parameters

Stack Gas Pressure, Ps (in.Hg)	29.40
Stack Gas Molecular Weight, Dry Basis, Md (lb/lb-mole)	34.49
Volume of Water Vapour Collected, Vwc (cu.ft)	6.509
Stack Gas Moisture Content (% as decimal)	0.098
Stack Gas Molecular Weight, Wet Basis, Ms (lb/lb-mole)	32.87

Isokineticity Checks

Check range	Within Criteria
Check average	Within Criteria

0

	Traverse Point	Time	Stack Gas	S-type Pitot,	Orifice	Stack Gas	Meter Press.,	Gas Meter			Isokinetics I (%)
		(min)	Temp, Ts (R)	delta P (in. H2O)	delta H (in. H2O)	Velocity, Us (ft/s)		Pm (in. Hg)	Avg. Temp, Tm (R)	Volume, Vm (cu. ft.)	
Traverse 1	1	2.5	1660	0.03	0.67	15.90	29.45	526	1.130	1.112	103.77
		5	1690	0.03	0.66	16.05	29.45	526	1.120	1.102	103.77
	2	7.5	1710	0.03	0.65	16.14	29.45	525	1.110	1.094	103.65
		10	1700	0.03	0.66	16.09	29.45	526	1.110	1.092	103.15
	3	12.5	1610	0.03	0.69	15.66	29.45	526	1.140	1.122	103.10
		15	1610	0.03	0.69	15.66	29.45	525	1.120	1.104	101.49
	4	17.5	1610	0.03	0.69	15.66	29.45	525	1.130	1.114	102.39
		20	1610	0.03	0.69	15.66	29.45	525	1.130	1.114	102.39
	5	22.5	1610	0.03	0.69	15.66	29.45	526	1.140	1.122	103.10
		25	1620	0.03	0.69	15.71	29.45	526	1.130	1.112	102.52
	6	27.5	1650	0.04	0.90	18.31	29.47	526	1.300	1.280	103.13
		30	1630	0.04	0.91	18.20	29.47	526	1.320	1.299	104.09
	7	32.5	1650	0.04	0.90	18.31	29.47	526	1.290	1.270	102.34
		35	1625	0.04	0.92	18.17	29.47	526	1.300	1.280	102.35
	8	37.5	1625	0.04	0.92	18.17	29.47	526	1.300	1.280	102.35
		40	1630	0.04	0.91	18.20	29.47	527	1.290	1.267	101.53
	9	42.5	1620	0.04	0.92	18.14	29.47	527	1.320	1.297	103.57
		45	1620	0.04	0.92	18.14	29.47	527	1.300	1.277	102.00
	10	47.5	1630	0.04	0.91	18.20	29.47	527	1.310	1.287	103.10
		50	1625	0.04	0.92	18.17	29.47	527	1.300	1.277	102.16
	11	52.5	1640	0.04	0.91	18.25	29.47	528	1.320	1.294	104.01
		55	1620	0.04	0.92	18.14	29.47	528	1.290	1.265	101.03
	12	57.5	1650	0.04	0.91	18.31	29.47	528	1.310	1.285	103.53
		60	1630	0.04	0.92	18.20	29.47	528	1.310	1.285	102.91
Traverse 2	1	62.5	1635	0.04	0.91	18.22	29.47	528	1.310	1.285	103.06
		65	1650	0.04	0.91	18.31	29.47	528	1.310	1.285	103.53
	2	67.5	1650	0.04	0.91	18.31	29.47	528	1.290	1.265	101.95
		70	1670	0.04	0.90	18.42	29.47	529	1.320	1.292	104.75
	3	72.5	1650	0.04	0.91	18.31	29.47	529	1.300	1.272	102.55
		75	1660	0.04	0.90	18.36	29.47	529	1.310	1.282	103.81
	4	77.5	1655	0.04	0.90	18.34	29.47	529	1.290	1.263	103.49
		80	1660	0.04	0.90	18.36	29.47	529	1.310	1.282	102.07
	5	82.5	1660	0.04	0.90	18.36	29.47	529	1.300	1.272	103.65
		85	1650	0.04	0.91	18.31	29.47	529	1.320	1.292	102.55
	6	87.5	1660	0.04	0.90	18.36	29.47	529	1.310	1.282	104.44
		90	1640	0.05	1.14	20.41	29.48	529	1.460	1.430	92.15
	7	92.5	1690	0.04	0.89	18.53	29.47	529	1.290	1.263	116.63
		95	1690	0.04	0.89	18.53	29.47	529	1.280	1.253	102.98
	8	97.5	1690	0.04	0.89	18.53	29.47	529	1.290	1.263	102.18
		100	1690	0.04	0.89	18.53	29.47	530	1.200	1.172	102.98
	9	102.5	1690	0.04	0.89	18.53	29.47	530	1.370	1.338	95.62
		105	1710	0.04	0.89	18.64	29.47	530	1.300	1.270	109.81
	10	107.5	1690	0.04	0.89	18.53	29.47	530	1.300	1.270	103.59
		110	1690	0.04	0.89	18.53	29.47	530	1.300	1.270	103.58
	11	112.5	1690	0.04	0.89	18.53	29.47	530	1.300	1.270	103.58
		115	1690	0.04	0.89	18.53	29.47	530	1.290	1.260	103.58
	12	117.5	1680	0.04	0.89	18.47	29.47	530	1.300	1.270	102.48
		120	1680	0.04	0.89	18.47	29.47	530	1.290	1.260	103.28
		Total	Average	Average	Average	Average	Average	Total	Total	Average	
		120	1,654	0.04	0.86	17.87	29.46	528	60.860	59.688	103.04

Raw Data for: TMAC Resources
Test #3

Client: TMAC
Job Number: 160930343
Incinerator
Plant: Incinerator
Location: Hope Bay, NU
Test: M-3
Date: 18-Sep-19
Personnel: TBH, JJC

Test Start: 10:48 AM
Test Finish: 12:48 PM

Particulate Matter
Collected from Filter (mg): 57.10
Collected from Probe Wash (mg): 25.60

Total Collected (mg): 82.70

Impinger No.	Final Weight	Tare Weight	Weight of Moisture (g)
1	866.0	736.3	129.7
2	750.9	727.7	23.2
3	733.8	730.8	3.0
4	612.3	612.0	0.3
5	766.8	766.5	0.3
6	755.3	755.3	0.0
7	973.7	964.9	8.8
Moisture Volume (mL)			165.3

Parameters
Barometric Pressure, Pbar (in. Hg) 29.50
Stack Static Pressure, Pstatic (in. H2O) 0.02
Ambient Temp, (°F) 47
H2O Volume Collected, Vw (mL) 165.3
Total # Sampling Points, 24
Sampling Time per Point, (min) 5
Readings Taken Every __ mins 2.5

O2, (%) 7.0
CO2, (%) 17.1
N2, (%) 75.9

Stack Diameter, (in.) 18
Stack Area, (sq. ft.) 1.77
Probe Length, (in.) 24
Nozzle Diameter, (in.) 0.536
Pitot Coefficient, (Cp) 0.821
Gamma, meter constant 0.979

	Traverse Point	Time (min)	Stack Gas Temp, Ts (°F)	S-type Pitot delta P (in. H2O)	Orifice delta H (in. H2O)	Gas Meter Volume (cu. ft.)	Gas Meter Temp (°F)			
Traverse 1	1	2.5	1115	0.03	0.72	593.50	64	T (deg C)	T (deg F)	
		5	1160	0.03	0.70	594.66	64			
		7.5	1160	0.03	0.70	595.81	64			
	2	10	1165	0.03	0.70	596.95	64			
		12.5	1100	0.03	0.73	598.09	64			
		15	1120	0.03	0.72	599.25	64			
	3	17.5	1090	0.03	0.73	600.40	64			
		20	1140	0.03	0.71	601.54	64			
		22.5	1070	0.03	0.74	602.69	65			
	4	25	1080	0.03	0.74	603.86	65			
		27.5	1100	0.04	0.97	605.04	64			
		30	1140	0.04	0.95	606.41	65			
	5	32.5	1130	0.03	0.71	607.72	65			
		35	1200	0.03	0.68	608.89	65			
		37.5	1200	0.04	0.91	610.05	65			
	6	40	1220	0.04	0.90	611.33	65			
		42.5	1100	0.04	0.97	612.65	65			
		45	1230	0.03	0.67	613.99	65			
	7	47.5	1210	0.03	0.68	615.13	65			
		50	1220	0.03	0.68	616.26	65			
		52.5	1100	0.03	0.73	617.36	65			
	8	55	1240	0.03	0.67	618.54	65			
		57.5	1200	0.03	0.68	619.67	66			
		60	1230	0.03	0.67	620.80	66			
	9					621.93				
						623.26				
						624.55				
Traverse 2	1	62.5	1160	0.04	0.94	625.84	66			
		65	1240	0.04	0.89	627.10	65			
		67.5	1130	0.04	0.95	628.16	65			
	2	70	1130	0.03	0.71	629.29	65			
		72.5	1180	0.03	0.69	630.43	66			
		75	1140	0.03	0.71	631.57	66			
	3	77.5	1140	0.03	0.71	632.70	66			
		80	1160	0.03	0.70	633.85	66			
		82.5	1175	0.03	0.70	635.18	66			
	4	85	1130	0.03	0.71	636.48	65			
		87.5	1180	0.04	0.92	637.80	66			
		90	1170	0.04	0.93	639.11	66			
	5	92.5	1170	0.04	0.93	640.43	66			
		95	1165	0.04	0.93	641.71	66			
		97.5	1200	0.04	0.91	643.03	66			
	6	100	1200	0.04	0.91	644.31	66			
		102.5	1240	0.04	0.89	645.89	66			
		105	1240	0.04	0.89	647.33	67			
	7	107.5	1210	0.06	1.36	648.78	67			
		110	1225	0.05	1.13	650.07	67			
		112.5	1210	0.05	1.14	651.36	67			
	8	115	1250	0.04	0.89	652.68	67			
		117.5	1270	0.04	0.88					
		120	1200	0.04	0.91					

Calculations for: TMAC Resources
Test #3

Client: TMAC
Job Number: 160930343

Plant: Incinerator
Location: Hope Bay, NU
Test: M-3
Date: 18-Sep-19
Personnel: TBH, JJC

Calculated Parameters

Stack Gas Pressure, Ps (in.Hg)	29.50
Stack Gas Molecular Weight, Dry Basis, Md (lb/lb-mole)	31.02
Volume of Water Vapour Collected, Vwc (cu.ft)	7.934
Stack Gas Moisture Content (% as decimal)	0.119
Stack Gas Molecular Weight, Wet Basis, Ms (lb/lb-mole)	29.47

Isokineticity Checks

Check range	Within Criteria
Check average	Within Criteria

0

	Traverse Point	Time (min)	Stack Gas Temp, Ts (R)	S-type Pitot, delta P (in. H2O)	Orifice delta H (in. H2O)	Stack Gas Velocity, Us (ft/s)	Meter Press., Pm (in. Hg)	Gas Meter Avg. Temp, Tm (R)	Volume, Vm (cu. ft.)	Vol. @ Ref., Vmc (cu. ft.)	Isokinetics I (%)
Traverse 1	1	2.5	1575	0.03	0.72	16.33	29.55	524	1.160	1.150	101.17
		5	1620	0.03	0.70	16.56	29.55	524	1.150	1.140	101.71
	2	7.5	1620	0.03	0.70	16.56	29.55	524	1.140	1.130	100.83
		10	1625	0.03	0.70	16.59	29.55	524	1.140	1.130	100.98
	3	12.5	1560	0.03	0.73	16.25	29.55	524	1.160	1.150	100.69
		15	1580	0.03	0.72	16.36	29.55	524	1.150	1.140	100.45
	4	17.5	1550	0.03	0.73	16.20	29.55	524	1.140	1.130	98.63
		20	1600	0.03	0.71	16.46	29.55	525	1.150	1.137	100.89
	5	22.5	1530	0.03	0.74	16.10	29.55	525	1.170	1.157	100.38
		25	1540	0.03	0.74	16.15	29.55	524	1.180	1.169	101.76
	6	27.5	1560	0.04	0.97	18.77	29.57	525	1.370	1.356	102.85
		30	1600	0.04	0.95	19.01	29.57	525	1.310	1.296	99.59
	7	32.5	1590	0.03	0.71	16.41	29.55	525	1.170	1.157	102.33
		35	1660	0.03	0.68	16.77	29.55	525	1.160	1.147	103.65
	8	37.5	1660	0.04	0.91	19.36	29.57	525	1.280	1.267	99.11
		40	1680	0.04	0.90	19.48	29.57	525	1.320	1.306	102.82
	9	42.5	1560	0.04	0.97	18.77	29.57	525	1.340	1.326	100.60
		45	1690	0.03	0.67	16.92	29.55	525	1.140	1.127	102.78
	10	47.5	1670	0.03	0.68	16.82	29.55	525	1.130	1.118	101.28
		50	1680	0.03	0.68	16.87	29.55	525	1.100	1.088	98.88
	11	52.5	1560	0.03	0.73	16.25	29.55	525	1.180	1.167	102.23
		55	1700	0.03	0.67	16.97	29.55	526	1.130	1.115	101.98
	12	57.5	1660	0.03	0.68	16.77	29.55	526	1.130	1.115	100.78
		60	1690	0.03	0.67	16.92	29.55	526	1.130	1.115	101.68
Traverse 2	1	62.5	1620	0.04	0.94	19.13	29.57	526	1.330	1.314	101.54
		65	1700	0.04	0.89	19.59	29.57	526	1.290	1.274	100.88
	2	67.5	1590	0.04	0.95	18.95	29.57	526	1.290	1.274	97.58
		70	1590	0.03	0.71	16.41	29.55	525	1.260	1.246	110.20
	3	72.5	1640	0.03	0.69	16.67	29.55	525	1.060	1.048	94.15
		75	1600	0.03	0.71	16.46	29.55	525	1.130	1.118	99.14
	4	77.5	1600	0.03	0.71	16.46	29.55	526	1.140	1.125	99.82
		80	1620	0.03	0.70	16.56	29.55	526	1.140	1.125	100.44
	5	82.5	1635	0.03	0.70	16.64	29.55	526	1.130	1.115	100.02
		85	1590	0.03	0.71	16.41	29.55	526	1.150	1.135	100.39
	6	87.5	1640	0.04	0.92	19.24	29.57	526	1.330	1.314	102.17
		90	1630	0.04	0.93	19.19	29.57	525	1.300	1.286	99.75
	7	92.5	1630	0.04	0.93	19.19	29.57	526	1.320	1.304	101.09
		95	1625	0.04	0.93	19.16	29.57	526	1.310	1.294	100.17
	8	97.5	1660	0.04	0.91	19.36	29.57	526	1.320	1.304	102.01
		100	1660	0.04	0.91	19.36	29.57	526	1.280	1.264	98.92
	9	102.5	1700	0.04	0.89	19.59	29.57	526	1.320	1.304	103.23
		105	1700	0.04	0.89	19.59	29.57	526	1.280	1.264	100.10
	10	107.5	1670	0.06	1.36	23.78	29.60	526	1.580	1.562	100.11
		110	1685	0.05	1.13	21.81	29.58	527	1.440	1.420	100.15
	11	112.5	1670	0.05	1.14	21.71	29.58	527	1.450	1.430	100.39
		115	1710	0.04	0.89	19.65	29.57	527	1.290	1.272	100.99
	12	117.5	1730	0.04	0.88	19.77	29.56	527	1.290	1.272	101.57
		120	1660	0.04	0.91	19.36	29.57	527	1.320	1.301	101.82
		Total	Average	Average	Average	Average	Average	Average	Total	Total	Average
		120	1,632	0.04	0.82	17.99	29.56	525	59.180	58.500	100.93

Stack: Hope Bay, NU
Operating Conditions: Normal
Stack Height above Grade: X.xx m
Stack Diameter: 0.46 m

Reference Temperature, Tref (F): 77
(R): 537
(K): 298
Reference Pressure, Pref (in.Hg): 29.92
(Bar): 1.0

Parameter	Symbol	Units	Test 1	Test 2	Test 3	Average
Test ID	-	-	M-1	M-2	M-3	-
Date	-	-	17-Sep-19	17-Sep-19	18-Sep-19	n/a
Start Time	-	-	12:34 PM	4:06 PM	10:48 AM	n/a
End Time	-	-	2:34 PM	6:06 PM	12:48 PM	n/a
Total Sampling Time	-	min	120	120	120	120
Stack Diameter	D	in.	18	18	18	18
Average Stack Gas Temperature	Ts	F	1112	1194	1172	1159
Average Dry Gas Meter Temperature	Tm	F	67	68	65	67
Barometric Pressure	Pbar	in.Hg	29.60	29.40	29.50	29.50
Stack Static Pressure	Pstatic	in.H2O	0.02	0.02	0.02	0.02
Avgerage Pressure Drop (Head)	dP	in.H2O	0.03	0.04	0.04	0.03
Average deltaH Orifice	dH	in.H2O	0.73	0.86	0.82	0.80
Average Meter Temperature	Tm	F	67	68	65	67
Gas Sample Volume	Vm	cu.ft	56.500	60.860	59.180	58.85
Average Isokinetics	I	%	102.0	103.0	100.9	102.0
Nozzle Diameter	Dn	in.	0.536	0.536	0.536	0.536
Pitot Coefficient	Cp	-	0.821	0.821	0.821	0.821
Gamma, meter constant	y	-	0.979	0.979	0.979	0.979
Reference Temperature	Tref	R	537	537	537	537
Reference Pressure	Pref	in.Hg	29.92	29.92	29.92	29.92
Stack Gas Oxygen Content	Co2	%	5.9	9.6	7.0	7.5
Stack Gas Carbon Dioxide Content	Cco2	%	18.5	13.9	17.1	16.5
Stack Gas Nitrogen Content	Cn2	%	75.6	90.4	75.9	80.6
Volume of Water Collected	Vw	mL	171.5	135.6	165.3	157.5
Particulate Collected from Filter	-	mg	62	69	57	63
Particulate Collected from Probe Wash	-	mg	36	33	26	31
Total Particulate Collected	Mp	mg	98	101	83	94

Legend: F - degrees Fahrenheit
K - degrees Kelvin
Bar - bars
in.Hg - inches of mercury
in. - inches

in.H2O - inches of water
cu.ft - cubic feet
R - degrees Rankin
NOx - as NO2

CALCULATIONS
TMAC
Incinerator
Stack: Hope Bay, NU
Operating Conditions: Normal
Stack Height above Grade: X.xx m
Stack Diameter: 0.46 m

Variable	Symbol	Units	Calculation	Test 1	Test 2	Test 3	Average
Stack Area	As	sq.ft sq.m	As = Pi x ((D/12)^2)/ 4 As (sq.m) = As (sq.ft) x 0.0929	1.77 0.16	1.77 0.16	1.77 0.16	1.77 0.16
Barometric Pressure Stack Static Pressure Avg. Stack Temperature Avg. Meter Temperature Nozzle Diameter	Pbar Pstatic Ts Tm Dn	kPa kPa R R mm	Pbar (kPa) = Pbar (in.Hg) x 3.386 Pstatic (kPa) = Pstatic (in.H2O) x 0.249 Ts (R) = Ts (F) + 460 Tm (R) = Tm (F) + 460 Dn (mm) = Dn (in.) x 25.4	100.2 0.005 1572 527 14	99.5 0.005 1654 528 14	99.9 0.005 1632 525 14	99.9 0.005 1619 527 14
Gas Meter Pressure Sample Volume at STP Volume of Water Vapour Water Fraction	Pm Vmc Vwc Bwo	in.Hg cu.ft cu.m cu.ft -	Pm = Pbar + (dH / 13.6) Vmc = Tref / Pref x (Vm x Pm x y) / Tm Vmc (cu.m) = 0.02832 x Vmc (cu.ft) Vwc = 0.0480 x Vw Bwo = Vwc / (Vwc + Vmc)	29.65 55.881 1.58 8.232 0.128	29.46 59.694 1.69 6.509 0.098	29.56 58.503 1.66 7.934 0.119	29.56 58.026 1.64 7.558 0.115
Molecular Weight, Dry Molecular Weight, Wet	Md Ms	lb/lb-mol lb/lb-mol	Md = 0.44 (Cco2) + 0.32 (Co2) + 0.28 (Cn2) Ms = Md (1 - Bwo) + (18 x Bwo)	31.20 29.50	34.49 32.87	31.02 29.47	32.24 30.61
Stack Pressure Stack Gas Velocity Actual Stack Gas Flow Rate Dry Stack Gas Flow Rate	Ps Us Q Qs	in.Hg ft/s m/s acfm dscfm dscms	Ps = Pbar + (Pstatic / 13.6) Us = 85.33 x Cp x ((dP x Ts)/(Ps x Ms))^0.5 Us (m/s) = 0.3048 x Us (ft/s) Q = 60 x Us x As Qs = Q x (1-Bwo) x (Tref/Ts) x (Ps/Pref) Qs (dscms) = 0.000472 x Qs (dscfm)	29.60 16.49 5.03 1,748 515 0.24	29.40 17.87 5.45 1,894 545 0.26	29.50 17.99 5.48 1,908 545 0.26	29.50 17.45 5.32 1,850 535 0.25
Particulate Concentration Particulate Emission Rate Particulate Concentration Corrected to 11% O2 Corrected to 3% O2 Corrected to 12% CO2	Cs ERp Cs Cs Cs	mg/dscm g/s kg/hr mg/dscm mg/dscm mg/dscm	Cs = Mp / Vmc ERp = Cs/1000 x Qs ERp (kg/hr) = 3.6 x ERp (g/s) Correction factor to 11% O2 Cs (11% O2) = Cs x (20.9-11) / (20.9-Co2) Cs (3% O2) = Cs x (20.9-3) / (20.9-Co2) Cs (12% CO2) = Cs x (12/Cco2)	61.862 0.015 0.05 0.661 41 74 40	59.804 0.015 0.06 0.879 53 95 52	49.916 0.013 0.05 0.710 35 64 35	57.194 0.014 0.05 43 78 42

Legend: sq.ft - square feet
sq.m - square metres
Pi - 3.142
R - degrees Rankin
in.Hg - inches of mercury

acfm - actual cubic feet per minute
dscfm - dry standard cubic feet per minute
dscms - dry standard cubic metres per second
ppm - parts per million
mg/dscm - miligrams per dry standard cubic metre
g/s - grams per second
NOx - as NO2

cu.ft - cubic feet
cu.m - cubic metres
STP - standard temperature and pressure
(25 C and 101.s kPa)

SUMMARY OF METAL EMISSIONS- TMAC Incinerator Exhaust Stack 2017

	TEST1	TEST2	TEST3
vol dry gas meter dscm	1.58	1.69	1.66
volumetric flow dry stack gas dscm/s	0.24	0.26	0.26
O2 correction factor	0.66	0.88	0.71

	Test 1			Test 2			Test 3			Average		
	mg/dscm at STP	mg/dscm at 11% O2	emission rate (kg/hr)	mg/dscm at STP	mg/dscm at 11% O2	emission rate (kg/hr)	mg/dscm at STP	mg/dscm at 11% O2	emission rate (kg/hr)	mg/dscm at STP	mg/dscm at 11% O2	emission rate (kg/hr)
Total Mercury (Hg)	3.34E-04	2.21E-04	2.92E-07	3.14E-04	2.76E-04	2.91E-07	3.90E-04	2.77E-04	3.61E-07	3.46E-04	2.58E-04	3.15E-07

PRELIMINARY STACK TESTING RESULTS

TMAC

Incinerator

Stack: Hope Bay, NU

Operating Conditions: Normal

Stack Height above Grade: X.xx m

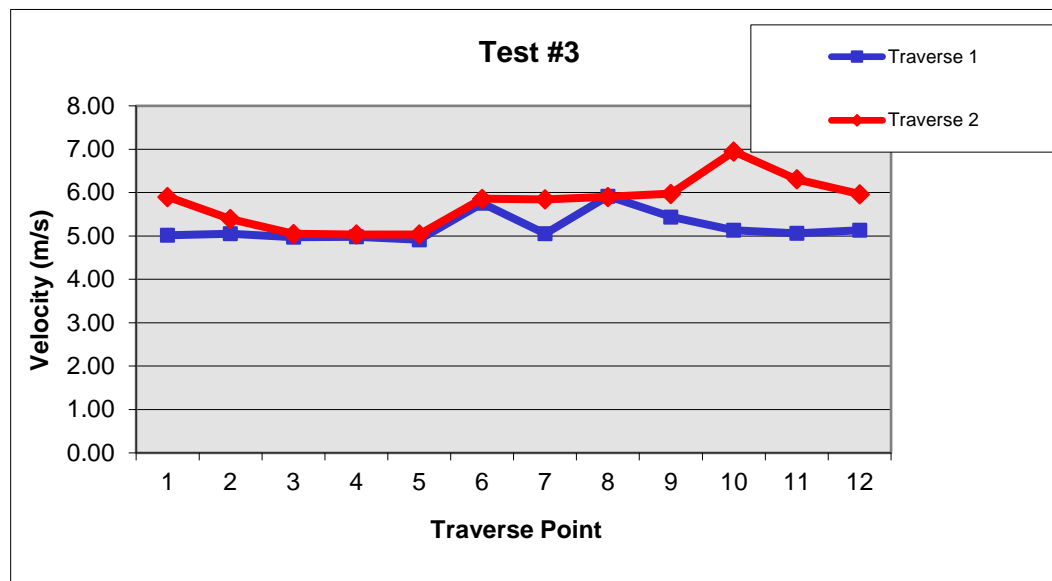
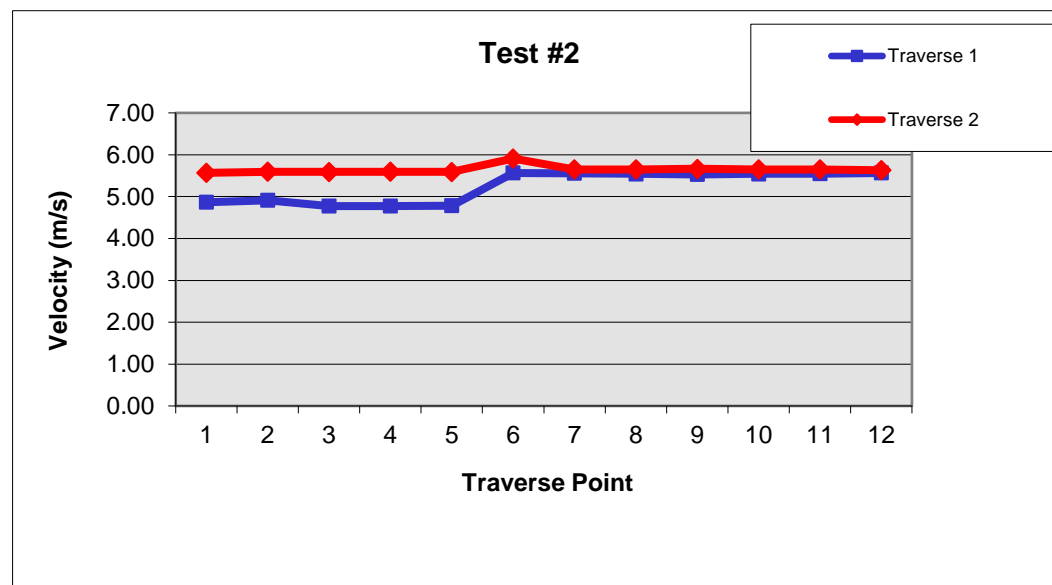
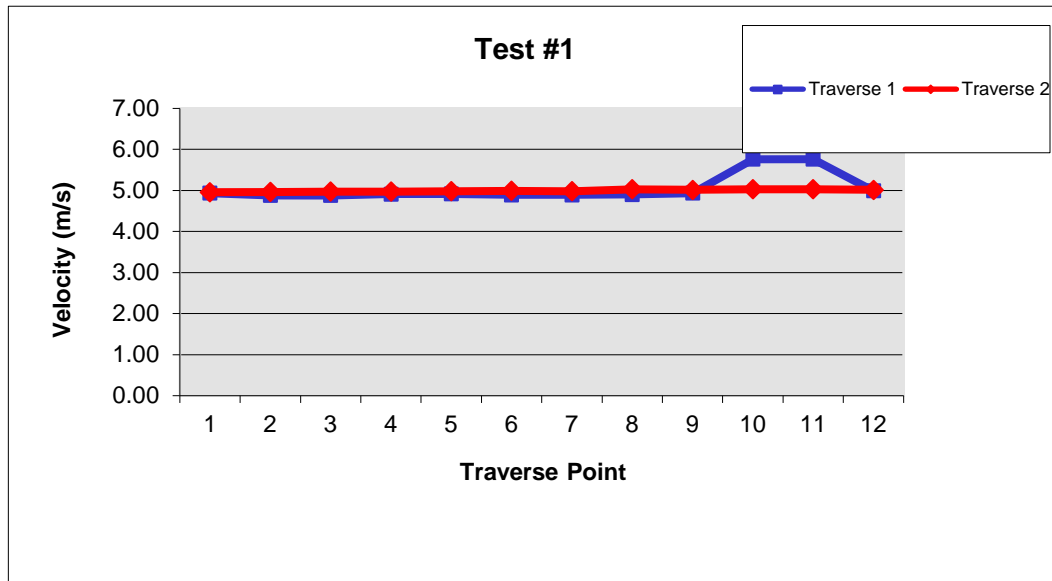
Stack Diameter: 0.46 m

Parameter	Test 1	Test 2	Test 3	Average
Test ID	M-1	M-2	M-3	
Test Date	17-Sep-19	17-Sep-19	18-Sep-19	
Stack Gas Temperature (C)	600	646	633	626
Moisture Content (%)	12.84	9.8	11.9	11.5
Velocity (m/s)	5.03	5.45	5.48	5.32
Volumetric Flow (dscms)	0.24	0.26	0.26	0.25
Oxygen - O2 (%)	5.93	9.64	6.96	7.51
Carbon Dioxide - CO2 (%)	18.50	13.87	17.14	16.50
Particulate Matter - PM				
Particulate Concentration (mg/dscm)	62	60	50	57
Corrected to 11% O2 (mg/dscm)	40.9	52.6	35.4	43.0
Corrected to 11% O2 (ug/dscm)	0.04	0.05	0.04	0.04
Emission Rate (g/s)	0.02	0.02	0.01	0.01

Legend: C - degrees Celsius
m/s - metres per second
dscms - dry standard cubic metres per second
ppm - parts per million
STP - standard temperature and pressure (25 C and 101.3 kPa)
mg/dscm - miligrams per dry standard cubic metre
NOx - as NO2

Parameter	Test 1	Test 2	Test 3	Average
Test Duration (min)	120	120	120	120
Stack Gas Static Pressure (kPa)	0.005	0.005	0.005	0.005
Volume of Gas Sampled (Rm ³)	1.58	1.69	1.66	1.64
Average Isokineticity (%)	102.0	103.0	100.9	102.0
Total Particulate Matter not including Impingers (mg)	97.90	101.10	82.70	93.90
Exhaust Gas Parameters				
Stack Gas Temperature (°C)	600	646	633	626
Stack Gas Moisture Content (%)	12.84	9.83	11.94	11.54
Stack Gas Velocity (m/s)	5.03	5.45	5.48	5.32
Stack Gas Flow Rate (Rm ³ /s)	0.24	0.26	0.26	0.25
Oxygen - O ₂ Concentration (%)	5.93	9.64	6.96	7.51
Carbon Dioxide - CO ₂ Concentration (%)	18.5	13.9	17.1	16.5
Particulate Matter (PM) ⁺ Concentration (mg/Rm ³)	61.9	59.8	49.9	57.2
Emission Rate (kg/hr)	0.05	0.06	0.05	0.05
Mercury (Hg) Concentration (ug/Rm ³)	0.33	0.31	0.39	0.35
Concentration (ug/Rm ³) @ 11%	0.22	0.28	0.28	0.26
Emission Rate (kg/hr)	2.92E-07	2.91E-07	3.61E-07	3.15E-07

Stack Gas Velocity Profiles
Hope Bay, NU
Particulate and Metals Testing



Raw Data for: New Incinerator DF Testing

Client:	TMAC
Job Number:	160930343
Plant:	incinerator
Location:	Hope Bay
Test:	SVOC-I
Date:	15-Sep-19
Personnel:	BC
Test Start:	10:55 AM
Test Finish:	2:05 PM

Dioxins and Furans			
Collected from Front Half Rinse (pg TEQ):			
Collected from Back half rinse (pg TEQ):			
Total Collected (pg TEQ):		6945.010	

Parameters	
Barometric Pressure, Phar (in. Hg)	29.50
Stack Static Pressure, Pstatic (in. H2O)	0.02
Ambient Temp. (°F)	41
H2O Volume Collected, Vw (mL)	356.7
Total # Sampling Points,	24
Sampling Time per Point, (min)	8
Readings Taken Every __ mins	4

O2, (%)	3.7
CO2, (%)	18.5
N2, (%)	77.8

Impinger No.	Final Weight (g)	Tare Weight (g)	Weight of Moisture (g)
Condenser	306.4	304.7	1.7
Resin Trap	350.6	347.9	2.7
Condensate trap	817.5	490.1	327.4
1	770.2	752.8	17.4
2	647.1	646.5	0.6
3	918.5	911.6	6.9
Moisture Volume (mL)			356.7

Stack Diameter, (in.)	18
Stack Area, (sq. ft.)	1.77
Probe Length, (in.)	24
Nozzle Diameter, (in.)	0.536
Pitot Coefficient, (Cp)	0.821
Gamma, meter constant	0.979

T (deg C)	T	P (kPa)	P
11:00	7.5		100.12
12:00	7.6		100.1
1:00	7.3		100.07
2:00	7.5		100.06

Gas Meter Temp						
	Traverse Point	Time (min)	Stack Gas Temp, Ts (°F)	S-type Pitot delta P (in. H2O)	Orifice delta H (in. H2O)	Gas Meter Volume (cu. ft.)
Traverse 1	1	4	1355	0.02	0.42	230.45
		8	1382	0.02	0.42	231.92
		12	1418	0.02	0.41	233.26
	2	16	1430	0.03	0.61	234.66
		20	1462	0.04	0.80	236.35
		24	1488	0.04	0.79	238.29
	3	28	1493	0.04	0.79	240.20
		32	1515	0.05	0.97	242.14
		36	1533	0.05	0.96	244.25
	4	40	1550	0.06	1.15	246.42
		44	1562	0.06	1.14	248.80
		48	1561	0.06	1.14	251.17
	5	52	1575	0.05	0.95	253.54
		56	1580	0.05	0.94	255.68
		60	1591	0.04	0.75	257.76
	6	64	1591	0.04	0.75	259.65
		68	1608	0.04	0.74	261.55
		72	1540	0.03	0.58	263.20
	7	76	1547	0.03	0.57	264.82
		80	1561	0.03	0.57	266.48
		84	1512	0.03	0.58	268.15
	8	88	1531	0.03	0.58	269.82
		92	1524	0.03	0.58	271.48
		96	1519	0.04	0.77	273.41
Traverse 2	1	100	1530	0.04	0.77	275.34
		104	1518	0.04	0.77	277.29
		108	1517	0.04	0.78	279.22
	2	112	1530	0.04	0.77	281.17
		116	1515	0.05	0.97	283.41
		120	1508	0.05	0.98	285.56
	3	124	1518	0.05	0.97	287.69
		128	1504	0.05	0.98	289.87
		132	1507	0.05	0.98	292.05
	4	136	1520	0.05	0.97	294.20
		140	1507	0.05	0.98	296.34
		144	1515	0.05	0.97	298.54
	5	148	1508	0.05	0.98	300.71
		152	1514	0.05	0.97	302.93
		156	1580	0.05	0.94	305.10
	6	160	1565	0.05	0.95	307.23
		164	1547	0.06	1.15	309.69
		168	1545	0.06	1.15	312.05
	7	172	1538	0.06	1.16	314.42
		176	1535	0.06	1.16	316.80
		180	1540	0.06	1.16	319.15
	8	184	1535	0.06	1.16	321.52
		188	1532	0.06	1.16	323.91
			1535	0.06	1.16	326.26

Raw Data for: New Incinerator DF Testing Test #2

Client:	TMAC
Job Number:	160930343
Plant:	incinerator
Location:	Hope Bay
Test:	SVOC-2
Date:	16-Sep-19
Personnel:	BC
Test Start:	10:00 AM
Test Finish:	12:00 PM

Parameters

Barometric Pressure, Pbar (in. Hg)
Stack Static Pressure, Pstatic (in. H2O)
Ambient Temp, (°F)
H2O Volume Collected, Vw (mL)
Total # Sampling Points,
Sampling Time per Point, (min)
Readings Taken Every __ mins

29.60	O2, (%)	4.76
0.02	CO2, (%)	19.54
35	N2, (%)	75.70
196.3		
24		
8		
4.0		

Dioxins and Furans

Collected from Front Half Rinse (pg TEQ):
Collected from Back half rinse (pg TEQ):
Total Collected (pg TEQ):

1656.91

Impinger No.	Final Weight (g)	Tare Weight (g)	Weight of Moisture (g)
Condenser	229.6	227.1	2.5
Resin Trap	342.2	339.4	2.8
Condensate trap	763.4	540.9	222.5
1	742.5	778.3	-35.8
2	620.0	619.8	0.2
3	922.2	918.1	4.1
		Moisture Volume (mL)	196.3

Stack Diameter, (in.)	18
Stack Area, (sq. ft.)	1.77
Probe Length, (in.)	24
Nozzle Diameter, (in.)	0.536
Pitot Coefficient, (Cp)	0.821
Gamma, meter constant	0.979

	Traverse Point	Time (min)	Stack Gas Temp, Ts (°F)	S-type Pitot delta P (in. H2O)	Orifice delta H (in. H2O)	Gas Meter Volume (cu. ft.)	Gas Meter Temp (°F)
Traverse 1	1	4	1420	0.03	0.57	326.60	
		8	1427	0.03	0.57	328.31	73
		12	1464	0.03	0.56	329.91	73
	2	16	1480	0.03	0.55	331.56	73
		20	1474	0.02	0.37	333.19	73
		24	1480	0.02	0.37	334.55	72
	3	28	1475	0.02	0.37	335.87	73
		32	1478	0.02	0.37	337.20	72
		36	1478	0.02	0.37	338.55	73
	4	40	1455	0.03	0.56	340.19	72
		44	1447	0.03	0.56	341.87	72
		48	1455	0.02	0.37	343.32	72
	5	52	1430	0.02	0.38	344.64	72
		56	1508	0.03	0.54	346.22	72
		60	1580	0.03	0.52	347.82	72
	6	64	1584	0.03	0.52	349.42	72
		68	1536	0.02	0.36	350.77	72
		72	1507	0.02	0.36	352.08	72
	7	76	1505	0.02	0.36	353.42	71
		80	1494	0.02	0.37	354.78	72
		84	1520	0.02	0.36	356.12	72
	8	88	1510	0.02	0.36	357.44	72
		92	1499	0.02	0.36	358.79	71
		96	1503	0.02	0.36	360.17	71
	9		1506	0.02	0.36	361.51	71
Traverse 2	1	100.0	1499	0.02	0.36	361.51	70
		104.0	1470	0.02	0.37	362.85	70
		108.0	1499	0.02	0.36	364.21	70
	2	112.0	1485	0.02	0.36	365.56	70
		116.0	1475	0.02	0.37	366.91	69
		120.0	1488	0.02	0.36	368.25	68
	3	124.0	1482	0.02	0.36	369.60	68
		128.0	1490	0.02	0.36	370.95	68
		132.0	1480	0.02	0.36	372.28	67
	4	136.0	1498	0.02	0.36	373.60	67
		140.0	1490	0.02	0.36	374.94	67
		144.0	1504	0.02	0.36	376.27	67
	5	148.0	1504	0.02	0.36	377.60	67
		152.0	1495	0.02	0.36	378.94	67
		156.0	1502	0.02	0.36	379.28	67
	6	160.0	1480	0.02	0.36	380.28	67
		164.0	1494	0.02	0.36	381.60	66
		168.0	1505	0.02	0.36	382.94	66
	7	172.0	1500	0.02	0.36	384.27	66
		176.0	1500	0.02	0.36	385.59	66
		180.0	1510	0.02	0.36	386.92	66
	8	184.0	1490	0.02	0.36	388.26	66
		188.0	1500	0.02	0.36	389.58	66
			1510	0.02	0.36	390.91	66
	9		1500	0.02	0.36	392.25	66

Calculations for: New Incinerator DF Testing Test #2

Client: TMAC
Job Number: 160930343

Plant: incinerator
Location: Hope Bay
Test: SVOC-2
Date: 16-Sep-19
Personnel: BC

Calculated Parameters	
Stack Gas Pressure, Ps (in.Hg)	29.60
Stack Gas Pressure, Ps (KPa)	100.24
Stack Gas Molecular Weight, Dry Basis, Md (lb/lb-mole)	31.32
Volume of Water Vapour Collected, Vwc (cu.ft)	9.422
Stack Gas Moisture Content (% as decimal)	0.127
Stack Gas Molecular Weight, Wet Basis, Ms (lb/lb-mole)	29.62

	Traverse Point	Time	Stack Gas Temp, Ts	S-type Pitot, delta P	Orifice delta H	Stack Gas Velocity, Us	Meter Press., Pm (in. Hg)	Gas Meter			Isokinetics I (%)
		(min)	(R)	(in. H2O)	(in. H2O)	(ft/s)		Avg. Temp, Tm (R)	Volume, Vm (cu. ft.)	Vol. @ Ref., Vmc (cu. ft.)	
Traverse 1	1	4	1880	0.03	0.57	17.77	29.64	533	1.710	1.671	101.43
		8	1887	0.03	0.57	17.80	29.64	533	1.600	1.563	95.08
	2	12	1924	0.03	0.56	17.97	29.64	533	1.650	1.612	99.01
		16	1940	0.03	0.55	18.05	29.64	533	1.630	1.593	98.21
	3	20	1934	0.02	0.37	14.71	29.63	532	1.360	1.331	100.35
		24	1940	0.02	0.37	14.74	29.63	533	1.320	1.289	97.36
	4	28	1935	0.02	0.37	14.72	29.63	532	1.330	1.301	98.16
		32	1938	0.02	0.37	14.73	29.63	533	1.350	1.319	99.53
	5	36	1915	0.03	0.56	17.93	29.64	532	1.640	1.606	98.36
		40	1907	0.03	0.56	17.90	29.64	532	1.680	1.645	100.55
	6	44	1915	0.02	0.37	14.64	29.63	532	1.450	1.419	106.46
		48	1890	0.02	0.38	14.55	29.63	532	1.320	1.292	96.28
	7	52	1968	0.03	0.54	18.18	29.64	532	1.580	1.547	96.06
		56	2040	0.03	0.52	18.51	29.64	532	1.600	1.566	99.04
	8	60	2044	0.03	0.52	18.53	29.64	532	1.600	1.566	99.13
		64	1996	0.02	0.36	14.95	29.63	532	1.350	1.321	101.19
	9	68	1967	0.02	0.36	14.84	29.63	532	1.310	1.282	97.48
		72	1965	0.02	0.36	14.83	29.63	531	1.340	1.314	99.85
	10	76	1954	0.02	0.37	14.79	29.63	532	1.360	1.331	100.86
		80	1980	0.02	0.36	14.89	29.63	532	1.340	1.311	100.04
	11	84	1970	0.02	0.36	14.85	29.63	532	1.320	1.292	98.30
		88	1959	0.02	0.36	14.81	29.63	531	1.350	1.323	100.44
	12	92	1963	0.02	0.36	14.82	29.63	531	1.380	1.353	102.78
		96	1966	0.02	0.36	14.84	29.63	531	1.340	1.314	99.87
Traverse 2	1	100	1959	0.02	0.36	14.81	29.63	530	1.340	1.316	99.88
		104	1930	0.02	0.37	14.70	29.63	530	1.360	1.336	100.62
	2	108	1959	0.02	0.36	14.81	29.63	530	1.350	1.326	100.63
		112	1945	0.02	0.36	14.76	29.63	529	1.350	1.328	100.46
	3	116	1935	0.02	0.37	14.72	29.63	528	1.340	1.321	99.65
		120	1948	0.02	0.36	14.77	29.63	528	1.350	1.331	100.73
	4	124	1942	0.02	0.36	14.74	29.63	528	1.350	1.331	100.57
		128	1950	0.02	0.36	14.78	29.63	527	1.330	1.314	99.47
	5	132	1940	0.02	0.36	14.74	29.63	527	1.320	1.304	98.47
		136	1958	0.02	0.36	14.81	29.63	527	1.340	1.324	100.43
	6	140	1950	0.02	0.36	14.78	29.63	527	1.330	1.314	99.47
		144	1964	0.02	0.36	14.83	29.63	527	1.330	1.314	99.83
	7	148	1955	0.02	0.36	14.79	29.63	527	1.340	1.324	100.35
		152	1962	0.02	0.36	14.82	29.63	527	1.340	1.324	100.53
	8	156	1940	0.02	0.36	14.74	29.63	526	1.320	1.306	98.66
		160	1954	0.02	0.36	14.79	29.63	526	1.340	1.326	100.51
	9	164	1965	0.02	0.36	14.83	29.63	526	1.330	1.316	100.04
		168	1960	0.02	0.36	14.81	29.63	526	1.320	1.306	99.16
	10	172	1960	0.02	0.36	14.81	29.63	526	1.330	1.316	99.92
		176	1950	0.02	0.36	14.78	29.63	526	1.340	1.326	100.41
	11	180	1960	0.02	0.36	14.81	29.63	526	1.320	1.306	99.16
		184	1970	0.02	0.36	14.85	29.63	526	1.330	1.316	100.17
	12	188	1960	0.02	0.36	14.81	29.63	526	1.340	1.326	100.67
			Total	Average	Average	Average	Average	Average	Average	Total	Total
		188	1,951	0.02	0.40	15.41	29.63	530	65.650	64.512	99.69

Raw Data for: New Incinerator DF Testing Test #3

Client: TMAC	
Job Number: 160930343	
Plant: incinerator	
Location: Hope Bay	
Test: SVOC-3	
Date: 16-Sep-19	
Personnel: BC	
Test Start:	2:18 PM
Test Finish:	4:18 PM

Parameters

Barometric Pressure, Pbar (in. Hg)	29.80
Stack Static Pressure, Pstatic (in. H2O)	0.02
Ambient Temp, (°F)	40
H2O Volume Collected, Vw (mL)	204.0
Total # Sampling Points,	24
Sampling Time per Point, (min)	8
Readings Taken Every __ mins	4

Dioxins and Furans	
Collected from Front Half Rinse (pg TEQ):	
Collected from Back half rinse (pg TEQ):	
Total Collected (pg TEQ):	4478.330

O2, (%)	9.9
CO2, (%)	14.2
N2, (%)	75.9

Impinger No.	Final Weight (g)	Tare Weight (g)	Weight of Moisture (g)
Condenser	264.1	262.1	2.0
Resin Trap	338.6	341.4	-2.8
Condensate trap	692.8	504.8	188.0
1	741.1	727.4	13.7
2	634.3	634.3	0.0
3	925.3	922.2	3.1
Moisture Volume (mL)			204.0

Stack Diameter, (in.)	18
Stack Area, (sq. ft.)	1.77
Probe Length, (in.)	24
Nozzle Diameter, (in.)	0.536
Pitot Coefficient, (Cp)	0.821
Gamma, meter constant	0.979

	Traverse Point	Time (min)	Stack Gas Temp, Ts (°F)	S-type Pitot delta P (in. H2O)	Orifice delta H (in. H2O)	Gas Meter Volume (cu. ft.)	Gas Meter Temp (°F)
Traverse 1	1	4	1650	0.04	0.70	392.78	59
		8	1560	0.04	0.73	394.57	60
	2	12	1538	0.04	0.74	396.44	60
		16	1480	0.04	0.76	398.30	61
	3	20	1430	0.04	0.78	400.20	61
		24	1460	0.04	0.77	402.14	62
	4	28	1400	0.03	0.60	404.06	62
		32	1480	0.03	0.57	405.77	62
	5	36	1495	0.03	0.57	407.44	62
		40	1495	0.03	0.57	409.08	63
	6	44	1450	0.03	0.58	410.71	64
		48	1495	0.03	0.57	412.41	64
	7	52	1480	0.03	0.57	414.07	64
		56	1510	0.02	0.38	415.45	63
	8	60	1520	0.02	0.37	416.81	63
		64	1460	0.03	0.58	418.42	64
	9	68	1520	0.03	0.56	420.05	64
		72	1470	0.03	0.58	421.69	65
	10	76	1520	0.02	0.37	423.14	65
		80	1500	0.03	0.57	424.79	65
	11	84	1590	0.03	0.54	426.40	65
		88	1470	0.02	0.38	427.82	65
	12	92	1510	0.02	0.38	429.19	65
		96	1515	0.02	0.38	430.56	65
			1510	0.02	0.38	431.89	65
Traverse 2	1	100	1490	0.03	0.57	433.51	65
		104	1450	0.03	0.58	435.20	66
	2	108	1520	0.03	0.56	436.86	65
		112	1535	0.03	0.56	438.53	66
	3	116	1530	0.03	0.56	440.17	66
		120	1530	0.03	0.56	441.83	66
	4	124	1520	0.03	0.56	443.47	66
		128	1505	0.03	0.57	445.15	66
	5	132	1500	0.03	0.57	446.82	66
		136	1460	0.03	0.58	448.53	66
	6	140	1400	0.03	0.60	450.18	66
		144	1475	0.03	0.58	451.81	66
	7	148	1400	0.04	0.80	453.68	66
		152	1440	0.04	0.78	455.58	66
	8	156	1460	0.03	0.58	457.29	66
		160	1390	0.04	0.80	459.20	66
	9	164	1300	0.04	0.85	461.21	66
		168	1370	0.04	0.81	463.22	67
	10	172	1420	0.04	0.79	465.20	66
		176	1375	0.04	0.81	467.20	67
	11	180	1470	0.04	0.77	469.17	67
		184	1480	0.04	0.77	471.10	67
	12	188	1515	0.04	0.75	473.00	67

T (deg C)	T (deg F)	P (kPa)	P (inHg)	
2:00	8.7	47.7	101.01	29.8
3:00	9.3	48.7	101.04	29.83
4:00	9.2	48.6	101.05	29.84

Test #3

Calculated Parameters

Stack Gas Pressure, Ps (in.Hg)	29.80
Stack Gas Pressure, Ps (KPa)	100.92
Stack Gas Molecular Weight, Dry Basis, Md (lb/lb-mole)	30.67
Volume of Water Vapour Collected, Vwc (cu.ft)	9.792
Stack Gas Moisture Content (% as decimal)	0.109
Stack Gas Molecular Weight, Wet Basis, Ms (lb/lb-mole)	29.29

	Traverse Point	Time	Stack Gas	S-type Pitot,	Orifice	Stack Gas	Gas Meter				Isokinetics
		(min)	Temp, Ts (R)	delta P (in. H2O)	delta H (in. H2O)	Velocity, Us (ft/s)	Meter Press., Pm (in. Hg)	Avg. Temp, Tm (R)	Volume, Vm (cu. ft.)	Vol. @ Ref., Vmc (cu. ft.)	
Traverse 1	1	4	2110	0.04	0.70	21.78	29.85	519	1.790	1.809	97.76
		8	2020	0.04	0.73	21.31	29.85	520	1.870	1.886	99.75
	2	12	1998	0.04	0.74	21.20	29.85	520	1.860	1.876	98.67
		16	1940	0.04	0.76	20.89	29.86	521	1.900	1.913	99.14
	3	20	1890	0.04	0.78	20.62	29.86	521	1.940	1.953	99.92
		24	1920	0.04	0.77	20.78	29.86	522	1.920	1.930	99.47
	4	28	1860	0.03	0.60	17.71	29.84	522	1.710	1.718	100.64
		32	1940	0.03	0.57	18.09	29.84	522	1.670	1.678	100.38
	5	36	1955	0.03	0.57	18.16	29.84	523	1.640	1.644	98.76
		40	1910	0.03	0.58	17.95	29.84	524	1.630	1.631	96.84
	6	44	1955	0.03	0.57	18.16	29.84	524	1.700	1.701	102.18
		48	1940	0.03	0.57	18.09	29.84	524	1.660	1.661	99.39
	7	52	1970	0.02	0.38	14.88	29.83	523	1.380	1.383	102.12
		56	1980	0.02	0.37	14.92	29.83	523	1.360	1.363	100.90
	8	60	1920	0.03	0.58	18.00	29.84	524	1.610	1.611	95.90
		64	1980	0.03	0.56	18.27	29.84	524	1.630	1.631	98.60
	9	68	1930	0.03	0.58	18.04	29.84	525	1.640	1.638	97.76
		72	1980	0.02	0.37	14.92	29.83	525	1.450	1.448	107.17
	10	76	1960	0.03	0.57	18.18	29.84	525	1.650	1.648	99.11
		80	2050	0.03	0.54	18.60	29.84	525	1.610	1.608	98.90
	11	84	1930	0.02	0.38	14.73	29.83	525	1.420	1.418	103.62
		88	1970	0.02	0.38	14.88	29.83	525	1.370	1.368	101.00
	12	92	1975	0.02	0.38	14.90	29.83	525	1.370	1.368	101.13
		96	1970	0.02	0.38	14.88	29.83	525	1.330	1.328	98.05
Traverse 2	1	100	1950	0.03	0.57	18.14	29.84	525	1.620	1.618	97.06
		104	1910	0.03	0.58	17.95	29.84	526	1.690	1.685	100.03
	2	108	1980	0.03	0.56	18.27	29.84	525	1.660	1.658	100.22
		112	1995	0.03	0.56	18.34	29.84	526	1.670	1.665	101.01
	3	116	1990	0.03	0.56	18.32	29.84	526	1.640	1.635	99.07
		120	1990	0.03	0.56	18.32	29.84	526	1.660	1.655	100.28
	4	124	1980	0.03	0.56	18.27	29.84	526	1.640	1.635	98.82
		128	1965	0.03	0.57	18.21	29.84	526	1.680	1.675	100.85
	5	132	1960	0.03	0.57	18.18	29.84	526	1.670	1.665	100.12
		136	1920	0.03	0.58	18.00	29.84	526	1.710	1.705	101.47
	6	140	1860	0.03	0.60	17.71	29.84	526	1.650	1.645	96.38
		144	1935	0.03	0.58	18.07	29.84	526	1.630	1.625	97.10
	7	148	1860	0.04	0.80	20.45	29.86	526	1.870	1.865	94.64
		152	1900	0.04	0.78	20.67	29.86	526	1.900	1.895	97.18
	8	156	1920	0.03	0.58	18.00	29.84	526	1.710	1.705	101.47
		160	1850	0.04	0.80	20.40	29.86	526	1.910	1.905	96.40
	9	164	1760	0.04	0.85	19.90	29.86	526	2.010	2.005	98.96
		168	1830	0.04	0.81	20.29	29.86	527	2.010	2.001	100.71
	10	172	1880	0.04	0.79	20.56	29.86	526	1.980	1.975	100.74
		176	1835	0.04	0.81	20.31	29.86	527	2.000	1.991	100.35
	11	180	1930	0.04	0.77	20.83	29.86	527	1.970	1.961	101.36
		184	1940	0.04	0.77	20.89	29.86	527	1.930	1.921	99.56
	12	188	1975	0.04	0.75	21.08	29.86	527	1.900	1.891	98.89
			Total	Average	Average	Average	Average	Average	Average	Total	Total
		188	1,940	0.03	0.61	18.53	29.85	525	80.220	80.190	99.57

DATA ENTRY
TMAC
incinerator
Fuel: municipal waste
Operating Conditions: Normal
Emission Control: dual chamber incinerator
Stack Height above Grade: XXX m
Stack Diameter: 0.46 m

Reference Temperature, Tref (F): 77
(R): 537
(K): 298
Reference Pressure, Pref (in.Hg): 29.92
(Bar): 1.0

Parameter	Symbol	Units	Test 1	Test 2	Test 3	Average
Test ID	-	-	SVOC-1	SVOC-2	SVOC-3	-
Date	-	-	15-Sep-19	16-Sep-19	16-Sep-19	n/a
Start Time	-	-	10:55 AM	10:00 AM	2:18 PM	n/a
End Time	-	-	2:05 PM	12:00 PM	4:18 PM	n/a
Total Sampling Time	-	min	188	188	188	188
Stack Diameter	D	in.	18	18	18	18
Average Stack Gas Temperature	Ts	F	1521	1491	1480	1497
Average Dry Gas Meter Temperature	Tm	F	58	70	65	64
Barometric Pressure	Pbar	in.Hg	29.50	29.60	29.80	29.63
Stack Static Pressure	Pstatic	in.H2O	0.02	0.02	0.02	0.02
Avgerage Pressure Drop (Head)	dP	in.H2O	0.05	0.02	0.03	0.03
Avgerage deltaH Orifice	dH	in.H2O	0.88	0.40	0.61	0.63
Average Meter Temperature	Tm	F	58	70	65	64
Gas Sample Volume	Vm	cu.ft	95.810	65.650	80.220	80.56
Average Isokinetics	I	%	106.8	99.7	99.6	102.0
Nozzle Diameter	Dn	in.	0.536	0.536	0.536	0.536
Pitot Coefficient	Cp	-	0.821	0.821	0.821	0.821
Gamma, meter constant	y	-	0.979	0.979	0.979	0.979
Reference Temperature	Tref	R	537	537	537	537
Reference Pressure	Pref	in.Hg	29.92	29.92	29.92	29.92
Stack Gas Oxygen Content	Co2	%	3.7	4.8	9.9	6.1
Stack Gas Carbon Dioxide Content	Cco2	%	18.5	19.5	14.2	17.4
Stack Gas Nitrogen Content	Cn2	%	77.8	75.7	75.9	76.5
Volume of Water Collected	Vw	mL	356.7	196.3	204.0	252.3
Dioxins and Furans Collected In Front Half	-	pg TEQ	0.000	0.000	0.000	0.0000
Doxins and Furans Collected In Back Half	-	pg TEQ	0.000	0.000	0.000	0.0000
Total Dioxins and Furans Collected	Mhg	pg TEQ	6945.010	1656.911	4478.330	4360.0837

Legend: F - degrees Fahrenheit
K - degrees Kelvin
Bar - bars
in.Hg - inches of mercury
in. - inches
in.H2O - inches of water
cu.ft - cubic feet
R - degrees Rankin
NOx - as NO2

CALCULATIONS
TMAC
incinerator
Fuel: municipal waste
Operating Conditions: Normal
Emission Control: dual chamber incinerator
Stack Height above Grade: XXX m
Stack Diameter: 0.46 m

Variable	Symbol	Units	Calculation	Test 1	Test 2	Test 3	Average
Stack Area	As	sq.ft sq.m	As = Pi x ((D/12)^2) / 4 As (sq.m) = As (sq.ft) x 0.0929	1.77 0.16	1.77 0.16	1.77 0.16	1.77 0.16
Barometric Pressure	Pbar	kPa	Pbar (kPa) = Pbar (in.Hg) x 3.386	99.9	100.2	100.9	100.3
Stack Static Pressure	Pstatic	kPa	Pstatic (kPa) = Pstatic (in.H2O) x 0.249	0.00	0.00	0.00	0.00
Avg. Stack Temperature	Ts	R	Ts (R) = Ts (F) + 460	1981	1951	1940	1957
Avg. Stack Temperature	Ts	R	Ts (C) = (Ts (R) - 492) x 5/9	827	811	804	814
Avg. Meter Temperature	Tm	R	Tm (R) = Tm (F) + 460	518	530	525	524
Nozzle Diameter	Dn	mm	Dn (mm) = Dn (in.) x 25.4	14	14	14	14
Gas Meter Pressure	Pm	in.Hg	Pm = Pbar + (dH / 13.6)	29.56	29.63	29.85	29.68
Sample Volume at STP	Vmc	cu.ft cu.m	Vmc = Tref / Pref x (Vm x Pm x y) / Tm Vmc (cu.m) = 0.02832 x Vmc (cu.ft)	96.039 2.720	64.524 1.827	80.188 2.271	80.250 2.273
Volume of Water Vapour	Vwc	cu.ft	Vwc = 0.0480 x Vw	17.122	9.422	9.792	12.112
Water Fraction	Bwo	-	Bwo = Vwc / (Vwc + Vmc)	0.151	0.127	0.109	0.129
Molecular Weight, Dry	Md	lb/lb-mol	Md = 0.44 (Cco2) + 0.32 (Co2) + 0.28 (Cn2)	31.11	31.32	30.67	31.03
Molecular Weight, Wet	Ms	lb/lb-mol	Ms = Md (1 - Bwo) + (18 x Bwo)	29.13	29.62	29.29	29.35
Stack Pressure	Ps	in.Hg	Ps = Pbar + (Pstatic / 13.6)	29.50	29.60	29.80	29.63
Stack Gas Velocity	Us	ft/s m/s	Us = 85.33 x Cp x ((dP x Ts)/(Ps x Ms))^0.5 Us (m/s) = 0.3048 x Us (ft/s)	22.45 6.84	15.41 4.70	18.53 5.65	18.80 5.73
Actual Stack Gas Flow Rate	Q	acfm	Q = 60 x Us x As	2,380	1,634	1,965	1,993
Dry Stack Gas Flow Rate	Qs	dscfm dscms	Qs = Q x (1-Bwo) x (Tref/Ts) x (Ps/Pref) Qs (dscms) = 0.000472 x Qs (dscfm)	540 0.25	388 0.18	483 0.23	470 0.22
Dioxin and Furan Concentration Uncorrected @ STP	Chg	pg/dscm	Chg = Mhg / Vmc	2553.47	906.74	1972.04	1810.75
Dioxin and Furan Emission Rate	ERhg	pg/s kg/hr	ERhg = Chg/1x10 ⁹ x Qs ERhg(kg/hr) = 3.6x10 ⁻⁹ x ERh (g/s)	650.64 0.00	166.20 0.00	449.50 0.00	422.11 0.00
Dioxin and Furan Concentration Corrected to 11% O2	Chg	pg/dscm	Correction factor to 11% O2 Chg (11% O2) = Chg (mg/dscm) x (20.9-11) / (20.9-Co2)	0.58 1472.17	0.61 556.08	0.90 1769.47	1265.91
Corrected to 3% O2	Chg	pg/dscm	Chg (3% O2) = Chg (mg/dscm) x (20.9-3) / (20.9-Co2)	2661.81	1005.44	3199.35	2288.87
Corrected to 12% CO2	Chg	pg/dscm	Chg (12% CO2) = Chg (mg/dscm) x (12/Cco2)	1656.30	556.77	1664.56	1292.54

Legend:
sq.ft - square feet
sq.m - square metres
Pi - 3.142
R - degrees Rankin
in.Hg - inches of mercury
g/s - grams per second

acfm - actual cubic feet per minute
dscfm - dry standard cubic feet per minute
dscms - dry standard cubic metres per second
ppm - parts per million
mg/dscm - miligrams per dry standard cubic metre
ug - mircograms

cu.ft - cubic feet
cu.m - cubic metres
STP - standard temperature and pressure
(25 C and 101. kPa)
NOx - as NO2
pg - picograms

OFFICIAL STACK TESTING RESULTS

TMAC

incinerator

Fuel: municipal waste

Operating Conditions: Normal

Emission Control: dual chamber incinerator

Stack Height above Grade: XXX m

Stack Diameter: 0.46 m

Parameter	Test 1	Test 2	Test 3	Average
Test ID Test Date	SVOC-1 15-Sep-19	SVOC-2 16-Sep-19	SVOC-3 16-Sep-19	
Stack Gas Temperature (C)	827	811	804	814
Moisture Content (%)	15.1	12.7	10.9	12.9
Velocity (m/s)	6.84	4.70	5.65	5.73
Volumetric Flow (dscms)	0.25	0.18	0.23	0.22
Oxygen - O2 (%)	3.73	4.76	9.87	6.12
Carbon Dioxide - CO2 (%)	18.5	19.5	14.2	17.4
Dioxins and Furans (TCDD Equivalent)				
Dioxin and Furan Concentration (pg TEQ/dscm)	2,553	907	1,972	1,811
Corrected to 11% O2 (pg TEQ/dscm)	1,472	556	1,769	1,266
Corrected to 11% O2 (ng TEQ/dscm)	1.47	0.56	1.77	1.27
Emission Rate (pg TEQ/s)	651	166	449	422
Emission Rate (ng Teq/s)	0.65	0.17	0.45	0.42

0.08

Legend: C - degrees Celsius
m/s - metres per second
dscms - dry standard cubic metres per second
ppm - parts per million
STP - standard temperature and pressure (25 C and 101.3 kPa)
mg/dscm - miligrams per dry standard cubic metre
NOx - as NO2

Stack Gas Velocity Profiles
Hope Bay
SVOCs / Dioxins & Furans Testing

