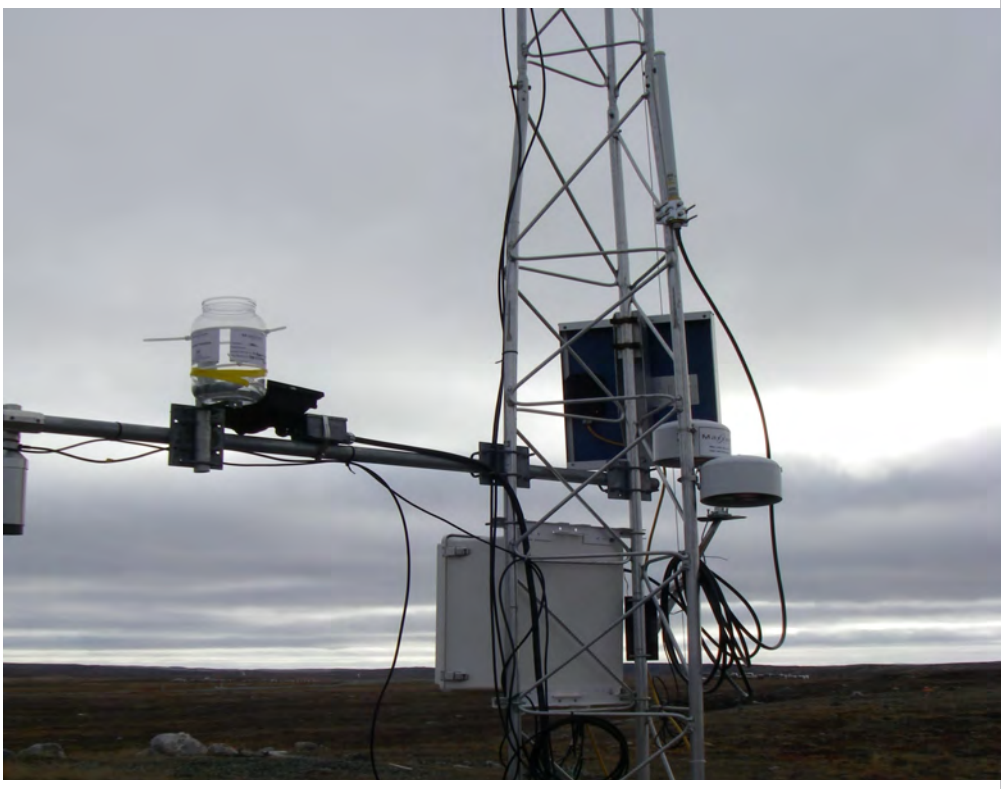
Appendix V4-2A

Doris North Gold Mine Project: Air Quality Compliance Report for Section 4 Item 30 of the Project Certificate

Hope Bay Mining Limited

Doris North Gold Mine Project: Air Quality Compliance Report for Section 4 Item 30 of the Project Certificate

NEWMONT™
The Gold Company



Rescan™ Environmental Services Ltd.
Sixth Floor - 1111 West Hastings Street
Vancouver, BC Canada V6E 2J3
Tel: (604) 689-9460 Fax: (604) 687-4277

Rescan™ Engineers & Scientists

November 2009

Executive Summary

Rescan™
Engineers and Scientists

Executive Summary

The following atmospheric monitoring requirements are outlined in the Doris North Gold Mine Project Certificate (NIRB No. 003, issued September 15, 2006):

1. Section 4.0. Item 8. Newmont will fund and install a weather station at the mine site to collect atmospheric data, including air temperature and precipitation. The design and location of this station shall be developed in consultation with Environment Canada officials.
2. Section 4.0. Item 30. Newmont will install and fund an atmospheric monitoring station. This station and its location shall be developed in consultation with EC and HC air quality officials and focus on particulates of concern generated at the mine site. The results of air-quality monitoring are to be reported every 6 months to NIRB through the Monitoring Officer, and from there to all of the parties.
3. Commentary: NIRB expects that Canada Wide Standards for Dioxins and Furans and the Canada Wide Standards for Mercury will apply and should be followed including stack testing of incinerators.

This report is intended to meet the requirements outlined in bullet 2 above. Separate reports will be submitted for the remaining bullets.

In order to comply with Item 30 in Section 4.0 of the Project Certificate, Newmont Mining Corporation (Newmont) along with Rescan Environmental Services (Rescan) conducted the following activities in 2009:

- Consulted with Mr. Dave Fox (Air Protection Management Analyst) of Environment Canada on the operation and location of the two Partisol samplers and the ambient air quality monitoring station prior to installation;
- Collected measurements of particulates of concern, including both suspended particulate matter (by the use of 2 Partisol samplers which measured PM_{10}, $PM_{2.5}$ and TSP) and dustfall (5 dustfall monitoring stations); and
- Collected measurements of ambient air quality, including sulphur dioxide, nitrogen dioxide, and ozone (SO_2, NO_2 and O_3; by the use of 2 Passive Air Monitoring Systems (PASS)).

Two continuous suspended particulate matter samplers (Partisol instruments manufactured by Thermo Fisher Scientific) and three dustfall collectors were installed in early summer 2009 to improve the previous ambient air quality monitoring program. The ambient air samplers (PASS) were installed in March 2009.

The samples collected for particulate matter (PM_{10}, $PM_{2.5}$ and TSP), dustfall and SO_2, NO_2 and O_3 were analyzed at an accredited laboratory. All parameters were compared with the Nunavut Environmental Guideline for Air Quality Sulphur Dioxide and Suspended Particulates, and the National Ambient Air Quality Objectives (NAAQOs) established under the Canadian Environmental Protection Act (CEPA). 2009 air quality monitoring results indicated that there were no exceedances for any of the monitored parameters, and results were indicative of background concentrations associated with undeveloped areas.

Table of Contents

Rescan™
Engineers and Scientists

DORIS NORTH GOLD MINE PROJECT: AIR QUALITY COMPLIANCE REPORT FOR SECTION 4 ITEM 30 OF THE PROJECT CERTIFICATE

Table of Contents

List of Appendices

List of Figures

FIGURE **PAGE**

List of Tables

TABLE **PAGE**

List of Plates

PLATE **PAGE**

Abbreviations and Definitions

Rescan™
Engineers and Scientists

Abbreviations and Definitions

Air Quality Standards	Objectives for maximum concentrations of criteria air contaminants in the atmosphere developed to ensure long-tern protection of public health and the environment.
Ambient Air Quality	The outdoor air quality at particular site.
ASTM	American Society for Testing and Materials.
BCMoE	British Columbia Ministry of Environment.
Criteria Air Contaminants	Contaminants for which environmental regulatory agencies have established ambient air concentration limits.
Fugitive Dust	Particulate matter, often sand or mineral dust, released to the atmosphere by mechanical disruption of soil or by wind scouring.
Inhalable particulate matter (PM10)	PM10 particles are airborne particles that have a diameter of 10 µm or less and are thus a subset of total suspended particulate. The majority of PM10 particles are from fugitive dust sources. PM10 can enter the respiratory system and have been linked to health problems.
Oxides of Nitrogen (NOx)	NOx gas primarily consists of nitrogen oxide (NO) and nitrogen dioxide (NO2). The gases are emitted with exhaust from combustion engines and products from blasting operations. NOx can be converted to nitric acid in the atmosphere and thus contribute to acid deposition.
Ozone (O_3)	A colorless, odorless reactive gas naturally found in the earth's stratosphere, where it absorbs the ultraviolet component of incoming solar radiation that could be harmful to life on earth. It is also found near earth's surface where pollutants emitted from human activities react in the presence of sunlight to form ozone. How sunny weather and stagnant conditions favor ozone formulation. The principal pollutants involved in these reactions are NOx, volatile organic carbon (VOC) and carbon monoxide (CO).
Respirable particulate matter ($PM_{2.5}$)	PM2.5 particles are a subset of PM10 and are defined as particles with a diameter less than 2.5 µm. These particles are small enough to enter deep into the respiratory system. The majority of PM emitted in diesel engine exhaust is PM2.5.
Sulphur Dioxide (SO_2)	Fossil fuel contains a small amount of organic compounds. During fuel combustion, the sulphur is oxidized and emitted as SO2 gas with the engine exhaust. In the atmosphere, SO2 can further oxidize to sulphate particles, which contribute to acid deposition.
TSP	Total suspended particulates (TSP) are solid matter or liquid droplets from smoke, dust, fuel ash, or condensing vapours that can be suspended in the air.
USEPA	United States Environmental Protection Agency. The USEPA has promulgated a variety of guidelines, objectives, emission factors, air dispersion modelling procedures and statutes for the protection of ambient air quality.

1. Introduction

1. Introduction

The following atmospheric monitoring requirements are outlined in the Doris North Gold Mine Project Certificate (NIRB No. 003, issued September 15, 2006):

1. Section 4.0. Item 8. Newmont will fund and install a weather station at the mine site to collect atmospheric data, including air temperature and precipitation. The design and location of this station shall be developed in consultation with Environment Canada officials.
2. Section 4.0. Item 30. Newmont will install and fund an atmospheric monitoring station. This station and its location shall be developed in consultation with EC and HC air quality officials and focus on particulates of concern generated at the mine site. The results of air-quality monitoring are to be reported every 6 months to NIRB through the Monitoring Officer, and from there to all of the parties.
3. Commentary: NIRB expects that Canada Wide Standards for Dioxins and Furans and the Canada Wide Standards for Mercury will apply and should be followed including stack testing of incinerators.

This report is intended to meet the requirements outlined in bullet 2 above. Separate reports will be submitted for the remaining bullets.

In order to comply with Item 30 in Section 4.0 of the Project Certificate, Newmont Mining Corporation (Newmont) along with Rescan Environmental Services (Rescan) conducted the following activities in 2009:

- Collected measurements of particulates of concern, including both suspended particulate matter (by the use of 2 Partisol samplers) and dustfall (5 dustfall monitoring stations); and
- Collected measurements of ambient air quality, including sulphur dioxide (SO_2), nitrogen dioxide (NO_2), and ozone (O_3, by the use of 2 Passive Air Monitoring Systems (PASS)).

As required in the Project Certificate, the locations for the instruments used to measure the above parameters along with the monitoring objectives were reviewed and approved by Mr. Dave Fox (Air Protection Management Analyst North, Environment Canada, Yellowknife).

Chapter 2 of this report provides the results from the particulate matter (both suspended particulate matter and dustfall) measurements, and Chapter 3 of this report provides the results from the passive ambient air quality samplers for SO_2, NO_2 and O_3. Chapter 4 provides a brief discussion of the results.

2. Particulate Matter

2. Particulate Matter

Particulate matter is a criteria air quality contaminant (CAC) associated with mining and mineral processing operations. It is generated by mobile equipment, crushing, blasting, bulk handling and storage and other associated mineral processing and construction activities. As part of the ambient air quality compliance monitoring program, particulate matter was monitored in 2009 at various locations for the concentration of suspended particulate matter and dustfall.

2.1 SUSPENDED PARTICULATE MATTER

Suspended particulate matter (SPM) in ambient air generally is a complex, multi-phase system of all airborne solid and low vapor pressure liquid particles having aerodynamic particle sizes from 0.01 to 100 µm in diameter and larger. SPM concentrations in ambient air were monitored using two Partisol samplers located on the butte near the Doris camp. The site selection, methods and results are presented below.

2.1.1 Site Selection

As with any type of ambient air monitoring study, the validity of conclusions depends on representativeness of the sample data. Therefore, the sampling location and the siting of the ambient air samplers are important.

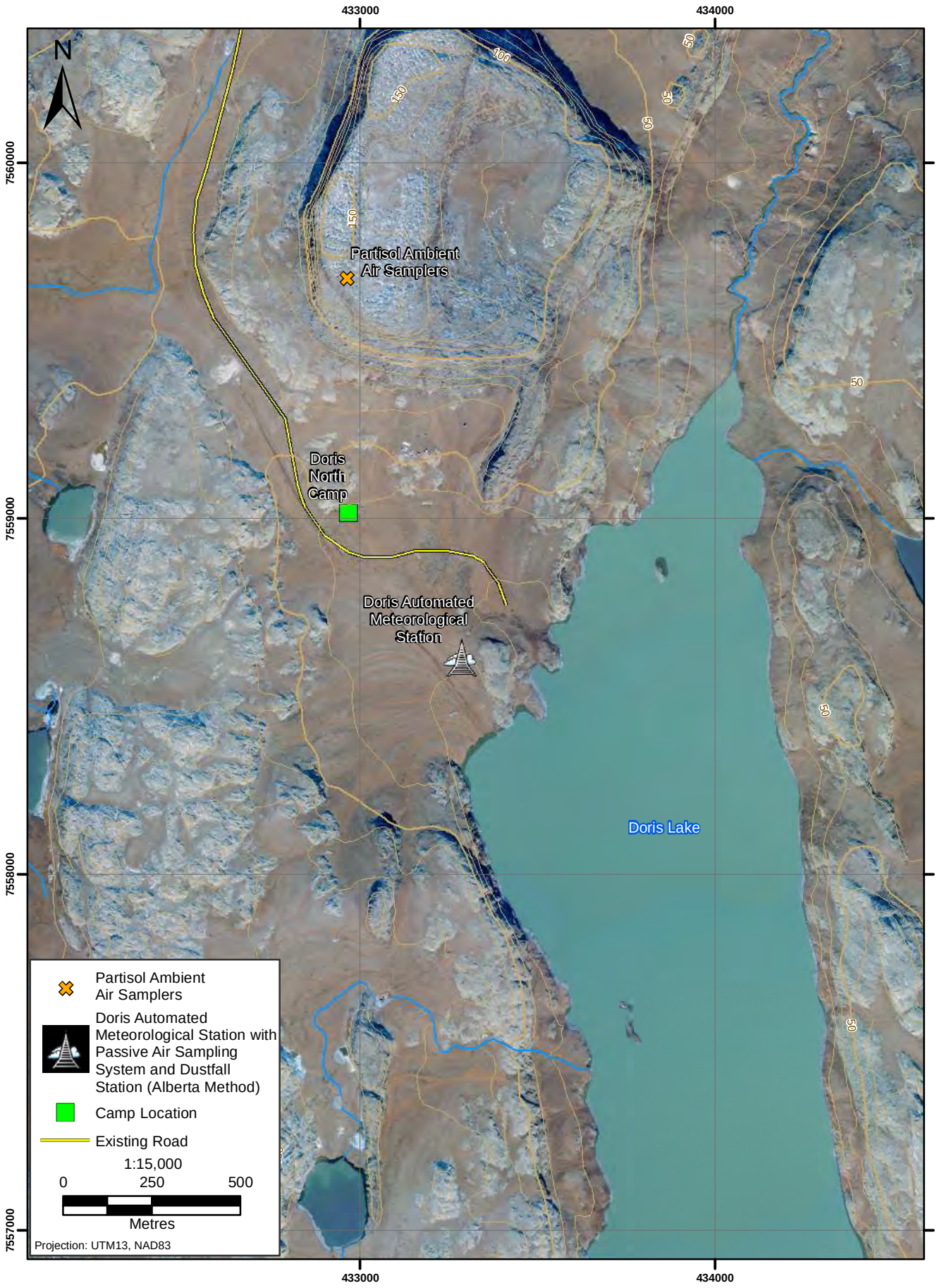
Nunavut does not have established siting requirements for ambient air samplers. Therefore, the siting criteria from the British Columbia Ministry of Environment (BC MoE 2009) and the USEPA methods (USEPA 2009 and USEPA 1999) were used.

Additional factors, not specified in standard site selection criteria, were also considered. Due to the very cold climate the Partisol samplers were installed inside a temperature controlled shelter. As a result the sample schedule interruptions potentially caused by cold weather, wet conditions and excess humidity (filter conditioning), air leaks and pump malfunctioning will be minimized. The Partisol air sampler location is free from obstructions and nearby pollutant sources that may cause interference in suspended particulate monitoring (Figure 2-1.1 and Plates 2-1.1 and 2.1-2).

2.1.2 Monitoring Method

Suspended particulate matter is being monitored by the Partisol ambient air samplers in three forms; TSP, PM_{10} and $PM_{2.5}$. The Partisol plus model 2025 ambient air sampler monitors TSP and the Partisol Sequential Dichotomous Model 2025D ambient air sampler monitors PM_{10} and $PM_{2.5}$ simultaneously (Plate 2.1-3). The Partisol instruments are widely used in Canada for compliance monitoring programs and are recognized as reference equivalent methods by the USEPA (USEPA 2009).

The Partisol ambient air samplers draw a particulate-laden ambient air stream through a size-selective inlet, and then through a 47 mm diameter filter. A built-in pump provides the vacuum required to pull the air flow through the sample filter and a volume flow controller monitors and automatically adjusts the flow rate (Figure 2.1-2). The filters, approved for use with the Partisol ambient air samplers, were the Pallflex TX40H120-WW teflon coated fibre glass type. The Partisol air sampler filters are pre and post weighted at a laboratory that is accredited by the Canadian Association for Laboratory Accreditation (CALA).



NEWMONT The Gold Company

Location of Partisol Ambient Air Samplers for Total Suspended Particulate (TSP), PM_{10} and $PM_{2.5}$

Figure 2.1-1

Rescan™ Engineers & Scientists

Plate 2.1-1. The Partisol ambient air samplers are located at the top of a butte that is approximately 660 m north of the Doris camp. Doris Lake is shown in the background of this photograph.

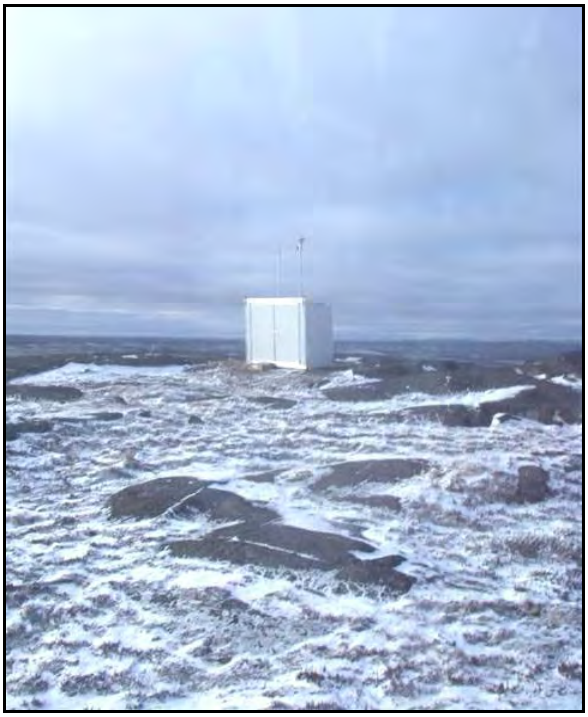


Plate 2.1-2. Temperature controlled shelter housing the Partisol ambient air samplers, late August 2009.

Plate 2.1-3. Inside the temperature controlled shelter the Partisol sampler for TSP is shown on the left and the PM10/PM2.5 sampler is on right.

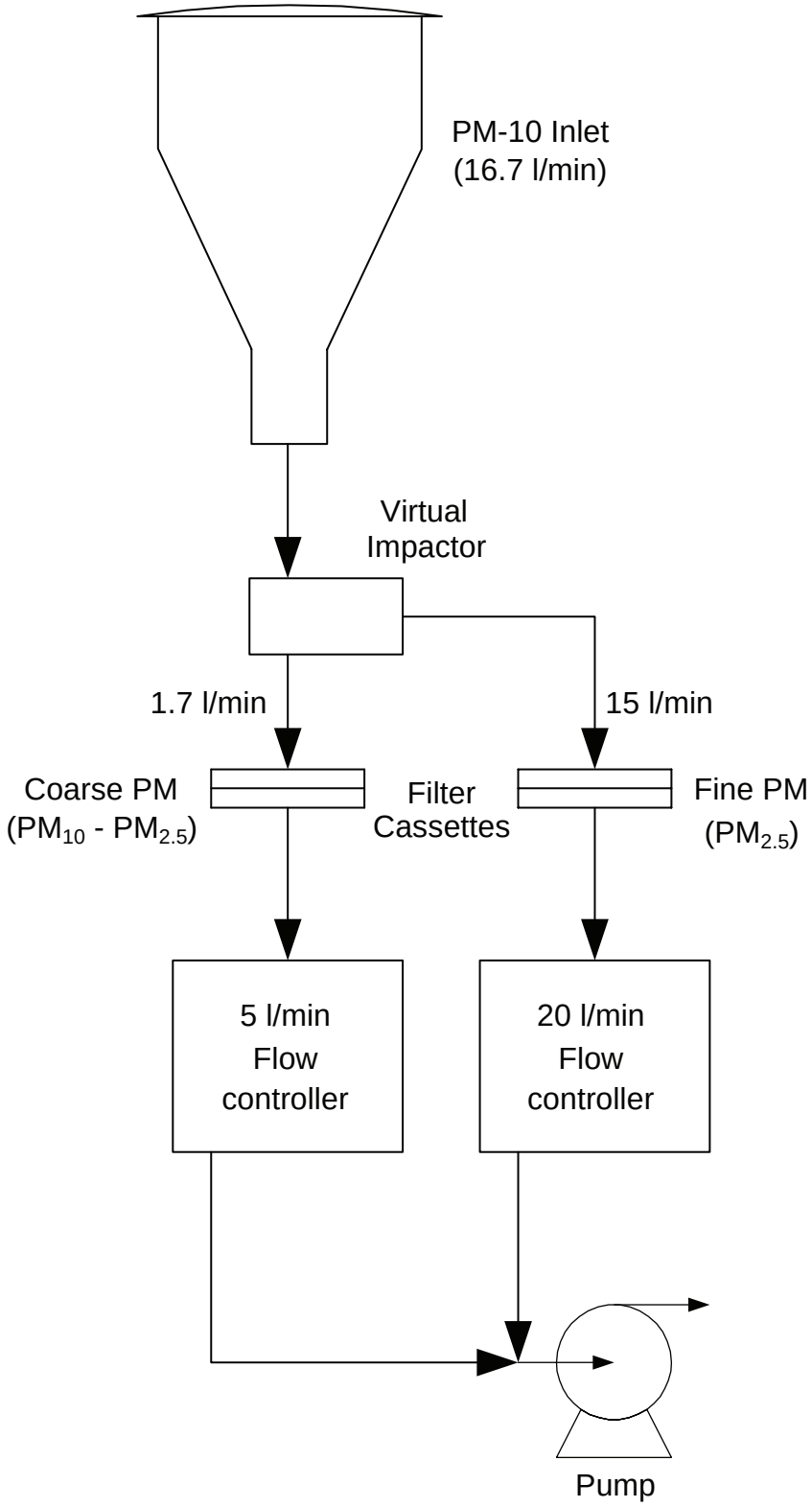
The filter exchange is performed using pneumatic pressure from the sample pump, and does not involve any special electromechanical components, belts or motors. New filter cassettes from the supply magazine (left) are pushed up and rightward to the sampling position, while the previous cassette is moved to the storage magazine (right, Plate 2.1-4). The supply and storage magazines are covered to seal off the filter cassettes thereby protecting them from environmental interferences during sampling operations.

The Partisol Plus 2025 TSP sampler (the instrument on left at Plate 2.1-3) monitors only TSP therefore, the instrument does not split the incoming ambient air and all sampling air goes through one filter.

The Partisol ambient air samplers at the Doris project are programmed to follow Environment Canada's National Air Pollution Surveillance (NAPS) schedule. The NAPS program requires 24-hour sampling every six days for particulate matter monitoring.

2.1.3 Results and Comparison

The ambient air quality sampling program for suspended particulate matter started on August 17, 2009. Table 2.1-1 summarizes the results from the Partisol 2025 Dichotomous sampler which provides ambient PM_{10} and $PM_{2.5}$ concentrations. The PM_{10} and $PM_{2.5}$ concentrations are representative of baseline conditions in an undisturbed remote area. There are no ambient air quality standards in Nunavut for PM_{10} and $PM_{2.5}$ therefore the Canada-Wide Standards were used to compare $PM_{2.5}$ and the British Columbia and Ontario standards for PM_{10}. The Canada-Wide Standards were created by the Canadian Council for Ministers of the Environment (CCME).



Source: Thermo Fisher Scientific, 2007

NEWMONT The Gold Company

Simplified Diagram for the Partisol Sequential Dichotomous Model 2025D Ambient Air Sampler

Figure 2.1-2

Rescan™ Engineers & Scientists

Plate 2.1-4. The new Partisol air sampler filters are contained in a magazine on the left side of the unit. The filters laden with suspended particulate matter are contained in a magazine on the right side of the unit.

Table 2.1-1. PM_{10} and $PM_{2.5}$ Results Summary

Parameter	Units	24-hr Limit	17-Aug-09	23-Aug-09	29-Aug-09	04-Sep-09	10-Sep-09	16-Sep-09	22-Sep-09
PM_{10}	$\mu g/m^3$	50*	2.9	2.2	4.2	7.8	4.8	6.4	4.8
$PM_{2.5}$	$\mu g/m^3$	30**	1.6	1.4	2.2	3.5	2.9	4.1	2.8

** British Columbia and Ontario*
*** Canada-Wide Standard based on 98 percentile*

Since the program was recently initiated, there are only seven sampling results and therefore a definitive trend for particulate matter concentration cannot be discerned. The next 6 month reporting period will provide sufficient data to be able to determine if there is a trend of increasing, decreasing or steady particulate matter concentrations at the site.

Table 2.1-2 summarizes the results from the Partisol Plus 2025 sampler which monitors TSP concentrations. None of the 24 hour TSP concentrations exceeded the Health Canada - National Ambient Air Quality Objective (NAAQO) or the Nunavut Environmental Guideline for Air Quality. Overall, the results are lower than expected because the TSP concentrations should be higher than the PM_{10} and $PM_{2.5}$ concentrations. PM_{10} and $PM_{2.5}$ are subsets of TSP and the TSP sampler should be collecting all PM with an approximate aero dynamic diameter of 100 μm or less. The cause of these lower than normal TSP concentrations is currently being investigated.

Table 2.1-2. Total Suspended Particulate (TSP) Results Summary

Sampling Date			17-Aug-09	23-Aug-09	29-Aug-09	4-Sep-09	10-Sep-09	16-Sep-09	22-Sep-09
	Units	24-hr Limit							
TSP	$\mu g/m^3$	120*	1.6	1.8	2.3	1.8	1.2	1.2	0.9

** 24-hr limit specified in Canadian Ambient Air Quality Objective and the Nunavut Environmental Guideline for Air Quality*

2.2 DUSTFALL

The purpose of the dustfall monitoring program is to quantify the amount of dust deposition near to the Doris North project site and compare the results to the available criteria and standards.

Two dustfall monitoring stations began collecting data in March 2009. Three new dustfall monitoring stations were established early July 2009. The first two dustfall stations are collocated with meteorological stations at Doris and Boston. The dustfall results have been prorated by the laboratory to a 30-day average, so that they can be compared with the standards. The first two existing dustfall stations use an Alberta Environment method (Alberta AMD 1989), and the remaining three stations use the ASTM 2004 method.

2.2.1 Site Selection

The two existing dustfall monitoring stations are located at the Doris North and Boston automated meteorological stations. Three new dustfall stations were installed in the vicinity of Doris camp (Figure 2.2-1) following the ASTM 2004 site selection recommendations. The dominant wind directions as well as present and future project activities were considered during the site selection process. There are no obstructions or local sources of air pollutants near the new stations. In addition, the topography is very convenient to collect representative data (Figure 2.2-1). The dustfall monitoring stations are in open areas that are free of structures higher than 1 m within a 20 m radius of the collection container.

2.2.2 Monitoring Method

Dustfall (settleable particulate matter) was monitored at the three new dustfall monitoring stations by using the ASTM D1739-98 method (ASTM 2004). The dustfall monitoring stations collect particles small enough to pass through a 1 mm screen and large enough to settle by virtue of their weight.

This method requires containers of a standard size and shape which are sealed in a laboratory. The containers are opened and installed inside of a wind screen for about 30 days. Monthly samples were sent to the laboratory for analysis of total, soluble and insoluble particulate matter. There were two dustfall collectors at each new dustfall station. One of the containers measured particulates (total, soluble and insoluble) and anions (sulphate, nitrate, chloride, and ammonia) and the other measured total metals and various cations. Because algae are an interference for the dustfall measurement the deionized water in the dustfall containers also contains algaecide. The wind screen around the sample container improves the dustfall collection efficiency and bird spikes are used to minimize contaminants from bird droppings (Plate 2.2-1).

The two original dustfall stations were operated by using the Alberta Environment method (Alberta AMD 1989). Each station consisted of one dustfall collector. Monthly samples were sent to the laboratory for analysis of total dustfall and total fixed dustfall. Total dustfall is defined as the amount of material left after evaporation of a sample of dustfall and its subsequent drying. Total fixed dustfall is the residue that is left after ignition of the total dustfall sample (AMD 1989).

NEWMONT The Gold Company

Dustfall and Passive Air Quality Monitoring Stations

Figure 2.2-1

Rescan Engineers & Scientists

Plate 2.2-1. Dustfall monitoring station three near the Doris project site. For locations using the ASTM (2004) method two sample containers are required to provide a sufficient volume of sample for the various parameters (e.g. particulate, anions, cations, total metals). Locations using the Alberta Environment (AMD 1989) method only require one collector.

2.2.3 Results and Comparison

The dustfall results and standards are summarized in Table 2.2-1 and Table 2.2-2, respectively. Table 2.2-3 summarizes the dustfall limits in various jurisdictions. There is no consistency in dustfall limits among various authorities and jurisdictions. Overall the Doris project dustfall results were lower than any of the limits listed in Table 2.2-3. This was expected and indicates typical baseline levels for an undisturbed area.

The concentration of total metals in the dustfall samples was also analyzed and the laboratory results are in Appendix III. The results indicate that most of the total metal concentrations were below the detection limit.

Table 2.2-1. Dustfall Results using the ASTM method (mg/dm^2/day)

Dustfall	DF1		DF2		DF3	
	Jul-2009	Aug-2009	Jul-2009	Aug-2009	Jul-2009	Aug-2009
Total	0.19	0.13	0.23	0.12	0.13	< DL
Total Insoluble	< DL	< DL	< DL	< DL	< DL	< DL
Total Soluble	0.15	0.13	0.19	0.13	0.12	0.11

Note : < DL = Less than the detection limit of 0.10 mg/dm^2/ day

Table 2.2-2. Dustfall Results using the Alberta Environment method (mg/dm²/day)

Doris Station	Mar-2009	Apr-2009	May-2009	Jun-2009	Jul-2009	Aug-2009	Sep-2009
Doris Total Dustfall	0.073	0.097	0.093	0.153	0.213	0.473	*
Doris Total Fixed Dustfall	0.023	0.073	0.023	0.100	0.190	0.437	*
Boston Station							
Boston Total Dustfall	0.123	0.160	0.137	0.190	0.160	0.467	0.227
Boston Total Fixed Dustfall	0.050	0.113	0.070	0.150	0.113	0.467	0.227

** Not available yet.*

Table 2.2-3. Dustfall Limits in Several Jurisdictions

Jurisdiction	**Dustfall Criterion Level (mg/m²/day)**	**Comments**	**Dustfall Criterion Level (mg/dm²/day)**
Alberta			
residential and recreational areas	175	averaged over 30 days	1.75
commercial and industrial areas	525	averaged over 30 days	5.25
Ontario	230	averaged over 30 days	2.3
Australia (new mines)	130	pro-rata compensation if level exceeded	1.3
	330	total compensation if level exceeded	3.3
United Kingdom			
open country	100	95th percentile - complaints likely if exceeded	1.0
residential areas	150	96th percentile - complaints likely if exceeded	1.5
commercial areas	190	97th percentile - complaints likely if exceeded	1.9
New York			
Level I	100		1.0
Level II	100		1.0
Level III	130		1.3
Level IV	200		2.0
British Columbia Pollution Control Objective (BC MOE 1979)	170 to 290		1.7 to 2.9

Source: Hrebenyk & Enns 2005 (except for the BC Pollution Control Objectives)

The total metal concentrations that were not below the detection limits were very low and for all intents and purposes would be considered negligible. There are no specific criteria for total metals in environmental dustfall. However, there is workplace or occupational air quality standards (e.g., industrial hygiene) for metals that are of concern with respect to human health. The metals that are a concern for human health are cadmium, lead and arsenic. The concentrations of total arsenic in the dustfall samples were below the detection limit in August but just above the limit of detection in July. The concentrations of total cadmium and lead in the dustfall samples were negligible.

3. Ambient Air Quality Monitoring by Passive Samplers

Rescan™
Engineers and Scientists

3. Ambient Air Quality Monitoring by Passive Samplers

Starting in March 2009, the passive ambient air quality samplers obtained monthly average concentrations for criteria air contaminants at the Project site. Passive ambient air samplers were collocated with the Boston and Doris automated meteorological stations and monitored SO_2, NO_2 and O_3 (Figure 2.2-1).

3.1 SITE SELECTION

The samplers (Plate 3.1-1) were placed in environmentally safe locations where they would not be affected by weather or damaged by wildlife. They were placed far from obstructions and there were no nearby roadways that could influence measurements. One sampler was located near the Doris meteorological station (Figure 2.2-1) and the other was located near the Boston meteorological station.

Plate 3.1-1. The white circular device shown in this photo is the passive air sampling system near the Doris automated meteorological station.

3.2 MONITORING METHOD

Passive air sampling is a diffusive method which monitors gas or vapor pollutants from the atmosphere at a rate controlled by a physical process, such as diffusion through a static air layer or permeation through a membrane. The passive method does not involve the active movement of the air through the sampler; therefore no electric air moving pump is required. The number of days of contact between the ambient air and the permeation membrane is important. The local meteorological conditions are also used in the calculations. The meteorological parameters that are used in the PASS calculations are air temperature, wind speed and relative humidity.

The passive air monitoring sampling system (PASS) provides low detection limits, is very easy to install and does not require power. The passive sampler is kept under a rain shelter (Plate 3.2-1) on a tripod beside the Doris meteorological station. The other PASS monitoring site is located at the Boston meteorological station. Duplicate PASS samplers are collected at the Boston station.

Plate 3.2-1. Passive air samplers under a rain shelter.

3.3 RESULTS AND COMPARISON

Monthly PASS samples were analyzed at Maxxam Analytical Laboratory. The PASS results and standards are summarized in Table 3.3-1 and Table 3.3-2, respectively. The original laboratory reports are in Appendix II.

The PASS results are expressed as monthly average concentrations; however Health Canada's National Ambient Air Quality Objectives (NAAQO) and the Nunavut Environmental Guideline for Air Quality only use averaging periods of 1-hour, 24-hour and 1-year. Therefore the PASS results cannot be directly compared with the Canadian and Nunavut ambient air quality objectives or guidelines. After a full year of PASS data has been collected, it will be possible to compare with the annual limit in the NAAQO and Nunavut guidelines.

Overall the concentrations of SO_2, NO_2 and O_3 were low and representative of baseline concentrations in an undisturbed area.

Duplicate PASS samples are collected at the Boston station. During June 2009 there was a discrepancy between the two results for ozone. The ozone concentration for the first PASS sampler was 20.7 ppb but below the detection limit (0.1 ppb) for the second PASS sampler. The sample that was below the detectable limit was eliminated from the data set because 20.7 ppb is more representative of the baseline ozone concentrations at the Boston station.

Table 3.3-1. Passive Ambient Air Quality Monitoring Results

Doris Station Parameter	Sampling Period Units	Mar-2009	Apr-2009	May-2009	Jun-2009	Jul-2009	Aug-2009
SO_2	µg/m³	< DL	< DL	< DL	0.3	< DL	< DL
	ppb	< DL	< DL	< DL	0.1	< DL	< DL
NO_2	µg/m³	3.0	0.4	0.8	< DL	0.2	0.6
	ppb	1.6	0.2	0.4	< DL	0.1	0.3
O_3	µg/m³	1.4	60.2	79.6	55.9	40.6	39.4
	ppb	0.7	30.7	40.6	28.5	20.7	20.1
Boston Station[1,2] Parameter							
SO_2	µg/m³	0.2	< DL	< DL	< DL	< DL	< DL
	ppb	0.1	< DL	< DL	< DL	< DL	< DL
NO_2	µg/m³	0.2	5.6	1.9	0.2	< DL	0.6
	ppb	0.1	3.0	1.0	0.1	< DL	0.3
O_3	µg/m³	65.6	50.2	57.5	40.6	39.6	38.2
	ppb	33.5	25.6	29.3	20.7	20.2	19.5

< DL = Less than the detection Limit
Detection limits are (0.1 ppb) (0.26 ug/m³) for SO_2, 0.1 ppb (0.188 ug/m³) for NO_2 and 0.1 ppb (0.196 ug/m³) for O_3.
Note 1 = The average of two samples are presented in the Table 2.3-1 above.
Note 2 = If one of the samples below detection limit and the other sample is in detectable limit, the undetectable concentration was assumed as half of the detection limit (0.05 ppb) in average calculations.

Table 3.3-2. Ambient Air Quality Limits

	Unit	Annual	Daily	1-Hour
SO_2 *	µg/m³	30	150	450
NO_2 **	µg/m³	60	200	300
O_3 **	µg/m³	30	30	100

** Nunavut Environmental Guideline for Air Quality*
*** National Ambient Air Quality Objectives (NAAQOs) established and reviewed based on recommendations under the Canadian Environmental Protection Act (CEPA)*

Although direct comparisons cannot be made between the monthly PASS results and the NAAQO and Nunavut air quality guidelines due to the different averaging periods some general observations can be made.

The ozone concentrations at Doris and Boston were lower than the 1-hour NAAQO. They were also lower than the CCME - Canada-Wide Standard which has an 8-hour limit of 65 ppb (127 µg/m³) for the 4th highest value. However, Health Canada's National Ambient Air Quality Objectives (NAAQO) for

Ground-level Ozone suggests that the average background ozone concentrations are 25 to 40 ppb for a monthly average (Health Canada 1999). The ozone concentrations at the site ranged from 0.7 to 40.6 ppb and roughly one half of the ozone concentrations at Doris and Boston were lower than Health Canada's suggested range for background ground-level ozone concentrations. These observations are only based on 6 months of data collection and future data will add to the robustness of the data set and allow for a more accurate comparison.

4. Results and Discussions

4. Results and Discussion

The ambient air quality monitoring program at the Doris project site was substantially improved during the summer of 2009. The two previously installed passive ambient air monitoring and dustfall stations remained the same and three new dustfall stations were installed. In addition, two Partisol ambient air quality samplers were installed to monitor TSP, PM_{10} and $PM_{2.5}$.

The Partisol sampler and program follows the Environment Canada – National Air Pollutant Surveillance (NAPS) schedule and allows for collection of a 24-hr sample every six days. The Partisol program was initiated in mid August 2009 and there were seven results included in this report. The PM_{10} and $PM_{2.5}$ concentrations at the Doris site were typical of background concentrations for a remote undisturbed area in Canada and they were lower than the Health Canada – National Ambient Air Quality Objectives, Canada-Wide Standards and Nunavut Environmental Guideline for Air Quality. The total suspended particulate matter concentrations at the Doris site were lower than expected; therefore, the ambient air sampler with undergo an operational check. It is possible that a leak in the system may have caused the lower than normal concentrations. A second possible cause could be an error in the pre and post weighing of the Partisol air sampler filters at the analytical laboratory.

Three new dustfall stations were installed near the Doris site according to the ASTM 1739-98 method (reapproved in 2004). The two original dustfall stations used the 1985 Alberta Air Monitoring Directive Method. The monthly dustfall values were all below dustfall criteria in various jurisdictions. The maximum recorded dustfall concentration of 0.23 mg/dm^2/day (July 2009 at DF2) was below the Alberta limit (5.25 mg/dm^2/day) and British Columbia limit (1.7 to 2.3 mg/dm^2/day).

The passive ambient air quality monitoring program included monthly sampling for SO_2, NO_2 and O_3. The maximum observed concentrations were 0.1, 3.0 and 40.6 ppb for SO_2, NO_2 and O_3 respectively. The background concentrations were representative of a remote undisturbed area. Because of different averaging periods the PASS results (monthly average) cannot be directly compared with the Nunavut Environmental Guideline for Air Quality or Health Canada's National Ambient Air Quality Objectives – NAAQO (annual, 24-hour and 1-hour averages). Generally the monthly average ozone concentrations at the Doris site were in the range of background concentrations recommended by Health Canada, 1999 (25 to 40 ppb monthly average). Additional future data will provide for more useful comparisons to be made. After one year of PASS data has been collected it will be possible to calculate an annual average for direct comparisons with the Nunavut Guidelines and Health Canada's NAAQO.

The ambient air quality monitoring program at the Doris site will continue with the collection of TSP, PM_{10} and $PM_{2.5}$ samples for 24-hr every 6 days, and monthly dustfall monitoring and passive air sampling for SO_2, NO_2 and O_3.

References

Rescan™
Engineers and Scientists

References

Alberta Environment. 1989 (amended in 2006). *Air Monitoring Directive (AMD) Appendix A-6 Determination of Dustfall,* Edmonton, AB.

American Society for Testing and Materials (ASTM). 2004. *Standard Test Method for Collection and Measurement of Dustfall (Settleable Particulate Matter) Designation D 1739-98 Reapproved 2004*, West Conshohocken, PA.

British Columbia Ministry of Environment (BCMoE). 1979. *Pollution Control Objectives for the Mining, Smelting and Related Industry of British Columbia*. Victoria, BC.

British Columbia Ministry of Environment (BCMoE). 2009. Air Monitoring Site Selection and Exposure Criteria, Victoria, BC.

Canadian Council of Ministers of the Environment, (CCME). 2000. *Canada-Wide Standards for Particulate Matter (PM) and Ozone*, Canadian Council of Ministers of the Environment, Quebec City, QC.

Health Canada. 1999. *National Ambient Air Quality Objectives for Ground-Level Ozone,* Federal-Provincial Working Group on Air Quality Objectives and Guidelines, Ottawa, ON.

Hrebenyk and Enns. 2005. *Peer Review of Diavik Diamond Mine Air Quality Monitoring Program*. Report prepared for Environmental Monitoring Advisory Board, Yellowknife, NWT.

Nunavut Government. 2002. Environmental Guideline for Air Quality – Sulphur Dioxide and Suspended Particulates. Government of the Nunavut, Environmental Protection Service, Department of Sustainable Development, Iqaluit, NU.

US Environmental Protection Agency (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 Environmental Protection Agency (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 1

Suspended Particulate Matter Results (TSP, PM10 and PM2.5)
Partisol Samplers

Rescan™
Engineers and Scientists

Maxxam Analytics

Site: HOPE BAY PROJECT

Attention: Tolga Olcay
RESCAN ENVIRONMENTAL SERVICES LTD.
SIXTH FLOOR
1111 WEST HASTINGS STREET
VANCOUVER, BC
CANADA V6E 2J3

Report Date: 2009/10/16

CERTIFICATE OF ANALYSIS

MAXXAM JOB #: A954794
Received: 2009/10/02, 11:09

Sample Matrix: Filter
Samples Received: 21

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Analytical Method
Mass Determination(ug/filter)	21	N/A	2009/10/16		
Mass Determination (ug/m³) (1)	21	N/A	2009/10/16		
Volume	21	N/A	2009/10/16		

* RPDs calculated using raw data. The rounding of final results may result in the apparent difference.

(1) As per method, results are blank subtracted.

Encryption Key

Levi Manchak
16 Oct 2009 13:25:21 -06:00

Please direct all questions regarding this Certificate of Analysis to your Project Manager.

LEVI MANCHAK,
Email:
Phone# (780) 378-8500

==========

Maxxam has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per section 5.10.2 of ISO/IEC 17025:2005(E), signing the reports. SCC and CALA have approved this reporting process and electronic report format.

For Service Group specific validation please refer to the Validation Signature Page

Total cover pages: 1

Maxxam Analytics

Maxxam Job #: A954794
Report Date: 2009/10/16

RESCAN ENVIRONMENTAL SERVICES LTD.

Site Reference: HOPE BAY PROJECT

RESULTS OF CHEMICAL ANALYSES OF FILTER

Maxxam ID		R04450	R04484	R04485	R04486	R04487		
Sampling Date		2009/08/17	2009/08/23	2009/08/29	2009/09/04	2009/09/10		
	Units	**DORIS - RP15486**	**DORIS - RP15277**	**DORIS - RP15480**	**DORIS - RP15576**	**DORIS - RP15550**	**RDL**	**QC Batch**
.								
Volume	m^3	2.50	2.50	2.50	2.50	2.50	0.01	3493771
PM2.5/10								
Particulate Matter	ug/m3	15	10	23	47	22	1	3493770
Particulate Matter	ug/filter	37	25	57	118	55	3	3493769

RDL = Reportable Detection Limit

Maxxam ID		R04488	R04489		R04490	R04491		
Sampling Date		2009/09/16	2009/09/22		2009/08/17	2009/08/23		
	Units	**DORIS - RP14323**	**DORIS - RP15109**	**RDL**	**DORIS - RP14351**	**DORIS - RP15545**	**RDL**	**QC Batch**
.								
Volume	m^3	2.50	2.50	0.01	22.70	22.80	0.01	3493771
PM2.5/10								
Particulate Matter	ug/m3	27	24	1	1.6	1.4	0.1	3493770
Particulate Matter	ug/filter	68	59	3	36	31	3	3493769

RDL = Reportable Detection Limit

Maxxam ID		R04492	R04493	R04494	R04495	R04496		
Sampling Date		2009/08/29	2009/09/04	2009/09/10	2009/09/16	2009/09/22		
	Units	**DORIS - RP14335**	**DORIS - RP14308**	**DORIS - RP13274**	**DORIS - RP14339**	**DORIS - RP14322**	**RDL**	**QC Batch**
.								
Volume	m^3	22.80	22.80	22.70	22.80	22.80	0.01	3493771
PM2.5/10								
Particulate Matter	ug/m3	2.2	3.5	2.9	4.1	2.8	0.1	3493770
Particulate Matter	ug/filter	50	79	66	93	63	3	3493769

RDL = Reportable Detection Limit

Maxxam Analytics

Maxxam Job #: A954794
Report Date: 2009/10/16

RESCAN ENVIRONMENTAL SERVICES LTD.

Site Reference: HOPE BAY PROJECT

RESULTS OF CHEMICAL ANALYSES OF FILTER

Maxxam ID		R04497	R04498	R04499	R04500	R04501		
Sampling Date		2009/08/17	2009/08/23	2009/08/29	2009/09/04	2009/09/10		
	Units	**DORIS - RP14314**	**DORIS - RP15549**	**DORIS - RP15479**	**DORIS - RP15072**	**DORIS - RP14087**	**RDL**	**QC Batch**
.								
Volume	m^3	25.40	25.40	25.40	25.40	25.40	0.01	3493771
PM2.5/10								
Particulate Matter	ug/m3	1.6	1.8	2.3	1.8	1.2	0.1	3493770
Particulate Matter	ug/filter	41	46	58	46	30	3	3493769

RDL = Reportable Detection Limit

Maxxam ID		R04502	R04504		
Sampling Date		2009/09/16	2009/09/22		
	Units	**DORIS - RP13102**	**DORIS - RP15114**	**RDL**	**QC Batch**
.					
Volume	m^3	25.40	25.40	0.01	3493771
PM2.5/10					
Particulate Matter	ug/m3	1.2	0.9	0.1	3493770
Particulate Matter	ug/filter	31	23	3	3493769

RDL = Reportable Detection Limit

General Comments

Results relate only to the items tested.

Maxxam Analytics

RESCAN ENVIRONMENTAL SERVICES LTD.
Attention: Tolga Olcay
Client Project #:
P.O. #:
Site Reference: HOPE BAY PROJECT

Quality Assurance Report

Maxxam Job Number: PA954794

QA/QC Batch Num	Init	QC Type	Parameter	Date Analyzed yyyy/mm/dd	Value	Recovery	Units	QC Limits
3493769	OZ	Calibration Check	Particulate Matter	2009/10/16		100	%	N/A

Calibration Check: A calibration standard analyzed at different times to evaluate on-going calibration accuracy.

Maxxam Analytics

Validation Signature Page

Maxxam Job #: A954794

The analytical data and all QC contained in this report were reviewed and validated by the following individual(s).

LINDA LIN, Supervisor, Centre for Passive Sampling Technology

==========

Maxxam has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per section 5.10.2 of ISO/IEC 17025:2005(E), signing the reports. SCC and CALA have approved this reporting process and electronic report format.

RESCAN ENVIRONMENTAL SERVICES LTD.
Client Project #:
Site Reference: HOPE BAY PROJECT
Sampler Initials:

Maxxam Job #: A954794
Report Date: 2009/10/16

RESULTS OF CHEMICAL ANALYSES OF FILTER

Maxxam ID		R04450	R04484	R04485	R04486	R04487	R04488	R04489		R04490	R04491	R04492
Sampling Date		17/08/2009	23/08/2009	29/08/2009	04/09/2009	10/09/2009	16/09/2009	22/09/2009		17/08/2009	23/08/2009	29/08/2009
	Units	**DORIS - RP15486**	**DORIS - RP15277**	**DORIS - RP15480**	**DORIS - RP15576**	**DORIS - RP15550**	**DORIS - RP14323**	**DORIS - RP15109**	**RDL**	**DORIS - RP14351**	**DORIS - RP15545**	**DORIS - RP14335**
.												
Volume	m^3	2.50	2.50	2.50	2.50	2.50	2.50	2.50	0.01	22.70	22.80	22.80
PM2.5/10												
Particulate Matter	ug/m3	15	10	23	47	22	27	24	1	1.6	1.4	2.2
Particulate Matter	ug/filter	37	25	57	118	55	68	59	3	36	31	50

RDL = Reportable Detection Limit
Results relate only to the items tested.

	17/08/2009	**8/23/2009**	**8/29/2009**	**9/4/2009**	**9/10/2009**	**9/16/2009**	**9/22/2009**
Coarse Sample ID	**RP15486**	**RP15277**	**RP15480**	**RP15576**	**RP15550**	**RP14323**	**RP15109**
Fine Sample ID	**RP04490**	**RP15545**	**RP14335**	**RP14308**	**RP13274**	**RP14329**	**RP14322**

Coarse Volume	(m3)	2.5	2.5	2.5	2.5	2.5	2.5	2.5	0.01
Coarse PM	(ug/filter)	37	25	57	118	55	68	59	3
Fine Volume	(m3)	22.7	22.8	22.8	22.8	22.7	22.8	22.8	0.01
Fine PM	(ug/filter)	36	31	50	79	66	93	63	3
PM 2.5	(ug/m3)	1.59	1.36	2.19	3.46	2.91	4.08	2.76	
PM10 - PM2.5	(ug/m3)	1.31	0.85	2.04	4.32	1.89	2.28	2.06	
PM 10*	(ug/m3)	2.90	2.21	4.23	7.79	4.80	6.36	4.82	

*Calculations supplied by Tolga Olcay w/Rescan Environmental Services Ltd.

Appendix 2

Passive Ambient Air Quality Results

Rescan™
Engineers and Scientists

Maxxam Analytics

Your Project #: 2009/01/30 - 2009/03/01
Site: BOSTON CAMP/DORIS NORTH

Attention: CHRIS MADLAND
GOLDER ASSOCIATES LTD
#300 10525-170 ST.
EDMONTON, AB
CANADA T5P4W2

Report Date: 2009/04/03

CERTIFICATE OF ANALYSIS

MAXXAM JOB #: A912281
Received: 2009/03/19, 09:20

Sample Matrix: Air
Samples Received: 5

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Analytical Method
Determination of Dustfall	2	2009/03/27	2009/03/27		
Determination of Dustfall-mg/cm2/30 days	2	2009/03/27	2009/03/27		
Exposure (Number of days)	2	2009/03/27	2009/03/27		
NO2 Passive Analysis (1)	3	2009/03/24	2009/04/03		EDM SOP-0318
O3 Passive Analysis (1)	3	2009/03/27	2009/04/03		EDM SOP-0317
SO2 Passive Analysis (1)	3	2009/03/24	2009/04/03		EDM SOP-0319

(1) The detection limit is based on a 30 day sampling period.

Encryption Key

Levi Manchak
03 Apr 2009 15:55:57 -06:00

Please direct all questions regarding this Certificate of Analysis to your Project Manager.

LEVI MANCHAK,
Email:
Phone# (780) 378-8500

==========

Maxxam has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per section 5.10.2 of ISO/IEC 17025:2005(E), signing the reports. SCC and CALA have approved this reporting process and electronic report format.

For Service Group specific validation please refer to the Validation Signature Page

Total cover pages: 1

Sample Details/Parameters	Result	RDL	Units	Extracted	Analyzed	By	Batch
O12345 09BOSTON-002							
Sampling Date 2009/02/01							
Matrix AIR							
RESULTS OF CHEMICAL ANALYSES OF AIR							
Passive Monitoring							
Calculated NO2	<0.1	0.1	ppb	2009/03/24	2009/04/03		3010592
Calculated O3	34.8	0.1	ppb	2009/03/27	2009/04/03		3019622
Calculated SO2	0.1	0.1	ppb	2009/03/24	2009/04/03		3010587
O12346 09BOSTON-002DUP							
Sampling Date 2009/02/01							
Matrix AIR							
RESULTS OF CHEMICAL ANALYSES OF AIR							
Passive Monitoring							
Calculated NO2	0.2	0.1	ppb	2009/03/24	2009/04/03		3010592
Calculated O3	32.1	0.1	ppb	2009/03/27	2009/04/03		3019622
Calculated SO2	<0.1	0.1	ppb	2009/03/24	2009/04/03		3010587
O12348 09BOSTONDF-002							
Sampling Date 2009/02/01							
Matrix AIR							
RESULTS OF CHEMICAL ANALYSES OF AIR							
Industrial							
Exposure	30	1	days	2009/03/27	2009/03/27		3019620
Dustfall Determination							
Total Dustfall	3	1	mg	2009/03/27	2009/03/27		3019617
Total Dustfall (30 day)	0.037	0.001	mg/cm2/30day	2009/03/27	2009/03/27		3019618
Total Fixed Dustfall	1	1	mg	2009/03/27	2009/03/27		3019617
Total Fixed Dustfall (30 day)	0.015	0.001	mg/cm2/30day	2009/03/27	2009/03/27		3019618
O12360 09DORIS-002							
Sampling Date 2009/01/30							
Matrix AIR							
RESULTS OF CHEMICAL ANALYSES OF AIR							
Passive Monitoring							
Calculated NO2	1.6	0.1	ppb	2009/03/24	2009/04/03		3010592
Calculated O3	0.7	0.1	ppb	2009/03/27	2009/04/03		3019622
Calculated SO2	<0.1	0.1	ppb	2009/03/24	2009/04/03		3010587
O12367 09DORISDF-002							
Sampling Date 2009/01/30							
Matrix AIR							
RESULTS OF CHEMICAL ANALYSES OF AIR							
Industrial							
Exposure	30	1	days	2009/03/27	2009/03/27		3019620
Dustfall Determination							
Total Dustfall	2	1	mg	2009/03/27	2009/03/27		3019617
Total Dustfall (30 day)	0.022	0.001	mg/cm2/30day	2009/03/27	2009/03/27		3019618
Total Fixed Dustfall	<1	1	mg	2009/03/27	2009/03/27		3019617
Total Fixed Dustfall (30 day)	0.007	0.001	mg/cm2/30day	2009/03/27	2009/03/27		3019618

General Comments

Results relate only to the items tested.

Maxxam Analytics

GOLDER ASSOCIATES LTD
Attention: CHRIS MADLAND
Client Project #: 2009/01/30 - 2009/03/01
P.O. #:
Site Reference: BOSTON CAMP/DORIS NORTH

Quality Assurance Report

Maxxam Job Number: PA912281

QA/QC Batch Num Init	QC Type	Parameter	Date Analyzed yyyy/mm/dd	Value	Recovery	Units	QC Limits
3010587 DF4	Calibration Check	Calculated SO2	2009/03/24		101	%	95 - 105
	SPIKE	Calculated SO2	2009/03/24		101	%	N/A
	BLANK	Calculated SO2	2009/03/24	<0.1		ppb	
3010592 DF4	Calibration Check	Calculated NO2	2009/03/24		101	%	76 - 118
	SPIKE	Calculated NO2	2009/03/24		101	%	N/A
	BLANK	Calculated NO2	2009/03/24	<0.1		ppb	
3019617 OZ	Calibration Check	Total Dustfall	2009/03/27		96	%	N/A
	BLANK	Total Dustfall	2009/03/27	<1		mg	
	RPD [O12348-01]	Total Dustfall	2009/03/27	NC		%	N/A
		Total Fixed Dustfall	2009/03/27	NC		%	N/A
3019622 OZ	Calibration Check	Calculated O3	2009/03/27		98	%	91 - 107
	SPIKE	Calculated O3	2009/03/27		101	%	N/A
	BLANK	Calculated O3	2009/03/27	<0.1		ppb	

N/A = Not Applicable
NC = Non-calculable
RPD = Relative Percent Difference

Maxxam Analytics

Validation Signature Page

Maxxam Job #: A912281

The analytical data and all QC contained in this report were reviewed and validated by the following individual(s).

LINDA LIN, Supervisor, Centre for Passive Sampling Technology

==========

Maxxam has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per section 5.10.2 of ISO/IEC 17025:2005(E), signing the reports. SCC and CALA have approved this reporting process and electronic report format.

Maxxam Analytics

Your Project #: 1009-002-02
Site: BOSTON CAMP/DORIS NORTH

Attention: DAN JARRATT
RESCAN ENVIRONMENTAL SERVICES LTD.
SIXTH FLOOR
1111 WEST HASTINGS STREET
VANCOUVER, BC
CANADA V6E 2J3

Report Date: 2009/06/03

CERTIFICATE OF ANALYSIS

MAXXAM JOB #: A924670
Received: 2009/05/26, 10:54

Sample Matrix: Air
Samples Received: 5

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Analytical Method
Determination of Dustfall	2	2009/06/01	2009/06/01		
Determination of Dustfall-mg/cm2/30 days	2	2009/06/01	2009/06/01		
Exposure (Number of days)	2	2009/06/01	2009/06/01		
NO2 Passive Analysis (1)	3	2009/06/01	2009/06/03		EDM SOP-0318
O3 Passive Analysis (1)	3	2009/06/01	2009/06/03		EDM SOP-0317
SO2 Passive Analysis (1)	3	2009/06/01	2009/06/03		EDM SOP-0319

* RPDs calculated using raw data. The rounding of final results may result in the apparent difference.

(1) The detection limit is based on a 30 day sampling period.

Encryption Key

Levi Manchak
04 Jun 2009 13:13:45 -06:00

Please direct all questions regarding this Certificate of Analysis to your Project Manager.

LEVI MANCHAK,
Email:
Phone# (780) 378-8500

==========

Maxxam has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per section 5.10.2 of ISO/IEC 17025:2005(E), signing the reports. SCC and CALA have approved this reporting process and electronic report format.

Total cover pages: 1

Maxxam Analytics

Maxxam Job #: A924670
Report Date: 2009/06/03

RESCAN ENVIRONMENTAL SERVICES LTD.
Client Project #: 1009-002-02
Site Reference: BOSTON CAMP/DORIS NORTH

RESULTS OF CHEMICAL ANALYSES OF AIR

Maxxam ID		O92909	O92910	O92912		
Sampling Date		2009/03/30	2009/03/30	2009/03/30		
	Units	**09BOSTON-004**	**09BOSTON-004DUP**	**08BOSTONDF-004**	**RDL**	**QC Batch**
Industrial						
Exposure	days			32	1	3161202
Dustfall Determination						
Total Dustfall	mg			4	1	3161307
Total Dustfall (30 day)	mg/cm2/30day			0.048	0.001	3161308
Total Fixed Dustfall	mg			3	1	3161307
Total Fixed Dustfall (30 day)	mg/cm2/30day			0.034	0.001	3161308
Passive Monitoring						
Calculated NO2	ppb	3.2	2.8		0.1	3161311
Calculated O3	ppb	28.1	23.2		0.1	3161312
Calculated SO2	ppb	<0.1	<0.1		0.1	3161316

RDL = Reportable Detection Limit

Maxxam ID		O92913	O92914		
Sampling Date		2009/03/31	2009/03/31		
	Units	**09DORIS-004**	**09DORISDF-004**	**RDL**	**QC Batch**
Industrial					
Exposure	days		30	1	3161202
Dustfall Determination					
Total Dustfall	mg		2	1	3161307
Total Dustfall (30 day)	mg/cm2/30day		0.029	0.001	3161308
Total Fixed Dustfall	mg		2	1	3161307
Total Fixed Dustfall (30 day)	mg/cm2/30day		0.022	0.001	3161308
Passive Monitoring					
Calculated NO2	ppb	0.2		0.1	3161311
Calculated O3	ppb	30.7		0.1	3161312
Calculated SO2	ppb	<0.1		0.1	3161316

RDL = Reportable Detection Limit

General Comments

Sample names taken from sample labels due to chain of custody names corresponding to previous sample set names.

Results relate only to the items tested.

Maxxam Analytics

RESCAN ENVIRONMENTAL SERVICES LTD.
Attention: DAN JARRATT
Client Project #: 1009-002-02
P.O. #:
Site Reference: BOSTON CAMP/DORIS NORTH

Quality Assurance Report

Maxxam Job Number: PA924670

QA/QC Batch Num	Init	QC Type	Parameter	Date Analyzed yyyy/mm/dd	Value	Recovery	Units	QC Limits
3161307	OZ	Calibration Check	Total Dustfall	2009/06/01		98	%	N/A
		BLANK	Total Dustfall	2009/06/01	<1		mg	
			Total Fixed Dustfall	2009/06/01	<1		mg	
3161311	OZ	Calibration Check	Calculated NO2	2009/06/03		96	%	76 - 118
		SPIKE	Calculated NO2	2009/06/03		99	%	N/A
		BLANK	Calculated NO2	2009/06/03	<0.1		ppb	
3161312	OZ	Calibration Check	Calculated O3	2009/06/03		99	%	91 - 107
		SPIKE	Calculated O3	2009/06/03		100	%	N/A
		BLANK	Calculated O3	2009/06/03	<0.1		ppb	
3161316	OZ	Calibration Check	Calculated SO2	2009/06/03		100	%	95 - 105
		SPIKE	Calculated SO2	2009/06/03		98	%	N/A
		BLANK	Calculated SO2	2009/06/03	<0.1		ppb	

N/A = Not Applicable

Maxxam Analytics

Your Project #: 1009-002-02
Site: BOSTON CAMP/DORIS NORTH

Attention: DAN JARRATT
RESCAN ENVIRONMENTAL SERVICES LTD.
SIXTH FLOOR
1111 WEST HASTINGS STREET
VANCOUVER, BC
CANADA V6E 2J3

Report Date: 2009/07/23

CERTIFICATE OF ANALYSIS

MAXXAM JOB #: A934201
Received: 2009/07/06, 12:17

Sample Matrix: Air
Samples Received: 5

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Analytical Method
Determination of Dustfall	2	2009/07/20	2009/07/20		
Determination of Dustfall-mg/cm2/30 days	2	2009/07/20	2009/07/20		
Exposure (Number of days)	2	2009/07/07	2009/07/20		
NO2 Passive Analysis (1)	3	2009/07/16	2009/07/23		EDM SOP-0318
O3 Passive Analysis (1)	2	2009/07/10	2009/07/23		EDM SOP-0317
O3 Passive Analysis (1)	1	2009/07/15	2009/07/23		EDM SOP-0317
SO2 Passive Analysis (1)	3	2009/07/17	2009/07/23		EDM SOP-0319

* RPDs calculated using raw data. The rounding of final results may result in the apparent difference.

(1) The detection limit is based on a 30 day sampling period.

Encryption Key

Levi Manchak
23 Jul 2009 16:11:19 -06:00

Please direct all questions regarding this Certificate of Analysis to your Project Manager.

LEVI MANCHAK,
Email:
Phone# (780) 378-8500

==========

Maxxam has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per section 5.10.2 of ISO/IEC 17025:2005(E), signing the reports. SCC and CALA have approved this reporting process and electronic report format.

Total cover pages: 1

Maxxam Analytics

Maxxam Job #: A934201
Report Date: 2009/07/23

RESCAN ENVIRONMENTAL SERVICES LTD.
Client Project #: 1009-002-02
Site Reference: BOSTON CAMP/DORIS NORTH
Sampler Initials: JT

RESULTS OF CHEMICAL ANALYSES OF AIR

Maxxam ID		P64521	P64522	P64524		
Sampling Date		2009/06/02	2009/06/21	2009/06/02		
	Units	**09BOSTON-006**	**09BOSTON-006DUP**	**08BOSTONDF-006**	**RDL**	**QC Batch**
Industrial						
Exposure	days			26	1	3257502
Dustfall Determination						
Total Dustfall	mg			4	1	3285535
Total Dustfall (30 day)	mg/cm2/30day			0.057	0.001	3285536
Total Fixed Dustfall	mg			3	1	3285535
Total Fixed Dustfall (30 day)	mg/cm2/30day			0.045	0.001	3285536
Passive Monitoring						
Calculated NO2	ppb	<0.1	0.2		0.1	3278330
Calculated O3	ppb	20.7	<0.1		0.1	3264513
Calculated SO2	ppb	<0.1	<0.1		0.1	3280236

RDL = Reportable Detection Limit

Maxxam ID		P64525	P64526		
Sampling Date		2009/06/01	2009/06/01		
	Units	**09DORIS-006**	**09DORISDF-006**	**RDL**	**QC Batch**
Industrial					
Exposure	days		29	1	3257502
Dustfall Determination					
Total Dustfall	mg		4	1	3285535
Total Dustfall (30 day)	mg/cm2/30day		0.046	0.001	3285536
Total Fixed Dustfall	mg		2	1	3285535
Total Fixed Dustfall (30 day)	mg/cm2/30day		0.030	0.001	3285536
Passive Monitoring					
Calculated NO2	ppb	<0.1		0.1	3278330
Calculated O3	ppb	28.5		0.1	3275596
Calculated SO2	ppb	0.1		0.1	3280236

RDL = Reportable Detection Limit

Maxxam Analytics

Maxxam Job #: A934201
Report Date: 2009/07/23

RESCAN ENVIRONMENTAL SERVICES LTD.
Client Project #: 1009-002-02
Site Reference: BOSTON CAMP/DORIS NORTH
Sampler Initials: JT

General Comments

Sample P64522-01: Notes on field sheet state duplicate not deployed until 2009/06/21.

Results relate only to the items tested.

Maxxam Analytics

RESCAN ENVIRONMENTAL SERVICES LTD.
Attention: DAN JARRATT
Client Project #: 1009-002-02
P.O. #:
Site Reference: BOSTON CAMP/DORIS NORTH

Quality Assurance Report

Maxxam Job Number: PA934201

QA/QC Batch Num	Init	QC Type	Parameter	Date Analyzed yyyy/mm/dd	Value	Recovery	Units	QC Limits
3264513	OZ	Calibration Check	Calculated O3	2009/07/10		101	%	91 - 107
		SPIKE	Calculated O3	2009/07/10		96	%	N/A
		BLANK	Calculated O3	2009/07/10	<0.1		ppb	
3275596	OZ	Calibration Check	Calculated O3	2009/07/15		100	%	91 - 107
		SPIKE	Calculated O3	2009/07/15		102	%	N/A
		BLANK	Calculated O3	2009/07/15	<0.1		ppb	
3278330	DF4	Calibration Check	Calculated NO2	2009/07/16		99	%	76 - 118
		SPIKE	Calculated NO2	2009/07/16		100	%	N/A
		BLANK	Calculated NO2	2009/07/16	<0.1		ppb	
3280236	DF4	Calibration Check	Calculated SO2	2009/07/17		99	%	95 - 105
		SPIKE	Calculated SO2	2009/07/17		103	%	N/A
		BLANK	Calculated SO2	2009/07/17	<0.1		ppb	
3285535	OZ	Calibration Check	Total Dustfall	2009/07/20		94	%	N/A
		BLANK	Total Dustfall	2009/07/20	<1		mg	
			Total Fixed Dustfall	2009/07/20	<1		mg	
		RPD [P64524-01]	Total Dustfall	2009/07/20	NC		%	N/A
			Total Fixed Dustfall	2009/07/20	NC		%	N/A

N/A = Not Applicable
NC = Non-calculable
RPD = Relative Percent Difference

Maxxam Analytics

Your Project #: 1009-002-02
Site: BOSTON CAMP/DORIS NORTH

Attention: DAN JARRATT
RESCAN ENVIRONMENTAL SERVICES LTD.
SIXTH FLOOR
1111 WEST HASTINGS STREET
VANCOUVER, BC
CANADA V6E 2J3

Report Date: 2009/07/23

CERTIFICATE OF ANALYSIS

MAXXAM JOB #: A934204
Received: 2009/07/06, 12:28

Sample Matrix: Air
Samples Received: 5

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Analytical Method
Determination of Dustfall	2	2009/07/20	2009/07/20		
Determination of Dustfall-mg/cm2/30 days	2	2009/07/20	2009/07/20		
Exposure (Number of days)	2	2009/07/07	2009/07/20		
NO2 Passive Analysis (1)	3	2009/07/16	2009/07/23		EDM SOP-0318
O3 Passive Analysis (1)	3	2009/07/15	2009/07/23		EDM SOP-0317
SO2 Passive Analysis (1)	3	2009/07/17	2009/07/23		EDM SOP-0319

* RPDs calculated using raw data. The rounding of final results may result in the apparent difference.

(1) The detection limit is based on a 30 day sampling period.

Encryption Key

Levi Manchak
23 Jul 2009 16:10:25 -06:00

Please direct all questions regarding this Certificate of Analysis to your Project Manager.

LEVI MANCHAK,
Email:
Phone# (780) 378-8500

==========

Maxxam has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per section 5.10.2 of ISO/IEC 17025:2005(E), signing the reports. SCC and CALA have approved this reporting process and electronic report format.

Total cover pages: 1