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January 29, 2015 File: L020

Dave Fox
Acting Head Environmental Assessment North
Environment Canada
5019 52nd St
P.O. Box 2310
Yellowknife, Northwest Territories
X1A 2P7

Mathew Seaboyer
Air Quality Programs Coordinator
Government of the Northwest Territories
Environment and Natural Resources
5102 – 50th Ave,
Yellowknife, Northwest Territories
X1A 2L9

Dear Mr. Fox and Mr. Seaboyer:

Re: De Beers - Snap Lake Mine
Incinerator Stack Testing

De Beers Canada Inc. (De Beers) Snap Lake Mine committed to conducting incineration stack testing in 2014 for its two (2) Ketek incinerators (model CY-100-CA) that were installed in 2013. De Beers is pleased to provide the following incinerator stack testing summary for your information.

Desired Emissions Targets in the NWT:

Air quality management and emissions are important global considerations, and as a company De Beers strives in mine planning to minimize our operational footprint. With regards to air emissions there are currently no regulated emissions standards, or enabling legislation in the Northwest Territories for incinerators. De Beers notes that the Mackenzie Valley Land and Water Board (MVLWB) does not regulate air emissions in the Northwest Territories.

As per the Environmental Agreement, De Beers Air Quality and Emission Monitoring Management Plan (AQEMMP) and Programs are to correspond with Articles VI Section 6.3 d) and e) and Article VI Section 7.2 part a).

Section 3.2 of the AQEMMP, requires De Beers to conduct Emission Estimates at the Snap Lake Mine, which was approved by the GNWT and EC. The AQEMMP states in Section 3.2 item 4) the emission estimate is "*to demonstrate De Beers' commitment to ongoing minimization of emissions.*"

The AQEMMP; Section 3.2.2.5 Dioxins, Furans and Mercury Calculation Methods states that De Beers would conduct *"intermittent"* stack sampling to estimate incinerator emissions and compare this to the Canadian Council of the Minsters of Environment (CCME) Canada Wide Standards for Dioxins, Furans and Mercury Emissions.

Deficiencies, as measured against the Canada Wide Standards, will be managed through adaptive management and continuous improvement by De Beers.

Air Emissions Monitoring:

A. Lanfranco and Associates Inc. (Lanfranco) of Surrey British Columbia, were retained to conduct the stack testing of the camp waste incinerators at the Snap Lake Mine. A final report was issued in September 2014 and has been included as Appendix I. A summary of the Mercury, Dioxin and Furan results are provided in Table 1.

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Table 1: Stack Testing Results- Snap Lake Mine Camp Waste Incinerators									
		Incinerator 1				Incinerator 2			
Parameter	Units	Trial 1	Trial 2	Trial 3	Average	Trial 1	Trial 2	Trial 3	Average
Mercury (corrected to 11%O_2)	ug/m^3	0.02	0.03	0.07	**0.04**	0.04	0.04	0.04	**0.04**
Temperature (Secondary Unit)	°C	996	1003	980	**993**	997	994	1005	**999**
Dioxins and Furans TEQ (corrected to 11%O_2)	pg/m^3	84	580	902	**522**	1482	7921	6258	**5220**

DE BEERS CANADA INC.
300, 5102 – 50TH AVENUE, YELLOWKNIFE, NT, X1A 3S8
TEL 1 (867) 766-7300 FAX 1 (867) 766-7347
www.debeerscanada.com

Stack Testing Results Summary:

Based upon the incinerator stack testing conducted by Lanfranco, the camp waste incinerators at the Snap Lake mine have dioxin and furan emissions above the CCME Canada Wide Standards (CWS)(80 pg/m^3); Incinerator 1 (522 pg/m^3) and Incinerator 2 (5220 pg/m^3) exceed this standard.

For Mercury emissions the CWS is 20 ug/m^3. Both incinerator 1 (0.04 ug/m^3) and incinerator 2 (ug/m^3) were well below this limit.

De Beers Adaptive Management Approach:

De Beers has committed to employing adaptive management as a core principle when operational issues arise with respect to air quality management as per Article VI, Section 7.2 of the Environmental Agreement. As a result of the elevated Dioxin and Furan emissions noted in the Lanfranco report, an adaptive management response has been triggered consisting of evaluation of results and adjustment of management practices to implement solutions.

Root Cause Analysis for Elevated Dioxins and Furans:

De Beers' root cause analysis began with a detailed analysis of the Lanfranco stack testing report. From the report two key issues were identified that may have resulted in elevated results for dioxin and furans:

1. Opaque smoke: Black opaque smoke was noted for all tests early in the incineration cycle.

2. Temperature: The incineration equipment did not consistently achieve primary (600°C) and secondary (1000°C) minimum temperatures for the complete destruction of dioxin and furans.

De Beers explored the potential deficiencies looking for commonality between the two issues; opaque smoke and low temperature as both issues were consistent themes that were identified as potential causes of the elevated levels of dioxins and furans. Upon investigation, a primary cause of opaque smoke is insufficient temperature as indicated in the Ketek manual. Lanfranco noted in their report that if the insufficient primary and secondary temperatures were rectified this may reduce the amount of dioxin and furan production. This is consistent with Environment Canada's *Technical Document for Batch Waste Incineration* where it states "*It is known that at temperatures in excess of 600C, any PCDD/F will be destroyed*"

A detailed internal root cause analysis was conducted to determine the main cause of elevated dioxin/furans identified during the incinerator testing. It is important to note

that both incinerators had undergone a routine inspection by the manufacturer one week prior to stack testing.

The root cause was:

1. Not following standardized work practices.

Adaptive Management Response:

To rectify the condition and emphasize the importance of standardized work procedures, all site services staff with responsibilities for the camp incinerator were retrained, and detailed instructions were incorporated into the operators Safety Health and Environment Operating Procedure (SHEOP).

Specifically the SHEOP was modified to include:

- Visual confirmation check of refractory and secondary temperatures. If temperatures are not achieved during the incineration run, the operator must notify supervision and environment departments to determine the cause of the failure. If safe to do so the incineration run should be shut down.

- Visual confirmation and Inspection of the refractory, nozzles and air intakes to ensure that they are intact and no blockages are present.

- A supervisory check has been included for the removal of ash after each incineration run.

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Conclusion:

De Beers is committed to ensuring that waste management practices at the Snap Lake Mine are protective of the environment. De Beers notes that currently in the NWT stack testing is not a regulated practice, and in the interim De Beers will ensure that its commitments to our stakeholders are upheld through the Environmental Agreement, Land and Water Board Authorizations and through consultation with our partners. De Beers highlights that it will conform with any regulatory requirements regarding incinerator stack testing once enabling legislation is developed and approved in the NWT.

As a result of the Lanfranco report finalized in September 2014, De Beers has implemented operational practices aimed at addressing the root cause of the elevated dioxin and furan production.

As per the Environmental Agreement, De Beers had committed to performing intermittent stack testing as per Section 3.2.2.5 Dioxins, Furans and Mercury Calculation Methods of the AQEMMP. This letter and attached report satisfies the commitment made by the Snap Lake Mine. De Beers will continue to employ best management practices and adaptive management based upon the findings of this study. Additionally De Beers will continue to improve standard practices to maintain camp waste incinerators operation at optimal levels. This report fulfills De Beers commitment for the Environmental Agreement to stack test the new Ketek incinerators installed in 2013.

Should you have any questions, comments or require further clarification, please do not hesitate to contact me at 767-8646 or email me at the following address: Alexandra.Hood@debeerscanada.com

Sincerely,

Alexandra Hood
Environment and Permitting Superintendant
Snap Lake Mine

Cc:

S. LaceyMcMillan	EC
P.di Pizzo, Z. Liu	SLEMA

Appendices
Appendix I – Lanfranco

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300, 5102 – 50TH AVENUE, YELLOWKNIFE, NT, X1A 3S8
TEL 1 (867) 766-7300 FAX 1 (867) 766-7347
www.debeerscanada.com

EMISSION COMPLIANCE SURVEY MONITORING REPORT
(De Beers, Snap Lake Incinerators)
(July 2014)

Prepared for

De Beers Group of Companies Canada

Yellowknife, NT

Prepared by

A. LANFRANCO & ASSOCIATES INC.

Surrey, B.C.

September 2014

Certification

The monitoring of the incinerators was conducted by three (two certified) stack test technicians.

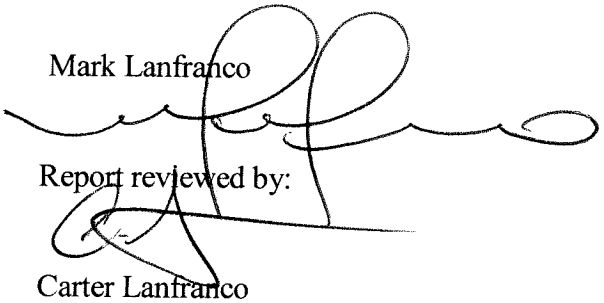
The field crew consisted of,

Mr. C. Lanfranco (certified), Mr. L. Agassiz (certified) and Mr. S. Ferguson.

The report was prepared by Mr. M. Lanfranco using reporting principles and guidelines generally acceptable to Environment Canada and US EPA. Final report review was conducted by Mr. C. Lanfranco.

The field crew certifies that the test methods used were Environment Canada or EPA reference methods for the parameters investigated.

Mark Lanfranco



Report reviewed by:

Carter Lanfranco

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SUMMARY

The following table presents the triplicate test averages for the listed parameters from the Westland Incinerator stacks at Snap Lake on July 11-15, 2014.

PARAMETER	Incinerator 1	Incinerator 2	CWS Emission Limits
Particulate (mg/Rm^3 @ 11% O_2)	59.8	79.3	N/A
Particulate (Kg/hr)	0.095	0.129	N/A
Hg (ug/Rm^3 @ 11% O_2)	**0.04**	**0.04**	**20**
Hg (g/hr)	<0.0001	<0.0001	N/A
Flowrate (Rm^3/min) *	18.4 (18.1)*	17.2 (17.4)*	N/A

PARAMETER	Incinerator 1	Incinerator 2	CWS Emission Limits
PCDD & PCDF TEQ (pg/Rm3 @11% O_2)	**522**	**5220**	**80**

* PCDD Flowrate results

N/A = not applicable
See Tables 1 and 2 for individual results

Note: values presented in boldface are results which have CWS permitted limits.

Concentrations and flow rates are expressed at standard conditions of 25°C and 101.3 "KPa (dry).

Rm^3 = reference cubic meter

1.0 INTRODUCTION

De Beers Mining Canada retained A. Lanfranco and Associates Inc. of Surrey, B.C., Canada to conduct an emission monitoring survey at the refuse incinerators located at Snap Lake, NT. The purpose of the survey was to measure and report emission levels of particulate, dioxins/furans (PCDD/PCDF), and mercury from the incinerator stacks during the firing of a normal mixture of camp refuse.

The survey is the initial emission monitoring of the incinerators in response to the emission survey requirements of the Canada Wide Standards (CWS). The CWS require, by 2006, emission measurements of dioxin/furan and mercury.

This report documents the methods used and results determined for triplicate stack samples from the twin incinerator stacks collected on July 11-15, 2014

The report also presents QA/QC results for spiked samples and all blank samples.

2.0 PROCESS DESCRIPTION/TEST OPERATIONS

The incinerators operated at Snap Lake were twin Model CY100CA D - two stage incinerators. The incinerators utilize a primary combustion chamber and secondary afterburner section, and are equipped with a six meter (nominal) refractory lined smokestack.

Following cleaning, and prior to waste introduction, the secondary chamber was pre-heated to approximately 1000 °C. The waste was manually introduced to the primary chamber via the main charge door prior to primary ignition. Testing commenced at a pre-determined time and once the primary chamber reached the 600°C set point.

Approximately 254 to 480 kg of waste, including a mixture of wet and dry waste described as "household waste" were loaded for each day. The operating procedure requires that each charge of waste to be incinerated during a twenty four hour time period.

The day to day test schedule for **Incinerator 1** was:

Date	Charge Size (weighed)	Test Matrix
July 11, 2014	480 kg	one dioxin/furan test and one Hg test
July 12, 2014	410 kg	one dioxin/furan test and one Hg test
July 13, 2014	454 kg	one dioxin/furan test and one Hg test

The day to day test schedule for **Incinerator 2** was:

Date	Charge Size (weighed)	Test Matrix
July 13, 2014	370 kg	one dioxin test and one Hg test
July 14, 2014	390 kg	one dioxin/furan test and two Hg tests
July 15, 2014	254 kg	one dioxin/furan test

note: O_2/CO_2, temperatures and velocities measured throughout the test program with EC reference techniques.

Waste Feed Charging Schedule and Test Start Times

In general, the incinerator was charged and the system was allowed to stabilize for about fifteen to twenty minutes prior to sample commencement. Once charged initially, the incinerator was not recharged during the emission survey. In other words, samples were collected during the first six hours of the incineration process. Details of the sampling initiation are as follows:

Incinerator 1

D/F Test 1 – July 11, 2014 commenced 60 minutes after Primary ignition
D/F Test 2 – July 12, 2014 commenced 40 minutes after Primary ignition
D/F Test 3 – July 13, 2014 commenced 20 minutes after Primary ignition
PM/Hg Test 1 – July 11, 2014 commenced 100 minutes after Primary ignition
PM/Hg Test 2 – July 12, 2014 commenced 60 minutes after Primary ignition
PM/Hg Test 3 – July 13, 2014 commenced 20 minutes after Primary ignition

Incinerator 2

D/F Test 1 – July 13, 2014 commenced 20 minutes after Primary ignition
D/F Test 2 – July 14, 2014 commenced 40 minutes after Primary ignition
D/F Test 3 – July 15, 2014 commenced 60 minutes after Primary ignition
PM/Hg Test 1 – July 13, 2014 commenced 20 minutes after Primary ignition
PM/Hg Test 2 – July 14, 2014 commenced 60 minutes after Primary ignition
PM/Hg Test 3 – July 15, 2014 commenced 100 minutes after Primary ignition

3.0 METHODOLOGY

The sampling and analytical methods used throughout this survey conform to the procedures outlined in the Environment Canada emission monitoring reference method manuals, and supplementary EPA reference methods. Specifically, the methods used were:

Parameter	Reference Method
Particulate Matter/Mercury	EPS Method 8 with EPA Method 29 (metals)
Sample and velocity traverse points	EPS Method 8 A
Velocity and flowrate	EPS Method 8 B
Oxygen (O_2 for corrections to 11%)	EPA CTM 34 (as approved by Env. Canada)
Gas molecular weight (O_2/CO_2)	EPS Method 8 C
Flue gas Moisture	EPS Method 8 D
Dioxin/furan	EPS Method 1/RM/2 with 1/RM/3 analysis

3.1 Preparation Techniques

The preparation, cleaning, and proofing of the sampling equipment and materials is an integral part of the quality assurance/quality control (QA/QC) component of each stack survey. Following are details of the cleaning and proofing of relevant sample train components.

Organic (Dioxin) Train Glassware

1. Washed twice with industrial strength cleaner/detergent
2. Rinsed with generous amounts of deionized H_2O
3. Rinsed three times with methylene chloride
4. Rinsed three times with hexane
5. Rinsed three times with acetone
6. Oven baked at 300°C overnight
7. Rinsed three times with hexane (saved for proofing)
8. Rinsed three times with acetone (saved for proofing)

Amberlite XAD-2

1. Rinsed and extracted with deionized H_2O
2. Soxhlet extraction with methanol, methylene chloride and toluene (22 hrs each)
3. Nitrogen purge
4. Oven dried @ 50°C
5. Approx. 40 gram aliquot saved for proofing
6. Individual sample traps packed and spiked with surrogate regime

Organic filters

1. Soxhlet extraction (16 hrs) with toluene
2. Nitrogen drying
3. Save 1 filter for proofing

Metal Train Glassware

1. Hot detergent wash with brushing
2. Rinse with 0.1 N HNO_3
3. Copious rinsing with deionized H_2O
4. Oven drying at 105°C

Metal Train Filters

1. Overnight extraction with 1:1 nitric acid
2. Overnight rinsing with deionized H_2O
3. Drying for 2 hrs @ 105°C, desiccation and weighing
4. Save 1 filter for blank

Other Glassware

1. Hot detergent wash with brushing
2. Copious deionized H_2O rinses

3.2 Sampling Techniques

Following are brief descriptions of the reference method sampling techniques utilized to collect the various samples. The techniques employed for isokinetic sampling of particulate/metals and dioxin/furan from this source were consistent and complied with the previously referenced stack testing methods.

EPS Method 8a - Sampling Site and Traverse Points

The stack sampling location was located about 7.3 diameters downstream and 1.8 diameters upstream of the nearest flow disturbances. From these criteria, and measured stack diameters of 16.0 inches, and Figure A-1 of EPS Method A, a 24 point sampling regime, where 12 points along 2 - 90° traverses were sampled for each isokinetic stack test. Test point locations for the incinerator stacks are presented in the following table.

Point	Distance from Wall
1	0.3 used 1.0 inch
2	1.1
3	1.9
4	2.8
5	4.0
6	5.7
7	10.3
8	12.0
9	13.2
10	14.1
11	14.9
12	15.7 used 15.0 inch

EPS Method 8b - Stack Gas Velocity and Volumetric Flowrate

At each traverse point a series of measurements including stack temperature, velocity pressure, static pressure, and sampling rate were recorded. Velocity and static pressures were measured with a calibrated S-type pitot tube mounted alongside the sample probe. Stack temperatures were measured with a calibrated K-type chromel-alumel thermocouple with a control console mounted digital readout. Cyclonic flow angles were measured using the null velocity technique.

EPS Method 8c/EPA CTM 34 - Molecular Weight by Gas Analysis

Stack gas molecular weight for O_2 was determined by the portable CEM system and was validated by a series of grab samples which were analyzed on site for O_2 and CO_2 by Fyrite analyzers. A minimum of four to a maximum of eight grab samples per traverse were collected. O_2 readings were taken every ten to fifteen minutes and were hand entered on the field data sheets. The Fyrite Tech Analytical O_2 analysers were calibrated (zero and span) at one to two hour intervals as required by EPA CTM 34. Compressed N_2 was used for zero, and ambient air was used for span. The CEM system results were averaged for insertion in the computer programs for final result calculations and corrections to 11% O_2.

EPS Method 8d - Moisture Content

Stack gas moisture content was determined from the measured condensed water vapour which was collected in the impinger (cold box) section of the sampling trains, and the gas volume sampled corrected to standard conditions of 25°C and 101.3 KPa (dry).

The contaminants investigated during this survey were collected with two independent sampling trains as follows:

EPS 1/RM/2 - Dioxin/Furan

This sample train was assembled and leak checked at the laboratory the night prior to testing. Prior to sampling initiation, the stack train was assembled as shown in Figure 1 and leak checked to code specifications. The probe (quartz lined) and filter module were heated to 120 +/- 15°C and crushed ice was placed around the impingers. Iced water was circulated in the condenser and in a cooling jacket around the XAD cartridge. Once the sampling system achieved the appropriate temperatures the probe tip was positioned at point No.1, isokinetic sampling was performed using the K_o orifice constant sampling procedure. A set of recordings was taken every five minutes until two sets of readings for each sample point of traverse one was achieved. The sample pump was shut off and the sample module with attached probe was withdrawn from the stack.

The system was repositioned at point No. 1 of the next traverse and an additional 120 (12 points for 10 minutes each) minutes of sampling commenced. This regime was continued until both sample ports had been sampled. The total sample volume for each PCDD/PCDF test was 4.2 to 4.8 Rm^3.

At the conclusion of the final traverse sampling the train was final leak checked and the probe was disassembled from the hot box/sample module.

Any open ends of the sampling module and probe assembly were immediately sealed with pre-cleaned aluminium foil or teflon tape, and leak checks were conducted with only teflon tape touching the open ends.

At the conclusion of each test the sample module and probe were lowered from the stack location and were in transport to the laboratory without delay. Approximately twenty minutes elapsed from sample conclusion to sample delivery at the sample recovery "laboratory".

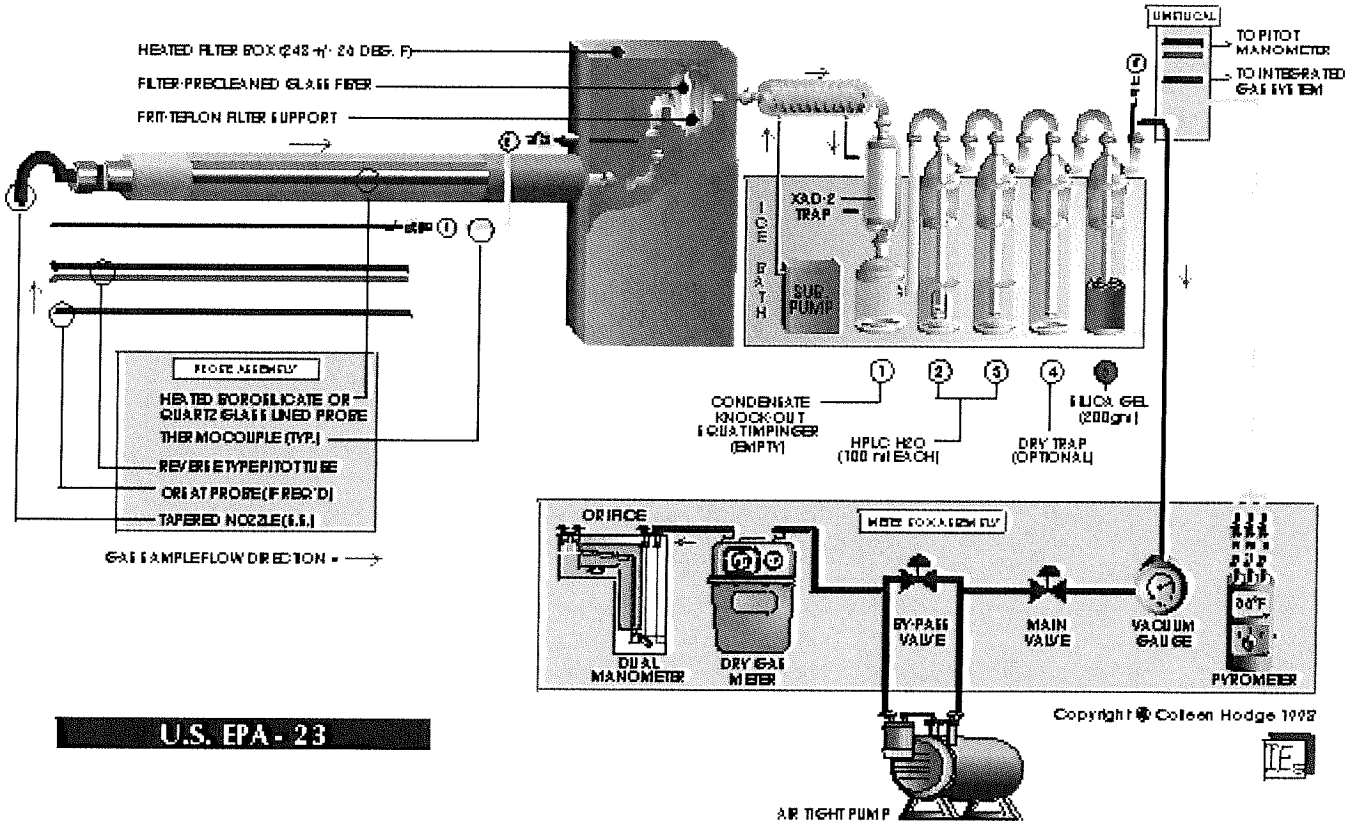


Figure 1 – Semi-Volatile (Dioxin/Furan) Sampling Train

Note – The above diagram depicts a US EPA 23 train. The train used for EC 1/RM/2 at Snap Lake is identical in all respects except that the two HPLC water impingers were replaced with one impinger containing 100 ml of ethylene glycol.

EPS Method 8/EPA 29 - Particulate, Hg

This train was a normal Method 29 train (Fig. 2) except special (low metal) microquartz glass filters were utilized and the impinger components were:

Incinerator Stack Impingers

100 ml 5% HNO_3 in 10% H_2O_2
100 ml 5% HNO_3 in 10% H_2O_2
Empty
100 ml 4% $KMnO_4$ in 10% H_2SO_4
100 ml 4% $KMnO_4$ in 10% H_2SO_4
100 ml distilled H_2O
200 g silica gel

The train was operated isokinetically, sampling a total of 12 points on 2 - 90° traverses for five minutes each, resulting in final sample volumes of about 2.5 to 2.8 Rm^3. Data recordings were conducted at five minute intervals. The train utilized a three foot quartz probe and nozzle.

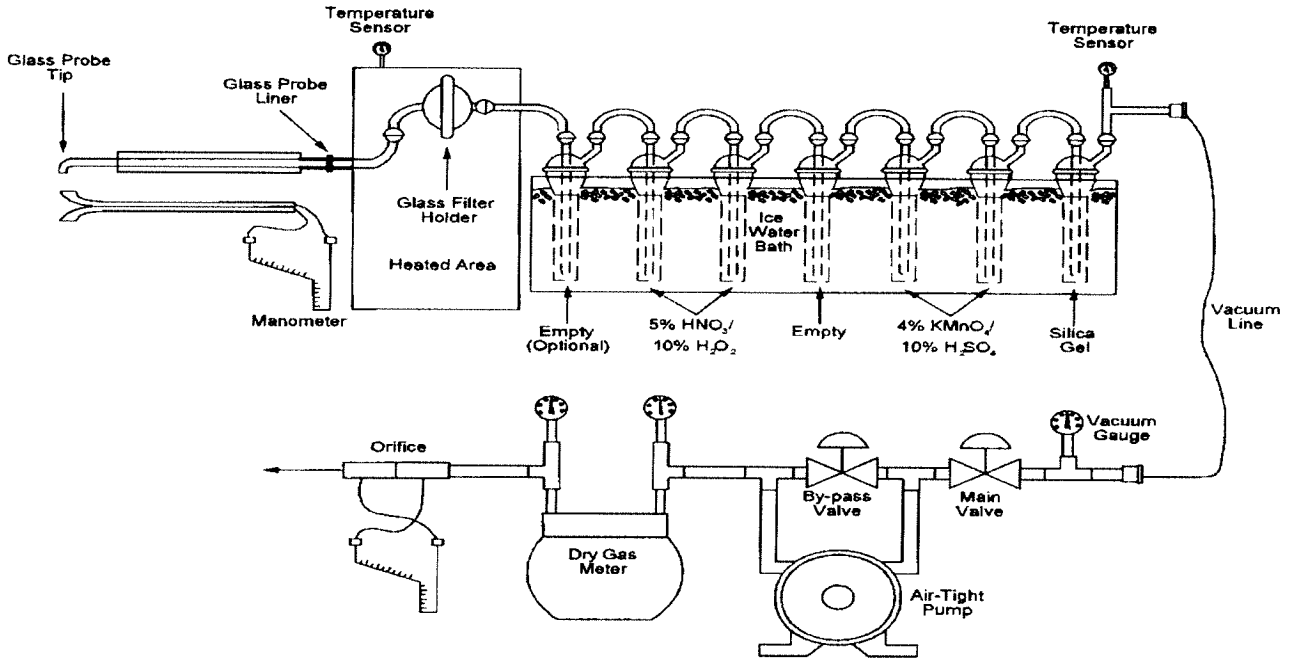


Figure 2: EPA Method 29 Particulate/Hg Sampling Train

3.3 Analytical and Sample Recovery Techniques

Following sampling for PCDD/PCDF, the sample train was sealed and transported to the field laboratory for sample recovery. At the laboratory the sample train was disassembled and six components were identified for each train. The recovery of each sample is described below:

1. Sample Filter: The exposed sample filter was removed from its holder with clean tweezers, placed on a sheet of aluminium foil, folded inside the foil and sealed in a glass petri dish. This was labelled component 1 of each test.

2. Front/Back Half Washings: This included a thorough acetone/hexane rinsing and brushing of the sample nozzle, probe liner, and connecting glassware prior to the filter. These washings were collected in a pre-cleaned one litre amber sample bottle with a teflon lined lid. This was labelled component 2 of each test. The back half of the filter holder and glassware connecting the filter holder to the condenser were rinsed and soaked with acetone and hexane with the solvents added to the component 2 sample bottle.

3. Amberlite XAD-2 Resin Trap: The resin trap was sealed with teflon tape, covered with aluminium foil and kept at about 4 °C prior to shipment to the analytical laboratory. This was labelled component 3 of each test.

4. Impinger Condensate: The condensate contained in the condensate trap, plus water and condensate from the impingers was measured for volume and collected in pre-cleaned amber bottles. These samples were labelled component 4 for each test.

5. Soak: The glassware connecting the filter to the XAD module was soaked with hexane and acetone sequentially, three times, with all "soaks" and rinses collected in 1 litre amber sample bottles.

6. Final Rinse: All glassware was rinsed with hexane and acetone, sequentially three times into amber sample bottles.

All samples were labelled appropriately and placed in a cold room at 4°C until analysis was initiated. Each bottle containing solvent was marked with the liquid level and the lid was sealed.

3.3.1 Organic Sample Analysis

The organic analysis of the sample train components involved an extremely complex series of procedures as detailed in the analytical manuals.

Following is a description, in very simplified terms, of the basic procedures used to process the sample train components.

Initially the sample components are separated into liquid (containers 2,4,5,6) or solid phases (containers 1 and 3) Figure 3. Solid samples are extracted with various solvents (usually toluene), sometimes under acid conditions. The liquid samples are extracted and concentrated with a rotary evaporator, with the final concentrate added to the filter and XAD components. At this point, an internal standard solution is added to the sample for QA/QC recovery determinations. The extraction and concentrating of the various train components are shown in Figure 4.

The toluene rinse has internal standards added, with subsequent concentration by rotary evaporation. The extract volumes are fractionated, cleaned-up and analyzed by high resolution GC/MS analytical instrumentation (Figure 5).

3.3.2 Particulate/Hg Sample Recovery/Analysis

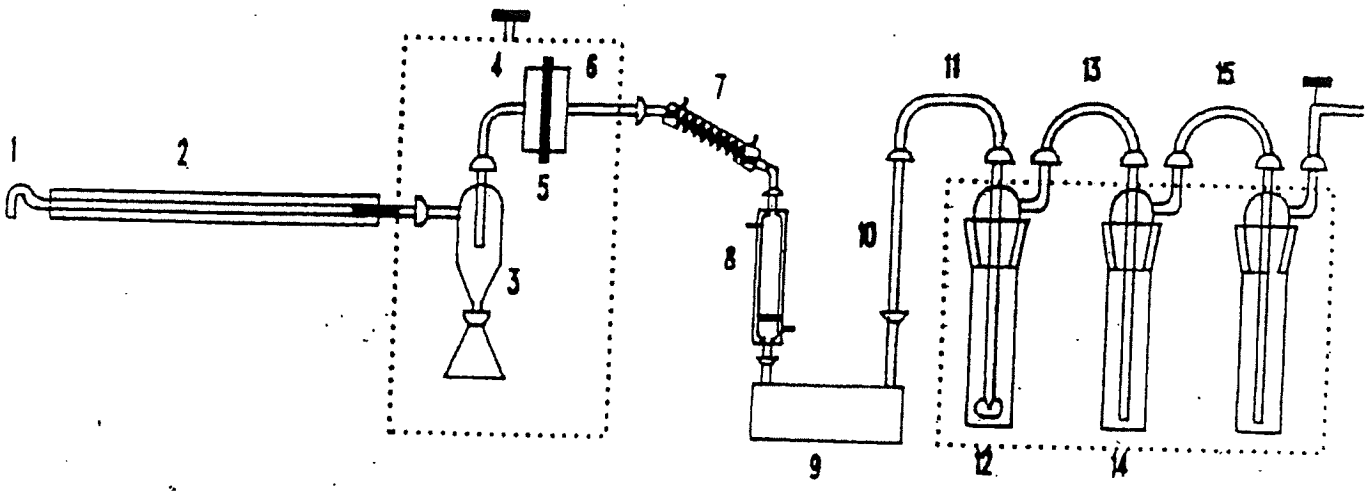
The particulate sample filters were removed from the cooled filter housing with teflon coated tweezers, with material retained on the gasket recovered with a nylon brush and added to the filter. The filter was folded and placed in an identified plastic petri dish or envelope labelled Container 1 with date, time and run number.

Sample clean-up of the probe and front half glassware from the Hg/particulate train was conducted with sequential rinses and brushings with acetone collected in Container 2.

Impingers 1 and 2 were measured for volume and transferred with about 100 ml of deionised water to a glass sample container. Impingers 3, 4, and 5 were transferred to a glass sample container using 100 ml potassium permanganate and water rinses. HCl rinses of the permanganate impingers were not conducted as visible deposits were effectively removed by the earlier rinsing.

Silica gel from the final impinger was transferred to its original container for final weighing.

Blank filters and solutions for each component of the particulate Hg test were collected and labelled appropriately.



Container or Sample	Component(s)	Recovery Procedure
1	1, 2, 3, 4	Wash and brush 3 times each with hexane (H) and acetone (A). Rinse 3 times each with H and A.
2	5	Remove carefully from holder. Place on pre-cleaned foil. Fold in half. Place in pre-cleaned glass petri dish.
3	6, 7	Soak 5 minutes each with H and A. Rinse 3 times each with H and A.
4	8	Cap ends and wrap in foil.
5	9, 12	Empty contents into container and rinse each 3 times with HPLC water.
6	6 to 15 except 8	Rinse 3 times each with H and A.

Mark liquid levels on all bottles.
All sample containers are pre-cleaned amber glass bottles with pre-cleaned Teflon lid liners.

FIGURE 3. SEMI-VOLATILE ORGANICS RECOVERY PROCEDURES

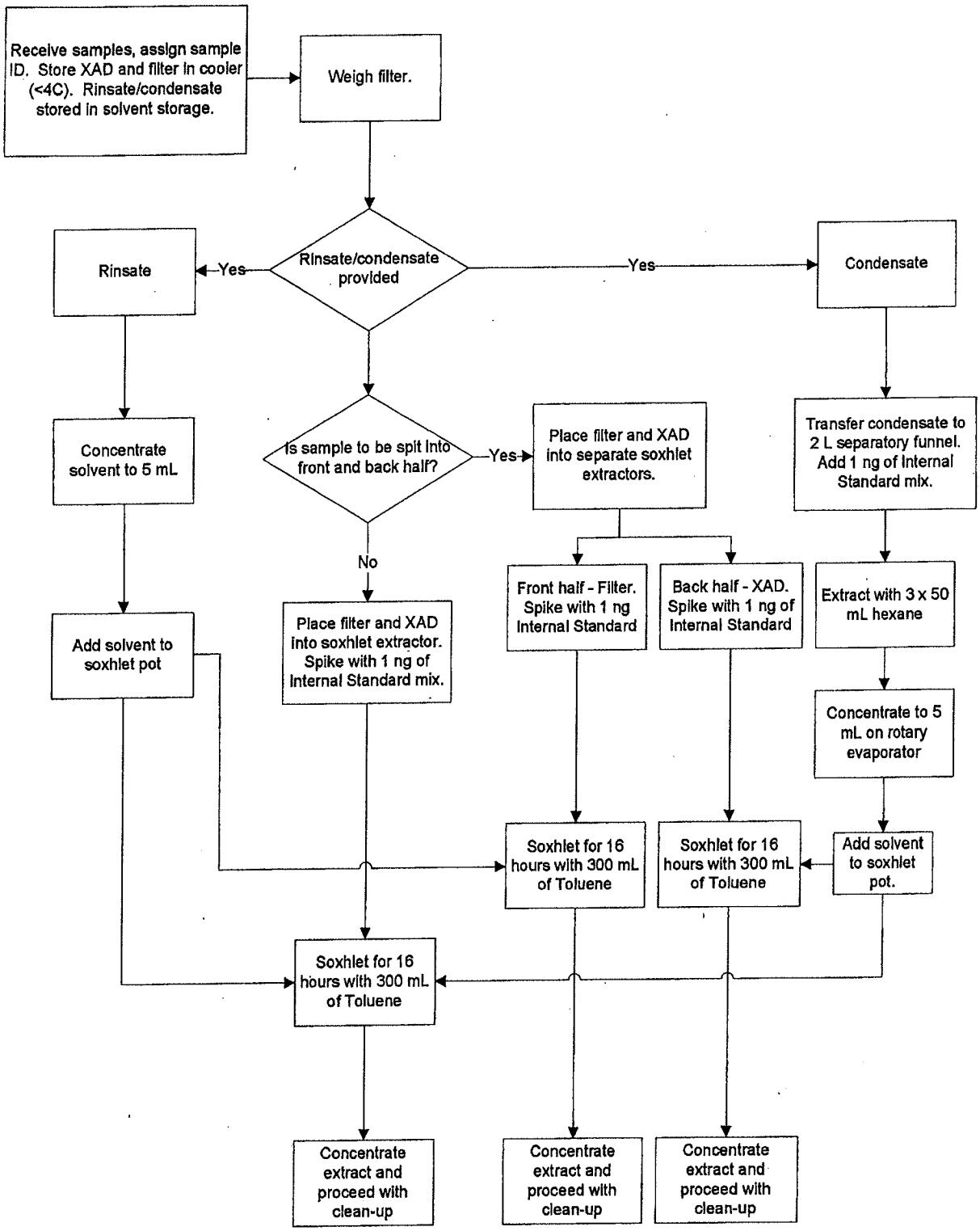


Fig 4 - Extraction schematic diagram for stack samples and components

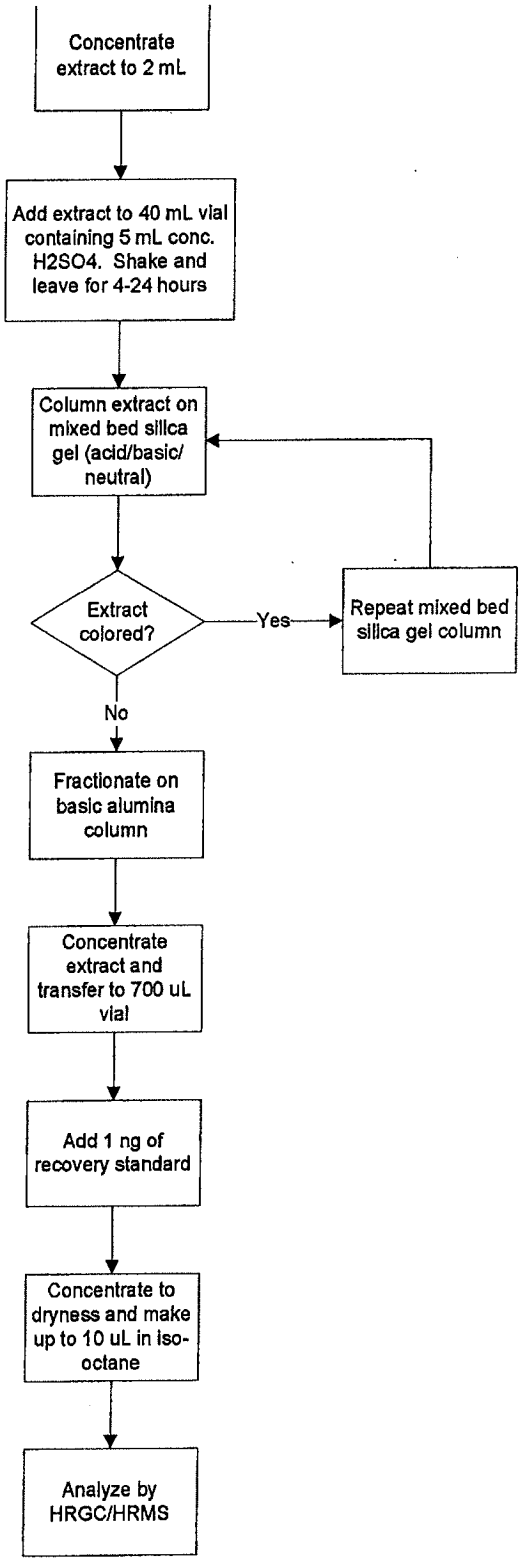


Fig. 5 Schematic of analytical methodology for Dioxin and Furan

Gravimetric Analysis

At A. Lanfranco and Associates Surrey, B.C. laboratory, the sample filters were desiccated to constant weight and weighed as per EPA Method 5. Probe and front-half acetone rinsings were evaporated at about 50 °C in tared, pre-cleaned 250 ml glass beakers, with subsequent weighing to constant weight. Blank filters and acetone were carried through the gravimetric process.

Hg Analysis

Following the gravimetric analysis, the filters and wash residues, along with the back half liquid samples were forwarded to Exova Laboratories in Surrey, B.C. for analysis of Hg. The samples and appropriate blanks were digested with acids and analyzed for Hg by ICAP procedures. Impingers 1, 2, 3, 4 and 5, for Hg, were analyzed at Exova using flameless atomic absorption.

3.4 Quality Assurance / Quality Control (QA/QC) Techniques

The QA/QC component of this survey was designed to exceed the requirements normally instituted by the regulatory agency. Additionally, QA/QC of this survey was accomplished by the following mechanisms.

1. Pre and Post-test leak checks
2. Calibration of volume measuring and monitoring instrumentation
3. Proofing of organic glassware and supplies (archived proofs)
4. Analysis of all blank solutions and materials
5. Spiking and recovery analysis of organic trains
6. Use of acid cleaned microquartz filters
7. Duplicate analysis of selected samples
8. Reference material analysis with samples
9. Labelling and record-keeping
10. Surrogate spiking of dioxin trains using EPA protocols
11. O2 analyser calibration using compressed zero gas

A "Blank" test was conducted, with that sampled analysed in the same manner as test samples.

4.0 RESULTS

Most of the stack testing results were calculated using a "STACK" computer program developed for EPA and Canadian requirements. Standard conditions used in the program are 25 °C and 29.92 "Hg (dry basis)

Corrections to 11% O_2 were calculated by multiplying the determined stack concentrations by;

$$\frac{20.9-11.0}{20.9-\text{measured } O_2}$$

Tables 1 and 2 present the detailed triplicate test data for Particulate, Hg, and flowrate, as well as supporting data such as temperatures, O_2/CO_2 and stack gas moistures.

PCDD/PCDF results are presented in Tables 1a and 2a. Tables 1a and 2a present the detailed triplicate test data for PCDD/PCDF in terms of actual amounts detected and toxic equivalents. In addition, all dioxin/furan results were recovery corrected according to surrogate recovery efficiencies determined for each organic analysis. Surrogates added and the recoveries determined are listed in the analytical data presented in the Appendices.

Table 3 presents particulate gravimetric results, and Table 4 presents process data.

Please note that data from the Hg and dioxin tests vary slightly for O_2, temperature and flowrates due to the timing of each test.

TABLE 1 INCINERATOR 1 EMISSION RESULTS

Parameter	Test 1	Test 2	Test 3	Average
Test Date	July. 11/14	July. 12/14	July. 13/14	
Test Time	13:50-16:00	10:26-14:05	14:50-17:13	
Duration (minutes)	120	120	120	120
Particulate (mg/Rm3)	68.2	78.9	111.1	86.1
Particulate (mg/Rm3 @ 11% O_2)	41.9	57.7	79.8	59.8
Particulate (Kg/hr)	0.078	0.085	0.123	0.095
Particulate (Kg/day)	1.9	2.0	2.9	2.3
Hg (ug/Rm3 @ 11% O2)	0.02	0.03	0.07	0.04
SO_x (mg/Rm3 @ 11% O_2)	56.0	73.0	35.0	54.7
Flowrate (Rm3/min)	19.0	18.0	18.4	18.4
Flowrate (acm/min)	97.0	90.8	91.4	93.1
Temperature (^{o}C)	996	1003	980	993
O_2 (vol % dry)	4.8	7.4	7.1	6.4
CO_2 (vol % dry)	11.0	9.8	10.3	10.4
H_2O (vol %)	11.9	11.2	11.7	11.6
Isokinetic Variation (%)	101.2	99.9	99.6	100

standard conditions of 25 deg C and 101.3kPa

TABLE 1a Detailed PCDD/PCDF Emission Results

Client: De Beers, Snap Lake
Jobsite: Snap Lake Mine
Source: Incinerator Stack #1

Component	TEF	Test 1 (July 11, 2014) Analyzed (ng)	Test 1 TEQ (ng)	Test 2 (July 12, 2014) Analyzed (ng)	Test 2 TEQ (ng)	Test 3 (July 13, 2014) Analyzed (ng)	Test 3 TEQ (ng)
2378 TCDD	1.0000	0.0010	0.0010	0.0540	0.0540	0.1300	0.1300
12378 PCDD	0.5000	0.2100	0.1050	1.0000	0.5000	0.7500	0.3750
123478 HxCDD	0.1000	0.2200	0.0220	1.6000	0.1600	0.8400	0.0840
123678 HxCDD	0.1000	0.2500	0.0250	1.1000	0.1100	1.4000	0.1400
123789 HxCDD	0.1000	0.2500	0.0250	0.9400	0.0940	1.1000	0.1100
1234678 HpCDD	0.0100	2.0000	0.0200	19.0000	0.1900	22.0000	0.2200
OCDD	0.0010	3.5000	0.0035	53.0000	0.0530	53.0000	0.0530
2378 TCDF	0.1000	0.1200	0.0120	0.2000	0.0200	0.5200	0.0520
12378 PCDF	0.0500	0.1600	0.0080	0.5900	0.0295	1.3000	0.0650
23478 PCDF	0.5000	0.3700	0.1850	1.3000	0.6500	2.5000	1.2500
123478 HxCDF	0.1000	0.3600	0.0360	1.7000	0.1700	3.5000	0.3500
123678 HxCDF	0.1000	0.4500	0.0450	3.1000	0.3100	4.9000	0.4900
234678 HxCDF	0.1000	0.8500	0.0850	7.6000	0.7600	12.0000	1.2000
123789 HxCDF	0.1000	0.1700	0.0170	1.2000	0.1200	2.8000	0.2800
1234678 HpCDF	0.0100	2.3000	0.0230	22.0000	0.2200	23.0000	0.2300
1234789 HpCDF	0.0100	0.3500	0.0035	3.2000	0.0320	11.0000	0.1100
OCDF	0.0010	1.2000	0.0012	21.0000	0.0210	45.0000	0.0450
Summed PCDD & PCDF TEQ (ng)			**0.617**		**3.494**		**5.184**
Sample Volume (Rm3)			**4.770**		**4.231**		**4.400**
PCDD & PCDF TEQ	**ng/Rm3**		**0.129**		**0.826**		**1.178**
PCDD & PCDF TEQ	**ng/Rm3 (@11% O2)**		**0.084**		**0.580**		**0.902**
PCDD & PCDF TEQ	**grams/day**		**0.000004**		**0.000021**		**0.000030**
Particulate	mg/dscm (@ 11% O2)		41.9		57.7		79.8
SOx	mg/dscm (@ 11% O2)		56.0		73.0		35.0
Hg	ug/dscm (@ 11% O2)		0.02		0.03		0.07
Flowrate (Rm3/min)			18.9		17.7		17.6
Oxygen (Vol. %)			5.6		6.8		8.0
Carbon Dioxide (Vol. %)			10.8		10.2		9.1
Carbon Monoxide (ppm)			0		0		0
Moisture (Vol. %)			11.5		12.0		11.9
Temperature (oC)			986.4		1008.2		990.7
Isokinetic Variation (%)			102.7		97.6		101.8

*Particulate emission results from Hg tests

TABLE 2 INCINERATOR 2 EMISSION RESULTS

Parameter	Test 1	Test 2	Test 3	Average
Test Date	July. 13/14	July. 14/14	July. 15/14	
Test Time	09:33-11:45	13:50-14:07	10:15-12:33	
Duration (minutes)	120	120	120	120
Particulate (mg/Rm3)	140.8	147.9	84.9	124.5
Particulate (mg/Rm3 @ 11% O_2)	80.3	99.3	58.2	79.2
Particulate (Kg/hr)	0.149	0.149	0.088	0.129
Particulate (Kg/day)	3.6	3.6	2.1	3.1
Hg (ug/Rm3 @ 11% O2)	0.04	0.04	0.04	0.04
SO_x (mg/Rm3 @ 11% O_2)	33.0	59.0	58.0	50.0
Flowrate (Rm3/min)	17.6	16.8	17.3	17.2
Flowrate (acm/min)	91.8	86.0	90.0	89.3
Temperature (^{o}C)	997	994	1005	999
O_2 (vol % dry)	3.5	6.2	6.5	5.4
CO_2 (vol % dry)	12.9	10.8	10.7	11.5
H_2O (vol %)	14.7	13.2	13.0	13.6
Isokinetic Variation (%)	104.9	102.4	100.6	103

standard conditions of 25 deg C and 101.3kPa

TABLE 2a Detailed PCDD/PCDF Emission Results

Client: De Beers, Snap Lake
Jobsite: Snap Lake Mine
Source: Incinerator Stack #2

Component	TEF	Test 1 (July 13, 2014) Analyzed (ng)	Test 1 TEQ (ng)	Test 2 (July 14, 2014) Analyzed (ng)	Test 2 TEQ (ng)	Test 3 (July 15, 2014) Analyzed (ng)	Test 3 TEQ (ng)
2378 TCDD	1.0000	0.3400	0.3400	9.2000	9.2000	2.2000	2.2000
12378 PCDD	0.5000	1.8000	0.9000	20.0000	10.0000	14.0000	7.0000
123478 HxCDD	0.1000	3.9000	0.3900	6.8000	0.6800	16.0000	1.6000
123678 HxCDD	0.1000	4.6000	0.4600	11.0000	1.1000	24.0000	2.4000
123789 HxCDD	0.1000	3.4000	0.3400	7.8000	0.7800	16.0000	1.6000
1234678 HpCDD	0.0100	64.0000	0.6400	45.0000	0.4500	69.0000	0.6900
OCDD	0.0010	127.0000	0.1270	47.0000	0.0470	117.0000	0.1170
2378 TCDF	0.1000	2.3000	0.2300	34.0000	3.4000	7.4000	0.7400
12378 PCDF	0.0500	4.2000	0.2100	38.0000	1.9000	17.0000	0.8500
23478 PCDF	0.5000	4.9000	2.4500	25.0000	12.5000	20.0000	10.0000
123478 HxCDF	0.1000	6.5000	0.6500	22.0000	2.2000	23.0000	2.3000
123678 HxCDF	0.1000	8.5000	0.8500	23.0000	2.3000	25.0000	2.5000
234678 HxCDF	0.1000	15.0000	1.5000	21.0000	2.1000	34.0000	3.4000
123789 HxCDF	0.1000	3.2000	0.3200	5.2000	0.5200	11.0000	1.1000
1234678 HpCDF	0.0100	36.0000	0.3600	33.0000	0.3300	40.0000	0.4000
1234789 HpCDF	0.0100	12.0000	0.1200	10.0000	0.1000	29.0000	0.2900
OCDF	0.0010	70.0000	0.0700	41.0000	0.0410	69.0000	0.0690
Summed PCDD & PCDF TEQ (ng)			**9.957**		**47.648**		**37.256**
Sample Volume (Rm3)			**4.482**		**4.333**		**4.423**
PCDD & PCDF TEQ	**ng/Rm3**		**2.221**		**10.997**		**8.423**
PCDD & PCDF TEQ	**ng/Rm3 (@11% O2)**		**1.482**		**7.921**		**6.258**
PCDD & PCDF TEQ	**grams/day**		**0.000057**		**0.000273**		**0.000207**
Particulate	mg/dscm (@ 11% O2)		80.3		99.3		58.2
SOx	mg/dscm (@ 11% O2)		33.0		59.0		58.0
Hg	ug/dscm (@ 11% O2)		0.04		0.04		0.04
Flowrate (Rm3/min)			17.9		17.2		17.1
Oxygen (Vol. %)			6.1		7.2		7.6
Carbon Dioxide (Vol. %)			10.6		10.2		10.0
Carbon Monoxide (ppm)			0		0 to 1200		0
Moisture (Vol. %)			12.3		12.2		12.4
Temperature (oC)			1000.9		1016.9		1012.8
Isokinetic Variation (%)			102.0		99.8		102.7

Table 3 Incinerator Stack Particulate Gravimetric Results

Test No.	Filter Particulate (mg)	Probe and Washings (mg)	Total Particulate (mg)
Incinerator 1			
1	94.9	99.2	194.1
2	97.2	112.5	209.7
3	147.6	154.8	302.4
Incinerator 2			
1	207.4	178.4	385.8
2	208.7	168.6	377.3
3	107.2	111.6	218.8

Table 4 Process Summary

	Nominal for all Tests
Incinerator 1	
Primary Temp.	600 °C
Secondary Temp	1000 °C
Load Type	normal mixture of camp refuse.
Load Size (approx)	448 kg
Load Rate	19 kg/hr (nominal)
Incinerator 2	
Primary Temp.	600 °C
Secondary Temp	1000 °C
Load Type	normal mixture of camp refuse.
Load Size (approx)	338 kg
Load Rate	14 kg/hr (nominal)

Detailed process data is presented in Appendix 4.

4.1 QA/QC Results

Pre and Post Test Leak Checks

Each test is required to be leak checked prior to, and following the test. The leak checks must show less than 0.02 cfm. All tests passed the code leak check requirements. Evidence of the leak checks is shown on each data sheet of appendix 4.

Equipment Calibrations

All emission monitoring equipment used for the Snap Lake camp incinerator emission monitoring was calibrated to Environment Canada specifications. Dry gas meters, pitot tubes and temperature measuring devices were calibrated within four months of the test date. See appendix 5

Proofing of Dioxin Glassware and Supplies

Although not required by Nunavut/GNWT, it is our practice to verify that the glassware and sorbent used in dioxin tests is free of contamination. Proofs of the glassware and XAD are implied by the very low Blank sample results of appendix 3.

Analysis of Blank Materials and Reagents

All blank materials and reagents yielded very low or non-detectable levels of target species.

Spiking and Recovery of Dioxin/Furan Surrogates

The recovery of the labelled surrogate samples ranged from 81 to 119. These recoveries comply with EPA Method 23 requirements of 70 to 130%. In addition, all data was recovery corrected for each congener. Recoveries of all internal standards ranged from 52 to 93%, complying with EPS 1/RM/2 and Method 23 requirements of 25 to 130% recovery.

Spiking and Recovery Assessments of Inorganic Samples

Blanks of all reagents used for sample collection were spiked to known contaminant concentrations and analyzed with the source samples. Normally a high and low spike was conducted. The various recoveries are reported on the analytical data in appendix 2. In summary the results are:

	Spike 1	Spike 2	Cert Ref. Mat.
Hg	96 % recovery	100 % recovery	2.32 measured for 2.42 ug true 6.88 measured for 6.88 ug true

Chain of Custody

All samples were in the possession of the stack test team until relinquishing to the courier/shipping companies used. The samples were inspected on arrival, and shipping containers were observed to be sealed on arrival, with no apparent tampering or sample loss in shipment.

Field Calibrations of O_2 Analyser

Field calibrations of the portable O_2 analyser were conducted according to the zero and span calibrations stipulated in EPA CTM 34. The O_2 analyser easily complied with the Performance Specification of +/- 0.3% drift between calibrations,

Dioxin Analytical Column

The dioxin analytical laboratory, Pacific Rim Laboratories of Surrey, B.C. used a Restek Dioxin-2 analytical column to quantify all D/F congeners, as required by the Environment Canada QA/QC document EPS 1/RM/23. This Environment Canada document requires that interfering peaks be resolved before reporting D/F concentrations.

5.0 DISCUSSION OF RESULTS

This survey was an investigation of specific emitted contaminants during the firing of waste materials normally disposed of in the Snap Lake camp incinerators. The survey included monitoring of contaminants required by Canada Wide Standards (CWS), namely dioxin/furan and mercury.

The incinerator tested, consisted of Primary and Secondary (afterburner) chambers. The combustion chambers use diesel fuel as the primary fuel.

Compliance Status

Based on the CWS and the "Guidelines for the Management of Biomedical Waste in the Northwest Territories", the test results showed that the emissions were in compliance for Hg. All six test runs for PCDD/DF at Snap Lake were above allowable limits for dioxin/furans.

Mercury

The average Hg emissions at Snap Lake were 0.04 ug/Rm^3 @ 11% O_2. Compared to the emission standard of 20 ug/Rm^3 @ 11% O_2, these results should be considered very low.

Mercury was found at levels above method detection limits, yielding confident quantification of Hg at the levels measured. The Hg emission results suggest that the waste feed Hg content was very low, however.

Dioxin/Furan

At Snap Lake, the Incinerator 1 average dioxin/furan emissions was 522 pg/Rm^3 @ 11% O_2, compared to an emission standard of 80 pg/Rm^3 @ 11% O_2. Interestingly the average was determined from a nearly compliant Test 1 (84 pg/Rm^3) and two significantly high DF tests. The Incinerator 2 average dioxin emission was 5220 pg/ Rm^3 @ 11% O_2 with a maximum DF level of 7921 pg/Rm^3 for test 2 from this source. This test was the only test where elevated CO was observed.

Closer monitoring of the waste stream would likely drastically increase the effectiveness of the incinerators. Segregating the waste material and controlling moisture content is highly recommended, while materials of particular concern such as polyvinyl chloride and copper (known dioxin catalysts) should be processed minimally.

Close attention to both Primary and Secondary chamber temperatures should be observed, as the technicians often recorded temperatures below the advised specification of 600 deg. C Primary and 1100 deg. C Secondary.

The technicians also observed periods of extremely elevated opacity (black plume) coinciding with low Oxygen measurements, suggesting poor combustion conditions towards the beginning of sampling (during high opacity). It is likely a large percentage of the contaminants were collected during these "less than optimum" combustion periods.

Further process data is not easily formatted for reporting purposes and is available upon request.

General

Research into dioxin emissions from combustion sources has generally shown that dioxin is formed in two manners. The first mechanism is known as the "Precursor mechanism" where there is incomplete combustion and dioxin is formed by reactions of chlorine and organic aromatic compounds. The second mechanism is known as "DeNovo Synthesis", where dioxin formation reactions occur post-combustor, in the air pollution control systems at temperatures between 200 and 450 °C.

Another well documented condition leading to higher than expected D/F emissions is known as the "memory effect". The "memory effect" phenomenon occurs when prior operating conditions and residual emitted materials effect the subsequent test periods. In the case of batch systems, like camp incinerators, the type and amounts of waste material used in several previous burn loads (before the compliance test) could significantly impact the results of the first series of compliance tests.

The QA/QC program was successful in showing excellent analytical accuracy, in proving the avoidance of any significant sample contamination, and in maintaining leak free sampling procedures. The analysis of the dioxin/furan samples indicated complete recovery by virtue of excellent surrogate recoveries for the compounds of interest.

There were no problems encountered in sample collection or analysis and validation of the field study is provided, in large part, by the analytical QA/QC program and the use of calibrated test equipment by qualified monitoring professionals. The test results, therefore, are reported with confidence and are considered an accurate representation of emission characteristics for the process conditions maintained on the test dates.

APPENDIX 1

COMPUTER OUTPUTS OF MEASURED

AND CALCULATED DATA

Client:	De Beers, Snap Lake	**Date:**	July. 11/14
Jobsite:	Snap Lake Mine	**Run:**	1 PCDD/PCDF
Source:	Incinerator Stack #1	**Run Time:**	13:10-17:20

Concentration:	0.00 mg/dscm	0.0000 gr/dscf
	0.00 mg/Acm	0.0000 gr/Acf
	0.00 mg/dscm (@ 11% O2)	0.0000 gr/dscf (@ 11% O2)
Emission Rate:	0.00 Kg/hr	0.000 lb/hr
Sample Gas Volume:	4.7703 dscm	168.462 dscf
Total Sample Time:	240.0 minutes	
Average Isokineticity:	102.7 %	

Flue Gas Characteristics

Moisture:	11.54 %	
Temperature	986.4 oC	1807.5 oF
Flow	18.9 dscm/min	669 dscf/min
	0.32 dscm/sec	11.1 dscf/sec
	95.8 Acm/min	3382 Acf/min
Velocity	12.306 m/sec	40.37 f/sec
Gas Analysis	5.63 % O2	10.80 % CO2
	29.952 Mol. Wt (g/gmole) Dry	28.573 Mol. Wt (g/gmole) Wet

*** Standard Conditions:** Metric: 25 deg C, 101.325 kPa
Imperial: 77 deg F, 29.92 in.Hg

A. Lanfranco and Associates Inc. - Emission Report

Client: De Beers, Snap Lake
Jobsite: Snap Lake Mine
Source: Incinerator Stack #1

Date: July. 11/14
Run: 1 PCDD/PCDF
Run Time: 13:10-17:20

Control Unit (Y)	1.0101
Nozzle Diameter (in.)	0.5113
Pitot Factor	0.8463
Baro. Press. (in. Hg)	28.25
Static Press. (in. Hg)	0.06
Stack Height (ft)	25
Stack Diameter (in.)	16.0
Stack Area (sq.ft.)	1.396
Minutes Per Reading	5.0
Minutes Per Point	10.0

Collection:

Filter (grams)	**0.0000**
Washings (grams)	**0.0000**
Impinger (grams)	**0.0000**
Total (grams)	**0.0000**

Gas Analysis (Vol. %):

	CO2	O2
Trav 1	11.25	4.56
Trav 2	10.34	6.69
Average =	**10.80**	**5.63**

Condensate Collection:

Impinger 1 (grams)	416.0
Impinger 2 (grams)	30.0
Impinger 3 (grams)	0.0
Impinger 4 (grams)	12.0
Total Gain (grams)	**458.0**

Traverse	Point	Time (min.)	Dry Gas Meter (ft3)	Pitot ^P (in. H2O)	Orifice ^H (in. H2O)	Dry Gas Temperature Inlet (oF)	Outlet (oF)	Vacuum (in. Hg.)	XAD Exit (oF)	Stack (oF)	Wall Dist. (in.)	Isokin. (%)
		0.0	851.412									
1	1	5.0	855.140	0.110	1.83	66	66	4	45	1750	0.3	105.9
		10.0	858.700	0.110	1.83	67	67	4	45	1779	0.3	101.6
	2	15.0	862.420	0.120	1.86	68	68	4	48	1780	1.1	101.4
		20.0	866.140	0.120	1.86	68	68	4	48	1794	1.1	101.8
	3	25.0	869.710	0.110	1.70	66	66	4	50	1797	1.9	102.4
		30.0	873.430	0.120	1.85	66	66	4	50	1798	1.9	102.2
	4	35.0	877.210	0.120	1.87	67	67	4	54	1830	2.8	104.4
		40.0	880.990	0.120	1.87	68	68	4	54	1888	2.8	105.5
	5	45.0	884.780	0.120	1.87	68	68	4	48	1900	4.0	106.1
		50.0	888.560	0.120	1.87	68	68	4	48	1905	4.0	105.9
	6	55.0	892.350	0.120	1.87	68	68	4	50	1910	5.7	106.3
		60.0	896.140	0.120	1.87	69	69	4	50	1915	5.7	106.2
	7	65.0	899.760	0.110	1.72	68	68	4	54	1920	10.3	106.2
		70.0	903.540	0.120	1.87	68	68	4	54	1760	10.3	102.6
	8	75.0	907.160	0.110	1.72	69	69	5	56	1735	12.0	101.8
		80.0	910.790	0.110	1.72	70	70	5	56	1720	12.0	101.6
	9	85.0	914.420	0.110	1.72	70	70	6	60	1717	13.2	101.5
		90.0	918.050	0.110	1.72	70	70	6	60	1800	13.2	103.4
	10	95.0	921.670	0.110	1.72	70	70	6	58	1770	14.1	102.4
		100.0	925.450	0.120	1.87	71	71	6	58	1770	14.1	102.3
	11	105.0	929.230	0.120	1.87	71	71	6	54	1766	14.9	102.2
		110.0	933.010	0.120	1.87	71	71	6	54	1750	14.9	101.8
	12	115.0	936.790	0.120	1.87	71	71	6	48	1750	15.7	101.8
		120.0	940.570	0.120	1.87	71	71	6	48	1788	15.7	102.7
		0.0	940.570									
2	1	5.0	944.310	0.120	1.83	71	71	7	52	1792	0.3	101.7
		10.0	948.070	0.120	1.83	72	72	8	52	1790	0.3	102.0
	2	15.0	951.830	0.120	1.83	72	72	8	54	1756	1.1	101.2
		20.0	955.570	0.120	1.83	73	73	8	54	1737	1.1	100.0
	3	25.0	959.150	0.110	1.68	72	72	7	54	1788	1.9	101.3
		30.0	962.730	0.110	1.68	73	73	7	54	1885	1.9	103.3
	4	35.0	966.510	0.120	1.87	72	72	8	48	1775	2.8	102.2
		40.0	970.290	0.120	1.87	73	73	8	48	1876	2.8	104.3
	5	45.0	973.910	0.110	1.72	73	73	10	48	1775	4.0	102.0
		50.0	977.490	0.110	1.68	73	73	10	48	1830	4.0	102.1
	6	55.0	980.910	0.100	1.53	72	72	10	50	1775	5.7	101.2
		60.0	984.330	0.100	1.53	71	71	10	50	1832	5.7	102.7
	7	65.0	987.570	0.090	1.38	70	70	10	52	1821	10.3	102.4

		70.0	990.900	0.095	1.45	70	70	10			52	1800	10.3	102.0
	8	75.0	994.140	0.090	1.38	70	70	10			54	1783	12.0	101.6
		80.0	997.380	0.090	1.38	70	70	10			54	1780	12.0	101.5
	9	85.0	1000.560	0.090	1.32	70	70	10			57	1915	13.2	102.6
		90.0	1003.800	0.090	1.38	70	70	10			57	1819	13.2	102.4
	10	95.0	1007.220	0.100	1.53	70	70	10			56	1840	14.1	103.0
		100.0	1010.810	0.110	1.68	70	70	10			56	1800	14.1	102.3
	11	105.0	1014.560	0.120	1.83	70	70	12			50	1800	14.9	102.3
		110.0	1018.140	0.110	1.68	70	70	12			50	1793	14.9	101.8
	12	115.0	1021.590	0.100	1.53	70	70	12			48	1806	15.7	103.2
		120.0	1024.940	0.100	1.46	70	70	12			48	1900	15.7	102.2
			Average:	0.111	1.720	69.9	69.9	7.1			52.0	1807.5		102.7

Client:	De Beers, Snap Lake	**Date:**	July. 12/14
Jobsite:	Snap Lake	**Run:**	2 PCDD/PCDF
Source:	Incinerator Stack #1	**Run Time:**	10:06-14:20

Concentration:	0.00 mg/dscm	0.0000 gr/dscf
	0.00 mg/Acm	0.0000 gr/Acf
	0.00 mg/dscm (@ 11% O2)	0.0000 gr/dscf (@ 11% O2)
Emission Rate:	0.00 Kg/hr	0.000 lb/hr
Sample Gas Volume:	4.2309 dscm	149.414 dscf
Total Sample Time:	240.0 minutes	
Average Isokineticity:	97.6 %	

Flue Gas Characteristics

Moisture:	11.99 %	
Temperature	1008.2 oC	1846.8 oF
Flow	17.7 dscm/min	625 dscf/min
	0.29 dscm/sec	10.4 dscf/sec
	90.7 Acm/min	3204 Acf/min
Velocity	11.656 m/sec	38.24 f/sec
Gas Analysis	6.80 % O2	10.21 % CO2
	29.906 Mol. Wt (g/gmole) Dry	28.478 Mol. Wt (g/gmole) Wet

*** Standard Conditions:** Metric: 25 deg C, 101.325 kPa
Imperial: 77 deg F, 29.92 in.Hg

A. Lanfranco and Associates Inc. - Emission Report

Client: De Beers, Snap Lake
Jobsite: Snap Lake
Source: Incinerator Stack #1

Date: July. 12/14
Run: 2 PCDD/PCDF
Run Time: 10:06-14:20

Control Unit (Y)	1.0101
Nozzle Diameter (in.)	0.5113
Pitot Factor	0.8463
Baro. Press. (in. Hg)	28.50
Static Press. (in. Hg)	0.06
Stack Height (ft)	25
Stack Diameter (in.)	16.0
Stack Area (sq.ft.)	1.396
Minutes Per Reading	5.0
Minutes Per Point	10.0

Collection:

Filter (grams)	**0.0000**
Washings (grams)	**0.0000**
Impinger (grams)	**0.0000**
Total (grams)	**0.0000**

Gas Analysis (Vol. %):

	CO2	O2
Trav 1	12.21	4.46
Trav 2	8.21	9.14
Average =	**10.21**	**6.80**

Condensate Collection:

Impinger 1 (grams)	372.0
Impinger 2 (grams)	36.0
Impinger 3 (grams)	2.0
Impinger 4 (grams)	14.0
Total Gain (grams)	**424.0**

Traverse	Point	Time (min.)	Dry Gas Meter (ft3)	Pitot ^P (in. H2O)	Orifice ^H (in. H2O)	Dry Gas Temperature Inlet (oF)	Outlet (oF)	Vacuum (in. Hg.)	XAD Exit (oF)	Stack (oF)	Wall Dist. (in.)	Isokin. (%)
		0.0	25.845									
1	1	5.0	28.820	0.075	1.17	78	78	3	41	1776	0.3	101.2
		10.0	31.810	0.080	1.20	79	79	4	41	1819	0.3	99.3
	2	15.0	34.890	0.085	1.27	81	81	4	41	1865	1.1	99.8
		20.0	38.030	0.090	1.32	81	81	4	41	1906	1.1	99.8
	3	25.0	40.990	0.080	1.20	81	81	4	42	1932	1.9	100.3
		30.0	44.140	0.090	1.32	83	83	5	42	1950	1.9	100.7
	4	35.0	47.280	0.090	1.32	84	84	5	42	1955	2.8	100.3
		40.0	50.470	0.085	1.33	86	86	5	42	1548	2.8	95.2
	5	45.0	53.730	0.090	1.41	87	87	5	43	1745	4.0	99.0
		50.0	56.800	0.080	1.25	88	88	6	43	1713	4.0	97.9
	6	55.0	60.060	0.090	1.41	90	90	6	48	1784	5.7	99.3
		60.0	63.400	0.095	1.48	91	91	6	48	1754	5.7	98.2
	7	65.0	66.710	0.100	1.46	92	92	6	53	1916	10.3	98.1
		70.0	70.180	0.110	1.61	92	92	6	53	1955	10.3	98.9
	8	75.0	73.520	0.100	1.50	93	93	6	56	1790	12.0	96.1
		80.0	76.860	0.100	1.50	94	94	6	56	1850	12.0	97.2
	9	85.0	80.030	0.090	1.35	94	94	8	60	1818	13.2	96.6
		90.0	83.340	0.100	1.46	95	95	8	60	1900	13.2	97.2
	10	95.0	86.650	0.100	1.46	95	95	8	48	1910	14.1	97.4
		100.0	89.990	0.100	1.50	96	96	9	48	1810	14.1	96.0
	11	105.0	93.370	0.100	1.50	96	96	10	42	1800	14.9	97.0
		110.0	96.990	0.120	1.76	97	97	10	42	1920	14.9	97.2
	12	115.0	100.770	0.130	1.90	98	98	10	40	1942	15.7	97.8
		120.0	104.430	0.120	1.80	98	98	10	40	1815	15.7	95.9
		0.0	104.430									
2	1	5.0	108.090	0.120	1.76	97	97	12	42	1915	0.3	98.2
		10.0	111.750	0.120	1.76	97	97	12	42	1930	0.3	98.5
	2	15.0	115.560	0.130	1.94	98	98	13	44	1872	1.1	97.1
		20.0	119.070	0.110	1.65	98	98	14	44	1850	1.1	96.8
	3	25.0	122.580	0.110	1.65	98	98	14	44	1850	1.9	96.8
		30.0	126.010	0.105	1.57	99	99	14	44	1872	1.9	97.0
	4	35.0	129.090	0.085	1.27	98	98	6	46	1805	2.8	95.5
		40.0	132.260	0.090	1.35	98	98	15	46	1835	2.8	96.2
	5	45.0	135.430	0.090	1.35	97	97	15	48	1860	4.0	96.9
		50.0	138.600	0.090	1.35	96	96	15	48	1856	4.0	97.0
	6	55.0	141.860	0.095	1.42	97	97	15	46	1850	5.7	96.8
		60.0	145.500	0.100	1.50	98	98	15	46	1823	5.7	104.6
	7	65.0	148.870	0.100	1.50	98	98	15	46	1816	10.3	96.7

		70.0	152.210	0.100	1.50	98	98	15			46	1809	10.3	95.7
	8	75.0	155.550	0.100	1.50	98	98	15			48	1850	12.0	96.5
		80.0	158.890	0.100	1.50	99	99	15			48	1880	12.0	97.0
	9	85.0	162.320	0.105	1.57	99	99	15			50	1888	13.2	97.4
		90.0	165.750	0.105	1.57	99	99	15			50	1864	13.2	96.9
	10	95.0	169.010	0.095	1.42	100	100	15			44	1836	14.1	96.0
		100.0	172.370	0.100	1.50	100	100	15			44	1820	14.1	96.1
	11	105.0	175.710	0.100	1.50	100	100	15			42	1835	14.9	95.9
		110.0	178.880	0.090	1.35	100	100	16			42	1828	14.9	95.7
	12	115.0	182.100	0.095	1.39	100	100	17			42	1900	15.7	96.1
		120.0	185.440	0.100	1.50	100	100	18			42	1827	15.7	95.7
			Average:	0.099	1.476	94.0	94.0	10.4			45.8	1846.8		97.6

Client:	De Beers, Snap Lake	**Date:**	July. 13/14
Jobsite:	Snap Lake Mine	**Run:**	3 PCDD/PCDF
Source:	Incinerator Stack #1	**Run Time:**	14:50-19:55

Concentration:	0.00 mg/dscm	0.0000 gr/dscf
	0.00 mg/Acm	0.0000 gr/Acf
	0.00 mg/dscm (@ 11% O2)	0.0000 gr/dscf (@ 11% O2)
Emission Rate:	0.00 Kg/hr	0.000 lb/hr
Sample Gas Volume:	4.4003 dscm	155.396 dscf
Total Sample Time:	240.0 minutes	
Average Isokineticity:	101.8 %	

Flue Gas Characteristics

Moisture:	11.87 %	
Temperature	990.7 oC	1815.2 oF
Flow	17.6 dscm/min	623 dscf/min
	0.29 dscm/sec	10.4 dscf/sec
	88.5 Acm/min	3126 Acf/min
Velocity	11.375 m/sec	37.32 f/sec
Gas Analysis	7.97 % O2	9.12 % CO2
	29.777 Mol. Wt (g/gmole) Dry	28.379 Mol. Wt (g/gmole) Wet

*** Standard Conditions:** Metric: 25 deg C, 101.325 kPa
Imperial: 77 deg F, 29.92 in.Hg

A. Lanfranco and Associates Inc. - Emission Report

Client: De Beers, Snap Lake
Jobsite: Snap Lake Mine
Source: Incinerator Stack #1

Date: July. 13/14
Run: 3 PCDD/PCDF
Run Time: 14:50-19:55

Control Unit (Y)	1.0101
Nozzle Diameter (in.)	0.5113
Pitot Factor	0.8463
Baro. Press. (in. Hg)	28.66
Static Press. (in. Hg)	0.06
Stack Height (ft)	25
Stack Diameter (in.)	16.0
Stack Area (sq.ft.)	1.396
Minutes Per Reading	5.0
Minutes Per Point	10.0

Collection:

Filter (grams)	**0.0000**
Washings (grams)	**0.0000**
Impinger (grams)	**0.0000**
Total (grams)	**0.0000**

Gas Analysis (Vol. %):

	CO2	O2
Trav 1	10.29	6.60
Trav 2	7.94	9.34
Average =	**9.12**	**7.97**

Condensate Collection:

Impinger 1 (grams)	388.0
Impinger 2 (grams)	36.0
Impinger 3 (grams)	0.0
Impinger 4 (grams)	12.0
Total Gain (grams)	**436.0**

Traverse	Point	Time (min.)	Dry Gas Meter (ft3)	Pitot ^P (in. H2O)	Orifice ^H (in. H2O)	Dry Gas Temperature Inlet (oF)	Outlet (oF)	Vacuum (in. Hg.)	XAD Exit (oF)	Stack (oF)	Wall Dist. (in.)	Isokin. (%)
		0.0	350.729									
1	1	5.0	354.270	0.110	1.66	60	80	5	42	1837	0.3	102.5
		10.0	357.890	0.115	1.74	59	81	5	42	1850	0.3	102.7
	2	15.0	361.490	0.115	1.70	59	82	6	44	1892	1.1	103.0
		20.0	364.980	0.110	1.63	63	83	6	44	1902	1.1	101.8
	3	25.0	368.310	0.100	1.45	66	83	10	46	1960	1.9	102.8
		30.0	371.570	0.095	1.38	65	84	12	46	1944	1.9	102.9
	4	35.0	374.740	0.090	1.31	66	84	14	48	1900	2.8	101.7
		40.0	378.200	0.090	1.57	67	83	16	48	1488	2.8	100.9
	5	45.0	381.570	0.100	1.48	67	84	15	50	1845	4.0	101.3
		50.0	384.950	0.100	1.48	67	84	15	50	1860	4.0	102.0
	6	55.0	388.390	0.100	1.52	69	81	5	52	1800	5.7	102.5
		60.0	391.970	0.110	1.67	69	82	5	52	1789	5.7	101.4
	7	65.0	395.510	0.105	1.62	71	82	6	52	1754	10.3	101.7
		70.0	398.960	0.100	1.55	71	81	6	52	1750	10.3	101.5
	8	75.0	402.540	0.110	1.67	71	82	7	49	1820	12.0	101.9
		80.0	406.130	0.110	1.67	71	81	8	49	1781	12.0	101.4
	9	85.0	409.550	0.100	1.52	72	82	10	49	1791	13.2	101.4
		90.0	412.890	0.095	1.44	72	82	10	49	1793	13.2	101.6
	10	95.0	416.130	0.090	1.36	72	82	10	50	1780	14.1	100.9
		100.0	419.340	0.090	1.33	72	82	12	50	1870	14.1	102.0
	11	105.0	422.610	0.090	1.39	72	82	12	52	1775	14.9	101.8
		110.0	425.770	0.085	1.31	73	82	12	52	1750	14.9	100.5
	12	115.0	428.920	0.085	1.29	73	81	12	50	1795	15.7	101.3
		120.0	432.160	0.090	1.36	73	82	12	50	1800	15.7	101.3
		0.0	432.160									
2	1	5.0	435.400	0.090	1.36	67	81	12	54	1794	0.3	101.8
		10.0	438.630	0.090	1.36	71	82	12	54	1780	0.3	100.7
	2	15.0	441.880	0.090	1.36	70	82	13	54	1800	1.1	101.9
		20.0	445.140	0.090	1.36	70	81	13	54	1800	1.1	102.3
	3	25.0	448.290	0.085	1.29	70	81	14	51	1793	1.9	101.5
		30.0	451.360	0.085	1.23	70	82	14	51	1890	1.9	100.9
	4	35.0	454.630	0.090	1.36	71	79	14	51	1789	2.8	102.5
		40.0	457.880	0.095	1.38	73	80	14	51	1870	2.8	100.6
	5	45.0	461.300	0.100	1.52	72	80	14	52	1790	4.0	101.5
		50.0	464.720	0.100	1.52	72	81	15	52	1807	4.0	101.8
	6	55.0	467.960	0.095	1.38	72	80	15	54	1886	5.7	100.7
		60.0	471.170	0.090	1.33	72	79	15	54	1860	5.7	102.0
	7	65.0	474.380	0.090	1.33	72	80	16	56	1875	10.3	102.3

		70.0	477.630	0.090	1.36	71	80	16			56	1798	10.3	101.9
	8	75.0	480.890	0.090	1.36	71	79	16			50	1803	12.0	102.5
		80.0	484.130	0.090	1.36	71	79	16			50	1795	12.0	101.6
	9	85.0	487.390	0.090	1.36	71	79	16			48	1800	13.2	102.4
		90.0	490.540	0.085	1.29	71	78	17			48	1808	13.2	102.1
	10	95.0	493.780	0.090	1.36	71	78	18			48	1793	14.1	101.7
		100.0	497.110	0.095	1.44	71	78	18			48	1800	14.1	101.9
	11	105.0	500.530	0.100	1.52	71	79	18			50	1816	14.9	102.3
		110.0	503.740	0.090	1.33	71	78	18			50	1850	14.9	102.0
	12	115.0	506.980	0.090	1.36	71	77	18			44	1810	15.7	102.2
		120.0	510.220	0.090	1.36	71	75	18			44	1798	15.7	102.1
			Average:	0.095	1.437	69.6	80.8	12.5			49.8	1815.2		101.8

Client:	De Beers, Snap Lake	**Date:**	July. 13/14
Jobsite:	Snap Lake Mine	**Run:**	1 PCDD/PCDF
Source:	Incinerator Stack #2	**Run Time:**	09:33-13:43

Concentration:	0.00 mg/dscm	0.0000 gr/dscf
	0.00 mg/Acm	0.0000 gr/Acf
	0.00 mg/dscm (@ 11% O2)	0.0000 gr/dscf (@ 11% O2)
Emission Rate:	0.00 Kg/hr	0.000 lb/hr
Sample Gas Volume:	4.4821 dscm	158.287 dscf
Total Sample Time:	240.0 minutes	
Average Isokineticity:	102.0 %	

Flue Gas Characteristics

Moisture:	12.31 %	
Temperature	1000.9 oC	1833.7 oF
Flow	17.9 dscm/min	633 dscf/min
	0.30 dscm/sec	10.6 dscf/sec
	91.2 Acm/min	3220 Acf/min
Velocity	11.715 m/sec	38.43 f/sec
Gas Analysis	6.06 % O2	10.59 % CO2
	29.937 Mol. Wt (g/gmole) Dry	28.467 Mol. Wt (g/gmole) Wet

*** Standard Conditions:** Metric: 25 deg C, 101.325 kPa
Imperial: 77 deg F, 29.92 in.Hg

A. Lanfranco and Associates Inc. - Emission Report

Client: De Beers, Snap Lake
Jobsite: Snap Lake Mine
Source: Incinerator Stack #2

Date: July. 13/14
Run: 1 PCDD/PCDF
Run Time: 09:33-13:43

Control Unit (Y)	1.0101
Nozzle Diameter (in.)	0.5113
Pitot Factor	0.8463
Baro. Press. (in. Hg)	28.66
Static Press. (in. Hg)	0.08
Stack Height (ft)	25
Stack Diameter (in.)	16.0
Stack Area (sq.ft.)	1.396
Minutes Per Reading	5.0
Minutes Per Point	10.0

Collection:

Filter (grams)	**0.0000**
Washings (grams)	**0.0000**
Impinger (grams)	**0.0000**
Total (grams)	**0.0000**

Gas Analysis (Vol. %):

	CO2	O2
Trav 1	12.89	3.68
Trav 2	8.29	8.44
Average =	**10.59**	**6.06**

Condensate Collection:

Impinger 1 (grams)	420.0
Impinger 2 (grams)	30.0
Impinger 3 (grams)	0.0
Impinger 4 (grams)	13.0
Total Gain (grams)	**463.0**

Traverse	Point	Time (min.)	Dry Gas Meter (ft3)	Pitot ^P (in. H2O)	Orifice ^H (in. H2O)	Dry Gas Temperature Inlet (oF)	Outlet (oF)	Vacuum (in. Hg.)	XAD Exit (oF)	Stack (oF)	Wall Dist. (in.)	Isokin. (%)
		0.0	186.413									
1	1	5.0	190.060	0.110	1.78	63	63	7	46	1660	0.3	103.4
		10.0	193.620	0.105	1.70	64	64	8	46	1670	0.3	103.4
	2	15.0	197.100	0.100	1.62	64	64	8	46	1689	1.1	104.0
		20.0	200.540	0.100	1.56	67	67	8	46	1750	1.1	103.6
	3	25.0	204.150	0.110	1.73	68	68	8	52	1756	1.9	103.7
		30.0	207.760	0.110	1.73	70	70	8	52	1766	1.9	103.5
	4	35.0	211.410	0.115	1.77	70	70	8	54	1772	2.8	102.5
		40.0	215.150	0.120	1.85	71	71	8	54	1798	2.8	103.3
	5	45.0	218.870	0.120	1.81	72	72	10	58	1850	4.0	103.7
		50.0	222.590	0.120	1.81	73	73	10	58	1868	4.0	103.9
	6	55.0	226.270	0.120	1.77	75	75	11	58	1895	5.7	103.0
		60.0	229.780	0.110	1.63	75	75	12	58	1910	5.7	102.9
	7	65.0	233.120	0.100	1.48	76	76	12	48	1927	10.3	102.8
		70.0	236.300	0.090	1.33	77	77	12	48	1950	10.3	103.4
	8	75.0	239.470	0.090	1.33	78	78	11	52	1950	12.0	102.9
		80.0	242.810	0.100	1.48	79	79	10	52	1959	12.0	102.9
	9	85.0	246.180	0.100	1.51	80	80	10	56	1850	13.2	101.3
		90.0	249.590	0.100	1.54	80	80	12	56	1800	13.2	101.4
	10	95.0	253.130	0.110	1.66	80	80	12	58	1878	14.1	102.1
		100.0	256.470	0.100	1.48	81	81	13	58	1950	14.1	102.3
	11	105.0	259.830	0.100	1.48	81	81	14	58	1941	14.9	102.7
		110.0	263.170	0.100	1.48	81	81	14	58	1900	14.9	101.3
	12	115.0	266.580	0.100	1.54	81	81	14	50	1811	15.7	101.4
		120.0	269.920	0.100	1.48	81	81	14	50	1930	15.7	101.9
		0.0	269.920									
2	1	5.0	273.290	0.100	1.51	81	81	14	54	1850	0.3	101.1
		10.0	276.660	0.100	1.51	82	82	14	54	1844	0.3	100.8
	2	15.0	280.090	0.100	1.54	82	82	14	56	1800	1.1	101.6
		20.0	283.500	0.100	1.54	83	83	14	56	1793	1.1	100.7
	3	25.0	286.730	0.090	1.39	83	83	14	58	1808	1.9	100.8
		30.0	289.990	0.090	1.39	83	83	14	58	1815	1.9	101.9
	4	35.0	293.370	0.100	1.48	82	82	12	48	1878	2.8	101.8
		40.0	296.710	0.100	1.48	83	83	12	48	1885	2.8	100.6
	5	45.0	300.040	0.095	1.47	83	83	12	50	1808	4.0	101.2
		50.0	303.270	0.090	1.36	82	82	12	50	1863	4.0	102.2
	6	55.0	306.590	0.095	1.47	81	81	12	49	1813	5.7	101.3
		60.0	309.930	0.095	1.47	82	82	12	49	1805	5.7	101.6
	7	65.0	313.350	0.100	1.54	81	81	13	52	1808	10.3	101.7

		70.0	316.770	0.100	1.54	80	80	14			52	1783	10.3	101.3
	8	75.0	320.190	0.100	1.54	81	81	14			56	1793	12.0	101.3
		80.0	323.600	0.100	1.54	82	82	14			56	1800	12.0	101.0
	9	85.0	326.970	0.100	1.51	83	83	14			56	1850	13.2	100.7
		90.0	330.390	0.100	1.54	84	84	14			56	1817	13.2	101.3
	10	95.0	333.620	0.090	1.39	83	83	14			54	1814	14.1	100.9
		100.0	336.760	0.085	1.31	82	82	14			54	1822	14.1	101.3
	11	105.0	340.090	0.095	1.47	83	83	13			52	1825	14.9	101.5
		110.0	343.330	0.090	1.39	84	84	13			52	1811	14.9	101.0
	12	115.0	346.500	0.090	1.33	85	85	13			48	1880	15.7	100.1
		120.0	349.820	0.095	1.47	86	86	14			48	1821	15.7	100.6
			Average:	0.101	1.536	78.5	78.5	12.0			52.9	1833.7		102.0

Client:	De Beers, Snap Lake Mine	**Date:**	July. 14/14
Jobsite:	Snap Lake	**Run:**	2 PCDD/PCDF
Source:	Incinerator Stack #2	**Run Time:**	13:30-18:25

Concentration:	0.00 mg/dscm	0.0000 gr/dscf
	0.00 mg/Acm	0.0000 gr/Acf
	0.00 mg/dscm (@ 11% O2)	0.0000 gr/dscf (@ 11% O2)
Emission Rate:	0.00 Kg/hr	0.000 lb/hr
Sample Gas Volume:	4.3329 dscm	153.017 dscf
Total Sample Time:	240.0 minutes	
Average Isokineticity:	99.8 %	

Flue Gas Characteristics

Moisture:	12.25 %	
Temperature	1016.9 oC	1862.4 oF
Flow	17.2 dscm/min	609 dscf/min
	0.29 dscm/sec	10.1 dscf/sec
	88.9 Acm/min	3139 Acf/min
Velocity	11.420 m/sec	37.47 f/sec
Gas Analysis	7.16 % O2	10.16 % CO2
	29.912 Mol. Wt (g/gmole) Dry	28.453 Mol. Wt (g/gmole) Wet

*** Standard Conditions:** Metric: 25 deg C, 101.325 kPa
Imperial: 77 deg F, 29.92 in.Hg

A. Lanfranco and Associates Inc. - Emission Report

Client: De Beers, Snap Lake Mine
Jobsite: Snap Lake
Source: Incinerator Stack #2

Date: July. 14/14
Run: 2 PCDD/PCDF
Run Time: 13:30-18:25

Control Unit (Y)	1.0101
Nozzle Diameter (in.)	0.5183
Pitot Factor	0.8463
Baro. Press. (in. Hg)	28.60
Static Press. (in. Hg)	0.08
Stack Height (ft)	25
Stack Diameter (in.)	16.0
Stack Area (sq.ft.)	1.396
Minutes Per Reading	5.0
Minutes Per Point	10.0

Collection:

Filter (grams)	**0.0000**
Washings (grams)	**0.0000**
Impinger (grams)	**0.0000**
Total (grams)	**0.0000**

Gas Analysis (Vol. %):

	CO2	O2
Trav 1	10.94	6.38
Trav 2	9.38	7.93
Average =	**10.16**	**7.16**

Condensate Collection:

Impinger 1 (grams)	425.0
Impinger 2 (grams)	20.0
Impinger 3 (grams)	0.0
Impinger 4 (grams)	0.0
Total Gain (grams)	**445.0**

Traverse	Point	Time (min.)	Dry Gas Meter (ft3)	Pitot ^P (in. H2O)	Orifice ^H (in. H2O)	Dry Gas Temperature Inlet (oF)	Outlet (oF)	Vacuum (in. Hg.)	XAD Exit (oF)	Stack (oF)	Wall Dist. (in.)	Isokin. (%)
		0.0	511.462									
1	1	5.0	514.840	0.080	1.48	81	81	5	52	1600	0.8	103.9
		10.0	518.220	0.080	1.48	82	82	5	52	1550	0.8	102.5
	2	15.0	521.390	0.080	1.31	82	82	8	52	1680	0.8	99.1
		20.0	524.560	0.080	1.31	82	82	12	52	1764	0.8	101.1
	3	25.0	527.820	0.090	1.38	82	82	15	56	1900	2.6	101.0
		30.0	531.150	0.090	1.44	82	82	15	56	1804	2.6	101.0
	4	35.0	534.440	0.090	1.41	83	83	16	58	1826	2.6	100.1
		40.0	537.770	0.090	1.44	84	84	18	58	1809	2.6	100.8
	5	45.0	541.100	0.090	1.44	85	85	18	54	1801	5.3	100.4
		50.0	544.330	0.085	1.36	85	85	18	54	1795	5.3	100.1
	6	55.0	547.620	0.090	1.41	85	85	18	50	1866	5.3	100.6
		60.0	550.910	0.090	1.41	84	84	5	50	1852	5.3	100.5
	7	65.0	554.200	0.090	1.41	85	85	5	52	1870	12.7	100.7
		70.0	557.580	0.095	1.49	85	85	6	52	1863	12.7	100.6
	8	75.0	560.930	0.095	1.46	86	86	6	54	1900	12.7	100.3
		80.0	564.190	0.090	1.38	87	87	6	54	1894	12.7	99.9
	9	85.0	567.470	0.090	1.38	88	88	7	58	1925	15.4	101.0
		90.0	570.730	0.090	1.38	88	88	7	58	1870	15.4	99.2
	10	95.0	573.990	0.090	1.38	89	89	7	60	1904	15.4	99.8
		100.0	577.340	0.095	1.46	90	90	8	60	1921	15.4	100.0
	11	105.0	580.690	0.095	1.46	91	91	8	52	1898	17.2	99.3
		110.0	584.050	0.095	1.46	91	91	8	52	1890	17.2	99.4
	12	115.0	587.310	0.090	1.38	92	92	8	52	1884	17.2	98.8
		120.0	590.590	0.090	1.38	92	92	8	52	1885	17.2	99.4
		0.0	590.590									
2	1	5.0	593.940	0.095	1.46	91	91	8	54	1880	0.8	98.9
		10.0	597.410	0.100	1.57	92	92	8	54	1868	0.8	99.5
	2	15.0	600.850	0.100	1.53	92	92	8	56	1881	0.8	98.9
		20.0	604.290	0.100	1.53	92	92	8	56	1920	0.8	99.7
	3	25.0	607.770	0.100	1.57	92	92	8	52	1856	2.6	99.5
		30.0	611.210	0.100	1.53	92	92	8	52	1868	2.6	98.6
	4	35.0	614.690	0.100	1.57	91	91	9	49	1870	2.6	100.0
		40.0	618.210	0.105	1.61	91	91	9	49	1910	2.6	99.6
	5	45.0	621.680	0.100	1.57	92	92	10	48	1871	5.3	99.5
		50.0	625.170	0.100	1.57	92	92	10	48	1876	5.3	100.2
	6	55.0	628.620	0.100	1.53	93	93	10	50	1880	5.3	99.0
		60.0	631.970	0.095	1.46	93	93	10	50	1915	5.3	99.3
	7	65.0	635.320	0.095	1.46	92	92	11	52	1881	12.7	98.8

		70.0	638.760	0.100	1.53	93	93	12			52	1880	12.7	98.7
	8	75.0	642.200	0.100	1.53	93	93	12			58	1919	12.7	99.5
		80.0	645.730	0.105	1.61	94	94	12			58	1925	12.7	99.6
	9	85.0	649.170	0.100	1.53	93	93	12			52	1914	15.4	99.4
		90.0	652.620	0.100	1.53	92	92	12			52	1890	15.4	99.4
	10	95.0	655.970	0.095	1.46	92	92	13			48	1898	15.4	99.1
		100.0	659.230	0.090	1.38	93	93	14			48	1910	15.4	99.2
	11	105.0	662.020	0.095	1.46	92	92	14			50	1922	17.2	83.0
		110.0	666.020	0.100	1.53	93	93	15			50	1920	17.2	115.7
	12	115.0	669.460	0.100	1.53	93	93	15			52	1910	17.2	99.3
		120.0	672.900	0.100	1.53	92	92	15			52	1880	17.2	98.9
			Average:	0.094	1.468	89.1	89.1	10.4			53.0	1862.4		99.8

Client:	De Beers, Snap Lake	**Date:**	July. 15/14
Jobsite:	Snap Lake Mine	**Run:**	3 PCDD/PCDF
Source:	Incinerator Stack #2	**Run Time:**	09:35-13:45

Concentration:	0.00 mg/dscm	0.0000 gr/dscf
	0.00 mg/Acm	0.0000 gr/Acf
	0.00 mg/dscm (@ 11% O2)	0.0000 gr/dscf (@ 11% O2)
Emission Rate:	0.00 Kg/hr	0.000 lb/hr
Sample Gas Volume:	4.4229 dscm	156.194 dscf
Total Sample Time:	240.0 minutes	
Average Isokineticity:	102.7 %	

Flue Gas Characteristics

Moisture:	12.39 %	
Temperature	1012.8 oC	1855.0 oF
Flow	17.1 dscm/min	604 dscf/min
	0.29 dscm/sec	10.1 dscf/sec
	89.0 Acm/min	3143 Acf/min
Velocity	11.436 m/sec	37.52 f/sec
Gas Analysis	7.58 % O2	10.00 % CO2
	29.903 Mol. Wt (g/gmole) Dry	28.429 Mol. Wt (g/gmole) Wet

*** Standard Conditions:** Metric: 25 deg C, 101.325 kPa
Imperial: 77 deg F, 29.92 in.Hg

A. Lanfranco and Associates Inc. - Emission Report

Client: De Beers, Snap Lake
Jobsite: Snap Lake Mine
Source: Incinerator Stack #2

Date: July. 15/14
Run: 3 PCDD/PCDF
Run Time: 09:35-13:45

Control Unit (Y)	1.0101
Nozzle Diameter (in.)	0.5183
Pitot Factor	0.8463
Baro. Press. (in. Hg)	28.30
Static Press. (in. Hg)	0.08
Stack Height (ft)	25
Stack Diameter (in.)	16.0
Stack Area (sq.ft.)	1.396
Minutes Per Reading	5.0
Minutes Per Point	10.0

Collection:

Filter (grams)	**0.0000**
Washings (grams)	**0.0000**
Impinger (grams)	**0.0000**
Total (grams)	**0.0000**

Gas Analysis (Vol. %):

	CO2	O2
Trav 1	11.00	6.74
Trav 2	9.00	8.41
Average =	**10.00**	**7.58**

Condensate Collection:

Impinger 1 (grams)	423.0
Impinger 2 (grams)	22.0
Impinger 3 (grams)	0.0
Impinger 4 (grams)	15.0
Total Gain (grams)	**460.0**

Traverse	Point	Time (min.)	Dry Gas Meter (ft3)	Pitot ^P (in. H2O)	Orifice ^H (in. H2O)	Dry Gas Temperature Inlet (oF)	Outlet (oF)	Vacuum (in. Hg.)	XAD Exit (oF)	Stack (oF)	Wall Dist. (in.)	Isokin. (%)
		0.0	673.290									
1	1	5.0	677.250	0.090	1.44	60	71	5	42	1793	0.8	123.1
		10.0	680.630	0.090	1.47	59	72	5	42	1775	0.8	104.7
	2	15.0	684.120	0.100	1.57	59	73	6	42	1853	0.8	104.2
		20.0	687.650	0.100	1.60	63	74	8	42	1800	0.8	103.7
	3	25.0	690.990	0.090	1.44	66	73	8	43	1810	2.6	103.4
		30.0	694.310	0.090	1.41	65	74	8	43	1859	2.6	103.9
	4	35.0	697.840	0.100	1.60	66	74	10	44	1817	2.6	103.8
		40.0	701.370	0.100	1.60	67	74	10	44	1809	2.6	103.5
	5	45.0	704.900	0.100	1.60	67	75	10	48	1811	5.3	103.5
		50.0	708.370	0.100	1.57	67	76	10	48	1853	5.3	102.6
	6	55.0	711.870	0.100	1.57	69	77	10	48	1828	5.3	102.6
		60.0	715.380	0.100	1.57	69	78	10	48	1867	5.3	103.7
	7	65.0	718.880	0.100	1.57	71	78	10	52	1841	12.7	102.6
		70.0	722.370	0.100	1.57	71	79	10	52	1870	12.7	102.9
	8	75.0	725.780	0.095	1.49	71	80	10	56	1837	12.7	102.3
		80.0	729.100	0.090	1.41	71	80	10	56	1837	12.7	102.3
	9	85.0	732.510	0.095	1.49	72	82	10	60	1840	15.4	102.0
		90.0	735.880	0.095	1.46	72	84	10	60	1900	15.4	101.9
	10	95.0	739.200	0.090	1.41	72	84	10	50	1858	15.4	102.3
		100.0	742.520	0.090	1.41	72	85	10	50	1845	15.4	101.9
	11	105.0	745.870	0.095	1.46	72	85	10	50	1894	17.2	101.1
		110.0	749.190	0.090	1.38	73	86	10	50	1852	17.2	101.8
	12	115.0	752.600	0.095	1.48	73	88	10	45	1866	17.2	101.9
		120.0	756.010	0.095	1.48	73	89	10	45	1852	17.2	101.5
		0.0	756.010									
2	1	5.0	759.450	0.100	1.53	67	88	10	45	1905	0.8	101.7
		10.0	762.980	0.105	1.61	71	86	10	45	1883	0.8	101.2
	2	15.0	766.510	0.105	1.61	70	87	11	46	1916	0.8	101.9
		20.0	770.100	0.105	1.64	70	88	12	46	1859	0.8	102.3
	3	25.0	773.710	0.110	1.69	70	88	12	44	1890	2.6	101.1
		30.0	777.390	0.110	1.72	70	88	12	44	1860	2.6	102.5
	4	35.0	780.740	0.095	1.46	71	87	12	43	1885	2.6	100.8
		40.0	784.230	0.100	1.57	73	88	12	43	1875	2.6	101.9
	5	45.0	787.550	0.090	1.41	72	88	12	43	1859	5.3	101.9
		50.0	790.870	0.090	1.41	72	89	12	43	1858	5.3	101.8
	6	55.0	794.090	0.085	1.33	72	87	12	46	1857	5.3	101.7
		60.0	797.410	0.090	1.41	72	88	12	46	1868	5.3	102.1
	7	65.0	800.580	0.085	1.30	72	87	12	48	1900	12.7	101.1

		70.0	803.900	0.090	1.41	71	88	12			48	1875	12.7	102.3
	8	75.0	807.220	0.090	1.41	71	87	12			50	1851	12.7	101.9
		80.0	810.540	0.090	1.41	71	88	12			50	1870	12.7	102.2
	9	85.0	813.670	0.080	1.25	71	88	12			51	1851	15.4	101.8
		90.0	816.890	0.085	1.33	71	87	12			51	1854	15.4	101.8
	10	95.0	820.020	0.080	1.25	71	87	12			53	1847	15.4	101.8
		100.0	823.150	0.080	1.25	71	88	12			53	1848	15.4	101.7
	11	105.0	826.390	0.085	1.33	71	87	12			56	1833	17.2	101.9
		110.0	829.520	0.080	1.25	71	86	12			56	1854	17.2	102.0
	12	115.0	832.790	0.090	1.44	71	87	12			58	1880	17.2	101.0
		120.0	835.970	0.085	1.30	71	88	12			58	1894	17.2	101.2
			Average:	0.094	1.466	69.6	83.1	10.5			48.5	1855.0		102.7

STANDARD VOLUME / GAS CONCENTRATION WORKSHEET

De Beers, Snap Lake	**Tested for:**	Hg	
Incinerator Stack #1	**DGM ID:**	Apex 522	
28.47	**DGM Y:**	0.9950	
July. 11-13/14			

	DRY GAS METER				CONSTANTS			RESULTS		11.0	
TIME	Reading (ft3)	Temp In (Avg. oF)	Temp Out (Avg. oF)	Avg. Delta H (inches H20)	Y Factor	Pb (in. Hg)	Volume Std. (m3 std.)	Lab Result (ug of Hg)	Concentration (ug Hg/m3)	Oxygen (%)	Conc. @ 11% O2 (ug/Sm3)
13:50	443.0350	63.0	63.0	2.4	0.9950	28.25	2.84479	0.08	0.03	4.8	**0.02**
16:00	546.5300	-	-	-	-	-					
10:26	562.6670	75.0	75.0	2.1	0.9950	28.50	2.65432	0.11	0.04	7.4	**0.03**
14:05	660.6600	-	-	-	-	-					
14:50	761.7470	83.0	83.0	2.3	0.9950	28.66	2.72191	0.28	0.10	7.1	**0.07**
17:13	863.1300	-	-	-	-	-					

Client:	De Beers, Snap Lake	**Date:**	July. 11/14
Jobsite:	Snap Lake	**Run:**	1 Partic/ Metals
Source:	Incinerator Stack #1	**Run Time:**	13:50-16:00

Particulate Concentration:	**68.2 mg/dscm**	0.0298 gr/dscf
	13.3 mg/Acm	0.0058 gr/Acf
	41.9 mg/dscm (@ 11% O2)	0.0183 gr/dscf (@ 11% O2)
Emission Rate:	0.08 Kg/hr	0.171 lb/hr
Sample Gas Volume:	2.8453 dscm	100.480 dscf
Total Sample Time:	120.0 minutes	
Average Isokineticity:	101.2 %	

Flue Gas Characteristics

Moisture:	11.87 %	
Temperature	995.8 oC	1824.5 oF
Flow	19.0 dscm/min	670 dscf/min
	0.32 dscm/sec	11.2 dscf/sec
	97.0 Acm/min	3425 Acf/min
Velocity	12.460 m/sec	40.88 f/sec
Gas Analysis	4.80 % O2	11.04 % CO2
	29.958 Mol. Wt (g/gmole) Dry	28.539 Mol. Wt (g/gmole) Wet

*** Standard Conditions:** Metric: 25 deg C, 101.325 kPa
Imperial: 77 deg F, 29.92 in.Hg

Client:	De Beers, Snap Lake	**Date:**	July. 11/14
Jobsite:	Snap Lake	**Run:**	1 Partic/ Metals
Source:	Incinerator Stack #1	**Run Time:**	13:50-16:00

Control Unit (Y)	0.9950
Nozzle Diameter (in.)	0.5623
Pitot Factor	0.8457
Baro. Press. (in. Hg)	28.25
Static Press. (in. H2O)	0.06
Stack Height (ft)	25
Stack Diameter (in.)	16.0
Stack Area (sq.ft.)	1.396
Minutes Per Reading	5.0
Minutes Per Point	5.0

Gas Analysis (Vol. %):

	CO2	O2
Trav. 1	11.08	4.90
Trav. 2	11.00	4.70
Average =	**11.04**	**4.80**

Condensate Collection:

Impinger 1 (grams)	153.0
Impinger 2 (grams)	55.0
Impinger 3 (grams)	46.0
Impinger 4 (grams)	18.0
Impinger 5 (grams)	0.0
Impinger 6 (grams)	10.0
Total Gain (grams)	**282.0**

Collection:

Filter (grams)	**0.0949**
Washings (grams)	**0.0992**
Impinger (grams)	**0.0000**
Total (grams)	**0.1941**

Traverse	Point	Time (min.)	Dry Gas Meter (ft3)	Pitot ^P (in. H2O)	Orifice ^H (in. H2O)	Dry Gas Temperature Inlet (oF)	Outlet (oF)	Stack (oF)	Wall Dist. (in.)	Isokin. (%)
		0.0	443.035							
1	1	5.0	447.240	0.110	2.31	60	60	1861	0.3	101.3
	2	10.0	451.620	0.120	2.51	60	60	1875	1.1	101.4
	3	15.0	455.970	0.120	2.48	59	59	1890	1.9	101.2
	4	20.0	460.130	0.110	2.26	60	60	1908	2.8	101.2
	5	25.0	464.460	0.120	2.48	60	60	1924	4.0	101.3
	6	30.0	468.850	0.120	2.51	61	61	1875	5.7	101.4
	7	35.0	473.210	0.115	2.48	61	61	1802	10.3	101.3
	8	40.0	477.540	0.110	2.46	62	62	1729	12.0	101.0
	9	45.0	481.760	0.105	2.35	63	63	1735	13.2	100.6
	10	50.0	486.090	0.110	2.47	62	62	1720	14.1	100.8
	11	55.0	490.370	0.110	2.36	63	63	1826	14.9	101.8
	12	60.0	494.460	0.105	2.19	62	62	1890	15.7	101.1
		0.0	494.460							
2	1	5.0	498.710	0.110	2.35	63	63	1832	0.3	101.2
	2	10.0	503.040	0.110	2.41	63	63	1780	1.1	101.9
	3	15.0	507.380	0.110	2.44	64	64	1754	1.9	101.4
	4	20.0	511.910	0.120	2.66	65	65	1762	2.8	101.4
	5	25.0	516.250	0.110	2.44	66	66	1764	4.0	101.2
	6	30.0	520.610	0.110	2.46	66	66	1745	5.7	101.3
	7	35.0	525.000	0.120	2.51	64	64	1886	10.3	101.1
	8	40.0	529.460	0.120	2.61	66	66	1808	12.0	100.6
	9	45.0	533.780	0.110	2.42	65	65	1780	13.2	101.3
	10	50.0	538.150	0.120	2.50	65	65	1907	14.1	100.9
	11	55.0	542.410	0.110	2.35	65	65	1845	14.9	101.3
	12	60.0	546.530	0.105	2.20	65	65	1889	15.7	101.2
			Average:	0.113	2.425	62.9	62.9	1824.5		101.2

Client:	De Beers, Snap Lake	**Date:**	July. 12/14
Jobsite:	Snap Lake	**Run:**	2 Partic/ Metals
Source:	Incinerator Stack #1	**Run Time:**	10:26-14:05

Particulate Concentration:	**78.9 mg/dscm**	0.0345 gr/dscf
	15.6 mg/Acm	0.0068 gr/Acf
	57.7 mg/dscm (@ 11% O2)	0.0252 gr/dscf (@ 11% O2)
Emission Rate:	0.09 Kg/hr	0.187 lb/hr
Sample Gas Volume:	2.6568 dscm	93.825 dscf
Total Sample Time:	120.0 minutes	
Average Isokineticity:	99.9 %	

Flue Gas Characteristics

Moisture:	11.18 %	
Temperature	1002.8 oC	1837.0 oF
Flow	18.0 dscm/min	634 dscf/min
	0.30 dscm/sec	10.6 dscf/sec
	90.8 Acm/min	3206 Acf/min
Velocity	11.665 m/sec	38.27 f/sec
Gas Analysis	7.35 % O2	9.79 % CO2
	29.860 Mol. Wt (g/gmole) Dry	28.535 Mol. Wt (g/gmole) Wet

*** Standard Conditions:** Metric: 25 deg C, 101.325 kPa
Imperial: 77 deg F, 29.92 in.Hg

Client:	De Beers, Snap Lake	**Date:**	July. 12/14
Jobsite:	Snap Lake	**Run:**	2 Partic/ Metals
Source:	Incinerator Stack #1	**Run Time:**	10:26-14:05

Control Unit (Y)	0.9950
Nozzle Diameter (in.)	0.5623
Pitot Factor	0.8457
Baro. Press. (in. Hg)	28.50
Static Press. (in. H2O)	0.06
Stack Height (ft)	25
Stack Diameter (in.)	16.0
Stack Area (sq.ft.)	1.396
Minutes Per Reading	5.0
Minutes Per Point	5.0

Gas Analysis (Vol. %):

	CO2	O2
Trav. 1	11.08	5.07
Trav. 2	8.50	9.63
Average =	**9.79**	**7.35**

Condensate Collection:

Impinger 1 (grams)	150.0
Impinger 2 (grams)	79.0
Impinger 3 (grams)	5.0
Impinger 4 (grams)	0.0
Impinger 5 (grams)	0.0
Impinger 6 (grams)	12.0
Total Gain (grams)	**246.0**

Collection:

Filter (grams)	**0.0972**
Washings (grams)	**0.1125**
Impinger (grams)	**0.0000**
Total (grams)	**0.2097**

Traverse	Point	Time (min.)	Dry Gas Meter (ft3)	Pitot ^P (in. H2O)	Orifice ^H (in. H2O)	Dry Gas Temperature Inlet (oF)	Outlet (oF)	Stack (oF)	Wall Dist. (in.)	Isokin. (%)
		0.0	562.667							
1	1	5.0	566.820	0.110	2.23	66	66	1927	0.3	100.0
	2	10.0	571.100	0.120	2.41	65	65	1944	1.1	99.2
	3	15.0	575.310	0.115	2.30	66	66	1960	1.9	99.8
	4	20.0	579.460	0.110	2.19	67	67	1976	2.8	100.7
	5	25.0	584.110	0.120	2.78	69	69	1637	4.0	100.0
	6	30.0	588.620	0.120	2.65	71	71	1756	5.7	99.3
	7	35.0	593.080	0.115	2.55	71	71	1746	10.3	100.1
	8	40.0	597.330	0.105	2.31	71	71	1750	12.0	99.8
	9	45.0	601.650	0.110	2.38	73	73	1805	13.2	100.0
	10	50.0	605.722	0.100	2.10	78	78	1901	14.1	99.9
	11	55.0	609.670	0.090	1.97	79	79	1806	14.9	99.8
	12	60.0	613.950	0.110	2.33	75	75	1862	15.7	99.9
		0.0	613.950							
2	1	5.0	618.090	0.100	2.18	76	76	1803	0.3	99.8
	2	10.0	622.030	0.090	1.93	75	75	1837	1.1	101.0
	3	15.0	625.690	0.080	1.68	76	76	1883	1.9	100.3
	4	20.0	629.790	0.100	2.11	77	77	1884	2.8	100.4
	5	25.0	634.100	0.110	2.37	77	77	1835	4.0	99.7
	6	30.0	638.200	0.100	2.15	78	78	1847	5.7	99.5
	7	35.0	642.120	0.090	1.97	79	79	1809	10.3	99.2
	8	40.0	645.810	0.080	1.75	79	79	1808	12.0	98.9
	9	45.0	649.650	0.085	1.86	79	79	1803	13.2	99.8
	10	50.0	653.320	0.080	1.69	80	80	1889	14.1	99.9
	11	55.0	657.040	0.080	1.75	80	80	1815	14.9	99.7
	12	60.0	660.660	0.075	1.65	81	81	1805	15.7	99.8

		Average:	0.100	2.137	74.5	74.5	1837.0	99.9

Client:	De Beers, Snap Lake	**Date:**	July. 13/14
Jobsite:	Snap Lake	**Run:**	3 Partic/ Metals
Source:	Incinerator Stack #1	**Run Time:**	14:50-17:13

Particulate Concentration:	**111.1 mg/dscm**	0.0485 gr/dscf
	22.3 mg/Acm	0.0098 gr/Acf
	79.8 mg/dscm (@ 11% O2)	0.0349 gr/dscf (@ 11% O2)
Emission Rate:	0.12 Kg/hr	0.270 lb/hr
Sample Gas Volume:	2.7220 dscm	96.126 dscf
Total Sample Time:	120.0 minutes	
Average Isokineticity:	99.6 %	

Flue Gas Characteristics

Moisture:	11.73 %	
Temperature	980.3 oC	1796.6 oF
Flow	18.4 dscm/min	650 dscf/min
	0.31 dscm/sec	10.8 dscf/sec
	91.4 Acm/min	3229 Acf/min
Velocity	11.749 m/sec	38.55 f/sec
Gas Analysis	7.13 % O2	10.25 % CO2
	29.925 Mol. Wt (g/gmole) Dry	28.527 Mol. Wt (g/gmole) Wet

*** Standard Conditions:** Metric: 25 deg C, 101.325 kPa
Imperial: 77 deg F, 29.92 in.Hg

Client:	De Beers, Snap Lake	**Date:**	July. 13/14
Jobsite:	Snap Lake	**Run:**	3 Partic/ Metals
Source:	Incinerator Stack #1	**Run Time:**	14:50-17:13

Control Unit (Y)	0.9950
Nozzle Diameter (in.)	0.5623
Pitot Factor	0.8457
Baro. Press. (in. Hg)	28.66
Static Press. (in. H2O)	0.06
Stack Height (ft)	25
Stack Diameter (in.)	16.0
Stack Area (sq.ft.)	1.396
Minutes Per Reading	5.0
Minutes Per Point	5.0

Gas Analysis (Vol. %):

	CO2	O2
Trav. 1	10.50	6.15
Trav. 2	10.00	8.10
Average =	**10.25**	**7.13**

Condensate Collection:

Impinger 1 (grams)	176.0
Impinger 2 (grams)	54.0
Impinger 3 (grams)	10.0
Impinger 4 (grams)	14.0
Impinger 5 (grams)	0.0
Impinger 6 (grams)	12.0
Total Gain (grams)	**266.0**

Collection:

Filter (grams)	**0.1476**
Washings (grams)	**0.1548**
Impinger (grams)	**0.0000**
Total (grams)	**0.3024**

Traverse	Point	Time (min.)	Dry Gas Meter (ft3)	Pitot ^P (in. H2O)	Orifice ^H (in. H2O)	Dry Gas Temperature Inlet (oF)	Dry Gas Temperature Outlet (oF)	Stack (oF)	Wall Dist. (in.)	Isokin. (%)
		0.0	761.747							
1	1	5.0	766.070	0.110	2.36	81	81	1819	0.3	99.8
	2	10.0	770.160	0.100	2.13	81	81	1834	1.1	99.2
	3	15.0	774.200	0.100	2.10	82	82	1876	1.9	98.7
	4	20.0	778.410	0.110	2.28	83	83	1908	2.8	98.6
	5	25.0	782.390	0.100	2.04	83	83	1946	4.0	98.5
	6	30.0	786.550	0.110	2.23	84	84	1966	5.7	98.5
	7	35.0	791.330	0.120	2.93	85	85	1560	10.3	98.8
	8	40.0	796.030	0.110	2.80	84	84	1472	12.0	99.4
	9	45.0	800.270	0.100	2.25	84	84	1720	13.2	99.8
	10	50.0	804.370	0.100	2.13	84	84	1850	14.1	99.3
	11	55.0	808.190	0.090	1.85	84	84	1926	14.9	99.0
	12	60.0	812.070	0.090	1.90	85	85	1868	15.7	99.2
		0.0	812.070							
2	1	5.0	817.050	0.110	2.40	84	84	1796	0.3	113.7
	2	10.0	821.870	0.110	2.43	83	83	1763	1.1	109.5
	3	15.0	825.940	0.100	2.10	84	84	1880	1.9	99.2
	4	20.0	830.200	0.105	2.31	82	82	1763	2.8	99.2
	5	25.0	834.590	0.110	2.45	81	81	1734	4.0	99.4
	6	30.0	839.150	0.120	2.68	81	81	1728	5.7	98.8
	7	35.0	843.420	0.110	2.32	83	83	1871	10.3	99.3
	8	40.0	847.280	0.100	2.21	82	82	1760	12.0	92.0
	9	45.0	851.390	0.100	2.14	83	83	1830	13.2	99.3
	10	50.0	855.470	0.095	2.10	82	82	1760	14.1	99.7
	11	55.0	859.440	0.090	2.00	83	83	1743	14.9	99.1
	12	60.0	863.130	0.090	1.86	82	82	1745	15.7	92.3

		Average:	0.103	2.250	82.9	82.9	1796.6	99.6

Client:	De Beers, Snap Lake	**Date:**	July. 13/14
Jobsite:	Snap Lake	**Run:**	1 Partic/ Metals
Source:	Incinerator Stack #2	**Run Time:**	09:33-11:45

Particulate Concentration:	**140.8 mg/dscm**	0.0615 gr/dscf
	27.0 mg/Acm	0.0118 gr/Acf
	80.3 mg/dscm (@ 11% O2)	0.0351 gr/dscf (@ 11% O2)
Emission Rate:	0.15 Kg/hr	0.328 lb/hr
Sample Gas Volume:	2.7401 dscm	96.766 dscf
Total Sample Time:	120.0 minutes	
Average Isokineticity:	104.9 %	

Flue Gas Characteristics

Moisture:	14.68 %	
Temperature	997.4 oC	1827.3 oF
Flow	17.6 dscm/min	622 dscf/min
	0.29 dscm/sec	10.4 dscf/sec
	91.8 Acm/min	3243 Acf/min
Velocity	11.798 m/sec	38.71 f/sec
Gas Analysis	3.54 % O2	12.88 % CO2
	30.202 Mol. Wt (g/gmole) Dry	28.410 Mol. Wt (g/gmole) Wet

*** Standard Conditions:** Metric: 25 deg C, 101.325 kPa
Imperial: 77 deg F, 29.92 in.Hg

Client:	De Beers, Snap Lake	**Date:**	July. 13/14
Jobsite:	Snap Lake	**Run:**	1 Partic/ Metals
Source:	Incinerator Stack #2	**Run Time:**	09:33-11:45

Control Unit (Y)	0.9950
Nozzle Diameter (in.)	0.5623
Pitot Factor	0.8457
Baro. Press. (in. Hg)	28.66
Static Press. (in. H2O)	0.08
Stack Height (ft)	25
Stack Diameter (in.)	16.0
Stack Area (sq.ft.)	1.396
Minutes Per Reading	5.0
Minutes Per Point	5.0

Gas Analysis (Vol. %):

	CO2	O2
Trav. 1	14.50	1.83
Trav. 2	11.25	5.25
Average =	**12.88**	**3.54**

Condensate Collection:

Impinger 1 (grams)	211.0
Impinger 2 (grams)	84.0
Impinger 3 (grams)	12.0
Impinger 4 (grams)	23.0
Impinger 5 (grams)	5.0
Impinger 6 (grams)	12.0
Total Gain (grams)	**347.0**

Collection:

Filter (grams)	**0.2074**
Washings (grams)	**0.1784**
Impinger (grams)	**0.0000**
Total (grams)	**0.3858**

Traverse	Point	Time (min.)	Dry Gas Meter (ft3)	Pitot ^P (in. H2O)	Orifice ^H (in. H2O)	Dry Gas Temperature Inlet (oF)	Dry Gas Temperature Outlet (oF)	Stack (oF)	Wall Dist. (in.)	Isokin. (%)
		0.0	661.255							
1	1	5.0	665.470	0.100	2.31	63	63	1657	0.3	105.0
	2	10.0	669.850	0.110	2.52	63	63	1675	1.1	104.5
	3	15.0	674.300	0.115	2.60	63	63	1702	1.9	104.5
	4	20.0	678.640	0.110	2.47	64	64	1724	2.8	104.5
	5	25.0	682.760	0.100	2.21	65	65	1755	4.0	104.6
	6	30.0	686.900	0.100	2.22	66	66	1756	5.7	104.9
	7	35.0	691.000	0.100	2.17	67	67	1804	10.3	104.8
	8	40.0	695.160	0.105	2.27	67	67	1816	12.0	104.1
	9	45.0	699.210	0.100	2.15	67	67	1833	13.2	104.2
	10	50.0	703.250	0.100	2.13	68	68	1858	14.1	104.3
	11	55.0	707.100	0.090	1.90	69	69	1878	14.9	104.9
	12	60.0	710.910	0.090	1.88	69	69	1903	15.7	104.4
		0.0	710.900							
2	1	5.0	715.030	0.105	2.18	69	69	1916	0.3	105.1
	2	10.0	719.020	0.100	2.07	70	70	1927	1.1	104.1
	3	15.0	723.000	0.100	2.06	70	70	1941	1.9	104.1
	4	20.0	727.380	0.110	2.44	70	70	1775	2.8	105.5
	5	25.0	731.750	0.110	2.45	71	71	1776	4.0	105.1
	6	30.0	735.920	0.100	2.26	71	71	1735	5.7	104.2
	7	35.0	740.350	0.110	2.53	72	72	1898	10.3	109.2
	8	40.0	744.770	0.120	2.49	73	73	1938	12.0	105.0
	9	45.0	748.800	0.100	2.06	74	74	1957	13.2	105.0
	10	50.0	752.890	0.100	2.12	75	75	1896	14.1	105.0
	11	55.0	756.850	0.090	1.99	75	75	1797	14.9	104.9
	12	60.0	760.700	0.090	1.88	76	76	1938	15.7	104.9

			Average:	0.102	2.223	69.0	69.0	1827.3		104.9

Client:	De Beers, Snap Lake	**Date:**	July. 14/14
Jobsite:	Snap Lake	**Run:**	2 Partic/ Metals
Source:	Incinerator Stack #2	**Run Time:**	13:50-14:07

Particulate Concentration:	**147.9 mg/dscm**	0.0646 gr/dscf
	28.9 mg/Acm	0.0126 gr/Acf
	99.3 mg/dscm (@ 11% O2)	0.0434 gr/dscf (@ 11% O2)
Emission Rate:	0.15 Kg/hr	0.329 lb/hr
Sample Gas Volume:	2.5510 dscm	90.087 dscf
Total Sample Time:	120.0 minutes	
Average Isokineticity:	102.4 %	

Flue Gas Characteristics

Moisture:	13.22 %	
Temperature	994.1 oC	1821.4 oF
Flow	16.8 dscm/min	593 dscf/min
	0.28 dscm/sec	9.9 dscf/sec
	86.0 Acm/min	3039 Acf/min
Velocity	11.056 m/sec	36.27 f/sec
Gas Analysis	6.15 % O2	10.84 % CO2
	29.980 Mol. Wt (g/gmole) Dry	28.395 Mol. Wt (g/gmole) Wet

*** Standard Conditions:** Metric: 25 deg C, 101.325 kPa
Imperial: 77 deg F, 29.92 in.Hg

Client:	De Beers, Snap Lake	**Date:**	July. 14/14
Jobsite:	Snap Lake	**Run:**	2 Partic/ Metals
Source:	Incinerator Stack #2	**Run Time:**	13:50-14:07

Control Unit (Y)	0.9950
Nozzle Diameter (in.)	0.5623
Pitot Factor	0.8457
Baro. Press. (in. Hg)	28.60
Static Press. (in. H2O)	0.08
Stack Height (ft)	25
Stack Diameter (in.)	16.0
Stack Area (sq.ft.)	1.396
Minutes Per Reading	5.0
Minutes Per Point	5.0

Gas Analysis (Vol. %):

	CO2	O2
Trav. 1	11.67	5.00
Trav. 2	10.00	7.30
Average =	**10.84**	**6.15**

Condensate Collection:

Impinger 1 (grams)	182.0
Impinger 2 (grams)	74.0
Impinger 3 (grams)	10.0
Impinger 4 (grams)	6.0
Impinger 5 (grams)	4.0
Impinger 6 (grams)	10.0
Total Gain (grams)	**286.0**

Collection:

Filter (grams)	**0.2087**
Washings (grams)	**0.1686**
Impinger (grams)	**0.0000**
Total (grams)	**0.3773**

Traverse	Point	Time (min.)	Dry Gas Meter (ft3)	Pitot ^P (in. H2O)	Orifice ^H (in. H2O)	Dry Gas Temperature Inlet (oF)	Dry Gas Temperature Outlet (oF)	Stack (oF)	Wall Dist. (in.)	Isokin. (%)
		0.0	864.309							
1	1	5.0	868.160	0.085	1.88	79	79	1778	0.3	101.8
	2	10.0	872.170	0.085	2.02	80	80	1628	1.1	102.2
	3	15.0	876.160	0.090	2.00	80	80	1773	1.9	102.2
	4	20.0	880.370	0.100	2.22	81	81	1779	2.8	102.3
	5	25.0	884.600	0.100	2.24	82	82	1767	4.0	102.4
	6	30.0	888.720	0.095	2.13	82	82	1759	5.7	102.1
	7	35.0	892.980	0.100	2.25	83	83	1761	10.3	102.8
	8	40.0	897.120	0.095	2.12	84	84	1781	12.0	102.7
	9	45.0	901.280	0.100	2.14	85	85	1878	13.2	102.6
	10	50.0	905.350	0.095	2.06	84	84	1851	14.1	102.5
	11	55.0	909.300	0.090	1.93	85	85	1880	14.9	102.6
	12	60.0	913.230	0.090	1.91	85	85	1900	15.7	102.6
		0.0	913.230							
2	1	5.0	916.960	0.080	1.71	85	85	1881	0.3	102.8
	2	10.0	920.710	0.080	1.72	86	86	1879	1.1	103.1
	3	15.0	924.560	0.085	1.85	85	85	1847	1.9	102.2
	4	20.0	928.540	0.090	1.98	86	86	1816	2.8	101.8
	5	25.0	932.550	0.090	1.98	86	86	1816	4.0	102.6
	6	30.0	936.630	0.095	2.08	86	86	1832	5.7	102.0
	7	35.0	940.600	0.090	1.94	87	87	1867	10.3	102.5
	8	40.0	944.480	0.085	1.86	86	86	1836	12.0	102.6
	9	45.0	948.470	0.090	1.96	87	87	1848	13.2	102.6
	10	50.0	952.310	0.085	1.85	88	88	1858	14.1	101.6
	11	55.0	956.090	0.080	1.74	87	87	1846	14.9	103.0
	12	60.0	959.860	0.080	1.74	88	88	1852	15.7	102.7
			Average:	0.090	1.971	84.5	84.5	1821.4		102.4

Client:	De Beers, Snap Lake	**Date:**	July. 15/14
Jobsite:	Snap Lake	**Run:**	3 Partic/ Metals
Source:	Incinerator Stack #2	**Run Time:**	10:15-12:33

Particulate Concentration:	**84.9 mg/dscm**	0.0371 gr/dscf
	16.3 mg/Acm	0.0071 gr/Acf
	58.2 mg/dscm (@ 11% O2)	0.0254 gr/dscf (@ 11% O2)
Emission Rate:	0.09 Kg/hr	0.194 lb/hr
Sample Gas Volume:	2.5775 dscm	91.026 dscf
Total Sample Time:	120.0 minutes	
Average Isokineticity:	100.6 %	

Flue Gas Characteristics

Moisture:	12.99 %	
Temperature	1004.9 oC	1840.8 oF
Flow	17.3 dscm/min	610 dscf/min
	0.29 dscm/sec	10.2 dscf/sec
	90.0 Acm/min	3178 Acf/min
Velocity	11.564 m/sec	37.94 f/sec
Gas Analysis	6.46 % O2	10.75 % CO2
	29.977 Mol. Wt (g/gmole) Dry	28.422 Mol. Wt (g/gmole) Wet

*** Standard Conditions:** Metric: 25 deg C, 101.325 kPa
Imperial: 77 deg F, 29.92 in.Hg

Client:	De Beers, Snap Lake	**Date:**	July. 15/14
Jobsite:	Snap Lake	**Run:**	3 Partic/ Metals
Source:	Incinerator Stack #2	**Run Time:**	10:15-12:33

Control Unit (Y)	0.9950
Nozzle Diameter (in.)	0.5623
Pitot Factor	0.8457
Baro. Press. (in. Hg)	28.30
Static Press. (in. H2O)	0.08
Stack Height (ft)	25
Stack Diameter (in.)	16.0
Stack Area (sq.ft.)	1.396
Minutes Per Reading	5.0
Minutes Per Point	5.0

Gas Analysis (Vol. %):

	CO2	O2
Trav. 1	11.41	6.08
Trav. 2	10.08	6.83
Average =	**10.75**	**6.46**

Condensate Collection:

Impinger 1 (grams)	182.0
Impinger 2 (grams)	71.0
Impinger 3 (grams)	10.0
Impinger 4 (grams)	8.0
Impinger 5 (grams)	2.0
Impinger 6 (grams)	10.0
Total Gain (grams)	**283.0**

Collection:

Filter (grams)	**0.1072**
Washings (grams)	**0.1116**
Impinger (grams)	**0.0000**
Total (grams)	**0.2188**

Traverse	Point	Time (min.)	Dry Gas Meter (ft3)	Pitot ^P (in. H2O)	Orifice ^H (in. H2O)	Dry Gas Temperature Inlet (oF)	Outlet (oF)	Stack (oF)	Wall Dist. (in.)	Isokin. (%)
		0.0	960.470							
1	1	5.0	964.410	0.095	2.00	70	70	1815	0.3	100.3
	2	10.0	968.290	0.090	1.90	71	71	1805	1.1	101.0
	3	15.0	972.330	0.100	2.10	70	70	1823	1.9	100.5
	4	20.0	976.470	0.105	2.20	71	71	1826	2.8	100.4
	5	25.0	980.630	0.105	2.21	72	72	1819	4.0	100.5
	6	30.0	984.850	0.110	2.28	76	76	1860	5.7	99.8
	7	35.0	989.100	0.110	2.32	73	73	1822	10.3	100.2
	8	40.0	993.220	0.105	2.18	74	74	1865	12.0	100.2
	9	45.0	997.330	0.100	2.11	76	76	1838	13.2	101.4
	10	50.0	1001.420	0.100	2.08	77	77	1874	14.1	101.5
	11	55.0	1005.290	0.090	1.91	77	77	1822	14.9	100.0
	12	60.0	1009.150	0.090	1.87	78	78	1880	15.7	100.8
		0.0	1009.150							
2	1	5.0	1013.030	0.090	1.91	79	79	1837	0.3	100.2
	2	10.0	1017.000	0.095	1.99	79	79	1863	1.1	100.4
	3	15.0	1021.090	0.100	2.11	80	80	1845	1.9	100.3
	4	20.0	1025.000	0.090	1.92	79	79	1825	2.8	100.8
	5	25.0	1029.090	0.100	2.12	79	79	1840	4.0	100.4
	6	30.0	1033.220	0.100	2.13	80	80	1831	5.7	101.0
	7	35.0	1037.330	0.100	2.13	81	81	1836	10.3	100.4
	8	40.0	1041.340	0.095	1.98	80	80	1875	12.0	101.5
	9	45.0	1045.260	0.090	1.91	80	80	1838	13.2	101.1
	10	50.0	1049.170	0.090	1.91	80	80	1839	14.1	100.9
	11	55.0	1052.960	0.085	1.79	81	81	1862	14.9	100.9
	12	60.0	1056.660	0.080	1.70	82	82	1839	15.7	100.8
			Average:	0.096	2.032	76.9	76.9	1840.8		100.6

STANDARD VOLUME / GAS CONCENTRATION WORKSHEET

De Beers, Snap Lake	**Tested for:**	SOx	
Incinerator #1	**DGM ID:**	LM-4	
28.25	**DGM Y:**	1.0073	
July. 11-13/14			

	DRY GAS METER				CONSTANTS			RESULTS		11.0	
TIME	Reading (ft3)	Temp In (Avg. oF)	Temp Out (Avg. oF)	Avg. Delta H (inches H20)	Y Factor	Pb (in. Hg)	Volume Std. (m3 std.)	Lab Result (mg of SOx)	Concentration (mg SOx/m3)	Oxygen (%)	Conc. @ 11% O2 (mg/Sm3)
13:55	181.5816	62.0	62.0	0.0	1.0073	28.25	0.33180	18.0	54.2	4.8	**33**
14:55	181.9265	-	-	-	-	-					
10:32	181.9392	64.0	64.0	0.0	1.0073	28.25	0.56714	44.3	78.1	7.8	**59**
11:32	182.5310	-	-	-	-	-					
14:50	183.1527	75.0	75.0	0.0	1.0073	28.25	0.49062	39.7	80.8	7.1	**58**
15:50	183.6754	-	-	-	-	-					

STANDARD VOLUME / GAS CONCENTRATION WORKSHEET

De Beers, Snap Lake	**Tested for:**	SOx
Incinerator #2	**DGM ID:**	LM-4
28.66	**DGM Y:**	1.0073
July. 13-15/14		

	DRY GAS METER				CONSTANTS			RESULTS		11.0	
TIME	Reading (ft3)	Temp In (Avg. oF)	Temp Out (Avg. oF)	Avg. Delta H (inches H20)	Y Factor	Pb (in. Hg)	Volume Std. (m3 std.)	Lab Result (mg of SOx)	Concentration (mg SOx/m3)	Oxygen (%)	Conc. @ 11% O2 (mg/Sm3)
9:33	182.5555	65.0	65.0	0.0	1.0073	28.66	0.56768	55.6	97.9	3.5	**56**
10:33	183.1405	-	-	-	-	-					
13:54	183.6852	64.0	64.0	0.0	1.0073	28.66	0.54057	58.7	108.5	6.2	**73**
14:54	184.2412	-	-	-	-	-					
10:15	184.2480	70.0	70.0	0.0	1.0073	28.66	0.48024	24.7	51.5	6.5	**35**
11:15	184.7476	-	-	-	-	-					

APPENDIX 2

ANALYTICAL DATA

METHOD 23/1-RM-3 DATA REPORT

Client:	A. Lanfranco & Associates	**Sample Date:**	11-Jul-14
Client ID:	Snap Lake - Run 1	**Date Extracted:**	29-Jul-14
	Incinerator #1	**Date Analysed:**	16-Aug-14
PRL ID:	PR141628	**Filter Wt.:**	0.44 g

DIOXINS		DL	# of	I-TEQs (ND=0)	I-TEQs (ND=½DL)	I-TEQs (ND=DL)
Congeners	pg	pg	peaks	pg	pg	pg
2,3,7,8-TCDD	ND	2		ND	1	2
Total TCDD	240	2	0			
1,2,3,7,8-PeCDD	210	4		105	105	105
Total PeCDD	1400	4	0			
1,2,3,4,7,8-HxCDD	220	4		22	22	22
1,2,3,6,7,8-HxCDD	250	4		25	25	25
1,2,3,7,8,9-HxCDD	250	4		25	25	25
Total HxCDD	3900	4	0			
1,2,3,4,6,7,8-HpCDD	2000	4		20	20	20
Total HpCDD	4300	4	0			
OCDD	3500	15	0	3.5	3.5	3.5
		Total Dioxin TEQ		200	200	200

FURANS		DL	# of	I-TEQs (ND=0)	I-TEQs (ND=½DL)	I-TEQs (ND=DL)
Congeners	pg	pg	peaks	pg	pg	pg
2,3,7,8-TCDF	120	2		12	12	12
Total TCDF	1900	2	0			
1,2,3,7,8-PeCDF	160	4		8	8	8
2,3,4,7,8-PeCDF	370	4		185	185	185
Total PeCDF	4200	4	0			
1,2,3,4,7,8-HxCDF	360	4		36	36	36
1,2,3,6,7,8-HxCDF	450	4		45	45	45
1,2,3,7,8,9-HxCDF	170	4		17	17	17
2,3,4,6,7,8-HxCDF	850	4		85	85	85
Total HxCDF	4300	4	0			
1,2,3,4,6,7,8-HpCDF	2300	4		23	23	23
1,2,3,4,7,8,9-HpCDF	350	4		3.5	3.5	3.5
Total HpCDF	4200	4	0			
OCDF	1200	15	0	1.2	1.2	1.2
		Total Furan TEQ		420	420	420

Total PCDD/PCDF Toxic Equivalent (pg)	620	620	620

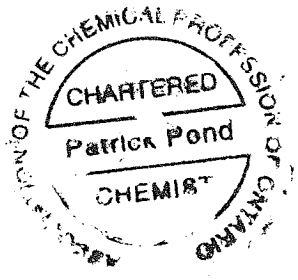
Surrogate Recoveries (%)

$^{37}Cl_4$ -2,3,7,8-TCDD	93
$^{13}C_{12}$ -2,3,4,7,8-PeCDF	88
$^{13}C_{12}$ -1,2,3,4,7,8-HxCDD	88
$^{13}C_{12}$ -1,2,3,4,7,8-HxCDF	89
$^{13}C_{12}$ -1,2,3,4,7,8,9-HpCDF	71

ND - none detected

Internal Standards (%)

$^{13}C_{12}$ -2,3,7,8-TCDD	90
$^{13}C_{12}$ -1,2,3,7,8-PeCDD	101
$^{13}C_{12}$ -1,2,3,6,7,8-HxCDD	95
$^{13}C_{12}$ -1,2,3,4,6,7,8-HpCDD	88
$^{13}C_{12}$ -OCDD	103
$^{13}C_{12}$ -2,3,7,8-TCDD	62
$^{13}C_{12}$ -1,2,3,7,8-PeCDF	93
$^{13}C_{12}$ -1,2,3,6,7,8-HxCDF	99
$^{13}C_{12}$ -1,2,3,4,6,7,8-HpCDF	84



Patrick Pond CTO 15/08/14

METHOD 23/1-RM-3 DATA REPORT

Client:	A. Lanfranco & Associates	**Sample Date:**	12-Jul-14
Client ID:	Snap Lake - Run 2	**Date Extracted:**	29-Jul-14
	Incinerator #1	**Date Analysed:**	16-Aug-14
PRL ID:	PR141629	**Filter Wt.:**	0.47 g

DIOXINS				I-TEQs		
		DL	# of	(ND=0)	(ND=½DL)	(ND=DL)
Congeners	**pg**	**pg**	**peaks**	**pg**	**pg**	**pg**
2,3,7,8-TCDD	54	2		54	54	54
Total TCDD	1500	2	5			
1,2,3,7,8-PeCDD	1000	4		500	500	500
Total PeCDD	4800	4	7			
1,2,3,4,7,8-HxCDD	1600	4		160	160	160
1,2,3,6,7,8-HxCDD	1100	4		110	110	110
1,2,3,7,8,9-HxCDD	940	4		94	94	94
Total HxCDD	16000	4	5			
1,2,3,4,6,7,8-HpCDD	19000	4		190	190	190
Total HpCDD	36000	4	2			
OCDD	53000	15	1	53	53	53
		Total Dioxin TEQ		**1200**	**1200**	**1200**

FURANS				I-TEQs		
		DL	# of	(ND=0)	(ND=½DL)	(ND=DL)
Congeners	**pg**	**pg**	**peaks**	**pg**	**pg**	**pg**
2,3,7,8-TCDF	200	2		20	20	20
Total TCDF	5000	2	9			
1,2,3,7,8-PeCDF	590	4		29.5	29.5	29.5
2,3,4,7,8-PeCDF	1300	4		650	650	650
Total PeCDF	21000	4	3			
1,2,3,4,7,8-HxCDF	1700	4		170	170	170
1,2,3,6,7,8-HxCDF	3100	4		310	310	310
1,2,3,7,8,9-HxCDF	1200	4		120	120	120
2,3,4,6,7,8-HxCDF	7600	4		760	760	760
Total HxCDF	28000	4	8			
1,2,3,4,6,7,8-HpCDF	22000	4		220	220	220
1,2,3,4,7,8,9-HpCDF	3200	4		32	32	32
Total HpCDF	39000	4	3			
OCDF	21000	15	1	21	21	21
		Total Furan TEQ		**2300**	**2300**	**2300**

Total PCDD/PCDF Toxic Equivalent (pg)	**3500**	**3500**	**3500**

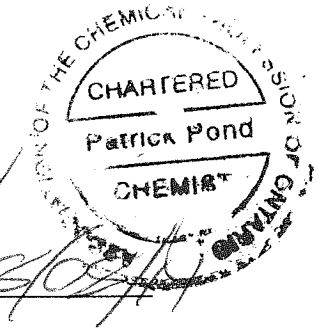
Surrogate Recoveries (%)

$^{37}Cl_4$ -2,3,7,8-TCDD	93
$^{13}C_{12}$ -2,3,4,7,8-PeCDF	90
$^{13}C_{12}$ -1,2,3,4,7,8-HxCDD	89
$^{13}C_{12}$ -1,2,3,4,7,8-HxCDF	83
$^{13}C_{12}$ -1,2,3,4,7,8,9-HpCDF	71

Internal Standards (%)

$^{13}C_{12}$ -2,3,7,8-TCDD	78
$^{13}C_{12}$ -1,2,3,7,8-PeCDD	103
$^{13}C_{12}$ -1,2,3,6,7,8-HxCDD	94
$^{13}C_{12}$ -1,2,3,4,6,7,8-HpCDD	93
$^{13}C_{12}$ -OCDD	126
$^{13}C_{12}$ -2,3,7,8-TCDF	59
$^{13}C_{12}$ -1,2,3,7,8-PeCDF	88
$^{13}C_{12}$ -1,2,3,6,7,8-HxCDF	93
$^{13}C_{12}$ -1,2,3,4,6,7,8-HpCDF	85

ND - none detected



Patrick Pond CTO

METHOD 23/1-RM-3 DATA REPORT

Client:	A. Lanfranco & Associates	**Sample Date:**	13-Jul-14
Client ID:	Snap Lake - Run 3	**Date Extracted:**	29-Jul-14
	Incinerator #1	**Date Analysed:**	17-Aug-14
PRL ID:	PR141630	**Filter Wt.:**	0.96 g

DIOXINS		DL	# of	I-TEQs (ND=0)	I-TEQs (ND=½DL)	I-TEQs (ND=DL)
Congeners	**pg**	**pg**	**peaks**	**pg**	**pg**	**pg**
2,3,7,8-TCDD	130	2		130	130	130
Total TCDD	1200	2	8			
1,2,3,7,8-PeCDD	750	4		375	375	375
Total PeCDD	3800	4	7			
1,2,3,4,7,8-HxCDD	840	4		84	84	84
1,2,3,6,7,8-HxCDD	1400	4		140	140	140
1,2,3,7,8,9-HxCDD	1100	4		110	110	110
Total HxCDD	16000	4	7			
1,2,3,4,6,7,8-HpCDD	22000	4		220	220	220
Total HpCDD	43000	4	2			
OCDD	53000	15	1	53	53	53
		Total Dioxin TEQ		**1100**	**1100**	**1100**

FURANS		DL	# of	I-TEQs (ND=0)	I-TEQs (ND=½DL)	I-TEQs (ND=DL)
Congeners	**pg**	**pg**	**peaks**	**pg**	**pg**	**pg**
2,3,7,8-TCDF	520	2		52	52	52
Total TCDF	11000	2	8			
1,2,3,7,8-PeCDF	1300	4		65	65	65
2,3,4,7,8-PeCDF	2500	4		1250	1250	1250
Total PeCDF	36000	4	3			
1,2,3,4,7,8-HxCDF	3500	4		350	350	350
1,2,3,6,7,8-HxCDF	4900	4		490	490	490
1,2,3,7,8,9-HxCDF	2800	4		280	280	280
2,3,4,6,7,8-HxCDF	12000	4		1200	1200	1200
Total HxCDF	46000	4	7			
1,2,3,4,6,7,8-HpCDF	23000	4		230	230	230
1,2,3,4,7,8,9-HpCDF	11000	4		110	110	110
Total HpCDF	73000	4	4			
OCDF	45000	15	1	45	45	45
		Total Furan TEQ		**4100**	**4100**	**4100**

Total PCDD/PCDF Toxic Equivalent (pg)	**5200**	**5200**	**5200**

Surrogate Recoveries (%)

$^{37}Cl_4$ -2,3,7,8-TCDD	94
$^{13}C_{12}$ -2,3,4,7,8-PeCDF	89
$^{13}C_{12}$ -1,2,3,4,7,8-HxCDD	83
$^{13}C_{12}$ -1,2,3,4,7,8-HxCDF	81
$^{13}C_{12}$ -1,2,3,4,7,8,9-HpCDF	76

Internal Standards (%)

$^{13}C_{12}$ -2,3,7,8-TCDD	81
$^{13}C_{12}$ -1,2,3,7,8-PeCDD	101
$^{13}C_{12}$ -1,2,3,6,7,8-HxCDD	96
$^{13}C_{12}$ -1,2,3,4,6,7,8-HpCDD	96
$^{13}C_{12}$ -OCDD	130
$^{13}C_{12}$ -2,3,7,8-TCDD	54
$^{13}C_{12}$ -1,2,3,7,8-PeCDF	87
$^{13}C_{12}$ -1,2,3,6,7,8-HxCDF	98
$^{13}C_{12}$ -1,2,3,4,6,7,8-HpCDF	87

ND - none detected

Patrick Pond CTO 12/08/19

ASSOCIATION OF THE CHEMICAL PROFESSION OF ONTARIO CHARTERED Patrick Pond CHEMIST

METHOD 23/1-RM-3 DATA REPORT

Client:	A. Lanfranco & Associates	**Sample Date:**	13-Jul-14
Client ID:	Snap Lake - Run 1	**Date Extracted:**	29-Jul-14
	Incinerator #2	**Date Analysed:**	16-Aug-14
PRL ID:	PR141631	**Filter Wt.:**	0.99 g

DIOXINS		DL	# of	I-TEQs (ND=0)	I-TEQs (ND=½DL)	I-TEQs (ND=DL)
Congeners	pg	pg	peaks	pg	pg	pg
2,3,7,8-TCDD	340	2		340	340	340
Total TCDD	2900	2	8			
1,2,3,7,8-PeCDD	1800	4		900	900	900
Total PeCDD	12000	4	7			
1,2,3,4,7,8-HxCDD	3900	4		390	390	390
1,2,3,6,7,8-HxCDD	4600	4		460	460	460
1,2,3,7,8,9-HxCDD	3400	4		340	340	340
Total HxCDD	42000	4	3			
1,2,3,4,6,7,8-HpCDD	64000	4		640	640	640
Total HpCDD	112000	4	2			
OCDD	127000	15	1	127	127	127
		Total Dioxin TEQ		3200	3200	3200

FURANS		DL	# of	I-TEQs (ND=0)	I-TEQs (ND=½DL)	I-TEQs (ND=DL)
Congeners	pg	pg	peaks	pg	pg	pg
2,3,7,8-TCDF	2300	2		230	230	230
Total TCDF	37000	2	12			
1,2,3,7,8-PeCDF	4200	4		210	210	210
2,3,4,7,8-PeCDF	4900	4		2450	2450	2450
Total PeCDF	91000	4	7			
1,2,3,4,7,8-HxCDF	6500	4		650	650	650
1,2,3,6,7,8-HxCDF	8500	4		850	850	850
1,2,3,7,8,9-HxCDF	3200	4		320	320	320
2,3,4,6,7,8-HxCDF	15000	4		1500	1500	1500
Total HxCDF	71000	4	7			
1,2,3,4,6,7,8-HpCDF	36000	4		360	360	360
1,2,3,4,7,8,9-HpCDF	12000	4		120	120	120
Total HpCDF	104000	4	4			
OCDF	70000	15	1	70	70	70
		Total Furan TEQ		6800	6800	6800

Total PCDD/PCDF Toxic Equivalent (pg)	10000	10000	10000

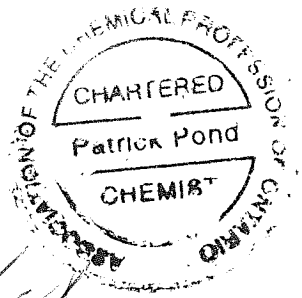
Surrogate Recoveries (%)

$^{37}Cl_4$ -2,3,7,8-TCDD	93
$^{13}C_{12}$ -2,3,4,7,8-PeCDF	84
$^{13}C_{12}$ -1,2,3,4,7,8-HxCDD	92
$^{13}C_{12}$ -1,2,3,4,7,8-HxCDF	78
$^{13}C_{12}$ -1,2,3,4,7,8,9-HpCDF	65

ND - none detected

Internal Standards (%)

$^{13}C_{12}$ -2,3,7,8-TCDD	84
$^{13}C_{12}$ -1,2,3,7,8-PeCDD	93
$^{13}C_{12}$ -1,2,3,6,7,8-HxCDD	91
$^{13}C_{12}$ -1,2,3,4,6,7,8-HpCDD	93
$^{13}C_{12}$ -OCDD	116
$^{13}C_{12}$ -2,3,7,8-TCDF	58
$^{13}C_{12}$ -1,2,3,7,8-PeCDF	87
$^{13}C_{12}$ -1,2,3,6,7,8-HxCDF	101
$^{13}C_{12}$ -1,2,3,4,6,7,8-HpCDF	87



Patrick Pond CTO

METHOD 23/1-RM-3 DATA REPORT

Client:	A. Lanfranco & Associates	**Sample Date:**	14-Jul-14
Client ID:	Snap Lake - Run 2	**Date Extracted:**	29-Jul-14
	Incinerator #2	**Date Analysed:**	16-Aug-14
PRL ID:	PR141632	**Filter Wt.:**	1.04 g

DIOXINS				I-TEQs		
		DL	# of	(ND=0)	(ND=½DL)	(ND=DL)
Congeners	pg	pg	peaks	pg	pg	pg
2,3,7,8-TCDD	9200	2		9200	9200	9200
Total TCDD	38000	2	6			
1,2,3,7,8-PeCDD	20000	4		10000	10000	10000
Total PeCDD	80000	4	7			
1,2,3,4,7,8-HxCDD	6800	4		680	680	680
1,2,3,6,7,8-HxCDD	11000	4		1100	1100	1100
1,2,3,7,8,9-HxCDD	7800	4		780	780	780
Total HxCDD	103000	4	7			
1,2,3,4,6,7,8-HpCDD	45000	4		450	450	450
Total HpCDD	80000	4	2			
OCDD	47000	15	1	47	47	47
		Total Dioxin TEQ		22000	22000	22000

FURANS				I-TEQs		
		DL	# of	(ND=0)	(ND=½DL)	(ND=DL)
Congeners	pg	pg	peaks	pg	pg	pg
2,3,7,8-TCDF	34000	2		3400	3400	3400
Total TCDF	436000	2	13			
1,2,3,7,8-PeCDF	38000	4		1900	1900	1900
2,3,4,7,8-PeCDF	25000	4		12500	12500	12500
Total PeCDF	509000	4	8			
1,2,3,4,7,8-HxCDF	22000	4		2200	2200	2200
1,2,3,6,7,8-HxCDF	23000	4		2300	2300	2300
1,2,3,7,8,9-HxCDF	5200	4		520	520	520
2,3,4,6,7,8-HxCDF	21000	4		2100	2100	2100
Total HxCDF	171000	4	9			
1,2,3,4,6,7,8-HpCDF	33000	4		330	330	330
1,2,3,4,7,8,9-HpCDF	10000	4		100	100	100
Total HpCDF	93000	4	4			
OCDF	41000	15	1	41	41	41
		Total Furan TEQ		25000	25000	25000

Total PCDD/PCDF Toxic Equivalent (pg)			
		47000	47000	47000

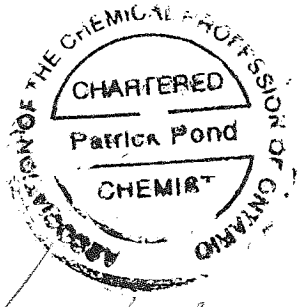
Surrogate Recoveries (%)

$^{37}Cl_4$ -2,3,7,8-TCDD	101
$^{13}C_{12}$ -2,3,4,7,8-PeCDF	90
$^{13}C_{12}$ -1,2,3,4,7,8-HxCDD	86
$^{13}C_{12}$ -1,2,3,4,7,8-HxCDF	95
$^{13}C_{12}$ -1,2,3,4,7,8,9-HpCDF	75

ND - none detected

Internal Standards (%)

$^{13}C_{12}$ -2,3,7,8-TCDD	77
$^{13}C_{12}$ -1,2,3,7,8-PeCDD	92
$^{13}C_{12}$ -1,2,3,6,7,8-HxCDD	88
$^{13}C_{12}$ -1,2,3,4,6,7,8-HpCDD	85
$^{13}C_{12}$ -OCDD	87
$^{13}C_{12}$ -2,3,7,8-TCDD	44
$^{13}C_{12}$ -1,2,3,7,8-PeCDF	88
$^{13}C_{12}$ -1,2,3,6,7,8-HxCDF	97
$^{13}C_{12}$ -1,2,3,4,6,7,8-HpCDF	85



Patrick Pond CTO

METHOD 23/1-RM-3 DATA REPORT

Client:	A. Lanfranco & Associates	**Sample Date:**	15-Jul-14
Client ID:	Snap Lake - Run 3	**Date Extracted:**	29-Jul-14
	Incinerator #2	**Date Analysed:**	16-Aug-14
PRL ID:	PR141633	**Filter Wt.:**	0.58 g

DIOXINS				I-TEQs		
		DL	# of	(ND=0)	(ND=½DL)	(ND=DL)
Congeners	pg	pg	peaks	pg	pg	pg
2,3,7,8-TCDD	2200	2		2200	2200	2200
Total TCDD	13000	2	7			
1,2,3,7,8-PeCDD	14000	4		7000	7000	7000
Total PeCDD	71000	4	7			
1,2,3,4,7,8-HxCDD	16000	4		1600	1600	1600
1,2,3,6,7,8-HxCDD	24000	4		2400	2400	2400
1,2,3,7,8,9-HxCDD	16000	4		1600	1600	1600
Total HxCDD	200000	4	7			
1,2,3,4,6,7,8-HpCDD	69000	4		690	690	690
Total HpCDD	127000	4	2			
OCDD	117000	15	1	117	117	117
		Total Dioxin TEQ		**16000**	**16000**	**16000**

FURANS				I-TEQs		
		DL	# of	(ND=0)	(ND=½DL)	(ND=DL)
Congeners	pg	pg	peaks	pg	pg	pg
2,3,7,8-TCDF	7400	2		740	740	740
Total TCDF	127000	2	10			
1,2,3,7,8-PeCDF	17000	4		850	850	850
2,3,4,7,8-PeCDF	20000	4		10000	10000	10000
Total PeCDF	339000	4	7			
1,2,3,4,7,8-HxCDF	23000	4		2300	2300	2300
1,2,3,6,7,8-HxCDF	25000	4		2500	2500	2500
1,2,3,7,8,9-HxCDF	11000	4		1100	1100	1100
2,3,4,6,7,8-HxCDF	34000	4		3400	3400	3400
Total HxCDF	242000	4	13			
1,2,3,4,6,7,8-HpCDF	40000	4		400	400	400
1,2,3,4,7,8,9-HpCDF	29000	4		290	290	290
Total HpCDF	139000	4	4			
OCDF	69000	15	1	69	69	69
		Total Furan TEQ		**22000**	**22000**	**22000**

Total PCDD/PCDF Toxic Equivalent (pg)	**38000**	**38000**	**38000**

Surrogate Recoveries (%)

$^{37}Cl_4$ -2,3,7,8-TCDD	95
$^{13}C_{12}$ -2,3,4,7,8-PeCDF	88
$^{13}C_{12}$ -1,2,3,4,7,8-HxCDD	85
$^{13}C_{12}$ -1,2,3,4,7,8-HxCDF	86
$^{13}C_{12}$ -1,2,3,4,7,8,9-HpCDF	76

ND - none detected

Internal Standards (%)

$^{13}C_{12}$ -2,3,7,8-TCDD	74
$^{13}C_{12}$ -1,2,3,7,8-PeCDD	100
$^{13}C_{12}$ -1,2,3,6,7,8-HxCDD	95
$^{13}C_{12}$ -1,2,3,4,6,7,8-HpCDD	100
$^{13}C_{12}$ -OCDD	129
$^{13}C_{12}$ -2,3,7,8-TCDD	45
$^{13}C_{12}$ -1,2,3,7,8-PeCDF	89
$^{13}C_{12}$ -1,2,3,6,7,8-HxCDF	97
$^{13}C_{12}$ -1,2,3,4,6,7,8-HpCDF	91

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CHARTERED
Patrick Pond
CHEMIST

Patrick Pond CTO

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Surrey, British Columbia
V3S 8P8, Canada

T: +1 (604) 514-3322
F: +1 (604) 514-3323
E: Surrey@exova.com
W: www.exova.com

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Report Transmission Cover Page

Bill To:	A. Lanfranco & Associates	Project:		Lot ID:	**1017066**
Report To:	A. Lanfranco & Associates	ID:		Control Number:	B202062
	#101, 9488 - 189 Street	Name:	Debeers	Date Received:	Jul 28, 2014
	Surrey, BC, Canada	Location:	Snaplake, YT	Date Reported:	Aug 18, 2014
	V4N 4W7	LSD:		Report Number:	1936220
Attn:	Al LanFranco	P.O.:			
Sampled By:		Acct code:			
Company:					

Contact & Affiliation	Address	Delivery Commitments
Mark Lanfranco A. Lanfranco & Associates Inc.	#101, 9488 - 189 Street Surrey, British Columbia V4N 4W7 Phone: (604) 881-2582 Fax: (604) 881-2581 Email: mark.lanfranco@alanfranco.com	On [Lot Verification] send (COA) by Email - Multiple Reports By Agreement On [Report Approval] send (COC, Test Report) by Email - Merge Reports On [Lot Creation] send (COR) by Email - Single Report

Notes To Clients:

Exova
#104, 19575-55 A Ave.
Surrey, British Columbia
V3S 8P8, Canada

T: +1 (604) 514-3322
F: +1 (604) 514-3323
E: Surrey@exova.com
W: www.exova.com

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Analytical Report

Bill To: A. Lanfranco & Associates
Report To: A. Lanfranco & Associates
#101, 9488 - 189 Street
Surrey, BC, Canada
V4N 4W7
Attn: Al LanFranco
Sampled By:
Company:

Project:
ID:
Name: Debeers
Location: Snaplake, YT
LSD:
P.O.:
Acct code:

Lot ID: **1017066**
Control Number: B202062
Date Received: Jul 28, 2014
Date Reported: Aug 18, 2014
Report Number: 1936220

		Reference Number	1017066-1	1017066-2	1017066-3	
		Sample Date				
		Sample Time				
		Sample Location				
		Sample Description	Snap Lake - Blank Beaker (M-X) + 3 bottles	Unit #1 Run#1 - Blank Beaker (MVLAF Run 1) + 3 bottles	Unit #1 Run#2 - Blank Beaker (MVLAF Run 2) + 3 bottles	
		Matrix	Stack Samples	Stack Samples	Stack Samples	
Analyte		**Units**	**Results**	**Results**	**Results**	Nominal Detection Limit
Mercury by CVAA						
Mercury	As Tested	ug/L	<0.050	<0.050	<0.050	0.05
Dilution Factor	As Tested		1.00	1.00	1.00	
Volume	Sample	mL	250	250	250	
Volume	aliquot volume	mL	25.0	25.0	25.0	
Volume	Final	mL	40.0	40.0	40.0	
Mercury	Fraction 1B	ug/sample	<0.020	<0.020	<0.020	
Mercury	As Tested	ug/L	<0.050	<0.050	<0.050	0.05
Dilution Factor	As Tested		1.00	1.00	1.00	
Volume	Sample	mL	700	1040	1060	
Volume	aliquot volume	mL	5.00	5.00	5.00	
Volume	Final	mL	40.0	40.0	40.0	
Mercury	Fraction 2B	ug/sample	<0.280	<0.416	<0.424	
Mercury	As Tested	ug/L	<0.050	<0.050	<0.050	0.05
Dilution Factor	As Tested		1.00	1.00	1.00	
Volume	Sample	mL	118	151	94.0	
Volume	aliquot volume	mL	25.0	25.0	25.0	
Volume	Final	mL	40.0	40.0	40.0	
Mercury	Fraction 3A	ug/sample	<0.009	<0.012	<0.008	
Mercury	As Tested	ug/L	<0.050	<0.050	<0.050	0.05
Dilution Factor	As Tested		1.00	1.00	1.00	
Volume	Sample	mL	1000	1000	1000	
Volume	aliquot volume	mL	25.0	25.0	25.0	
Volume	Final	mL	40.0	40.0	40.0	
Mercury	Fraction 3B	ug/sample	<0.080	<0.080	<0.080	
Mercury	As Tested	ug/L	<0.05	0.25	0.33	0.05
Dilution Factor	As Tested		1.00	1.00	1.00	
Volume	Sample	mL	200	200	200	
Volume	aliquot volume	mL	25.0	25.0	25.0	
Volume	Final	mL	40	40	40	
Mercury	Fraction 3C	ug/sample	<0.02	0.080	0.11	

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#104, 19575-55 A Ave.
Surrey, British Columbia
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E: Surrey@exova.com
W: www.exova.com

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Analytical Report

Bill To: A. Lanfranco & Associates
Report To: A. Lanfranco & Associates
#101, 9488 - 189 Street
Surrey, BC, Canada
V4N 4W7
Attn: Al LanFranco
Sampled By:
Company:

Project:
ID:
Name: Debeers
Location: Snaplake, YT
LSD:
P.O.:
Acct code:

Lot ID: **1017066**
Control Number: B202062
Date Received: Jul 28, 2014
Date Reported: Aug 18, 2014
Report Number: 1936220

		Reference Number	1017066-4	1017066-5	1017066-6	
		Sample Date				
		Sample Time				
		Sample Location				
		Sample Description	Unit #1 Run#3 - Blank Beaker (Met 3) + 3 bottles	Unit #2 Run#1 - Blank Beaker (Mex1) + 3 bottles	Unit #2 Run#2 - Blank Beaker (MB2) + 3 bottles	
		Matrix	Stack Samples	Stack Samples	Stack Samples	
Analyte		**Units**	**Results**	**Results**	**Results**	Nominal Detection Limit
Mercury by CVAA						
Mercury	As Tested	ug/L	<0.050	<0.050	0.140	0.05
Dilution Factor	As Tested		1.00	1.00	1.00	
Volume	Sample	mL	250	250	250	
Volume	aliquot volume	mL	25.0	25.0	25.0	
Volume	Final	mL	40.0	40.0	40.0	
Mercury	Fraction 1B	ug/sample	<0.020	<0.020	0.056	
Mercury	As Tested	ug/L	<0.050	<0.050	<0.050	0.05
Dilution Factor	As Tested		1.00	1.00	1.00	
Volume	Sample	mL	1000	930	980	
Volume	aliquot volume	mL	5.00	5.00	5.00	
Volume	Final	mL	40.0	40.0	40.0	
Mercury	Fraction 2B	ug/sample	<0.400	<0.372	<0.392	
Mercury	As Tested	ug/L	<0.050	<0.050	<0.050	0.05
Dilution Factor	As Tested		1.00	1.00	1.00	
Volume	Sample	mL	110	98.0	109	
Volume	aliquot volume	mL	25.0	25.0	25.0	
Volume	Final	mL	40.0	40.0	40.0	
Mercury	Fraction 3A	ug/sample	<0.009	<0.008	<0.009	
Mercury	As Tested	ug/L	<0.050	<0.050	<0.050	0.05
Dilution Factor	As Tested		1.00	1.00	1.00	
Volume	Sample	mL	1000	1000	1000	
Volume	aliquot volume	mL	25.0	25.0	25.0	
Volume	Final	mL	40.0	40.0	40.0	
Mercury	Fraction 3B	ug/sample	<0.080	<0.080	<0.080	
Mercury	As Tested	ug/L	0.89	0.64	0.33	0.05
Dilution Factor	As Tested		1.00	1.00	1.00	
Volume	Sample	mL	200	200	200	
Volume	aliquot volume	mL	25.0	25.0	25.0	
Volume	Final	mL	40	40	40	
Mercury	Fraction 3C	ug/sample	0.28	0.20	0.11	

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V3S 8P8, Canada

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Analytical Report

Bill To: A. Lanfranco & Associates
Report To: A. Lanfranco & Associates
#101, 9488 - 189 Street
Surrey, BC, Canada
V4N 4W7
Attn: Al LanFranco
Sampled By:
Company:

Project:
ID:
Name: Debeers
Location: Snaplake, YT
LSD:
P.O.:
Acct code:

Lot ID: **1017066**
Control Number: B202062
Date Received: Jul 28, 2014
Date Reported: Aug 18, 2014
Report Number: 1936220

Reference Number	1017066-7
Sample Date	
Sample Time	
Sample Location	
Sample Description	Unit #2 Run#3 - Blank Beaker (MNew7) + 3 bottles
Matrix	Stack Samples

Analyte		Units	Results	Results	Results	Nominal Detection Limit
Mercury by CVAA						
Mercury	As Tested	ug/L	<0.050			0.05
Dilution Factor	As Tested		1.00			
Volume	Sample	mL	250			
Volume	aliquot volume	mL	25.0			
Volume	Final	mL	40.0			
Mercury	Fraction 1B	ug/sample	<0.020			
Mercury	As Tested	ug/L	<0.050			0.05
Dilution Factor	As Tested		1.00			
Volume	Sample	mL	970			
Volume	aliquot volume	mL	5.00			
Volume	Final	mL	40.0			
Mercury	Fraction 2B	ug/sample	<0.388			
Mercury	As Tested	ug/L	<0.050			0.05
Dilution Factor	As Tested		1.00			
Volume	Sample	mL	113			
Volume	aliquot volume	mL	25.0			
Volume	Final	mL	40.0			
Mercury	Fraction 3A	ug/sample	<0.009			
Mercury	As Tested	ug/L	<0.050			0.05
Dilution Factor	As Tested		1.00			
Volume	Sample	mL	1000			
Volume	aliquot volume	mL	25.0			
Volume	Final	mL	40.0			
Mercury	Fraction 3B	ug/sample	<0.080			
Mercury	As Tested	ug/L	0.46			0.05
Dilution Factor	As Tested		1.00			
Volume	Sample	mL	200			
Volume	aliquot volume	mL	25.0			
Volume	Final	mL	40			
Mercury	Fraction 3C	ug/sample	0.15			

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Analytical Report

Bill To:	A. Lanfranco & Associates	Project:		Lot ID:	**1017066**
Report To:	A. Lanfranco & Associates	ID:		Control Number:	B202062
	#101, 9488 - 189 Street	Name:	Debeers	Date Received:	Jul 28, 2014
	Surrey, BC, Canada	Location:	Snaplake, YT	Date Reported:	Aug 18, 2014
	V4N 4W7	LSD:		Report Number:	1936220
Attn:	Al LanFranco	P.O.:			
Sampled By:		Acct code:			
Company:					

Approved by:

Carol Nam, Dipl. T.
Quality Officer

Data have been validated by Analytical Quality Control and Exova's Integrated Data Validation System (IDVS).
Generation and distribution of the report, and approval by the digitized signature above, are performed through a secure and controlled automatic process.

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Surrey, British Columbia
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Methodology and Notes

Bill To:	A. Lanfranco & Associates	Project:		Lot ID:	**1017066**
Report To:	A. Lanfranco & Associates	ID:		Control Number:	B202062
	#101, 9488 - 189 Street	Name:	Debeers	Date Received:	Jul 28, 2014
	Surrey, BC, Canada	Location:	Snaplake, YT	Date Reported:	Aug 18, 2014
	V4N 4W7	LSD:		Report Number:	1936220
Attn:	Al LanFranco	P.O.:			
Sampled By:		Acct code:			
Company:					

Method of Analysis

Method Name	Reference	Method	Date Analysis Started	Location
Mercury in Air (Surrey) - 1B	EMC	* Metals Emissions from Stationary Sources, 29	30-Jul-14	Exova Surrey
Mercury in Air (Surrey) - 2B	EMC	* Metals Emissions from Stationary Sources, 29	13-Aug-14	Exova Surrey
Mercury in Air (Surrey) - 3A	EMC	* Metals Emissions from Stationary Sources, 29	11-Aug-14	Exova Surrey
Mercury in Air (Surrey) - 3B	EMC	* Metals Emissions from Stationary Sources, 29	13-Aug-14	Exova Surrey
Mercury in Air (Surrey) - 3C	EMC	* Metals Emissions from Stationary Sources, 29	11-Aug-14	Exova Surrey

** Reference Method Modified*

Comments:

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Project Information

Project ID:
Project Name: DE BEERS
Project Location: SNAP LAKE, N.T.
Legal Location:
PO/AFE#:
Proj. Acct. Code:

Billing Information

Company: A. LANFRANCO + ASSOC
Address:
Attention: MARK/AL LANFRANCO
Phone: 604-881-2582
Cell:
Fax:
E-mail: mark.lanfranco@alanfranco.com
Agreement ID:
Copy of report:

Copy of Report To:

Company:
Address: SAME
Attention:
Phone:
Cell:
Fax:
E-mail:
Copy of invoice:

RUSH Priority

Upon filling out this section, client accepts that surcharges will be applied to the analysis

Date Required | As Indicated | All Analysis

When "ASAP" is requested, turn around will default to a 100% RUSH priority, with pricing and turn around time to match. Please contact the lab prior to submitting RUSH samples.

Signature

Sample Custody (please print)

Sampled by:
Company:
I authorize Exova to proceed with the work indicated on this form:
Date: Initial:

This section for Lab use only

Date/Time stamp:

Report Results

E-mail / Mail | Online / Fax | PDF / Excel | QA/QC Report

Special Instructions/Comments (please include contact information including ph. # if different from above).

Use full Method 29 By C.V.A.A.

Include Regulatory Requirements Below:

Number of Containers: 49

	Sample Identification	Location	Depth IN CM M	Date/Time sampled	Matrix	Sampling Method	↓	Enter tests above (√ relevant samples below)
1								
2	SNAP LAKE - BLANK	Beaker (M-X) + 3 Bottles					4	✓
3								
4	Unit #1, Run #1	Beaker (MULAF RUN 1) + 3 Bottles					4	✓
5	Unit #1, Run #2	Beaker (MULAF Run 2) + 3 Bottles					4	✓
6	Unit #1, Run #3	Beaker (Met 3) + 3 Bottles					4	✓
7								
8	Unit #2, Run #1	Beaker (Mex 1) + 3 Bottles					4	✓
9	Unit #2, Run #2	Beaker (MB 2) + 3 Bottles					4	✓
10	Unit #2, Run #3	Beaker (MNew 7) + 3 Bottles					4	✓
11								
12								
13								
14								
15								

Indicate below any deficiencies in the condition of samples:

- Were Exova supplies used?
- Was there any damage to the shipping container?
- Were the containers packaged well?
- Were any extra samples received (document below)?
- Are samples within recommended holding times/temp?

Environmental Sample Information Sheet

Note: Proper completion of this form is required in order to proceed with analysis

Please indicate any potentially hazardous samples

LOT: 1017066 COC

Shipping: COD Y/N
Cooler temp: 25°
and size of coolers received:
Delivery Method:
Waybill:
Received by:

Page of Control # B20262

Titration Calculation Table

Client: De Beers, Snap Lake
Location: Snap Lake
Source: Incinerator #1
Date: July 11-13/14
Parameter: SOx

Normality = 0.009328
mg Factor = 32.02

Dilution Factor: 0

	Vol.	Aliquot	Titration	mg as SO2
Blank		10.00	0.05	
Samples				
Run 1	262.0	10.00	2.35	**18.0**
Run 2	385.0	10.00	3.90	**44.3**
Run 3	450.0	10.00	3.00	**39.7**

Titration Calculation Table

Client: De Beers, Snap Lake
Location: Snap Lake
Source: Incinerator #2
Date: July. 13-15/14
Parameter: SOx

Normality = 0.009328
mg Factor = 32.02

Dilution Factor: 0

	Vol.	Aliquot	Titration	mg as SO2
Blank		10.00	0.05	
Samples				
Run 1	400.0	10.00	4.70	**55.6**
Run 2	485.0	10.00	4.10	**58.7**
Run 3	385.0	10.00	2.20	**24.7**

APPENDIX 3

QA/QC RESULTS

SAMPLE RECEIPT FORM / CHEMICAL ANALYSIS FORM

FILE #: PR141627

CLIENT: A. Lanfranco & Associates Inc.
#101 – 9488 189th Street
Surrey, BC
V4N 4W7

Phone: (604) 881-2582
Fax: (604) 881-2581

RECEIVED BY: P.A. Pond **DATE/TIME:** July 17, 2014 (4:40 p.m.)
CONDITION: good, 10°C

# of Containers	Sample Type	Sample (Client Codes)	Lab Codes	Test Requested
		Project: Snap Lake		
5	XAD, filter, rinses	BLANK July 11/14	PR141627	PCDD/F
5	XAD, filter, rinses	Run #1 – Incinerator #1 July 11/14	PR141628	PCDD/F
5	XAD, filter, rinses	Run #2 – Incinerator #1 July 12/14	PR141629	PCDD/F
5	XAD, filter, rinses	Run #3 – Incinerator #1 July 13/14	PR141630	PCDD/F
5	XAD, filter, rinses	Run #1 – Incinerator #2 July 13/14	PR141631	PCDD/F
5	XAD, filter, rinses	Run #2 – Incinerator #2 July 14/14	PR141632	PCDD/F
5	XAD, filter, rinses	Run #3 – Incinerator #2 July 15/14	PR141633	PCDD/F

STORAGE: XAD, filter stored at 4°C, rinses stored at ambient temperature.

ANALYTES: HRGC/HRMS analysis for polychlorinated dibenzo(p)dioxins and dibenzofurans (PCDD/F).

SPECIAL INSTRUCTIONS: none

METHODOLOGY

Reference Method: PCDD/F: SOP LAB01; EPA Method 23, Environment Canada 1-RM-3

Data summarized in Data Report Attached

Report sent to: Mark Lanfranco Date: August 18, 2014

Comments: Results relate only to items tested.

David Hope PChem, CEO

Professional Chemist BC 2008105 David Hope Association of the Chemical Profession of British Columbia

METHOD 23/1-RM-3 DATA REPORT

Client:	A. Lanfranco & Associates	**Sample Date:**	11-Jul-14
Client ID:	Snap Lake - Blank	**Date Extracted:**	29-Jul-14
PRL ID:	PR141627	**Date Analysed:**	16-Aug-14
		Filter Wt.:	0.24 g

DIOXINS				I-TEQs		
		DL	# of	(ND=0)	(ND=½DL)	(ND=DL)
Congeners	pg	pg	peaks	pg	pg	pg
2,3,7,8-TCDD	ND	2		ND	1	2
Total TCDD	ND	2	0			
1,2,3,7,8-PeCDD	ND	4		ND	1	2
Total PeCDD	ND	4	0			
1,2,3,4,7,8-HxCDD	ND	4		ND	0.2	0.4
1,2,3,6,7,8-HxCDD	ND	4		ND	0.2	0.4
1,2,3,7,8,9-HxCDD	ND	4		ND	0.2	0.4
Total HxCDD	ND	4	0			
1,2,3,4,6,7,8-HpCDD	57	4		0.57	0.57	0.57
Total HpCDD	64	4	2			
OCDD	440	15	1	0.44	0.44	0.44
		Total Dioxin TEQ		1.0	3.6	6.2

FURANS				I-TEQs		
		DL	# of	(ND=0)	(ND=½DL)	(ND=DL)
Congeners	pg	pg	peaks	pg	pg	pg
2,3,7,8-TCDF	ND	2		ND	0.1	0.2
Total TCDF	ND	2	0			
1,2,3,7,8-PeCDF	ND	4		ND	0.1	0.2
2,3,4,7,8-PeCDF	ND	4		ND	1	2
Total PeCDF	4.2	4	1			
1,2,3,4,7,8-HxCDF	ND	4		ND	0.2	0.4
1,2,3,6,7,8-HxCDF	ND	4		ND	0.2	0.4
1,2,3,7,8,9-HxCDF	ND	4		ND	0.2	0.4
2,3,4,6,7,8-HxCDF	ND	4		ND	0.2	0.4
Total HxCDF	ND	4	0			
1,2,3,4,6,7,8-HpCDF	24	4		0.24	0.24	0.24
1,2,3,4,7,8,9-HpCDF	ND	4		ND	0.02	0.04
Total HpCDF	78	4	2			
OCDF	68	15	1	0.068	0.068	0.068
		Total Furan TEQ		0.31	2.3	4.3

Total PCDD/PCDF Toxic Equivalent (pg)	1.3	5.9	11

Surrogate Recoveries (%)

$^{37}Cl_4$ -2,3,7,8-TCDD	102
$^{13}C_{12}$ -2,3,4,7,8-PeCDF	90
$^{13}C_{12}$ -1,2,3,4,7,8-HxCDD	88
$^{13}C_{12}$ -1,2,3,4,7,8-HxCDF	84
$^{13}C_{12}$ -1,2,3,4,7,8,9-HpCDF	73

ND - none detected

Internal Standards (%)

$^{13}C_{12}$ -2,3,7,8-TCDD	70
$^{13}C_{12}$ -1,2,3,7,8-PeCDD	82
$^{13}C_{12}$ -1,2,3,6,7,8-HxCDD	42
$^{13}C_{12}$ -1,2,3,4,6,7,8-HpCDD	49
$^{13}C_{12}$ -OCDD	52
$^{13}C_{12}$ -2,3,7,8-TCDF	50
$^{13}C_{12}$ -1,2,3,7,8-PeCDF	76
$^{13}C_{12}$ -1,2,3,6,7,8-HxCDF	41
$^{13}C_{12}$ -1,2,3,4,6,7,8-HpCDF	43

Patrick Pond 19/08/14
Patrick Pond CTO

THE CHEMICAL PROFESSION OF CANADA
CHARTERED
Patrick Pond
CHEMIST

QC REPORT - BLANK

Client:	A. Lanfranco & Associates	**Contact:**	Mark Lanfranco
Client ID:	BLANK	**Date Extracted:**	29-Jul-14
PRL ID:	DF140408B	**Date Analysed:**	16-Aug-14

DIOXINS		DL	# of	I-TEQs		
				(ND=0)	(ND=½DL)	(ND=DL)
Congeners	pg	pg	peaks	pg	pg	pg
2,3,7,8-TCDD	ND	2		ND	1	2
Total TCDD	ND	2	0			
1,2,3,7,8-PeCDD	ND	4		ND	1	2
Total PeCDD	ND	4	0			
1,2,3,4,7,8-HxCDD	ND	4		ND	0.2	0.4
1,2,3,6,7,8-HxCDD	ND	4		ND	0.2	0.4
1,2,3,7,8,9-HxCDD	ND	4		ND	0.2	0.4
Total HxCDD	ND	4	0			
1,2,3,4,6,7,8-HpCDD	36	4		0.36	0.36	0.36
Total HpCDD	63	4	2			
OCDD	310	15	1	0.31	0.31	0.31
		Total Dioxin TEQ		**0.67**	**3.3**	**5.9**

FURANS		DL	# of	I-TEQs		
				(ND=0)	(ND=½DL)	(ND=DL)
Congeners	pg	pg	peaks	pg	pg	pg
2,3,7,8-TCDF	ND	2		ND	0.1	0.2
Total TCDF	ND	2	0			
1,2,3,7,8-PeCDF	ND	4		ND	0.1	0.2
2,3,4,7,8-PeCDF	ND	4		ND	1	2
Total PeCDF	ND	4	0			
1,2,3,4,7,8-HxCDF	ND	4		ND	0.2	0.4
1,2,3,6,7,8-HxCDF	ND	4		ND	0.2	0.4
1,2,3,7,8,9-HxCDF	ND	4		ND	0.2	0.4
2,3,4,6,7,8-HxCDF	ND	4		ND	0.2	0.4
Total HxCDF	ND	4	0			
1,2,3,4,6,7,8-HpCDF	8.3	4		0.083	0.083	0.083
1,2,3,4,7,8,9-HpCDF	ND	4		ND	0.02	0.04
Total HpCDF	11	4	2			
OCDF	22	15	1	0.022	0.022	0.022
		Total Furan TEQ		**0.11**	**2.1**	**4.1**

Total PCDD/PCDF Toxic Equivalent (pg)			
	0.78	**5.4**	**10**

Internal Standards (%)

$^{13}C_{12}$ -2,3,7,8-TCDD	68
$^{13}C_{12}$ -1,2,3,7,8-PeCDD	87
$^{13}C_{12}$ -1,2,3,6,7,8-HxCDD	82
$^{13}C_{12}$ -1,2,3,4,6,7,8-HpCDD	81
$^{13}C_{12}$ -OCDD	89
$^{13}C_{12}$ -2,3,7,8-TCDF	54
$^{13}C_{12}$ -1,2,3,7,8-PeCDF	75
$^{13}C_{12}$ -1,2,3,6,7,8-HxCDF	83
$^{13}C_{12}$ -1,2,3,4,6,7,8-HpCDF	78

ND - none detected

Patrick Pond CTO

THE CHEMICAL PROFESSION OF ONTARIO
CHARTERED
Patrick Pond
CHEMIST

QC REPORT - SPIKE

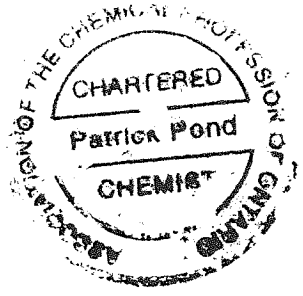
Client:	A. Lanfracno & Associates	**Contact:**	Mark Lanfranco
Client ID:	MATRIX SPIKE	**Date Extracted:**	29-Jul-14
PRL ID:	DF140409S	**Date Analysed:**	16-Aug-14

DIOXINS			Acceptable Recovery		Pass/Fail	Int. Std Recoveries
	LOF	Recovery	Min	Max		
Congeners	pg	%	%	%		%
2,3,7,8-TCDD	200	111	80	120	Pass	67
1,2,3,7,8-PeCDD	1000	108	80	120	Pass	96
1,2,3,4,7,8-HxCDD	1000	104	80	120	Pass	-
1,2,3,6,7,8-HxCDD	1000	111	80	120	Pass	93
1,2,3,7,8,9-HxCDD	1000	100	80	120	Pass	-
1,2,3,4,6,7,8-HpCDD	1000	115	80	120	Pass	92
OCDD	2000	119	80	120	Pass	97

FURANS			Acceptable Recovery		Pass/Fail	Int. Std Recoveries
	LOF	Recovery	Min	Max		
Congeners	pg	%	%	%		%
2,3,7,8-TCDF	200	114	80	120	Pass	52
1,2,3,7,8-PeCDF	1000	112	80	120	Pass	81
2,3,4,7,8-PeCDF	1000	100	80	120	Pass	-
1,2,3,4,7,8-HxCDF	1000	101	80	120	Pass	-
1,2,3,6,7,8-HxCDF	1000	112	80	120	Pass	91
1,2,3,7,8,9-HxCDF	1000	82	80	120	Pass	-
2,3,4,6,7,8-HxCDF	1000	102	80	120	Pass	-
1,2,3,4,6,7,8-HpCDF	1000	115	80	120	Pass	82
1,2,3,4,7,8,9-HpCDF	1000	81	80	120	Pass	-
OCDF	2000	82	80	120	Pass	-

LOF - Level of Fortification

Patrick Pond CTO



Acronyms used in reporting dioxins and furans:

TCDD = Tetrachlorodibenzo-*p*-dioxin	TCDF = Tetrachlorodibenzofuran
PeCDD = Pentachlorodibenzo-*p*-dioxin	PeCDF = Pentachlorodibenzofuran
HxCDD = Hexachlorodibenzo-*p*-dioxin	HxCDF = Hexachlorodibenzofuran
HpCDD = Heptachlorodibenzo-*p*-dioxin	HpCDF = Heptachlorodibenzofuran
OCDD = Octachlorodibenzo-*p*-dioxin	OCDF = Octachlorodibenzofuran

Acceptable recoveries for surrogates

	EPA Method 23	
	Min (%)	**Max (%)**
$^{37}Cl_4$ -2,3,7,8-TCDD	70	130
$^{13}C_{12}$ -2,3,4,7,8-PeCDF	70	130
$^{13}C_{12}$ -1,2,3,4,7,8-HxCDD	70	130
$^{13}C_{12}$ -1,2,3,4,7,8-HxCDF	70	130
$^{13}C_{12}$ -1,2,3,4,7,8,9-HpCDF	70	130

Acceptable recoveries for Internal Standards

	EPA Method 23		Env. Can. 1-RM-3	
	Min (%)	**Max (%)**	**Min (%)**	**Max (%)**
$^{13}C_{12}$ -2,3,7,8-TCDD	40	130	40	130
$^{13}C_{12}$ -1,2,3,7,8-PeCDD	40	130	40	130
$^{13}C_{12}$ -1,2,3,6,7,8-HxCDD	40	130	40	130
$^{13}C_{12}$ -1,2,3,4,6,7,8-HpCDD	25	130	40	130
$^{13}C_{12}$ -OCDD	25	130	40	130
$^{13}C_{12}$ -2,3,7,8-TCDF	40	130	40	130
$^{13}C_{12}$ -1,2,3,7,8-PeCDF	40	130		
$^{13}C_{12}$ -1,2,3,6,7,8-HxCDF	40	130		
$^{13}C_{12}$ -1,2,3,4,6,7,8-HpCDF	25	130		

Pacific Rim Laboratories Inc. #103, 19575-55A Avenue, Surrey, BC V3S 8P8 CANADA
Tel: + 604.532.8711 Fax: + 604.532.8712 Email: info@pacificrimlabs.com
www.pacificrimlabs.com

Exova
#104, 19575-55 A Ave.
Surrey, British Columbia
V3S 8P8, Canada

T: +1 (604) 514-3322
F: +1 (604) 514-3323
E: Surrey@exova.com
W: www.exova.com

Exova

Quality Control

Bill To:	A. Lanfranco & Associates	Project:		Lot ID:	**1017066**
Report To:	A. Lanfranco & Associates	ID:		Control Number:	B202062
	#101, 9488 - 189 Street	Name:	Debeers	Date Received:	Jul 28, 2014
	Surrey, BC, Canada	Location:	Snaplake, YT	Date Reported:	Aug 18, 2014
	V4N 4W7	LSD:		Report Number:	1936220
Attn:	Al LanFranco	P.O.:			
Sampled By:		Acct code:			
Company:					

Mercury by CVAA

Blanks	**Units**	**Measured**	**Lower Limit**	**Upper Limit**		**Passed QC**
Mercury	ug/L	0	-0.051	0.051		yes
Date Acquired:	August 05, 2014					
Certified Reference Material	**Units**	**Measured**	**Target**	**Lower Limit**	**Upper Limit**	**Passed QC**
Mercury	ug/L	6.88	6.881	4.361	9.401	yes
Date Acquired:	August 05, 2014					
Mercury	ug/L	2.32	2.428	1.831	3.025	yes
Date Acquired:	August 13, 2014					
Client Sample Replicates	**Units**	**Replicate 1**	**Replicate 2**	**% RSD Criteria**	**Absolute Criteria**	**Passed QC**
Mercury	ug/L	<0.050	<0.050	30	0.050	yes
Date Acquired:	August 05, 2014					
Matrix Spike	**Units**	**% Recovery**	**Lower Limit**	**Upper Limit**		**Passed QC**
Mercury	ug/L	103	85	115		yes
Date Acquired:	August 05, 2014					

APPENDIX 4

FIELD DATA SHEETS

and PROCESS DATA

XAD 4-070
BLK XAD LF 067

@ 1750 $\sqrt{10.74}$ − 10.91 * 10.48 — 15.48 ΔH − 15.62 * 14.48

@ 1800 $\sqrt{10.80}$ 15.28 ΔH

C.L

PLANT	De Beers - Snap Lake	PROBE TIP DIAMETER, IN.	4Q-D ,5113
		PROBE LENGTH, FT / Cp	HT 4B ,8463
RUN No	1 Dioxin	FILTER NUMBER	
LOCATION	Incinerator #1		
DATE	July. 11/14	STATIC PRESSURE, IN. H_2O	0.06
OPERATOR	C.L	STACK DIAMETER	16.0"
CONTROL UNIT / Y	STACAE2 1.0101	STACK HEIGHT	25'
BAROMETRIC PRESSURE, IN. Hg	28.25	INITIAL LEAK TEST	0.001 @ 15"
ASSUMED MOISTURE, Bw	10%	FINAL LEAK TEST	0.001 @ 15"

IMPINGER VOLUMES	INITIAL (mL)	FINAL (mL)	TOTAL GAIN (mL)
Imp. # 1	0	416	416
Imp. # 2	100	130	30
Imp. # 3	0		
Imp. # 4			

Upstream Diameters

Downstream Diameters

Point	Clock Time	Dry Gas Meter Ft^3	XAD	Pitot IN. H_2O ΔP	Orifice ΔH IN. H_2O	Dry Gas Temp. Inlet °F	Dry Gas Temp. Outlet °F	Pump Vac. IN. Hg Gauge	Temperature °F Box	Temperature °F Probe	Temperature °F Impinger Exit	Temperature °F Stack	Fyrites NOVA CO_2 Vol. %	Fyrites NOVA O_2 Vol. %	NOx-CO
1	1310	851.412													
1		855.14	45	.11	1.83		66	4	250	250	50	1750			
1		858.70		.11	1.83		67	4				1779	12.0	3.5	295-0
2		862.42	48	.12	1.86		68	4	250	250	50	1780			
2		866.14		.12	1.86		68	4				1794			
3		869.71	50	.11	1.70		66	4	250	250	50	1797	12.5	3.5	180-0
3		873.43		.12	1.85		66	4				1798			
4		877.21	54	.12	1.87		67	4	250	250	54	1830			
4		880.99		.12	1.87		68	4				1888	12.5	3.0	177-0
5		884.78	48	.12	1.87		68	4	250	250	54	1900			
5		888.56		.12	1.87		68	4				1905			
6		892.35	50	.12	1.87		68	4	250	250	54	1910	12.5	3.0	166-0
6		896.14		.12	1.87		69	4				1915			
7		899.76	54	.11	1.72		68	4	250	250	54	1920			
7		903.54		.12	1.87		68	4				1760	9.0	8.0	68-0
8		907.16	56	.11	1.72		69	5	250	260	54	1735			
8		910.79		.11	1.72		70	5				1720			
9		914.42	60	.11	1.72		70	6	250	272	54	1717	8.5	6.5	88-0
9		918.05		.11	1.72		70	6				1800			
10		921.67	58	.11	1.72		70	6	250	275	55	1776			
10		925.45		.12	1.87		71	6				1770	12.5	3.0	291-0
11		929.23	54	.12	1.87		71	6	250	275	56	1766			
11		933.01		.12	1.87		71	6				1760			
12		936.79	48	.12	1.87		71	6	250	275	56	1750	9.5	6.0	100-0
12		940.57		.12	1.87		71	6				1788			
1		944.31	52	.12	1.83		71	7	250	275	55	1772			
1		948.07		.12	1.83		72	8				1790	12.5	3.0	278-0
2		951.83	54	.12	1.83		72	8	247	275	54	1756			
2		955.57		.12	1.83		73	8				1737			
3		959.15	54	.11	1.68		72	7	256	275	54	1788	12.0	4.0	249-0
3		962.73		.11	1.68		73	7				1885			

* 60 min after primary ignition

@1900 √10.59 14.64 ΔH @1750 √10.91 15.62 ΔH @1800 √10.80 15.28 ΔH C.L

PLANT	DeBeers - Snap Lake	PROBE TIP DIAMETER, IN.	4Q-D .513
		PROBE LENGTH, FT / Cp	HT 4B .8463
RUN No	1 Dioxin - Continued	FILTER NUMBER	
LOCATION	Incinerator #1		
DATE	July 11/14	STATIC PRESSURE, IN. H_2O	
OPERATOR	C.L	STACK DIAMETER	16"
CONTROL UNIT / Y	1.0101	STACK HEIGHT	25'
BAROMETRIC PRESSURE, IN. Hg	28.25	INITIAL LEAK TEST	0 @ 15"
ASSUMED MOISTURE, Bw	10%	FINAL LEAK TEST	0.001 @ 15"

IMPINGER VOLUMES	INITIAL (mL)	FINAL (mL)	TOTAL GAIN (mL)
Imp. # 1			
Imp. # 2			
Imp. # 3			
Imp. # 4			

Upstream Diameters

Downstream Diameters

Point	Clock Time	Dry Gas Meter Ft^3	XAD	Pitot IN. H_2O ΔP	Orifice ΔH IN. H_2O	Dry Gas Temp. Inlet °F	Dry Gas Temp. Outlet °F	Pump Vac. IN. Hg Gauge	Temperature °F Box	Temperature °F Probe	Temperature °F Impinger Exit	Temperature °F Stack	Fyrites NOVA CO_2 Vol. %	Fyrites NOVA O_2 Vol. %	NOX - CO
4	Continued	962.73													
4		966.51	48	.12	1.87		72	8	252	270	52	1775			
4	160	970.29		.12	1.87		73	8				1876			
5		973.91	48	.11	1.72		73	10	254	272	54	1775	9.0	9.4	88-0
5		977.49		.11	1.68		73	10				1830			
6		980.91	50	.10	1.53		72	10	257	270	56	1775			
6		984.33		.10	1.53		71	10				1832			
7		987.57	52	.09	1.38		70	10	252	275	58	1821	12.0	5.0	206-0
7		990.90		.095	1.45		70	10				1800			
8		994.14	54	.09	1.38		70	10	250	270	58	1783			
8	200	997.38		.09	1.38		70	10				1780			
9		1000.56	57	.09	1.32		70	10	250	275	58	1915	9.0	6.5	180-0
9		1003.80		.09	1.38		70	10				1819			
10		1007.22	56	.10	1.53		70	10	260	270	60	1840			
10		1010.81		.11	1.68		70	10				1800	8.9	9.0	90-0
11		1014.56	50	.12	1.83		70	12	262	272	57	1800			
11		1018.14		.11	1.68		70	12				1793			
12		1021.59	48	.10	1.53		70	12	262	275	58	1806			
12	17:20	1024.94		.10	1.46		70	12				1900	9.0	9.9	100-0

XAD - LF 071

1750 - 10.85 15.63
comc 1850 - 10 57 14.96 ΔH √11.56 1751ΔH
1900 - 10.46 14.64 @ 1550

PLANT SNAP LAKE - De Beers	PROBE TIP DIAMETER, IN. 4Q-D .5113	IMPINGER	INITIAL / FINAL / TOTAL GAIN
	PROBE LENGTH, FT / Cp HT 4B .8463	VOLUMES	(mL) / (mL) / (mL)
RUN No 2 Dioxin	FILTER NUMBER	Imp. # 1	0 / 372 / 372
LOCATION Incinerator #1		Imp. # 2	100 / 136 / 36
DATE July 12/14	STATIC PRESSURE, IN. H_2O 0.06	Imp. # 3	0 / 2 / 2
OPERATOR C.L	STACK DIAMETER 16.0"	Imp. # 4	
CONTROL UNIT / Y STACK 2 - 1.0101	STACK HEIGHT 25'		
BAROMETRIC PRESSURE, IN. Hg 28.50	INITIAL LEAK TEST 0.001 @ 15"		
ASSUMED MOISTURE, Bw 10%	FINAL LEAK TEST 0.001 @ 15"	Upstream Diameters	
		Downstream Diameters	

Point	Clock Time	Dry Gas Meter Ft^3	XAD	Pitot IN. H_2O ΔP	Orifice ΔH IN. H_2O	Dry Gas Temp. Inlet °F	Dry Gas Temp. Outlet °F	Pump Vac. IN. Hg Gauge	Temperature °F Box	Temperature °F Probe	Temperature °F Impinger Exit	Temperature °F Stack	Fyrites NOVA CO_2 Vol. %	Fyrites NOVA O_2 Vol. %	NOx-CO
1	10:06	25.845													
1		28.82	41	.075	1.17		78	3	250	250	59	1776	14.0	2.2	306-0
		31.81		.080	1.20		79	4				1819			
2		34.89	41	.085	1.27		81	4	250	250	60	1865			
2		38.03		.090	1.32		81	4				1906	13.0	2.4	309-0
3		40.99	42	.080	1.20		81	4	252	254	57	1932			
3		44.14		.090	1.32		83	5				1956			
4		47.28	42	.090	1.32		84	5	250	258	56	1955	13.5	2.5	307-0
4		50.47		.085	1.33		86	5				1548			
5		53.73	43	.090	1.41		87	5	251	250	57	1745			
5		56.80		.080	1.25		88	6				1713			
6		60.06	48	.090	1.41		90	6	250	250	58	1781	8.5	9.6	68-0
6		63.40		.095	1.48		91	6				1754			
7		66.71	53	.10	1.46		92	6	250	250	60	1916			
7		70.18		.11	1.61		92	6				1955			
8		73.52	56	.10	1.50		93	6	251	257	60	1790	12.0	5.4	260-0
8		76.86		.10	1.50		94	6				1850			
9		80.03	60	.09	1.35		94	8	253	252	64	1818			
9		83.34		.10	1.46		95	8				1900			
10		86.65	48	.10	1.46		95	8	252	251	60	1910	12.0	5.6	260-0
10		89.99		.10	1.50		96	9				1810			
11		93.37	42	.10	1.50		96	10	250	260	58	1800			
11		96.99		.12	1.76		97	10				1920			
12		100.77	40	.13	1.90		98	10	252	266	58	1942	12.5	3.5	320-0
12		104.43		.12	1.80		98	10				1815			
1	High Particle	108.09	42	.12	1.76		97	12	252	270	58	1915			
1		111.75		.12	1.76		97	12	?			1930			
2		115.56	44	.13	1.94		98	13	255	275	54	1872	8.5	9.5	100-0
2		119.07		.11	1.65		98	14				1850			
3		122.58	44	.11	1.65		98	14	250	275	54	1850			
3		126.01		.105	1.57		99	14				1872			

* More "dry" cardboard waste today * 90310 - waste

* 40 min after primary ignition

cem @ 1750 10.85 / 1850 10.57 / 1900 10.46 / 1950 11.56

ΔH 15.63 / 14.96 / 14.64 / 17.51

PLANT: SNAP LAKE - De Beers	PROBE TIP DIAMETER, IN.: .513	IMPINGER VOLUMES	INITIAL (mL) / FINAL (mL) / TOTAL GAIN (mL)
RUN No: 2 Dioxin Continued	PROBE LENGTH, FT / Cp: .8463	Imp. # 1	
LOCATION: Incinerator #1	FILTER NUMBER	Imp. # 2	
DATE: July 12/14	STATIC PRESSURE, IN. H_2O	Imp. # 3	
OPERATOR: C-L	STACK DIAMETER: 16.0"	Imp. # 4	
CONTROL UNIT / Y: 1.0101	STACK HEIGHT: 25'		
BAROMETRIC PRESSURE, IN. Hg: 28.50	INITIAL LEAK TEST: 0.001 @ 15"		
ASSUMED MOISTURE, Bw: 10%	FINAL LEAK TEST: 0.001 @ 18"	Upstream Diameters	
		Downstream Diameters	

Point	Clock Time	Dry Gas Meter Ft^3	XAD	Pitot IN. H_2O ΔP	Orifice ΔH IN. H_2O	Dry Gas Temp. Inlet °F	Dry Gas Temp. Outlet °F	Pump Vac. IN. Hg Gauge	Temperature °F Box	Temperature °F Probe	Temperature °F Impinger Exit	Temperature °F Stack	Fyrites NOVA CO_2 Vol. %	Fyrites NOVA O_2 Vol. %	NOx-CO
	Continued	126.01													
4		129.09	46	.085	1.27		98	15	254	260	57	1805	8.0	9.4	100-0
4	160	132.26		.09	1.35		98	15				1835			
5		135.43	48	.09	1.35		97	15	256	253	58	1860			
5		138.60		.09	1.35		96	15				1856	8.0	9.5	99-0
6		141.86	46	.095	1.42		97	15	253	250	58	1850			
6		145.50		.10	1.50		98	15				1823			
7		148.87	46	.10	1.50		98	15	252	250	60	1816	8.0	9.6	97.0
7		152.21		.10	1.50		98	15				1809			
8		155.55	48	.10	1.50		98	15	252	250	60	1850			
8		158.89		.10	1.50		99	15				1880	9.5	9.9	100-0
9		162.32	50	.105	1.57		99	15	253	250	62	1888			
9		165.75		.105	1.57		99	15				1864			
10		169.01	44	.095	1.42		100	15	251	250	60	1836	7.0	9.8	104-0
10		172.37		.10	1.50		100	15				1826			
11		175.71	42	.10	1.50		100	15	251	250	58	1835			
11		178.88		.09	1.35		100	16				1828	8.5	6.3	155-0
12		182.10	42	.095	1.39		100	17	252	250	59	1900			
12	14:20	185.44		.10	1.50		100	18				1827			

XAD # LF 065

PLANT Snap Lake - De Beers	PROBE TIP DIAMETER, IN. 4Q-0 .5113	IMPINGER	INITIAL / FINAL / TOTAL GAIN
	PROBE LENGTH, FT / Cp HT 48 .8463	VOLUMES	(mL) / (mL) / (mL)
RUN No 3 Dioxin-	FILTER NUMBER	Imp. # 1	0 / 388 / 388
LOCATION #1 Incinerator		Imp. # 2	100 / 136 / 36
DATE July 13/14	STATIC PRESSURE, IN. H_2O 0.06	Imp. # 3	0 /
OPERATOR C.L	STACK DIAMETER 16.0"	Imp. # 4	/ /
CONTROL UNIT / CAE2 1.0101	STACK HEIGHT 25'		/ /
	Leak check #1 / Leak check #2		/ /
BAROMETRIC PRESSURE, IN. Hg 28.66	INITIAL LEAK TEST 0.010 @ 15" / 0.008 @ 15"	Upstream Diameters	
ASSUMED MOISTURE, Bw 12%	FINAL LEAK TEST 0.008 @ 15" / 0.004 @ 15"	Downstream Diameters	

Point	Clock Time	Dry Gas Meter Ft^3	XAD	Pitot IN. H_2O ΔP	Orifice ΔH IN. H_2O	Dry Gas Temp. Inlet °F	Dry Gas Temp. Outlet °F	Pump Vac. IN. Hg Gauge	Temperature °F Box	Temperature °F Probe	Temperature °F Impinger Exit	Temperature °F Stack	Fyrites Nova A CO_2 Vol. %	Fyrites Nova A O_2 Vol. %	NOx-CO
1	14:50	350.729													
1		354.27	42	.11	1.66		80	5	241	251	60	1837			
		357.89		.115	1.74		81	5				1850	14.0	1.6	395-0
2		361.49	44	.115	1.70		82	6	245	255	58	1852			
2		364.98		.11	1.63		83	6				1902			
3		368.31	46	.10	1.45		83	10	245	275	60	1960	14.0	1.4	351-0
3		371.57		.095	1.38		84	12				1944			
4		374.74	48	.09	1.31		84	14	250	263	60	1900			
4		378.20		.09	1.57		83	16				1488	7.0	10.8	327-0
5	Stop Test 15:40 High particle	381.57	50	.10	1.48		84	15	243	265	62	1845			
5	*Filter change* 15:40 0.008 @ 15"	384.95		.10	1.48		84	15				1860			
6	Start 16:20	*388.39	52	.10	1.52		81	5	253	267	62	1800			
6		391.97		.11	1.67		82	5				1789	8.0	8.9	77-0
7		395.51	52	.105	1.62		82	6	255	270	60	1754			
7		398.96		.10	1.55		81	6				1750			
8		402.54	49	.11	1.67		82	7	262	275	60	1820	8.0	9.3	85-0
8		406.13		.11	1.67		81	8				1781			
9		409.55	49	.10	1.52		82	10	248	270	60	1791			
9		412.89		.095	1.44		82	10				1793			
10		416.13	50	.09	1.36		82	10	243	273	58	1780	12.0	6.5	129-0
10		419.34		.09	1.33		82	12				1870			
11		422.61	52	.09	1.39		82	12	246	270	60	1775			
11		425.77		.085	1.31		82	12				1750	9.0	7.7	96-0
12		428.92	50	.085	1.29		81	12	248	275	60	1795			
12		432.16		.09	1.36		82	12				1800			
				~~.0~~				~~12~~							
1		435.40	54	.09	1.36		81	12	250	275	62	1794			
1		438.63		.09	1.36		82	12				1780	8.0	9.3	96-0
2		441.88	54	.09	1.36		82	13	250	275	60	1800			
2		445.14		.09	1.36		81	13				1800			
3		448.29	51	.085	1.29		81	14	247	268	58	1793	8.0	9.5	100-0
3		451.36		.085	1.23		82	14				1890			

1000 LB of Waste

* 20 min after primary ignition

PLANT Snap Lake - De Beers	PROBE TIP DIAMETER, IN. .5113	IMPINGER	INITIAL | FINAL | TOTAL GAIN
	PROBE LENGTH, FT / Cp .8463	VOLUMES	(mL) | (mL) | (mL)
RUN No 3 Dioxin - Continued	FILTER NUMBER	Imp. # 1	0
LOCATION Incinerator #1		Imp. # 2	100
DATE July. 13/14	STATIC PRESSURE, IN. H_2O	Imp. # 3	0
OPERATOR C.L	STACK DIAMETER 16.0'	Imp. # 4	
CONTROL UNIT / Y Lo101	STACK HEIGHT 25'		
BAROMETRIC PRESSURE, IN. Hg 28.66	INITIAL LEAK TEST		
ASSUMED MOISTURE, Bw 12%	FINAL LEAK TEST	Upstream Diameters	
		Downstream Diameters	

Point	Clock Time	Dry Gas Meter Ft^3	XAD	Pitot IN. H_2O ΔP	Orifice ΔH IN. H_2O	Dry Gas Temp. Inlet °F	Dry Gas Temp. Outlet °F	Pump Vac. IN. Hg Gauge	Temperature °F Box	Temperature °F Probe	Temperature °F Impinger Exit	Temperature °F Stack	Fyrites NOVA CO_2 Vol. %	Fyrites NOVA O_2 Vol. %	NOx-CO
4	Continued	451.36	XAD												
4	100	454.63	51	.09	1.36		79	14	255	270	58	1789			
5		457.88		.095	1.38		80	14				1870	8.0	9.8	86-0
5		461.30	52	.10	1.52		80	14	250	271	58	1790			
6		464.72		.10	1.52		81	15				1807			
6		467.96	54	.095	1.38		80	15	254	274	60	1886	8.5	8.1	106-0
6		471.17		.09	1.33		79	15				1860			
7		474.38	56	.09	1.33		80	16	246	275	62	1875	8.0	8.5	166-0
7		477.63		.09	1.36		80	16				1798			
8		480.89	50	.09	1.36		79	16	253	270	62	1803			
8		484.13		.09	1.36		79	16				1795	7.0	10.0	95-0
9		487.39	48	.09	1.36		79	16	248	270	60	1800			
9		490.54		.085	1.29		78	17				1808			
10		493.78	48	.09	1.36		78	18	244	272	58	1793	8.0	10.1	99-0
10		497.11		.095	1.44		78	18				1800			
11		500.53	50	.10	1.52		79	18	252	268	56	1816			
11		503.74		.09	1.33		78	18				1850	8.0	9.4	90-0
12		506.98	44	.09	1.36		77	18	251	272	58	1810			
12	19:55	510.22		.09	1.36		75	18				1798			

7:55

PLANT DeBeers - Snap Lake	PROBE TIP DIAMETER, IN. 0.5623	IMPINGER	INITIAL / FINAL / TOTAL GAIN
	PROBE LENGTH, FT / Cp HT 4a / 0.9457	VOLUMES	(mL) / (mL) / (mL)
RUN No Metals/Partic Run 1	FILTER NUMBER	Imp. # 1	100 / 253 / 153
LOCATION Incinerator 1		Imp. # 2	100 / 155 / 55
DATE July 11, 2014	STATIC PRESSURE, IN. H_2O +0.06	Imp. # 3	– / 46 / 46
OPERATOR LA	STACK DIAMETER 16"	Imp. # 4	100 / 118 / 18
CONTROL UNIT / Y APEX 522 / 0.9950	STACK HEIGHT 25'		100 / 100 / 0
4H@ 1.8690			Gel /
BAROMETRIC PRESSURE, IN. Hg 28.25	INITIAL LEAK TEST 0.001@15"		
ASSUMED MOISTURE, Bw 10%	FINAL LEAK TEST 0.001@15"	Upstream Diameters	
		Downstream Diameters	

Point	Clock Time	Dry Gas Meter Ft^3	NO_x (ppm)	Pitot IN. H_2O ΔP	Orifice ΔH IN. H_2O	Dry Gas Temp. Inlet °F	Dry Gas Temp. Outlet °F	Pump Vac. IN. Hg Gauge	Temperature °F Box	Temperature °F Probe	Temperature °F Impinger Exit	Temperature °F Stack	Fyrites CO_2 Vol. %	Fyrites O_2 Vol. %	CO PPM
1		447.24		0.11	2.39		60		248	256		1861			
2		451.62	177	0.12	2.51		60	4	245	255	50	1875	12.5	3.8	0
3		455.97		0.12	2.48		59		248	257		1890			
4		460.13	176	0.11	2.26		60	4	249	256	52	1908	12.5	3.8	0
5		464.46		0.12	2.48		60		247	256		1924			
6		468.85	68	0.12	2.51		61	4	248	255	53	1875	9.0	7.6	0
7		473.21		0.115	2.48		61		247	256		1902			
8		477.54	68	0.11	2.46		62	4	246	257	53	1729	9.5	6.2	0
9		481.76		0.105	2.35		63		248	256		1735			
10		486.09	93	0.11	2.47		62	5	249	250	54	1729	10.5	6.6	0
11		490.37		0.11	2.36		63		247	253		1826			
12		494.46	291	0.105	2.19		62	5	248	254	52	1890	12.5	3.0	0
1		498.71		0.11	2.35		63	5	249	256		1932			
2		503.04	98	0.11	2.41		63		248	256	50	1780	9.5	6.0	0
3		507.38		0.11	2.44		64	5	247	257		1754			
4		511.91	72	0.12	2.66		65		247	258	51	1762	9.0	7.2	0
5		516.25		0.11	2.44		66	6	246	259		1764			
6		520.61	278	0.11	2.46		66		243	258	51	1745	12.5	3.0	0
7		525.09		0.12	2.51		64	6	247	257		1886			
8		529.46	173	0.12	2.61		66		246	254	50	1898	10.0	5.5	0
9		533.78		0.11	2.42		65	6	248	255		1750			
10		538.15	253	0.12	2.50		65		250	256	50	1907	12.5	3.5	0
11		542.41		0.11	2.35		65	6	251	257		1845			
12	16:00	546.53	276	0.105	2.20		65		249	256	52	1859	12.5	3.0	0

Primary ignition @ 12:10 P/M Metals @ 13:50 → Primary T = 662°C Secondary T = 1109°C

PLANT	DeBeers Snap Lake	PROBE TIP DIAMETER, IN.	0.5623
RUN No	2 - Partic/Metals	PROBE LENGTH, FT / Cp	HT 4a / 0.8457
LOCATION	Incinerator 1	FILTER NUMBER	
DATE	July 12, 2014	STATIC PRESSURE, IN. H_2O	
OPERATOR	LA	STACK DIAMETER	16"
CONTROL UNIT / Y	Apex 522 / 0.9950	STACK HEIGHT	25'
	ΔH@ → 1.8690		
BAROMETRIC PRESSURE, IN. Hg	~~28.25~~ 28.50	INITIAL LEAK TEST	0.001 @ 15"
ASSUMED MOISTURE, Bw	12%	FINAL LEAK TEST	0.001 @ 15"

IMPINGER VOLUMES	INITIAL (mL)	FINAL (mL)	TOTAL GAIN (mL)
Imp. # 1	100	259	159
Imp. # 2	100	179	79
Imp. # 3	—	5	5
Imp. # 4	100	100	0
	100	100	0
	Gel		

Upstream Diameters

Downstream Diameters

Point	Clock Time	Dry Gas Meter Ft^3	NOx (ppm)	Pitot IN. H_2O ΔP	Orifice ΔH IN. H_2O	Dry Gas Temp. Inlet °F	Dry Gas Temp. Outlet °F	Pump Vac. IN. Hg Gauge	Temperature °F Box	Temperature °F Probe	Temperature °F Impinger Exit	Temperature °F Stack	Fyrites CO_2 Vol. %	Fyrites O_2 Vol. %	CO ppm
	10:26	562.667													
1		566.82		0.11	2.23		66	2	247	258	54	1927			
2		571.10	307	0.12	2.41		65	3	246	254		1944	13.0	2.4	0
3		575.31		0.115	2.30		66	~~34~~ 4	246	258	54	1960			
4		579.46	304	0.11	2.19		67	5	245	258		1976	13.5	2.5	0
5		584.11		0.12	2.78		69	6	246	257	54	1637			
6		588.62	77	0.12	2.65		71	7	247	258		1756	9.0	8.0	0
7		593.08		0.115	2.55		71	8	248	257	55	1746			
8		597.33	96	0.105	2.31		71	12	249	256		1750	10.0	5.6	0
9	Filter change	601.65		0.11	2.38		73	15	246	257	55	1805			
10		605.722	301	0.10	2.10		78	2	247	256		1904	13.0	2.5	0
11		609.67		0.09	1.97		79	2	248	256	53	1806			
12	12:45	613.95	100	0.11	2.33		75	3	246	257		1862	8.0	9.4	0
1	13:05	618.09		0.10	2.19		76	3	247	256	54	1803			
2		622.03	99	0.09	1.93		75	3	248	258		1837	8.0	9.5	0
3		625.69		0.08	1.66		76	2.5	249	257	53	1883			
4		629.79	97	0.10	2.11		77	3.0	250	258		1884	8.0	9.6	0
5		634.10		0.11	2.37		~~78~~ 77	3.5	247	256	55	1835			
6		638.20	100	0.10	2.15		78	3.0	246	257		1847	9.5	9.9	0
7		642.12		0.09	1.97		79	3.0	247	256	54	1809			
8		645.81	106	0.08	1.75		79	3.0	246	258		1896	9	9.2	0
9		649.65		0.085	1.86		79	3.0	247	257	54	1903			
10		653.32	104	0.080	1.69		80	3.0	246	258		1889	7.0	4.8	0
11		657.04		0.080	1.75		80	3.0	247	259	55	1915			
12	14:05	660.66	106	0.075	1.65		81	3.0	246	259		1905	9.5	9.8	0

Primary Ignition @ 0926 PM/Metals @ 1026

Load: 903 lbs Primary: 610°C Secondary: 1115°C

PLANT	DeBeers Snap Lake	PROBE TIP DIAMETER, IN.	0.5623
RUN No	3 - P/M Metals	PROBE LENGTH, FT / Cp	HT 4a / 0.8457
LOCATION	Incineratar 1	FILTER NUMBER	
DATE	July 13, 2014	STATIC PRESSURE, IN. H_2O	
OPERATOR	LA	STACK DIAMETER	16"
CONTROL UNIT / Y	Apex 522 / 0.9950	STACK HEIGHT	25'
BAROMETRIC PRESSURE, IN. Hg	28.66	INITIAL LEAK TEST	0.001@17"
ASSUMED MOISTURE, Bw	13%	FINAL LEAK TEST	0.001@18"

IMPINGER VOLUMES	INITIAL (mL)	FINAL (mL)	TOTAL GAIN (mL)
Imp. # 1	100	276	176
Imp. # 2	100	154	54
Imp. # 3	—	10	10
Imp. # 4	100	114	14
	100	100	0

Upstream Diameters

Downstream Diameters

Point	Clock Time	Dry Gas Meter Ft^3	NOx (ppm)	Pitot IN. H_2O ΔP	Orifice ΔH IN. H_2O	Dry Gas Temp. Inlet °F	Dry Gas Temp. Outlet °F	Pump Vac. IN. Hg Gauge	Temperature °F Box	Temperature °F Probe	Temperature °F Impinger Exit	Temperature °F Stack	Fyrites CO_2 Vol. %	Fyrites O_2 Vol. %	CO (ppm)
	14:50	761.747													
1		766.07		0.11	2.36		81	3	247	258		1819			
2		770.16	394	0.10	2.13		81	4	246	257	55	1834	14	1.6	0
3		774.20		0.10	2.10		82	5	246	257		1876			
4		778.41	351	0.11	2.28		83	7	245	256	54	1908	14	1.4	0
5		782.39		0.10	2.04		83	8	244	257		1946			
6		786.55	327	0.11	2.23		84	9	246	258	54	1966	7.0	10.8	0
7		791.33		0.12	2.93		85	10	246	258		1560			
8		796.23	306	0.11	2.80		84	11	246	257	54	1472	6.0	11.2	5
9		800.27		0.16	2.25		84	12	247	256		1720			
10		804.37	347	0.10	2.13		84	12	246	255	54	1850	14	1.7	0
11		808.19		0.09	1.85		84	11.5	245	254		1926			
12		812.27	91	0.09	1.90		85	12	246	255	54	1868	8	10.2	0
1	Stopped@1600 to change filter →	817.05		0.11	2.40		84	17	247	256		1796			
2		821.87	68	0.11	2.43		83	19	248	257	53	1763	9	7.6	0
3	Restart@ →	825.94		0.10	2.10		84	2	248	252		1880			
4	1608	830.20	71	0.105	2.31		82	4	246	255	54	1763	9	7.7	0
5		834.59		0.11	2.45		81	4	247	253		1734			
6		839.15	85	0.12	2.66		81	4	247	254	54	1728	9	7.5	0
7		843.42		0.11	2.32		83	5	248	255		1871			
8		847.28	78	0.10	2.21		82	5	248	254	55	1760	8.0	9.0	0
9		851.39		0.10	2.14		83	6	248	255		1830			
10		855.47	84	0.095	2.10		82	6	248	254	55	1760	8.0	9.3	0
11		859.44		0.09	2.08		83	6	247	255		1743			
12	1713	863.13	98	0.09	1.86		82	6	246	255	55	1745	8.0	7.5	0

4C @ 0.001@30"
4C @ 0.001@17"

Primary Ignition @1430 Test Start @ 1450 Primary T = 302°C Secondary = 981°C Load: 1000 lbs

MD-LF060

Primary ignition 09:13

PLANT Soap Lake - De Beers	PROBE TIP DIAMETER, IN. 4QD .5113	IMPINGER VOLUMES	INITIAL (mL) / FINAL (mL) / TOTAL GAIN (mL)
	PROBE LENGTH, FT / Cp HT4B .8463		
RUN No 1 Dioxin	FILTER NUMBER	Imp. # 1	0 / 420 / 420
LOCATION Incinerator #2		Imp. # 2	100 / 130 / 30
DATE July. 13/14	STATIC PRESSURE, IN. H_2O 0.08	Imp. # 3	
OPERATOR C.L	STACK DIAMETER 16.0"	Imp. # 4	
CONTROL UNIT / Y CAE2 1.0101	STACK HEIGHT 25'		
BAROMETRIC PRESSURE, IN. Hg 28.66	INITIAL LEAK TEST 0.001 @ 15"		
ASSUMED MOISTURE, Bw 10%	FINAL LEAK TEST 0.001 @ 15"	Upstream Diameters	
		Downstream Diameters	

Point	Clock Time	Dry Gas Meter Ft^3	XAD	Pitot IN. H_2O ΔP	Orifice ΔH IN. H_2O	Dry Gas Temp. Inlet °F	Dry Gas Temp. Outlet °F	Pump Vac. IN. Hg Gauge	Temperature °F Box	Temperature °F Probe	Temperature °F Impinger Exit	Temperature °F Stack	Fyrites NOVA CO_2 Vol. %	Fyrites NOVA O_2 Vol. %	NOX-CO
1	09:33	186.413													
1		190.06	46	.11	1.78		63	7	250	250	58	1660			
		193.62		.105	1.70		64	8				1670	15.0	1.5	322-0
2		197.10	46	.10	1.62		64	8	250	250	59	1689			
2		200.54		.10	1.56		67	8				1750			
3		204.15	52	.11	1.73		68	8	253	253	60	1756	15.0	1.5	341-0
3		207.76		.11	1.73		70	8				1766			
4		211.41	54	.115	1.77		70	8	254	250	60	1772			
4		215.15		.12	1.85		71	8				1798	14.5	1.5	345-0
5		218.87	58	.12	1.89		72	10	249	242	64	1850			
5		222.59		.12	1.86		73	10				1868			
6		226.27	58	.12	1.77		75	11	242	260	60	1895	14.0	2.3	343-0
6		229.78		.11	1.63		75	12				1910			
7		233.12	48	.10	1.48		76	12	249	264	59	1927			
7		236.30		.09	1.33		77	12				1950	14.5	2.0	361-0
8		239.47	52	.09	1.33		78	11	256	268	58	1950			
8		242.81		.10	1.48		79	10				1959			
9		246.18	56	.10	1.51		80	10	244	260	60	1850	14.0	2.5	335-0
9		249.59		.10	1.54		80	12				1800			
10		253.13	58	.11	1.66		80	12	250	250	64	1878	8.5	9.3	68-0
10		256.47		.10	1.48		81	13				1950			
11		259.83	58	.10	1.48		81	14	245	258	62	1941	12.5	3.0	343-0
11		263.17		.10	1.48		81	14				1900			
12		266.58	50	.10	1.54		81	14	250	251	60	1811			
12		269.92		.10	1.48		81	14				1930	8.0	9.5	71-0
1		273.29	54	.10	1.51		81	14	248	250	60	1850			
1		276.66		.10	1.51		82	14				1844	11.5	5.5	244-0
2		280.09	56	.10	1.54		82	14	248	250	62	1800			
2		283.50		.10	1.54		83	14				1793			
3		286.73	58	.09	1.39		83	14	250	250	62	1808	9.0	8.5	100-0
3		289.99		.09	1.39		83	14				1815			

*20 min after primary ignition

PLANT	Snap Lake - De Beers	PROBE TIP DIAMETER, IN.	4QD .5113
		PROBE LENGTH, FT / Cp	HT 4b .8463
RUN No	1 Dioxin - Continued	FILTER NUMBER	
LOCATION	Incinerator #2		
DATE	July 13/14	STATIC PRESSURE, IN. H_2O	
OPERATOR	CL	STACK DIAMETER	16.0"
CONTROL UNIT / Y	1.0101	STACK HEIGHT	25'
BAROMETRIC PRESSURE, IN. Hg	28.66	INITIAL LEAK TEST	0.001 @ 15"
ASSUMED MOISTURE, Bw	10%	FINAL LEAK TEST	0.001 @ 15"

IMPINGER VOLUMES	INITIAL (mL)	FINAL (mL)	TOTAL GAIN (mL)
Imp. # 1			
Imp. # 2			
Imp. # 3			
Imp. # 4			

Upstream Diameters

Downstream Diameters

Point	Clock Time	Dry Gas Meter Ft^3	ΔAO	Pitot IN. H_2O ΔP	Orifice ΔH IN. H_2O	Dry Gas Temp. Inlet °F	Dry Gas Temp. Outlet °F	Pump Vac. IN. Hg Gauge	Temperature °F Box	Temperature °F Probe	Temperature °F Impinger Exit	Temperature °F Stack	Fyrites NOVA CO_2 Vol. %	Fyrites NOVA O_2 Vol. %	NOx - CO
	Continued	289.99	XAO												
4		293.37	48	.10	1.48		82	12	253	250	60	1878			
4	16:00	296.71		.10	1.48		83	12				1885	9.0	7.5	188-0
5		300.04	50	.095	1.47		83	12	249	247	59	1808			
5		303.27		.09	1.36		82	12				1863			
6		306.59	49	.095	1.47		81	12	245	251	58	1813			
6		309.93		.095	1.47		82	12				1805	8.0	9.0	108-0
7		313.35	52	.10	1.54		81	13	250	250	60	1808			
7		316.77		.10	1.54		80	14				1783			
8		320.19	56	.10	1.54		81	14	250	250	62	1793			
8	20:00	323.60		.10	1.54		82	14				1800	6.0	11.6	93-0
9		326.97	56	.10	1.51		83	14	250	250	64	1850			
9		330.39		.10	1.54		84	14				1817			
10		333.62	54	.09	1.39		83	14	250	250	62	1814			
10		336.76		.085	1.31		82	14				1822	7.0	9.0	178-0
11		340.09	52	.095	1.47		83	13	250	250	60	1825			
11		343.33		.090	1.39		84	13				1811			
12		346.50	48	.090	1.33		85	13	245	250	61	1880	7.5	8.0	135-0
12	13:43	349.82		.095	1.47		86	14				1821			

XAO LF 069

ΔH @ calc.:

		ΔH
11.20 @ 1750		16.36
11.09 @ 1800		16.00
10.98 @ 1850		15.65
10.87 @ 1900		15.32
11.94 @ 1500		18.45

PLANT: Snap Lake - De Beers
RUN No: 2 Dioxin
LOCATION: Incinerator #2
DATE: July 14/14
OPERATOR: C.L
CONTROL UNIT / Y: ST CAE 2 1.0101
BAROMETRIC PRESSURE, IN. Hg: 28.60
ASSUMED MOISTURE, Bw: 12%

PROBE TIP DIAMETER, IN: *4QC - .5183*
PROBE LENGTH, FT / Cp: HT 4B - .8463
FILTER NUMBER:
STATIC PRESSURE, IN. H_2O: 0.08
STACK DIAMETER: 16.0"
STACK HEIGHT: 25'
INITIAL LEAK TEST: Leak check #1 0.005 @ 15" / Leak check #2 0.002 @ 15"
FINAL LEAK TEST: 0.005 @ 18" / 0.002 @ 20"
Upstream Diameters: 1.75
Downstream Diameters: 7.25

IMPINGER VOLUMES	INITIAL (mL)	FINAL (mL)	TOTAL GAIN (mL)
Imp. # 1	0	425	425
Imp. # 2	100	120	20
Imp. # 3	0		
Imp. # 4			

Point	Clock Time	Dry Gas Meter Ft^3	XAO	Pitot IN. H_2O ΔP	Orifice ΔH IN. H_2O	Dry Gas Temp. Inlet °F	Dry Gas Temp. Outlet °F	Pump Vac. IN. Hg Gauge	Temperature °F Box	Temperature °F Probe	Temperature °F Impinger Exit	Temperature °F Stack	Fyrites NOVA CO_2 Vol. %	Fyrites NOVA O_2 Vol. %	NOX-CO
	13:30	511.462													
1		514.84		.08	1.48		81	5	250	253	60	1600			
1		518.22	52	.08	1.48		82	5				1550	16.0	1.0	378-1000
2		521.39		.08	1.31		82	8	246	253	62	1680			
2		524.56	52	.08	1.31		82	12				1764			
3		527.82		.09	1.38		82	15	253	260	60	1900	8.0	8.0	481-1000
3		531.15	56	.09	1.44		82	15				1804			
4		534.44		.09	1.41		83	16	249	274	62	1826			
4		537.77	58	.09	1.44		84	18				1809	12.0	5.6	104-44
5	High Partic Stop @ 14:20 Leak check 0.002 @ 15" Start @ 15:10	541.10		.09	1.44		85	18	250	270	64	1801			
5		544.33	54	.085	1.36		85	18				1795			
6		547.62		.09	1.41		85	18	250	275	64	1866	9.5	7.3	90-0
6		550.91	50	.09	1.41		84	5				1852			
7		554.20		.09	1.41		85	5	248	265	62	1870	10.5	8.5	119-0
7		557.58	52	.095	1.49		85	6				1863			
8		560.93		.095	1.46		86	6	252	270	64	1900			
8		564.19	54	.09	1.38		87	6				1894	10.5	8.4	132-8
9		567.47		.09	1.38		88	7	251	272	65	1925			
9		570.73	58	.09	1.38		88	7				1870			
10		573.99		.09	1.38		89	7	252	275	66	1904			
10		577.34	60	.095	1.46		90	8				1921	8.5	9.0	123-8
11		580.69		.095	1.46		91	8	251	270	64	1898			
11		584.05	52	.095	1.46		91	8				1890			
12		587.31		.09	1.38		92	8	250	275	62	1884	12.5	3.2	244-7
12		590.59	52	.09	1.38		92	8				1885			
1		593.94	54	.095	1.46		91	8	255	275	62	1880			
1		597.41		.10	1.57		92	8				1868	12.0	4.0	127-0
2		600.85	56	.10	1.53		92	8	252	275	62	1881			
2		604.29		.10	1.53		92	8				1920			
3		607.77	52	.10	1.57		92	8	253	272	64	1856			
3		611.21		.10	1.53		92	8				1868			

860lb of waste

* Primary ignition 12:50

* 40 min after primary ignition

PLANT	Snap Lake - De Beers	PROBE TIP DIAMETER, IN.	.5183
		PROBE LENGTH, FT / Cp	HT 4ft .8463
RUN No	2 Dioxin - continued	FILTER NUMBER	
LOCATION	Incinerator #2		
DATE	July 14/14	STATIC PRESSURE, IN. H_2O	
OPERATOR	CL	STACK DIAMETER	16.0"
CONTROL UNIT / Y	1.0101	STACK HEIGHT	25'
BAROMETRIC PRESSURE, IN. Hg	28.60	INITIAL LEAK TEST	
ASSUMED MOISTURE, Bw	12%	FINAL LEAK TEST	

IMPINGER VOLUMES	INITIAL (mL)	FINAL (mL)	TOTAL GAIN (mL)
Imp. # 1			
Imp. # 2			
Imp. # 3			
Imp. # 4			

Upstream Diameters

Downstream Diameters

Point	Clock Time	Dry Gas Meter Ft^3	ΔAD	Pitot IN. H_2O ΔP	Orifice ΔH IN. H_2O	Dry Gas Temp. Inlet °F	Dry Gas Temp. Outlet °F	Pump Vac. IN. Hg Gauge	Temperature °F Box	Temperature °F Probe	Temperature °F Impinger Exit	Temperature °F Stack	Fyrites Nova CO_2 Vol. %	Fyrites Nova O_2 Vol. %	NOx-CO
	Continued	611.21													
4		614.69	49	.10	1.57		91	9	257	275	62	1870	8.0	8.4	124-4
4		618.21		.105	1.61		91	9				1910			
5		621.68	48	.10	1.57		92	10	260	275	60	1871	9.0	8.0	125-0
5		625.17		.10	1.57		92	10				1876			
6		628.62	50	.10	1.53		93	10	256	272	58	1880			
6		631.97		.095	1.46		93	10				1915	10.5	9.3	121-0
7		635.32	52	.095	1.46		92	11	251	270	58	1881			
7		638.76		.10	1.53		93	12				1880			
8		642.20	58	.10	1.53		93	12	253	275	60	1919	8.0	9.0	120-0
8	1500	645.73		.105	1.61		94	12				1925			
9		649.17	52	.10	1.53		93	12	247	270	62	1914			
9		652.62		.10	1.53		92	12				1890	8.0	8.7	127-0
10		655.97	48	.095	1.46		92	13	251	275	62	1898			
10		659.23		.09	1.38		93	14				1910			
11		662.58	50	.095	1.46		92	14	249	275	60	1922	11.5	7.0	119-0
11		666.02		.10	1.53		93	15				1920			
12		669.46	52	.10	1.53		93	15	250	272	58	1910			
12	18:25	672.90		.10	1.53		92	15				1880	8.0	9.0	127-0

* XAD LF 066

1750	11.27	16.36	
1800	11.16	16.00	
1850	11.05	15.65	ΔH
1900	10.88	15.32	
1500	11.94	18.45	

PLANT	Snap Lake - De Beers	PROBE TIP DIAMETER, IN.	48-C .5183
		PROBE LENGTH, FT / Cp	HT 48 .8463
RUN No	3 Dioxin	FILTER NUMBER	
LOCATION	Incinerator #2		
DATE	July 15/14	STATIC PRESSURE, IN. H_2O	0.08
OPERATOR	C.L	STACK DIAMETER	16.0"
CONTROL UNIT / Y	STACK 2 1.0101	STACK HEIGHT	25'
BAROMETRIC PRESSURE, IN. Hg	28.30	INITIAL LEAK TEST	0.002 @ 15"
ASSUMED MOISTURE, Bw	12%	FINAL LEAK TEST	0.009 @ 15"

IMPINGER VOLUMES	INITIAL (mL)	FINAL (mL)	TOTAL GAIN (mL)
Imp. # 1	0	423	423
Imp. # 2	100	122	22
Imp. # 3	0		
Imp. # 4			

Upstream Diameters

Downstream Diameters

Point	Clock Time	Dry Gas Meter Ft^3	XAD	Pitot IN. H_2O ΔP	Orifice ΔH IN. H_2O	Dry Gas Temp. Inlet °F	Dry Gas Temp. Outlet °F	Pump Vac. IN. Hg Gauge	Temperature °F Box	Temperature °F Probe	Temperature °F Impinger Exit	Temperature °F Stack	Fyrites MAVA CO_2 Vol. %	Fyrites MAVA O_2 Vol. %	
	09:35	673.290													
1		677.25	42	.09	1.44		71	5	255	254	54	1793			
		680.63		.09	1.47		72	5				1775	9.0	8.1	84-0
2		684.12	42	.10	1.57		73	6	244	254	58	1853			
2		687.65		.10	1.60		74	8				1900			
3		690.99	43	.09	1.44		73	8	250	266	58	1810	15.0	3.5	260-0
3		694.31		.09	1.41		74	8				1859			
4		697.84	44	.10	1.60		74	10	251	270	60	1817			
4		701.37		.10	1.60		74	10				1809	13.5	3.5	282-0
5		704.90	48	.10	1.60		75	10	249	275	56	1811			
5		708.37		.10	1.57		76	10				1853			
6		711.87	48	.10	1.57		77	10	251	275	58	1828	11.5	8.0	130-0
6		715.38		.10	1.57		78	10				1867			
7		718.88	52	.10	1.57		78	10	251	275	60	1841			
7		722.37		.10	1.57		79	10				1870	10.0	8.0	132-0
8		725.78	56	.095	1.49		80	10	250	272	62	1837			
8		729.10		.09	1.41		80	10				1837	8.5	7.5	150-0
9		732.51	60	.095	1.49		82	10	252	275	62	1840			
9		735.88		.095	1.46		84	10				1900			
10		739.20	50	.09	1.41		84	10	252	275	64	1858	11.5	6.5	130-0
10		742.52		.09	1.41		85	10				1845			
11		745.87	50	.095	1.46		85	10	249	272	60	1894			
11		749.19		.09	1.38		86	10				1852	9.0	8.8	128-0
12		752.60	45	.095	1.48		88	10	252	275	58	1866			
12		756.01		.095	1.48		89	10				1852			
1		759.45	45	.16	1.53		88	10	250	275	58	1905	9.5	9.0	128-0
1		762.98		.105	1.61		86	10				1883			
2		766.51	46	.105	1.61		87	11	252	273	60	1916			
2		770.10		.105	1.64		88	12				1859	11.0	4.0	193-0
3		773.71	44	.11	1.69		88	12	250	275	60	1890			
3		777.39		.11	1.72		88	12				1860			

* 8:35 Primary ignition

* 560lb of waste

* 60 min after primary ignition

PLANT Snap Lake - De Beers	PROBE TIP DIAMETER, IN. .5183	IMPINGER VOLUMES	INITIAL (mL) / FINAL (mL) / TOTAL GAIN (mL)
	PROBE LENGTH, FT / Cp .8463		
RUN No 3 Dioxin - Continued	FILTER NUMBER	Imp. # 1	
LOCATION Incinerator #2		Imp. # 2	
DATE July 15/14	STATIC PRESSURE, IN. H_2O 0.08	Imp. # 3	
OPERATOR CL	STACK DIAMETER 16.0"	Imp. # 4	
CONTROL UNIT / Y CAF 2 1.0101	STACK HEIGHT 25'		
BAROMETRIC PRESSURE, IN. Hg 28.30	INITIAL LEAK TEST		
ASSUMED MOISTURE, Bw 12%	FINAL LEAK TEST	Upstream Diameters	
		Downstream Diameters	

Point	Clock Time	Dry Gas Meter Ft^3	XAD	Pitot IN. H_2O ΔP	Orifice ΔH IN. H_2O	Dry Gas Temp. Inlet °F	Dry Gas Temp. Outlet °F	Pump Vac. IN. Hg Gauge	Temperature °F Box	Temperature °F Probe	Temperature °F Impinger Exit	Temperature °F Stack	Fyrites NOVA CO_2 Vol. %	Fyrites NOVA O_2 Vol. %	Nox-Co
	Continued	777.39													
4		~~780.74~~	43	.095	1.46		87	12	249	269	58	1885			
4	13:00	784.23		.10	1.57		88	12				1875	9.0	9.2	124-0
5		787.55	43	.09	1.41		88	12	250	270	60	1859			
5		790.87		.09	1.41		89	12				1858			
6		794.09	46	.085	1.33		87	12	249	272	58	1857	8.0	9.1	123-0
6		797.41		.09	1.41		88	12				1868			
7		800.58	48	.085	1.30		87	12	253	275	60	1900			
7		803.90		.09	1.41		88	12				1875	8.0	9.8	122-0
8		807.22	50	.09	1.41		87	12	251	270	60	1851			
8		810.54		.09	1.41		88	12				1870			
9		813.67	51	.08	1.25		88	12	250	272	60	1851	8.5	9.6	118-0
9		816.89		.085	1.33		87	12				1854			
10		820.02	53	.08	1.25		87	12	247	270	62	1847			
10		823.15		.08	1.25		88	12				1848	9.0	9.5	119-0
11		826.39	56	.085	1.33		87	12	249	275	62	1833			
11		829.52		.08	1.25		86	12				1854			
12		832.79	58	.09	1.44		87	12	252	275	64	1880	9.0	7.1	106-0
12	13:45	835.97		.085	1.30		88	12				1894			

PLANT Snap Lake DeBeers	PROBE TIP DIAMETER, IN. 0.3623	IMPINGER VOLUMES	INITIAL (mL) / FINAL (mL) / TOTAL GAIN (mL)
RUN No 1 - PM/Metals	PROBE LENGTH, FT / Cp HT 4a/ 0.8457	Imp. # 1	109 / 311 / 211
LOCATION Incinerator 2	FILTER NUMBER	Imp. # 2	100 / 184 / 84
DATE July 13, 2014	STATIC PRESSURE, IN. H_2O +0.08	Imp. # 3	- / 15 / 15
OPERATOR LA	STACK DIAMETER 16"	Imp. # 4	100 / 123 / 23
CONTROL UNIT / Y Apex 522 / 0.9950	STACK HEIGHT 25'		100 / 105 / 5
ΔH@ = 1.8690			Gel / /
BAROMETRIC PRESSURE, IN. Hg 28.66	INITIAL LEAK TEST 0.001@ 15"		
ASSUMED MOISTURE, Bw 11%	FINAL LEAK TEST 0.001@ 15"	Upstream Diameters	
		Downstream Diameters	

Point	Clock Time	Dry Gas Meter Ft^3	NOx ppm	Pitot IN. H_2O ΔP	Orifice ΔH IN. H_2O	Dry Gas Temp. ~~Inlet~~ (23 Ft)	Dry Gas Temp. Outlet °F	Pump Vac. IN. Hg Gauge	Temperature °F Box	Temperature °F Probe	Temperature °F Impinger Exit	Temperature °F Stack	Fyrites CO_2 Vol. %	Fyrites O_2 Vol. %	CO ppm
1		665.47		0.10	2.31	63	63	5	246	256		1657			
2		669.65	322	0.11	2.52	65	65	6	245	257	53	1675	15	1.5	0
3		674.30		0.115	2.60	63	63	6	245	258		1702			
4		678.64	341	0.11	2.47	65	64	7	246	257	53	1724	15	1.5	0
5		682.26		0.10	2.21	65	65	7	246	257		1755			
6		686.90	345	0.10	2.22	63	66	8	247	258	53	1756	14.5	1.5	0
7		691.00		0.10	2.17	65	67	8	246	257		1804			
8		695.16	343	0.105	2.27	65	67	9	245	257	54	1816	14.0	2.3	0
9		699.21		0.10	2.15	63	67	9	244	256		1833			
10		703.25	341	0.10	2.13	60	68	10	245	256	54	1858	14.0	2.2	0
11		707.10		0.09	1.90	65	69	10.5	247	257		1878			
12		710.91	361	0.09	1.88	65	69	11	245	256	54	1903	14.5	2.0	0
1		715.03		0.105	2.18	65	69	13	246	259		1916			
2		719.02	335	0.10	2.07	60	70	13	247	257	54	1927	14.0	2.5	0
3		723.00		0.10	2.06	65	70	14	248	256		1941			
4		727.38	67	0.11	2.44	65	70	15	246	255	53	1775	8.5	9.3	0
5		731.75		0.11	2.45	63	71	16	247	256		1776			
6		735.92	271	0.10	2.26	65	71	16	248	257	53	1735	12.5	3.4	0
7		740.35		0.12	2.53	65	72	18	247	256		1998			
8		744.77	339	0.12	2.49	60	73	19	246	255	54	1938	12	3.0	0
9		748.80		0.10	2.06	65	74	19	245	256		1957			
10		752.89	71	0.10	2.12	65	75	20	244	257	55	1896	8.0	9.5	0
11		756.85		0.09	1.99	63	75	20	244	258		1797			
12	1145	760.70	300	0.09	1.88	63	76	20	245	259	55	1738	12.5	3.8	0

Primary ignition @ 0913 Test Start @ 0933 Primary 341°C Secondary 900°C

PLANT DeBeers Snap Lake	PROBE TIP DIAMETER, IN. 0.5623	IMPINGER	INITIAL / FINAL / TOTAL GAIN
	PROBE LENGTH, FT / Cp HT 4a / 0.8457	VOLUMES	(mL) / (mL) / (mL)
RUN No 2 - P/M & Metals	FILTER NUMBER	Imp. # 1	100 / 282 / 182
LOCATION Incinerator 2		Imp. # 2	100 / 174 / 74
DATE July 14, 2014	STATIC PRESSURE, IN. H_2O	Imp. # 3	– / 10 / 10
OPERATOR LA	STACK DIAMETER 16"	Imp. # 4	100 / 106 / 6
CONTROL UNIT / Y Apex 522/0.9950	STACK HEIGHT 25'		100 / 104 / 4
ΔH@ = 1.8690			Gel / /
BAROMETRIC PRESSURE, IN. Hg 28.60	INITIAL LEAK TEST 0.001@ 19"		
ASSUMED MOISTURE, Bw 12%	FINAL LEAK TEST 0.001@ 19"	Upstream Diameters	
		Downstream Diameters	

Point	Clock Time	Dry Gas Meter Ft^3	NOx (ppm)	Pitot IN. H_2O ΔP	Orifice ΔH IN. H_2O	Dry Gas Temp. Inlet °F	Dry Gas Temp. Outlet °F	Pump Vac. IN. Hg Gauge	Temperature °F Box	Temperature °F Probe	Temperature °F Impinger Exit	Temperature °F Stack	Fyrites CO_2 Vol. %	Fyrites O_2 Vol. %	CO (ppm)
	13:50	864.309													
1		868.16	481	0.085	1.88		74	6	246	258		1778	8.0	9.1	1200
2		872.17		0.095	2.02		80	7.5	247	257	55	1628			
3		876.16	106	0.09	2.00		80	8	248	256		1773	12	5.6	50
4		880.37		0.10	2.22		81	9.5	247	255	54	1779			
5		884.60	91	0.10	2.24		82	10	247	254		1767	9.5	7.3	0
6		888.72		0.095	2.13		82	11	247	255	54	1759			
7	Start to Change Filter	892.98	366	0.10	2.25		83	18-20	246	254		1761	15	1	1800
8		897.12		0.095	2.12		84	3	247	255	55	1781			
9		901.28	332	0.10	2.14		85	4	246	256		1878	12.5	3	70
10		905.35		0.095	2.06		84	4.5	246	257	54	1951			
11		909.30	102	0.09	1.93		85	5.5	247	258		1880	13	4	5
12		913.23		0.09	1.91		85	7	248	257	54	1900			
1		916.96	109	0.08	1.71		85	7	249	256		1881	8.0	8.3	0
2		920.71		0.08	1.72		86	7	246	257	55	1879			
3		924.56	102	0.085	1.85		85	8	246	256		1847	9.0	7.6	20
4		928.54		0.09	1.98		86	8	247	258	54	1816			
5		932.55	119	0.09	1.98		86	8.5	246	257		1816	10.5	8.5	0
6		936.63		0.095	2.08		86	9	247	256	53	1832			
7		940.60	128	0.09	1.94		86	9	248	257		1867	9.0	8.5	0
8		944.48		0.085	1.86		86	9	247	257	53	1836			
9		948.47	253	0.09	1.96		87	9	246	256		1848	12.5	2.5	40
10		952.31		0.085	1.85		86	9	247	258	53	1858			
11		956.09	132	0.08	1.74		87	9.5	246	257		1846	11.0	8.4	7
12	14:07	959.86		0.08	1.74		86	9.5	245	257	54	1852			

H/C 0.001@20" H/C 0.001@15" Stopped @ 1425 restart @ 1430

Primary Ignition @ 12:50 Load = 860 lbs Metals start @ 13:50 Primary T = 840 °C Secondary T = 1000 °C

PLANT De Beers Snap Lake	PROBE TIP DIAMETER, IN. 0.5623	IMPINGER VOLUMES	INITIAL (mL) / FINAL (mL) / TOTAL GAIN (mL)
RUN No 3 Partic / Metals	PROBE LENGTH, FT / Cp HT 4a / 0.8457		
LOCATION Incinerator 2	FILTER NUMBER	Imp. # 1	100 / 282 / 182
DATE July 15, 2014		Imp. # 2	100 / 171 / 71
OPERATOR LA	STATIC PRESSURE, IN. H_2O +0.08	Imp. # 3	— / 10 / 10
CONTROL UNIT / Y Apex 522 / 0.9950	STACK DIAMETER 16"	Imp. # 4	100 / 108 / 8
ΔH@ = 1.8698	STACK HEIGHT 25'		100 / 102 / 2
BAROMETRIC PRESSURE, IN. Hg ~~28.500~~ 28.3			Gel / /
ASSUMED MOISTURE, Bw 13%	INITIAL LEAK TEST 0.001 @ 18"		
	FINAL LEAK TEST 0.003 @ 21"	Upstream Diameters	
		Downstream Diameters	

Point	Clock Time	Dry Gas Meter Ft^3	NOx ppm	Pitot IN. H_2O ΔP	Orifice ΔH IN. H_2O	Dry Gas Temp. Inlet °F	Dry Gas Temp. Outlet °F	Pump Vac. IN. Hg Gauge	Temperature °F Box	Temperature °F Probe	Temperature °F Impinger Exit	Temperature °F Stack	Fyrites CO_2 Vol. %	Fyrites O_2 Vol. %	CO ppm
1	10:15	960.470		0.095	2.00		70	3	248	258		1815			
2		964.41													
3		968.29	232	0.090	1.90		71	3	247	257	55	1805	13.5	3.5	0
4		972.33		0.10	2.10		70	3.5	247	257		1823			
5		976.47	130	0.105	2.28		71	4	246	259	52	1826	11.5	8.0	0
6		980.63		0.105	2.21		72	4.5	245	258		1819			
7		984.85	132	0.11	2.28		73	5	246	258	52	1860	10	8.0	0
8		989.10		0.11	2.32		73	5.5	247	257		1822			
9		993.22	150	0.105	2.19		74	6	247	256	52	1865	8.5	7.5	0
10		997.33		0.10	2.11		76	7	246	257		1839			
11		1001.42	130	0.10	2.08		77	8	246	255	53	1874	11.5	6.5	0
12		1005.29		0.09	1.91		77	8	247	258		1822			
		1009.15	231	0.09	1.87		78	8.5	248	257	53	1880	13.5	3.0	0
1		1013.03		0.09	1.91		79	9	247	256		1837			
2		1017.00	128	0.095	1.99		79	10	246	255	54	1863	9.0	8.8	0
3		1021.09		0.10	2.11		80	11.5	245	257		1845			
4		1025.00	180	0.09	1.92		79	13	246	258	55	1825	12.0	4.5	0
5		1029.09		0.10	2.12		79	16	247	257		1840			
6	Start to Change Filter →	1033.22	128	0.10	2.13		80	20	246	258	55	1831	9.5	9.0	0
7	Restart →	1037.33		0.10	2.13		81	3	246	257		1836			
8		1041.34	193	0.095	1.98		80	4	245	257	50	1875	11.0	4.0	0
9		1045.26		0.09	1.91		80	4	246	256		1838			
10		1049.17	124	0.09	1.91		80	4	245	258	50	1839	9.0	9.2	0
11		1052.96		0.085	1.79		81	4	246	257		1863			
12	12:33	1056.66	81	0.08	1.70		82	4.5	247	256	51	1839	10.0	6.5	0

4/C @ 0.09 @ 22"
4/C @ 0.08 @ 19"

Primary Ignitron @ 0835 Load: 560 lbs Metals start @ 10:15 Primary T = 705 °C Secondary = 1090 °C

PLANT DeBeer's Snap Lake	PROBE TIP DIAMETER, IN.	IMPINGER VOLUMES	INITIAL (mL) / FINAL (mL) / TOTAL GAIN (mL)
	PROBE LENGTH, FT / Cp		
RUN No 1-3 SO_x	FILTER NUMBER	Imp. # 1	100 / /
LOCATION Incinerator 1		Imp. # 2	100 / /
DATE July 11	STATIC PRESSURE, IN. H_2O	Imp. # 3	– / /
OPERATOR	STACK DIAMETER 16"	Imp. # 4	Gel / /
CONTROL UNIT / Y GM-4	STACK HEIGHT 25'		/ /
	1 2 3		/ /
BAROMETRIC PRESSURE, IN. Hg 25.25	INITIAL LEAK TEST 0.001 @ 15" 0.000 0.000		
ASSUMED MOISTURE, Bw	FINAL LEAK TEST 0.00 0.000	Upstream Diameters	
		Downstream Diameters	

Point	Clock Time	Dry Gas Meter m^3 ~~Ft^3~~		Pitot IN. H_2O ΔP	Orifice ΔH IN. H_2O	Dry Gas Temp. Inlet °F	Dry Gas Temp. Outlet °F	Pump Vac. IN. Hg Gauge	Temperature °F Box	Temperature °F Probe	Temperature °F Impinger Exit	Temperature °F Stack	Fyrites CO_2 Vol. %	Fyrites O_2 Vol. %
	13:58	181.5816												
1							60							
2							61							
3							61							
4							62							
5							63							
6	14:55	191.9265					63							
0:00	10:32	181.9392					58							
0:10							61							
0:20	10:52	182.1402					64							
0:30							64							
0:40							64							
0:50							65							
1:00	11:32	182.5310					65	3						
~~0:00~~	~~9:33~~	~~182.5555~~					~~62~~							
~~0:10~~							~~63~~							
~~0:20~~							~~64~~							
~~0:30~~														
~~0:40~~														
~~0:50~~														
~~1:00~~	~~10:33~~													
0:00	14:50	183.1527					~~74~~							
0:10							~~75~~							
0:20							75							
0:30							76							
0:40							76							
0:50							76							
1:00	15:50	183.6754					75							

PLANT DeBeers Snap Lake	PROBE TIP DIAMETER, IN.	IMPINGER	INITIAL / FINAL / TOTAL GAIN
	PROBE LENGTH, FT / Cp	VOLUMES	(mL) / (mL) / (mL)
RUN No 1-3 SOx	FILTER NUMBER	Imp. # 1	100
LOCATION Incinerator #2		Imp. # 2	100
DATE July 13, 2014	STATIC PRESSURE, IN. H_2O	Imp. # 3	0
OPERATOR	STACK DIAMETER 16"	Imp. # 4	GGL
CONTROL UNIT / Y LM-4	STACK HEIGHT 25'		
	1 2 3		
BAROMETRIC PRESSURE, IN. Hg	INITIAL LEAK TEST 0.001 0.002 0.000		
ASSUMED MOISTURE, Bw	FINAL LEAK TEST 0.001 0.001 0.000	Upstream Diameters	
		Downstream Diameters	

Point	Clock Time	Dry Gas Meter ~~ft³~~ m³		Pitot IN. H_2O ΔP	Orifice ΔH IN. H_2O	Dry Gas Temp. Inlet °F	Dry Gas Temp. Outlet °F	Pump Vac. IN. Hg Gauge	Temperature °F Box	Temperature °F Probe	Temperature °F Impinger Exit	Temperature °F Stack	Fyrites CO_2 Vol. %	Fyrites O_2 Vol. %
0:00	9:33	182.5555												
0:10							62							
0:20							63							
0:30							64							
0:40							65							
0:50							68							
1:00	10:33	183.1405					70							
0:00	13:54	183.6852					60							
0:10							62							
0:20							62							
0:30							63							
0:40							65							
0:50							67							
1:00	14:54	184.2412					67							
0:00	10:15	184.2480					66							
0:10							67							
0:20							67							
0:30							68							
0:40							69							
0:50							71							
1:00	11:15	184.7476					72							
							70							

APPENDIX 5

CALIBRATION DATA

PLANT	DeBeers Snap Lake	PROBE TIP DIAMETER, IN.	
		PROBE LENGTH, FT / Cp	
RUN No	Post-Test Cal	FILTER NUMBER	
LOCATION	Incinerators		
DATE	July 15, 2014	STATIC PRESSURE, IN. H_2O	
OPERATOR		STACK DIAMETER	
CONTROL UNIT / Y	Apex 522 0.9950	STACK HEIGHT	
BAROMETRIC PRESSURE, IN. Hg	28.5	INITIAL LEAK TEST	
ASSUMED MOISTURE, Bw		FINAL LEAK TEST	

IMPINGER VOLUMES	INITIAL (mL)	FINAL (mL)	TOTAL GAIN (mL)
Imp. # 1			
Imp. # 2			
Imp. # 3			
Imp. # 4			

Upstream Diameters

Downstream Diameters

Point	Clock Time	Dry Gas Meter Ft^3		Pitot IN. H_2O ΔP	Orifice ΔH IN. H_2O	Dry Gas Temp. Inlet °F	Dry Gas Temp. Outlet °F	Pump Vac. IN. Hg Gauge	Temperature °F Box	Temperature °F Probe	Temperature °F Impinger Exit	Temperature °F Stack	Fyrites CO_2 Vol. %	Fyrites O_2 Vol. %
	Orifice 63 (5 min)													
									Orifice					
	Initial	57.005			2.0		74	19.5	80° F					
	Final	61.062			2.0		78	19.5	80° F					

PLANT De Beers - Snap Lake	PROBE TIP DIAMETER, IN.	IMPINGER VOLUMES	INITIAL (mL) / FINAL (mL) / TOTAL GAIN (mL)
	PROBE LENGTH, FT / Cp		
RUN No Calibration	FILTER NUMBER	Imp. # 1	
LOCATION		Imp. # 2	
DATE July. 15/14	STATIC PRESSURE, IN. H_2O	Imp. # 3	
OPERATOR C.L	STACK DIAMETER	Imp. # 4	
CONTROL UNIT / Y STACK 2 1.001	STACK HEIGHT		
BAROMETRIC PRESSURE, IN. Hg 28.30	INITIAL LEAK TEST		
ASSUMED MOISTURE, Bw	FINAL LEAK TEST	Upstream Diameters	
		Downstream Diameters	

Point	Clock Time	Dry Gas Meter Ft^3		Pitot IN. H_2O ΔP	Orifice ΔH IN. H_2O	Dry Gas Temp. Inlet °F	Dry Gas Temp. Outlet °F	Pump Vac. IN. Hg Gauge	Temperature °F Box	Temperature °F Probe	Temperature °F Impinger Exit	Temperature °F Stack	Fyrites CO_2 Vol. %	Fyrites O_2 Vol. %
	13:40	835.970	orifice temp											
5min		840.039	84°F	N/A	1.90		88	18	N/A	N/A	N/A	N/A	N/A	N/A
			84		1.90		86	18						

CEM FIELD DATA SHEET

Plant : De Beers Snaplake
Source : Incinerator 1
Date : July 11-13, 2014

Technician : CA
Ambient Temp °C :
Bar. Pressure in Hg :

Cylinder Gas Pressure (psi)

1 Gas	2 Gas	3 Gas	4 Gas	5 Gas	N_2	O_2	H_2	Comb Air	Low meth	Mid meth	High meth
						20.9 (Amb)					

Certified Gas Value (ppm)

CO												
SO2												
NOx												

Range

CEM Readings (Nova)

Time	Source	O_2	CO_2	CO	THC	SO_2	NO_x	Response Time (sec)
								NO_x up
July 11/14 1300	Amb	20.9		0			0	NO_x dn
	N_2	0.0		0			0	O_2 up
								O_2 dn
1400	Amb	20.9		0			0	CO up
1430	Amb	20.9		0			0	CO dn
1500	Amb	20.9		0			0	CO_2 up
								CO_2 dn
1750	Amb	20.9		0			0	SO_2 up
	N_2	0.0		0			0	SO_2 dn
								THC up
								THC dn
July 12/14 0830	Amb	20.9		0			0	
	N_2	0.0		0			0	
1435	Amb	20.8		0			2	
	N_2	-0.2		0			0	
July 13/14 0830	Amb	20.9		0			0	
	N_2	0.0		0			0	
1330	Amb	20.9		0			0	
	N_2	0.1		0			0	
1715	Amb	20.9		0			0	
	N_2	0.1		0			0	

CEM FIELD DATA SHEET

Plant :_____ Technician :_____
Source :_____ Ambient Temp °C :_____
Date :_____ Bar. Pressure in Hg :_____

Cylinder Gas Pressure (psi)

1 Gas	2 Gas	3 Gas	4 Gas	5 Gas	N_2	O_2	H_2	Comb Air	Low meth	Mid meth	High meth

Certified Gas Value (ppm)

CO												
SO2												
NOx												

Range

CEM Readings

Time	Source	O_2	CO_2	CO	THC	SO_2	NO_x	Response Time (sec)
July 14/14 1330	Amb	20.9		0			0	NO_x up
	N_2	0.0		0			0	NO_x dn
								O_2 up
1815	Amb	20.9		0			0	O_2 dn
	N_2	0.3		0			0	CO up
								CO dn
July 15/14 0845	Amb	20.9		0			0	CO_2 up
	N_2	0		0			0	CO_2 dn
								SO_2 up
1345	Amb	20.9		0			0	SO_2 dn
	N_2	0.2		0			0	THC up
								THC dn

A.Lanfranco & Associates inc.

EPA Method 5

Meter Box Calibration

English Meter Box Units, English K' Factor

Model #: CAE2
Serial #: 28-072911-1

Date: 30-Apr-14
Barometric Pressure: 30.30 (in. Hg)
Theoretical Critical Vacuum: 14.29 (in. Hg)

!!!!!!!!!
IMPORTANT For valid test results, the Actual Vacuum should be 1 to 2 in. Hg greater than the Theoretical Critical Vacuum shown above.
IMPORTANT The Critical Orifice Coefficient, K', must be entered in English units, (ft)^3*(deg R)^0.5/((in.Hg)*(min)).
!!!!!!!!!

DRY GAS METER READINGS									CRITICAL ORIFICE READINGS					
					Initial Temps.		Final Temps.					Ambient Temperature		
dH (in H2O)	Time (min)	Volume Initial (cu ft)	Volume Final (cu ft)	Volume Total (cu ft)	Inlet (deg F)	Outlet (deg F)	Inlet (deg F)	Outlet (deg F)	Orifice Serial# (number)	K' Orifice Coefficient (see above)	Actual Vacuum (in Hg)	Initial (deg F)	Final (deg F)	Average (deg F)
0.35	15.00	69.400	74.068	4.668	75.0	75.0	76.0	76.0	40	0.2408	24.5	76.0	79.0	77.5
0.69	17.00	61.500	69.234	7.734	76.0	76.0	75.0	75.0	48	0.3560	23.0	78.0	75.0	76.5
1.18	15.00	51.500	60.479	8.979	72.0	72.0	74.0	74.0	55	0.4606	21.5	76.0	72.0	74.0
1.98	16.00	39.000	51.289	12.289	71.0	71.0	69.0	69.0	63	0.5956	19.7	74.0	73.0	73.5
3.85	19.00	18.500	38.438	19.938	71.0	71.0	70.0	70.0	73	0.8185	16.8	72.0	73.0	72.5

**********RESULTS**********

DRY GAS METER		ORIFICE			DRY GAS METER		ORIFICE			
					CALIBRATION FACTOR Y		CALIBRATION FACTOR dH@			
VOLUME CORRECTED Vm(std) (cu ft)	VOLUME CORRECTED Vm(std) (liters)	VOLUME CORRECTED Vcr(std) (cu ft)	VOLUME CORRECTED Vcr(std) (liters)	VOLUME NOMINAL Vcr (cu ft)	Value (number)	Variation (number)	Value (in H2O)	Value (mm H2O)	Variation (in H2O)	Ko (value)
4.663	132.1	4.721	133.7	4.747	1.012	0.002	1.985	50.41	0.119	0.680
7.732	219.0	7.917	224.2	7.947	1.024	0.014	1.787	45.39	-0.079	0.709
9.030	255.7	9.059	256.6	9.051	1.003	-0.007	1.826	46.37	-0.040	0.715
12.453	352.7	12.501	354.0	12.478	1.004	-0.006	1.841	46.75	-0.025	0.711
20.276	574.2	20.420	578.3	20.344	1.007	-0.003	1.890	48.00	0.024	0.698
				Average Y---------->	**1.0101**		**Average dH@----->**	**1.866**	**47.4**	**Average Ko----->**	**0.703**

TEMPERATURE CALIBRATION

Calibration Standard ------> Omega Model CL23A S/N:T-218768

Reference Temperature Set-Point (deg F)	Temperature Device Reading (deg F)	Results Variation (degF)	Results Percent of Absolute
32	33	1	0.20%
100	101	1	0.18%
300	301	1	0.13%
500	502	2	0.21%
1000	1001	1	0.07%

Note: For Calibration Factor Y, the ratio of the reading of the calibration meter to the dry gas meter, acceptable tolerance of individual values from the average is +-0.02.
For Orifice Calibration Factor dH@, the orifice differential pressure in inches of H20 that equates to 0.75 cfm of air at 68 F and 29.92 inches of Hg, acceptable tolerance of individual values from the average is +-0.2.
For Temperature Devicee, the reading must be within 1.5% of certified calibration standard (absolute temperature) to be acceptable.

SIGNED:

Date: Apr. 30/14

A. LANFRANCO AND ASSOCIATES INC.

EPA Method 5

Meter Box Calibration

English Meter Box Units, English K' Factor

Model #: Apex Inst. Model 522

Serial #:

Date: June. 10/14

Barometric Pressure: 29.95 (in. Hg)

Theoretical Critical Vacuum: 14.13 (in. Hg)

!!!!!!!!

IMPORTANT For valid test results, the Actual Vacuum should be 1 to 2 in. Hg greater than the Theoretical Critical Vacuum shown above.

IMPORTANT The Critical Orifice Coefficient, K', must be entered in English units, (ft)^3*(deg R)^0.5/((in.Hg)*(min)).

!!!!!!!!

---------- DRY GAS METER READINGS ----------									-CRITICAL ORIFICE READINGS-					
					Initial Temps.		Final Temps.					-- Ambient Temperature --		
dH (in H2O)	Time (min)	Volume Initial (cu ft)	Volume Final (cu ft)	Volume Total (cu ft)	Inlet (deg F)	Outlet (deg F)	Inlet (deg F)	Outlet (deg F)	Orifice Serial# (number)	K' Orifice Coefficient (see above)	Actual Vacuum (in Hg)	Initial (deg F)	Final (deg F)	Average (deg F)
3.90	16.00	306.000	323.248	17.248	79.0	78.0	76.0	75.0	73	0.8185	18.0	72.0	72.0	72.0
2.10	15.00	323.248	335.040	11.792	76.0	75.0	76.0	75.0	63	0.5956	21.0	73.0	72.0	72.5
1.25	15.00	335.040	344.233	9.193	76.0	75.0	76.0	75.0	55	0.4606	23.0	73.0	72.0	72.5
0.66	15.00	363.880	370.848	6.968	76.0	75.0	76.0	75.0	48	0.3560	23.0	73.0	72.0	72.5
0.31	24.00	356.276	363.880	7.604	76.0	75.0	76.0	75.0	40	0.2408	25.0	73.0	73.0	73.0

--- DRY GAS METER ---		--------- ORIFICE ---------			-- DRY GAS METER --		---------- ORIFICE ----------			
					CALIBRATION FACTOR Y		CALIBRATION FACTOR dH@			
VOLUME CORRECTED Vm(std) (cu ft)	VOLUME CORRECTED Vm(std) (liters)	VOLUME CORRECTED Vcr(std) (cu ft)	VOLUME CORRECTED Vcr(std) (liters)	VOLUME NOMINAL Vcr (cu ft)	Value (number)	Variation (number)	Value (in H2O)	Value (mm H2O)	Variation (in H2O)	Ko (value)
17.132	485.2	17.005	481.6	17.124	0.993	-0.002	1.913	48.60	0.044	0.694
11.694	331.2	11.595	328.4	11.687	0.992	-0.003	1.953	49.60	0.084	0.689
9.098	257.6	8.987	253.9	9.038	0.986	-0.009	1.944	49.37	0.075	0.695
6.886	195.0	6.931	196.3	6.986	1.006	0.012	1.770	44.96	-0.099	0.714
7.508	212.6	7.497	212.3	7.564	0.999	0.004	1.765	44.84	-0.104	0.721
				Average Y---------->	**0.9950**		**Average dH@----->**	**1.8690**	**47.47**	**Average Ko----->**	**0.7027**

TEMPERATURE CALIBRATION

Calibration Standard -------> Omega Model CL23A S/N:T-218768

Reference Temperature Set-Point (deg F)	Temperature Device Reading (deg F)	Results Variation (degF)	Results Percent of Absolute
32	33	1	0.20%
100	99	-1	-0.18%
300	298	-2	-0.26%
500	498	-2	-0.21%
1000	995	-5	-0.34%

Note: For Calibration Factor Y, the ratio of the reading of the calibration meter to the dry gas meter, acceptable tolerance of individual values from the average is +-0.02.
For Orifice Calibration Factor dH@, the orifice differential pressure in inches of H20 that equates to 0.75 cfm of air at 68 F and 29.92 inches of Hg, acceptable tolerance of individual values from the average is +-0.2.
For Temperature Devicee, the reading must be within 1.5% of certified calibration standard (absolute temperature) to be acceptable.

SIGNED:

Date: June 10/14

Pitot Tube Calibration

Date: 27-Jun-14
Pbar (in.Hg): 30.25

Temp (R): 530
Dn (in.): 0.25

Pitot ID: **4A**

Reference Pitot (in H2O)	S-Type Pitot (in H2O)	Air Velocity (ft/s)	Pitot Coeff. Cp	Deviation (absolute)
0.620	0.860	51.8	0.8406	0.0056
0.520	0.730	47.5	0.8356	0.0006
0.370	0.520	40.0	0.8351	0.0001
0.240	0.340	32.3	0.8318	0.0032
0.120	0.170	22.8	0.8318	0.0032
		Average :	0.8350	0.0025

Pitot ID: **HT-4A**

Reference Pitot (in H2O)	S-Type Pitot (in H2O)	Air Velocity (ft/s)	Pitot Coeff. Cp	Deviation (absolute)
0.080	0.110	18.6	0.8443	0.0014
0.250	0.350	32.9	0.8367	0.0090
0.360	0.490	39.5	0.8486	0.0029
0.520	0.700	47.5	0.8533	0.0076
JUNE 10/14		Average :	0.8457	0.0052

Pitot ID: **4A-1**

Reference Pitot (in H2O)	S-Type Pitot (in H2O)	Air Velocity (ft/s)	Pitot Coeff. Cp	Deviation (absolute)
0.130	0.180	23.7	0.8413	0.0007
0.150	0.210	25.5	0.8367	0.0040
0.320	0.440	37.2	0.8443	0.0036
0.420	0.580	42.7	0.8425	0.0018
0.660	0.920	53.5	0.8385	0.0021
		Average :	0.8407	0.0024

Pitot ID: **HT-4B**

Reference Pitot (in H2O)	S-Type Pitot (in H2O)	Air Velocity (ft/s)	Pitot Coeff. Cp	Deviation (absolute)
0.080	0.110	18.6	0.8443	0.0014
0.240	0.330	32.3	0.8443	0.0014
0.350	0.480	39.0	0.8454	0.0003
0.510	0.690	47.0	0.8511	0.0054
JUNE 10/14		Average :	0.8463	0.0022

Pitot ID: **4A-2**

Reference Pitot (in H2O)	S-Type Pitot (in H2O)	Air Velocity (ft/s)	Pitot Coeff. Cp	Deviation (absolute)
0.100	0.140	20.8	0.8367	0.0000
0.300	0.420	36.1	0.8367	0.0000
0.400	0.560	41.6	0.8367	0.0000
0.620	0.870	51.8	0.8357	0.0009
0.730	1.020	56.3	0.8375	0.0008
		Average :	0.8367	0.0004

Pitot ID:

Reference Pitot (in H2O)	S-Type Pitot (in H2O)	Air Velocity (ft/s)	Pitot Coeff. Cp	Deviation (absolute)
		Average :		

Pitot ID: **4B**

Reference Pitot (in H2O)	S-Type Pitot (in H2O)	Air Velocity (ft/s)	Pitot Coeff. Cp	Deviation (absolute)
0.630	0.880	52.3	0.8377	0.0007
0.540	0.750	48.4	0.8400	0.0031
0.390	0.550	41.1	0.8337	0.0033
0.250	0.350	32.9	0.8367	0.0002
0.100	0.140	20.8	0.8367	0.0002
		Average :	0.8370	0.0015

Pitot ID:

Reference Pitot (in H2O)	S-Type Pitot (in H2O)	Air Velocity (ft/s)	Pitot Coeff. Cp	Deviation (absolute)
		Average :		

* Average absolute deviation must not exceed 0.01.

Calibrated by A. Lanfranco and Associates Inc.

A. LANFRANCO and ASSOCIATES INC.

ENVIRONMENTAL CONSULTANTS

UNI PROBE NOZZLE DIAMETER CALIBRATION FORM

Technician: C. Lanfranco
Date: June. 10/14

Signature:

Nozzle I.D.	d1 (inch)	d2 (inch)	d3 (inch)	difference (inch)	average dia. (inch)	average area (ft^2)
4Q - A	0.4680	0.4680	0.4670	0.0010	0.4677	0.0011929
4Q - B	0.4690	0.4695	0.4695	0.0005	0.4693	0.0012014
4Q - C	0.5190	0.5180	0.5180	0.0010	0.5183	0.0014654
4Q - D	0.5120	0.5100	0.5120	0.0020	0.5113	0.0014261
4Q - E	0.5065	0.5070	0.5075	0.0010	0.5070	0.0014020
4Q - F	0.6570	0.6575	0.6570	0.0005	0.6572	0.0023555
4Q - G	0.6520	0.6530	0.6520	0.0010	0.6523	0.0023210
New/Old 3A	0.5620	0.5620	0.5630	0.0010	0.5623	0.0017247
No-Name	0.5080	0.5080	0.5090	0.0010	0.5083	0.0014094

Where:

(a) D1, D2, D3 = three different nozzle diameters; each diameter must be measured to within (0.025mm) 0.001 in.

(b) Difference = maximum difference between any two diameters; must be less than or equal to (0.1mm) 0.004 in.

(c) Average = average of D1, D2 and D3

BAROMETER CALIBRATION FORM

Device	Cal Date	Pbar Env Canada (kPa)	Pbar Env Canada (inches of Hg)	Device (inches of Hg) Reading	Device (inches of Hg) Elevation Corrected	Difference (Env Can - Elv Corr)
LA	January 9, 2014	101.0	29.83	29.71	29.783	0.05
DS	January 9, 2014	101.0	29.83	29.74	29.813	0.02
CL	January 9, 2014	101.0	29.83	29.70	29.773	0.06
AL	January 9, 2014	101.0	29.83	29.71	29.783	0.05
ML	January 9, 2014	101.0	29.83	29.70	29.773	0.06
MH	January 9, 2014	101.0	29.83	29.74	29.813	0.02
SH	January 9, 2014	101.0	29.83	29.70	29.773	0.06
JZ	January 9, 2014	101.0	29.83	29.70	29.773	0.06
JB	January 9, 2014	101.0	29.83	29.73	29.803	0.03

Performance Specification is

Device Corrected for Elevation must be +/- 0.1 " Hg of ENV CANADA SEA-LEVEL Pbar

Enter Environment canada Pressure from their website for Vancouver (link below)
and the reading from your barometer on the ground floor of the office.

http://www.weatheroffice.gc.ca/city/pages/bc-74_metric_e.html

EPA Method 5

Meter Box Calibration

English Meter Box Units, English K' Factor

Model #: **LM 4**

Serial #: **n/a**

Date: Jan.6/14

Barometric Pressure: 30.05 (in. Hg)

Theoretical Critical Vacuum: 14.17 (in. Hg)

!!!!!!!!!

IMPORTANT For valid test results, the Actual Vacuum should be 1 to 2 in. Hg greater than the Theoretical Critical Vacuum shown above.

IMPORTANT The Critical Orifice Coefficient, K', must be entered in English units, (ft)^3*(deg R)^0.5/((in.Hg)*(min)).

!!!!!!!!!

---------- DRY GAS METER READINGS ----------									-CRITICAL ORIFICE READINGS-					
					Initial Temps.		Final Temps.					-- Ambient Temperature --		
dH (in H2O)	Time (min)	Volume Initial (cu ft)	Volume Final (cu ft)	Volume Total (cu ft)	Inlet (deg F)	Outlet (deg F)	Inlet (deg F)	Outlet (deg F)	Orifice Serial# (number)	K' Orifice Coefficient (see above)	Actual Vacuum (in Hg)	Initial (deg F)	Final (deg F)	Average (deg F)
0.00	15.00	180.462	180.714	8.899	67.0	67.0	67.0	67.0	55	0.4606	14.0	62.0	61.0	61.5
0.00	16.00	180.714	180.984	9.517	65.0	65.0	65.0	65.0	55	0.4606	14.0	61.0	61.0	61.0
0.00	15.00	180.984	181.181	6.989	65.0	65.0	66.0	66.0	48	0.3560	14.0	62.0	61.0	61.5

********** RESULTS **********

--- DRY GAS METER ---		------- ORIFICE -------			-- DRY GAS METER --		------- ORIFICE -------			
					CALIBRATION FACTOR Y		CALIBRATION FACTOR dH@			
VOLUME CORRECTED Vm(std) (cu ft)	VOLUME CORRECTED Vm(std) (liters)	VOLUME CORRECTED Vcr(std) (cu ft)	VOLUME CORRECTED Vcr(std) (liters)	VOLUME NOMINAL Vcr (cu ft)	Value (number)	Variation (number)	Value (in H2O)	Value (mm H2O)	Variation (in H2O)	Ko (value)
8.951	253.5	9.091	257.5	8.944	1.016	0.008	0.000	0.00	0.000	#DIV/0!
9.610	272.1	9.702	274.8	9.536	1.010	0.002	0.000	0.00	0.000	#DIV/0!
7.050	199.6	7.027	199.0	6.913	0.997	-0.011	0.000	0.00	0.000	#DIV/0!
				Average Y------->	**1.0073**	**Average dH@----->**	**0.00**	**0.0**	**Average Ko---->**	**#DIV/0!**

TEMPERATURE CALIBRATION

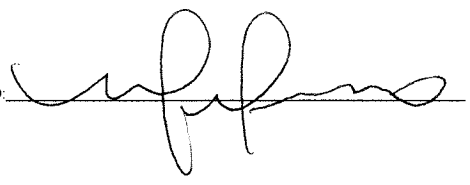
Calibration Standard -------> Omega Model CL23A S/N:T-218768

Reference Temperature Set-Point (deg F)	Temperature Device Reading (deg F)	Results Variation (degF)	Results Percent of Absolute
32	n/a	-32	-6.51%
100		-100	-17.87%
300		-300	-39.49%
800		-800	-63.51%
1700		-1700	-78.72%

Note: For Calibration Factor Y, the ratio of the reading of the calibration meter to the dry gas meter, acceptable tolerance of individual values from the average is +-0.02.

For Orifice Calibration Factor dH@, the orifice differential pressure in inches of H20 that equates to 0.75 cfm of air at 68 F and 29.92 inches of Hg, acceptable tolerance of individual values from the average is +-0.2.

For Temperature Devicee, the reading must be within 1.5% of certified calibration standard (absolute temperature) to be acceptable.

SIGNED: 

Date: Jan.6/14

Calibration Certificate

Date: 10-Jul-14
Technician: M. Harrington
Signature:
Insrtument Calibrated: Nova 1 (New Nova)

O2

Gas	Instrument Reading	Certified Value	% Calibration Error
Zero	0.1	0.0	0.1
O2/CO2	10.9	10.9	0.0
Ambient	20.9	20.9	0.0

Performance Specification: +/- 1% O2 (absolute diff)

CO

Gas	Instrument Reading	Certified Value	% Calibration Error
Zero	0	0	0.0
1 Gas	466	463	0.6
2 Gas	245	240	2.1
3 Gas			
4 Gas			
5 Gas			

Performance Specification: +/- 5% of Certified Gas Value

Nox

Gas	Instrument Reading	Certified Value	% Calibration Error
Zero	0	0	0.0
1 Gas	465	464	0.2
2 Gas	240	236	1.7
3 Gas			
4 Gas			
5 Gas			

Performance Specification: +/- 5% of Certified Gas Value