Hope Bay Mining Limited

DORIS NORTH GOLD MINE PROJECT
Incinerator Stack Testing Compliance Report for Section 4 Item 30 of the Project Certificate

NEWMONT™
NORTH AMERICA

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

November 2011

DORIS NORTH GOLD MINE PROJECT

INCINERATOR STACK TESTING COMPLIANCE REPORT FOR SECTION 4 ITEM 30 OF THE PROJECT CERTIFICATE

November 2011
Project #1009-008-12

Citation:
Rescan. 2011. *Doris North Gold Mine Project: Incinerator Stack Testing Compliance Report for Section 4 Item 30 of the Project Certificate*. Prepared for Hope Bay Mining Limited by Rescan Environmental Services Ltd.

Prepared for:

NEWMONT™ NORTH AMERICA

Hope Bay Mining Limited

Prepared by:

Rescan™ Engineers and Scientists

Rescan™ Environmental Services Ltd.
Vancouver, British Columbia

Executive Summary

Rescan™
Engineers and Scientists

Executive Summary

The following incinerator stack emissions monitoring requirements are outlined in the Doris North Gold Mine Project Certificate (NIRB No. 003, issued September 15, 2006): under Section 4.0, Item 30.

> *Commentary: NIRB expects that Canada Wide Standards for Dioxins and Furans and the Canada Wide Standards for Mercury will apply and should be followed including stack testing of incinerators.*

This report is intended to document efforts to meet the requirements outlined above.

In order to comply with Item 30 in Section 4.0 of the Project Certificate, Hope Bay Mining Limited (HBML) along with Rescan Environmental Services (Rescan) conducted the following activities in Aug/Sept 2011:

- Collected measurements of dioxin and furan emissions from the Doris incinerator stack; and
- Collected measurements of mercury emissions from the Doris incinerator stack.

The samples were analyzed at Exova and Pacific Rim laboratories, who are fully accredited laboratories. Dioxin, furan and mercury emission levels were compared with the Canada Wide Standards. The Canada Wide Standards were developed by the Canadian Council for Ministers of the Environment (CCME). The Doris incinerator stack emissions monitoring results indicated that there were no exceedances for the mercury emissions; however, although there was a significant decrease in the dioxin and furan emissions compared to 2009 results, levels still exceeded the Canada Wide Standards.

Table of Contents

Rescan™
Engineers and Scientists

DORIS NORTH GOLD MINE PROJECT
INCINERATOR STACK TESTING COMPLIANCE REPORT FOR SECTION 4 ITEM 30 OF THE PROJECT CERTIFICATE

Table of Contents

List of Figures

List of Tables

List of Plates

PLATE **PAGE**

List of Appendices

Abbreviations and Definitions

Rescan™
Engineers and Scientists

Abbreviations and Definitions

Amberlite XAD-2	An amberlite adsorbent resin used to extract dioxin and furan from the stack gas emitted from a waste incinerator.
Canada-wide Standards	Objectives for maximum concentrations of criteria air contaminants in the atmosphere developed to ensure long-term protection of public health and the environment.
CCME	Canadian Council for Ministers of the Environment.
Congener	In chemistry, congeners are related chemicals, e.g., a derivative or an element in the same group of the periodic table. For example, there are 209 congeners of polychlorinated biphenyls (PCB) as well as 209 congeners of polybrominated diphenyl ethers (PBDE).
Criteria Air Contaminants	Contaminants for which environmental regulatory agencies have established ambient air concentration limits.
Mercury	Mercury is a natural and persistent bioaccumulative element which can be transported many miles in the atmosphere, mercury can have impacts many years and many miles removed from its original source. A common thread through all mercury impacts is that deposition to waterbodies from anthropogenic emissions poses a threat to human and ecosystem health. Mercury also enters into the environment through the disposal (e.g., land filling, incineration) of certain products. Products containing mercury include: auto parts, batteries, fluorescent bulbs, medical products, thermometers, and thermostats.
PCDD	**Polychlorinated dibenzodioxins (PCDDs)**, or simply **dioxins**, are a group of polyhalogenated compounds which are significant because they act as environmental pollutants. They are commonly referred to as dioxins for simplicity in scientific publications because every PCDD molecule contains a dioxin skeletal structure. Members of the PCDD family have been shown to bioaccumulate in humans and wildlife due to their lipophilic properties, and are known teratogens, mutagens, and suspected human carcinogens. They are organic compounds.
PCDF	**Polychlorinated dibenzofurans (PCDFs)**, or simply **furans**, are a group of halogenated organic compounds which are toxic environmental pollutants. They are known teratogens, mutagens, and suspected human carcinogens. PCDFs tend to co-occur with polychlorinated dibenzodioxins (PCDDs). PCDFs can be formed by pyrolysis or incineration at temperatures below 1200 °C of chlorine containing products, such as PVC, PCBs, and other organochlorides, or of non-chlorine containing products in the presence of chlorine donors.

Standard (or reference) conditions for temperature and pressure	In physical sciences, **standard conditions for temperature and pressure** (informally abbreviated as **STP**) are standard sets of conditions for experimental measurements, to allow comparisons to be made between different sets of data. Environment Canada uses a standard reference pressure of 101.3 kPa and a standard reference temperature of 298 K (25 degrees Celsius). For atmospheric and ambient air sampling the US EPA uses 298K (25 degrees Celsius) and 760 mm Hg (101.3 kPa) to define standard conditions.
Toxic Equivalency (TEQ)	The combined toxicity of all 29 dioxins is called the "TEQ" (for Toxic EQuivalency).
Toxicity Equivalency Factor (TEF)	Toxic Equivalency Factors (TEFs) are toxicity potency factors that are used by the World Health Organization (WHO) and by scientists and regulators globally as a consistent method to evaluate the toxicities of highly variable mixtures of dioxin compounds.
US EPA	United States Environmental Protection Agency. The USEPA has promulgated a variety of guidelines, objectives, and reference/standard methods for collection of air emissions samples from stationary sources such as waste incinerators.
Waste incinerator	A device, mechanism or structure constructed primarily to thermally treat (e.g., combust or pyrolyze) a waste for the purpose of reducing its volume, destroying a hazardous chemical present in the waste, or destroying pathogens present in the waste. This includes facilities where waste heat is recovered as a byproduct from the exhaust gases from an incinerator, but does not include industrial processes where fuel derived from waste is fired as an energy source as a matter incidental to the manufacture of the primary product.

1. Introduction

Rescan™
Engineers and Scientists

1. Introduction

The following atmospheric monitoring requirements are outlined in Section 4.0 Item 30 of the Doris North Gold Mine Project Certificate (NIRB No. 003, issued September 15, 2006):

> *Commentary: NIRB expects that Canada Wide Standards for Dioxins and Furans and the Canada Wide Standards for Mercury will apply and should be followed including stack testing of incinerators.*

This report is intended to document efforts to meet the requirements outlined above.

In order to comply with Item 30 in Section 4.0 of the Project Certificate, Hope Bay Mining Limited (HBML) along with Rescan Environmental Services (Rescan) conducted the following activities in 2011:

- Collected dioxin and furan samples from the Doris camp incinerator; and
- Collected mercury samples from the Doris camp incinerator.

The stack testing program conducted in 2009 found that the incinerator was not in compliance with Canada Wide Standards (CWS) for dioxins and furans. Consequently there were waste management changes implemented after the program in 2009 in order to reduce emissions.

Chapter 2 of this report provides a description of the Doris incinerator and how it was being operated at the time of the stack emissions testing program in late August and early September 2011. Chapter 3 of this report provides the methods used for the dioxin and furan measurements, and provides the methods for the mercury measurements. Chapter 4 provides a brief discussion of the results for both dioxin/furan and mercury.

2. Process Description

2. Process Description

The incinerator operated at Hope Bay, Doris Camp is a Westland Incinerator, Model CY 100 CA-D-O two-stage incinerator. The incinerator utilizes a primary combustion chamber and secondary afterburner section, and is equipped with a six-metre (nominal) refractory lined stack. Plates 2-1 and 2-2 show the Doris incinerator before and after construction of the building that now encloses the incinerator.

Plate 2-1. The Doris incinerator viewed from the east, September 2009.

The stack testing programs were performed with one "charge" of approximately 113 kg of wet waste, 23 kg of dry waste and 27 kg of sewage treatment plant (STP) waste. The waste was introduced into the primary chamber via the main charge door. There was an initial 10 minute of "pre-purging" while both the primary and secondary blowers were on. After the pre-purge, the primary blower turned off, and the secondary blower continued to operate while the secondary burner started. The primary burner and blower started when the set point operating temperature of 800°C was reached in the secondary burner. The maximum set point for the secondary burner was 1200°C, while the maximum set point for the primary burner was 550°C. The stack testing programs on each day were performed with one charge, while there is typically three loads/day. Diesel was the main combustion fuel. Plate 2-3 shows the charged primary chamber, prior to testing. Plate 2-4 shows the panel readout for temperature and blower function.

The changes in stack emissions test schedule between 2009 and 2011 are summarized in Table 2-1.

Plate 2-2. The Doris incinerator viewed from the east, May 2011.

Plate 2-3. Waste in the Doris incinerator primary chamber, August 2011.

Plate 2-4. There are three digital temperature readings displayed on the upper row. The lower light display shows the function of the secondary and primary burners and blowers.

Table 2-1. Order of Stack Emissions Test Schedule

Date	Feed Rate	Test Matrix
September 29, 2009	10 kg/hr (nominal)	One test for dioxin/furan
September 30, 2009	10 kg/hr (nominal)	One mercury test, one dioxin/furan test, one mercury test
October 1, 2009	10 kg/hr (nominal)	One dioxin/furan test, one mercury test
August 30, 2011	One charge of ~163kg	One test for dioxin/furan, and one mercury test
August 31, 2011	One charge of ~163kg	One test for dioxin/furan, and one mercury test
September 1, 2011	One charge of ~163kg	One test for dioxin/furan, and one mercury test

Notes: O_2/CO_2, temperatures and stack gas velocities were measured throughout the test program using Environment Canada – Environmental Protection Service reference techniques.
In 2009, 10 to 15 kg of waste was added every 90 to 110 minutes with a dioxin/furan and mercury test being 3.5 and 1 hour's long respectively.
On September 30, 2009, 2 tests for mercury were conducted.

3. Methods

3. Methods

3.1 DIOXINS AND FURANS

Polychlorinated dibenzo-p-dioxins (PCDDs) and polychlorinated dibenzofurans (PCDFs), commonly known as dioxins and furans, are toxic, persistent, bioaccumulative, and result predominantly from human activity. Due to their extraordinary environmental persistence and capacity to accumulate in biological tissues, dioxins and furans are slated for virtual elimination under the *Canadian Environmental Protection Act (CEPA*), the federal *Toxic Substances Management Policy (TSMP)* and the CCME *Policy for the Management of Toxic Substances*.

The presence of dioxins and furans in the Canadian environment can be attributed to three principle sources: point source discharges (to water, air and soil), contamination from *in situ* dioxins and furans, and loadings from the long-range transportation of air pollutants.

Waste incineration has historically been responsible for a significant portion of the dioxins and furans emitted in Canada. The total release of dioxins and furans from this sector amounts to 22.5% of the total releases to the atmosphere. Improved exhaust gas controls to reduce emissions of acid gases and fine particulates or activated carbon injection systems have decreased emissions of dioxins and furans from the municipal solid waste (MSW) sector. The Canada Wide Standard for Dioxin and Furans indicate that the maximum allowable dioxin and furan (PCDD/PCDF) emissions are 80 picograms per reference cubic meter (pg/Rm^3) of international toxic equivalents (I-TEQ) where a reference cubic meter is measured at 25°C and 101.3 kPa. In addition, it is standard practice to provide the dioxin and furan concentrations at 11% oxygen (O_2; CCME 2001).

3.1.1 Monitoring Methods

The sampling and analytical methods used for the dioxin and furan emissions testing conformed to the procedures outlined in the Environment Canada – Environmental Protection Service emission monitoring reference method manuals (EC-EPS 1989). The specific methods used for the incinerator stack emissions testing program are summarized in Table 3.1-1.

Table 3.1-1. Summary of Doris Incinerator Stack Emissions Testing Methods for Dioxin and Furan

Parameter	Reference Method
Sample and velocity traverse points	EPS Method 8 A
Velocity and flowrate	EPS Method 8 B
Gas molecular weight (O2/CO2)	EPS Method 8 C
Stack gas moisture	EPS Method 8 D
Dioxin/furan	EPS Method 1/RM/2 with 1/RM/3 analysis

3.1.2 Equipment Preparation Techniques

The preparation, cleaning, and proofing of the stack emissions sampling equipment and materials is an integral part of the quality assurance/quality control (QA/QC) program. The following are details of the cleaning and proofing required for the dioxin and furan sampling equipment.

Glassware Cleaning

- Washed twice with industrial strength cleaner/detergent
- Rinsed with generous amounts of deionized H_2O
- Rinsed three times with methylene chloride
- Rinsed three times with hexane
- Rinsed three times with acetone
- Oven baked at 300°C overnight
- Rinsed three times with hexane (saved for proofing)
- Rinsed three times with acetone (saved for proofing)

Amberlite XAD-2

- Rinsed and extracted with deionized H_2O
- Soxhlet extraction with methanol, methylene chloride and toluene (22 hrs each)
- Nitrogen purge
- Oven dried at 50°C
- Approximately 40-gram aliquot saved for proofing
- Individual sample traps packed and spiked with surrogate regime

Organic Filters

- Soxhlet extraction (16 hrs) with toluene
- Nitrogen drying
- Save 1 filter for proofing

Other Glassware

- Hot detergent wash with brushing
- Copious deionized H_2O rinses

3.1.3 Reference Methods for Dioxin and Furan Stack Emissions Sampling

Following are brief descriptions of the reference method sampling techniques utilized to collect the dioxin and furan samples from the Doris incinerator stack. Isokinetic stack testing methods were used. Isokinetic stack testing withdraws the sample from the stack at the same flow rate at which the stack gas is moving through the stack. Isokinetic stack testing ensures that a representative sample of the stack gases is taken.

3.1.3.1 *EPS Method 8a - Sampling Site and Traverse Points*

The stack sampling ports for the Doris Camp incinerator stack were located about seven stack diameters downstream and greater than two diameters upstream of the nearest flow disturbances. From these criteria, a measured stack diameter of 46 cm (18.0 inches), and Figure A-1 of EPS Method A, a 12-point sampling regime was established. The prescribed sample regime for each isokinetic stack test included six sample points along two axes at 90° traverses. The test point locations for the Doris Camp incinerator stack are summarized in Table 3.1-2.

Table 3.1-2. Doris Camp Incinerator Stack Testing Sample Points

Point	Distance from Stack Wall (cm)
1	2.5
2	6.6
3	13.5
4	32.3
5	39.1
6	43.2

3.1.3.2 *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.

3.1.3.3 *EPS Method 8c - Molecular Weight by Gas Analysis*

Stack gas molecular weight was determined by a series of grab samples that were analyzed on site for O_2 and CO_2 by Fyrite analyzers. Plate 3.1-1 shows a typical Fyrite analyzer being used to determine the O_2 and CO_2 content of the stack gas. A minimum of four to a maximum of eight grab samples were collected per test and the results averaged for insertion in the computer programs for result calculations and corrections to 11% O_2. As a QA/QC component, calibrated portable O_2 analyzers were also used for oxygen analysis.

Plate 3.1-1. The O_2 and CO_2 concentration in the stack gas was determined using portable Fyrites analyzers.

3.1.3.4 *EPS Method 8d - Moisture Content*

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

3.1.3.5 *EPS 1/RM/2 - Dioxin/Furan*

The sample equipment for the dioxin and furan testing 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 3.1-1 and leak checked to code specifications. The probe (quartz or glass lined) and filter module were heated to 120 +/- 15^{o}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 and isokinetic sampling was performed using the Ko orifice constant sampling procedure. A set of recordings was taken every four minutes until four 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 96 (6 points for 16 minutes each) minutes of sampling commenced. This regime was continued until both sample ports had been sampled. The total sample volume for each dioxin and furan test was 3.7 to 3.8 Rm^3 for the three tests.

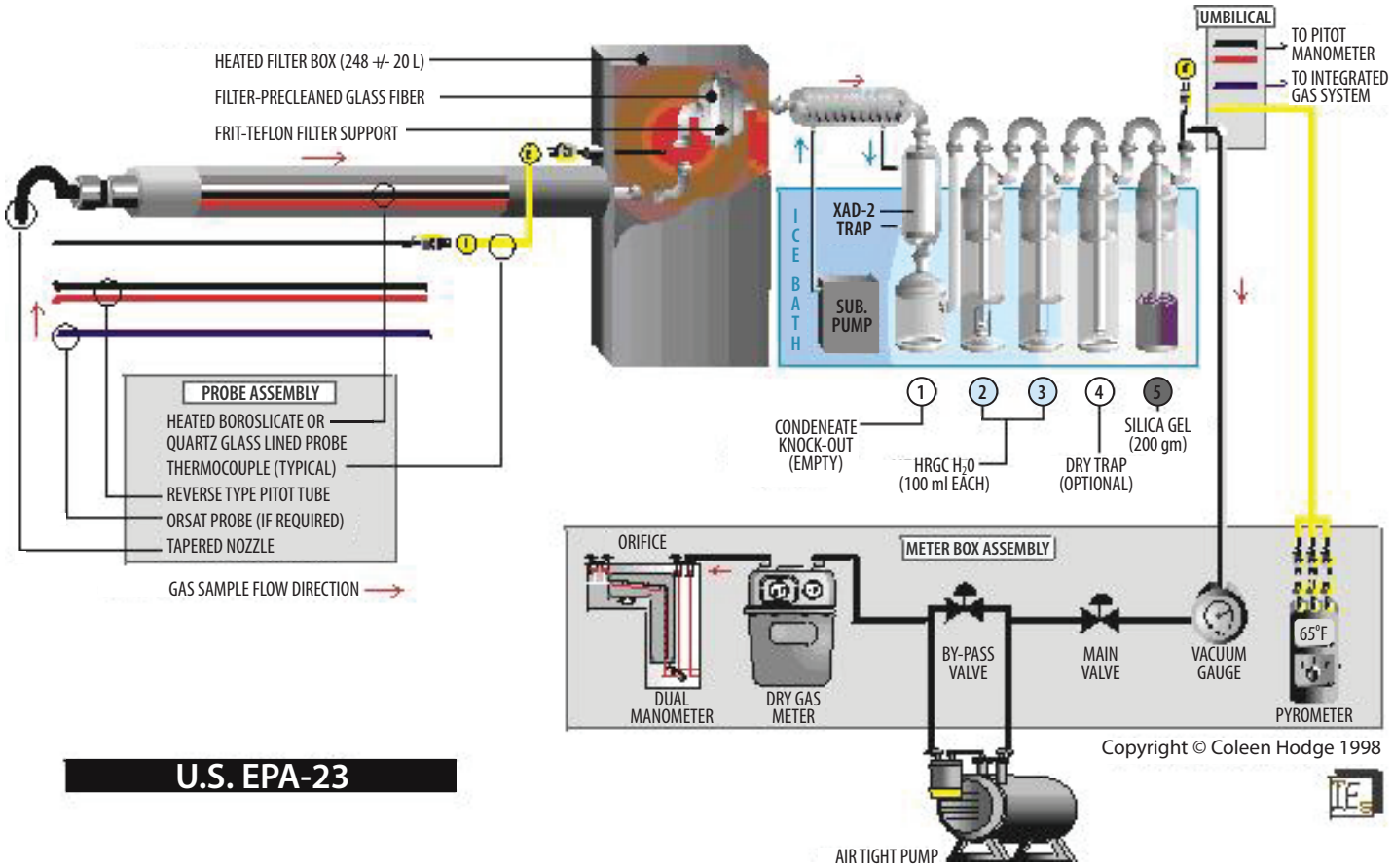
At the conclusion of the sampling, the train was checked for leaks and the probe was disassembled from the hot box/sample module. Any open ends of the sampling module and probe assembly were immediately sealed with pre-cleaned aluminium foil or teflon tape, and leak checks were conducted with only teflon tape touching the open ends.

At the conclusion of each test, the sample module and probe were lowered from the stack location and were transported to the laboratory immediately. Approximately twenty minutes elapsed from sample conclusion to sample delivery at the sample recovery "laboratory".

3.1.4 Analytical and Sample Recovery Techniques

Following sampling for dioxins and furans, 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:

- **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.
- **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 being added to the component 2 sample bottle.
- **Amberlite XAD-2 Resin Trap**: The resin trap was sealed with teflon tape, covered with aluminium foil and kept at about 4 ^{o}C prior to shipment to the analytical laboratory. This was labelled component 3 of each test.
- **Impinger Condensate**: The volume of condensate contained in the condensate trap, plus water and condensate from the impingers was measured and collected in precleaned amber bottles. These samples were labelled component 4 for each test.



Note: HRGC = high resolution gas chromatography.
XAD-2 = an amberlite adsorbent resin used to extract dioxin and furan from the incinerator stack gases.

Figure 3.1-1

NEWMONT™ The Gold Company

Semi-Volatile (Dioxin/Furan) Sampling Train

Figure 3.1-1

Rescan™ Engineers & Scientists

- **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.
- **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 the analyses began. In addition, each bottle containing solvent was marked with the liquid level and the lid was sealed.

3.1.5 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 were separated into liquid (containers 2, 4, 5, 6) or solid phases (containers 1 and 3). Figure 3.1-2 summarizes the recovery procedures for semi-volatile organics. Solid samples were extracted with various solvents (usually toluene), sometimes under acid conditions. The liquid samples were 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 was added to the sample for QA/QC recovery determinations. Figure 3.1-3 summarizes the extraction and concentrating of the various train components.

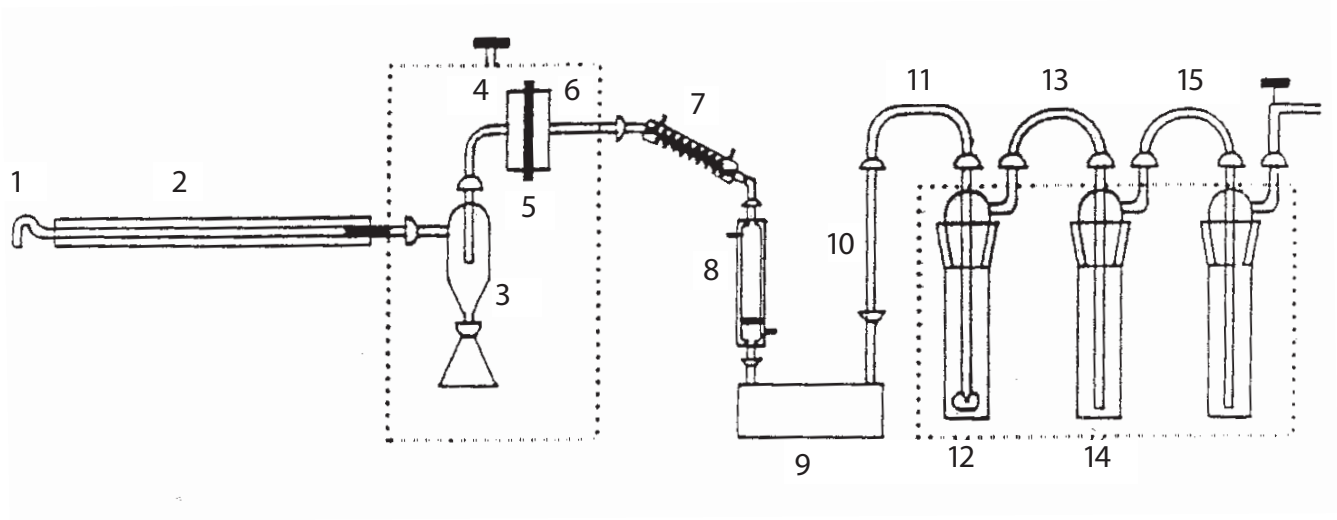
The toluene rinse had internal standards added, with subsequent concentration by rotary evaporation. The extract volumes were fractionated, cleaned-up and analyzed by high-resolution gas chromatograph/mass spectrophotometer (GC/MS) analytical instrumentation. Figure 3.1-4 summarizes the analytical methodology for the dioxin and furan samples.

3.1.6 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. QA/QC of this survey was accomplished by the following mechanisms.

- Pre- and Post-test leak checks
- Calibration of volume measuring and monitoring instrumentation
- Proofing of organic glassware and supplies (archived proofs)
- Analysis of all blank solutions and materials
- Spiking and recovery analysis of organic trains
- Use of acid cleaned micro quartz filters
- Duplicate analysis of selected samples
- Reference material analysis with samples
- Labelling and record-keeping
- Surrogate spiking of dioxin trains using EPA protocols.

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



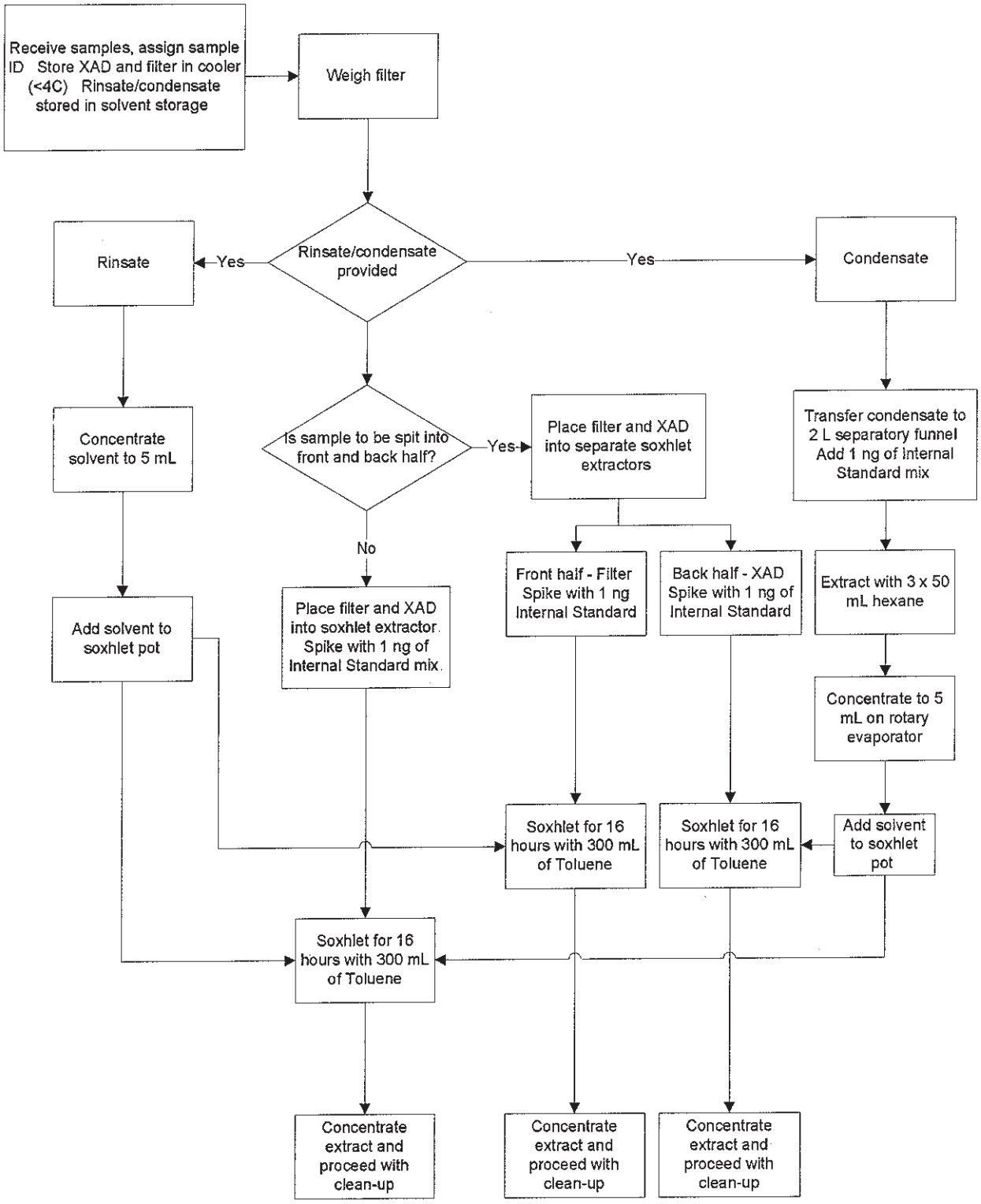
Container or Sample	Component (s)	Recovery Procedure
1	1,2,3,4	Wash and brush 3 times each with hexane (H) and acetone (A). Rinse 3 times each with H and A.
2	5	Remove carefully from holder. Place on pre-cleaned glass petri dish.
3	6,7	Soak 5 minutes each with H and A. Rinse 3 times each with H and A.
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.

NEWMONT The Gold Company

Dioxin and Furan Stack Emissions Testing Recovery Procedures

Figure 3.1-2

Rescan Engineers & Scientists

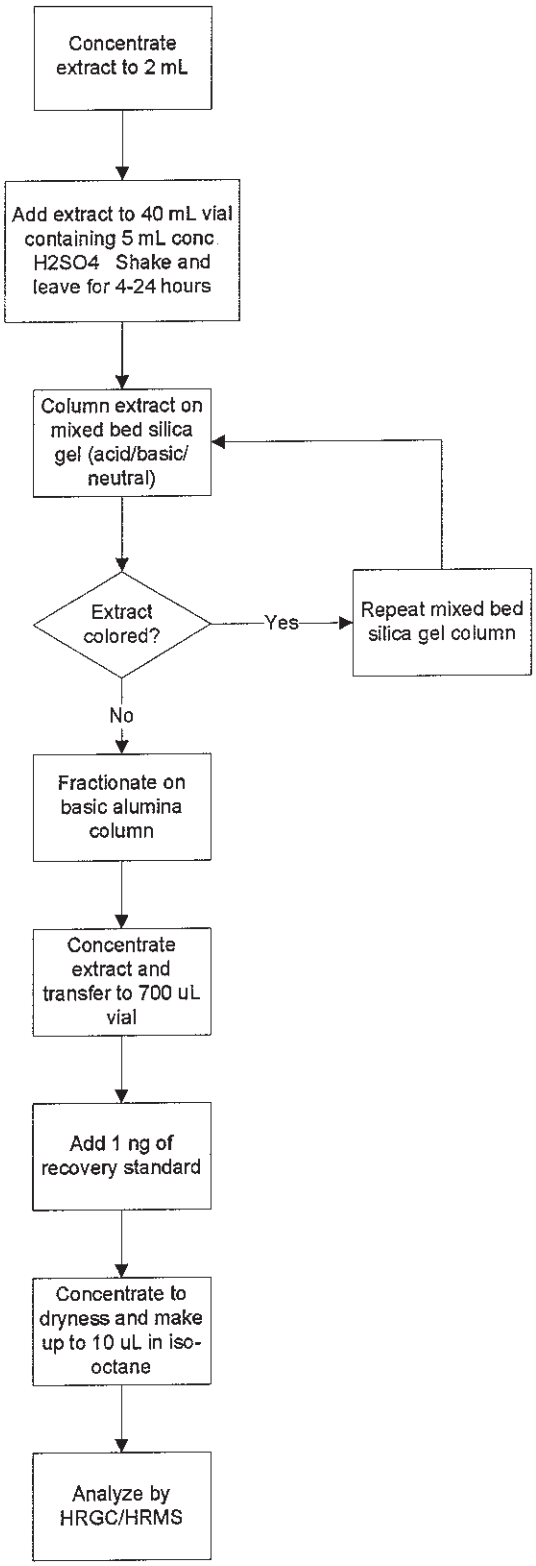


NEWMONT The Gold Company

Extraction Schematic Diagram for Stack Samples

Figure 3.1-3

Rescan Engineers & Scientists



NEWMONT The Gold Company

Schematic of Analytical Methodology for Dioxin and Furan

Figure 3.1-4

Rescan Engineers & Scientists

3.2 MERCURY

Waste incineration has historically been responsible for a significant portion of the mercury emitted in Canada. Mercury is a natural and persistent bioaccumulative element that can be transported many miles in the atmosphere. Mercury can have impacts many years and many miles removed from its original source. A common thread through all mercury impacts is that deposition to water bodies from anthropogenic emissions poses a threat to human and ecosystem health. Mercury also enters into the environment through the disposal (e.g., land filling, incineration) of certain products. Products containing mercury include: auto parts, batteries, fluorescent bulbs, energy efficient bulbs, medical products, thermometers, and thermostats.

The Canada Wide Standard for Mercury indicate that the maximum allowable mercury emissions are 20 micrograms per reference cubic metre ($\mu g/Rm^3$) where a reference cubic metre is measured at 25°C and 101.3 kPa (CCME 2000). In addition, it is standard practice to provide the mercury concentrations at 11% oxygen (O_2).

3.2.1 Monitoring Methods

The sampling and analytical methods used for the mercury emissions testing conformed to the procedures outlined in the Environment Canada – Environmental Protection Service emission monitoring reference method manuals (EC-EPS 1993). The specific methods used for the incinerator stack emissions testing program are summarized in Table 3.2-1.

Table 3.2-1. Summary of Doris Incinerator Stack Emissions Testing Methods for Mercury

Parameter	Reference Method
Sample and velocity traverse points	EPS Method 8 A
Velocity and flowrate	EPS Method 8 B
Gas molecular weight (O_2/CO_2)	EPS Method 8 C
Stack gas moisture	EPS Method 8 D
Particulate Matter/Mercury	EPS Method 8 with US EPA Method 29 (metals)

Figure 3.2-1 summarizes the sampling equipment used to collect the mercury samples following the standard methods in the US EPA Method 29 Determination of Metal Emissions from Stationary Sources (EC-EPS 1993).

Similar to the dioxin and furan emissions sampling, the mercury emissions sampling was conducted using isokinetic sampling methods. Isokinetic sampling withdraws a sample from the stack at the same velocity at which the gases are travelling in the stack. Isokinetic sampling removes a representative sample from the stack that is not biased by over or under sampling the actual stack gas.

3.2.2 Equipment Preparation Techniques

Following is a summary of the methods used to prepare the mercury stack emissions sampling train (i.e., test equipment).

3.2.2.1 *EPS Method 8/EPA 29 - Particulate, Hg*

This train was a normal Method 29 train (Figure 3.2-1) except special (low metal) micro quartz glass filters were utilized and the impinger contents were:

- Impinger #1 100 ml 5% HNO3 in 10% H2O2

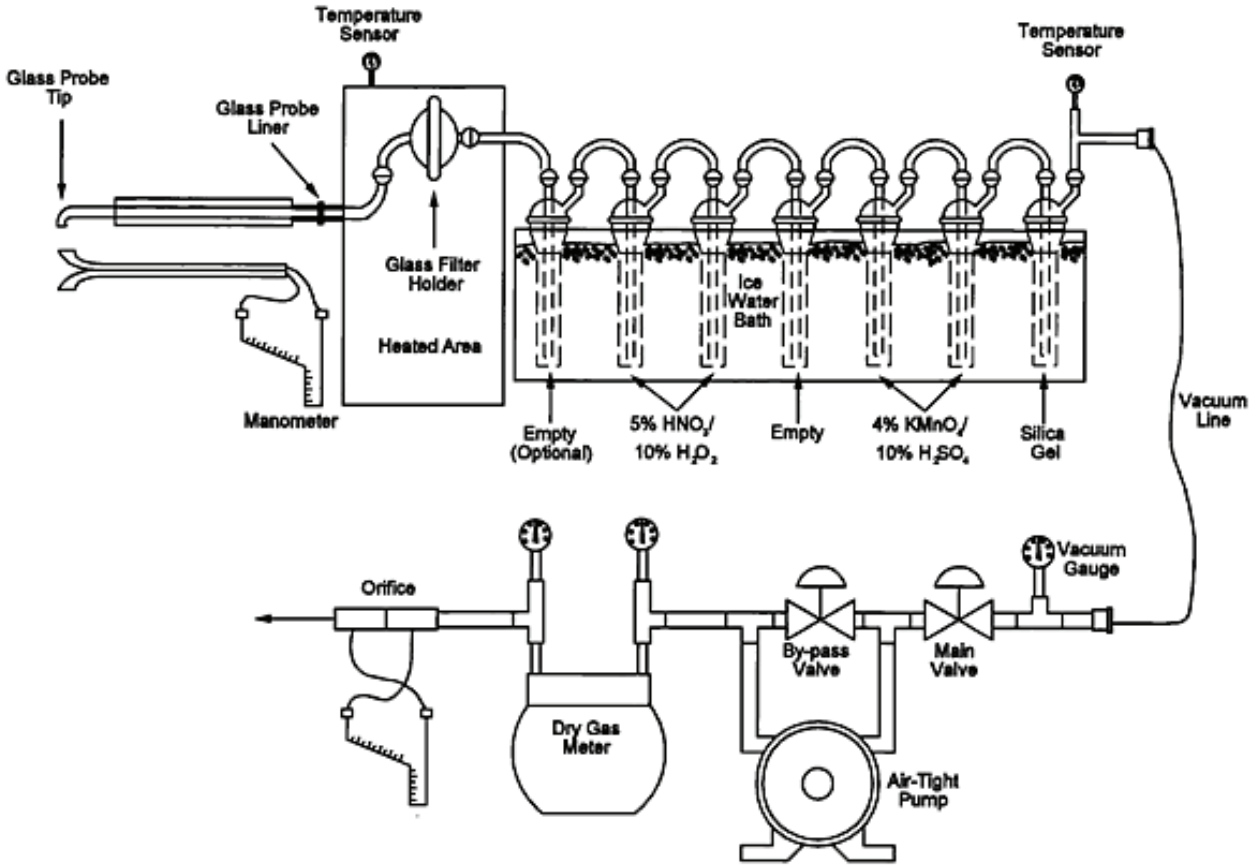


Figure 3.2-1

EPA Method 29 Particulate/Mercury Sampling Train

NEWMONT The Gold Company

Rescan™ Engineers & Scientists

- Impinger #2 100 ml 5% HNO_3 in 10% H_2O_2
- Impinger #3 Empty
- Impinger #4 100 ml 4% $KMnO_4$ in 10% H_2SO_4
- Impinger #5 100 ml 4% $KMnO_4$ in 10% H_2SO_4
- Impinger #6 100 ml distilled H_2O
- Impinger #7 200 g silica gel

The train was operated isokinetically, sampling a total of 6 points on two 90° traverses for five minutes each, resulting in final sample volumes of about 1.3 Rm^3. Data recordings were conducted at five-minute intervals. The train utilized a three-foot quartz probe and nozzle.

The methods used to prepare the glassware and filters are summarized below.

Metal Train Glassware

- Hot detergent wash with brushing
- Rinse with 0.1 N HNO_3
- Copious rinsing with deionized H_2O
- Oven drying at 105ºC

Metal Train Filters

- Overnight extraction with 1:1 nitric acid
- Overnight rinsing with deionized H_2O
- Drying for 2 hrs at 105ºC, desiccation and weighing
- Save 1 filter for blank

3.2.3 Mercury Sample Recovery and Analysis

The particulate sample filters were removed from the cooled filter housing with Teflon coated tweezers. Materials retained on the gasket were 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 the date, time and the appropriate run number.

Sequential rinses and brushings with acetone were used to clean the probe and front half glassware from the mercury/particulate sample train. The resulting liquid was stored in Container 2.

Impingers 1 and 2 were measured for volume and transferred with about 100 ml of deionised water to a polyethylene sample container. Impingers 3, 4, and 5 were transferred to another polyethylene 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 rinsings.

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 mercury test were collected and labelled appropriately. A chain of custody was filled out and the samples were shipped to the analytical laboratory. All samples were labelled appropriately and placed in a cold room at 4ºC until the analyses began.

3.2.3.1 *Gravimetric Analysis*

At the A. Lanfranco and Associates Langley, BC laboratory, the sample filters were desiccated to a constant weight and weighed as per US EPA Method 5. The probe and front-half acetone rinsings were evaporated at about 70°C in tared, precleaned 250 ml glass beakers, with subsequent weighing to a constant weight. Blank filters and acetone were carried through the gravimetric process.

3.2.3.2 *Mercury Analysis*

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

3.2.4 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. QA/QC of this survey was accomplished by the following mechanisms.

- Pre- and Post-test leak checks
- Calibration of volume measuring and monitoring instrumentation
- Proofing of organic glassware and supplies (archived proofs)
- Analysis of all blank solutions and materials
- Spiking and recovery analysis of organic trains
- Use of acid cleaned micro quartz filters
- Duplicate analysis of selected samples
- Reference material analysis with samples
- Labelling and record-keeping
- Surrogate spiking of dioxin trains using EPA protocols.

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

4. Results and Summary

4. Results and Summary

4.1 DIOXINS AND FURANS

Table 4.1-1 summarizes the Doris camp incinerator emissions testing results for dioxins (PCDD) and furans (PCDF); the testing was done in triplicate to comply with the approved reference methods for source testing by Environment Canada – Environmental Protection Service (EC-EPS 1989). Appendix D contains the report from the analytical laboratory for the dioxin and furan emissions from the incinerator.

Table 4.1-1. Doris Camp Incinerator Emissions Testing Results for Dioxins and Furans

		Test 1 (Aug. 30/11)		Test 2 (Aug. 31/11)		Test 3 (Sept. 1/11)	
Component	TEF	Analyzed (ng)	TEQ (ng)	Analyzed (ng)	TEQ (ng)	Analyzed (ng)	TEQ (ng)
2378 TCDD	1.0000	0.0130	0.0130	0.0260	0.0260	0.0010	0.0010
12378 PCDD	0.5000	0.3100	0.1550	0.2100	0.1050	0.0430	0.0215
123478 HxCDD	0.1000	0.2900	0.0290	0.2000	0.0200	0.0510	0.0051
123678 HxCDD	0.1000	1.5000	0.1500	0.3000	0.0300	0.0730	0.0073
123789 HxCDD	0.1000	1.2000	0.1200	0.2800	0.0280	0.0590	0.0059
1234678 HpCDD	0.0100	9.5000	0.0950	1.6000	0.0160	0.6200	0.0062
OCDD	0.0010	8.7000	0.0087	2.1000	0.0021	1.6000	0.0016
2378 TCDF	0.1000	0.0700	0.0070	0.0300	0.0030	0.0150	0.0015
12378 PCDF	0.0500	0.1200	0.0060	0.0580	0.0029	0.0540	0.0027
23478 PCDF	0.5000	0.3100	0.1550	0.1200	0.0600	0.0020	0.0010
123478 HxCDF	0.1000	0.3100	0.0310	0.1400	0.0140	0.1300	0.0130
123678 HxCDF	0.1000	0.3800	0.0380	0.1600	0.0160	0.1900	0.0190
234678 HxCDF	0.1000	0.7400	0.0740	0.3300	0.0330	0.4700	0.0470
123789 HxCDF	0.1000	0.1700	0.0170	0.1100	0.0110	0.1500	0.0150
1234678 HpCDF	0.0100	1.8000	0.0180	0.8000	0.0080	1.3000	0.0130
1234789 HpCDF	0.0100	0.2200	0.0022	0.1500	0.0015	0.2400	0.0024
OCDF	0.0010	0.9100	0.0009	0.5200	0.0005	1.1000	0.0011
Summed PCDD & PCDF TEQ (ng)			0.920		0.377		0.164
Sample Volume (Rm^3)			3.819		3.838		3.712
PCDD & PCDF TEQ	ng/Rm^3		0.241		0.098		0.044
PCDD & PCDF TEQ	ng/Rm^3 (@11% O_2)		0.254		0.091		0.038
PCDD & PCDF TEQ	**pg/Rm^3 (@11% O_2)**		**254**		**91**		**38**
PCDD & PCDF TEQ	grams/day		0.000007		0.000003		0.000001
Particulate	mg/dscm (@ 11% O_2)		13.2		11.4		7.1
Flowrate (Rm^3/min)			21.6		21.1		20.7
Oxygen (Vol. %)			11.5		10.2		9.5
Carbon Dioxide (Vol. %)			8.5		8.6		8.9
Carbon Monoxide (ppm)			10 to 80		6 to 32		4 to 23
Moisture (Vol. %)			9.3		10.0		10.1
Average Stack Gas Temperature (°C)			883.8		921.0		930.8
Isokinetic Variation (%)			99.5		102.6		100.9

*Notes: PCDD = **Polychlorinated** dibenzodioxins (**PCDDs**), or simply **dioxins**.*
*PCDF = **Polychlorinated dibenzofurans** (PCDFs), or simply **furans**.*
TEF = Toxic Equivalency Factor.
TEQ = The combined toxicity of all 29 dioxins is called the "TEQ" (for Toxic EQuivalency).
dscm = dry standard cubic metre.

Figures 4.1-1 to 4.1-3 summarize the Doris camp incinerator stack gas temperatures during the three air emissions tests for dioxins and furans. Before the stack emissions testing began, the manufacturer of the Doris camp incinerator (Westland Incinerators, Edmonton, AB) recommended that the temperature in the secondary chamber be maintained above 850°C. The average stack gas temperature was above 850°C, and the temperature in the secondary chamber was maintained at greater than 900°C for all tests.

The dioxin/furan results were recovery corrected according to surrogate recovery efficiencies determined for each organic analysis.

The average dioxin/furan emissions were 128 pg/Rm^3 at 11% O_2, compared to the CWS guideline of 80 pg/Rm^3 at 11% O_2. The dioxin/furan emission concentrations from the Doris Camp incinerator for this survey were much lower than the 2009 data, and were very low in comparison to historical data available for uncontrolled camp refuse incinerators. The dioxin/furan emission levels showed a significant decreasing trend from Test 1 to Test 3. CO, an indicator of incomplete combustion also decreased from Test 1 to Test 3, while the stack temperature increased from Test 1 to Test 3.

A well-documented condition leading to higher than expected dioxin/furan 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 could significantly impact the results of the first series of compliance tests. In this case, the significant decrease in dioxin/furan from test to test, may suggest that Test 1 was impacted by prior operating conditions.

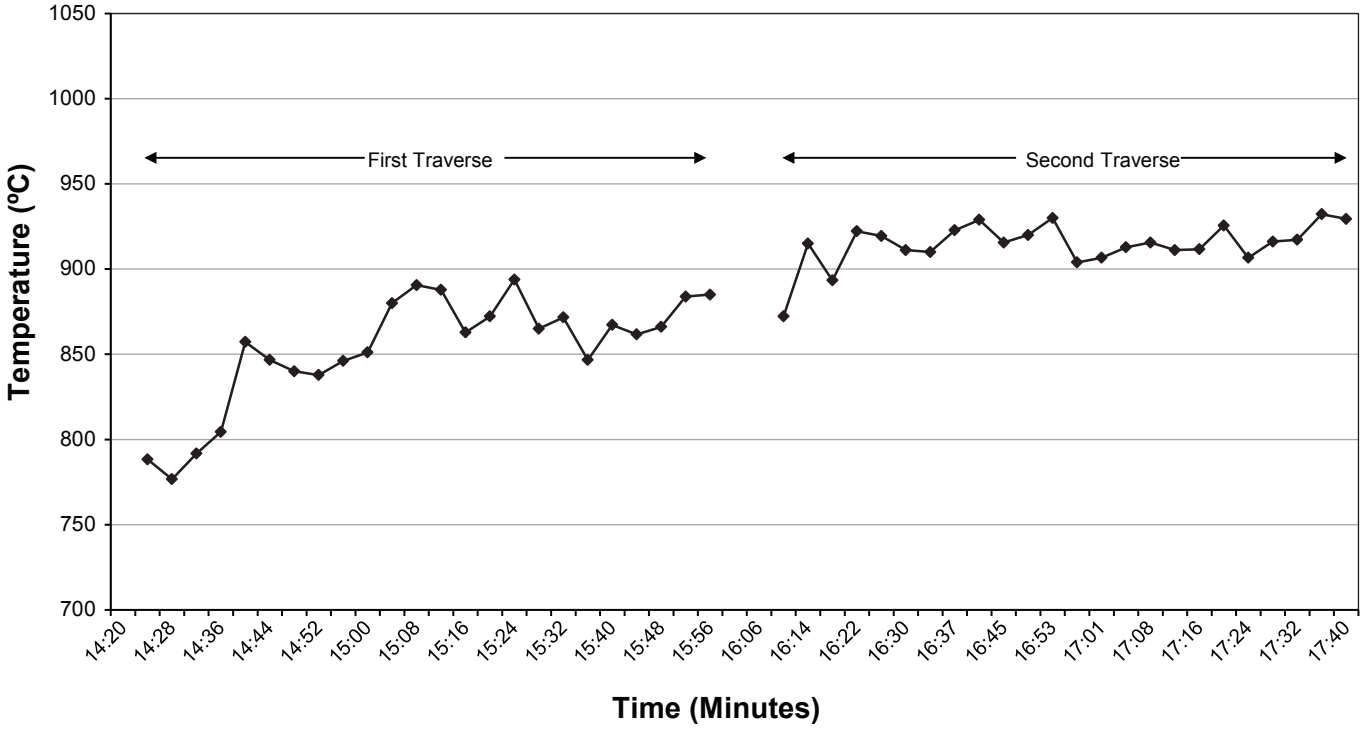
Significant gains in dioxins and furans emissions reductions were obtained when comparing the 2009 and 2011 incinerator test results. During the 2009 testing program, the secondary burner cycled on and off. During the 2011 program the secondary burner was on at all times. Table 4.1-2 summarizes the temperature variance, between the two testing years, that can be seen in the recorded values of the stack gas temperature.

Table 4.1-2. Summary of Doris Incinerator Stack Gas Temperatures during 2009 and 2011

	Test 1		Test 2		Test 3	
Testing Year	**2009**	**2011**	**2009**	**2011**	**2009**	**2011**
Average Stack Gas Temperature (°C)	881.1	883.8	855.8	921	873.1	930.8
Maximum Temperature (°C)	912	932	903	985	899	983
Minimum Temperature (°C)	627	777	612	813	837	837

Appendix E summarizes the quality assurance and quality control results (QA/QC) results for the Doris incinerator stack emissions testing program. 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. The recovery of the five-labelled surrogates ranged from 86 to 116%. These recoveries comply with the US 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 45 to 90%, complying with EPS 1/RM/2 and EPA Method 23 requirements of 40 to 130% recovery.

Run 1 of 3 - August 30, 2011 at 14:20 17:40



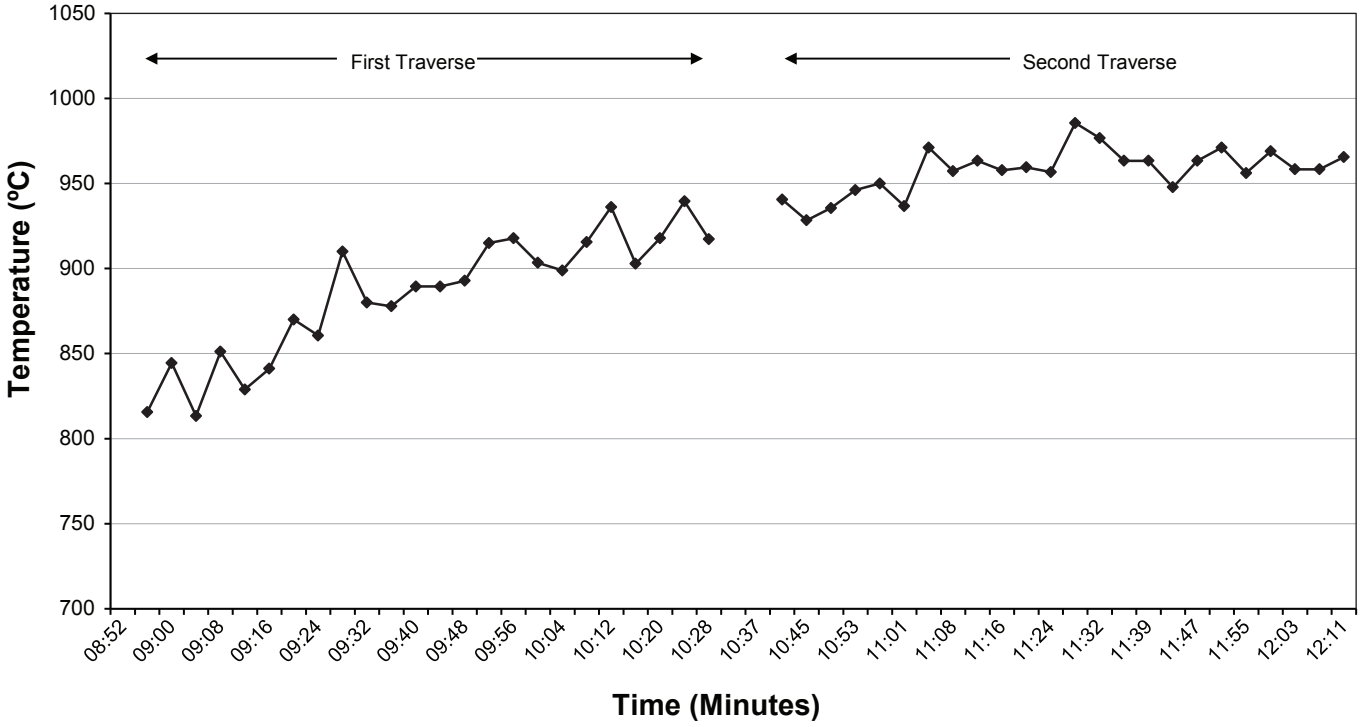
NEWMONT NORTH AMERICA

Stack Gas Temperature for Doris Incinerator
Dioxin/Furan Stack Emissions Testing, Run 1 of 3

Figure 4.1-1

Rescan™ Engineers & Scientists

Run 2 of 3 - August 31, 2011 at 08:52 - 12:11



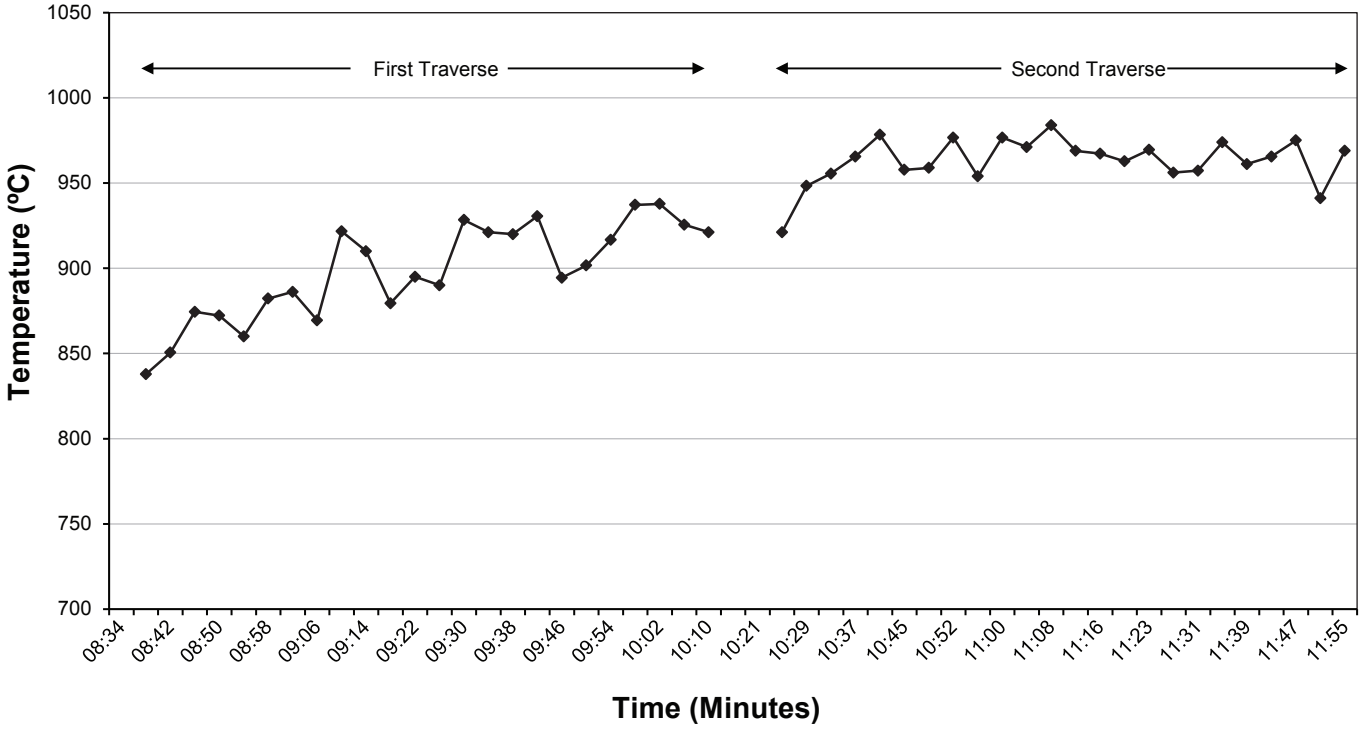
NEWMONT NORTH AMERICA

Stack Gas Temperature for Doris Incinerator
Dioxin/Furan Stack Emissions Testing, Run 2 of 3

Figure 4.1-2

Rescan™ Engineers & Scientists

Run 3 of 3 - September 1, 2011 at 08:34 - 11:55



NEWMONT NORTH AMERICA

Stack Gas Temperature for Doris Incinerator
Dioxin/Furan Stack Emissions Testing, Run 3 of 3

Figure 4.1-3

Rescan™ Engineers & Scientists

4.2 MERCURY

Table 4.2-1 summarizes the Doris camp incinerator emissions testing results for mercury; the testing was done in triplicate to comply with the approved reference methods for source testing by Environment Canada – Environmental Protection Service (EC-EPS 1993). Appendix B contains the report from the analytical laboratory for the mercury emissions from the incinerator. Appendix C summarizes the measured and calculated data collected during the stack emissions sampling.

Table 4.2-1. Doris Camp Incinerator Emissions Testing Results for Mercury and Particulate

	Test 1	Test 2	Test 3	Average
Test Date	Aug. 30/11	Aug. 31/11	Sept. 1/11	
Test Time	18:00 – 19:02	12:40 – 13:45	12:16 – 13:20	
Duration (minutes)	60	60	60	60
Parameter				
Particulate (mg/Rm^3)	11.1	9.5	7.7	9.4
Particulate (mg/Rm^3 @ 11% O_2)	13.2	11.4	7.1	10.6
Particulate (kg/hr)	0.015	0.012	0.010	0.012
Particulate (kg/day)	0.4	0.3	0.2	0.3
Mercury (ug/Rm^3 @ 11% O_2)	**0.04**	**1.60**	**0.18**	**0.61**
Flowrate (Rm^3/min)	22.2	21.1	21.3	21.5
Flowrate (acm/min)	98.4	98.7	99.7	98.9
Average Stack Gas Temperature (°C)	942	986	991	973
O_2 (vol. % dry)	12.6	12.7	10.2	11.8
CO_2 (vol. % dry)	8.4	7.4	9.5	8.4
H_2O (vol. %)	8.4	10.0	9.7	9.3
Isokinetic Variation (%)	98.9	101.4	101.1	100

Note: standard conditions are 25°C and 101.3 kPa.

Figures 4.2-1 to 4.2-3 summarize the Doris camp incinerator stack gas temperatures during the three air emissions tests for mercury. The manufacturer of the Doris camp incinerator (Westland Incinerators, Edmonton, AB) recommends that the temperature in the secondary chamber be maintained above 850°C. The average stack gas temperature was above 900°C, and the temperature for the secondary chamber was maintained above 900°C for the duration of all three tests.

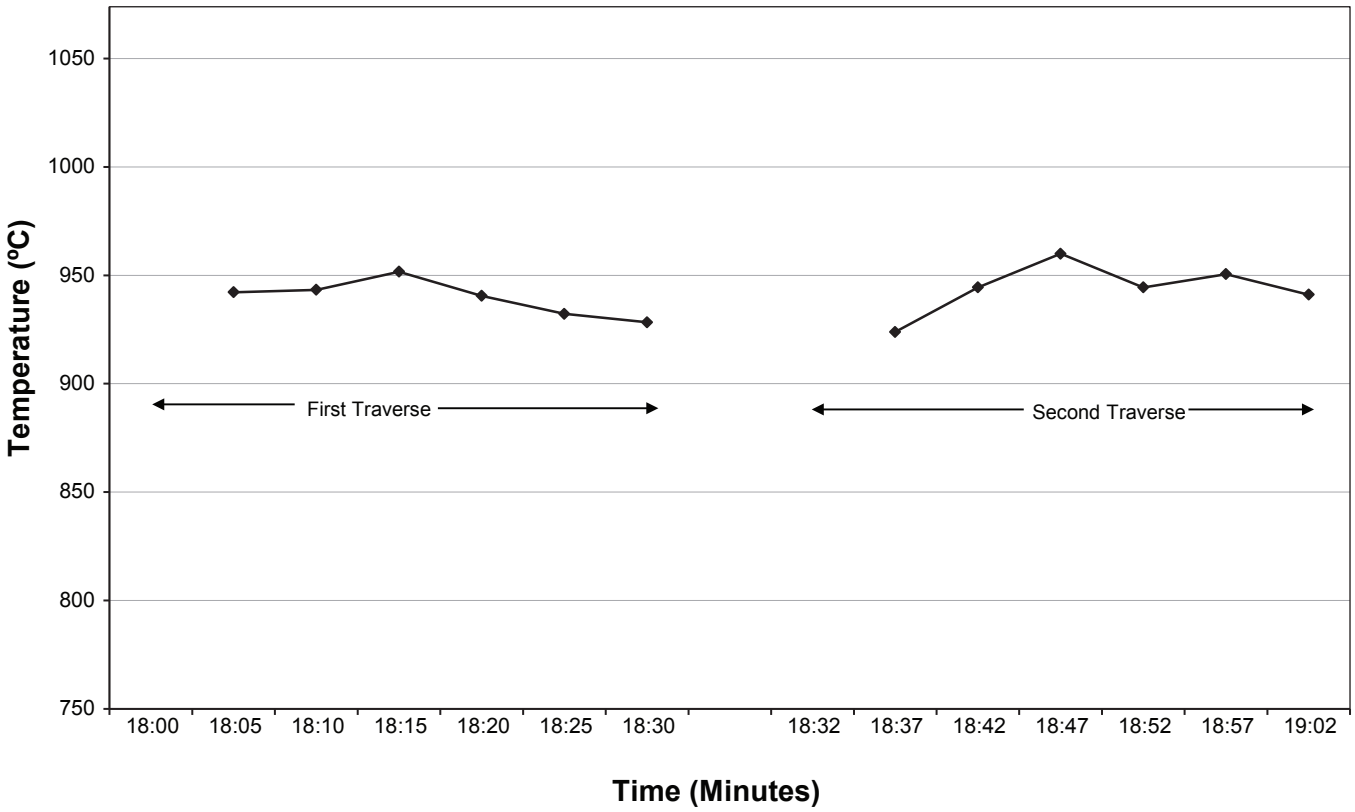
Concentrations and flow rates are expressed at standard conditions of 25°C and 101.3 kPa (dry). Most of the stack testing results were calculated using a "STACK" computer program developed for US EPA and Canadian requirements. The percentage of O_2 in air is 20.9% and corrections to 11% O_2 were calculated by multiplying the determined stack concentrations by:

$$(20.9 - 11.0) / (20.9 - \text{measured } O_2)$$

The data from the mercury tests vary slightly for O_2, temperature and flow rates due to the timing of each test.

The data from the mercury tests vary slightly for O_2, temperature and flow rates due to the timing of each test. The average mercury emissions were 0.61 ug/Rm^3 at 11% O_2, compared to the CWS guideline of 20 ug/Rm^3 at 11% O_2. The results suggest that the waste feed mercury content is very low.

Run 1 of 3 - August 30, 2011 at 18:00 - 19:02



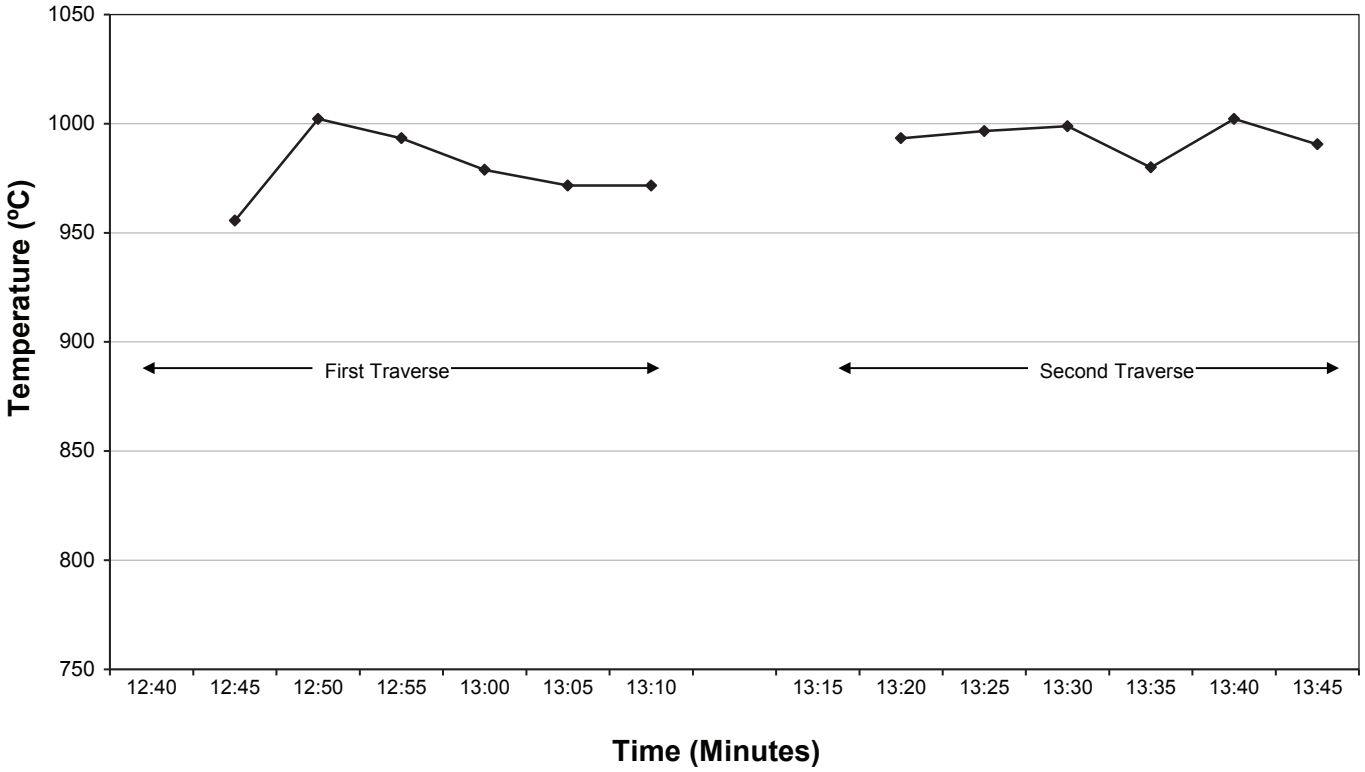
NEWMONT NORTH AMERICA

Stack Gas Temperature for Doris Incinerator Mercury Stack Emissions Testing, Run 1 of 3

Figure 4.2-1

Rescan™ Engineers & Scientists

Run 2 of 3 - August 31, 2011 at 12:40 - 13:45



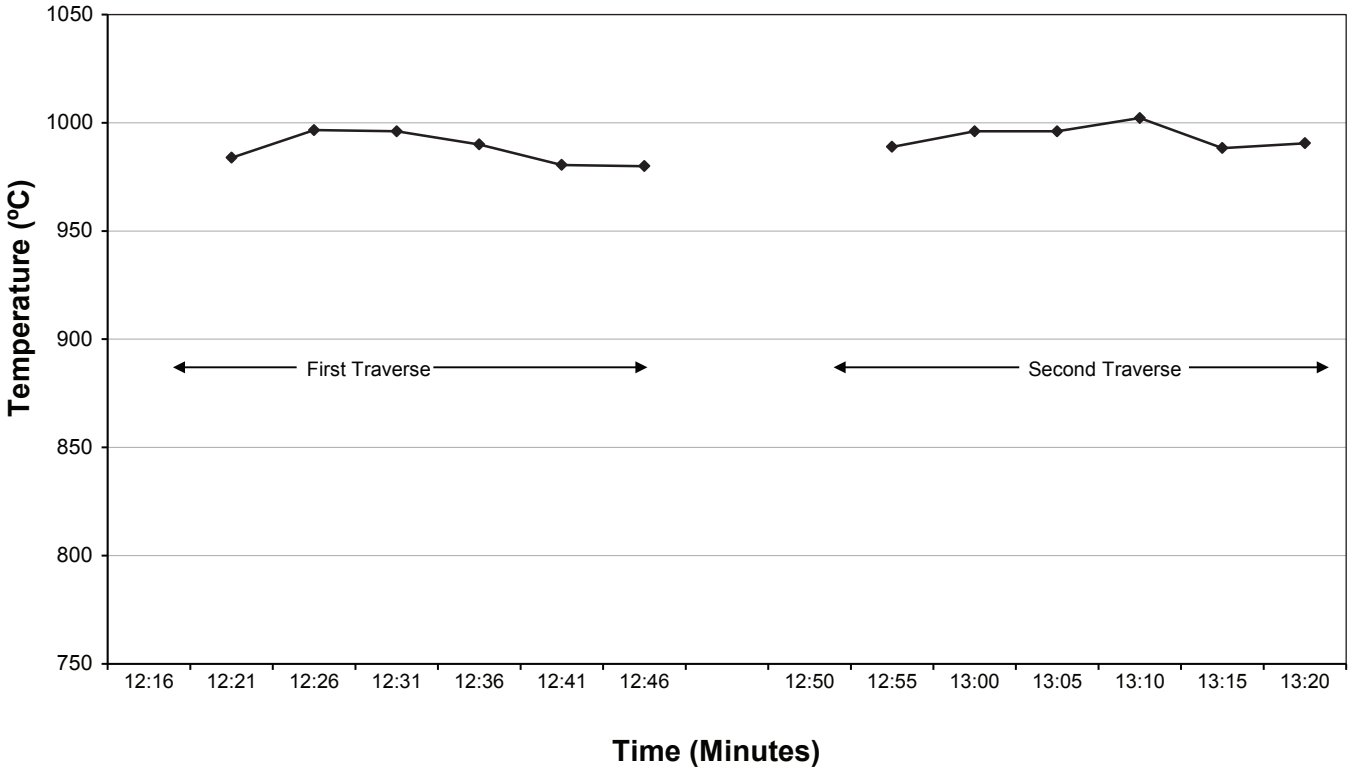
NEWMONT NORTH AMERICA

Stack Gas Temperature for Doris Incinerator Mercury Stack Emissions Testing, Run 2 of 3

Figure 4.2-2

Rescan™ Engineers & Scientists

Run 3 of 3 - September 1, 2011 at 12:16 - 13:20



NEWMONT NORTH AMERICA

Stack Gas Temperature for Doris Incinerator Mercury Stack Emissions Testing, Run 3 of 3

Figure 4.2-3

Rescan™ Engineers & Scientists

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 (Appendix E) 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.

4.3 SUMMARY

The test results showed that the emissions from the Doris Camp incinerator were in compliance with the Canada Wide Standards (CWS) for mercury, but were not in compliance with the CWS for dioxin/furan. Table 4.3-1 summarizes the triplicate test averages for the dioxin/furan and mercury emissions from the Doris Camp incinerator stack on August 30 to September 1, 2011.

Table 4.3-1. Summary of Doris Incinerator Stack Dioxin/Furan and Mercury Emissions, 2011

Parameter and Units	Average Emission Concentration	Canada Wide Standard
Dioxin/Furan (pg/Rm^3 TEQ @ 11% O_2)	**128**	80
Mercury (ug/Rm^3 @ 11% O_2)	0.61	20

Note : Boldface results are exceeding the Canada Wide Standards

References

Rescan™
Engineers and Scientists

References

Canadian Council of Ministers of the Environment, (CCME). 2001. Canada-Wide Standards for Dioxins and Furans, Canadian Council of Ministers of the Environment, Quebec City, QC.

Canadian Council of Ministers of the Environment, (CCME). 2000. Canada-Wide Standards for Mercury Emissions, Canadian Council of Ministers of the Environment, Quebec City, QC.

Environment Canada – Environmental Protection Service (EC-EPS). 1989. Reference Methods for Source Testing: Measurement of Releases of Selected Semi-volatile Organic Compounds from Stationary Sources. Reference Method EPS 1/RM/2. Environment Canada, Ottawa, ON.

Environment Canada – Environmental Protection Service (EC-EPS). 1993. Reference Methods for Source Testing: Measurement of Releases of Particulate from Stationary Sources. Reference Method EPS 1/RM/8. Environment Canada, Ottawa, ON.

Appendix A

Doris Incinerator Operations Data

Rescan™
Engineers and Scientists

Appendix A. Doris Incinerator Operations Data

Day	Time	Activity	1st Chamber Temp. (Celsius)	2nd Chamber Temp. (Celsius)	Stack Gas Temp. at Sample Ports (Celsius)	Notes
Tuesday August 30, 2011	10:25	set-up	not available	not available	not available	Ready to go but need a package that was forgotten in Yellowknife before testing starts.
	13:30	pre-op	not available	not available	not available	~163kgs of waste. 11 bags of dry, 12 bags of wet, and 2 bags of sewage treatment product (STP)
	13:45	pre-op	not available	not available	not available	Started incinerator. Approx. a 40 minute warmup.
	14:10	pre-op	598	1000	not available	Primary burner started
	14:20	sampling	not available	not available	not available	Began first dioxin/furan test
	14:40	sampling	not available	not available	857	
	15:10	monitoring	510	1005	891	
	16:10	monitoring	565	1013	872	
	17:10	monitoing	580	1012	not available	
	17:40	sampling	not available	not available	929	End of dioxin/furan test
	18:00	sampling	not available	not available	not available	Start of metals/Hg test
	18:10	monitoring	570	1011	not available	
	18:30	sampling	not available	not available	928	
	19:02	sampling	not available	not available	941	End of metals/Hg test
	19:10	monitoring	575	1022	not available	
Wednesday August 31, 2011	8:10	pre-op	not available	not available	not available	Rescan/Lanfranco ready to test, start of pre-purge, and ~163kgs of waste added
	8:30	pre-op	not available	not available	not available	Secondary burner starts
	8:40	pre-op	not available	not available	not available	Primary burner starts
	8:52	sampling	not available	not available	not available	Began second dioxin/furan test
	9:00	monitoring	540	990	not available	
	10:00	sampling	536	992	903	
	11:00	monitoring	571	1028	not available	
	12:00	monitoring	572	1035	not available	
	12:11	sampling	not available	not available	966	End of second dioxin/furan test
	12:40	charging	not available	not available	not available	Start of second metals/Hg test
	13:00	monitoring	543	1029	979	Stopped testing temporarily to change sample ports
	13:45	sampling	not available	not available	991	End of second metals/Hg test
	14:00	monitoring	545	1007	not available	
Thursday September 1, 2011	7:30	pre-op	not available	not available	not available	~163kgs of waste added
	8:00	pre-op	not available	not available	not available	Pre-purge started
	8:10	pre-op	not available	not available	not available	Secondary burner started
	8:18	pre-op	not available	not available	not available	Primary burner started
	8:34	sampling	not available	not available	not available	Started 3rd dioxin/furan test
	9:30	sampling	not available	not available	928	
	10:00	monitoring	550	1023	not available	
	11:00	sampling	542	1036	977	
	11:55	sampling	not available	not available	969	Finished third test for dioxin/furan
	12:00	monitoring	563	1074	not available	
	12:16	sampling	not available	not available	not available	Started third metals/Hg test
	13:00	sampling	541	1067	996	
	13:20	sampling	not available	not available	991	Ended third metals/Hg test

Notes:

Low Set point for 1st chamber: 550 Celsius

High Set point for 2nd chamber: 1200 Celsius

Temperature control set point: 800 Celsius

Appendix B

Mercury Laboratory Reports

Rescan™
Engineers and Scientists

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

Report Transmission Cover Page

Bill To:	A. Lanfranco & Associates	Project:		Lot ID:	**827075**
Report To:	A. Lanfranco & Associates	ID:	Hope Bay Doris Camp	Control Number:	A171291
	#101, 9488 - 189 Street	Name:	Incinerator	Date Received:	Sep 19, 2011
	Surrey, BC, Canada	Location:		Date Reported:	Sep 30, 2011
	V4N 4W7	LSD:		Report Number:	1475517
Attn:	Al LanFranco	P.O.:			
Sampled By:		Acct code:	(Repeat)		
Company:					

Contact & Affiliation	Address	Delivery Commitments
Al LanFranco A. Lanfranco & Associates Inc.	#101, 9488 - 189 Street Surrey, British Columbia V4N 4W7 Phone: (604) 881-2582 Fax: (604) 881-2581 Email: lanfranco@telus.net	On [Lot Verification] send (COA) by Email - Multiple Reports On [Report Approval] send (Test Report, COC) by Automated Fax On [Report Approval] send (Test Report, COC) by Email - Merge Reports On [Report Approval] send (Test Report, COC) by Automated Fax On [Report Approval] send (COC, Test Report) by Email - Merge Reports On [Report Approval] send (COC, Test Report) by Automated Fax On [Report Approval] send (Test Report, COC) by Email - Merge Reports On [Report Approval] send (Test Report, COC) by Automated Fax On [Report Approval] send (Test Report, COC) by Email - Merge Reports On [Lot Approval and Final Test Report Approval] send (Invoice) by Post M
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 [Report Approval] send (Test Report, COC) by Email - Merge Reports On [Report Approval] send (Test Report, COC) by Email - Merge Reports On [Report Approval] send (COC, Test Report) by Email - Merge Reports On [Report Approval] send (Test Report, COC) by Email - Merge Reports

Notes To Clients:

- Report was re-issued to include mercury results on samples 827075-6, 7 and 8 without dilution. Report 1475517 replaces all previous reports.

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

Analytical Report

Bill To:	A. Lanfranco & Associates	Project:		Lot ID:	**827075**
Report To:	A. Lanfranco & Associates	ID:	Hope Bay Doris Camp	Control Number:	A171291
	#101, 9488 - 189 Street	Name:	Incinerator	Date Received:	Sep 19, 2011
	Surrey, BC, Canada	Location:		Date Reported:	Sep 30, 2011
	V4N 4W7	LSD:		Report Number:	1475517
Attn:	Al LanFranco	P.O.:			
Sampled By:		Acct code:	(Repeat)		
Company:					

			Reference Number	827075-1	827075-2	827075-3	
			Sample Date		Aug 30, 2011	Aug 31, 2011	
			Sample Time		NA	NA	
			Sample Location				
			Sample Description	Metals Blank (Beaker "GVRD blank" + 1B+1)	Metal Run 1 (Beaker "Mm" + 2 B+1s)	Metals Run 2 (Beaker "11" + 2B+1s)	
			Matrix	Stack Samples	Stack Samples	Stack Samples	
Analyte		**Units**		**Results**	**Results**	**Results**	Nominal Detection Limit
Air Quality Metals							
Mercury	Strong Acid Extractable	ug		<0.02	0.04	1.75	0.005

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

Analytical Report

Bill To:	A. Lanfranco & Associates	Project:		Lot ID:	**827075**
Report To:	A. Lanfranco & Associates	ID:	Hope Bay Doris Camp	Control Number:	A171291
	#101, 9488 - 189 Street	Name:	Incinerator	Date Received:	Sep 19, 2011
	Surrey, BC, Canada	Location:		Date Reported:	Sep 30, 2011
	V4N 4W7	LSD:		Report Number:	1475517
Attn:	Al LanFranco	P.O.:			
Sampled By:		Acct code:	(Repeat)		
Company:					

			Reference Number	827075-4	827075-5	827075-6	
			Sample Date	Sep 01, 2011		Aug 30, 2011	
			Sample Time	NA		NA	
			Sample Location				
			Sample Description	Metals Run 3 (Beaker "A3" + 2BHs)	Hg Blank (1 Sample B+1)	Hg Run 1 (2 Sample B+1s)	
			Matrix	Stack Samples	Stack Samples	Stack Samples	
Analyte		**Units**		**Results**	**Results**	**Results**	Nominal Detection Limit
Air Quality Metals							
Mercury	Strong Acid Extractable	ug		0.26			0.005
Volume	Sample	mL			825	1610	
Volume	aliquot volume	mL			25	25	
Volume	Final	mL			40	40	
Mercury	As Tested	ug/L			<0.05	<0.05	0.05
Dilution Factor	As Tested				1.00	1.00	
Mercury	Total	ug/sample			<0.07	<0.1	

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

Analytical Report

Bill To:	A. Lanfranco & Associates	Project:		Lot ID:	**827075**
Report To:	A. Lanfranco & Associates	ID:	Hope Bay Doris Camp	Control Number:	A171291
	#101, 9488 - 189 Street	Name:	Incinerator	Date Received:	Sep 19, 2011
	Surrey, BC, Canada	Location:		Date Reported:	Sep 30, 2011
	V4N 4W7	LSD:		Report Number:	1475517
Attn:	Al LanFranco	P.O.:			
Sampled By:		Acct code:	(Repeat)		
Company:					

		Reference Number	827075-7	827075-8			
		Sample Date	Aug 31, 2011	Sep 01, 2011			
		Sample Time	NA	NA			
		Sample Location					
		Sample Description	Hg Run 2 (2 Sample B+1s)	Hg Run 3 (2 Sample B+1s)			
		Matrix	Stack Samples	Stack Samples			
Analyte		**Units**	**Results**	**Results**	**Results**		Nominal Detection Limit
Air Quality Metals							
Volume	Sample	mL	1890	1600			
Volume	aliquot volume	mL	25	25			
Volume	Final	mL	40	40			
Mercury	As Tested	ug/L	<0.05	<0.05			0.05
Dilution Factor	As Tested		1.00	1.00			
Mercury	Total	ug/sample	<0.2	<0.1			

Approved by:

Mathieu Simoneau
Operations Manager

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

Methodology and Notes

Bill To:	A. Lanfranco & Associates	Project:		Lot ID:	**827075**
Report To:	A. Lanfranco & Associates	ID:	Hope Bay Doris Camp	Control Number:	A171291
	#101, 9488 - 189 Street	Name:	Incinerator	Date Received:	Sep 19, 2011
	Surrey, BC, Canada	Location:		Date Reported:	Sep 30, 2011
	V4N 4W7	LSD:		Report Number:	1475517
Attn:	Al LanFranco	P.O.:			
Sampled By:		Acct code:	(Repeat)		
Company:					

Method of Analysis

Method Name	Reference	Method	Date Analysis Started	Location
Mercury in Air (Surrey)	APHA	* Cold Vapour Atomic Absorption Spectrometric Method, 3112 B	28-Sep-11	Exova Surrey
Mercury in Air (Surrey)	APHA	* Cold Vapour Atomic Absorption Spectrometric Method, 3112 B	30-Sep-11	Exova Surrey
Metals (Strong Acid Leachable) in air	APHA	* Cold Vapour Atomic Absorption Spectrometric Method, 3112 B	23-Sep-11	Exova Surrey

** Reference Method Modified*

References

APHA	Standard Methods for the Examination of Water and Wastewater

Comments:

- Report was re-issued to include mercury results on samples 827075-6, 7 and 8 without dilution. Report 1475517 replaces all previous reports.

Exova
#104, 19575-55 A Ave.
Surrey, British Columbia
V3S 6P8, 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:	**827075**
Report To:	A. Lanfranco & Associates	ID:	Hope Bay Doris Camp	Control Number:	A171291
	#101, 9488 - 189 Street	Name:	Incinerator	Date Received:	Sep 19, 2011
	Surrey, BC, Canada	Location:		Date Reported:	Sep 30, 2011
	V4N 4W7	LSD:		Report Number:	1475517
Attn:	Al LanFranco	P.O.:			
Sampled By:		Acct code:	(Repeat)		
Company:					

Air Quality Metals

Blanks	Units	Measured	Lower Limit	Upper Limit		Passed QC
Mercury	ug/L	0.04	-0.05	0.05		yes
Date Acquired:	September 28, 2011					

Calibration Check	Units	% Recovery	Lower Limit	Upper Limit		Passed QC
Mercury	ug/L	96.50	80	120		yes
Date Acquired:	September 23, 2011					

Replicates	Units	Replicate 1	Replicate 2	% RSD Criteria	Absolute Criteria	Passed QC
Mercury	ug/L	<0.05	0.05	30	0.05	yes
Date Acquired:	September 28, 2011					

Matrix Spike	Units	% Recovery	Lower Limit	Upper Limit		Passed QC
Mercury	ug	127	80	120		yes
Date Acquired:	September 23, 2011					
Mercury	ug/L	104	85	115		yes
Date Acquired:	September 28, 2011					

Appendix C

Measured and Calculated Data

Rescan™
Engineers and Scientists

A. Lanfranco And Associates Inc.

STANDARD VOLUME / GAS CONCENTRATION WORKSHEET

Newmont Doris Camp		Tested for:	Hg								
Incin. Stack		DGM ID:	D741C								
29.95		DGM Y:	0.9869								
Aug. 30 - Sept. 1, 2011											
										11.0	
	DRY GAS METER				CONSTANTS			RESULTS			
TIME	Reading	Temp In	Temp Out	Avg. Delta H	Y Factor	Pb	Volume Std.	Lab Result	Concentration	Oxygen	Conc. @ 11% O2
	(ft3)	(Avg. oF)	(Avg. oF)	(inches H20)		(in. Hg)	(m3 std.)	(ug of Hg)	(ug Hg/m3)	(%)	(ug/Sm3)
Aug. 30											
18:00	789.2490	77.1	70.3	2.0	0.9869	29.95	1.34673	0.04	0.03	12.6	0.04
19:02	836.8600	-	-	-	-	-					
Aug. 31											
12:40	985.5510	95.5	89.9	2.0	0.9869	29.95	1.31281	1.75	1.33	12.7	1.60
13:45	1033.6200	-	-	-	-	-					
Oct. 1											
12:16	171.3510	71.8	63.0	1.9	0.9869	30.05	1.32737	0.26	0.20	10.2	0.18
13:20	217.5800	-	-	-	-	-					

Client:	Newmont, Hope Bay	**Date:**	August 30/11
Jobsite:	Doris Camp	**Run:**	1 Partic/ Hg
Source:	Incinerator Stack	**Run Time:**	18:00 - 19:02

Particulate Concentration:	**11.1 mg/dscm**	0.0048 gr/dscf
	2.5 mg/Acm	0.0011 gr/Acf
	13.2 mg/dscm (@ 11% O2)	0.0058 gr/dscf (@ 11% O2)
Emission Rate:	0.01 Kg/hr	0.032 lb/hr
Sample Gas Volume:	1.3468 dscm	47.563 dscf
Total Sample Time:	60.0 minutes	
Average Isokineticity:	98.9 %	

Flue Gas Characteristics

Moisture:	8.40 %	
Temperature	941.9 oC	1727.4 oF
Flow	22.2 dscm/min	782 dscf/min
	0.37 dscm/sec	13.0 dscf/sec
	98.4 Acm/min	3477 Acf/min
Velocity	9.994 m/sec	32.79 f/sec
Gas Analysis	12.60 % O2	8.40 % CO2
	29.848 Mol. Wt (g/gmole) Dry	28.852 Mol. Wt (g/gmole) Wet

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

Client:	Newmont, Hope Bay	**Date:**	August 30/11
Jobsite:	Doris Camp	**Run:**	1 Partic/ Hg
Source:	Incinerator Stack	**Run Time:**	18:00 - 19:02

Control Unit (Y)	0.9869
Nozzle Diameter (in.)	0.5763
Pitot Factor	0.8327
Baro. Press. (in. Hg)	29.95
Static Press. (in. H2O)	0.04
Stack Height (ft)	50
Stack Diameter (in.)	18.0
Stack Area (sq.ft.)	1.767
Minutes Per Reading	5.0
Minutes Per Point	5.0

Gas Analysis (Vol. %):

	CO2	O2
Traverse 1	8.00	12.70
traverse 2	8.80	12.50
Average =	**8.40**	**12.60**

Condensate Collection:

Impinger 1 (grams)	52.0
Impinger 2 (grams)	24.0
Impinger 3 (grams)	2.0
Impinger 4 (grams)	2.0
Impinger 5 (grams)	2.0
Impinger 6 (grams)	8.9
Total Gain (grams)	**90.9**

Collection:

Filter (grams)	**0.0044**
Washings (grams)	**0.0105**
Impinger (grams)	**0.0000**
Total (grams)	**0.0149**

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	789.249							
1	1	5.0	793.340	0.090	2.16	70	70	1728	0.8	99.1
	2	10.0	797.340	0.085	2.04	74	72	1730	2.6	99.2
	3	15.0	801.550	0.095	2.26	76	70	1745	5.3	99.1
	4	20.0	805.440	0.080	1.92	78	70	1725	12.7	99.1
	5	25.0	809.220	0.075	1.81	78	70	1710	15.4	99.1
	6	30.0	812.880	0.070	1.70	78	70	1703	17.2	99.1
		0.0	812.880							
2	1	5.0	816.520	0.070	1.71	77	71	1695	0.8	98.4
	2	10.0	820.500	0.085	2.03	77	70	1732	2.6	98.6
	3	15.0	825.000	0.110	2.60	79	70	1760	5.3	98.6
	4	20.0	829.220	0.095	2.27	79	70	1732	12.7	98.8
	5	25.0	833.090	0.080	1.90	80	70	1743	15.4	98.8
	6	30.0	836.860	0.075	1.80	79	70	1726	17.2	99.1
			Average:	0.084	2.017	77.1	70.3	1727.4		98.9

Client:	Newmont, Hope Bay	**Date:**	August 31/11
Jobsite:	Doris Camp	**Run:**	2 Partic/Hg
Source:	Incinerator Stack	**Run Time:**	12:40 - 13:45

Particulate Concentration:	**9.5 mg/dscm**	0.0042 gr/dscf
	2.0 mg/Acm	0.0009 gr/Acf
	11.4 mg/dscm (@ 11% O2)	0.0050 gr/dscf (@ 11% O2)
Emission Rate:	0.01 Kg/hr	0.027 lb/hr
Sample Gas Volume:	1.3128 dscm	46.361 dscf
Total Sample Time:	60.0 minutes	
Average Isokineticity:	101.4 %	
Flue Gas Characteristics		
Moisture:	9.96 %	
Temperature	986.3 oC	1807.3 oF
Flow	21.1 dscm/min	744 dscf/min
	0.35 dscm/sec	12.4 dscf/sec
	98.7 Acm/min	3485 Acf/min
Velocity	10.017 m/sec	32.86 f/sec
Gas Analysis	12.65 % O2	7.40 % CO2
	29.690 Mol. Wt (g/gmole) Dry	28.526 Mol. Wt (g/gmole) Wet

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

Client:	Newmont, Hope Bay	**Date:**	August 31/11
Jobsite:	Doris Camp	**Run:**	2 Partic/Hg
Source:	Incinerator Stack	**Run Time:**	12:40 - 13:45

Control Unit (Y)	0.9869
Nozzle Diameter (in.)	0.5763
Pitot Factor	0.8327
Baro. Press. (in. Hg)	29.95
Static Press. (in. H2O)	0.04
Stack Height (ft)	50
Stack Diameter (in.)	18.0
Stack Area (sq.ft.)	1.767
Minutes Per Reading	5.0
Minutes Per Point	5.0

Gas Analysis (Vol. %):

	CO2	O2
Traverse 1	7.30	13.10
Traverse 2	7.50	12.20
Average =	**7.40**	**12.650**

Condensate Collection:

Impinger 1 (grams)	76.0
Impinger 2 (grams)	15.0
Impinger 3 (grams)	2.0
Impinger 4 (grams)	2.0
Impinger 5 (grams)	2.0
Impinger 6 (grams)	9.8
Total Gain (grams)	**106.8**

Collection:

Filter (grams)	**0.0034**
Washings (grams)	**0.0091**
Impinger (grams)	**0.0000**
Total (grams)	**0.0125**

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	985.550							
1	1	5.0	989.840	0.090	2.26	93	91	1752	0.8	101.5
	2	10.0	994.280	0.100	2.43	94	93	1836	2.6	101.3
	3	15.0	998.720	0.100	2.43	95	89	1820	5.3	101.2
	4	20.0	1002.850	0.085	2.10	95	88	1794	12.7	101.6
	5	25.0	1006.740	0.075	1.86	96	89	1781	15.4	101.3
	6	30.0	1010.640	0.075	1.85	95	89	1781	17.2	101.6
		0.0	1010.640							
2	1	5.0	1014.510	0.075	1.82	95	90	1820	0.8	101.6
	2	10.0	1018.500	0.080	1.94	96	90	1826	2.6	101.5
	3	15.0	1022.850	0.095	2.30	97	90	1830	5.3	101.7
	4	20.0	1026.600	0.070	1.72	97	90	1796	12.7	101.2
	5	25.0	1030.170	0.065	1.57	97	90	1836	15.4	100.8
	6	30.0	1033.620	0.060	1.46	96	90	1815	17.2	101.0
			Average:	0.081	1.978	95.5	89.9	1807.3		101.4

Client:	Newmont, Hope Bay	**Date:**	September 1/11
Jobsite:	Doris Camp	**Run:**	3 Partic/ Hg
Source:	Incinerator Stack	**Run Time:**	12:16 - 13:20

Particulate Concentration:	**7.7 mg/dscm**	0.0034	gr/dscf
	1.6 mg/Acm	0.0007	gr/Acf
	7.1 mg/dscm (@ 11% O2)	0.0031	gr/dscf (@ 11% O2)
Emission Rate:	0.01 Kg/hr	0.022	lb/hr
Sample Gas Volume:	1.3273 dscm	46.875	dscf
Total Sample Time:	60.0 minutes		
Average Isokineticity:	101.1 %		
Flue Gas Characteristics			
Moisture:	9.66 %		
Temperature	990.8 oC	1815.4	oF
Flow	21.3 dscm/min	754	dscf/min
	0.36 dscm/sec	12.6	dscf/sec
	99.7 Acm/min	3522	Acf/min
Velocity	10.124 m/sec	33.22	f/sec
Gas Analysis	10.20 % O2	9.45	% CO2
	29.920 Mol. Wt (g/gmole) Dry	28.769	Mol. Wt (g/gmole) Wet

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

Client:	Newmont, Hope Bay	**Date:**	September 1/11
Jobsite:	Doris Camp	**Run:**	3 Partic/ Hg
Source:	Incinerator Stack	**Run Time:**	12:16 - 13:20

Control Unit (Y)	0.9869
Nozzle Diameter (in.)	0.5763
Pitot Factor	0.8327
Baro. Press. (in. Hg)	30.05
Static Press. (in. H2O)	0.04
Stack Height (ft)	50
Stack Diameter (in.)	18.0
Stack Area (sq.ft.)	1.767
Minutes Per Reading	5.0
Minutes Per Point	5.0

Gas Analysis (Vol. %):

	CO2	O2
Traverse 1	9.70	10.70
Traverse 2	9.20	9.70
Average =	**9.45**	**10.20**

Condensate Collection:

Impinger 1 (grams)	70.0
Impinger 2 (grams)	18.0
Impinger 3 (grams)	2.0
Impinger 4 (grams)	3.0
Impinger 5 (grams)	2.0
Impinger 6 (grams)	9.4
Total Gain (grams)	**104.4**

Collection:

Filter (grams)	**0.0054**
Washings (grams)	**0.0048**
Impinger (grams)	**0.0000**
Total (grams)	**0.0102**

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	171.351							
1	1	5.0	175.590	0.100	2.32	69	63	1803	0.8	101.3
	2	10.0	180.010	0.110	2.53	69	62	1826	2.6	101.3
	3	15.0	184.120	0.095	2.19	71	62	1825	5.3	101.1
	4	20.0	188.020	0.085	1.97	71	62	1814	12.7	101.1
	5	25.0	191.820	0.080	1.86	72	62	1797	15.4	101.1
	6	30.0	195.380	0.070	1.63	73	63	1796	17.2	100.9
		0.0	195.380							
2	1	5.0	199.180	0.080	1.86	72	64	1812	0.8	101.2
	2	10.0	203.080	0.085	1.96	72	63	1825	2.6	101.2
	3	15.0	207.200	0.095	2.19	72	63	1825	5.3	101.2
	4	20.0	210.860	0.075	1.72	74	64	1836	12.7	101.0
	5	25.0	214.290	0.065	1.51	73	64	1811	15.4	101.1
	6	30.0	217.580	0.060	1.39	74	64	1815	17.2	100.9
			Average:	0.083	1.928	71.8	63.0	1815.4		101.1

A. Lanfranco and Associates Inc. - Emission Report

Client:	Newmont, Hope Bay	**Date:**	August 30/11
Jobsite:	Doris Camp	**Run:**	1 PCDD/PCDF
Source:	Incinerator stack	**Run Time:**	14:20 - 17:40

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:	3.8188 dscm	134.863 dscf
Total Sample Time:	192.0 minutes	
Average Isokineticity:	99.5 %	

Flue Gas Characteristics

Moisture:	9.30 %	
Temperature	883.8 oC	1622.9 oF
Flow	21.6 dscm/min	762 dscf/min
	0.36 dscm/sec	12.7 dscf/sec
	92.2 Acm/min	3258 Acf/min
Velocity	9.365 m/sec	30.72 f/sec
Gas Analysis	11.50 % O2	8.46 % CO2
	29.814 Mol. Wt (g/gmole) Dry	28.715 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: Newmont, Hope Bay
Jobsite: Doris Camp
Source: Incinerator stack

Date: August 30/11
Run: 1 PCDD/PCDF
Run Time: 14:20 - 17:40

Control Unit (Y)	0.9869
Nozzle Diameter (in.)	0.5467
Pitot Factor	0.8327
Baro. Press. (in. Hg)	29.95
Static Press. (in. Hg)	0.04
Stack Height (ft)	50
Stack Diameter (in.)	18.0
Stack Area (sq.ft.)	1.767
Minutes Per Reading	4.0
Minutes Per Point	16.0

Collection:

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

Gas Analysis (Vol. %):

	CO2	O2
Trav 1	8.75	11.25
Trav 2	8.17	11.75
Average =	**8.46**	**11.50**

Condensate Collection:

Impinger 1 (grams)	256.0
Impinger 2 (grams)	20.0
Impinger 3 (grams)	0.0
Impinger 4 (grams)	12.1
Total Gain (grams)	**288.1**

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)	Vacuum (in. Hg.)	XAD Exit (oF)	Stack (oF)	Wall Dist. (in.)	Isokin. (%)
		0.0	650.373									
1	1	4.0	653.760	0.100	2.26	81	81	3	50	1451	0.8	99.8
		8.0	657.160	0.100	2.26	81	81	3	50	1430	0.8	99.6
		12.0	660.540	0.100	2.26	83	81	3	50	1457	0.8	99.5
		16.0	663.910	0.100	2.23	86	81	3	52	1480	0.8	99.5
	2	20.0	667.530	0.120	2.56	86	82	3	52	1575	2.6	100.0
		24.0	671.180	0.120	2.56	90	85	4	52	1556	2.6	99.7
		28.0	674.700	0.110	2.40	93	86	4	52	1544	2.6	99.7
		32.0	678.220	0.110	2.40	93	85	4	52	1540	2.6	99.7
	3	36.0	681.730	0.110	2.38	93	86	4	52	1555	5.3	99.7
		40.0	685.240	0.110	2.38	94	87	4	53	1564	5.3	99.7
		44.0	688.700	0.110	2.32	94	87	4	53	1616	5.3	99.5
		48.0	692.150	0.110	2.30	94	87	4	53	1635	5.3	99.7
	4	52.0	695.440	0.100	2.09	94	87	4	53	1630	12.7	99.5
		56.0	698.590	0.090	1.92	92	87	4	53	1585	12.7	99.5
		60.0	701.740	0.090	1.91	93	87	4	53	1602	12.7	99.8
		64.0	704.860	0.090	1.91	95	87	4	53	1641	12.7	99.6
	5	68.0	707.640	0.070	1.49	93	87	4	53	1589	15.4	99.5
		72.0	710.410	0.070	1.48	93	87	4	53	1601	15.4	99.4
		76.0	713.000	0.060	1.30	93	87	4	53	1556	15.4	99.3
		80.0	715.570	0.060	1.28	92	87	4	53	1593	15.4	99.5
	6	84.0	718.350	0.070	1.50	91	87	4	54	1583	17.2	99.5
		88.0	720.690	0.050	1.06	91	86	4	53	1591	17.2	99.3
		92.0	723.230	0.060	1.25	90	86	4	53	1623	17.2	99.3
		96.0	725.783	0.060	1.26	91	86	4	53	1625	17.2	99.8
		0.0	725.783									
2	1	4.0	728.530	0.070	1.48	86	85	4	53	1602	0.8	99.4
		8.0	731.420	0.080	1.63	89	85	4	53	1679	0.8	99.4
		12.0	734.340	0.080	1.66	89	85	5	53	1640	0.8	99.5
		16.0	737.220	0.080	1.62	90	84	5	53	1692	0.8	99.4
	2	20.0	740.100	0.080	1.62	89	83	5	53	1687	2.6	99.4
		24.0	742.980	0.080	1.62	87	82	5	53	1672	2.6	99.4
		28.0	745.870	0.080	1.62	87	82	5	53	1670	2.6	99.7
		32.0	748.740	0.080	1.61	87	82	5	53	1693	2.6	99.5
	3	36.0	751.410	0.070	1.40	85	82	5	53	1704	5.3	99.4
		40.0	754.450	0.090	1.80	84	79	5	54	1680	5.3	99.7
		44.0	757.490	0.090	1.80	86	79	5	54	1688	5.3	99.7
		48.0	760.500	0.090	1.78	84	77	5	54	1706	5.3	99.5
	4	52.0	763.180	0.070	1.42	84	77	5	54	1659	12.7	99.2

		56.0	765.860	0.070	1.42	83	77	5			53	1664	12.7	99.4
		60.0	768.330	0.060	1.20	83	76	5			53	1675	12.7	99.3
		64.0	770.580	0.050	1.00	82	77	5			53	1680	12.7	99.1
	5	68.0	772.840	0.050	1.00	82	77	5			53	1672	15.4	99.4
		72.0	775.090	0.050	1.00	81	76	5			53	1673	15.4	99.2
		76.0	777.330	0.050	0.99	82	75	5			53	1698	15.4	99.3
		80.0	779.580	0.050	1.00	80	74	5			54	1664	15.4	99.2
	6	84.0	781.830	0.050	1.00	80	74	5			54	1681	17.2	99.6
		88.0	784.070	0.050	0.99	80	74	5			54	1683	17.2	99.2
		92.0	786.070	0.040	0.80	81	75	4			54	1710	17.2	99.4
		96.0	788.312	0.050	0.99	81	75	4			54	1705	17.2	99.6
			Average:	0.079	1.650	87.5	82.1	4.3			52.9	1622.9		99.5

A. Lanfranco and Associates Inc. - Emission Report

Client:	Newmont, Hope Bay	**Date:**	August 31/11
Jobsite:	Doris Camp	**Run:**	2 PCDD/PCDF
Source:	Incinerator stack	**Run Time:**	08:52 - 12:11

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:	3.8382 dscm	135.546 dscf
Total Sample Time:	192.0 minutes	
Average Isokineticity:	102.6 %	

Flue Gas Characteristics

Moisture:	10.05 %	
Temperature	921.0 oC	1689.9 oF
Flow	21.1 dscm/min	745 dscf/min
	0.35 dscm/sec	12.4 dscf/sec
	93.9 Acm/min	3314 Acf/min
Velocity	9.528 m/sec	31.26 f/sec
Gas Analysis	10.20 % O2	8.60 % CO2
	29.784 Mol. Wt (g/gmole) Dry	28.600 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: Newmont, Hope Bay
Jobsite: Doris Camp
Source: Incinerator stack

Date: August 31/11
Run: 2 PCDD/PCDF
Run Time: 08:52 - 12:11

Control Unit (Y)	0.9869
Nozzle Diameter (in.)	0.5467
Pitot Factor	0.8327
Baro. Press. (in. Hg)	29.95
Static Press. (in. Hg)	0.04
Stack Height (ft)	50
Stack Diameter (in.)	18.0
Stack Area (sq.ft.)	1.767
Minutes Per Reading	4.0
Minutes Per Point	16.0

Collection:

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

Gas Analysis (Vol. %):

	CO2	O2
Trav 1	10.00	9.00
Trav 2	7.20	11.40
Average =	8.60	10.20

Condensate Collection:

Impinger 1 (grams)	250.0
Impinger 2 (grams)	52.0
Impinger 3 (grams)	0.0
Impinger 4 (grams)	13.4
Total Gain (grams)	315.4

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)	Vacuum (in. Hg.)	XAD Exit (oF)	Stack (oF)	Wall Dist. (in.)	Isokin. (%)
		0.0	843.447									
1	1	4.0	846.780	0.100	2.21	75	75	6	55	1500	0.8	101.2
		8.0	850.060	0.100	2.15	76	71	4	55	1552	0.8	101.1
		12.0	853.380	0.100	2.21	76	70	4	55	1496	0.8	101.0
		16.0	856.810	0.110	2.33	76	70	4	55	1564	0.8	101.3
	2	20.0	860.110	0.100	2.21	77	69	4	55	1524	2.6	101.1
		24.0	863.410	0.100	2.16	79	70	4	55	1546	2.6	101.4
		28.0	866.660	0.100	2.10	80	70	4	55	1598	2.6	101.0
		32.0	870.090	0.110	2.33	81	71	5	55	1581	2.6	101.1
	3	36.0	873.300	0.100	2.03	81	72	5	55	1670	5.3	101.2
		40.0	876.400	0.090	1.89	83	75	5	55	1616	5.3	101.2
		44.0	879.500	0.090	1.89	84	75	5	55	1612	5.3	101.0
		48.0	882.590	0.090	1.89	85	75	5	54	1633	5.3	101.1
	4	52.0	885.510	0.080	1.67	86	76	5	54	1633	12.7	101.1
		56.0	888.430	0.080	1.66	87	77	5	54	1639	12.7	101.1
		60.0	891.330	0.080	1.34	87	78	5	54	1679	12.7	101.2
		64.0	894.030	0.070	1.43	87	78	5	54	1684	12.7	100.8
	5	68.0	896.760	0.070	1.45	88	80	5	54	1658	15.4	101.0
		72.0	899.300	0.060	1.25	89	82	5	54	1650	15.4	101.0
		76.0	901.600	0.050	1.03	89	81	4	54	1680	15.4	101.0
		80.0	903.880	0.050	1.01	90	81	4	54	1717	15.4	100.8
	6	84.0	906.420	0.060	1.25	90	81	4	54	1657	17.2	101.2
		88.0	908.940	0.060	1.23	90	82	4	54	1684	17.2	100.9
		92.0	911.220	0.050	1.01	91	83	4	54	1723	17.2	100.7
		96.0	913.530	0.050	1.03	92	84	4	54	1683	17.2	100.9
		0.0	913.530									
2	1	4.0	916.420	0.080	1.63	91	86	5	54	1725	0.8	100.8
		8.0	919.330	0.080	1.64	93	86	5	54	1703	0.8	100.8
		12.0	922.050	0.070	1.43	94	87	5	54	1716	0.8	100.8
		16.0	924.770	0.070	1.42	95	87	5	54	1735	0.8	101.2
	2	20.0	927.490	0.070	1.42	95	89	6	54	1742	2.6	101.2
		24.0	930.410	0.080	1.64	95	89	6	54	1718	2.6	101.1
		28.0	933.290	0.080	1.60	97	90	6	54	1780	2.6	100.8
		32.0	936.190	0.080	1.62	98	90	6	54	1755	2.6	100.9
	3	36.0	939.090	0.080	1.61	98	90	6	54	1766	5.3	101.1
		40.0	942.170	0.090	1.82	98	91	6	54	1756	5.3	101.0
		44.0	945.260	0.090	1.82	99	92	6	53	1759	5.3	101.2
		48.0	948.350	0.090	1.83	98	92	6	53	1754	5.3	101.2
	4	52.0	951.550	0.100	1.97	96	90	6	53	1806	12.7	101.0

		56.0	954.240	0.070	1.39	96	89	5			53	1790	12.7	101.0
		60.0	956.940	0.070	1.40	96	89	5			53	1766	12.7	100.9
		64.0	959.640	0.070	1.40	95	91	5			53	1766	12.7	100.8
	5	68.0	962.350	0.070	1.42	96	90	5			53	1738	15.4	100.5
		72.0	965.040	0.070	1.40	96	92	5			53	1766	15.4	100.2
		76.0	969.810	0.070	1.39	96	92	5			53	1780	15.4	178.3
		80.0	972.520	0.070	1.41	96	90	5			53	1753	15.4	100.9
	6	84.0	975.010	0.060	1.20	96	90	5			53	1776	17.2	100.6
		88.0	977.520	0.060	1.21	96	91	5			53	1757	17.2	100.8
		92.0	980.030	0.060	1.21	96	91	5			53	1757	17.2	100.8
		96.0	982.532	0.060	1.20	96	91	5			53	1770	17.2	100.8
			Average:	0.078	1.601	90.0	82.9	5.0			53.9	1689.9		102.6

A. Lanfranco and Associates Inc. - Emission Report

Client:	Newmont, Hope Bay	**Date:**	September 1/11
Jobsite:	Doris Camp	**Run:**	3 PCDD/PCDF
Source:	Incinerator stack	**Run Time:**	08:34 - 11:55

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:	3.7121 dscm	131.091 dscf
Total Sample Time:	192.0 minutes	
Average Isokineticity:	100.9 %	

Flue Gas Characteristics

Moisture:	10.14 %	
Temperature	930.8 oC	1707.4 oF
Flow	20.7 dscm/min	732 dscf/min
	0.35 dscm/sec	12.2 dscf/sec
	92.7 Acm/min	3274 Acf/min
Velocity	9.412 m/sec	30.88 f/sec
Gas Analysis	9.50 % O2	8.85 % CO2
	29.796 Mol. Wt (g/gmole) Dry	28.600 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: Newmont, Hope Bay
Jobsite: Doris Camp
Source: Incinerator stack

Date: September 1/11
Run: 3 PCDD/PCDF
Run Time: 08:34 - 11:55

Control Unit (Y)	0.9869
Nozzle Diameter (in.)	0.5467
Pitot Factor	0.8327
Baro. Press. (in. Hg)	30.05
Static Press. (in. Hg)	0.04
Stack Height (ft)	50
Stack Diameter (in.)	18.0
Stack Area (sq.ft.)	1.767
Minutes Per Reading	4.0
Minutes Per Point	16.0

Collection:

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

Gas Analysis (Vol. %):

	CO2	O2
Trav 1	10.30	9.00
Trav 2	7.40	10.00
Average =	8.85	9.50

Condensate Collection:

Impinger 1 (grams)	252.0
Impinger 2 (grams)	42.0
Impinger 3 (grams)	0.0
Impinger 4 (grams)	14.1
Total Gain (grams)	308.1

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	40.186									
1	0	4.0	43.220	0.090	1.91	60	60	5	48	1540	0.8	101.1
		8.0	46.390	0.100	2.08	59	57	5	48	1563	0.8	101.2
		12.0	49.360	0.090	1.83	59	59	5	48	1606	0.8	100.7
		16.0	52.350	0.090	1.84	63	57	5	48	1602	0.8	101.1
	1	20.0	55.360	0.090	1.86	66	57	5	48	1580	2.6	101.0
		24.0	58.340	0.090	1.82	65	57	5	48	1620	2.6	101.0
		28.0	61.320	0.090	1.81	66	57	5	48	1627	2.6	101.1
		32.0	64.320	0.090	1.84	67	58	5	48	1597	2.6	100.8
	2	36.0	67.420	0.100	1.96	67	59	5	48	1691	5.3	101.0
		40.0	70.540	0.100	1.98	67	59	5	48	1670	5.3	101.2
		44.0	73.700	0.100	2.04	69	60	5	48	1615	5.3	100.9
		48.0	76.680	0.090	1.81	69	60	5	48	1643	5.3	100.9
	3	52.0	79.680	0.090	1.82	71	61	6	49	1634	12.7	101.1
		56.0	82.460	0.080	1.57	71	62	6	49	1703	12.7	100.8
		60.0	85.250	0.080	1.58	71	62	6	49	1690	12.7	100.9
		64.0	88.050	0.080	1.58	71	62	6	49	1688	12.7	101.2
	4	68.0	90.660	0.070	1.38	72	63	5	49	1707	15.4	101.0
		72.0	93.310	0.070	1.42	72	63	5	49	1642	15.4	101.0
		76.0	95.950	0.070	1.42	72	64	5	49	1655	15.4	100.9
		80.0	98.580	0.070	1.40	72	64	5	49	1682	15.4	101.1
	5	84.0	101.180	0.070	1.40	72	64	5	49	1719	17.2	100.8
		88.0	103.780	0.070	1.38	73	65	5	49	1720	17.2	100.7
		92.0	106.400	0.070	1.38	73	64	5	49	1698	17.2	101.0
		96.0	109.020	0.070	1.38	73	64	5	49	1690	17.2	100.8
		0.0	109.020									
2	0	4.0	111.800	0.080	1.58	67	62	6	48	1690	0.8	100.9
		8.0	114.560	0.080	1.55	71	64	6	48	1739	0.8	100.7
		12.0	117.320	0.080	1.55	70	65	6	48	1752	0.8	101.0
		16.0	119.890	0.070	1.35	70	64	6	48	1770	0.8	101.0
	1	20.0	122.440	0.070	1.35	70	63	6	48	1793	2.6	100.8
		24.0	125.010	0.070	1.35	70	63	6	48	1756	2.6	100.8
		28.0	127.580	0.070	1.35	71	63	6	48	1758	2.6	100.7
		32.0	130.150	0.070	1.33	73	64	6	48	1790	2.6	101.2
	2	36.0	132.920	0.080	1.55	72	64	6	48	1749	5.3	101.2
		40.0	135.660	0.080	1.51	72	64	6	49	1790	5.3	101.0
		44.0	138.410	0.080	1.52	72	64	6	49	1780	5.3	101.2
		48.0	141.140	0.080	1.51	72	64	6	49	1803	5.3	101.0
	3	52.0	143.710	0.070	1.33	72	63	6	49	1776	12.7	101.0

		56.0	146.090	0.060	1.15	71	64	6			49	1773	12.7	101.0
		60.0	148.470	0.060	1.15	71	63	6			48	1765	12.7	100.9
		64.0	150.850	0.060	1.15	71	63	6			48	1777	12.7	101.1
	4	68.0	153.030	0.050	0.94	71	63	6			48	1753	15.4	100.9
		72.0	155.210	0.050	0.96	71	63	6			48	1755	15.4	100.9
		76.0	157.370	0.050	0.95	71	63	6			48	1785	15.4	100.7
		80.0	159.750	0.060	1.15	71	63	5			48	1762	15.4	100.8
	5	84.0	162.120	0.060	1.15	71	63	5			48	1770	17.2	100.6
		88.0	164.490	0.060	1.15	71	64	5			48	1787	17.2	100.8
		92.0	166.860	0.060	1.15	71	64	5			48	1726	17.2	99.5
		96.0	169.234	0.060	1.15	71	64	5			48	1776	17.2	100.8
			Average:	0.075	1.487	69.6	62.1	5.5			48.4	1707.4		100.9

Appendix D

Dioxin and Furan Laboratory Reports

Rescan™
Engineers and Scientists

SAMPLE RECEIPT FORM / CHEMICAL ANALYSIS FORM

FILE #: PR112008

CLIENT: A. Lanfranco & Assoc.
#101 – 9488 189 Street
Surrey, BC
V4N 4W7
Phone – 604-881-2582
Fax - 604-881-2581

RECEIVED BY: P.A. Pond **DATE/TIME:** September 12, 2011 (12:15PM)
CONDITION: intact, 4°C; one container missing for BLK run
LABELLING: all bottles, filters and XAD columns labelled

# of Samples	Sample Type	Sample (Client Codes)	Lab Codes
6	XAD, filters	Newmont Hope Bay BLK	PR112008
7	XAD, filters	Newmont Hope Bay Run-1	PR112009
7	XAD, filters	Newmont Hope Bay Run-2	PR112010
7	XAD, filters	Newmont Hope Bay Run-3	PR112011

STORAGE: XAD and filter stored at 4 °C, others stored in dark at ambient temperature

ANALYTES: HRGC/HRMS analysis for dioxins/furans

SPECIAL INSTRUCTIONS: none

METHODOLOGY
Reference Method: Dioxin: SOP LAB01; Environment Canada 1-RM-3

Data summarized in Data Report Attached

Report sent to: Al Lanfranco Date: October 12, 2011

Comments: Results relate only to items tested.

David Hope PChem, CEO

METHOD 23/1-RM-3 DATA REPORT

Client:	A. Lanfranco & Assoc	**Sample Date:**	30-Aug-11
Client ID:	Newmont Hope Bay - BLK	**Date Extracted:**	29-Sep-11
PRL ID:	PR112008	**Date Analysed:**	12-Oct-11
		Filter Wt.:	0.39 g

DIOXINS		DL	# of	I-TEQs (ND=0)	I-TEQs (ND=½DL)	WHO-TEQs (ND=0)	WHO-TEQs (ND=½DL)
Congeners	pg	pg	peaks	pg	pg	pg	pg
2,3,7,8-TCDD	ND	2		ND	1	ND	1
Total TCDD	ND	2	0				
1,2,3,7,8-PeCDD	ND	4		ND	1	ND	2
Total PeCDD	19	4	2				
1,2,3,4,7,8-HxCDD	ND	4		ND	0.2	ND	0.2
1,2,3,6,7,8-HxCDD	ND	4		ND	0.2	ND	0.2
1,2,3,7,8,9-HxCDD	ND	4		ND	0.2	ND	0.2
Total HxCDD	180	4	3				
1,2,3,4,6,7,8-HpCDD	66	4		0.66	0.66	0.66	0.66
Total HpCDD	200	4	2				
OCDD	38	15	1	0.038	0.038	0.0038	0.0038
		Total Dioxin TEQ		**0.70**	**3.3**	**0.66**	**4.3**

FURANS		DL	# of	I-TEQs (ND=0)	I-TEQs (ND=½DL)	WHO-TEQs (ND=0)	WHO-TEQs (ND=½DL)
Congeners	pg	pg	peaks	pg	pg	pg	pg
2,3,7,8-TCDF	ND	2		ND	0.1	ND	0.1
Total TCDF	ND	2	0				
1,2,3,7,8-PeCDF	ND	4		ND	0.1	ND	0.1
2,3,4,7,8-PeCDF	ND	4		ND	1	ND	1
Total PeCDF	ND	4	0				
1,2,3,4,7,8-HxCDF	ND	4		ND	0.2	ND	0.2
1,2,3,6,7,8-HxCDF	ND	4		ND	0.2	ND	0.2
1,2,3,7,8,9-HxCDF	ND	4		ND	0.2	ND	0.2
2,3,4,6,7,8-HxCDF	ND	4		ND	0.2	ND	0.2
Total HxCDF	13	4	2				
1,2,3,4,6,7,8-HpCDF	12	4		0.12	0.12	0.12	0.12
1,2,3,4,7,8,9-HpCDF	ND	4		ND	0.02	ND	0.02
Total HpCDF	23	4	3				
OCDF	ND	15	0	ND	0.0075	ND	0.00075
		Total Furan TEQ		**0.12**	**2.1**	**0.12**	**2.1**
Total PCDD/PCDF Toxic Equivalent (pg)				**0.82**	**5.4**	**0.78**	**6.4**

Surrogate Recoveries (%)

$^{37}Cl_4$ -2,3,7,8-TCDD	75
$^{13}C_{12}$ -2,3,4,7,8-PeCDF	103
$^{13}C_{12}$ -1,2,3,4,7,8-HxCDD	93
$^{13}C_{12}$ -1,2,3,4,7,8-HxCDF	111
$^{13}C_{12}$ -1,2,3,4,7,8,9-HpCDF	109

ND - none detected

Internal Standards (%)

$^{13}C_{12}$ -2,3,7,8-TCDD	90
$^{13}C_{12}$ -1,2,3,7,8-PeCDD	130
$^{13}C_{12}$ -1,2,3,6,7,8-HxCDD	59
$^{13}C_{12}$ -1,2,3,4,6,7,8-HpCDD	73
$^{13}C_{12}$ -OCDD	42
$^{13}C_{12}$ -2,3,7,8-TCDF	116
$^{13}C_{12}$ -1,2,3,7,8-PeCDF	109
$^{13}C_{12}$ -1,2,3,6,7,8-HxCDF	44
$^{13}C_{12}$ -1,2,3,4,6,7,8-HpCDF	55

Patrick Pond

METHOD 23/1-RM-3 DATA REPORT

Client:	A. Lanfranco & Assoc	**Sample Date:**	30-Aug-11
Client ID:	Newmont Hope Bay - Run 1	**Date Extracted:**	29-Sep-11
PRL ID:	PR112009	**Date Analysed:**	9-Oct-11
		Filter Wt.:	0.48 g

DIOXINS		DL	# of	I-TEQs (ND=0)	I-TEQs (ND=½DL)	WHO-TEQs (ND=0)	WHO-TEQs (ND=½DL)
Congeners	pg	pg	peaks	pg	pg	pg	pg
2,3,7,8-TCDD	13	2		13	13	13	13
Total TCDD	29000	2	6				
1,2,3,7,8-PeCDD	310	4		155	155	310	310
Total PeCDD	9800	4	3				
1,2,3,4,7,8-HxCDD	290	4		29	29	29	29
1,2,3,6,7,8-HxCDD	1500	4		150	150	150	150
1,2,3,7,8,9-HxCDD	1200	4		120	120	120	120
Total HxCDD	30000	4	3				
1,2,3,4,6,7,8-HpCDD	9500	4		95	95	95	95
Total HpCDD	28000	4	2				
OCDD	8700	15	1	8.7	8.7	0.87	0.87
		Total Dioxin TEQ		571	571	718	718

FURANS		DL	# of	I-TEQs (ND=0)	I-TEQs (ND=½DL)	WHO-TEQs (ND=0)	WHO-TEQs (ND=½DL)
Congeners	pg	pg	peaks	pg	pg	pg	pg
2,3,7,8-TCDF	70	2		7	7	7	7
Total TCDF	1900	2	16				
1,2,3,7,8-PeCDF	120	4		6	6	6	6
2,3,4,7,8-PeCDF	310	4		155	155	155	155
Total PeCDF	5000	4	5				
1,2,3,4,7,8-HxCDF	310	4		31	31	31	31
1,2,3,6,7,8-HxCDF	380	4		38	38	38	38
1,2,3,7,8,9-HxCDF	170	4		17	17	17	17
2,3,4,6,7,8-HxCDF	740	4		74	74	74	74
Total HxCDF	4100	4	6				
1,2,3,4,6,7,8-HpCDF	1800	4		18	18	18	18
1,2,3,4,7,8,9-HpCDF	220	4		2.2	2.2	2.2	2.2
Total HpCDF	2600	4	2				
OCDF	910	15	1	0.91	0.91	0.091	0.091
		Total Furan TEQ		349	349	348	348
Total PCDD/PCDF Toxic Equivalent (pg)				920	920	1066	1066

Surrogate Recoveries (%)

$^{37}Cl_4$ -2,3,7,8-TCDD	107
$^{13}C_{12}$ -2,3,4,7,8-PeCDF	91
$^{13}C_{12}$ -1,2,3,4,7,8-HxCDD	92
$^{13}C_{12}$ -1,2,3,4,7,8-HxCDF	87
$^{13}C_{12}$ -1,2,3,4,7,8,9-HpCDF	92

ND - none detected

Internal Standards (%)

$^{13}C_{12}$ -2,3,7,8-TCDD	71
$^{13}C_{12}$ -1,2,3,7,8-PeCDD	72
$^{13}C_{12}$ -1,2,3,6,7,8-HxCDD	72
$^{13}C_{12}$ -1,2,3,4,6,7,8-HpCDD	83
$^{13}C_{12}$ -OCDD	81
$^{13}C_{12}$ -2,3,7,8-TCDF	71
$^{13}C_{12}$ -1,2,3,7,8-PeCDF	65
$^{13}C_{12}$ -1,2,3,6,7,8-HxCDF	70
$^{13}C_{12}$ -1,2,3,4,6,7,8-HpCDF	72

Patrick Pond

METHOD 23/1-RM-3 DATA REPORT

Client:	A. Lanfranco & Assoc	**Sample Date:**	31-Aug-11
Client ID:	Newmont Hope Bay - Run 2	**Date Extracted:**	29-Sep-11
PRL ID:	PR112010	**Date Analysed:**	9-Oct-11
		Filter Wt.:	0.46 g

DIOXINS		DL	# of	I-TEQs (ND=0)	I-TEQs (ND=½DL)	WHO-TEQs (ND=0)	WHO-TEQs (ND=½DL)
Congeners	pg	pg	peaks	pg	pg	pg	pg
2,3,7,8-TCDD	26	2		26	26	26	26
Total TCDD	5900	2	3				
1,2,3,7,8-PeCDD	210	4		105	105	210	210
Total PeCDD	1300	4	5				
1,2,3,4,7,8-HxCDD	200	4		20	20	20	20
1,2,3,6,7,8-HxCDD	300	4		30	30	30	30
1,2,3,7,8,9-HxCDD	280	4		28	28	28	28
Total HxCDD	3800	4	5				
1,2,3,4,6,7,8-HpCDD	1600	4		16	16	16	16
Total HpCDD	3800	4	2				
OCDD	2100	15	1	2.1	2.1	0.21	0.21
		Total Dioxin TEQ		227	227	330	330

FURANS		DL	# of	I-TEQs (ND=0)	I-TEQs (ND=½DL)	WHO-TEQs (ND=0)	WHO-TEQs (ND=½DL)
Congeners	pg	pg	peaks	pg	pg	pg	pg
2,3,7,8-TCDF	30	2		3	3	3	3
Total TCDF	710	2	14				
1,2,3,7,8-PeCDF	58	4		2.9	2.9	2.9	2.9
2,3,4,7,8-PeCDF	120	4		60	60	60	60
Total PeCDF	2000	4	5				
1,2,3,4,7,8-HxCDF	140	4		14	14	14	14
1,2,3,6,7,8-HxCDF	160	4		16	16	16	16
1,2,3,7,8,9-HxCDF	110	4		11	11	11	11
2,3,4,6,7,8-HxCDF	330	4		33	33	33	33
Total HxCDF	1600	4	7				
1,2,3,4,6,7,8-HpCDF	800	4		8	8	8	8
1,2,3,4,7,8,9-HpCDF	150	4		1.5	1.5	1.5	1.5
Total HpCDF	1500	4	3				
OCDF	520	15	1	0.52	0.52	0.052	0.052
		Total Furan TEQ		150	150	149	149

Total PCDD/PCDF Toxic Equivalent (pg)	377	377	480	480

Surrogate Recoveries (%)

$^{37}Cl_4$ -2,3,7,8-TCDD	93
$^{13}C_{12}$ -2,3,4,7,8-PeCDF	100
$^{13}C_{12}$ -1,2,3,4,7,8-HxCDD	97
$^{13}C_{12}$ -1,2,3,4,7,8-HxCDF	86
$^{13}C_{12}$ -1,2,3,4,7,8,9-HpCDF	96

ND - none detected

Internal Standards (%)

$^{13}C_{12}$ -2,3,7,8-TCDD	64
$^{13}C_{12}$ -1,2,3,7,8-PeCDD	68
$^{13}C_{12}$ -1,2,3,6,7,8-HxCDD	67
$^{13}C_{12}$ -1,2,3,4,6,7,8-HpCDD	85
$^{13}C_{12}$ -OCDD	90
$^{13}C_{12}$ -2,3,7,8-TCDF	59
$^{13}C_{12}$ -1,2,3,7,8-PeCDF	57
$^{13}C_{12}$ -1,2,3,6,7,8-HxCDF	65
$^{13}C_{12}$ -1,2,3,4,6,7,8-HpCDF	70

Patrick Pond

METHOD 23/1-RM-3 DATA REPORT

Client:	A. Lanfranco & Assoc	**Sample Date:**	1-Sep-11
Client ID:	Newmont Hope Bay - Run 3	**Date Extracted:**	29-Sep-11
PRL ID:	PR112011	**Date Analysed:**	12-Oct-11
		Filter Wt.:	0.45 g

DIOXINS		DL	# of	I-TEQs		WHO-TEQs	
				(ND=0)	(ND=½DL)	(ND=0)	(ND=½DL)
Congeners	pg	pg	peaks	pg	pg	pg	pg
2,3,7,8-TCDD	ND	2		ND	1	ND	1
Total TCDD	2000	2	5				
1,2,3,7,8-PeCDD	43	4		21.5	21.5	43	43
Total PeCDD	270	4	6				
1,2,3,4,7,8-HxCDD	51	4		5.1	5.1	5.1	5.1
1,2,3,6,7,8-HxCDD	73	4		7.3	7.3	7.3	7.3
1,2,3,7,8,9-HxCDD	59	4		5.9	5.9	5.9	5.9
Total HxCDD	870	4	6				
1,2,3,4,6,7,8-HpCDD	620	4		6.2	6.2	6.2	6.2
Total HpCDD	1400	4	2				
OCDD	1600	15	1	1.6	1.6	0.16	0.16
		Total Dioxin TEQ		48	49	68	69

FURANS		DL	# of	I-TEQs		WHO-TEQs	
				(ND=0)	(ND=½DL)	(ND=0)	(ND=½DL)
Congeners	pg	pg	peaks	pg	pg	pg	pg
2,3,7,8-TCDF	15	2		1.5	1.5	1.5	1.5
Total TCDF	500	2	11				
1,2,3,7,8-PeCDF	54	4		2.7	2.7	2.7	2.7
2,3,4,7,8-PeCDF	ND	4		ND	1	ND	1
Total PeCDF	2000	4	4				
1,2,3,4,7,8-HxCDF	130	4		13	13	13	13
1,2,3,6,7,8-HxCDF	190	4		19	19	19	19
1,2,3,7,8,9-HxCDF	150	4		15	15	15	15
2,3,4,6,7,8-HxCDF	470	4		47	47	47	47
Total HxCDF	2100	4	8				
1,2,3,4,6,7,8-HpCDF	1300	4		13	13	13	13
1,2,3,4,7,8,9-HpCDF	240	4		2.4	2.4	2.4	2.4
Total HpCDF	2500	4	3				
OCDF	1100	15	1	1.1	1.1	0.11	0.11
		Total Furan TEQ		115	116	114	115
Total PCDD/PCDF Toxic Equivalent (pg)				162	164	181	183

Surrogate Recoveries (%)

$^{37}Cl_4$ -2,3,7,8-TCDD	94
$^{13}C_{12}$ -2,3,4,7,8-PeCDF	116
$^{13}C_{12}$ -1,2,3,4,7,8-HxCDD	99
$^{13}C_{12}$ -1,2,3,4,7,8-HxCDF	88
$^{13}C_{12}$ -1,2,3,4,7,8,9-HpCDF	87

ND - none detected

Internal Standards (%)

$^{13}C_{12}$ -2,3,7,8-TCDD	56
$^{13}C_{12}$ -1,2,3,7,8-PeCDD	64
$^{13}C_{12}$ -1,2,3,6,7,8-HxCDD	73
$^{13}C_{12}$ -1,2,3,4,6,7,8-HpCDD	72
$^{13}C_{12}$ -OCDD	53
$^{13}C_{12}$ -2,3,7,8-TCDF	60
$^{13}C_{12}$ -1,2,3,7,8-PeCDF	45
$^{13}C_{12}$ -1,2,3,6,7,8-HxCDF	71
$^{13}C_{12}$ -1,2,3,4,6,7,8-HpCDF	64

Patrick Pond

METHOD 23/1-RM-3 QC REPORT - BLANK

Client:	A. Lanfranco & Assoc	Sample Date:	n/a
Client ID:	Blank	Date Extracted:	29-Sep-11
PRL ID:	DF110459B	Date Analysed:	11-Oct-11

DIOXINS				I-TEQs		WHO-TEQs	
		DL	# of	(ND=0)	(ND=½DL)	(ND=0)	(ND=½DL)
Congeners	pg	pg	peaks	pg	pg	pg	pg
2,3,7,8-TCDD	ND	2		ND	1	ND	1
Total TCDD	ND	2	0				
1,2,3,7,8-PeCDD	ND	4		ND	1	ND	2
Total PeCDD	ND	4	0				
1,2,3,4,7,8-HxCDD	ND	4		ND	0.2	ND	0.2
1,2,3,6,7,8-HxCDD	ND	4		ND	0.2	ND	0.2
1,2,3,7,8,9-HxCDD	ND	4		ND	0.2	ND	0.2
Total HxCDD	ND	4	0				
1,2,3,4,6,7,8-HpCDD	ND	4		ND	0.02	ND	0.02
Total HpCDD	ND	4	0				
OCDD	27	15	1	0.027	0.027	0.0027	0.0027
		Total Dioxin TEQ		0	3	0	4

FURANS				I-TEQs		WHO-TEQs	
		DL	# of	(ND=0)	(ND=½DL)	(ND=0)	(ND=½DL)
Congeners	pg	pg	peaks	pg	pg	pg	pg
2,3,7,8-TCDF	ND	2		ND	0.1	ND	0.1
Total TCDF	ND	2	0				
1,2,3,7,8-PeCDF	ND	4		ND	0.1	ND	0.1
2,3,4,7,8-PeCDF	ND	4		ND	1	ND	1
Total PeCDF	ND	4	0				
1,2,3,4,7,8-HxCDF	ND	4		ND	0.2	ND	0.2
1,2,3,6,7,8-HxCDF	ND	4		ND	0.2	ND	0.2
1,2,3,7,8,9-HxCDF	ND	4		ND	0.2	ND	0.2
2,3,4,6,7,8-HxCDF	ND	4		ND	0.2	ND	0.2
Total HxCDF	ND	4	0				
1,2,3,4,6,7,8-HpCDF	ND	4		ND	0.02	ND	0.02
1,2,3,4,7,8,9-HpCDF	ND	4		ND	0.02	ND	0.02
Total HpCDF	ND	4	0				
OCDF	ND	15	0	ND	0.0075	ND	0.00075
		Total Furan TEQ		0	2	0	2
Total PCDD/PCDF Toxic Equivalent (pg)				0	5	0	6

ND - none detected

Internal Standards (%)

$^{13}C_{12}$-2,3,7,8-TCDD	63
$^{13}C_{12}$-1,2,3,7,8-PeCDD	73
$^{13}C_{12}$-1,2,3,6,7,8-HxCDD	67
$^{13}C_{12}$-1,2,3,4,6,7,8-HpCDD	78
$^{13}C_{12}$-OCDD	64
$^{13}C_{12}$-2,3,7,8-TCDF	57
$^{13}C_{12}$-1,2,3,7,8-PeCDF	58
$^{13}C_{12}$-1,2,3,6,7,8-HxCDF	59
$^{13}C_{12}$-1,2,3,4,6,7,8-HpCDF	69

Patrick Pond

QC REPORT - SPIKE

Client:	A. Lanfranco & Assoc	**Contact:**	Al Lanfranco
Client ID:	MATRIX SPIKE	**Date Extracted:**	29-Sep-11
PRL ID:	DF110460S	**Date Analysed:**	11-Oct-11

DIOXINS			Acceptable Recovery		Pass/Fail	Int. Std
	LOF	Recovery	Min	Max		Recoveries
Congeners	pg	%	%	%		%
2,3,7,8-TCDD	200	96	80	120	Pass	66
1,2,3,7,8-PeCDD	1000	93	80	120	Pass	70
1,2,3,4,7,8-HxCDD	1000	102	80	120	Pass	-
1,2,3,6,7,8-HxCDD	1000	97	80	120	Pass	70
1,2,3,7,8,9-HxCDD	1000	111	80	120	Pass	-
1,2,3,4,6,7,8-HpCDD	1000	90	80	120	Pass	81
OCDD	2000	100	80	120	Pass	59

FURANS			Acceptable Recovery		Pass/Fail	Int. Std
	LOF	Recovery	Min	Max		Recoveries
Congeners	pg	%	%	%		%
2,3,7,8-TCDF	200	100	80	120	Pass	59
1,2,3,7,8-PeCDF	1000	114	80	120	Pass	57
2,3,4,7,8-PeCDF	1000	105	80	120	Pass	-
1,2,3,4,7,8-HxCDF	1000	85	80	120	Pass	-
1,2,3,6,7,8-HxCDF	1000	106	80	120	Pass	66
1,2,3,7,8,9-HxCDF	1000	86	80	120	Pass	-
2,3,4,6,7,8-HxCDF	1000	91	80	120	Pass	-
1,2,3,4,6,7,8-HpCDF	1000	120	80	120	Pass	64
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

Acronyms used in reporting dioxins and furans:

TCDD = Tetrachlorodibenzo-*p*-dioxin
PeCDD = Pentachlorodibenzo-*p*-dioxin
HxCDD = Hexachlorodibenzo-*p*-dioxin
HpCDD = Heptachlorodibenzo-*p*-dioxin
OCDD = Octachlorodibenzo-*p*-dioxin

TCDF = Tetrachlorodibenzofuran
PeCDF = Pentachlorodibenzofuran
HxCDF = Hexachlorodibenzofuran
HpCDF = Heptachlorodibenzofuran
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		

Appendix E

Quality Assurance Quality Control (QAQC) Result

Rescan™
Engineers and Scientists

Appendix E. Quality Assurance Quality Control (QAQC) 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 cubic feet per minute (cfm). All tests passed the code leak check requirements. Evidence of the leak checks is shown on each data sheet.

Equipment Calibrations

All emission monitoring equipment used for the Doris 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.

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.

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 five labelled surrogates ranged from 86 to 116. 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 45 to 90%, complying with EPS 1/RM/2 and Method 23 requirements of 40 to 130% recovery (except for 31% recovery of Octa dioxin for Run 3 only).

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. In summary the results are:

	Spike 1	Spike 2	Spike 3
Hg	96.5 % recovery	127% recovery	104% recovery

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.