Sears Canada Inc. Supplemental Soil Vapour Monitoring Point Installation and Monitoring Report November 2019

Hounsfield Heights and North Hill Mall

Calgary, Alberta

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13 January 2020 CG2430.1E38

Sears Canada Inc. Supplemental Soil Vapour Monitoring Point Installation and Monitoring Report November 2019

Hounsfield Heights and North Hill Mall Calgary, Alberta

Table of Contents

1.0 Introduction

Clifton Associates Ltd. (Clifton) is pleased to present this Supplemental Soil Vapour Monitoring Point Installation and Monitoring Report, November 2019 (Report) prepared for the account of Sears Canada Inc. (Sears) and to the stakeholders. The Report describes in detail the activities in the Hounsfield Heights community and North Hill Mall area within the City of Calgary (the Site) conducted by Clifton in November 2019.

Since 1998, site investigations have revealed the presence of PHCs in the subsurface soils and groundwater beneath City of Calgary properties in the Hounsfield Heights community in Calgary, Alberta. The source of the PHCs is suspected to be a former gasoline station on the property owned by Sears located at the North Hill Shopping Centre as stipulated in the 2014 Updated SMP. Evidence suggests that gasoline may have leaked from underground fuel storage tanks prior to their removal in the mid-1990s when the gasoline station was decommissioned.

As a part of the updated SMP for the Site, a community-wide soil vapour monitoring program has been carried out by Clifton since 2016. The monitoring program at the Site is conducted in accordance with the Clifton Associates Ltd.: *Sears Canada Inc., Revised Soil Vapour Monitoring Program (Update Fall 2016), Hounsfield Heights and North Hill Mall, Calgary, Alberta* document approved by the regulator (Alberta Environment and Parks), utilizing an established network of the soil vapour monitoring points at the Site shown in Appendix A, Figure 1.

2.0 Risk Management and Contingency Plan Implementation

2.1 Risk Management and Contingency Plan Trigger Event

The soil vapour analytical laboratory results collected during the Winter 2019 sampling event conducted in January showed that vapour migration from groundwater or soil at the Site in the vicinity of the soil vapour monitoring point SV32 might be an active exposure pathway of concern for indoor vapour inhalation. Soil vapour sample ID SV32/1421 collected on 31 January 2019 exceeded the Site-specific guidelines for soil vapour quality as follows:

- Petroleum hydrocarbons Aliphatic sub-fraction C6 – C8: recorded value 1,220,000 µg/m3 (Site-specific soil vapour quality guideline: 915,445 µg/m3);
- Napthalene: recorded value (up to) 1,200 µg/m3 (Site-specific soil vapour quality guideline: 103 µg/m3); and
- 1,2 – Dichloroethane: recorded value (up to) 180 µg/m3 (Site-specific soil vapour quality guideline: 40 µg/m3).

Based upon the above findings, implementation of the regulator-approved Risk Management and Contingency Plan (RMCP) for the Site per the *Revised Soil Vapour Monitoring Program (Update Fall*

2016), Hounsfield Heights and North Hill Mall, Calgary, Alberta (October 2016) document, was recommended. The RMCP implementation included the following steps:

- Increasing soil vapour monitoring frequency to quarterly in the area of the concern;
- Communicating exceedance and proposed course of further action to the regulator and owners of the potentially affected properties;
- Establishing lines of communication with the property owners; arranging meeting outlining reasons for an additional environmental work at the property; discussing with the owner available options; and, obtaining the owner's approval with one of the following options (options stated in the order from the most to the least desirable):
  - Sub-slab monitoring point installation, followed by concurrent sampling of the sub-slab soil vapour and indoor air quality;
  - Additional installation of at least one (but ideally two) external monitoring points located between structure and contaminant source in an approximate distance of 1.0 m from foundation to a depth of 1.0 m below foundation to be sampled concurrently with indoor air quality; and
  - Standalone indoor air quality sampling.

The RMCP is described in greater detail in Section 7.0 of the Clifton report titled *Revised Soil Vapour Monitoring Program (Update Fall 2016), Hounsfield Heights and North Hill Mall, Calgary, Alberta (20 October 2016).* As a summary, any concentrations of soil vapour which are within 90-100% of the soil vapour quality guidelines, or exceed the guidelines, require the frequency of sampling to increase to quarterly. In addition, any residences within a 15 m radius of the exceedance are to be contacted in an effort to obtain additional soil vapour quality data from their properties. This may include the advancement of shallow vapour probes, sub-slab vapour probes, obtaining an indoor air sample or a combination of any of the three options.

2.2 Communication with the Property-Owners

Considering the location of SV32, six properties were identified within the RMCP radius. In May 2019, the owners of one of the properties located within the RMCP radius of SV32 granted their approval to proceed with an installation of the additional soil vapour monitoring points.

Clifton installed two additional soil vapour monitoring points in the immediate vicinity of the subject property on 13 May 2019. Both monitoring points were installed in an approximate distance of 1.0 m from the foundations of the residence. A total installation depth of 1.0 m bgs was selected considering water table elevation at the location. One of the points (ID SV321) was installed directly between soil vapour monitoring point SV32 and the residence. Soil vapour monitoring point SV322 was installed along the west wall of the residence.

Subsequently, the owners of one of the residential properties within the RMCP radius located at 15th Street NW granted their approval to install an additional soil vapour monitoring point in November 2019.

Following the property-owners' consent, Clifton installed one additional soil vapour monitoring point (marked as SV323) in the immediate vicinity of the subject property located at 15th Street NW. Installation location was selected in the line between SV32 and the property. The installation is approximately 1 m away from the foundations of the structure and has an installation depth of 1.0 m bgs.

The installation locations are shown in Appendix A, Figure 1.

2.3 Soil Vapour Monitoring Point Installation

Monitoring points were developed by inserting stainless steel permanent soil vapour implant equipped by stainless steel mesh and PTFE umbrella into a borehole opened by hand auger. The sampling implant was surrounded by approximately 0.3 m of coarse sand. A competent seal was constructed above the screened zone by using hydraulic cement hydrated in three lifts by distilled water. The installation was finished by attaching a brass needle valve with compression cap at the end of the sampling train and mounting a flush-mounted 101.6 mm casted aluminum cover for protection against elements over the sampling point.

"As-built" cross section for the installed soil vapour monitoring points is shown in Appendix A, Figure 2.

3.0 Supplemental Soil Vapour Monitoring Methodology

3.1 Soil Vapour Monitoring Points

Where applicable, newly installed monitoring points were allowed to equilibrate for at least 48-hours. The points were subsequently purged by the SKC PGX-R8 vacuum pump calibrated for a flow rate of 70 mL/min for 20 minutes. Purging vacuum rate thus did not exceeded 10" (254 mm) of water column in order to avoid excessive moisture influx to the radius of influence.

Clifton used as soil vapour sampling media 1.4L Summa canisters, which were proofed and cleaned by the laboratory as per the United States Environmental Protection Agency (USEPA) reference method TO-14A. The sampling train included: an orifice equipped flow controller calibrated for a sampling rate between 20-200 mL/min; and, a length of the dedicated PTFE tubing with stainless steel fitting to connect to a valve at the top of the soil vapour monitoring point. Collected soil vapour samples were forwarded under the Chain-of-Custody protocols to Bureau Veritas for analyses.

3.2 QA/QC

A comprehensive QA/QC program was implemented to ensure that the sampling and analyses follow established protocols and provide defendable, representative results. The program included all aspects of data collection from the field to the laboratory.

The field QA/QC consisted of the following components:

- Labelling air sampling containers with the specific sample number to ensure adequate identification;
- Using laboratory-prepared batch-proofed and cleaned air sampling containers cleaned as per USEPA TO-14A reference method;
- Conducting an integrity 15-minutes shut-in vacuum test on sampling trains;
- Conducting helium tracer competent seal integrity testing;
- Measuring initial and final vacuum levels by the independent, standalone gauge to ensure sample validity;
- Forwarding collected samples under the Chain-of -Custody protocols to Bureau Veritas; and
- Reviewing the laboratory quality assurance data (laboratory duplicates, spikes, chromatogram records).

4.0 Sampling Results

4.1 External Soil Vapour Monitoring Point

Clifton carried out the soil vapour monitoring event at the Site on 12 November 2019. An additional soil vapour sample was collected from the external monitoring point SV32 in accordance with the requirement of the Risk Management and Contingency plan for an increased sampling frequency at this point. There were no recorded exceedances for the investigated Contaminants of Potential Concern (CoPC) compared either to the Soil Vapour Quality Guidelines (SVQG) protective of indoor air quality or to the increased monitoring frequency trigger values.

Complete analytical results for SV32 are presented in Appendix B, Table 3.

4.2 Estimates of Indoor Air Quality - Residential Property at 10th Avenue NW

A rough estimate of indoor air quality is based on the soil vapour samples collected from the nearest soil vapour monitoring points. The sample from the soil vapour monitoring point SV321 was therefore used to estimate indoor air quality for the subject property located at 10th Avenue NW. Although this monitoring point has an installation depth 1.0 m bgs, and is located approximately 1.0 m outside of the structure foundations, no allowance was made for either vertical, or horizontal biodegradation to add a level of conservativism to the estimate. Analytical results for this sample was therefore compared to SVQG based on default attenuation factors. No exceedances for CoPC criteria protective of indoor air quality were recorded.

The sample collected from the soil vapour monitoring point SV322 was considered as non-representative due to the loss of vacuum during transport to the analytical laboratory caused possibly by a leaking sampler valve. This sample was therefore not evaluated.

Analytical results for soil vapour monitoring point SV321 are presented in Appendix B, Table 1.

4.3 Estimates of Indoor Air Quality - Residential Property at 15th Street NW

A rough estimate of indoor air quality is based on the soil vapour samples collected from the nearest soil vapour monitoring points. The sample from the soil vapour monitoring point SV323 was therefore used to estimate indoor air quality for the subject property located at 15th Street NW. Although this monitoring point has an installation depth 1.0 m bgs, and is located approximately 1.0 m outside of the structure foundations, no allowance was made for either vertical, or horizontal biodegradation to add a level of conservativism to the estimate. Analytical results for this sample was therefore compared to SVQG based on default attenuation factors. No exceedances for CoPC criteria protective of indoor air quality were recorded.

Analytical results for soil vapour monitoring point SV323 are presented in Appendix B, Table 2.

4.4 QA/QC Results

Prior to the sampling, soil vapour monitoring points were tested for seal integrity by helium tracer gas method. Test results are summarized in Appendix C. The threshold limit applied was at least 95% differential between initial and final concentration of He in the shroud. All soil vapour monitoring points passed these integrity criteria.

Soil vapour sample collected from the soil vapour monitoring point SV322 was considered as non-representative due to the loss of vacuum during transport to the analytical laboratory caused possibly by a leaking sampler valve. This sample was therefore not evaluated.

Soil vapour samples from the soil vapour monitoring points SV32, SV321 and SV323 can be considered as representative based on the QA/QC criteria.

5.0 Discussion of Results and Recommendations

The soil vapour analytical laboratory results collected during the supplemental sampling event on 12 November 2019 showed that a potential vapour intrusion pathway into the subject structures located at 10th Avenue NW, and 15th Street NW, respectively, should not pose immediate health risk for the occupants at the moment, and therefore, an immediate application of exposure controls is not deemed necessary.

There were no recorded exceedances for the investigated CoPCs when compared to either to the SVQG protective of indoor air quality, soil vapour remediation guidelines protective of indoor air quality for a commercial building, or to the increased monitoring frequency trigger values. However, considering known temporal and spatial variations in soil vapour concentrations, vapour migration from groundwater or soil at the Site in the vicinity of the soil vapour monitoring point SV32 is still to be considered as an exposure pathway of a potential concern for indoor vapour inhalation.

In view of the above mentioned, the recommended further course of action at the Site should include the following steps:

- Soil vapour monitoring point SV32 should still be sampled seasonally (i.e., four times a year) until five consecutive readings below 90% of SVQG for all investigated CoPC are recorded, or until instructed by the regulator otherwise;
- Soil vapour monitoring points SV32, SV321, SV322 and SV323 should be re-sampled during January or February 2020 to confirm that the exposure pathway for indoor vapour inhalation is not active at the times of a year with minimum biodegradation and maximum stack effect;
- Organic vapour (OVA) concentrations in two groundwater monitoring wells in the proximity of SV32 (BH1941 and BH1942) should be measured and recorded at the time of the soil vapour sampling event; and
- Soil vapour monitoring points SV321, SV322 and SV323 should be automatically re-sampled in the case of any future SVQG exceedances recorded at SV32 or recorded elevated OVA readings at BH1941 or BH1942.

Possible future mitigation actions/exposure control implementation at the Site will depend on the results obtained from additional environmental investigation described above.

6.0 Closure

This report was prepared by Clifton Associates Ltd. for the account of Sears Canada Inc. The material in it reflects Clifton Associates Ltd. best judgment available to it at the time of preparation. Any use that a third party makes of this report, or any reliance on or decisions to be made based on it, are the responsibility of such third parties. Clifton Associates Ltd. accepts no responsibility for damages, if any, suffered by any third party as a result of decisions made or actions based on this report.

This report has been prepared in accordance with generally accepted engineering practice common to the local area. No other warranty expressed or implied is made.

This report focuses exclusively at indoor air quality in the investigated buildings. No conclusions should be made based on this report regarding any concentrations of substances in other areas of the Site. Other Contaminants of Concern may be present at the Site in areas that were not investigated. Clifton Associates Ltd. accepts no responsibility for any deficiencies or inaccuracies in the information provided in this report that are the direct result of intentional or unintentional misrepresentations, errors or omissions of the persons interviewed, or information reviewed.

No environmental site investigation or remediation can wholly eliminate uncertainty regarding environmental conditions in connection with a property. This investigation is intended to reduce, but not eliminate the uncertainty regarding environmental conditions. Conclusions regarding the condition of the

Site do not represent a warranty that all areas within the site and beneath structures are of the same quality as those sampled. Further, contamination could also exist in forms not indicated by the investigation.

The work was based in part upon the environmental quality guidelines and regulations in effect when the work was begun. Future regulatory changes may require reassessment of the findings of this investigation.

Yours truly,
Clifton Associates Ltd.

PROFESSIONAL ENGINEER DANIEL BUDAI ALBERTA
13 January 2020

PROFESSIONAL GEOLOGIST WILLIAM MORGAN ALBERTA
13 January 2020

Daniel Budai P.Eng.
Environmental Engineer

William R. Morgan, P.Geol.
Senior Environmental Geologist

Association of Professional Engineers
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Permit to Practice P04823

Reference List

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Clifton Associates Ltd.: *Sears Canada Inc., Soil Vapour Monitoring Points Installation Report, Hounsfield Heights and North Hill Mall, Calgary, Alberta*, 20 October 2016.

Appendix A

Clifton Associates
Figures

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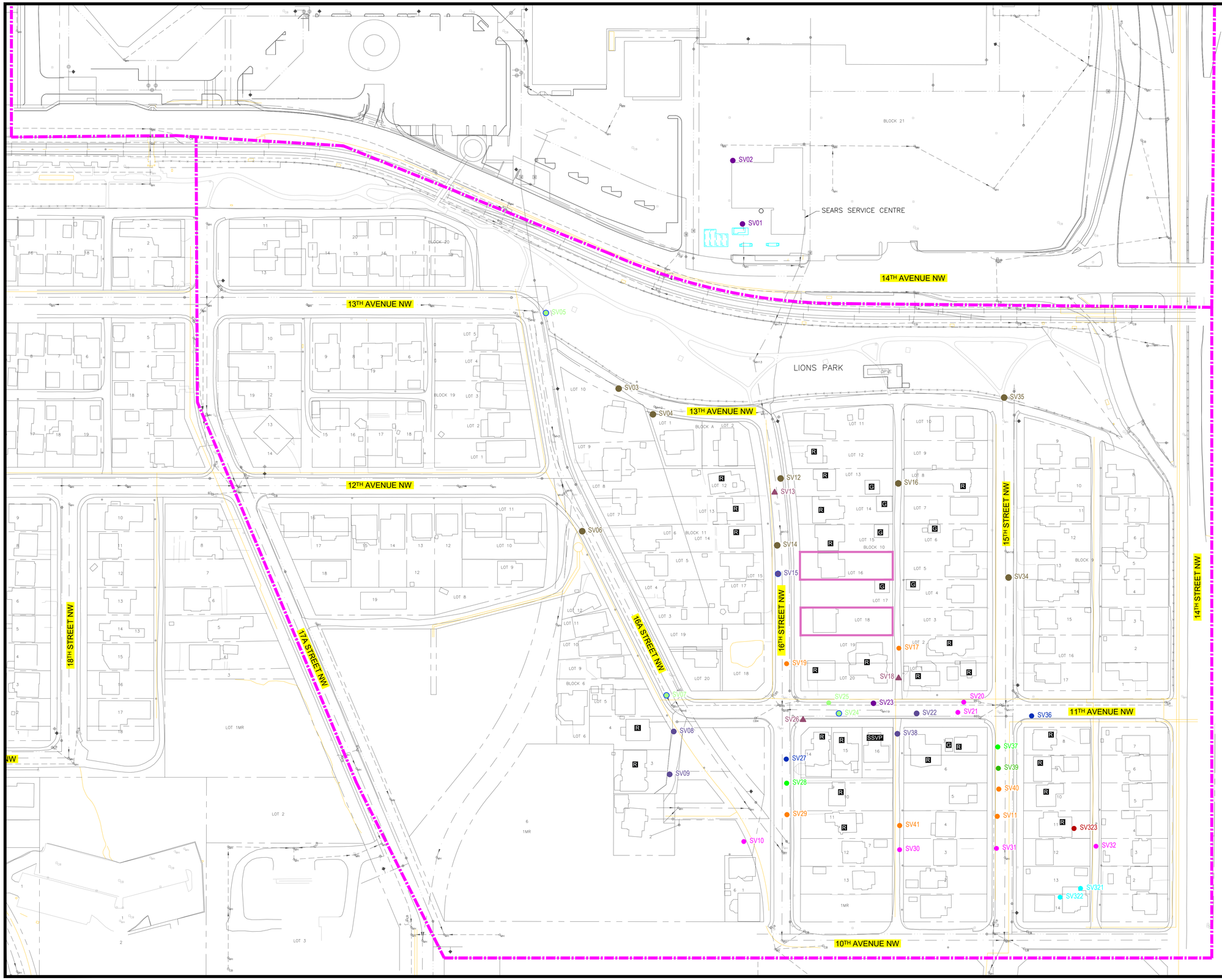

LEGEND

SITE BOUNDARY	
LRT TRACKS	
FENCE LINE	
LEGAL LINE	
FORMER FACILITY/FEATURE	
BUILDING	
SOIL VAPOUR PROBES INSTALLED AT 1.0 mbgs	SV#
SOIL VAPOUR PROBES INSTALLED AT 1.5 mbgs	SV#
SOIL VAPOUR PROBES INSTALLED AT 2.0 mbgs	SV#
SOIL VAPOUR PROBES INSTALLED AT 2.5 mbgs	SV#
SOIL VAPOUR PROBES INSTALLED AT 3.0 mbgs	SV#
SOIL VAPOUR PROBES INSTALLED AT 3.5 mbgs	SV#
SOIL VAPOUR PROBES INSTALLED AT 4.0 mbgs	SV#
SOIL VAPOUR PROBES INSTALLED AT 4.5 mbgs	SV#
SOIL VAPOUR PROBES INSTALLED AT 5.0 mbgs	SV#
SOIL VAPOUR PROBES INSTALLED AT 5.5 mbgs	SV#
SOIL VAPOUR PROBES INSTALLED AT 6.0 mbgs	SV#
NESTED SOIL VAPOUR MONITORING POINT	SV#
ADDITIONAL SOIL VAPOUR MONITORING POINTS INSTALLED IN MAY 2019	SV#
ADDITIONAL SOIL VAPOUR MONITORING POINTS INSTALLED IN NOVEMBER 2019	SV#
RESIDENTIAL STRUCTURES WITH REPORTED UNUSUAL FEATURES (EARTHEN FLOORS)	
RESIDENTIAL	R
DETACHED GARAGE	G
SUB-SLAB SOIL VAPOUR POINT	SSVP

UTILITY LINES & SYMBOLS

NATURAL GAS LINE	
SANITARY SEWER	
STORM SEWER	
WATER	
CATCH BASIN	
FIRE HYDRANT	
LIGHT STANDARD	
MANHOLE	
UTILITY POLE	

NOTES:

1 DRAWING COMPILED FROM PLANIMETRIC FILES SUPPLIED BY THE CITY OF CALGARY (INCLUDING U/G UTILITIES) & FROM SITE ASSESSMENT INFORMATION. ADDITIONAL REFERENCES FROM SEACOR ENVIRONMENTAL ENGINEERING INC., DRAWINGS 149-5A11.DWG, 149-5A8.DWG.

0 10 20 30 40 50 m

PLOT SIZE 22x34

ENGINEER

Clifton

CLIENT

SEARS

PROJECT SUPPLEMENTAL SOIL VAPOUR MONITORING POINT INSTALLATION & MONITORING REPORT NOVEMBER 2019
HOUNSFIELD HEIGHTS AND NORTH HILL MALL
CALGARY, ALBERTA

TITLE

SOIL VAPOUR MONITORING POINTS INSTALLATION LAYOUT (AS OF NOVRMBER 2019)

DESIGNED	SCALE	DATE
KD	1:1000	2019-11-18
DRAWN	PROJECT NO.	FIG.
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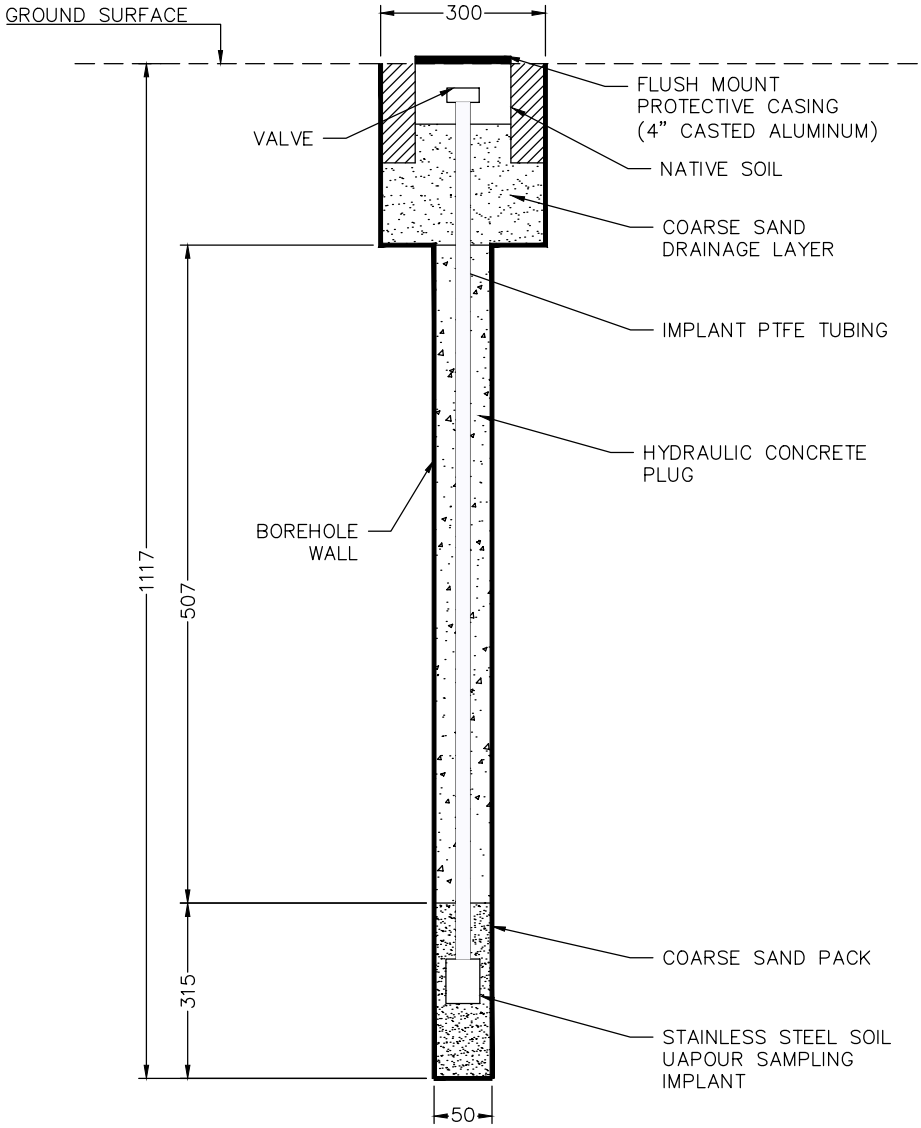
CHECKED	FILE NO.	
DB	CG2430.1-E38	



ENGINEER: Clifton		PROJECT: SUPPLEMENTAL SOIL VAPOUR MONITORING POINT INSTALLATION & MONITORING REPORT NOVEMBER 2019 HOUNSFIELD HEIGHTS AND NORTH HILL MALL CALGARY, ALBERTA	SCALE: NTS
CLIENT: SEARS		TITLE: SOIL VAPOUR MONITORING POINT SV323 "AS BUILT" CROSS SECTION	DRAWING NO.: 2
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Appendix B

Clifton Associates
Analytical Results Tables

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Table 1 - Summary of Soil Vapour Laboratory Analysis

Chemicals of Potential Concern & Matrix Gases in Soil Vapour

Estimate of Indoor Air Quality for Residential Property at 10th Avenue NW, Calgary, Alberta

Sample ID	321	322	Guideline[1]	RDL
Sampling Date	12-Nov-19			
Parameter				
Benzene	<0.32	ND	3.0E+02	0.32
Toluene	<0.38	ND	1.9E+05	0.38
Ethylbenzene	<0.43	ND	5.0E+04	0.43
Xylenes	<1.3	ND	8.9E+03	1.3
Aliphatic C6-C8[2]	<10.0	ND	9.2E+05	10.0
Aliphatic C8-C10	<5.0	ND	4.8E+04	5.0
Aromatic C8-C10	14.2	ND	8.1E+03	5.0
Aliphatic >C10-C12	7.9	ND	5.0E+04	5.0
Aliphatic >C12-C16	<5.0	ND	5.0E+04	5.0
Aromatic >C10-C12	<5.0	ND	1.0E+04	5.0
Aromatic >C12-C16	<5.0	ND	1.0E+04	5.0
1,2-Dichloroethane (1,2-DCA)	<0.40	ND	4.0E+01	0.40
Naphtalene	<1.0	ND	1.0E+02	1.0
Oxygen (% v/v)	22.7	ND	NG	0.1
Nitrogen (% v/v)	77.2	ND	NG	0.1
Methane (% v/v)	<0.2	ND	NG	0.1
Carbon Dioxide (% v/v)	<0.2	ND	NG	0.1

Notes:

1 Soil vapour quality guidelines protective of indoor air quality for a residential building on fine-textured soil, depth < 100 cm, Intrinsik 31/8/2016

Indicates that the concentration exceeds guideline

2 Aliphatic C6-C8 values calculated by summing Aliphatic >C5-C6 and Aliphatic >C6-C8 fractions

RDL Reportable Detection Limit

ND No data available

NG No applicable guideline

All results are expressed as $\mu g/m^3$ unless otherwise noted.

Testing was conducted by Bureau Veritas

Clifton Associates

Job No.	CG2430.1E38
Client	Sears Canada Inc.
Project	SSVMP, Fall 2019
Location	Calgary, Alberta

Table 2- Summary of Soil Vapour Laboratory Analysis

Chemicals of Potential Concern & Matrix Gases in Soil Vapour

Estimate of Indoor Air Quality for Residential Property at 15th Street NW, Calgary, Alberta

Sample ID	323	Guideline[1]	RDL
Sampling Date	12-Nov-19		
Parameter			
Benzene	0.52	3.0E+02	0.32
Toluene	1.57	1.9E+05	0.38
Ethylbenzene	<0.43	5.0E+04	0.43
Xylenes	<1.3	8.9E+03	1.3
Aliphatic C6-C8[2]	<10.0	9.2E+05	10.0
Aliphatic C8-C10	<5.0	4.8E+04	5.0
Aromatic C8_C10	<5.0	8.1E+03	5.0
Aliphatic >C10-C12	18.0	5.0E+04	5.0
Aliphatic >C12-C16	<5.0	5.0E+04	5.0
Aromatic >C10-C12	<5.0	1.0E+04	5.0
Aromatic >C12-C16	<5.0	1.0E+04	5.0
1,2-Dichloroethane (1,2-DCA)	<0.40	4.0E+01	0.40
Naphthalene	<1.0	1.0E+02	1.0
Oxygen (% v/v)	22.5	NG	0.1
Nitrogen (% v/v)	77.5	NG	0.1
Methane (% v/v)	<0.1	NG	0.1
Carbon Dioxide (% v/v)	<0.1	NG	0.1

Notes:

1 Soil vapour quality guidelines protective of indoor air quality for a residential building on fine-textured soil, depth < 100 cm, Intrinsik 31/8/2016

Indicates that the concentration exceeds guideline

2 Aliphatic C6-C8 values calculated by summing Aliphatic >C5-C6 and Aliphatic >C6-C8 fractions

RDL Reportable Detection Limit

NG No applicable guideline

All results are expressed as µg/m^3 unless otherwise noted.

Testing was conducted by Bureau Veritas

Clifton Associates

Job No.	CG2430.1E38
Client	Sears Canada Inc.
Project	SSVMP, Fall 2019
Location	Calgary, Alberta

Table 3 - Summary of Soil Vapour Laboratory Analysis
Chemicals of Potential Concern & Matrix Gases in Soil Vapour

Soil Vapour Sample - Residential Buildings - Installation Depth 1.0 m bgs

Sample ID	32	Guideline[1]	Guideline[2]	RDL
Sampling Date	12-Nov-19			
Parameter				
Benzene	0.51	3.0E+02	2.7E+02	0.32
Toluene	0.81	1.9E+05	1.7E+05	0.38
Ethylbenzene	<0.43	5.0E+04	4.5E+04	0.43
Xylenes	<1.3	8.9E+03	8.0E+03	1.3
Aliphatic C6-C8[3]	<56.3	9.2E+05	8.2E+05	10.0
Aliphatic C8-C10	<5.0	4.8E+04	4.3E+04	5.0
Aromatic C8_C10	<5.0	8.1E+03	7.3E+03	5.0
Aliphatic >C10-C12	<5.0	5.0E+04	4.5E+04	5.0
Aliphatic >C12-C16	<5.0	5.0E+04	4.5E+04	5.0
Aromatic >C10-C12	<5.0	1.0E+04	9.0E+03	5.0
Aromatic >C12-C16	<5.0	1.0E+04	9.0E+03	5.0
1,2-Dichloroethane (1,2-DCA)	<0.40	4.0E+01	3.6E+01	0.40
Naphthalene	<1.0	1.0E+02	9.3E+01	1.0
Oxygen (% v/v)	17.3	NG	NG	0.1
Nitrogen (% v/v)	82.1	NG	NG	0.1
Methane (% v/v)	<0.1	NG	NG	0.1
Carbon Dioxide (% v/v)	0.6	NG	NG	0.1

Notes:

1 Soil vapour quality guidelines protective of indoor air quality for a residential building on fine-textured soil, depth < 100 cm, Intrinsik 31/8/2016

Indicates that the concentration exceeds guideline

2 Inreased monitoring frequency trigger values

RDL Reportable Detection Limit

3 Aliphatic C6-C8 values calculated by summing Aliphatic >C5-C6 and Aliphatic >C6-C8 fractions

NG No applicable guideline

All results are expressed as µg/m^3 unless otherwise noted.

Testing was conducted by Bureau Veritas

Clifton Associates

Job No.	CG2430.1E38
Client	Sears Canada Inc.
Project	SSVMP, Fall 2019
Location	Calgary, Alberta

Appendix C

Clifton Associates
QA/QC Tables

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Summary of Soil Vapour Monitoring Points Integrity Testing by Helium Tracer

SVMP ID		SV32	SV321	SV322	SV323
Installation Date		01-Jun-16	13-Mar-19	13-Mar-19	08-Nov-19
Testing Date Date		12-Nov-19	12-Nov-19	12-Nov-19	12-Nov-19
Helium Analyzer	**Units**	MGD 2002	MGD 2002	MGD 2002	MGD 2002
Initial Recorded He Shroud Concentration	%	27.6	28.1	24.9	26.0
Final Recorded He Concentration in Sampling Train after Purge	%	0.12	0.05	0.04	0.00
Difference	%	99.57	99.82	99.84	100.00
Integrity Test Result	PASS/FAIL	**PASS**	**PASS**	**PASS**	**PASS**

Notes:

He 99.99% commercial grade helium tracer
Testing conducted by Clifton Associates Ltd.

Testing Threshold Difference 95% or more between initial and final He concentration

Clifton Associates

Job No.	CG2430.1E38
Client	Sears Canada Inc.
Project	SSVMP, Fall 2019
Location	Calgary, Alberta

Appendix D

Clifton Associates
Meteorological Data

Clifton Associates

Calgary Office
2222 30th Avenue NE
Calgary, Alberta T2E 7K9

T (403) 263 2556
F (403) 234 9033

calgary@clifton.ca
www.clifton.ca

Meteorological Data Record for 12 November 2019[1]

Average Temperature: 5 degC

Average Wind Speed: 9 km/h

Wind Direction: N

Average Barometric pressure: 101.22 kPa

Tendency: Falling

[1] Based on the Calgary International Airport Data

Appendix E

Clifton Associates
Certificates of Analysis

Clifton Associates

Calgary Office
2222 30th Avenue NE
Calgary, Alberta T2E 7K9

T (403) 263 2556
F (403) 234 9033

calgary@clifton.ca
www.clifton.ca

Your Project #: CG2430.IE38
Your C.O.C. #: 41783

Attention: Stephen Dabadie

Clifton Associates Ltd.
2222 30 Ave. NE
Calgary, AB
CANADA T2E 7K9

Report Date: 2019/11/28
Report #: R5983813
Version: 1 - Final

CERTIFICATE OF ANALYSIS

BV LABS JOB #: B9W0500
Received: 2019/11/14, 08:38

Sample Matrix: Air
Samples Received: 3

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Analytical Method
BTEX and CCME Compounds in Air(TO-15mod)	3	N/A	2019/11/22	BRL SOP-00304	EPA TO-15 m
BTEX Fractionation in Air (TO-15mod)	3	N/A	2019/11/22	BRL SOP-00304	EPA TO-15 m
Canister Pressure (TO-15)	3	N/A	2019/11/22	BRL SOP-00304	EPA TO-15 m
Matrix Gases (1)	3	N/A	2019/11/26	CAM SOP-00225	GC/TCD
Volatile Organics in Air (ug/m3)	3	N/A	2019/11/25	BRL SOP-00304	EPA TO-15 m
Volatile Organics in Air (TO-15) (2)	3	N/A	2019/11/22	BRL SOP-00304	EPA TO-15 m

Remarks:

Bureau Veritas Laboratories are accredited to ISO/IEC 17025 for specific parameters on scopes of accreditation. Unless otherwise noted, procedures used by BV Labs are based upon recognized Provincial, Federal or US method compendia such as CCME, MELCC, EPA, APHA.

All work recorded herein has been done in accordance with procedures and practices ordinarily exercised by professionals in BV Labs profession using accepted testing methodologies, quality assurance and quality control procedures (except where otherwise agreed by the client and BV Labs in writing). All data is in statistical control and has met quality control and method performance criteria unless otherwise noted. All method blanks are reported; unless indicated otherwise, associated sample data are not blank corrected. Where applicable, unless otherwise noted, Measurement Uncertainty has not been accounted for when stating conformity to the referenced standard.

BV Labs liability is limited to the actual cost of the requested analyses, unless otherwise agreed in writing. There is no other warranty expressed or implied. BV Labs has been retained to provide analysis of samples provided by the Client using the testing methodology referenced in this report. Interpretation and use of test results are the sole responsibility of the Client and are not within the scope of services provided by BV Labs, unless otherwise agreed in writing. BV Labs is not responsible for the accuracy or any data impacts, that result from the information provided by the customer or their agent.

Solid sample results, except biota, are based on dry weight unless otherwise indicated. Organic analyses are not recovery corrected except for isotope dilution methods.
Results relate to samples tested. When sampling is not conducted by BV Labs, results relate to the supplied samples tested.
This Certificate shall not be reproduced except in full, without the written approval of the laboratory.
Reference Method suffix “m” indicates test methods incorporate validated modifications from specific reference methods to improve performance.
* RPDs calculated using raw data. The rounding of final results may result in the apparent difference.
(1) Argon interferes with Oxygen and is included in the reported Oxygen concentration. The atmosphere contains about 0.9% Argon.
(2) Air sampling canisters have been cleaned in accordance with U.S. EPA Method TO15. At the end of the cleaning, evacuation, and pressurization cycles, one canister was selected and was pressurized with Zero Air. This canister was then analyzed via TO15 on a GC/MS. The canister must have been found to contain <0.2 ppbv concentration of all target analytes in order for the batch to have been considered clean. Each canister also underwent a leak check prior to shipment.

Please Note: SUMMA® canister samples will be retained by Bureau Veritas Laboratories for a period of 5 calendar days or as contractually agreed from the date of this report, after which time they will be cleaned for reuse. If you require a longer sample storage period, please contact your service representative.

55555 North Service Road, Burlington, Ontario, Canada L7L 5H7 Tel: (905) 332-8788 Toll Free: (800) 668-0639 Fax: (905) 332-9169

Your Project #: CG2430.IE38
Your C.O.C. #: 41783

Attention: Stephen Dabadie

Clifton Associates Ltd.
2222 30 Ave. NE
Calgary, AB
CANADA T2E 7K9

Report Date: 2019/11/28
Report #: R5983813
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CERTIFICATE OF ANALYSIS

BV LABS JOB #: B9W0500
Received: 2019/11/14, 08:38

Encryption Key

Cristina (Maria) Bacchus
Project Manager
28 Nov 2019 13:59:42

Please direct all questions regarding this Certificate of Analysis to your Project Manager.
Cristina (Maria) Bacchus, Project Manager
Email: MariaCristina.Bacchus@bvlabs.com
Phone# (905)817-5763
==========
BV Labs has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per ISO/IEC 17025, signing the reports. For Service Group specific validation please refer to the Validation Signature Page.

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BV Labs Job #: B9W0500
Report Date: 2019/11/28

Clifton Associates Ltd.
Client Project #: CG2430.IE38
Sampler Initials: DB

RESULTS OF ANALYSES OF AIR

BV Labs ID		LHN073	LHN074	LHN075	
Sampling Date		2019/11/12	2019/11/12	2019/11/12	
COC Number		41783	41783	41783	
	UNITS	**321**	**32**	**323**	**QC Batch**
Volatile Organics					
Pressure on Receipt	psig	(-2.2)	(-2.2)	(-2.9)	6458117
QC Batch = Quality Control Batch					

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BV Labs Job #: B9W0500
Report Date: 2019/11/28

Clifton Associates Ltd.
Client Project #: CG2430.IE38
Sampler Initials: DB

COMPRESSED GAS PARAMETERS (AIR)

BV Labs ID		LHN073	LHN073		LHN074	LHN075		
Sampling Date		2019/11/12	2019/11/12		2019/11/12	2019/11/12		
COC Number		41783	41783		41783	41783		
	UNITS	**321**	**321 Lab-Dup**	**RDL**	**32**	**323**	**RDL**	**QC Batch**
Fixed Gases								
Oxygen	% v/v	22.7	22.7	0.2	17.3	22.5	0.1	6463557
Nitrogen	% v/v	77.2	77.2	0.2	82.1	77.5	0.1	6463557
Methane	% v/v	<0.2	<0.2	0.2	<0.1	<0.1	0.1	6463557
Carbon Dioxide	% v/v	<0.2	<0.2	0.2	0.6	<0.1	0.1	6463557

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
Lab-Dup = Laboratory Initiated Duplicate

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BV Labs Job #: B9W0500
Report Date: 2019/11/28

Clifton Associates Ltd.
Client Project #: CG2430.IE38
Sampler Initials: DB

VOLATILE ORGANICS BY GC/MS (AIR)

BV Labs ID		LHN073		LHN074		LHN075		
Sampling Date		2019/11/12		2019/11/12		2019/11/12		
COC Number		41783		41783		41783		
	UNITS	**321**	**RDL**	**32**	**RDL**	**323**	**RDL**	**QC Batch**
Volatile Organics								
Dichlorodifluoromethane (FREON 12)	ppbv	0.55	0.20	0.54	0.20	0.47	0.20	6458022
1,2-Dichlorotetrafluoroethane	ppbv	<0.17	0.17	<0.17	0.17	<0.17	0.17	6458022
Chloromethane	ppbv	<0.30	0.30	0.43	0.30	0.42	0.30	6458022
Vinyl Chloride	ppbv	<0.10	0.10	<0.10	0.10	<0.10	0.10	6458022
Chloroethane	ppbv	<0.30	0.30	<0.30	0.30	<0.30	0.30	6458022
1,3-Butadiene	ppbv	<0.50	0.50	<0.50	0.50	<0.50	0.50	6458022
Trichlorofluoromethane (FREON 11)	ppbv	0.22	0.20	<0.20	0.20	<0.20	0.20	6458022
Ethanol (ethyl alcohol)	ppbv	<1.0	1.0	1.1	1.0	2.5	1.0	6458022
Trichlorotrifluoroethane	ppbv	<0.15	0.15	<0.15	0.15	<0.15	0.15	6458022
2-propanol	ppbv	<1.0	1.0	<1.0	1.0	<1.0	1.0	6458022
2-Propanone	ppbv	2.48	0.60	2.33	0.60	4.34	0.60	6458022
Methyl Ethyl Ketone (2-Butanone)	ppbv	<0.40	0.40	<0.50	0.50	<0.40	0.40	6458022
Methyl Isobutyl Ketone	ppbv	<0.20	0.20	<0.20	0.20	<0.20	0.20	6458022
Methyl Butyl Ketone (2-Hexanone)	ppbv	<1.0	1.0	<1.0	1.0	<1.0	1.0	6458022
Methyl t-butyl ether (MTBE)	ppbv	<0.20	0.20	<0.20	0.20	<0.20	0.20	6458022
Ethyl Acetate	ppbv	<1.0	1.0	<1.0	1.0	<1.0	1.0	6458022
1,1-Dichloroethylene	ppbv	<0.10	0.10	<0.10	0.10	<0.10	0.10	6458022
cis-1,2-Dichloroethylene	ppbv	<0.10	0.10	<0.10	0.10	<0.10	0.10	6458022
trans-1,2-Dichloroethylene	ppbv	<0.10	0.10	<0.10	0.10	0.18	0.10	6458022
Methylene Chloride(Dichloromethane)	ppbv	<0.60	0.60	<0.60	0.60	<0.60	0.60	6458022
Chloroform	ppbv	0.42	0.10	<0.10	0.10	<0.10	0.10	6458022
Carbon Tetrachloride	ppbv	<0.10	0.10	<0.10	0.10	<0.10	0.10	6458022
1,1-Dichloroethane	ppbv	<0.10	0.10	<0.10	0.10	<0.10	0.10	6458022
1,2-Dichloroethane	ppbv	<0.10	0.10	<0.10	0.10	<0.10	0.10	6458022
Ethylene Dibromide	ppbv	<0.10	0.10	<0.10	0.10	<0.10	0.10	6458022
1,1,1-Trichloroethane	ppbv	<0.10	0.10	<0.10	0.10	<0.10	0.10	6458022
1,1,2-Trichloroethane	ppbv	<0.10	0.10	<0.10	0.10	<0.10	0.10	6458022
1,1,2,2-Tetrachloroethane	ppbv	<0.10	0.10	<0.10	0.10	<0.10	0.10	6458022
cis-1,3-Dichloropropene	ppbv	<0.10	0.10	<0.10	0.10	<0.10	0.10	6458022
trans-1,3-Dichloropropene	ppbv	<0.10	0.10	<0.10	0.10	<0.10	0.10	6458022
1,2-Dichloropropane	ppbv	<0.10	0.10	<0.10	0.10	<0.10	0.10	6458022
Bromomethane	ppbv	<0.10	0.10	<0.10	0.10	<0.10	0.10	6458022
Bromoform	ppbv	<0.20	0.20	<0.20	0.20	<0.20	0.20	6458022
Bromodichloromethane	ppbv	<0.20	0.20	<0.20	0.20	<0.20	0.20	6458022
Dibromochloromethane	ppbv	<0.20	0.20	<0.20	0.20	<0.20	0.20	6458022
Trichloroethylene	ppbv	<0.10	0.10	<0.10	0.10	<0.10	0.10	6458022

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

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BV Labs Job #: B9W0500
Report Date: 2019/11/28

Clifton Associates Ltd.
Client Project #: CG2430.IE38
Sampler Initials: DB

VOLATILE ORGANICS BY GC/MS (AIR)

BV Labs ID		LHN073		LHN074		LHN075		
Sampling Date		2019/11/12		2019/11/12		2019/11/12		
COC Number		41783		41783		41783		
	UNITS	**321**	**RDL**	**32**	**RDL**	**323**	**RDL**	**QC Batch**
Tetrachloroethylene	ppbv	<0.10	0.10	<0.10	0.10	0.56	0.10	6458022
Benzene	ppbv	<0.10	0.10	0.16	0.10	0.16	0.10	6458022
Toluene	ppbv	<0.10	0.10	0.22	0.10	0.42	0.10	6458022
Ethylbenzene	ppbv	<0.10	0.10	<0.10	0.10	<0.10	0.10	6458022
p+m-Xylene	ppbv	<0.20	0.20	<0.20	0.20	0.27	0.20	6458022
o-Xylene	ppbv	<0.10	0.10	<0.10	0.10	<0.10	0.10	6458022
Styrene	ppbv	<0.10	0.10	<0.10	0.10	<0.10	0.10	6458022
4-ethyltoluene	ppbv	<0.50	0.50	<0.50	0.50	<0.50	0.50	6458022
1,3,5-Trimethylbenzene	ppbv	<0.50	0.50	<0.50	0.50	<0.50	0.50	6458022
1,2,4-Trimethylbenzene	ppbv	<0.50	0.50	<0.50	0.50	<0.50	0.50	6458022
Chlorobenzene	ppbv	<0.10	0.10	<0.10	0.10	<0.10	0.10	6458022
Benzyl chloride	ppbv	<0.50	0.50	<0.50	0.50	<0.50	0.50	6458022
1,3-Dichlorobenzene	ppbv	<0.40	0.40	<0.40	0.40	<0.40	0.40	6458022
1,4-Dichlorobenzene	ppbv	<0.10	0.10	<0.10	0.10	<0.10	0.10	6458022
1,2-Dichlorobenzene	ppbv	<0.10	0.10	<0.10	0.10	<0.10	0.10	6458022
1,2,4-Trichlorobenzene	ppbv	<0.50	0.50	<0.50	0.50	<0.50	0.50	6458022
Hexachlorobutadiene	ppbv	<0.50	0.50	<0.50	0.50	<0.50	0.50	6458022
Hexane	ppbv	0.27	0.20	0.25	0.20	<0.20	0.20	6458022
Heptane	ppbv	<0.30	0.30	<0.30	0.30	<0.30	0.30	6458022
Cyclohexane	ppbv	<0.20	0.20	<0.20	0.20	<0.20	0.20	6458022
Tetrahydrofuran	ppbv	<0.40	0.40	<0.40	0.40	<0.40	0.40	6458022
1,4-Dioxane	ppbv	<1.0	1.0	<1.0	1.0	<1.0	1.0	6458022
Naphthalene	ppbv	<0.20	0.20	<0.20	0.20	<0.20	0.20	6458022
Total Xylenes	ppbv	<0.30	0.30	<0.30	0.30	<0.30	0.30	6458022
1,1,1,2-Tetrachloroethane	ppbv	<0.10	0.10	<0.10	0.10	<0.10	0.10	6458022
Vinyl Bromide	ppbv	<0.20	0.20	<0.20	0.20	<0.20	0.20	6458022
Propene	ppbv	1.64	0.50	3.94	0.50	0.64	0.50	6458022
2,2,4-Trimethylpentane	ppbv	<0.20	0.20	4.02	0.20	<0.20	0.20	6458022
Carbon Disulfide	ppbv	0.58	0.50	<0.50	0.50	<0.50	0.50	6458022
Vinyl Acetate	ppbv	<0.20	0.20	<0.20	0.20	<0.20	0.20	6458022
Surrogate Recovery (%)								
Bromochloromethane	%	92		96		93		6458022
D5-Chlorobenzene	%	89		93		89		6458022
Difluorobenzene	%	93		96		93		6458022

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

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BV Labs Job #: B9W0500
Report Date: 2019/11/28

Clifton Associates Ltd.
Client Project #: CG2430.IE38
Sampler Initials: DB

CALCULATED VOLATILE ORGANICS (AIR)

BV Labs ID		LHN073		LHN074		LHN075		
Sampling Date		2019/11/12		2019/11/12		2019/11/12		
COC Number		41783		41783		41783		
	UNITS	**321**	**RDL**	**32**	**RDL**	**323**	**RDL**	**QC Batch**
Calculated Parameters								
Dichlorodifluoromethane (FREON 12)	ug/m3	2.70	0.99	2.65	0.99	2.31	0.99	6441779
1,2-Dichlorotetrafluoroethane	ug/m3	<1.2	1.2	<1.2	1.2	<1.2	1.2	6441779
Chloromethane	ug/m3	<0.62	0.62	0.89	0.62	0.87	0.62	6441779
Vinyl Chloride	ug/m3	<0.26	0.26	<0.26	0.26	<0.26	0.26	6441779
Chloroethane	ug/m3	<0.79	0.79	<0.79	0.79	<0.79	0.79	6441779
1,3-Butadiene	ug/m3	<1.1	1.1	<1.1	1.1	<1.1	1.1	6441779
Trichlorofluoromethane (FREON 11)	ug/m3	1.3	1.1	<1.1	1.1	<1.1	1.1	6441779
Ethanol (ethyl alcohol)	ug/m3	<1.9	1.9	2.1	1.9	4.7	1.9	6441779
Trichlorotrifluoroethane	ug/m3	<1.2	1.2	<1.2	1.2	<1.2	1.2	6441779
2-propanol	ug/m3	<2.5	2.5	<2.5	2.5	<2.5	2.5	6441779
2-Propanone	ug/m3	5.9	1.4	5.5	1.4	10.3	1.4	6441779
Methyl Ethyl Ketone (2-Butanone)	ug/m3	<1.2	1.2	<1.5	1.5	<1.2	1.2	6441779
Methyl Isobutyl Ketone	ug/m3	<0.82	0.82	<0.82	0.82	<0.82	0.82	6441779
Methyl Butyl Ketone (2-Hexanone)	ug/m3	<4.1	4.1	<4.1	4.1	<4.1	4.1	6441779
Methyl t-butyl ether (MTBE)	ug/m3	<0.72	0.72	<0.72	0.72	<0.72	0.72	6441779
Ethyl Acetate	ug/m3	<3.6	3.6	<3.6	3.6	<3.6	3.6	6441779
1,1-Dichloroethylene	ug/m3	<0.40	0.40	<0.40	0.40	<0.40	0.40	6441779
cis-1,2-Dichloroethylene	ug/m3	<0.40	0.40	<0.40	0.40	<0.40	0.40	6441779
trans-1,2-Dichloroethylene	ug/m3	<0.40	0.40	<0.40	0.40	0.71	0.40	6441779
Methylene Chloride(Dichloromethane)	ug/m3	<2.1	2.1	<2.1	2.1	<2.1	2.1	6441779
Chloroform	ug/m3	2.06	0.49	<0.49	0.49	<0.49	0.49	6441779
Carbon Tetrachloride	ug/m3	<0.63	0.63	<0.63	0.63	<0.63	0.63	6441779
1,1-Dichloroethane	ug/m3	<0.40	0.40	<0.40	0.40	<0.40	0.40	6441779
1,2-Dichloroethane	ug/m3	<0.40	0.40	<0.40	0.40	<0.40	0.40	6441779
Ethylene Dibromide	ug/m3	<0.77	0.77	<0.77	0.77	<0.77	0.77	6441779
1,1,1-Trichloroethane	ug/m3	<0.55	0.55	<0.55	0.55	<0.55	0.55	6441779
1,1,2-Trichloroethane	ug/m3	<0.55	0.55	<0.55	0.55	<0.55	0.55	6441779
1,1,2,2-Tetrachloroethane	ug/m3	<0.69	0.69	<0.69	0.69	<0.69	0.69	6441779
cis-1,3-Dichloropropene	ug/m3	<0.45	0.45	<0.45	0.45	<0.45	0.45	6441779
trans-1,3-Dichloropropene	ug/m3	<0.45	0.45	<0.45	0.45	<0.45	0.45	6441779
1,2-Dichloropropane	ug/m3	<0.46	0.46	<0.46	0.46	<0.46	0.46	6441779
Bromomethane	ug/m3	<0.39	0.39	<0.39	0.39	<0.39	0.39	6441779
Bromoform	ug/m3	<2.1	2.1	<2.1	2.1	<2.1	2.1	6441779
Bromodichloromethane	ug/m3	<1.3	1.3	<1.3	1.3	<1.3	1.3	6441779
Dibromochloromethane	ug/m3	<1.7	1.7	<1.7	1.7	<1.7	1.7	6441779
Trichloroethylene	ug/m3	<0.54	0.54	<0.54	0.54	<0.54	0.54	6441779

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

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BV Labs Job #: B9W0500
Report Date: 2019/11/28

Clifton Associates Ltd.
Client Project #: CG2430.IE38
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CALCULATED VOLATILE ORGANICS (AIR)

BV Labs ID		LHN073		LHN074		LHN075		
Sampling Date		2019/11/12		2019/11/12		2019/11/12		
COC Number		41783		41783		41783		
	UNITS	**321**	**RDL**	**32**	**RDL**	**323**	**RDL**	**QC Batch**
Tetrachloroethylene	ug/m3	<0.68	0.68	<0.68	0.68	3.81	0.68	6441779
Benzene	ug/m3	<0.32	0.32	0.51	0.32	0.52	0.32	6441779
Toluene	ug/m3	<0.38	0.38	0.81	0.38	1.57	0.38	6441779
Ethylbenzene	ug/m3	<0.43	0.43	<0.43	0.43	<0.43	0.43	6441779
p+m-Xylene	ug/m3	<0.87	0.87	<0.87	0.87	1.18	0.87	6441779
o-Xylene	ug/m3	<0.43	0.43	<0.43	0.43	<0.43	0.43	6441779
Styrene	ug/m3	<0.43	0.43	<0.43	0.43	<0.43	0.43	6441779
4-ethyltoluene	ug/m3	<2.5	2.5	<2.5	2.5	<2.5	2.5	6441779
1,3,5-Trimethylbenzene	ug/m3	<2.5	2.5	<2.5	2.5	<2.5	2.5	6441779
1,2,4-Trimethylbenzene	ug/m3	<2.5	2.5	<2.5	2.5	<2.5	2.5	6441779
Chlorobenzene	ug/m3	<0.46	0.46	<0.46	0.46	<0.46	0.46	6441779
Benzyl chloride	ug/m3	<2.6	2.6	<2.6	2.6	<2.6	2.6	6441779
1,3-Dichlorobenzene	ug/m3	<2.4	2.4	<2.4	2.4	<2.4	2.4	6441779
1,4-Dichlorobenzene	ug/m3	<0.60	0.60	<0.60	0.60	<0.60	0.60	6441779
1,2-Dichlorobenzene	ug/m3	<0.60	0.60	<0.60	0.60	<0.60	0.60	6441779
1,2,4-Trichlorobenzene	ug/m3	<3.7	3.7	<3.7	3.7	<3.7	3.7	6441779
Hexachlorobutadiene	ug/m3	<5.3	5.3	<5.3	5.3	<5.3	5.3	6441779
Hexane	ug/m3	0.94	0.70	0.87	0.70	<0.70	0.70	6441779
Heptane	ug/m3	<1.2	1.2	<1.2	1.2	<1.2	1.2	6441779
Cyclohexane	ug/m3	<0.69	0.69	<0.69	0.69	<0.69	0.69	6441779
Tetrahydrofuran	ug/m3	<1.2	1.2	<1.2	1.2	<1.2	1.2	6441779
1,4-Dioxane	ug/m3	<3.6	3.6	<3.6	3.6	<3.6	3.6	6441779
Naphthalene	ug/m3	<1.0	1.0	<1.0	1.0	<1.0	1.0	6441779
Total Xylenes	ug/m3	<1.3	1.3	<1.3	1.3	<1.3	1.3	6441779
1,1,1,2-Tetrachloroethane	ug/m3	<0.69	0.69	<0.69	0.69	<0.69	0.69	6441779
Vinyl Bromide	ug/m3	<0.87	0.87	<0.87	0.87	<0.87	0.87	6441779
Propene	ug/m3	2.82	0.86	6.79	0.86	1.10	0.86	6441779
2,2,4-Trimethylpentane	ug/m3	<0.93	0.93	18.8	0.93	<0.93	0.93	6441779
Carbon Disulfide	ug/m3	1.8	1.6	<1.6	1.6	<1.6	1.6	6441779
Vinyl Acetate	ug/m3	<0.70	0.70	<0.70	0.70	<0.70	0.70	6441779

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

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BV Labs Job #: B9W0500
Report Date: 2019/11/28

Clifton Associates Ltd.
Client Project #: CG2430.IE38
Sampler Initials: DB

VOLATILE ORGANIC HYDROCARBONS BY GC/MS (AIR)

BV Labs ID		LHN073	LHN074	LHN075		
Sampling Date		2019/11/12	2019/11/12	2019/11/12		
COC Number		41783	41783	41783		
	UNITS	**321**	**32**	**323**	**RDL**	**QC Batch**
Volatile Organics						
F1-BTEX, C6-C10 (as Toluene)	ug/m3	141	49.3	12.9	5.0	6461122
F2, C10-C16 (as Decane)	ug/m3	14.0	<5.0	18.6	5.0	6461122
Aliphatic >C5-C6	ug/m3	<5.0	<5.0	<5.0	5.0	6461118
Aliphatic >C6-C8	ug/m3	<5.0	51.3	<5.0	5.0	6461118
Aliphatic >C8-C10	ug/m3	<5.0	<5.0	<5.0	5.0	6461118
Aliphatic >C10-C12	ug/m3	7.9	<5.0	18.0	5.0	6461118
Aliphatic >C12-C16	ug/m3	<5.0	<5.0	<5.0	5.0	6461118
Aromatic >C7-C8 (TEX Excluded)	ug/m3	<5.0	<5.0	<5.0	5.0	6461118
Aromatic >C8-C10	ug/m3	14.2	<5.0	<5.0	5.0	6461118
Aromatic >C10-C12	ug/m3	<5.0	<5.0	<5.0	5.0	6461118
Aromatic >C12-C16	ug/m3	<5.0	<5.0	<5.0	5.0	6461118

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

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GENERAL COMMENTS

Vinyl acetate was less than 60% recovery in the reference standard. There were no positives found for this compound therefore the data should not be affected.
Matrix Gas Analysis: Canisters were pressurized with Helium to enable sampling. Results and DLs adjusted accordingly. Matrix Gas Analysis: Results normalized to 100% dry volume.

Sample LHN073 [321] : Propene is a mixture of both propene and propane and this represents the highest possible concentration of propene. Increased DL for 2-butanone due to matrix interference.

Sample LHN074 [32] : Increased DL for 2-butanone due to matrix interference.

Sample LHN075 [323] : Propene is a mixture of both propene and propane and this represents the highest possible concentration of propene. Increased DL for 2-butanone due to matrix interference.

Results relate only to the items tested.

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QUALITY ASSURANCE REPORT

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
6441779	ASC	RPD	Dichlorodifluoromethane (FREON 12)	2019/11/22	4.6		%	25
			1,2-Dichlorotetrafluoroethane	2019/11/22	NC		%	25
			Chloromethane	2019/11/22	NC		%	25
			Vinyl Chloride	2019/11/22	NC		%	25
			Chloroethane	2019/11/22	NC		%	25
			1,3-Butadiene	2019/11/22	NC		%	25
			Trichlorofluoromethane (FREON 11)	2019/11/22	5.8		%	25
			Ethanol (ethyl alcohol)	2019/11/22	8.1		%	25
			Trichlorotrifluoroethane	2019/11/22	NC		%	25
			2-propanol	2019/11/22	NC		%	25
			2-Propanone	2019/11/22	3.9		%	25
			Methyl Ethyl Ketone (2-Butanone)	2019/11/22	NC		%	25
			Methyl Isobutyl Ketone	2019/11/22	NC		%	25
			Methyl Butyl Ketone (2-Hexanone)	2019/11/22	NC		%	25
			Methyl t-butyl ether (MTBE)	2019/11/22	NC		%	25
			Ethyl Acetate	2019/11/22	NC		%	25
			1,1-Dichloroethylene	2019/11/22	NC		%	25
			cis-1,2-Dichloroethylene	2019/11/22	NC		%	25
			trans-1,2-Dichloroethylene	2019/11/22	NC		%	25
			Methylene Chloride(Dichloromethane)	2019/11/22	NC		%	25
			Chloroform	2019/11/22	NC		%	25
			Carbon Tetrachloride	2019/11/22	NC		%	25
			1,1-Dichloroethane	2019/11/22	NC		%	25
			1,2-Dichloroethane	2019/11/22	NC		%	25
			Ethylene Dibromide	2019/11/22	NC		%	25
			1,1,1-Trichloroethane	2019/11/22	NC		%	25
			1,1,2-Trichloroethane	2019/11/22	NC		%	25
			1,1,2,2-Tetrachloroethane	2019/11/22	NC		%	25
			cis-1,3-Dichloropropene	2019/11/22	NC		%	25
			trans-1,3-Dichloropropene	2019/11/22	NC		%	25
			1,2-Dichloropropane	2019/11/22	NC		%	25
			Bromomethane	2019/11/22	NC		%	25
			Bromoform	2019/11/22	NC		%	25
			Bromodichloromethane	2019/11/22	NC		%	25
			Dibromochloromethane	2019/11/22	NC		%	25
			Trichloroethylene	2019/11/22	NC		%	25
			Tetrachloroethylene	2019/11/22	NC		%	25
			Benzene	2019/11/22	3.0		%	25
			Toluene	2019/11/22	1.5		%	25
			Ethylbenzene	2019/11/22	NC		%	25
			p+m-Xylene	2019/11/22	3.4		%	25
			o-Xylene	2019/11/22	3.7		%	25
			Styrene	2019/11/22	NC		%	25
			4-ethyltoluene	2019/11/22	NC		%	25
			1,3,5-Trimethylbenzene	2019/11/22	NC		%	25
			1,2,4-Trimethylbenzene	2019/11/22	NC		%	25
			Chlorobenzene	2019/11/22	NC		%	25
			Benzyl chloride	2019/11/22	NC		%	25
			1,3-Dichlorobenzene	2019/11/22	NC		%	25
			1,4-Dichlorobenzene	2019/11/22	NC		%	25
			1,2-Dichlorobenzene	2019/11/22	NC		%	25
			1,2,4-Trichlorobenzene	2019/11/22	NC		%	25
			Hexachlorobutadiene	2019/11/22	NC		%	25
			Hexane	2019/11/22	12		%	25

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Report Date: 2019/11/28

Clifton Associates Ltd.
Client Project #: CG2430.IE38
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QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
			Heptane	2019/11/22	8.4		%	25
			Cyclohexane	2019/11/22	NC		%	25
			Tetrahydrofuran	2019/11/22	NC		%	25
			1,4-Dioxane	2019/11/22	NC		%	25
			Naphthalene	2019/11/22	NC		%	25
			Total Xylenes	2019/11/22	1.5		%	25
			1,1,1,2-Tetrachloroethane	2019/11/22	NC		%	25
			Vinyl Bromide	2019/11/22	NC		%	25
			Propene	2019/11/22	NC		%	25
			2,2,4-Trimethylpentane	2019/11/22	0.77		%	25
			Carbon Disulfide	2019/11/22	NC		%	25
			Vinyl Acetate	2019/11/22	NC		%	25
			Dichlorodifluoromethane (FREON 12)	2019/11/25	4.6		%	25
			1,2-Dichlorotetrafluoroethane	2019/11/25	NC		%	25
			Chloromethane	2019/11/25	NC		%	25
			Vinyl Chloride	2019/11/25	NC		%	25
			Chloroethane	2019/11/25	NC		%	25
			1,3-Butadiene	2019/11/25	NC		%	25
			Trichlorofluoromethane (FREON 11)	2019/11/25	8.7		%	25
			Ethanol (ethyl alcohol)	2019/11/25	18		%	25
			Trichlorotrifluoroethane	2019/11/25	NC		%	25
			2-propanol	2019/11/25	NC		%	25
			2-Propanone	2019/11/25	12		%	25
			Methyl Ethyl Ketone (2-Butanone)	2019/11/25	8.8		%	25
			Methyl Isobutyl Ketone	2019/11/25	NC		%	25
			Methyl Butyl Ketone (2-Hexanone)	2019/11/25	NC		%	25
			Methyl t-butyl ether (MTBE)	2019/11/25	NC		%	25
			Ethyl Acetate	2019/11/25	NC		%	25
			1,1-Dichloroethylene	2019/11/25	NC		%	25
			cis-1,2-Dichloroethylene	2019/11/25	NC		%	25
			trans-1,2-Dichloroethylene	2019/11/25	NC		%	25
			Methylene Chloride(Dichloromethane)	2019/11/25	NC		%	25
			Chloroform	2019/11/25	4.9		%	25
			Carbon Tetrachloride	2019/11/25	NC		%	25
			1,1-Dichloroethane	2019/11/25	NC		%	25
			1,2-Dichloroethane	2019/11/25	NC		%	25
			Ethylene Dibromide	2019/11/25	NC		%	25
			1,1,1-Trichloroethane	2019/11/25	NC		%	25
			1,1,2-Trichloroethane	2019/11/25	NC		%	25
			1,1,2,2-Tetrachloroethane	2019/11/25	NC		%	25
			cis-1,3-Dichloropropene	2019/11/25	NC		%	25
			trans-1,3-Dichloropropene	2019/11/25	NC		%	25
			1,2-Dichloropropane	2019/11/25	NC		%	25
			Bromomethane	2019/11/25	NC		%	25
			Bromoform	2019/11/25	NC		%	25
			Bromodichloromethane	2019/11/25	NC		%	25
			Dibromochloromethane	2019/11/25	NC		%	25
			Trichloroethylene	2019/11/25	NC		%	25
			Tetrachloroethylene	2019/11/25	4.1		%	25
			Benzene	2019/11/25	NC		%	25
			Toluene	2019/11/25	3.6		%	25
			Ethylbenzene	2019/11/25	5.7		%	25
			p+m-Xylene	2019/11/25	6.6		%	25
			o-Xylene	2019/11/25	12		%	25

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QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
			Styrene	2019/11/25	NC		%	25
			4-ethyltoluene	2019/11/25	NC		%	25
			1,3,5-Trimethylbenzene	2019/11/25	NC		%	25
			1,2,4-Trimethylbenzene	2019/11/25	NC		%	25
			Chlorobenzene	2019/11/25	NC		%	25
			Benzyl chloride	2019/11/25	NC		%	25
			1,3-Dichlorobenzene	2019/11/25	NC		%	25
			1,4-Dichlorobenzene	2019/11/25	NC		%	25
			1,2-Dichlorobenzene	2019/11/25	NC		%	25
			1,2,4-Trichlorobenzene	2019/11/25	NC		%	25
			Hexachlorobutadiene	2019/11/25	NC		%	25
			Hexane	2019/11/25	NC		%	25
			Heptane	2019/11/25	NC		%	25
			Cyclohexane	2019/11/25	NC		%	25
			Tetrahydrofuran	2019/11/25	NC		%	25
			1,4-Dioxane	2019/11/25	NC		%	25
			Naphthalene	2019/11/25	NC		%	25
			Total Xylenes	2019/11/25	8.0		%	25
			1,1,1,2-Tetrachloroethane	2019/11/25	NC		%	25
			Vinyl Bromide	2019/11/25	NC		%	25
			Propene	2019/11/25	NC		%	25
			2,2,4-Trimethylpentane	2019/11/25	NC		%	25
			Carbon Disulfide	2019/11/25	2.2		%	25
			Vinyl Acetate	2019/11/25	NC		%	25
6458022	LSY	Spiked Blank	Bromochloromethane	2019/11/22		95	%	60 - 140
			D5-Chlorobenzene	2019/11/22		104	%	60 - 140
			Difluorobenzene	2019/11/22		102	%	60 - 140
			Dichlorodifluoromethane (FREON 12)	2019/11/22		89	%	70 - 130
			1,2-Dichlorotetrafluoroethane	2019/11/22		104	%	70 - 130
			Chloromethane	2019/11/22		79	%	70 - 130
			Vinyl Chloride	2019/11/22		87	%	70 - 130
			Chloroethane	2019/11/22		96	%	70 - 130
			1,3-Butadiene	2019/11/22		99	%	70 - 130
			Trichlorofluoromethane (FREON 11)	2019/11/22		107	%	70 - 130
			Ethanol (ethyl alcohol)	2019/11/22		107	%	70 - 130
			Trichlorotrifluoroethane	2019/11/22		101	%	70 - 130
			2-propanol	2019/11/22		79	%	70 - 130
			2-Propanone	2019/11/22		110	%	70 - 130
			Methyl Ethyl Ketone (2-Butanone)	2019/11/22		105	%	70 - 130
			Methyl Isobutyl Ketone	2019/11/22		96	%	70 - 130
			Methyl Butyl Ketone (2-Hexanone)	2019/11/22		93	%	70 - 130
			Methyl t-butyl ether (MTBE)	2019/11/22		107	%	70 - 130
			Ethyl Acetate	2019/11/22		130	%	70 - 130
			1,1-Dichloroethylene	2019/11/22		104	%	70 - 130
			cis-1,2-Dichloroethylene	2019/11/22		106	%	70 - 130
			trans-1,2-Dichloroethylene	2019/11/22		107	%	70 - 130
			Methylene Chloride(Dichloromethane)	2019/11/22		97	%	70 - 130
			Chloroform	2019/11/22		116	%	70 - 130
			Carbon Tetrachloride	2019/11/22		100	%	70 - 130
			1,1-Dichloroethane	2019/11/22		108	%	70 - 130
			1,2-Dichloroethane	2019/11/22		106	%	70 - 130
			Ethylene Dibromide	2019/11/22		107	%	70 - 130
			1,1,1-Trichloroethane	2019/11/22		102	%	70 - 130
			1,1,2-Trichloroethane	2019/11/22		107	%	70 - 130

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QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
			1,1,2,2-Tetrachloroethane	2019/11/22		104	%	70 - 130
			cis-1,3-Dichloropropene	2019/11/22		105	%	70 - 130
			trans-1,3-Dichloropropene	2019/11/22		101	%	70 - 130
			1,2-Dichloropropane	2019/11/22		102	%	70 - 130
			Bromomethane	2019/11/22		93	%	70 - 130
			Bromoform	2019/11/22		104	%	70 - 130
			Bromodichloromethane	2019/11/22		115	%	70 - 130
			Dibromochloromethane	2019/11/22		109	%	70 - 130
			Trichloroethylene	2019/11/22		108	%	70 - 130
			Tetrachloroethylene	2019/11/22		106	%	70 - 130
			Benzene	2019/11/22		105	%	70 - 130
			Toluene	2019/11/22		108	%	70 - 130
			Ethylbenzene	2019/11/22		103	%	70 - 130
			p+m-Xylene	2019/11/22		103	%	70 - 130
			o-Xylene	2019/11/22		102	%	70 - 130
			Styrene	2019/11/22		105	%	70 - 130
			4-ethyltoluene	2019/11/22		102	%	70 - 130
			1,3,5-Trimethylbenzene	2019/11/22		97	%	70 - 130
			1,2,4-Trimethylbenzene	2019/11/22		96	%	70 - 130
			Chlorobenzene	2019/11/22		101	%	70 - 130
			Benzyl chloride	2019/11/22		74	%	70 - 130
			1,3-Dichlorobenzene	2019/11/22		96	%	70 - 130
			1,4-Dichlorobenzene	2019/11/22		94	%	70 - 130
			1,2-Dichlorobenzene	2019/11/22		92	%	70 - 130
			1,2,4-Trichlorobenzene	2019/11/22		105	%	70 - 130
			Hexachlorobutadiene	2019/11/22		99	%	70 - 130
			Hexane	2019/11/22		111	%	70 - 130
			Heptane	2019/11/22		101	%	70 - 130
			Cyclohexane	2019/11/22		104	%	70 - 130
			Tetrahydrofuran	2019/11/22		105	%	70 - 130
			1,4-Dioxane	2019/11/22		112	%	70 - 130
			Naphthalene	2019/11/22		101	%	70 - 130
			Total Xylenes	2019/11/22		103	%	70 - 130
			1,1,1,2-Tetrachloroethane	2019/11/22		99	%	70 - 130
			Vinyl Bromide	2019/11/22		111	%	70 - 130
			Propene	2019/11/22		73	%	70 - 130
			2,2,4-Trimethylpentane	2019/11/22		101	%	70 - 130
			Carbon Disulfide	2019/11/22		110	%	70 - 130
			Vinyl Acetate	2019/11/22		56 (1)	%	70 - 130
6458022	LSY	Method Blank	Bromochloromethane	2019/11/22		98	%	60 - 140
			D5-Chlorobenzene	2019/11/22		97	%	60 - 140
			Difluorobenzene	2019/11/22		98	%	60 - 140
			Dichlorodifluoromethane (FREON 12)	2019/11/22	<0.20		ppbv	
			1,2-Dichlorotetrafluoroethane	2019/11/22	<0.17		ppbv	
			Chloromethane	2019/11/22	<0.30		ppbv	
			Vinyl Chloride	2019/11/22	<0.10		ppbv	
			Chloroethane	2019/11/22	<0.30		ppbv	
			1,3-Butadiene	2019/11/22	<0.50		ppbv	
			Trichlorofluoromethane (FREON 11)	2019/11/22	<0.20		ppbv	
			Ethanol (ethyl alcohol)	2019/11/22	<1.0		ppbv	
			Trichlorotrifluoroethane	2019/11/22	<0.15		ppbv	
			2-propanol	2019/11/22	<1.0		ppbv	
			2-Propanone	2019/11/22	<0.60		ppbv	
			Methyl Ethyl Ketone (2-Butanone)	2019/11/22	<0.20		ppbv	

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QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
			Methyl Isobutyl Ketone	2019/11/22	<0.20		ppbv	
			Methyl Butyl Ketone (2-Hexanone)	2019/11/22	<1.0		ppbv	
			Methyl t-butyl ether (MTBE)	2019/11/22	<0.20		ppbv	
			Ethyl Acetate	2019/11/22	<1.0		ppbv	
			1,1-Dichloroethylene	2019/11/22	<0.10		ppbv	
			cis-1,2-Dichloroethylene	2019/11/22	<0.10		ppbv	
			trans-1,2-Dichloroethylene	2019/11/22	<0.10		ppbv	
			Methylene Chloride(Dichloromethane)	2019/11/22	<0.60		ppbv	
			Chloroform	2019/11/22	<0.10		ppbv	
			Carbon Tetrachloride	2019/11/22	<0.10		ppbv	
			1,1-Dichloroethane	2019/11/22	<0.10		ppbv	
			1,2-Dichloroethane	2019/11/22	<0.10		ppbv	
			Ethylene Dibromide	2019/11/22	<0.10		ppbv	
			1,1,1-Trichloroethane	2019/11/22	<0.10		ppbv	
			1,1,2-Trichloroethane	2019/11/22	<0.10		ppbv	
			1,1,2,2-Tetrachloroethane	2019/11/22	<0.10		ppbv	
			cis-1,3-Dichloropropene	2019/11/22	<0.10		ppbv	
			trans-1,3-Dichloropropene	2019/11/22	<0.10		ppbv	
			1,2-Dichloropropane	2019/11/22	<0.10		ppbv	
			Bromomethane	2019/11/22	<0.10		ppbv	
			Bromoform	2019/11/22	<0.20		ppbv	
			Bromodichloromethane	2019/11/22	<0.20		ppbv	
			Dibromochloromethane	2019/11/22	<0.20		ppbv	
			Trichloroethylene	2019/11/22	<0.10		ppbv	
			Tetrachloroethylene	2019/11/22	<0.10		ppbv	
			Benzene	2019/11/22	<0.10		ppbv	
			Toluene	2019/11/22	<0.10		ppbv	
			Ethylbenzene	2019/11/22	<0.10		ppbv	
			p+m-Xylene	2019/11/22	<0.20		ppbv	
			o-Xylene	2019/11/22	<0.10		ppbv	
			Styrene	2019/11/22	<0.10		ppbv	
			4-ethyltoluene	2019/11/22	<0.50		ppbv	
			1,3,5-Trimethylbenzene	2019/11/22	<0.50		ppbv	
			1,2,4-Trimethylbenzene	2019/11/22	<0.50		ppbv	
			Chlorobenzene	2019/11/22	<0.10		ppbv	
			Benzyl chloride	2019/11/22	<0.50		ppbv	
			1,3-Dichlorobenzene	2019/11/22	<0.40		ppbv	
			1,4-Dichlorobenzene	2019/11/22	<0.10		ppbv	
			1,2-Dichlorobenzene	2019/11/22	<0.10		ppbv	
			1,2,4-Trichlorobenzene	2019/11/22	<0.50		ppbv	
			Hexachlorobutadiene	2019/11/22	<0.50		ppbv	
			Hexane	2019/11/22	<0.20		ppbv	
			Heptane	2019/11/22	<0.30		ppbv	
			Cyclohexane	2019/11/22	<0.20		ppbv	
			Tetrahydrofuran	2019/11/22	<0.40		ppbv	
			1,4-Dioxane	2019/11/22	<1.0		ppbv	
			Naphthalene	2019/11/22	<0.20		ppbv	
			Total Xylenes	2019/11/22	<0.30		ppbv	
			1,1,1,2-Tetrachloroethane	2019/11/22	<0.10		ppbv	
			Vinyl Bromide	2019/11/22	<0.20		ppbv	
			Propene	2019/11/22	<0.50		ppbv	
			2,2,4-Trimethylpentane	2019/11/22	<0.20		ppbv	
			Carbon Disulfide	2019/11/22	<0.50		ppbv	
			Vinyl Acetate	2019/11/22	<0.20		ppbv	

55555 North Service Road, Burlington, Ontario, Canada L7L 5H7 Tel: (905) 332-8788 Toll Free: (800) 668-0639 Fax: (905) 332-9169

BV Labs Job #: B9W0500
Report Date: 2019/11/28

Clifton Associates Ltd.
Client Project #: CG2430.IE38
Sampler Initials: DB

QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
6461118	LSY	Method Blank	Aliphatic >C5-C6	2019/11/22	<5.0		ug/m3	
			Aliphatic >C6-C8	2019/11/22	<5.0		ug/m3	
			Aliphatic >C8-C10	2019/11/22	<5.0		ug/m3	
			Aliphatic >C10-C12	2019/11/22	<5.0		ug/m3	
			Aliphatic >C12-C16	2019/11/22	<5.0		ug/m3	
			Aromatic >C7-C8 (TEX Excluded)	2019/11/22	<5.0		ug/m3	
			Aromatic >C8-C10	2019/11/22	<5.0		ug/m3	
			Aromatic >C10-C12	2019/11/22	<5.0		ug/m3	
			Aromatic >C12-C16	2019/11/22	<5.0		ug/m3	
6461118	LSY	RPD	Aliphatic >C5-C6	2019/11/22	NC		%	25
			Aliphatic >C6-C8	2019/11/22	NC		%	25
			Aliphatic >C8-C10	2019/11/22	NC		%	25
			Aliphatic >C10-C12	2019/11/22	NC		%	25
			Aliphatic >C12-C16	2019/11/22	NC		%	25
			Aromatic >C7-C8 (TEX Excluded)	2019/11/22	NC		%	25
			Aromatic >C8-C10	2019/11/22	NC		%	25
			Aromatic >C10-C12	2019/11/22	NC		%	25
			Aromatic >C12-C16	2019/11/22	NC		%	25
6461122	LSY	Method Blank	F1-BTEX, C6-C10 (as Toluene)	2019/11/22	<5.0		ug/m3	
			F2, C10-C16 (as Decane)	2019/11/22	<5.0		ug/m3	
6463557	IH0	Method Blank	Oxygen		<0.1		% v/v	
			Nitrogen		<0.1		% v/v	
			Methane		<0.1		% v/v	
			Carbon Dioxide		<0.1		% v/v	
6463557	IH0	RPD [LHN073-01]	Oxygen	2019/11/26	0.18		%	20
			Nitrogen	2019/11/26	0.052		%	20
			Methane	2019/11/26	NC		%	20
			Carbon Dioxide	2019/11/26	NC		%	20

Duplicate: Paired analysis of a separate portion of the same sample. Used to evaluate the variance in the measurement.

Spiked Blank: A blank matrix sample to which a known amount of the analyte, usually from a second source, has been added. Used to evaluate method accuracy.

Method Blank: A blank matrix containing all reagents used in the analytical procedure. Used to identify laboratory contamination.

Surrogate: A pure or isotopically labeled compound whose behavior mirrors the analytes of interest. Used to evaluate extraction efficiency.

NC (Duplicate RPD): The duplicate RPD was not calculated. The concentration in the sample and/or duplicate was too low to permit a reliable RPD calculation (absolute difference <= 2x RDL).

(1) Recovery or RPD for this parameter is outside control limits. The overall quality control for this analysis meets acceptability criteria.

55555 North Service Road, Burlington, Ontario, Canada L7L 5H7 Tel: (905) 332-8788 Toll Free: (800) 668-0639 Fax: (905) 332-9169

VALIDATION SIGNATURE PAGE

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

Maureen Smith, Supervisor, Volatiles

Tom Mitchell, B.Sc, Supervisor, Compressed Gases

BV Labs has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per ISO/IEC 17025, signing the reports.
For Service Group specific validation please refer to the Validation Signature Page.

55555 North Service Road, Burlington, Ontario, Canada L7L 5H7 Tel: (905) 332-8788 Toll Free: (800) 668-0639 Fax: (905) 332-9169

Quantitation Report (QT Reviewed)

Data File : T:\MSD53\Data\191122\R112214.D
Acq On : 22 Nov 2019 19:27
Sample : LHN073 100ML
Misc :
MS Integration Params: lscint.p

Vial: 14
Operator: LSY
Inst : MSD53
Multiplr: 1.00

Quant Time: Nov 25 08:59:12 2019 Results File: TO15_191028.RES

Quant Method : T:\MSD53\Data\M...ds\TO15_191028.M (RTE Integrator)
Title : TO15 calibration, INTstd Lot#1482488, EXP. 2020/07/07
Last Update : Tue Oct 29 08:46:15 2019
Response via : Initial Calibration
DataAcq Meth : TO15ACQ.M
Daily CC File:T:\MSD53\Data\191122\R112202.D Acquired: 22 Nov 2019 9:01

Internal Standards	R.T.	QIon	Response	Conc Units	Recovery
1) BROMOCHLOROMETHANE	11.82	130	414719	26.5000 PPBV	92
31) 1,4-DIFLUOROBENZENE	13.72	114	1719017	27.0000 PPBV	93
52) d5-CHLOROBENZENE	18.79	117	1465474	27.0000 PPBV	89

System Monitoring Compounds

Target Compounds					Qvalue
2) Propene	5.3372	41	11660	1.6389 ppbv #	74
3) Dichlorodifluoromethane	5.4309	85	18119	0.5467 ppbv	99
4) Chloromethane	5.7792	50	1803	0.1508 ppbv	96
7) Butane	6.3149	43	11421m	0.7783 ppbv	0
11) Ethanol	7.4133	31	3779	0.6333 ppbv	91
13) Trichlorofluoromethane	7.9357	101	8830	0.2230 ppbv	99
15) Acetone	8.1768	43	36196	2.4773 ppbv #	76
17) Carbon Disulfide	9.4761	76	21658	0.5840 ppbv	99
18) Dichloromethane	9.2885	49	4738	0.3480 ppbv	92
24) Hexane	11.1370	57	5084	0.2658 ppbv #	70
25) 2-Butanone (MEK)	11.1370	43	6956m	0.3397 ppbv	1
27) Chloroform	11.9540	83	12528	0.4210 ppbv	97
35) Benzene	13.2131	78	4105	0.0901 ppbv	97
47) Toluene	16.4680	91	5656	0.0944 ppbv	98

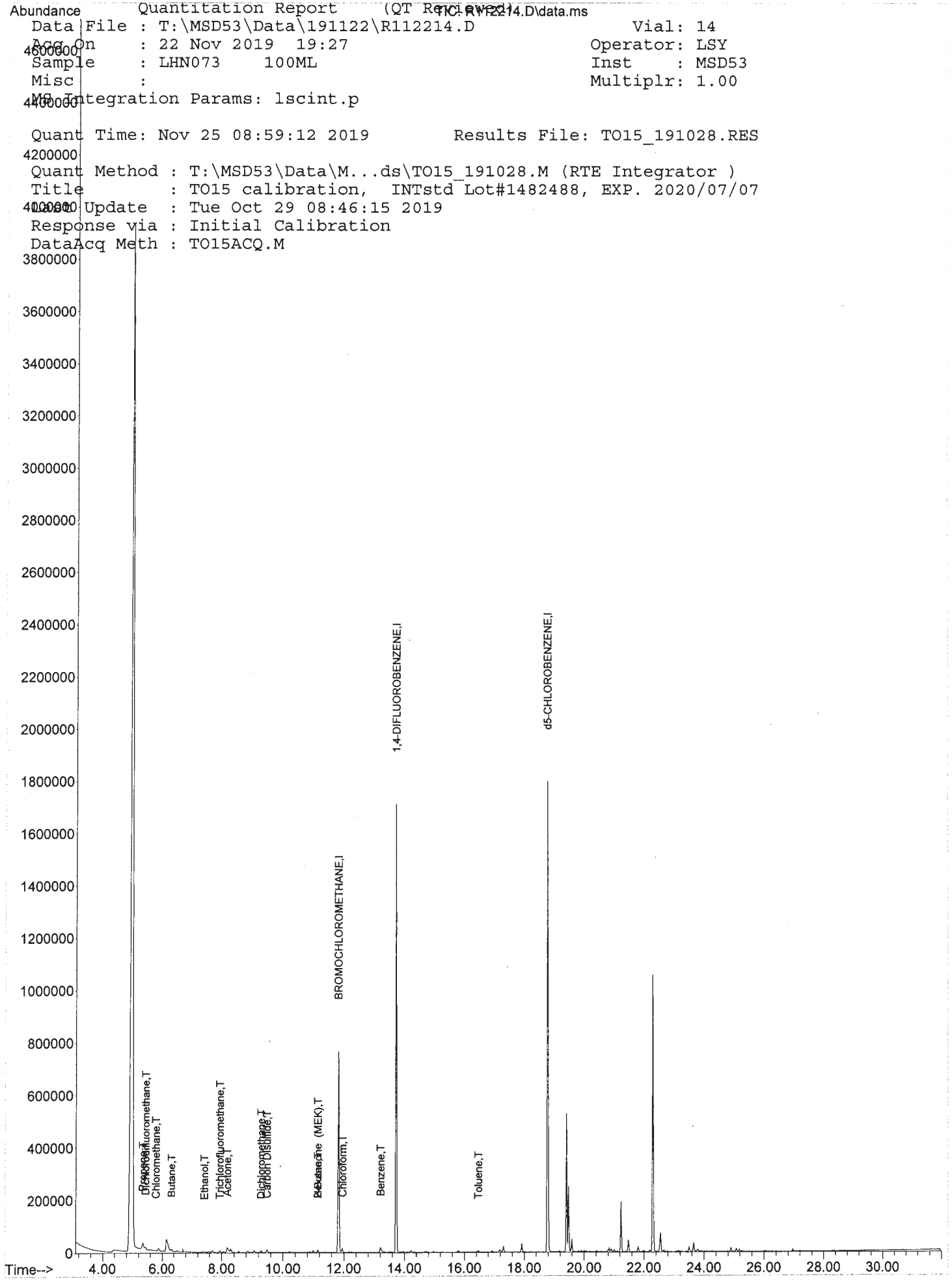
(#) = qualifier out of range (m) = manual integration

Quantitation Report (QT Reviewed)

Data File : T:\MSD53\Data\191122\R112214.D Vial: 14
Acq On : 22 Nov 2019 19:27 Operator: LSY
Sample : LHN073 100ML Inst : MSD53
Misc : Multiplr: 1.00
MS Integration Params: lscint.p

Quant Time: Nov 25 08:59:12 2019 Results File: TO15_191028.RES

Quant Method : T:\MSD53\Data\M...ds\TO15_191028.M (RTE Integrator)
Title : TO15 calibration, INTstd Lot#1482488, EXP. 2020/07/07
Last Update : Tue Oct 29 08:46:15 2019
Response via : Initial Calibration
DataAcq Meth : TO15ACQ.M



Quantitation Report (QT Reviewed)

Data File : T:\MSD53\Data\191122\R112215.D
Acq On : 22 Nov 2019 20:14
Sample : LHN074 100ML
Misc :
MS Integration Params: lscint.p

Vial: 15
Operator: LSY
Inst : MSD53
Multiplr: 1.00

Quant Time: Nov 25 09:03:22 2019 Results File: TO15_191028.RES

Quant Method : T:\MSD53\Data\M...ds\TO15_191028.M (RTE Integrator)
Title : TO15 calibration, INTstd Lot#1482488, EXP. 2020/07/07
Last Update : Tue Oct 29 08:46:15 2019
Response via : Initial Calibration
DataAcq Meth : TO15ACQ.M
Daily CC File:T:\MSD53\Data\191122\R112202.D Acquired: 22 Nov 2019 9:01

Internal Standards	R.T.	QIon	Response	Conc Units	Recovery
1) BROMOCHLOROMETHANE	11.83	130	431118	26.5000 PPBV	96
31) 1,4-DIFLUOROBENZENE	13.72	114	1776223	27.0000 PPBV	96
52) d5-CHLOROBENZENE	18.79	117	1524531	27.0000 PPBV	93

System Monitoring Compounds

Target Compounds					Qvalue
2) Propene	5.3238	41	29171	3.9442 ppbv	92
3) Dichlorodifluoromethane	5.4175	85	18491	0.5367 ppbv	98
4) Chloromethane	5.7792	50	5329	0.4286 ppbv #	88
7) Butane	6.3149	43	13203	0.8655 ppbv	97
11) Ethanol	7.4133	31	6838m	1.1023 ppbv	23
13) Trichlorofluoromethane	7.9491	101	7710	0.1873 ppbv	97
15) Acetone	8.1902	43	35379	2.3293 ppbv #	86
17) Carbon Disulfide	9.4761	76	9342	0.2423 ppbv	99
18) Dichloromethane	9.3019	49	4904	0.3465 ppbv #	88
24) Hexane	11.1504	57	4926	0.2477 ppbv #	54
25) 2-Butanone (MEK)	11.1370	43	7812m	0.3670 ppbv	1
35) Benzene	13.2131	78	7529	0.1599 ppbv	98
36) 2,2,4-Trimethylpentane	13.9498	57	259115	4.0231 ppbv	99
47) Toluene	16.4680	91	13355	0.2157 ppbv	100
56) M&P-Xylene	19.4014	91	6086m	0.0967 ppbv	96

(#) = qualifier out of range (m) = manual integration

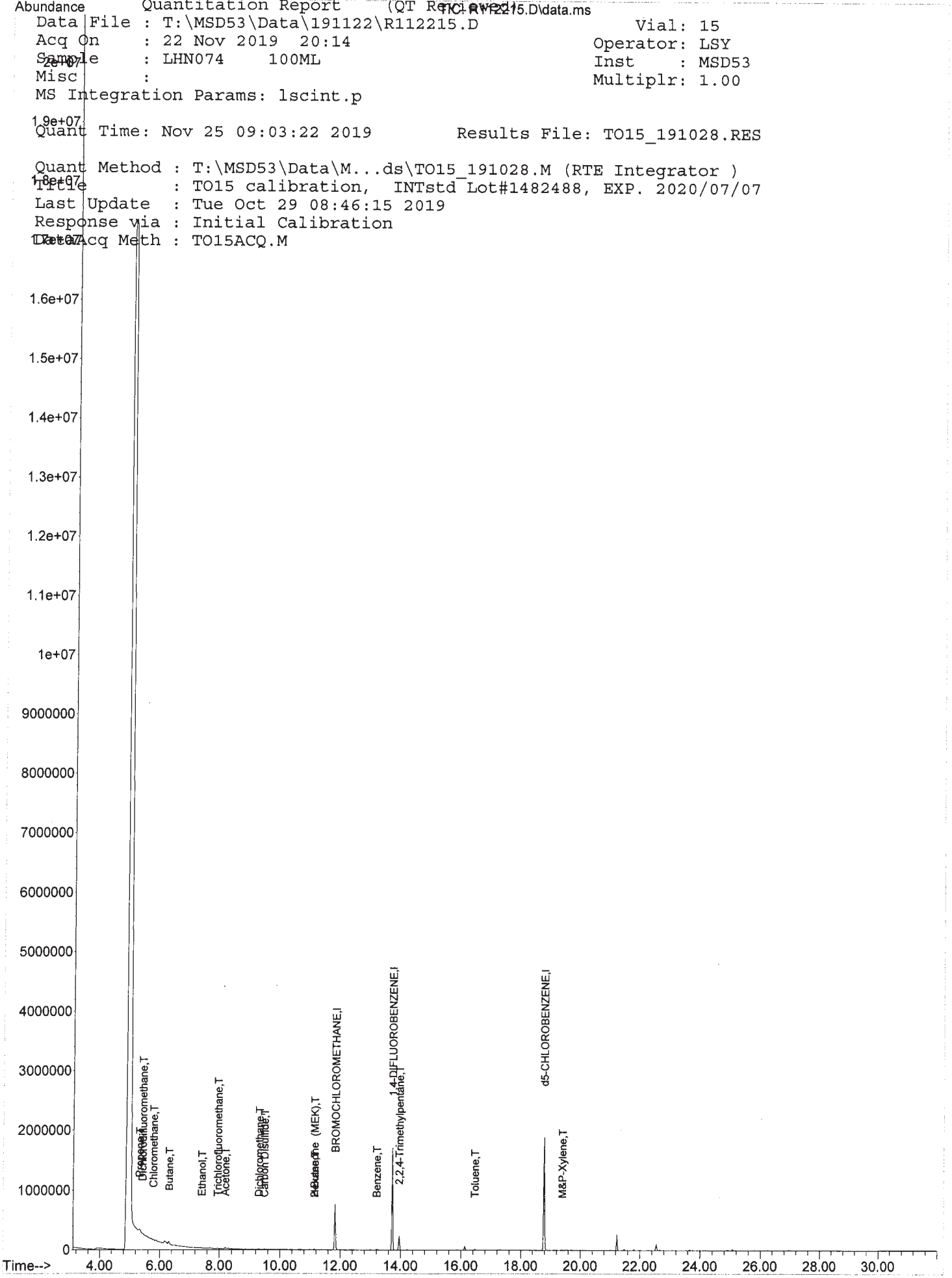
Quantitation Report (QT Reviewed)

Data File : T:\MSD53\Data\191122\R112215.D
Acq On : 22 Nov 2019 20:14
Sample : LHN074 100ML
Misc :
MS Integration Params: lscint.p

Vial: 15
Operator: LSY
Inst : MSD53
Multiplr: 1.00

Quant Time: Nov 25 09:03:22 2019 Results File: TO15_191028.RES

Quant Method : T:\MSD53\Data\M...ds\TO15_191028.M (RTE Integrator)
Title : TO15 calibration, INTstd Lot#1482488, EXP. 2020/07/07
Last Update : Tue Oct 29 08:46:15 2019
Response via : Initial Calibration
Data Acq Meth : TO15ACQ.M



Quantitation Report (QT Reviewed)

Data File : T:\MSD53\Data\191122\R112216.D
Acq On : 22 Nov 2019 21:01
Sample : LHN075 100ML
Misc :
MS Integration Params: lscint.p

Vial: 16
Operator: LSY
Inst : MSD53
Multiplr: 1.00

Quant Time: Nov 25 09:10:31 2019 Results File: TO15_191028.RES

Quant Method : T:\MSD53\Data\M...ds\TO15_191028.M (RTE Integrator)
Title : TO15 calibration, INTstd Lot#1482488, EXP. 2020/07/07
Last Update : Tue Oct 29 08:46:15 2019
Response via : Initial Calibration
DataAcq Meth : TO15ACQ.M
Daily CC File:T:\MSD53\Data\191122\R112202.D Acquired: 22 Nov 2019 9:01

Internal Standards	R.T.	QIon	Response	Conc Units	Recovery
1) BROMOCHLOROMETHANE	11.82	130	417683	26.5000 PPBV	93
31) 1,4-DIFLUOROBENZENE	13.72	114	1719431	27.0000 PPBV	93
52) d5-CHLOROBENZENE	18.79	117	1463007	27.0000 PPBV	89

System Monitoring Compounds

Target Compounds					Qvalue
2) Propene	5.3370	41	4594	0.6411 ppbv #	73
3) Dichlorodifluoromethane	5.4308	85	15578	0.4667 ppbv	99
4) Chloromethane	5.7656	50	5082	0.4219 ppbv	93
7) Butane	6.3148	43	12323m	0.8338 ppbv	0
11) Ethanol	7.3998	31	15132	2.5177 ppbv	97
13) Trichlorofluoromethane	7.9356	101	7771	0.1949 ppbv	96
15) Acetone	8.1633	43	63837	4.3381 ppbv	89
17) Carbon Disulfide	9.4759	76	4188	0.1121 ppbv #	90
18) Dichloromethane	9.2884	49	4780	0.3486 ppbv	92
20) trans-1,2-Dichloroethylene	10.2260	61	3254	0.1788 ppbv	95
24) Hexane	11.1369	57	3272	0.1698 ppbv #	30
25) 2-Butanone (MEK)	11.1235	43	6447m	0.3126 ppbv	1
35) Benzene	13.2130	78	7447	0.1634 ppbv	99
36) 2,2,4-Trimethylpentane	13.9497	57	5356	0.0859 ppbv #	82
38) Heptane	14.2310	43	3867	0.1937 ppbv #	82
47) Toluene	16.4679	91	24903	0.4155 ppbv	98
51) Tetrachloroethylene	17.6734	166	20458	0.5612 ppbv	99
55) Ethylbenzene	19.1735	91	6078	0.0808 ppbv	97
56) M&P-Xylene	19.3879	91	16357m	0.2707 ppbv	100
59) o-Xylene	20.0710	91	5785	0.0975 ppbv	100
65) Decane	22.5222	57	7251	0.1805 ppbv	95
72) Dodecane	26.9558	57	4058	0.0865 ppbv	99

(#) = qualifier out of range (m) = manual integration

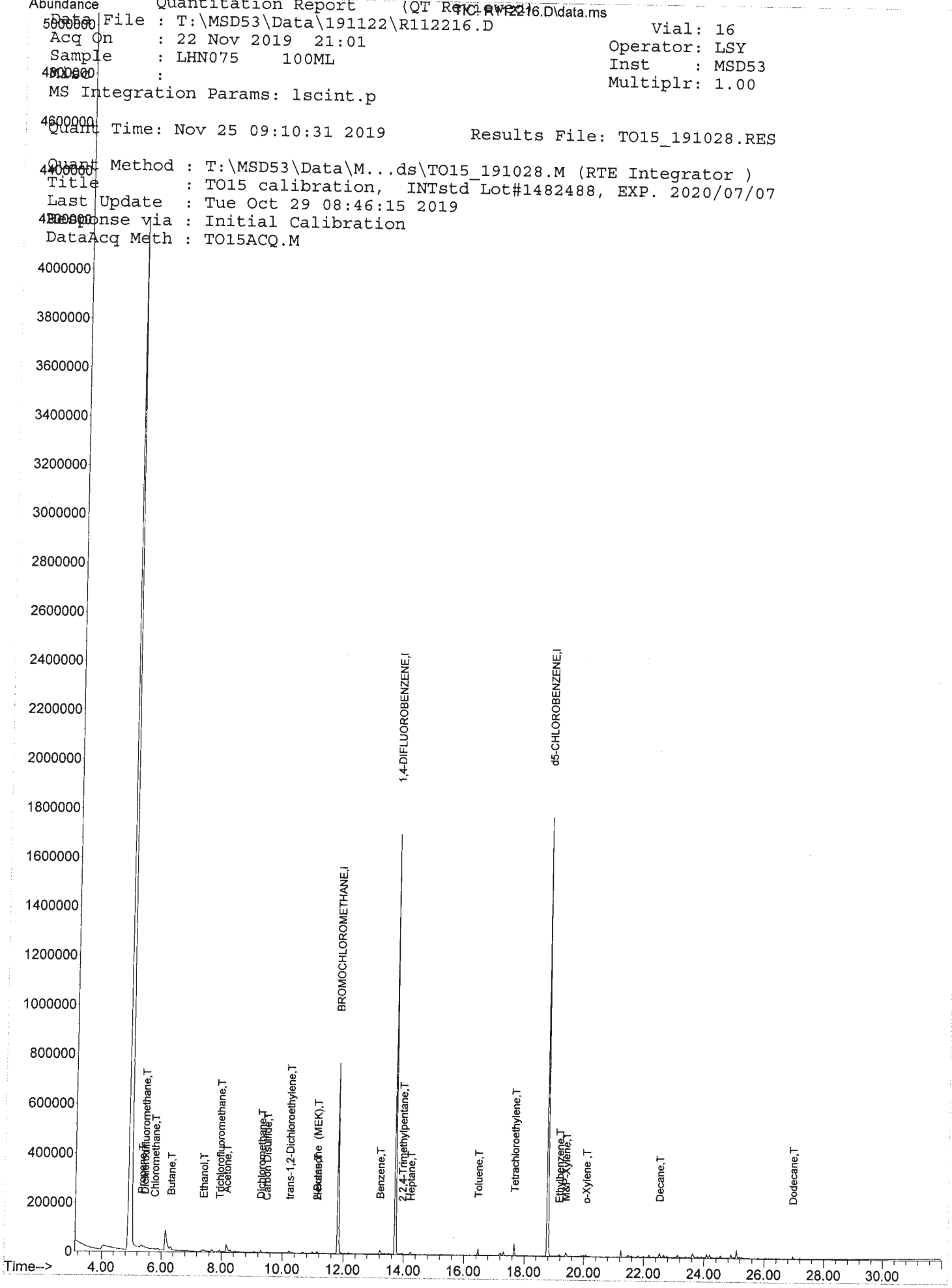
Quantitation Report (QT Reviewed)

Data File : T:\MSD53\Data\191122\R112216.D
Acq On : 22 Nov 2019 21:01
Sample : LHN075 100ML
Misc :
MS Integration Params: lscint.p

Vial: 16
Operator: LSY
Inst : MSD53
Multiplr: 1.00

Quant Time: Nov 25 09:10:31 2019 Results File: TO15_191028.RES

Quant Method : T:\MSD53\Data\M...ds\TO15_191028.M (RTE Integrator)
Title : TO15 calibration, INTstd Lot#1482488, EXP. 2020/07/07
Last Update : Tue Oct 29 08:46:15 2019
Response via : Initial Calibration
DataAcq Meth : TO15ACQ.M



Chain of Custody Form - Summa™ Canister

41783

Maxxam
A Bureau Veritas Group Company

6740 Campobello Rd
Mississauga Ontario, L5N 2L8
www.maxxam.ca

Toll Free: 1-800-668-0639
Phone: (905) 817-5700
Fax: (905) 817-5777

CAM FCD-01302 /2

Page 1 of 1

INVOICE INFORMATION

Company Name: CLIFTON ASSOCIATES LTD.
Contact Name: Stephen D'Abadie
Address: 2222 30 AVE NE CALGARY, AB T2E 7K9
E-mail: Stephen_DAbadie@clifton.ca
Ph:
Sampled by: DB

REPORT INFORMATION

Company Name:
Project Manager:
Address:
E-mail: Daniel_Budai@clifton.ca
Ph: 403 690 6940

ANALYSIS REQUESTED

Field Sample ID	Canister Serial #	Flow Regulator Serial #	Collection Date	START VACUUM (inches of Hg)	END VACUUM (inches of Hg)	SOIL VAPOUR	AMBIENT/INDOOR AIR	AMBIENT/COMMERCIAL/INDUSTRIAL	SUB-SLAB GAS	FULL LIST OF VOCs (reference TO15A)	Aromatic/Aliphatic Hydrocarbon Fractions	F1 (C6-C10) and F2 (C10-C16)	Selected VOC's - please specify	Other	MATRIX GASES	CHROMATOGRAM RECORD		CANISTERS NOT USED
322	2487	0673	12/11/19	26.0	4.0	X				X	X	X			X	X		
321	2080	1463	12/11/19	26.2	3.0	X				X	X	X			X	X		
32	1797	1204	12/11/19	26.0	3.0	X				X	X	X			X	X		
323	2526	0096	12/11/19	25.5	4.5	X				X	X	X			X	X		

TAT Requirement

- STD 10 Business day [X]
- Rush 5 Business day * [ ]
- Rush 2 Business day * [ ]
- Rush Other * [ ]

* need approval from Maxxam

PROJECT INFORMATION

Project #: CG2430.1E38
Name:
PO #:
Maxxam Quote #:
Maxxam Contact:
Task Order/Line Item

REPORTING REQUIREMENTS

EDD [ ]
Regulations ON 153 [ ]
ON 419 [ ]
BC CSR [ ]
Other

Notes

1) please indicate on chain of custody if your samples are soil vapour or ambient air
2) please list all c...

PROJECT SPE

14-Nov-19 08:38
Cristina (Maria) Bacchus
B9W0500
KK4 AIR-001

Client Signature:
Date/Time: 12/11/19 15:19

Received by: Bish Kingsbury
Date/Time: 2019/11/12 1559

PLEASE RETURN ALL UNUSED EQUIPMENT

Unless otherwise agreed to in writing, work submitted on this Chain of Custody is subject to Maxxam's standard Terms and Conditions. Signing of this Chain of Custody document is acknowledgment and acceptance of our terms which are available for viewing at www.maxxam.ca/terms.

COC-1003 (11/2017)

Khushboo Kapoor
KHUSHBOO KAPOOR 2019/11/14 08:39