
Sears Canada Inc. Supplemental Soil Vapour Monitoring Points Installation and Monitoring Report

Hounsfield Heights and North Hill
Mall
Calgary, Alberta

Clifton Associates



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Sears Canada Inc.
Supplemental Soil Vapour
Monitoring Points Installation and
Monitoring Report
Hounsfield Heights and North Hill Mall
Calgary, Alberta

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1.0 Introduction

Clifton Associates Ltd. (Clifton) is pleased to present this Supplemental Soil Vapour Monitoring Points Installation and Monitoring Report (Report) prepared for the account of Sears Canada Inc., 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 March and May 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 was 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.

The soil vapour analytical laboratory results collected during the Winter 2019 sampling event 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 Risk Management and Contingency Plan for the Site was recommended that included the following steps:

- Collect confirmatory soil vapour sample from an area of the concern;
- Communicate exceedance and proposed course of further action to the regulator and owners of the potentially affected properties;

- Establish lines of communication with the property owner; arrange meeting outlining reasons for an additional environmental work at the property; discuss with the owner available options; and, obtain 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.

2.0 Confirmatory Soil Vapour Sampling

In accordance with the Risk Management and Contingency Plan within the accepted *Revised Soil Vapour Monitoring Program (Update Fall 2016), Hounsfeld Heights and North Hill Mall, Calgary, Alberta* (October 2016), the soil vapour monitoring point SV32 was re-sampled on 20 March 2019, and the following exceedances of the applicable guidelines were recorded:

- Benzene: recorded value 332 $\mu\text{g}/\text{m}^3$ (Site-specific soil vapour quality guideline: 300 $\mu\text{g}/\text{m}^3$);
- Napthalene: recorded value (up to) 97 $\mu\text{g}/\text{m}^3$ (Increased monitoring frequency threshold value¹: 92.7 $\mu\text{g}/\text{m}^3$); and
- 1,2 – Dichloroethane: recorded value (up to) 37 $\mu\text{g}/\text{m}^3$ (Increased monitoring frequency threshold value: 36 $\mu\text{g}/\text{m}^3$).

Recorded concentrations confirmed exceedances for some of the investigated compounds, and requirement to implement further investigative steps per the Risk Management and Contingency Plan.

Complete analytical results for the confirmatory sampling at SV32 can be found in Appendix B, Table 1.

3.0 Communication with the Property-Owners

Considering the location of SV32, six properties were identified within the Contingency Plan radius. The Contingency Plan is described in greater detail in Section 7.0 of the Clifton report titled *Revised Soil Vapour Monitoring Program (Update Fall 2016), Hounsfeld 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

¹ Set as the Site-specific soil vapour quality guideline minus 10%.

of shallow vapour probes, sub-slab vapour probes, obtaining an indoor air sample or a combination of any of the three options.

Clifton's representative contacted the owners of the above properties in March 2019. Communication with residents was completed via phone, email and/or in-person meetings. Residents which could not be contacted through the above methods had a letter detailing the situation left in their mailbox with appropriate instructions.

Currently, the owners of one of the properties located within the Contingency Plan radius of SV32 granted their approval to proceed with an installation of the additional soil vapour monitoring points.

4.0 Additional Soil Vapour Monitoring Points Installation

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 .

As per the Risk Management and Contingency Plan within the Soil Vapour Monitoring Program, the two new soil vapour monitoring points will be used to estimate indoor air quality within the residence.

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 an 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 sections for the installed soil vapour monitoring points are shown in Appendix A, Figures 2 and 3, respectively.

5.0 Supplemental Soil Vapour Monitoring

Installed monitoring points were allowed to equilibrate for at least 48-hours. Prior to the sample collection, monitoring points were checked for seal integrity using helium tracer as shown in Appendix B, Table 4. 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 exceed 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 Maxxam Analytics Inc. for analyses.

6.0 Sampling Results

6.1 External Soil Vapour Monitoring Point

Clifton carried out the soil vapour monitoring event at the Site on 16 May 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 2.

6.2 Estimates of Indoor Air Quality

A rough estimate of indoor air quality is based on the soil vapour samples collected from the nearest soil vapour monitoring points. Samples from the soil vapour monitoring points SV321 and SV322, respectively, were therefore used to estimate indoor air quality for the subject property. Albeit these monitoring points have installation depth 1.0 m bgs, and are 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 conservatism to the estimate. Analytical results for both samples were 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 points SV321 and SV322 are presented in Appendix B, Table 3.

7.0 Discussion of Results and Recommendations

The soil vapour analytical laboratory results collected during the supplemental sampling event on 16 May 2019 were all below the regulatory guidelines for risks to human health and therefore, the vapour intrusion pathway into the residential structure should not pose immediate health risk for the occupants, and as such, an immediate application of exposure controls is not deemed necessary.

Analytical results for the monitoring point SV32 show a marked decline in concentrations of the CoPC compared to the confirmatory sample, which can be explained by different levels of the biodegradation and water table elevation variations caused by a time lapse between sampling rounds (March vs. May). 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 be sampled seasonally (i.e., four times a year) until five consecutive readings below 90% of SVQG for all investigated CoPC are recorded;
- Soil vapour monitoring points SV321 and SV322 should be re-sampled during winter 2019-2020 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; and
- Soil vapour monitoring points SV321 and SV322 should be automatically re-sampled in the case of any future SVQG exceedances recorded at SV32.

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

8.0 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.

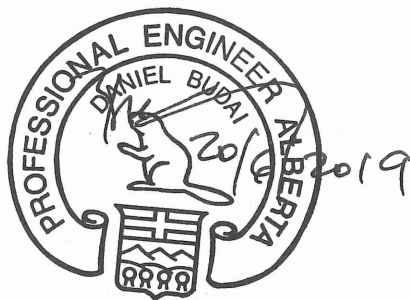
This report has been prepared in accordance with generally accepted engineering practice common to the local area. No other warranty expressed or implied is made.

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.

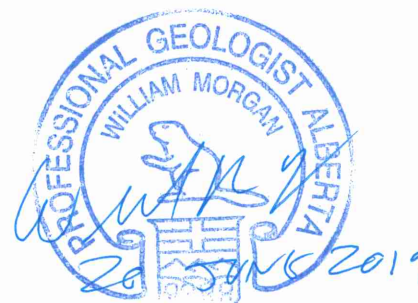
No environmental site investigation or remediation can wholly eliminate uncertainty regarding environmental conditions in connection with a property. This investigation is intended to reduce, but not eliminate the uncertainty regarding environmental conditions. Conclusions regarding the condition of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



Daniel Budai P.Eng.
Environmental Engineer



William R. Morgan P.Geol.
Environmental Geoscientist

Reference List

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Clifton Associates Ltd.: *Sears Canada Inc., Revised Soil Vapour Monitoring Program (Update Fall 2016), Hounsfield Heights and North Hill Mall, Calgary, Alberta*, 20 October 2016.

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

Clifton Associates

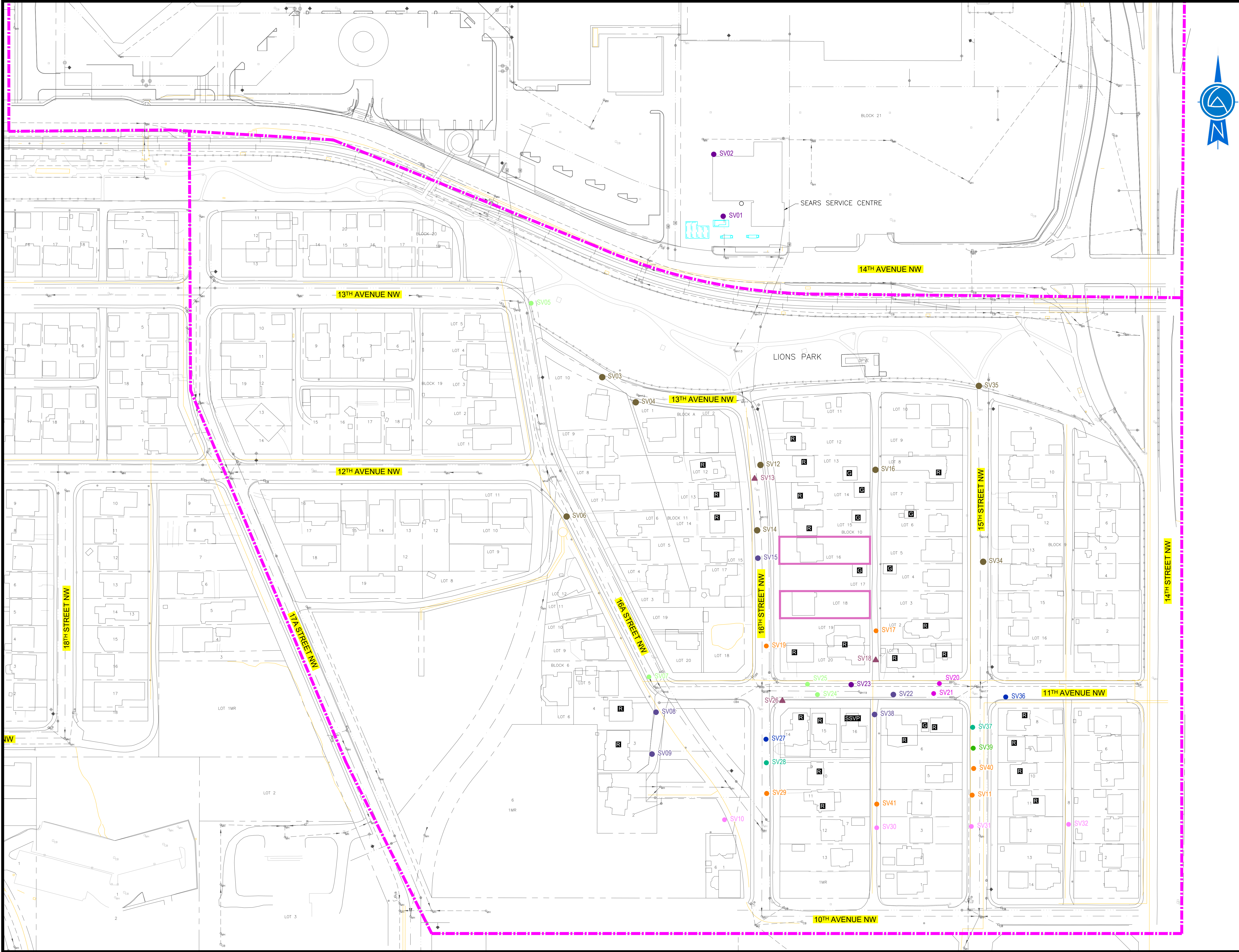


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- LEGEND**
- SITE BOUNDARY
LRT TRACKS
FENCE LINE
LEGAL LINE
FORMER FACILITY/FEATURE
BUILDING
SOIL VAPOUR PROBES INSTALLED AT 1.0 mbgs
SOIL VAPOUR PROBES INSTALLED AT 1.5 mbgs
SOIL VAPOUR PROBES INSTALLED AT 2.0 mbgs
SOIL VAPOUR PROBES INSTALLED AT 2.5 mbgs
SOIL VAPOUR PROBES INSTALLED AT 3.0 mbgs
SOIL VAPOUR PROBES INSTALLED AT 3.5 mbgs
SOIL VAPOUR PROBES INSTALLED AT 4.0 mbgs
SOIL VAPOUR PROBES INSTALLED AT 4.5 mbgs
SOIL VAPOUR PROBES INSTALLED AT 5.0 mbgs
SOIL VAPOUR PROBES INSTALLED AT 5.5 mbgs
SOIL VAPOUR PROBES INSTALLED AT 6.0 mbgs
NESTED SOIL VAPOUR MONITORING POINT
RESIDENTIAL STRUCTURES WITH REPORTED UNUSUAL FEATURES (EARTHEN FLOORS)

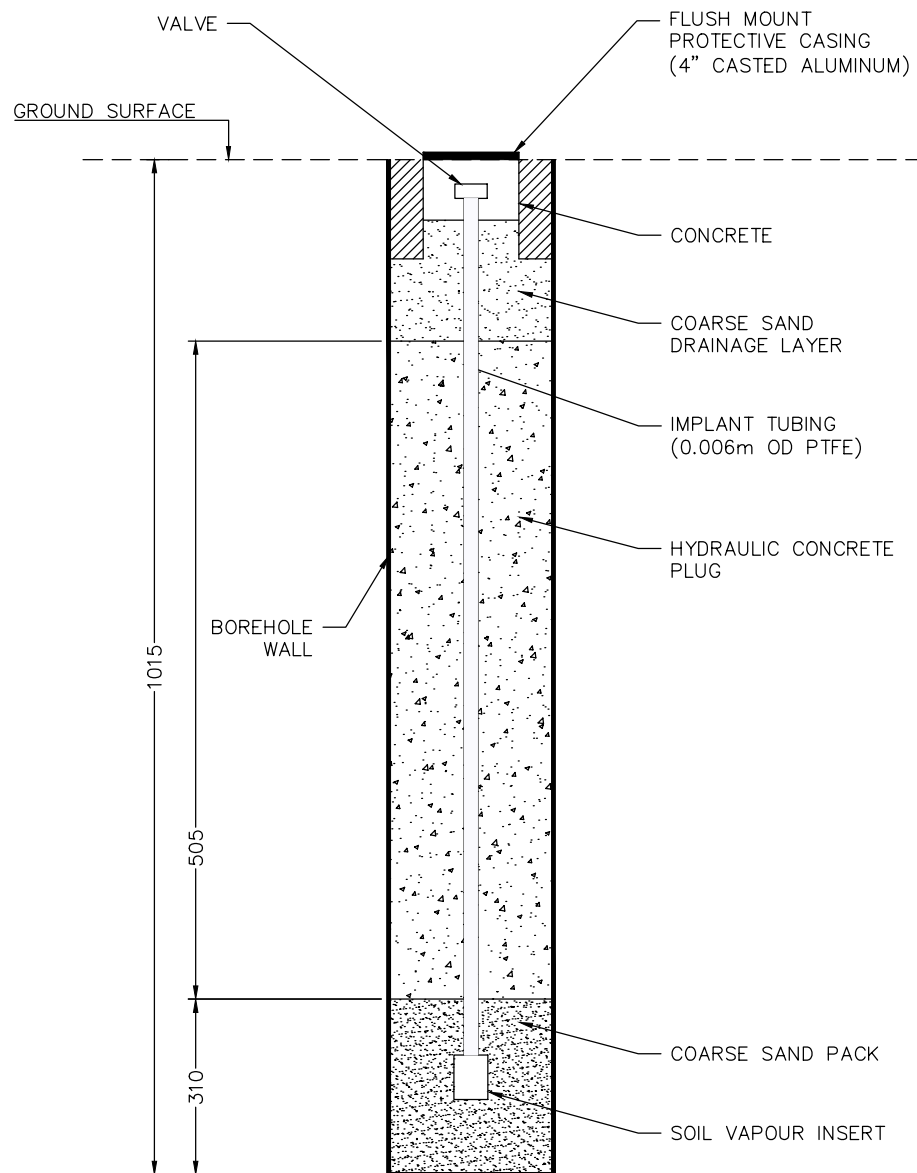
- RESIDENTIAL
DETACHED GARAGE
SUB-SLAB SOIL VAPOUR POINT



- UTILITY LINES & SYMBOLS**
NATURAL GAS LINE
SANITARY SEWER
STORM SEWER
WATER
CATCH BASIN
FIRE HYDRANT
LIGHT STANDARD
MANHOLE
UTILITY POLE

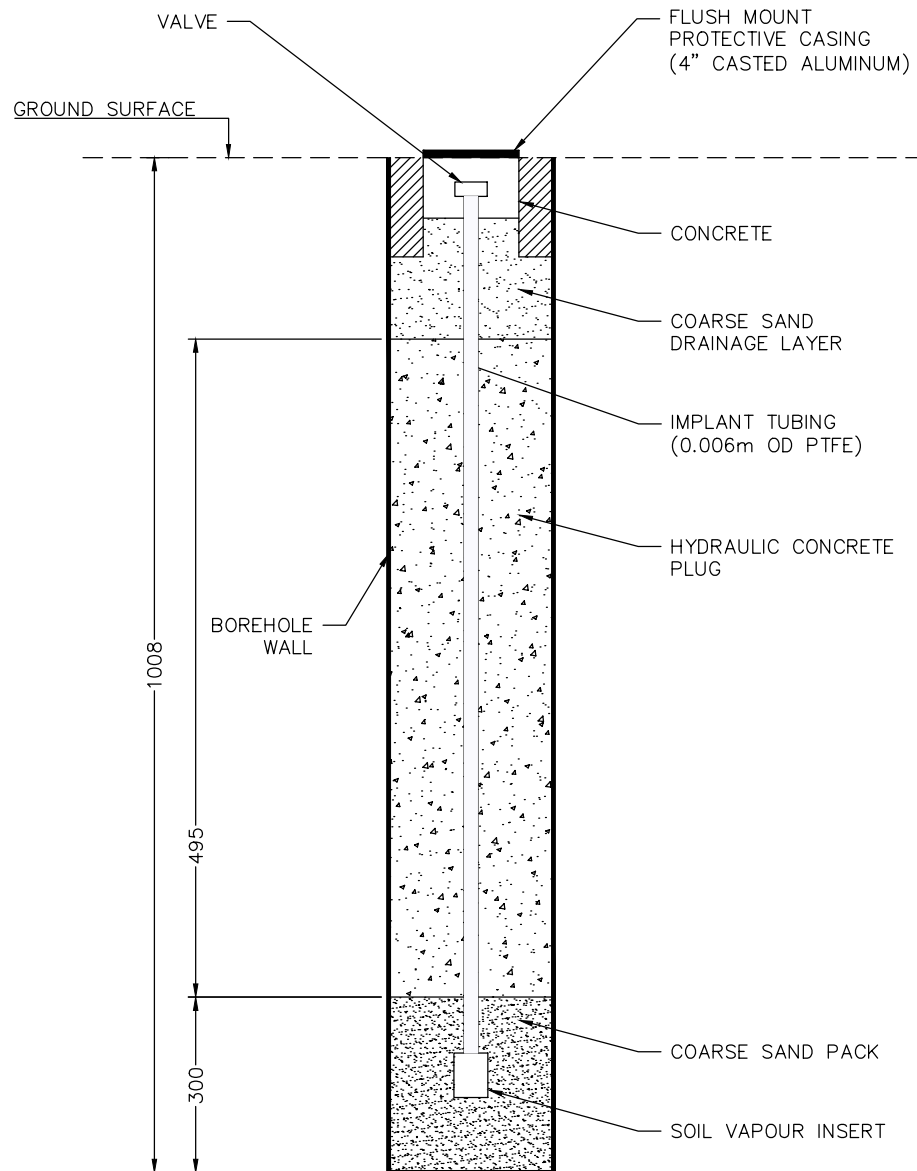
NOTES:
1. DRAWING COMPILED FROM PLANIMETRIC FILES SUPPLIED BY THE CITY OF CALGARY (INCLUDING U/G UTILITIES) & FROM SITE ASSESSMENT INFORMATION. ADDITIONAL REFERENCES FROM SEACOR ENVIRONMENTAL ENGINEERING INC., DRAWINGS 149-5A11.DWG, 149-5A6.DWG.





ENGINEER			
CLIENT			
PROJECT			
SUPPLEMENTAL SOIL MONITORING POINTS INSTALLATION & SAMPLING HOUSFIELD HEIGHTS / NORTH HILL MALL CALGARY, ALBERTA			
TITLE			
SOIL VAPOUR MONITORING POINTS INSTALLATION LAYOUT (AS OF MAY 2019)			
DESIGNED	KD	SCALE	1:1000
DRAWN	RD	PROJECT NO.	CG2430.1 E30
CHECKED	DB	FILE NO.	CG2430.1-E11-08
DATE			2019-06-06
FIG.			1



ENGINEER 	PROJECT SUPPLEMENTAL SOIL MONITORING POINTS INSTALLATION & SAMPLING HOUNSFIELD HEIGHTS / NORTH HILL MALL CALGARY, ALBERTA	SCALE NTS
CLIENT 	TITLE SOIL VAPOUR MONITORING POINT SV321 "AS BUILT" CROSS SECTION	DRAWING NO. 2
PROJECT NO. CG2430.1 E11	FILE NO. CG2430.1-E11-10.dwg	DATE



ENGINEER 	PROJECT SUPPLEMENTAL SOIL MONITORING POINTS INSTALLATION & INSTALLATION HOUNSFIELD HEIGHTS / NORTH HILL MALL CALGARY, ALBERTA	SCALE NTS
CLIENT 	TITLE SOIL VAPOUR MONITORING POINT SV322 "AS BUILT" CROSS SECTION	DRAWING NO. 3
PROJECT NO. CG2430.1 E11	FILE NO. CG2430.1-E11-09.dwg	DATE

Appendix B

Clifton Associates

Analytical Results Tables

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Table 1 - Summary of Soil Vapour Laboratory Analysis
Chemicals of Potential Concern in Soil Vapour
Soil Vapour Samples-Residential Buildings-Installation Depth 1.0 m bgs

Sample ID	RDL		SV32CS/1521		Guideline ¹	Guideline ³
Installation Depth (m bgs)			1.0			
Sampling Date			20-Mar-19			
Parameter						
Benzene	30		332		300.0	270.0
Toluene	35		1030		187900.0	169110.0
Ethylbenzene	40		<40		49625.0	44662.5
Xylenes	120		<120		8909.0	8018.1
Aliphatic C6-C8 ²	460		130670		915445.0	823900.5
Aliphatic C8-C10	460		<460		48060.0	43254.0
Aromatic C8-C10	460		<460		8125.0	7312.5
Aliphatic >C10-C12	460		<460		50000.0	45000.0
Aliphatic >C12-C16	460		<460		50000.0	45000.0
Aromatic >C10-C12	460		<460		10000.0	9000.0
Aromatic >C12-C16	460		<460		10000.0	9000.0
1,2-Dichloroethane (1,2-DCA)	37		<37		40.0	36.0
Naphtalene	97		<97		103.0	92.7
Oxygen (% v/v)	0.2		14.1		N/A	N/A
Nitrogen (% v/v)	0.2		83.5		N/A	N/A
Methane (% v/v)	0.2		<0.2		N/A	N/A
Carbon Dioxide (% v/v)	0.2		2.5		N/A	N/A

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 1

Indicates that the concentration exceeds guideline 3

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

3 Increased monitoring frequency trigger values

RDL Reportable Detection Limit

NG No applicable guideline

All results are expressed as µg/m³ unless otherwise noted.

Testing was conducted by Maxxam Analytics Inc.



Job No.	CG2430.1E11
Client	Sears Canada Inc.
Project	Confirmatory Sampling, Winter 2019
Location	Calgary, Alberta

Table 2 - Summary of Soil Vapour Laboratory Analysis
Chemicals of Potential Concern in Soil Vapour
Soil Vapour Samples-Residential Buildings-Installation Depth 1.0 m bgs

Sample ID	RDL		32		Guideline ¹	Guideline ³
Installation Depth (m bgs)			1.0			
Sampling Date			16-May-19			
Parameter						
Benzene	0.319		10.1		300.0	270.0
Toluene	0.377		225		187900.0	169110.0
Ethylbenzene	0.434		<0.434		49625.0	44662.5
Xylenes	1.30		1.94		8909.0	8018.1
Aliphatic C6-C8 ²	5.0		2244		915445.0	823900.5
Aliphatic C8-C10	5.0		22.6		48060.0	43254.0
Aromatic C8-C10	5.0		<5.0		8125.0	7312.5
Aliphatic >C10-C12	5.0		7.1		50000.0	45000.0
Aliphatic >C12-C16	5.0		<5.0		50000.0	45000.0
Aromatic >C10-C12	5.0		<5.0		10000.0	9000.0
Aromatic >C12-C16	5.0		<5.0		10000.0	9000.0
1,2-Dichloroethane (1,2-DCA)	0.405		0.482		40.0	36.0
Naphtalene	1.05		<1.05		103.0	92.7
Oxygen (% v/v)	0.2		20.2		N/A	N/A
Nitrogen (% v/v)	0.2		77.9		N/A	N/A
Methane (% v/v)	0.2		<0.2		N/A	N/A
Carbon Dioxide (% v/v)	0.2		2.0		N/A	N/A

Notes:

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

Indicates that the concentration exceeds guideline 1

Indicates that the concentration exceeds guideline 3

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

3 Increased monitoring frequency trigger values

RDL Reportable Detection Limit

NG No applicable guideline

All results are expressed as µg/m³ unless otherwise noted.

Testing was conducted by Maxxam Analytics Inc.



Job No.	CG2430.1E11
Client	Sears Canada Inc.
Project	Supplemental Sampling, 2019
Location	Calgary, Alberta

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

Estimate of Indoor Air Quality for Residential Property

Sample ID	RDL	321	322	Guideline ¹
Sampling Date		16-May-19	16-May-19	
Parameter				
Benzene	0.319	<0.638	<0.319	3.0E+02
Toluene	0.377	3.59	2.06	1.9E+05
Ethylbenzene	0.434	1.85	1.25	5.0E+04
Xylenes	1.30	10.7	8.02	8.9E+03
Aliphatic C6-C8 ²	5.0	<20.0	<10.0	9.2E+05
Aliphatic C8-C10	5.0	46	11.3	4.8E+04
Aromatic C8_C10	5.0	18	13.6	8.1E+03
Aliphatic >C10-C12	5.0	1840	250	5.0E+04
Aliphatic >C12-C16	5.0	265	73.2	5.0E+04
Aromatic >C10-C12	5.0	37	27.8	1.0E+04
Aromatic >C12-C16	5.0	<10	<5.0	1.0E+04
1,2-Dichloroethane (1,2-DCA)	0.405	<0.810	<0.405	4.0E+01
Naphtalene	1.05	<2.10	<1.05	1.0E+02
Oxygen (% v/v)	0.2	ND	22.2	NG
Nitrogen (% v/v)	0.2	ND	76.7	NG
Methane (% v/v)	0.2	ND	<0.2	NG
Carbon Dioxide (% v/v)	0.2	ND	1.1	NG

Notes:

1 Soil vapour quality guidelines protective of indoor air quality for a residential building on fine-textured soil, depth < 100 cm, Intrinsic 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

ND No data

All results are expressed as µg/m³ unless otherwise noted.

Testing was conducted by Maxxam Analytics Inc.



Job No.	CG2430.1E11
Client	Sears Canada Inc.
Project	Supplemental Sampling, 2019
Location	Calgary, Alberta

Table 4 - Summary of Integrity Testing by Helium Tracer

SVMP ID		SV32	SV32	SV321	SV322								
Installation Date		01-Jun-16	01-Jun-16	13-May-19	13-May-19								
Testing Date Date		20-Mar-19	16-May-19	16-May-19	16-May-19								
Helium Analyzer	Units	MGD 2002	MGD 2002	MGD 2002	MGD 2002								
Initial Recorded He Shroud Concentration	%	16.1	12.3	38.2	30.5								
Final He Concentration after Purge	%	0.040	0.025	0.05	0.75								
Difference	%	99.752	99.797	99.869	97.541								
Integrity Test Result	PASS/FAIL	PASS	PASS	PASS	PASS								

Notes:

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



Job No. CG2430.1E11
Client Sears Canada Inc.
Project Confirmatory/Supplemental Sampling, 2019
Location Calgary, Alberta

Clifton Associates

Certificates of Analyses

Clifton Associates



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Your Project #: CG2430.1E11
Site Location: SEARS CANADA
Your C.O.C. #: 40864

Attention: Stephen Dabadie

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Calgary, AB
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Report Date: 2019/03/28
Report #: R5647437
Version: 1 - Final

CERTIFICATE OF ANALYSIS

MAXXAM JOB #: B973248

Received: 2019/03/21, 08:27

Sample Matrix: Air
Samples Received: 1

Analyses	Date		Date Analyzed	Laboratory Method	Reference
	Quantity	Extracted			
BTEX and CCME Compounds in Air(TO-15mod)	1	N/A	2019/03/21	BRL SOP-00304	EPA TO-15 m
BTEX Fractionation in Air (TO-15mod)	1	N/A	2019/03/21	BRL SOP-00304	EPA TO-15 m
Canister Pressure (TO-15)	1	N/A	2019/03/21	BRL SOP-00304	EPA TO-15 m
Matrix Gases (1)	1	N/A	2019/03/27	CAM SOP-00225	GC/TCD
Volatile Organics in Air (ug/m3)	1	N/A	2019/03/25	BRL SOP-00304	EPA TO-15 m
Volatile Organics in Air (TO-15) (2)	1	N/A	2019/03/21	BRL SOP-00304	EPA TO-15 m

Remarks:

Maxxam Analytics' laboratories are accredited to ISO/IEC 17025:2005 for specific parameters on scopes of accreditation. Unless otherwise noted, procedures used by Maxxam are based upon recognized Provincial, Federal or US method compendia such as CCME, MDDELCC, EPA, APHA.

All work recorded herein has been done in accordance with procedures and practices ordinarily exercised by professionals in Maxxam's profession using accepted testing methodologies, quality assurance and quality control procedures (except where otherwise agreed by the client and Maxxam 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.

Maxxam Analytics' liability is limited to the actual cost of the requested analyses, unless otherwise agreed in writing. There is no other warranty expressed or implied. Maxxam 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 Maxxam, unless otherwise agreed in writing. Maxxam 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 Maxxam, 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 Maxxam 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.

Your Project #: CG2430.1E11
Site Location: SEARS CANADA
Your C.O.C. #: 40864

Attention: Stephen Dabadie

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

Report Date: 2019/03/28
Report #: R5647437
Version: 1 - Final

CERTIFICATE OF ANALYSIS

MAXXAM JOB #: B973248
Received: 2019/03/21, 08:27

Encryption Key

Please direct all questions regarding this Certificate of Analysis to your Project Manager.
Cristina (Maria) Bacchus, Project Manager
Email: CBacchus@maxxam.ca
Phone# (905)817-5763

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Maxxam has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per section 5.10.2 of ISO/IEC 17025:2005(E), signing the reports. For Service Group specific validation please refer to the Validation Signature Page.

RESULTS OF ANALYSES OF AIR

Maxxam ID		JGE659	
Sampling Date		2019/03/20	
COC Number		40864	
	UNITS	SV32CS/1521	QC Batch
Volatile Organics			
Pressure on Receipt	psig	(-2.9)	6031827
QC Batch = Quality Control Batch			

COMPRESSED GAS PARAMETERS (AIR)

Maxxam ID		JGE659	JGE659		
Sampling Date		2019/03/20	2019/03/20		
COC Number		40864	40864		
	UNITS	SV32CS/1521	SV32CS/1521 Lab-Dup	RDL	QC Batch
Fixed Gases					
Oxygen	% v/v	14.1	14.1	0.2	6039478
Nitrogen	% v/v	83.5	83.5	0.2	6039478
Methane	% v/v	<0.2	<0.2	0.2	6039478
Carbon Dioxide	% v/v	2.5	2.5	0.2	6039478
RDL = Reportable Detection Limit					
QC Batch = Quality Control Batch					
Lab-Dup = Laboratory Initiated Duplicate					

VOLATILE ORGANICS BY GC/MS (AIR)

Maxxam ID		JGE659	JGE659		
Sampling Date		2019/03/20	2019/03/20		
COC Number		40864	40864		
	UNITS	SV32CS/1521	SV32CS/1521 Lab-Dup	RDL	QC Batch
Volatile Organics					
Dichlorodifluoromethane (FREON 12)	ppbv	<19	<19	19	6029925
1,2-Dichlorotetrafluoroethane	ppbv	<16	<16	16	6029925
Chloromethane	ppbv	<28	<28	28	6029925
Vinyl Chloride	ppbv	<9.3	<9.3	9.3	6029925
Chloroethane	ppbv	<28	<28	28	6029925
1,3-Butadiene	ppbv	<46	<46	46	6029925
Trichlorofluoromethane (FREON 11)	ppbv	<19	<19	19	6029925
Ethanol (ethyl alcohol)	ppbv	<93	<93	93	6029925
Trichlorotrifluoroethane	ppbv	<14	<14	14	6029925
2-propanol	ppbv	<93	<93	93	6029925
2-Propanone	ppbv	<56	<56	56	6029925
Methyl Ethyl Ketone (2-Butanone)	ppbv	<19	<19	19	6029925
Methyl Isobutyl Ketone	ppbv	<19	<19	19	6029925
Methyl Butyl Ketone (2-Hexanone)	ppbv	<93	<93	93	6029925
Methyl t-butyl ether (MTBE)	ppbv	<19	<19	19	6029925
Ethyl Acetate	ppbv	<93	<93	93	6029925
1,1-Dichloroethylene	ppbv	<9.3	<9.3	9.3	6029925
cis-1,2-Dichloroethylene	ppbv	<9.3	<9.3	9.3	6029925
trans-1,2-Dichloroethylene	ppbv	<9.3	<9.3	9.3	6029925
Methylene Chloride(Dichloromethane)	ppbv	<56	<56	56	6029925
Chloroform	ppbv	<9.3	<9.3	9.3	6029925
Carbon Tetrachloride	ppbv	<9.3	<9.3	9.3	6029925
1,1-Dichloroethane	ppbv	<9.3	<9.3	9.3	6029925
1,2-Dichloroethane	ppbv	<9.3	<9.3	9.3	6029925
Ethylene Dibromide	ppbv	<9.3	<9.3	9.3	6029925
1,1,1-Trichloroethane	ppbv	<9.3	<9.3	9.3	6029925
1,1,2-Trichloroethane	ppbv	<9.3	<9.3	9.3	6029925
1,1,2,2-Tetrachloroethane	ppbv	<9.3	<9.3	9.3	6029925
cis-1,3-Dichloropropene	ppbv	<9.3	<9.3	9.3	6029925
trans-1,3-Dichloropropene	ppbv	<9.3	<9.3	9.3	6029925
1,2-Dichloropropane	ppbv	<9.3	<9.3	9.3	6029925
Bromomethane	ppbv	<9.3	<9.3	9.3	6029925
Bromoform	ppbv	<19	<19	19	6029925
Bromodichloromethane	ppbv	<19	<19	19	6029925
RDL = Reportable Detection Limit					
QC Batch = Quality Control Batch					
Lab-Dup = Laboratory Initiated Duplicate					

VOLATILE ORGANICS BY GC/MS (AIR)

Maxxam ID		JGE659	JGE659		
Sampling Date		2019/03/20	2019/03/20		
COC Number		40864	40864		
	UNITS	SV32CS/1521	SV32CS/1521 Lab-Dup	RDL	QC Batch
Dibromochloromethane	ppbv	<19	<19	19	6029925
Trichloroethylene	ppbv	<9.3	<9.3	9.3	6029925
Tetrachloroethylene	ppbv	<9.3	<9.3	9.3	6029925
Benzene	ppbv	104	102	9.3	6029925
Toluene	ppbv	273	274	9.3	6029925
Ethylbenzene	ppbv	<9.3	<9.3	9.3	6029925
p+m-Xylene	ppbv	<19	<19	19	6029925
o-Xylene	ppbv	<9.3	<9.3	9.3	6029925
Styrene	ppbv	<9.3	<9.3	9.3	6029925
4-ethyltoluene	ppbv	<46	<46	46	6029925
1,3,5-Trimethylbenzene	ppbv	<46	<46	46	6029925
1,2,4-Trimethylbenzene	ppbv	<46	<46	46	6029925
Chlorobenzene	ppbv	<9.3	<9.3	9.3	6029925
Benzyl chloride	ppbv	<46	<46	46	6029925
1,3-Dichlorobenzene	ppbv	<37	<37	37	6029925
1,4-Dichlorobenzene	ppbv	<9.3	<9.3	9.3	6029925
1,2-Dichlorobenzene	ppbv	<9.3	<9.3	9.3	6029925
1,2,4-Trichlorobenzene	ppbv	<46	<46	46	6029925
Hexachlorobutadiene	ppbv	<46	<46	46	6029925
Hexane	ppbv	<19	<19	19	6029925
Heptane	ppbv	<28	<28	28	6029925
Cyclohexane	ppbv	<19	<19	19	6029925
Tetrahydrofuran	ppbv	<37	<37	37	6029925
1,4-Dioxane	ppbv	<93	<93	93	6029925
Naphthalene	ppbv	<19	<19	19	6029925
Total Xylenes	ppbv	<28	<28	28	6029925
1,1,1,2-Tetrachloroethane	ppbv	<9.3	<9.3	9.3	6029925
Vinyl Bromide	ppbv	<19	<19	19	6029925
Propene	ppbv	<46	<46	46	6029925
2,2,4-Trimethylpentane	ppbv	10600	10500	19	6029925
Carbon Disulfide	ppbv	<46	<46	46	6029925
Vinyl Acetate	ppbv	<19	<19	19	6029925
Surrogate Recovery (%)					
Bromochloromethane	%	96	96		6029925
D5-Chlorobenzene	%	93	91		6029925
RDL = Reportable Detection Limit QC Batch = Quality Control Batch Lab-Dup = Laboratory Initiated Duplicate					

Maxxam Job #: B973248
Report Date: 2019/03/28

Clifton Associates Ltd.
Client Project #: CG2430.1E11
Site Location: SEARS CANADA
Sampler Initials: DB

VOLATILE ORGANICS BY GC/MS (AIR)

Maxxam ID		JGE659	JGE659		
Sampling Date		2019/03/20	2019/03/20		
COC Number		40864	40864		
	UNITS	SV32CS/1521	SV32CS/1521 Lab-Dup	RDL	QC Batch
Difluorobenzene	%	96	96		6029925
RDL = Reportable Detection Limit QC Batch = Quality Control Batch Lab-Dup = Laboratory Initiated Duplicate					

CALCULATED VOLATILE ORGANICS (AIR)

Maxxam ID		JGE659	JGE659		
Sampling Date		2019/03/20	2019/03/20		
COC Number		40864	40864		
	UNITS	SV32CS/1521	SV32CS/1521 Lab-Dup	RDL	QC Batch
Calculated Parameters					
Dichlorodifluoromethane (FREON 12)	ug/m3	<91	<91	91	6029948
1,2-Dichlorotetrafluoroethane	ug/m3	<110	<110	110	6029948
Chloromethane	ug/m3	<57	<57	57	6029948
Vinyl Chloride	ug/m3	<24	<24	24	6029948
Chloroethane	ug/m3	<73	<73	73	6029948
1,3-Butadiene	ug/m3	<100	<100	100	6029948
Trichlorofluoromethane (FREON 11)	ug/m3	<100	<100	100	6029948
Ethanol (ethyl alcohol)	ug/m3	<170	<170	170	6029948
Trichlorotrifluoroethane	ug/m3	<110	<110	110	6029948
2-propanol	ug/m3	<230	<230	230	6029948
2-Propanone	ug/m3	<130	<130	130	6029948
Methyl Ethyl Ketone (2-Butanone)	ug/m3	<55	<55	55	6029948
Methyl Isobutyl Ketone	ug/m3	<76	<76	76	6029948
Methyl Butyl Ketone (2-Hexanone)	ug/m3	<380	<380	380	6029948
Methyl t-butyl ether (MTBE)	ug/m3	<67	<67	67	6029948
Ethyl Acetate	ug/m3	<330	<330	330	6029948
1,1-Dichloroethylene	ug/m3	<37	<37	37	6029948
cis-1,2-Dichloroethylene	ug/m3	<37	<37	37	6029948
trans-1,2-Dichloroethylene	ug/m3	<37	<37	37	6029948
Methylene Chloride(Dichloromethane)	ug/m3	<190	<190	190	6029948
Chloroform	ug/m3	<45	<45	45	6029948
Carbon Tetrachloride	ug/m3	<58	<58	58	6029948
1,1-Dichloroethane	ug/m3	<37	<37	37	6029948
1,2-Dichloroethane	ug/m3	<37	<37	37	6029948
Ethylene Dibromide	ug/m3	<71	<71	71	6029948
1,1,1-Trichloroethane	ug/m3	<50	<50	50	6029948
1,1,2-Trichloroethane	ug/m3	<50	<50	50	6029948
1,1,2,2-Tetrachloroethane	ug/m3	<64	<64	64	6029948
cis-1,3-Dichloropropene	ug/m3	<42	<42	42	6029948
trans-1,3-Dichloropropene	ug/m3	<42	<42	42	6029948
1,2-Dichloropropane	ug/m3	<43	<43	43	6029948
Bromomethane	ug/m3	<36	<36	36	6029948
Bromoform	ug/m3	<190	<190	190	6029948
Bromodichloromethane	ug/m3	<120	<120	120	6029948
RDL = Reportable Detection Limit					
QC Batch = Quality Control Batch					
Lab-Dup = Laboratory Initiated Duplicate					

CALCULATED VOLATILE ORGANICS (AIR)

Maxxam ID		JGE659	JGE659		
Sampling Date		2019/03/20	2019/03/20		
COC Number		40864	40864		
	UNITS	SV32CS/1521	SV32CS/1521 Lab-Dup	RDL	QC Batch
Dibromochloromethane	ug/m3	<160	<160	160	6029948
Trichloroethylene	ug/m3	<50	<50	50	6029948
Tetrachloroethylene	ug/m3	<63	<63	63	6029948
Benzene	ug/m3	332	327	30	6029948
Toluene	ug/m3	1030	1030	35	6029948
Ethylbenzene	ug/m3	<40	<40	40	6029948
p+m-Xylene	ug/m3	<80	<80	80	6029948
o-Xylene	ug/m3	<40	<40	40	6029948
Styrene	ug/m3	<39	<39	39	6029948
4-ethyltoluene	ug/m3	<230	<230	230	6029948
1,3,5-Trimethylbenzene	ug/m3	<230	<230	230	6029948
1,2,4-Trimethylbenzene	ug/m3	<230	<230	230	6029948
Chlorobenzene	ug/m3	<43	<43	43	6029948
Benzyl chloride	ug/m3	<240	<240	240	6029948
1,3-Dichlorobenzene	ug/m3	<220	<220	220	6029948
1,4-Dichlorobenzene	ug/m3	<56	<56	56	6029948
1,2-Dichlorobenzene	ug/m3	<56	<56	56	6029948
1,2,4-Trichlorobenzene	ug/m3	<340	<340	340	6029948
Hexachlorobutadiene	ug/m3	<490	<490	490	6029948
Hexane	ug/m3	<65	<65	65	6029948
Heptane	ug/m3	<110	<110	110	6029948
Cyclohexane	ug/m3	<64	<64	64	6029948
Tetrahydrofuran	ug/m3	<110	<110	110	6029948
1,4-Dioxane	ug/m3	<330	<330	330	6029948
Naphthalene	ug/m3	<97	<97	97	6029948
Total Xylenes	ug/m3	<120	<120	120	6029948
1,1,1,2-Tetrachloroethane	ug/m3	<64	<64	64	6029948
Vinyl Bromide	ug/m3	<81	<81	81	6029948
Propene	ug/m3	<80	<80	80	6029948
2,2,4-Trimethylpentane	ug/m3	49300	49100	86	6029948
Carbon Disulfide	ug/m3	<140	<140	140	6029948
Vinyl Acetate	ug/m3	<65	<65	65	6029948
RDL = Reportable Detection Limit QC Batch = Quality Control Batch Lab-Dup = Laboratory Initiated Duplicate					

VOLATILE ORGANIC HYDROCARBONS BY GC/MS (AIR)

Maxxam ID		JGE659	JGE659		
Sampling Date		2019/03/20	2019/03/20		
COC Number		40864	40864		
	UNITS	SV32CS/1521	SV32CS/1521 Lab-Dup	RDL	QC Batch
Volatile Organics					
F1-BTEX, C6-C10 (as Toluene)	ug/m3	47400	47700	460	6034792
F2, C10-C16 (as Decane)	ug/m3	<460	<460	460	6034792
Aliphatic >C5-C6	ug/m3	2670	2650	460	6034806
Aliphatic >C6-C8	ug/m3	128000	128000	460	6034806
Aliphatic >C8-C10	ug/m3	<460	<460	460	6034806
Aliphatic >C10-C12	ug/m3	<460	<460	460	6034806
Aliphatic >C12-C16	ug/m3	<460	<460	460	6034806
Aromatic >C7-C8 (TEX Excluded)	ug/m3	<460	<460	460	6034806
Aromatic >C8-C10	ug/m3	<460	<460	460	6034806
Aromatic >C10-C12	ug/m3	<460	<460	460	6034806
Aromatic >C12-C16	ug/m3	<460	<460	460	6034806
RDL = Reportable Detection Limit					
QC Batch = Quality Control Batch					
Lab-Dup = Laboratory Initiated Duplicate					

GENERAL COMMENTS

Sample JGE659 [SV32CS/1521] : Sample was analyzed at a 92.5X dilution. The DL's were adjusted accordingly.

Matrix Gas Analysis: Canister was pressurized with Helium to enable sampling. Results and DLs adjusted accordingly.

Matrix Gas Analysis: Results normalized to 100% dry volume.

Results relate only to the items tested.

QUALITY ASSURANCE REPORT

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
6029925	NS2	Spiked Blank	Bromochloromethane	2019/03/21		97	%	60 - 140
			D5-Chlorobenzene	2019/03/21		99	%	60 - 140
			Difluorobenzene	2019/03/21		100	%	60 - 140
			Dichlorodifluoromethane (FREON 12)	2019/03/21		90	%	70 - 130
			1,2-Dichlorotetrafluoroethane	2019/03/21		81	%	70 - 130
			Chloromethane	2019/03/21		73	%	70 - 130
			Vinyl Chloride	2019/03/21		87	%	70 - 130
			Chloroethane	2019/03/21		89	%	70 - 130
			1,3-Butadiene	2019/03/21		93	%	70 - 130
			Trichlorofluoromethane (FREON 11)	2019/03/21		98	%	70 - 130
			Ethanol (ethyl alcohol)	2019/03/21		84	%	70 - 130
			Trichlorotrifluoroethane	2019/03/21		93	%	70 - 130
			2-propanol	2019/03/21		75	%	70 - 130
			2-Propanone	2019/03/21		94	%	70 - 130
			Methyl Ethyl Ketone (2-Butanone)	2019/03/21		101	%	70 - 130
			Methyl Isobutyl Ketone	2019/03/21		98	%	70 - 130
			Methyl Butyl Ketone (2-Hexanone)	2019/03/21		100	%	70 - 130
			Methyl t-butyl ether (MTBE)	2019/03/21		96	%	70 - 130
			Ethyl Acetate	2019/03/21		96	%	70 - 130
			1,1-Dichloroethylene	2019/03/21		105	%	70 - 130
			cis-1,2-Dichloroethylene	2019/03/21		97	%	70 - 130
			trans-1,2-Dichloroethylene	2019/03/21		102	%	70 - 130
			Methylene Chloride(Dichloromethane)	2019/03/21		88	%	70 - 130
			Chloroform	2019/03/21		97	%	70 - 130
			Carbon Tetrachloride	2019/03/21		103	%	70 - 130
			1,1-Dichloroethane	2019/03/21		96	%	70 - 130
			1,2-Dichloroethane	2019/03/21		99	%	70 - 130
			Ethylene Dibromide	2019/03/21		104	%	70 - 130
			1,1,1-Trichloroethane	2019/03/21		93	%	70 - 130
			1,1,2-Trichloroethane	2019/03/21		101	%	70 - 130
			1,1,2,2-Tetrachloroethane	2019/03/21		102	%	70 - 130
			cis-1,3-Dichloropropene	2019/03/21		99	%	70 - 130
			trans-1,3-Dichloropropene	2019/03/21		106	%	70 - 130
			1,2-Dichloropropane	2019/03/21		101	%	70 - 130
			Bromomethane	2019/03/21		121	%	70 - 130
			Bromoform	2019/03/21		109	%	70 - 130
			Bromodichloromethane	2019/03/21		102	%	70 - 130
			Dibromochloromethane	2019/03/21		108	%	70 - 130
			Trichloroethylene	2019/03/21		99	%	70 - 130
			Tetrachloroethylene	2019/03/21		100	%	70 - 130
			Benzene	2019/03/21		100	%	70 - 130
			Toluene	2019/03/21		105	%	70 - 130
			Ethylbenzene	2019/03/21		102	%	70 - 130
			p+m-Xylene	2019/03/21		101	%	70 - 130
			o-Xylene	2019/03/21		103	%	70 - 130
			Styrene	2019/03/21		109	%	70 - 130
			4-ethyltoluene	2019/03/21		104	%	70 - 130
			1,3,5-Trimethylbenzene	2019/03/21		101	%	70 - 130
			1,2,4-Trimethylbenzene	2019/03/21		98	%	70 - 130
			Chlorobenzene	2019/03/21		108	%	70 - 130
			Benzyl chloride	2019/03/21		102	%	70 - 130
			1,3-Dichlorobenzene	2019/03/21		110	%	70 - 130
			1,4-Dichlorobenzene	2019/03/21		107	%	70 - 130

QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
6029925	NS2	Method Blank	1,2-Dichlorobenzene	2019/03/21		101	%	70 - 130
			1,2,4-Trichlorobenzene	2019/03/21		83	%	70 - 130
			Hexachlorobutadiene	2019/03/21		88	%	70 - 130
			Hexane	2019/03/21		91	%	70 - 130
			Heptane	2019/03/21		100	%	70 - 130
			Cyclohexane	2019/03/21		95	%	70 - 130
			Tetrahydrofuran	2019/03/21		98	%	70 - 130
			1,4-Dioxane	2019/03/21		97	%	70 - 130
			Naphthalene	2019/03/21		76	%	70 - 130
			Total Xylenes	2019/03/21		102	%	70 - 130
			1,1,1,2-Tetrachloroethane	2019/03/21		105	%	70 - 130
			Vinyl Bromide	2019/03/21		94	%	70 - 130
			Propene	2019/03/21		94	%	70 - 130
			2,2,4-Trimethylpentane	2019/03/21		99	%	70 - 130
			Carbon Disulfide	2019/03/21		103	%	70 - 130
			Vinyl Acetate	2019/03/21		72	%	70 - 130
			Bromochloromethane	2019/03/21		90	%	60 - 140
			D5-Chlorobenzene	2019/03/21		95	%	60 - 140
			Difluorobenzene	2019/03/21		99	%	60 - 140
			Dichlorodifluoromethane (FREON 12)	2019/03/21	<0.20		ppbv	
			1,2-Dichlorotetrafluoroethane	2019/03/21	<0.17		ppbv	
			Chloromethane	2019/03/21	<0.30		ppbv	
			Vinyl Chloride	2019/03/21	<0.10		ppbv	
			Chloroethane	2019/03/21	<0.30		ppbv	
			1,3-Butadiene	2019/03/21	<0.50		ppbv	
			Trichlorofluoromethane (FREON 11)	2019/03/21	<0.20		ppbv	
			Ethanol (ethyl alcohol)	2019/03/21	<1.0		ppbv	
			Trichlorotrifluoroethane	2019/03/21	<0.15		ppbv	
			2-propanol	2019/03/21	<1.0		ppbv	
			2-Propanone	2019/03/21	<0.60		ppbv	
			Methyl Ethyl Ketone (2-Butanone)	2019/03/21	<0.20		ppbv	
			Methyl Isobutyl Ketone	2019/03/21	<0.20		ppbv	
			Methyl Butyl Ketone (2-Hexanone)	2019/03/21	<1.0		ppbv	
			Methyl t-butyl ether (MTBE)	2019/03/21	<0.20		ppbv	
			Ethyl Acetate	2019/03/21	<1.0		ppbv	
			1,1-Dichloroethylene	2019/03/21	<0.10		ppbv	
			cis-1,2-Dichloroethylene	2019/03/21	<0.10		ppbv	
			trans-1,2-Dichloroethylene	2019/03/21	<0.10		ppbv	
			Methylene Chloride(Dichloromethane)	2019/03/21	<0.60		ppbv	
			Chloroform	2019/03/21	<0.10		ppbv	
			Carbon Tetrachloride	2019/03/21	<0.10		ppbv	
			1,1-Dichloroethane	2019/03/21	<0.10		ppbv	
			1,2-Dichloroethane	2019/03/21	<0.10		ppbv	
			Ethylene Dibromide	2019/03/21	<0.10		ppbv	
			1,1,1-Trichloroethane	2019/03/21	<0.10		ppbv	
			1,1,2-Trichloroethane	2019/03/21	<0.10		ppbv	
			1,1,2,2-Tetrachloroethane	2019/03/21	<0.10		ppbv	
			cis-1,3-Dichloropropene	2019/03/21	<0.10		ppbv	
			trans-1,3-Dichloropropene	2019/03/21	<0.10		ppbv	
			1,2-Dichloropropane	2019/03/21	<0.10		ppbv	
			Bromomethane	2019/03/21	<0.10		ppbv	
			Bromoform	2019/03/21	<0.20		ppbv	
			Bromodichloromethane	2019/03/21	<0.20		ppbv	

QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
6029925	NS2	RPD [JGE659-01]	Dibromochloromethane	2019/03/21	<0.20		ppbv	
			Trichloroethylene	2019/03/21	<0.10		ppbv	
			Tetrachloroethylene	2019/03/21	<0.10		ppbv	
			Benzene	2019/03/21	<0.10		ppbv	
			Toluene	2019/03/21	<0.10		ppbv	
			Ethylbenzene	2019/03/21	<0.10		ppbv	
			p+m-Xylene	2019/03/21	<0.20		ppbv	
			o-Xylene	2019/03/21	<0.10		ppbv	
			Styrene	2019/03/21	<0.10		ppbv	
			4-ethyltoluene	2019/03/21	<0.50		ppbv	
			1,3,5-Trimethylbenzene	2019/03/21	<0.50		ppbv	
			1,2,4-Trimethylbenzene	2019/03/21	<0.50		ppbv	
			Chlorobenzene	2019/03/21	<0.10		ppbv	
			Benzyl chloride	2019/03/21	<0.50		ppbv	
			1,3-Dichlorobenzene	2019/03/21	<0.40		ppbv	
			1,4-Dichlorobenzene	2019/03/21	<0.10		ppbv	
			1,2-Dichlorobenzene	2019/03/21	<0.10		ppbv	
			1,2,4-Trichlorobenzene	2019/03/21	<0.50		ppbv	
			Hexachlorobutadiene	2019/03/21	<0.50		ppbv	
			Hexane	2019/03/21	<0.20		ppbv	
			Heptane	2019/03/21	<0.30		ppbv	
			Cyclohexane	2019/03/21	<0.20		ppbv	
			Tetrahydrofuran	2019/03/21	<0.40		ppbv	
			1,4-Dioxane	2019/03/21	<1.0		ppbv	
			Naphthalene	2019/03/21	<0.20		ppbv	
			Total Xylenes	2019/03/21	<0.30		ppbv	
			1,1,1,2-Tetrachloroethane	2019/03/21	<0.10		ppbv	
			Vinyl Bromide	2019/03/21	<0.20		ppbv	
			Propene	2019/03/21	<0.50		ppbv	
			2,2,4-Trimethylpentane	2019/03/21	<0.20		ppbv	
			Carbon Disulfide	2019/03/21	<0.50		ppbv	
			Vinyl Acetate	2019/03/21	<0.20		ppbv	
			Dichlorodifluoromethane (FREON 12)	2019/03/21	NC		%	25
			1,2-Dichlorotetrafluoroethane	2019/03/21	NC		%	25
			Chloromethane	2019/03/21	NC		%	25
			Vinyl Chloride	2019/03/21	NC		%	25
			Chloroethane	2019/03/21	NC		%	25
			1,3-Butadiene	2019/03/21	NC		%	25
			Trichlorofluoromethane (FREON 11)	2019/03/21	NC		%	25
			Ethanol (ethyl alcohol)	2019/03/21	NC		%	25
			Trichlorotrifluoroethane	2019/03/21	NC		%	25
			2-propanol	2019/03/21	NC		%	25
			2-Propanone	2019/03/21	NC		%	25
			Methyl Ethyl Ketone (2-Butanone)	2019/03/21	NC		%	25
			Methyl Isobutyl Ketone	2019/03/21	NC		%	25
			Methyl Butyl Ketone (2-Hexanone)	2019/03/21	NC		%	25
			Methyl t-butyl ether (MTBE)	2019/03/21	NC		%	25
			Ethyl Acetate	2019/03/21	NC		%	25
			1,1-Dichloroethylene	2019/03/21	NC		%	25
			cis-1,2-Dichloroethylene	2019/03/21	NC		%	25
			trans-1,2-Dichloroethylene	2019/03/21	NC		%	25
			Methylene Chloride(Dichloromethane)	2019/03/21	NC		%	25
			Chloroform	2019/03/21	NC		%	25

QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
6029948	ASC	RPD [JGE659-01]	Carbon Tetrachloride	2019/03/21	NC		%	25
			1,1-Dichloroethane	2019/03/21	NC		%	25
			1,2-Dichloroethane	2019/03/21	NC		%	25
			Ethylene Dibromide	2019/03/21	NC		%	25
			1,1,1-Trichloroethane	2019/03/21	NC		%	25
			1,1,2-Trichloroethane	2019/03/21	NC		%	25
			1,1,2,2-Tetrachloroethane	2019/03/21	NC		%	25
			cis-1,3-Dichloropropene	2019/03/21	NC		%	25
			trans-1,3-Dichloropropene	2019/03/21	NC		%	25
			1,2-Dichloropropane	2019/03/21	NC		%	25
			Bromomethane	2019/03/21	NC		%	25
			Bromoform	2019/03/21	NC		%	25
			Bromodichloromethane	2019/03/21	NC		%	25
			Dibromochloromethane	2019/03/21	NC		%	25
			Trichloroethylene	2019/03/21	NC		%	25
			Tetrachloroethylene	2019/03/21	NC		%	25
			Benzene	2019/03/21	1.6		%	25
			Toluene	2019/03/21	0.28		%	25
			Ethylbenzene	2019/03/21	NC		%	25
			p+m-Xylene	2019/03/21	NC		%	25
			o-Xylene	2019/03/21	NC		%	25
			Styrene	2019/03/21	NC		%	25
			4-ethyltoluene	2019/03/21	NC		%	25
			1,3,5-Trimethylbenzene	2019/03/21	NC		%	25
			1,2,4-Trimethylbenzene	2019/03/21	NC		%	25
			Chlorobenzene	2019/03/21	NC		%	25
			Benzyl chloride	2019/03/21	NC		%	25
			1,3-Dichlorobenzene	2019/03/21	NC		%	25
			1,4-Dichlorobenzene	2019/03/21	NC		%	25
			1,2-Dichlorobenzene	2019/03/21	NC		%	25
			1,2,4-Trichlorobenzene	2019/03/21	NC		%	25
			Hexachlorobutadiene	2019/03/21	NC		%	25
			Hexane	2019/03/21	NC		%	25
			Heptane	2019/03/21	NC		%	25
			Cyclohexane	2019/03/21	NC		%	25
			Tetrahydrofuran	2019/03/21	NC		%	25
			1,4-Dioxane	2019/03/21	NC		%	25
			Naphthalene	2019/03/21	NC		%	25
			Total Xylenes	2019/03/21	NC		%	25
			1,1,1,2-Tetrachloroethane	2019/03/21	NC		%	25
			Vinyl Bromide	2019/03/21	NC		%	25
			Propene	2019/03/21	NC		%	25
			2,2,4-Trimethylpentane	2019/03/21	0.32		%	25
			Carbon Disulfide	2019/03/21	NC		%	25
			Vinyl Acetate	2019/03/21	NC		%	25
			Dichlorodifluoromethane (FREON 12)	2019/03/26	NC		%	25
			1,2-Dichlorotetrafluoroethane	2019/03/26	NC		%	25
			Chloromethane	2019/03/26	NC		%	25
			Vinyl Chloride	2019/03/26	NC		%	25
			Chloroethane	2019/03/26	NC		%	25
			1,3-Butadiene	2019/03/26	NC		%	25
			Trichlorofluoromethane (FREON 11)	2019/03/26	NC		%	25
			Ethanol (ethyl alcohol)	2019/03/26	NC		%	25

QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
			Trichlorotrifluoroethane	2019/03/26	NC		%	25
			2-propanol	2019/03/26	NC		%	25
			2-Propanone	2019/03/26	NC		%	25
			Methyl Ethyl Ketone (2-Butanone)	2019/03/26	NC		%	25
			Methyl Isobutyl Ketone	2019/03/26	NC		%	25
			Methyl Butyl Ketone (2-Hexanone)	2019/03/26	NC		%	25
			Methyl t-butyl ether (MTBE)	2019/03/26	NC		%	25
			Ethyl Acetate	2019/03/26	NC		%	25
			1,1-Dichloroethylene	2019/03/26	NC		%	25
			cis-1,2-Dichloroethylene	2019/03/26	NC		%	25
			trans-1,2-Dichloroethylene	2019/03/26	NC		%	25
			Methylene Chloride(Dichloromethane)	2019/03/26	NC		%	25
			Chloroform	2019/03/26	NC		%	25
			Carbon Tetrachloride	2019/03/26	NC		%	25
			1,1-Dichloroethane	2019/03/26	NC		%	25
			1,2-Dichloroethane	2019/03/26	NC		%	25
			Ethylene Dibromide	2019/03/26	NC		%	25
			1,1,1-Trichloroethane	2019/03/26	NC		%	25
			1,1,2-Trichloroethane	2019/03/26	NC		%	25
			1,1,2,2-Tetrachloroethane	2019/03/26	NC		%	25
			cis-1,3-Dichloropropene	2019/03/26	NC		%	25
			trans-1,3-Dichloropropene	2019/03/26	NC		%	25
			1,2-Dichloropropane	2019/03/26	NC		%	25
			Bromomethane	2019/03/26	NC		%	25
			Bromoform	2019/03/26	NC		%	25
			Bromodichloromethane	2019/03/26	NC		%	25
			Dibromochloromethane	2019/03/26	NC		%	25
			Trichloroethylene	2019/03/26	NC		%	25
			Tetrachloroethylene	2019/03/26	NC		%	25
			Benzene	2019/03/26	1.6		%	25
			Toluene	2019/03/26	0.28		%	25
			Ethylbenzene	2019/03/26	NC		%	25
			p+m-Xylene	2019/03/26	NC		%	25
			o-Xylene	2019/03/26	NC		%	25
			Styrene	2019/03/26	NC		%	25
			4-ethyltoluene	2019/03/26	NC		%	25
			1,3,5-Trimethylbenzene	2019/03/26	NC		%	25
			1,2,4-Trimethylbenzene	2019/03/26	NC		%	25
			Chlorobenzene	2019/03/26	NC		%	25
			Benzyl chloride	2019/03/26	NC		%	25
			1,3-Dichlorobenzene	2019/03/26	NC		%	25
			1,4-Dichlorobenzene	2019/03/26	NC		%	25
			1,2-Dichlorobenzene	2019/03/26	NC		%	25
			1,2,4-Trichlorobenzene	2019/03/26	NC		%	25
			Hexachlorobutadiene	2019/03/26	NC		%	25
			Hexane	2019/03/26	NC		%	25
			Heptane	2019/03/26	NC		%	25
			Cyclohexane	2019/03/26	NC		%	25
			Tetrahydrofuran	2019/03/26	NC		%	25
			1,4-Dioxane	2019/03/26	NC		%	25
			Naphthalene	2019/03/26	NC		%	25
			Total Xylenes	2019/03/26	NC		%	25
			1,1,1,2-Tetrachloroethane	2019/03/26	NC		%	25

QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
6034792	NS2	Method Blank	Vinyl Bromide	2019/03/26	NC		%	25
			Propene	2019/03/26	NC		%	25
			2,2,4-Trimethylpentane	2019/03/26	0.32		%	25
			Carbon Disulfide	2019/03/26	NC		%	25
			Vinyl Acetate	2019/03/26	NC		%	25
6034792	NS2	RPD [JGE659-01]	F1-BTEX, C6-C10 (as Toluene)	2019/03/21	<5.0		ug/m3	
			F2, C10-C16 (as Decane)	2019/03/21	<5.0		ug/m3	
6034806	NS2	Method Blank	F1-BTEX, C6-C10 (as Toluene)	2019/03/21	0.50		%	25
			F2, C10-C16 (as Decane)	2019/03/21	NC		%	25
			Aliphatic >C5-C6	2019/03/21	<5.0		ug/m3	
			Aliphatic >C6-C8	2019/03/21	<5.0		ug/m3	
			Aliphatic >C8-C10	2019/03/21	<5.0		ug/m3	
			Aliphatic >C10-C12	2019/03/21	<5.0		ug/m3	
			Aliphatic >C12-C16	2019/03/21	<5.0		ug/m3	
			Aromatic >C7-C8 (TEX Excluded)	2019/03/21	<5.0		ug/m3	
			Aromatic >C8-C10	2019/03/21	<5.0		ug/m3	
			Aromatic >C10-C12	2019/03/21	<5.0		ug/m3	
6034806	NS2	RPD [JGE659-01]	Aromatic >C12-C16	2019/03/21	<5.0		ug/m3	
			Aliphatic >C5-C6	2019/03/21	0.91		%	25
			Aliphatic >C6-C8	2019/03/21	0.17		%	25
			Aliphatic >C8-C10	2019/03/21	NC		%	25
			Aliphatic >C10-C12	2019/03/21	NC		%	25
			Aliphatic >C12-C16	2019/03/21	NC		%	25
			Aromatic >C7-C8 (TEX Excluded)	2019/03/21	NC		%	25
			Aromatic >C8-C10	2019/03/21	NC		%	25
			Aromatic >C10-C12	2019/03/21	NC		%	25
			Aromatic >C12-C16	2019/03/21	NC		%	25
6039478	CAT	Method Blank	Oxygen		<0.1		% v/v	
			Nitrogen		<0.1		% v/v	
			Methane		<0.1		% v/v	
			Carbon Dioxide		<0.1		% v/v	
6039478	CAT	RPD [JGE659-01]	Oxygen	2019/03/27	0.21		%	20
			Nitrogen	2019/03/27	0.036		%	20
			Methane	2019/03/27	NC		%	20
			Carbon Dioxide	2019/03/27	0.41		%	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.

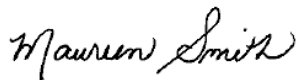
Method Blank: A blank matrix containing all reagents used in the analytical procedure. Used to identify laboratory contamination.

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).

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

Maxxam has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per section 5.10.2 of ISO/IEC 17025:2005(E), signing the reports. For Service Group specific validation please refer to the Validation Signature Page.

Quantitation Report (QT Reviewed)

Data File : C:\Data\20190321\S032111.D Vial: 11
 Acq On : 21 Mar 2019 18:35 Operator: NS2
 Sample : JGE659 PDX25.7 50ML Inst : Instrument #1
 Misc : -7.0inHg -> 6.0psig , 60mL -> 1.5psig Multiplr: 1.00
 MS Integration Params: rteint3.p

Quant Time: Mar 22 15:33:32 2019 Results File: T015_190123.RES

Quant Method : C:\methods\T015_190123.M (RTE Integrator)
 Title : T015 calibration, INTstd lot#160-401162459-1 expiry 2019/04/13
 Last Update : Thu Jan 24 09:46:35 2019
 Response via : Initial Calibration
 DataAcq Meth : T0157200.M
 Daily CC File: C:\Data\20190321\S032102.D Acquired: 21 Mar 2019 9:55

Internal Standards	R.T.	QIon	Response	Conc	Units	Recovery
1) BROMOCHLOROMETHANE	12.38	130	567966	26.3000	PPBV	96
31) 1,4-DIFLUOROBENZENE	14.55	114	1999729	26.8000	PPBV	96
52) d5-CHLOROBENZENE	20.21	117	1777518	26.8000	PPBV	93

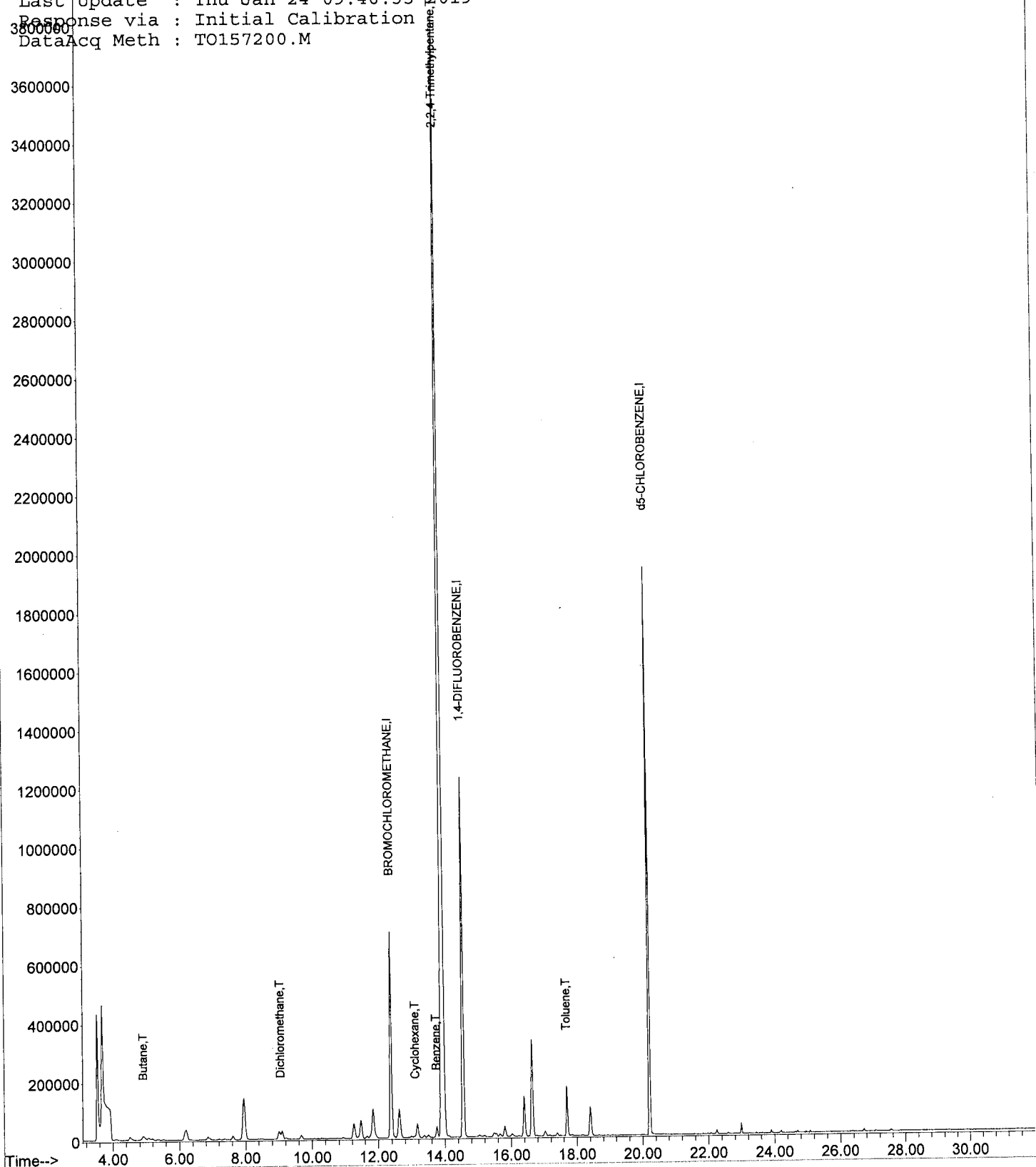
System Monitoring Compounds

Target Compounds					Qvalue	
7) Butane	4.91	43	43971	2.6996	ppbv	98
18) Dichloromethane	9.06	49	3740	0.2237	ppbv #	84
33) Cyclohexane	13.11	56	4639m	0.1950	ppbv	56
35) Benzene	13.75	78	62595	1.1239	ppbv	99
36) 2,2,4-Trimethylpentane	13.93	57	8050414	114.0918	ppbv	99
47) Toluene	17.69	91	209934	2.9546	ppbv	99

Abundance Quantitation Report (QT Report) C:\Data\20190321\11.D\data.ms
Data File : C:\Data\20190321\11.D\data.ms Vial: 11
Acq On : 21 Mar 2019 18:35 Operator: NS2
Sample : JGE659 PDX25.7 50ML Inst : Instrument #1
Misc : -7.0inHg -> 6.0psig , 60mL -> 1.5psig Multiplr: 1.00
MS Integration Params: rteint3.p

Quant Time: Mar 22 15:33:32 2019 Results File: T015_190123.RES

Quant Method : C:\methods\T015_190123.M (RTE Integrator)
Title : T015 calibration, INTstd lot#160-401162459-1 expiry 2019/04/13
Last Update : Thu Jan 24 09:46:35 2019
Response via : Initial Calibration
DataAcq Meth : T0157200.M



Quantitation Report (QT Reviewed)
Data File : C:\Data\20190321\S032112.D
Acq On : 21 Mar 2019 19:20
Sample : JGE659:D1 PDX25.7 50ML
Misc : -7.0inHg -> 6.0psig , 60mL -> 1.5psig
MS Integration Params: rteint3.p

Vial: 12
Operator: NS2
Inst : Instrument #1
Multiplr: 1.00

Quant Time: Mar 22 15:35:09 2019

Results File: T015_190123.RES

Quant Method : C:\methods\T015_190123.M (RTE Integrator)
Title : T015 calibration, INTstd lot#160-401162459-1 expiry 2019/04/13
Last Update : Thu Jan 24 09:46:35 2019
Response via : Initial Calibration
DataAcq Meth : T0157200.M
Daily CC File: C:\Data\20190321\S032102.D Acquired: 21 Mar 2019 9:55

Internal Standards	R.T.	QIon	Response	Conc	Units	Recovery
1) BROMOCHLOROMETHANE	12.38	130	563652	26.3000	PPBV	96
31) 1,4-DIFLUOROBENZENE	14.55	114	1992528	26.8000	PPBV	96
52) d5-CHLOROBENZENE	20.21	117	1745166	26.8000	PPBV	91

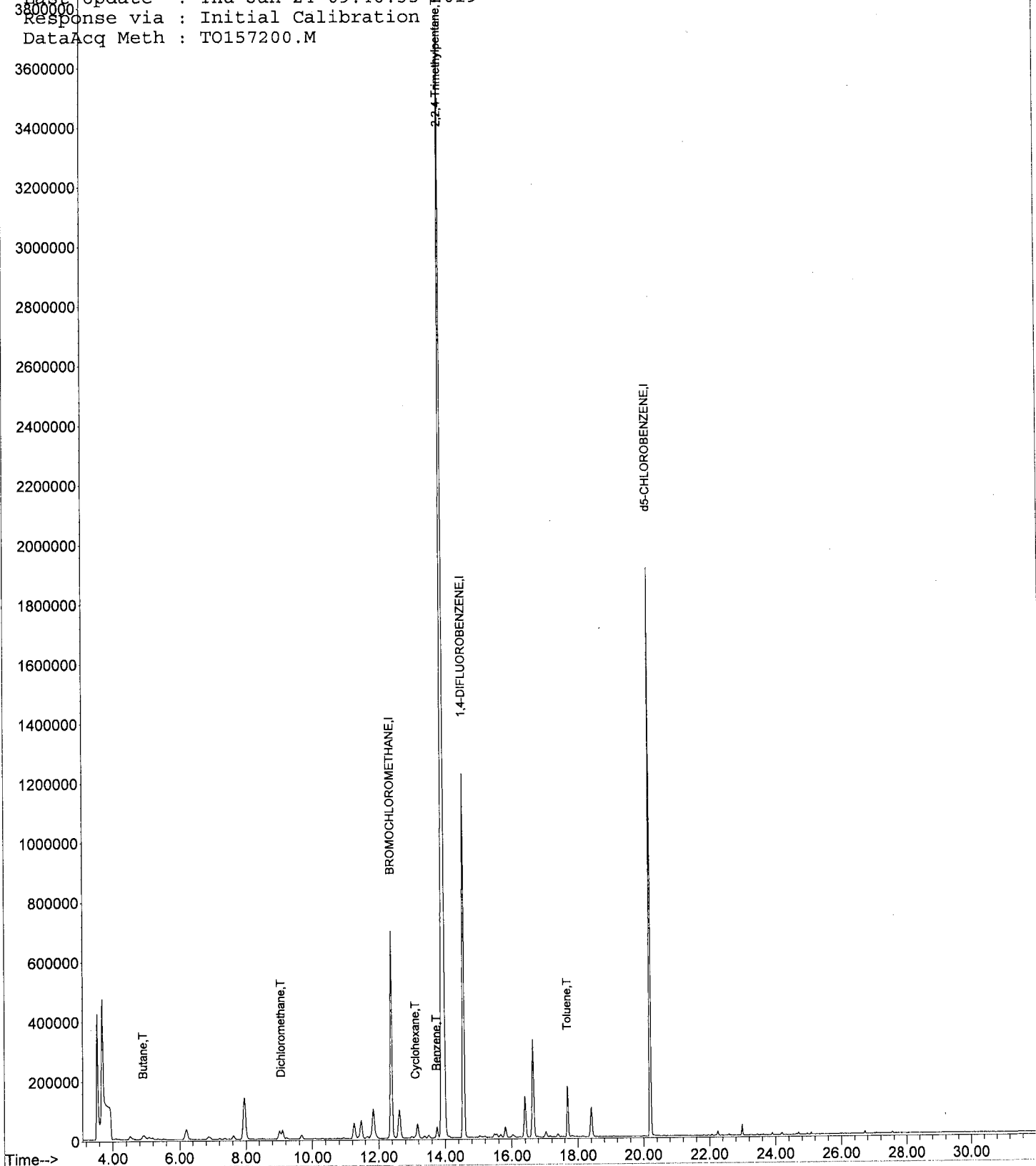
System Monitoring Compounds

Target Compounds					Qvalue	
7) Butane	4.90	43	45239	2.7987	ppbv	95
18) Dichloromethane	9.06	49	3794	0.2286	ppbv #	48
33) Cyclohexane	13.11	56	4057m	0.1712	ppbv	58
35) Benzene	13.75	78	61410	1.1066	ppbv	100
36) 2,2,4-Trimethylpentane	13.93	57	7995764	113.7268	ppbv	99
47) Toluene	17.69	91	209754	2.9627	ppbv	100

Abundance Quantitation Report (QT Report) T015_190326.M
Data File : C:\Data\20190321\S032112.D Vial: 12
Acq On : 21 Mar 2019 19:20 Operator: NS2
Sample : JGE659:D1 PDX25.7 50ML Inst : Instrument #1
Misc : -7.0inHg -> 6.0psig , 60mL -> 1.5psig Multiplr: 1.00
MS Integration Params: rteint3.p

Quant Time: Mar 22 15:35:09 2019 Results File: T015_190123.RES

Quant Method : C:\methods\T015_190123.M (RTE Integrator)
Title : T015 calibration, INTstd lot#160-401162459-1 expiry 2019/04/13
Last Update : Thu Jan 24 09:46:35 2019
Response via : Initial Calibration
DataAcq Meth : T0157200.M



Your Project #: CG2430.1E11
Your C.O.C. #: 40865

Attention: Daniel Budai

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

Report Date: 2019/05/27
Report #: R5727235
Version: 1 - Final

CERTIFICATE OF ANALYSIS

MAXXAM JOB #: B9D2395

Received: 2019/05/17, 08:37

Sample Matrix: Air
Samples Received: 3

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Reference
BTEX and CCME Compounds in Air(TO-15mod)	3	N/A	2019/05/17	BRL SOP-00304	EPA TO-15 m
BTEX Fractionation in Air (TO-15mod)	3	N/A	2019/05/17	BRL SOP-00304	EPA TO-15 m
Canister Pressure (TO-15)	3	N/A	2019/05/17	BRL SOP-00304	EPA TO-15 m
Matrix Gases (1)	2	N/A	2019/05/24	CAM SOP-00225	GC/TCD
Volatile Organics in Air (TO-15) (2)	3	N/A	2019/05/17	BRL SOP-00304	EPA TO-15 m

Reference Method suffix "m" indicates test methods incorporate validated modifications from specific reference methods to improve performance.

(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 Maxxam 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.

Encryption Key

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

Cristina (Maria) Bacchus, Project Manager

Email: CBacchus@maxxam.ca

Phone# (905)817-5763

=====

Maxxam has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per section 5.10.2 of ISO/IEC 17025:2005(E), signing the reports. For Service Group specific validation please refer to the Validation Signature Page.

RESULTS OF ANALYSES OF AIR

Maxxam ID		JSZ220	JSZ221	JSZ222	
Sampling Date		2019/05/16	2019/05/16	2019/05/16	
COC Number		40865	40865	40865	
	UNITS	32	321	322	QC Batch
Volatile Organics					
Pressure on Receipt	psig	(-2.3)	(-2.6)	(-1.4)	6130785
QC Batch = Quality Control Batch					

COMPRESSED GAS PARAMETERS (AIR)

Maxxam ID		JSZ220	JSZ220	JSZ222		
Sampling Date		2019/05/16	2019/05/16	2019/05/16		
COC Number		40865	40865	40865		
	UNITS	32	32 Lab-Dup	322	RDL	QC Batch
Fixed Gases						
Oxygen	% v/v	20.2	20.2	22.2	0.2	6142302
Nitrogen	% v/v	77.9	77.8	76.7	0.2	6142302
Methane	% v/v	<0.2	<0.2	<0.2	0.2	6142302
Carbon Dioxide	% v/v	2.0	2.1	1.1	0.2	6142302
RDL = Reportable Detection Limit						
QC Batch = Quality Control Batch						
Lab-Dup = Laboratory Initiated Duplicate						

VOLATILE ORGANIC HYDROCARBONS BY GC/MS (AIR)

Maxxam ID		JSZ220		JSZ221		JSZ222		
Sampling Date		2019/05/16		2019/05/16		2019/05/16		
COC Number		40865		40865		40865		
	UNITS	32	RDL	321	RDL	322	RDL	QC Batch
Volatile Organics								
F1-BTEX, C6-C10 (as Toluene)	ug/m3	975	5.0	265	10	76.0	5.0	6130814
F2, C10-C16 (as Decane)	ug/m3	16.0	5.0	2800	10	644	5.0	6130814
Aliphatic >C5-C6	ug/m3	854	5.0	<10	10	<5.0	5.0	6130808
Aliphatic >C6-C8	ug/m3	1390	5.0	<10	10	<5.0	5.0	6130808
Aliphatic >C8-C10	ug/m3	22.6	5.0	46	10	11.3	5.0	6130808
Aliphatic >C10-C12	ug/m3	7.1	5.0	1840	10	250	5.0	6130808
Aliphatic >C12-C16	ug/m3	<5.0	5.0	265	10	73.2	5.0	6130808
Aromatic >C7-C8 (TEX Excluded)	ug/m3	<5.0	5.0	<10	10	<5.0	5.0	6130808
Aromatic >C8-C10	ug/m3	<5.0	5.0	18	10	13.6	5.0	6130808
Aromatic >C10-C12	ug/m3	<5.0	5.0	37	10	27.8	5.0	6130808
Aromatic >C12-C16	ug/m3	<5.0	5.0	<10	10	<5.0	5.0	6130808
RDL = Reportable Detection Limit								
QC Batch = Quality Control Batch								

VOLATILE ORGANICS BY GC/MS (AIR)

Maxxam ID		JSZ220				JSZ221				
Sampling Date		2019/05/16				2019/05/16				
COC Number		40865				40865				
	UNITS	32	RDL	ug/m3	DL (ug/m3)	321	RDL	ug/m3	DL (ug/m3)	QC Batch
Volatile Organics										
Dichlorodifluoromethane (FREON 12)	ppbv	0.43	0.20	2.13	0.989	0.52	0.40	2.55	1.98	6127616
1,2-Dichlorotetrafluoroethane	ppbv	<0.17	0.17	<1.19	1.19	<0.34	0.34	<2.38	2.38	6127616
Chloromethane	ppbv	<0.30	0.30	<0.620	0.620	<0.60	0.60	<1.24	1.24	6127616
Vinyl Chloride	ppbv	<0.10	0.10	<0.256	0.256	<0.20	0.20	<0.511	0.511	6127616
Chloroethane	ppbv	<0.30	0.30	<0.792	0.792	<0.60	0.60	<1.58	1.58	6127616
1,3-Butadiene	ppbv	<0.50	0.50	<1.11	1.11	<1.0	1.0	<2.21	2.21	6127616
Trichlorofluoromethane (FREON 11)	ppbv	0.27	0.20	1.53	1.12	<0.40	0.40	<2.25	2.25	6127616
Ethanol (ethyl alcohol)	ppbv	1.6	1.0	3.02	1.88	10.8	2.0	20.3	3.77	6127616
Trichlorotrifluoroethane	ppbv	<0.15	0.15	<1.15	1.15	<0.30	0.30	<2.30	2.30	6127616
2-propanol	ppbv	<1.0	1.0	<2.46	2.46	<2.0	2.0	<4.92	4.92	6127616
2-Propanone	ppbv	2.04	0.60	4.84	1.43	2.2	1.2	5.33	2.85	6127616
Methyl Ethyl Ketone (2-Butanone)	ppbv	<0.20	0.20	<0.590	0.590	<0.40	0.40	<1.18	1.18	6127616
Methyl Isobutyl Ketone	ppbv	<0.20	0.20	<0.819	0.819	<0.40	0.40	<1.64	1.64	6127616
Methyl Butyl Ketone (2-Hexanone)	ppbv	<1.0	1.0	<4.10	4.10	<2.0	2.0	<8.19	8.19	6127616
Methyl t-butyl ether (MTBE)	ppbv	<0.20	0.20	<0.721	0.721	<0.40	0.40	<1.44	1.44	6127616
Ethyl Acetate	ppbv	<1.0	1.0	<3.60	3.60	<2.0	2.0	<7.21	7.21	6127616
1,1-Dichloroethylene	ppbv	<0.10	0.10	<0.396	0.396	<0.20	0.20	<0.793	0.793	6127616
cis-1,2-Dichloroethylene	ppbv	<0.10	0.10	<0.396	0.396	<0.20	0.20	<0.793	0.793	6127616
trans-1,2-Dichloroethylene	ppbv	<0.10	0.10	<0.396	0.396	<0.20	0.20	<0.793	0.793	6127616
Methylene Chloride(Dichloromethane)	ppbv	0.90	0.60	3.12	2.08	<1.2	1.2	<4.17	4.17	6127616
Chloroform	ppbv	3.39	0.10	16.5	0.488	0.45	0.20	2.18	0.977	6127616
Carbon Tetrachloride	ppbv	<0.10	0.10	<0.629	0.629	<0.20	0.20	<1.26	1.26	6127616
1,1-Dichloroethane	ppbv	<0.10	0.10	<0.405	0.405	<0.20	0.20	<0.809	0.809	6127616
1,2-Dichloroethane	ppbv	0.12	0.10	0.482	0.405	<0.20	0.20	<0.810	0.810	6127616
Ethylene Dibromide	ppbv	<0.10	0.10	<0.768	0.768	<0.20	0.20	<1.54	1.54	6127616
1,1,1-Trichloroethane	ppbv	<0.10	0.10	<0.546	0.546	<0.20	0.20	<1.09	1.09	6127616
1,1,2-Trichloroethane	ppbv	<0.10	0.10	<0.546	0.546	<0.20	0.20	<1.09	1.09	6127616
1,1,2,2-Tetrachloroethane	ppbv	<0.10	0.10	<0.687	0.687	<0.20	0.20	<1.37	1.37	6127616
cis-1,3-Dichloropropene	ppbv	<0.10	0.10	<0.454	0.454	<0.20	0.20	<0.908	0.908	6127616
trans-1,3-Dichloropropene	ppbv	<0.10	0.10	<0.454	0.454	<0.20	0.20	<0.908	0.908	6127616
1,2-Dichloropropane	ppbv	<0.10	0.10	<0.462	0.462	<0.20	0.20	<0.924	0.924	6127616
Bromomethane	ppbv	<0.10	0.10	<0.388	0.388	<0.20	0.20	<0.777	0.777	6127616
Bromoform	ppbv	<0.20	0.20	<2.07	2.07	<0.40	0.40	<4.13	4.13	6127616
Bromodichloromethane	ppbv	<0.20	0.20	<1.34	1.34	<0.40	0.40	<2.68	2.68	6127616
Dibromochloromethane	ppbv	<0.20	0.20	<1.70	1.70	<0.40	0.40	<3.41	3.41	6127616
Trichloroethylene	ppbv	<0.10	0.10	<0.537	0.537	10.0	0.20	53.8	1.07	6127616
RDL = Reportable Detection Limit										
QC Batch = Quality Control Batch										

VOLATILE ORGANICS BY GC/MS (AIR)

Maxxam ID		JSZ220				JSZ221				
Sampling Date		2019/05/16				2019/05/16				
COC Number		40865				40865				
	UNITS	32	RDL	ug/m3	DL (ug/m3)	321	RDL	ug/m3	DL (ug/m3)	QC Batch
Tetrachloroethylene	ppbv	0.21	0.10	1.41	0.678	<0.20	0.20	<1.36	1.36	6127616
Benzene	ppbv	3.18	0.10	10.1	0.319	<0.20	0.20	<0.638	0.638	6127616
Toluene	ppbv	59.7	0.10	225	0.377	0.95	0.20	3.59	0.754	6127616
Ethylbenzene	ppbv	<0.10	0.10	<0.434	0.434	0.43	0.20	1.85	0.868	6127616
p+m-Xylene	ppbv	<0.20	0.20	<0.868	0.868	1.85	0.40	8.03	1.74	6127616
o-Xylene	ppbv	0.45	0.10	1.94	0.434	0.62	0.20	2.71	0.868	6127616
Styrene	ppbv	<0.10	0.10	<0.426	0.426	<0.20	0.20	<0.852	0.852	6127616
4-ethyltoluene	ppbv	<0.50	0.50	<2.46	2.46	<1.0	1.0	<4.92	4.92	6127616
1,3,5-Trimethylbenzene	ppbv	<0.50	0.50	<2.45	2.45	<1.0	1.0	<4.91	4.91	6127616
1,2,4-Trimethylbenzene	ppbv	<0.50	0.50	<2.45	2.45	1.6	1.0	7.62	4.91	6127616
Chlorobenzene	ppbv	<0.10	0.10	<0.460	0.460	<0.20	0.20	<0.921	0.921	6127616
Benzyl chloride	ppbv	<0.50	0.50	<2.59	2.59	<1.0	1.0	<5.18	5.18	6127616
1,3-Dichlorobenzene	ppbv	<0.40	0.40	<2.40	2.40	<0.80	0.80	<4.81	4.81	6127616
1,4-Dichlorobenzene	ppbv	<0.10	0.10	<0.601	0.601	<0.20	0.20	<1.20	1.20	6127616
1,2-Dichlorobenzene	ppbv	<0.10	0.10	<0.601	0.601	<0.20	0.20	<1.20	1.20	6127616
1,2,4-Trichlorobenzene	ppbv	<0.50	0.50	<3.71	3.71	<1.0	1.0	<7.42	7.42	6127616
Hexachlorobutadiene	ppbv	<0.50	0.50	<5.33	5.33	<1.0	1.0	<10.7	10.7	6127616
Hexane	ppbv	0.25	0.20	0.881	0.705	<0.40	0.40	<1.41	1.41	6127616
Heptane	ppbv	<0.30	0.30	<1.23	1.23	<0.60	0.60	<2.46	2.46	6127616
Cyclohexane	ppbv	8.47	0.20	29.1	0.688	<0.40	0.40	<1.38	1.38	6127616
Tetrahydrofuran	ppbv	<0.40	0.40	<1.18	1.18	<0.80	0.80	<2.36	2.36	6127616
1,4-Dioxane	ppbv	<1.0	1.0	<3.60	3.60	<2.0	2.0	<7.21	7.21	6127616
Naphthalene	ppbv	<0.20	0.20	<1.05	1.05	<0.40	0.40	<2.10	2.10	6127616
Total Xylenes	ppbv	0.45	0.30	1.94	1.30	2.47	0.60	10.7	2.61	6127616
1,1,1,2-Tetrachloroethane	ppbv	<0.10	0.10	<0.687	0.687	<0.20	0.20	<1.37	1.37	6127616
Vinyl Bromide	ppbv	<0.20	0.20	<0.875	0.875	<0.40	0.40	<1.75	1.75	6127616
Propene	ppbv	1.49	0.50	2.56	0.861	<1.0	1.0	<1.72	1.72	6127616
2,2,4-Trimethylpentane	ppbv	105	0.20	492	0.934	<0.40	0.40	<1.87	1.87	6127616
Carbon Disulfide	ppbv	<0.50	0.50	<1.56	1.56	1.0	1.0	3.12	3.11	6127616
Vinyl Acetate	ppbv	<0.20	0.20	<0.704	0.704	<0.40	0.40	<1.41	1.41	6127616
Surrogate Recovery (%)										
Bromochloromethane	%	91		N/A	N/A	88		N/A	N/A	6127616
D5-Chlorobenzene	%	91		N/A	N/A	87		N/A	N/A	6127616
Difluorobenzene	%	91		N/A	N/A	88		N/A	N/A	6127616
RDL = Reportable Detection Limit										
QC Batch = Quality Control Batch										
N/A = Not Applicable										

VOLATILE ORGANICS BY GC/MS (AIR)

Maxxam ID		JSZ222				
Sampling Date		2019/05/16				
COC Number		40865				
	UNITS	322	RDL	ug/m3	DL (ug/m3)	QC Batch
Volatile Organics						
Dichlorodifluoromethane (FREON 12)	ppbv	0.48	0.20	2.37	0.989	6127616
1,2-Dichlorotetrafluoroethane	ppbv	<0.17	0.17	<1.19	1.19	6127616
Chloromethane	ppbv	<0.30	0.30	<0.620	0.620	6127616
Vinyl Chloride	ppbv	<0.10	0.10	<0.256	0.256	6127616
Chloroethane	ppbv	<0.30	0.30	<0.792	0.792	6127616
1,3-Butadiene	ppbv	<0.50	0.50	<1.11	1.11	6127616
Trichlorofluoromethane (FREON 11)	ppbv	0.27	0.20	1.50	1.12	6127616
Ethanol (ethyl alcohol)	ppbv	4.2	1.0	7.87	1.88	6127616
Trichlorotrifluoroethane	ppbv	<0.15	0.15	<1.15	1.15	6127616
2-propanol	ppbv	<1.0	1.0	<2.46	2.46	6127616
2-Propanone	ppbv	1.61	0.60	3.83	1.43	6127616
Methyl Ethyl Ketone (2-Butanone)	ppbv	<0.20	0.20	<0.590	0.590	6127616
Methyl Isobutyl Ketone	ppbv	<0.20	0.20	<0.819	0.819	6127616
Methyl Butyl Ketone (2-Hexanone)	ppbv	<1.0	1.0	<4.10	4.10	6127616
Methyl t-butyl ether (MTBE)	ppbv	<0.20	0.20	<0.721	0.721	6127616
Ethyl Acetate	ppbv	<1.0	1.0	<3.60	3.60	6127616
1,1-Dichloroethylene	ppbv	<0.10	0.10	<0.396	0.396	6127616
cis-1,2-Dichloroethylene	ppbv	<0.10	0.10	<0.396	0.396	6127616
trans-1,2-Dichloroethylene	ppbv	<0.10	0.10	<0.396	0.396	6127616
Methylene Chloride(Dichloromethane)	ppbv	<0.60	0.60	<2.08	2.08	6127616
Chloroform	ppbv	0.87	0.10	4.27	0.488	6127616
Carbon Tetrachloride	ppbv	<0.10	0.10	<0.629	0.629	6127616
1,1-Dichloroethane	ppbv	<0.10	0.10	<0.405	0.405	6127616
1,2-Dichloroethane	ppbv	<0.10	0.10	<0.405	0.405	6127616
Ethylene Dibromide	ppbv	<0.10	0.10	<0.768	0.768	6127616
1,1,1-Trichloroethane	ppbv	<0.10	0.10	<0.546	0.546	6127616
1,1,2-Trichloroethane	ppbv	<0.10	0.10	<0.546	0.546	6127616
1,1,2,2-Tetrachloroethane	ppbv	<0.10	0.10	<0.687	0.687	6127616
cis-1,3-Dichloropropene	ppbv	<0.10	0.10	<0.454	0.454	6127616
trans-1,3-Dichloropropene	ppbv	<0.10	0.10	<0.454	0.454	6127616
1,2-Dichloropropane	ppbv	<0.10	0.10	<0.462	0.462	6127616
Bromomethane	ppbv	<0.10	0.10	<0.388	0.388	6127616
Bromoform	ppbv	<0.20	0.20	<2.07	2.07	6127616
Bromodichloromethane	ppbv	<0.20	0.20	<1.34	1.34	6127616
Dibromochloromethane	ppbv	<0.20	0.20	<1.70	1.70	6127616
Trichloroethylene	ppbv	6.71	0.10	36.0	0.537	6127616
RDL = Reportable Detection Limit						
QC Batch = Quality Control Batch						

VOLATILE ORGANICS BY GC/MS (AIR)

Maxxam ID		JSZ222				
Sampling Date		2019/05/16				
COC Number		40865				
	UNITS	322	RDL	ug/m3	DL (ug/m3)	QC Batch
Tetrachloroethylene	ppbv	<0.10	0.10	<0.678	0.678	6127616
Benzene	ppbv	<0.10	0.10	<0.319	0.319	6127616
Toluene	ppbv	0.55	0.10	2.06	0.377	6127616
Ethylbenzene	ppbv	0.29	0.10	1.25	0.434	6127616
p+m-Xylene	ppbv	1.31	0.20	5.69	0.868	6127616
o-Xylene	ppbv	0.54	0.10	2.34	0.434	6127616
Styrene	ppbv	<0.10	0.10	<0.426	0.426	6127616
4-ethyltoluene	ppbv	<0.50	0.50	<2.46	2.46	6127616
1,3,5-Trimethylbenzene	ppbv	<0.50	0.50	<2.45	2.45	6127616
1,2,4-Trimethylbenzene	ppbv	1.58	0.50	7.74	2.45	6127616
Chlorobenzene	ppbv	<0.10	0.10	<0.460	0.460	6127616
Benzyl chloride	ppbv	<0.50	0.50	<2.59	2.59	6127616
1,3-Dichlorobenzene	ppbv	<0.40	0.40	<2.40	2.40	6127616
1,4-Dichlorobenzene	ppbv	<0.10	0.10	<0.601	0.601	6127616
1,2-Dichlorobenzene	ppbv	<0.10	0.10	<0.601	0.601	6127616
1,2,4-Trichlorobenzene	ppbv	<0.50	0.50	<3.71	3.71	6127616
Hexachlorobutadiene	ppbv	<0.50	0.50	<5.33	5.33	6127616
Hexane	ppbv	<0.20	0.20	<0.705	0.705	6127616
Heptane	ppbv	<0.30	0.30	<1.23	1.23	6127616
Cyclohexane	ppbv	<0.20	0.20	<0.688	0.688	6127616
Tetrahydrofuran	ppbv	<0.40	0.40	<1.18	1.18	6127616
1,4-Dioxane	ppbv	<1.0	1.0	<3.60	3.60	6127616
Naphthalene	ppbv	<0.20	0.20	<1.05	1.05	6127616
Total Xylenes	ppbv	1.85	0.30	8.02	1.30	6127616
1,1,1,2-Tetrachloroethane	ppbv	<0.10	0.10	<0.687	0.687	6127616
Vinyl Bromide	ppbv	<0.20	0.20	<0.875	0.875	6127616
Propene	ppbv	<0.50	0.50	<0.861	0.861	6127616
2,2,4-Trimethylpentane	ppbv	<0.20	0.20	<0.934	0.934	6127616
Carbon Disulfide	ppbv	0.74	0.50	2.32	1.56	6127616
Vinyl Acetate	ppbv	<0.20	0.20	<0.704	0.704	6127616
Surrogate Recovery (%)						
Bromochloromethane	%	90		N/A	N/A	6127616
D5-Chlorobenzene	%	90		N/A	N/A	6127616
Difluorobenzene	%	90		N/A	N/A	6127616
RDL = Reportable Detection Limit						
QC Batch = Quality Control Batch						
N/A = Not Applicable						

GENERAL COMMENTS

Matrix Gas Analysis: Canisters were pressurized with Helium to enable sampling. Results and DLs adjusted accordingly. Results normalized to 100% dry volume.

Sample JSZ220 [32] : Propene is a mixture of both propene and propane and this represents the highest possible concentration of propene.

Sample JSZ221 [321] : Sample was analyzed at a 2X dilution. The DL's were adjusted accordingly.

Results relate only to the items tested.

QUALITY ASSURANCE REPORT

QA/QC	Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
6127616	LSY	Spiked Blank		Bromochloromethane	2019/05/17		104	%	60 - 140
				D5-Chlorobenzene	2019/05/17		105	%	60 - 140
				Difluorobenzene	2019/05/17		104	%	60 - 140
				Dichlorodifluoromethane (FREON 12)	2019/05/17		93	%	70 - 130
				1,2-Dichlorotetrafluoroethane	2019/05/17		87	%	70 - 130
				Chloromethane	2019/05/17		87	%	70 - 130
				Vinyl Chloride	2019/05/17		84	%	70 - 130
				Chloroethane	2019/05/17		86	%	70 - 130
				1,3-Butadiene	2019/05/17		87	%	70 - 130
				Trichlorofluoromethane (FREON 11)	2019/05/17		108	%	70 - 130
				Ethanol (ethyl alcohol)	2019/05/17		84	%	70 - 130
				Trichlorotrifluoroethane	2019/05/17		95	%	70 - 130
				2-propanol	2019/05/17		86	%	70 - 130
				2-Propanone	2019/05/17		99	%	70 - 130
				Methyl Ethyl Ketone (2-Butanone)	2019/05/17		96	%	70 - 130
				Methyl Isobutyl Ketone	2019/05/17		90	%	70 - 130
				Methyl Butyl Ketone (2-Hexanone)	2019/05/17		91	%	70 - 130
				Methyl t-butyl ether (MTBE)	2019/05/17		91	%	70 - 130
				Ethyl Acetate	2019/05/17		91	%	70 - 130
				1,1-Dichloroethylene	2019/05/17		98	%	70 - 130
				cis-1,2-Dichloroethylene	2019/05/17		93	%	70 - 130
				trans-1,2-Dichloroethylene	2019/05/17		97	%	70 - 130
				Methylene Chloride(Dichloromethane)	2019/05/17		83	%	70 - 130
				Chloroform	2019/05/17		99	%	70 - 130
				Carbon Tetrachloride	2019/05/17		91	%	70 - 130
				1,1-Dichloroethane	2019/05/17		93	%	70 - 130
				1,2-Dichloroethane	2019/05/17		98	%	70 - 130
				Ethylene Dibromide	2019/05/17		101	%	70 - 130
				1,1,1-Trichloroethane	2019/05/17		89	%	70 - 130
				1,1,2-Trichloroethane	2019/05/17		100	%	70 - 130
				1,1,2,2-Tetrachloroethane	2019/05/17		99	%	70 - 130
				cis-1,3-Dichloropropene	2019/05/17		93	%	70 - 130
				trans-1,3-Dichloropropene	2019/05/17		95	%	70 - 130
				1,2-Dichloropropane	2019/05/17		96	%	70 - 130
				Bromomethane	2019/05/17		92	%	70 - 130
				Bromoform	2019/05/17		101	%	70 - 130
				Bromodichloromethane	2019/05/17		106	%	70 - 130
				Dibromochloromethane	2019/05/17		107	%	70 - 130
				Trichloroethylene	2019/05/17		92	%	70 - 130
				Tetrachloroethylene	2019/05/17		94	%	70 - 130
				Benzene	2019/05/17		99	%	70 - 130
				Toluene	2019/05/17		102	%	70 - 130
				Ethylbenzene	2019/05/17		98	%	70 - 130
				p+m-Xylene	2019/05/17		94	%	70 - 130
				o-Xylene	2019/05/17		96	%	70 - 130
				Styrene	2019/05/17		92	%	70 - 130
				4-ethyltoluene	2019/05/17		96	%	70 - 130
				1,3,5-Trimethylbenzene	2019/05/17		93	%	70 - 130
				1,2,4-Trimethylbenzene	2019/05/17		88	%	70 - 130
				Chlorobenzene	2019/05/17		99	%	70 - 130
				Benzyl chloride	2019/05/17		89	%	70 - 130
				1,3-Dichlorobenzene	2019/05/17		97	%	70 - 130
				1,4-Dichlorobenzene	2019/05/17		94	%	70 - 130
				1,2-Dichlorobenzene	2019/05/17		94	%	70 - 130

QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
6127616	LSY	Method Blank	1,2,4-Trichlorobenzene	2019/05/17		92	%	70 - 130
			Hexachlorobutadiene	2019/05/17		95	%	70 - 130
			Hexane	2019/05/17		88	%	70 - 130
			Heptane	2019/05/17		89	%	70 - 130
			Cyclohexane	2019/05/17		89	%	70 - 130
			Tetrahydrofuran	2019/05/17		91	%	70 - 130
			1,4-Dioxane	2019/05/17		102	%	70 - 130
			Naphthalene	2019/05/17		88	%	70 - 130
			Total Xylenes	2019/05/17		95	%	70 - 130
			1,1,1,2-Tetrachloroethane	2019/05/17		105	%	70 - 130
			Vinyl Bromide	2019/05/17		98	%	70 - 130
			Propene	2019/05/17		82	%	70 - 130
			2,2,4-Trimethylpentane	2019/05/17		98	%	70 - 130
			Carbon Disulfide	2019/05/17		105	%	70 - 130
			Vinyl Acetate	2019/05/17		67 (1)	%	70 - 130
			Bromochloromethane	2019/05/17		94	%	60 - 140
			D5-Chlorobenzene	2019/05/17		94	%	60 - 140
			Difluorobenzene	2019/05/17		95	%	60 - 140
			Dichlorodifluoromethane (FREON 12)	2019/05/17	<0.20		ppbv	
			1,2-Dichlorotetrafluoroethane	2019/05/17	<0.17		ppbv	
			Chloromethane	2019/05/17	<0.30		ppbv	
			Vinyl Chloride	2019/05/17	<0.10		ppbv	
			Chloroethane	2019/05/17	<0.30		ppbv	
			1,3-Butadiene	2019/05/17	<0.50		ppbv	
			Trichlorofluoromethane (FREON 11)	2019/05/17	<0.20		ppbv	
			Ethanol (ethyl alcohol)	2019/05/17	<1.0		ppbv	
			Trichlorotrifluoroethane	2019/05/17	<0.15		ppbv	
			2-propanol	2019/05/17	<1.0		ppbv	
			2-Propanone	2019/05/17	<0.60		ppbv	
			Methyl Ethyl Ketone (2-Butanone)	2019/05/17	<0.20		ppbv	
			Methyl Isobutyl Ketone	2019/05/17	<0.20		ppbv	
			Methyl Butyl Ketone (2-Hexanone)	2019/05/17	<1.0		ppbv	
			Methyl t-butyl ether (MTBE)	2019/05/17	<0.20		ppbv	
			Ethyl Acetate	2019/05/17	<1.0		ppbv	
			1,1-Dichloroethylene	2019/05/17	<0.10		ppbv	
			cis-1,2-Dichloroethylene	2019/05/17	<0.10		ppbv	
			trans-1,2-Dichloroethylene	2019/05/17	<0.10		ppbv	
			Methylene Chloride(Dichloromethane)	2019/05/17	<0.60		ppbv	
			Chloroform	2019/05/17	<0.10		ppbv	
			Carbon Tetrachloride	2019/05/17	<0.10		ppbv	
			1,1-Dichloroethane	2019/05/17	<0.10		ppbv	
			1,2-Dichloroethane	2019/05/17	<0.10		ppbv	
			Ethylene Dibromide	2019/05/17	<0.10		ppbv	
			1,1,1-Trichloroethane	2019/05/17	<0.10		ppbv	
			1,1,2-Trichloroethane	2019/05/17	<0.10		ppbv	
			1,1,2,2-Tetrachloroethane	2019/05/17	<0.10		ppbv	
			cis-1,3-Dichloropropene	2019/05/17	<0.10		ppbv	
			trans-1,3-Dichloropropene	2019/05/17	<0.10		ppbv	
			1,2-Dichloropropane	2019/05/17	<0.10		ppbv	
			Bromomethane	2019/05/17	<0.10		ppbv	
			Bromoform	2019/05/17	<0.20		ppbv	
			Bromodichloromethane	2019/05/17	<0.20		ppbv	
			Dibromochloromethane	2019/05/17	<0.20		ppbv	
			Trichloroethylene	2019/05/17	<0.10		ppbv	

QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
6130808	LSY	Method Blank	Tetrachloroethylene	2019/05/17	<0.10		ppbv	
			Benzene	2019/05/17	<0.10		ppbv	
			Toluene	2019/05/17	<0.10		ppbv	
			Ethylbenzene	2019/05/17	<0.10		ppbv	
			p+m-Xylene	2019/05/17	<0.20		ppbv	
			o-Xylene	2019/05/17	<0.10		ppbv	
			Styrene	2019/05/17	<0.10		ppbv	
			4-ethyltoluene	2019/05/17	<0.50		ppbv	
			1,3,5-Trimethylbenzene	2019/05/17	<0.50		ppbv	
			1,2,4-Trimethylbenzene	2019/05/17	<0.50		ppbv	
			Chlorobenzene	2019/05/17	<0.10		ppbv	
			Benzyl chloride	2019/05/17	<0.50		ppbv	
			1,3-Dichlorobenzene	2019/05/17	<0.40		ppbv	
			1,4-Dichlorobenzene	2019/05/17	<0.10		ppbv	
			1,2-Dichlorobenzene	2019/05/17	<0.10		ppbv	
			1,2,4-Trichlorobenzene	2019/05/17	<0.50		ppbv	
			Hexachlorobutadiene	2019/05/17	<0.50		ppbv	
			Hexane	2019/05/17	<0.20		ppbv	
			Heptane	2019/05/17	<0.30		ppbv	
			Cyclohexane	2019/05/17	<0.20		ppbv	
			Tetrahydrofuran	2019/05/17	<0.40		ppbv	
			1,4-Dioxane	2019/05/17	<1.0		ppbv	
			Naphthalene	2019/05/17	<0.20		ppbv	
			Total Xylenes	2019/05/17	<0.30		ppbv	
			1,1,1,2-Tetrachloroethane	2019/05/17	<0.10		ppbv	
			Vinyl Bromide	2019/05/17	<0.20		ppbv	
			Propene	2019/05/17	<0.50		ppbv	
			2,2,4-Trimethylpentane	2019/05/17	<0.20		ppbv	
			Carbon Disulfide	2019/05/17	<0.50		ppbv	
			Vinyl Acetate	2019/05/17	<0.20		ppbv	
			Aliphatic >C5-C6	2019/05/17	<5.0		ug/m3	
			Aliphatic >C6-C8	2019/05/17	<5.0		ug/m3	
			Aliphatic >C8-C10	2019/05/17	<5.0		ug/m3	
			Aliphatic >C10-C12	2019/05/17	<5.0		ug/m3	
			Aliphatic >C12-C16	2019/05/17	<5.0		ug/m3	
			Aromatic >C7-C8 (TEX Excluded)	2019/05/17	<5.0		ug/m3	
			Aromatic >C8-C10	2019/05/17	<5.0		ug/m3	
			Aromatic >C10-C12	2019/05/17	<5.0		ug/m3	
			Aromatic >C12-C16	2019/05/17	<5.0		ug/m3	
6130808	LSY	RPD	Aliphatic >C5-C6	2019/05/17	NC		%	25
			Aliphatic >C6-C8	2019/05/17	2.4		%	25
			Aliphatic >C8-C10	2019/05/17	5.2		%	25
			Aliphatic >C10-C12	2019/05/17	19		%	25
			Aliphatic >C12-C16	2019/05/17	NC		%	25
			Aromatic >C7-C8 (TEX Excluded)	2019/05/17	NC		%	25
			Aromatic >C8-C10	2019/05/17	NC		%	25
			Aromatic >C10-C12	2019/05/17	NC		%	25
6130814	LSY	Method Blank	Aromatic >C12-C16	2019/05/17	NC		%	25
			F1-BTEX, C6-C10 (as Toluene)	2019/05/17	<5.0		ug/m3	
6142302	A1S	Method Blank	F2, C10-C16 (as Decane)	2019/05/17	<5.0		ug/m3	
			Oxygen	2019/05/24	<0.1		% v/v	
			Nitrogen	2019/05/24	<0.1		% v/v	
			Methane	2019/05/24	<0.1		% v/v	
			Carbon Dioxide	2019/05/24	<0.1		% v/v	

QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
6142302	A1S	RPD [JSZ220-01]	Oxygen	2019/05/24	0.099		%	20
			Nitrogen	2019/05/24	0.13		%	20
			Methane	2019/05/24	NC		%	20
			Carbon Dioxide	2019/05/24	5.9		%	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.

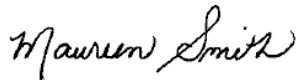
Surrogate: A pure or isotopically labeled compound whose behavior mirrors the analytes of interest. Used to evaluate extraction efficiency.

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 $\leq 2 \times$ RDL).

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

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

Maxxam has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per section 5.10.2 of ISO/IEC 17025:2005(E), signing the reports. For Service Group specific validation please refer to the Validation Signature Page.

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CAM FCD-01302 /2

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COC-1003 (11/2017)

Maxam's standard Terms and Conditions. Signing of this Ch
Khusboo Kapoor
 KHUSHBOO KAPOOR

2019/05/17 08:37

Data Path : T:\MSD53\Data\190517\
 Data File : R051714.D
 Acq On : 17 May 2019 19:37
 Operator : LSY
 Sample : JSZ221 50ML
 Misc :
 ALS Vial : 14 Sample Multiplier: 1

Quant Time: May 22 13:58:10 2019

Quant Method : T:\MSD53\Data\Methods\TO15_190503.M

Quant Title : TO15 calibration, INTstd Lot#160-401162459-1, EXP. 2019/04/13

QLast Update : Mon May 06 08:51:30 2019

Response via : Initial Calibration

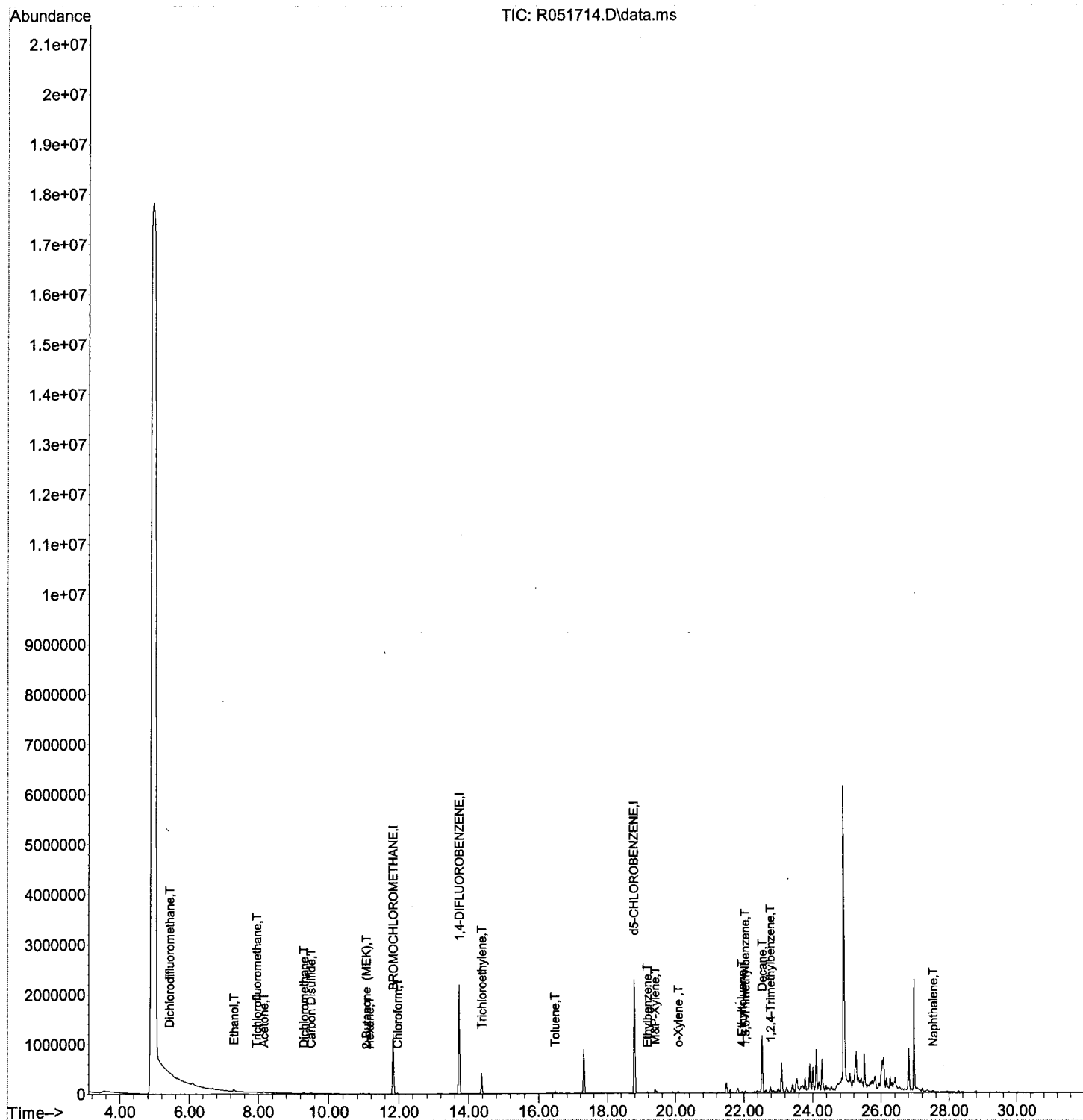
Compound	R.T.	QIon	Response	Conc	Units	Dev(Min)

Internal Standards						
1) BROMOCHLOROMETHANE	11.833	130	578901	26.30	PPBV	0.00
31) 1,4-DIFLUOROBENZENE	13.735	114	2218551	26.80	PPBV	0.00
52) d5-CHLOROBENZENE	18.785	117	1954171	26.80	PPBV	-0.01
Target Compounds						Qvalue
3) Dichlorodifluoromethane	5.417	85	13306	0.26	ppbv	98
11) Ethanol	7.293	31	51646	5.39	ppbv	97
13) Trichlorofluoromethane	7.949	101	6836	0.14	ppbv	100
15) Acetone	8.150	43	26629	1.12	ppbv #	79
17) Carbon Disulfide	9.489	76	30557	0.50	ppbv	99
18) Dichloromethane	9.288	49	13614	0.59	ppbv	89
24) Hexane	11.150	57	3378	0.10	ppbv	91
25) 2-Butanone (MEK)	11.070	43	3297	0.10	ppbv	94
27) Chloroform	11.954	83	9720	0.22	ppbv	100
39) Trichloroethylene	14.378	130	179972	5.01	ppbv	98
47) Toluene	16.468	91	41503	0.48	ppbv	98
55) Ethylbenzene	19.173	91	24542	0.21	ppbv	99
56) M&P-Xylene	19.401	91	85149m	0.92	ppbv	
59) o-Xylene	20.084	91	28276	0.31	ppbv	99
63) 4-Ethyltoluene	21.946	105	30956	0.24	ppbv	94
64) 1,3,5-Trimethylbenzene	22.040	105	29975	0.26	ppbv	97
65) Decane	22.536	57	541002	8.42	ppbv	97
66) 1,2,4-Trimethylbenzene	22.777	105	89063	0.78	ppbv	98
74) Naphthalene	27.532	128	11399	0.11	ppbv	99

(#) = qualifier out of range (m) = manual integration (+) = signals summed

Data Path : T:\MSD53\Data\190517\
Data File : R051714.D
Acq On : 17 May 2019 19:37
Operator : LSY
Sample : JSZ221 50ML
Misc :
ALS Vial : 14 Sample Multiplier: 1

Quant Time: May 22 13:58:10 2019
Quant Method : T:\MSD53\Data\Methods\TO15_190503.M
Quant Title : TO15 calibration, INTstd Lot#160-401162459-1, EXP. 2019/04/13
QLast Update : Mon May 06 08:51:30 2019
Response via : Initial Calibration



Data Path : T:\MSD53\Data\190517\
 Data File : R051716.D
 Acq On : 17 May 2019 21:13
 Operator : LSY
 Sample : JSZ220 100ML
 Misc :
 ALS Vial : 16 Sample Multiplier: 1

Quant Time: May 21 08:34:35 2019
 Quant Method : T:\MSD53\Data\Methods\TO15_190503.M
 Quant Title : TO15 calibration, INTstd Lot#160-401162459-1, EXP. 2019/04/13
 QLast Update : Mon May 06 08:51:30 2019
 Response via : Initial Calibration

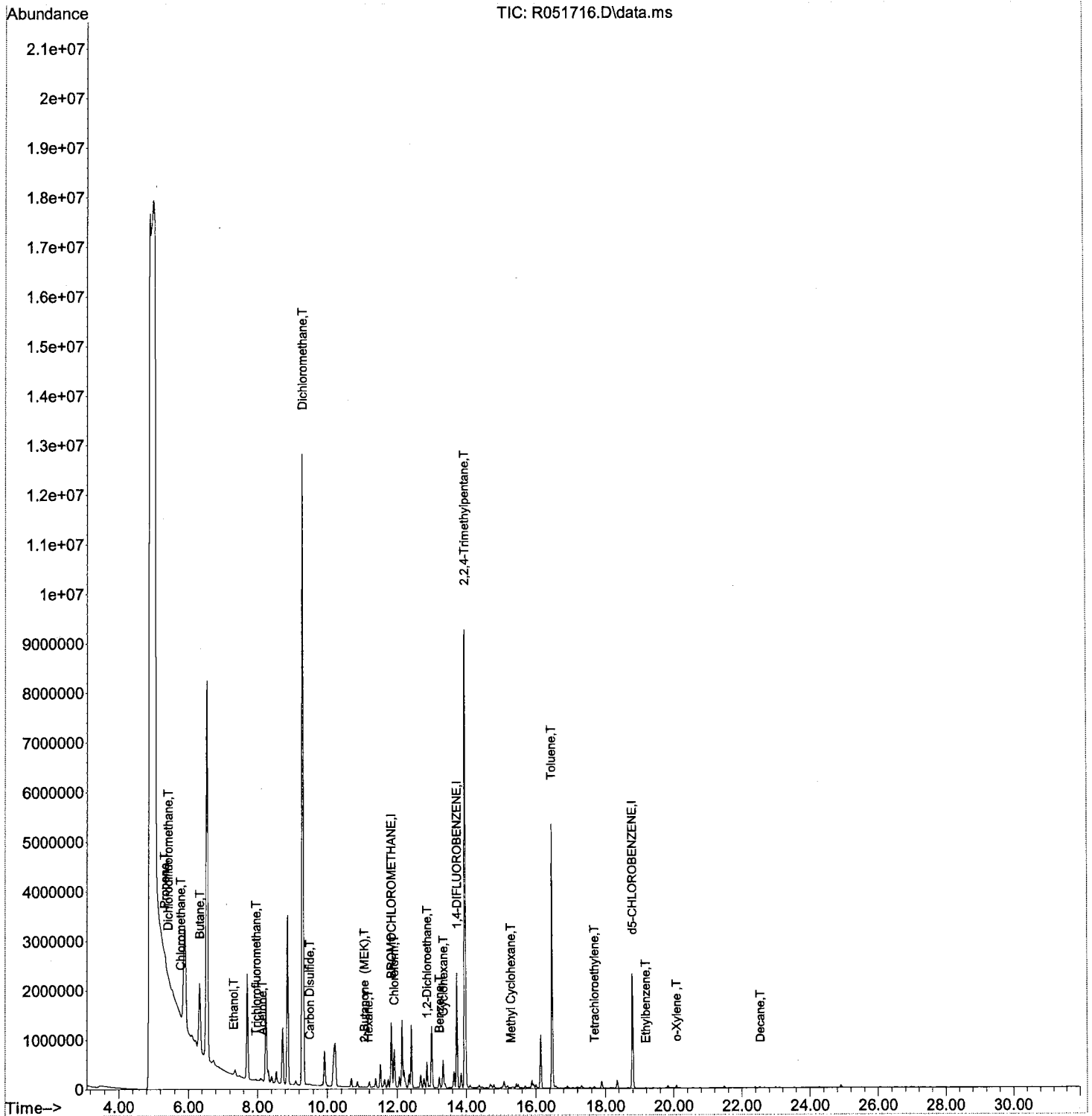
Compound	R.T.	QIon	Response	Conc	Units	Dev(Min)

Internal Standards						
1) BROMOCHLOROMETHANE	11.833	130	595857	26.30	PPBV	0.00
31) 1,4-DIFLUOROBENZENE	13.735	114	2286878	26.80	PPBV	0.00
52) d5-CHLORO BENZENE	18.798	117	2028743	26.80	PPBV	0.00
Target Compounds						Qvalue
2) Propene	5.310	41	18904	1.49	ppbv	# 79
3) Dichlorodifluoromethane	5.404	85	22908	0.43	ppbv	100
4) Chloromethane	5.766	50	3903	0.19	ppbv	# 88
7) Butane	6.328	43	1887510	75.89	ppbv	98
11) Ethanol	7.306	31	15804	1.60	ppbv	# 93
13) Trichlorofluoromethane	7.962	101	14049	0.27	ppbv	99
15) Acetone	8.136	43	49800	2.04	ppbv	98
17) Carbon Disulfide	9.489	76	26319	0.42	ppbv	98
18) Dichloromethane	9.302	49	21276	0.90	ppbv	# 1
24) Hexane	11.164	57	8446	0.25	ppbv	# 43
25) 2-Butanone (MEK)	11.056	43	6682	0.19	ppbv	92
27) Chloroform	11.914	83	152033	3.39	ppbv	88
30) 1,2-Dichloroethane	12.865	62	3097	0.12	ppbv	95
33) Cyclohexane	13.334	56	285801	8.47	ppbv	98
35) Benzene	13.226	78	228985	3.18	ppbv	100
36) 2,2,4-Trimethylpentane	13.976	57	10728252	105.29	ppbv	100
44) Methyl Cyclohexane	15.276	83	4714	0.11	ppbv	# 89
47) Toluene	16.468	91	5361698	59.65	ppbv	99
51) Tetrachloroethylene	17.687	166	10994	0.21	ppbv	98
55) Ethylbenzene	19.187	91	9949	0.08	ppbv	97
59) o-Xylene	20.084	91	41927	0.45	ppbv	99
65) Decane	22.536	57	10405	0.16	ppbv	98

(#) = qualifier out of range (m) = manual integration (+) = signals summed

Data Path : T:\MSD53\Data\190517\
Data File : R051716.D
Acq On : 17 May 2019 21:13
Operator : LSY
Sample : JSZ220 100ML
Misc :
ALS Vial : 16 Sample Multiplier: 1

Quant Time: May 21 08:34:35 2019
Quant Method : T:\MSD53\Data\Methods\TO15_190503.M
Quant Title : TO15 calibration, INTstd Lot#160-401162459-1, EXP. 2019/04/13
QLast Update : Mon May 06 08:51:30 2019
Response via : Initial Calibration



Data Path : T:\MSD53\Data\190517\
 Data File : R051718.D
 Acq On : 17 May 2019 22:49
 Operator : LSY
 Sample : JSZ222 100ML
 Misc :
 ALS Vial : 18 Sample Multiplier: 1

Quant Time: May 21 08:46:10 2019
 Quant Method : T:\MSD53\Data\Methods\TO15_190503.M
 Quant Title : TO15 calibration, INTstd Lot#160-401162459-1, EXP. 2019/04/13
 QLast Update : Mon May 06 08:51:30 2019
 Response via : Initial Calibration

Compound	R.T.	QIon	Response	Conc	Units	Dev (Min)

Internal Standards						
1) BROMOCHLOROMETHANE	11.833	130	588010	26.30	PPBV	0.00
31) 1,4-DIFLUOROBENZENE	13.735	114	2261937	26.80	PPBV	0.00
52) d5-CHLORO BENZENE	18.798	117	2025625	26.80	PPBV	0.00
Target Compounds						Qvalue
3) Dichlorodifluoromethane	5.417	85	25109	0.48	ppbv	99
11) Ethanol	7.306	31	40690	4.18	ppbv	97
13) Trichlorofluoromethane	7.949	101	13566	0.27	ppbv	98
15) Acetone	8.150	43	38864	1.61	ppbv #	85
17) Carbon Disulfide	9.489	76	46098	0.74	ppbv	98
18) Dichloromethane	9.302	49	7646	0.33	ppbv	90
24) Hexane	11.150	57	3169	0.10	ppbv #	90
25) 2-Butanone (MEK)	11.070	43	4730	0.14	ppbv	100
27) Chloroform	11.954	83	38694	0.87	ppbv	99
29) Tetrahydrofuran	12.182	42	2004	0.09	ppbv #	85
39) Trichloroethylene	14.378	130	245874	6.71	ppbv	99
47) Toluene	16.468	91	48713	0.55	ppbv	98
51) Tetrachloroethylene	17.687	166	4551	0.09	ppbv	95
55) Ethylbenzene	19.174	91	34276	0.29	ppbv	99
56) M&P-Xylene	19.401	91	125043m	1.31	ppbv	
59) o-Xylene	20.084	91	50510	0.54	ppbv	99
63) 4-Ethyltoluene	21.946	105	46282	0.34	ppbv	98
64) 1,3,5-Trimethylbenzene	22.040	105	51995	0.44	ppbv	97
65) Decane	22.536	57	98249	1.48	ppbv	91
66) 1,2,4-Trimethylbenzene	22.777	105	187495	1.58	ppbv	98
70) 1,2,3-Trimethylbenzene	23.554	105	42242m	0.37	ppbv	
72) Dodecane	26.969	57	380758	5.23	ppbv	100
74) Naphthalene	27.532	128	17464	0.16	ppbv	99

(#) = qualifier out of range (m) = manual integration (+) = signals summed

Data Path : T:\MSD53\Data\190517\
Data File : R051718.D
Acq On : 17 May 2019 22:49
Operator : LSY
Sample : JSZ222 100ML
Misc :
ALS Vial : 18 Sample Multiplier: 1

Quant Time: May 21 08:46:10 2019
Quant Method : T:\MSD53\Data\Methods\T015_190503.M
Quant Title : T015 calibration, INTstd Lot#160-401162459-1, EXP. 2019/04/13
QLast Update : Mon May 06 08:51:30 2019
Response via : Initial Calibration

