

December 16, 2024

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Cleaner Air Oregon Project Engineer
Oregon Department of Environmental Quality
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Portland, OR 97232
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RE: 25-0008 – PDX-4 – Cleaner Air Oregon Emission Inventory Additional Information Request Response

Amy DeVita-McBride:

Amazon Data Services, Inc. (ADS) submitted the Cleaner Air Oregon (CAO) Emissions Inventory (Inventory) for the existing data center campus, Source Number 25-0008 (PDX-4), to the Oregon Department of Environmental Quality (Oregon DEQ) in accordance with Oregon Administrative Rule (OAR) 340-245-0030 on September 23, 2024. ADS received a response letter from Oregon DEQ on October 29, 2024, requesting additional information be submitted to Oregon DEQ by November 27, 2024.

ADS submitted a request for extension on November 11, 2024, to extend the submittal date to December 20, 2024. Oregon DEQ approved this extension request on November 19, 2024. This letter contains the additional information requested by Oregon DEQ.

REQUESTED INFORMATION

1. **Submit to DEQ a revised Inventory (AQ520), along with all supporting calculations in Excel format, as well as all information required under OAR 340-245-0040(4). Include the following updates to the AQ 520:**
 - a. **Cold starts: Incorporate emissions from engine cold starts into the Inventory. Per footnote 7 in the letter provided with the Inventory submittal, emissions from cold starts will be included in emissions assessed for risk. As such, emissions from engine cold starts must be incorporated into the Inventory for approval.**

Cold starts have been added to the requested PTE and capacity emission rates. The facility has assumed 30 startups per year and one startup per day.
 - b. **2023 Annual Fuel Usage: Review of annual fuel usage for the engines against information submitted in both the 2023 annual reporting and the Air Toxics Emission Inventory (ATEI) show discrepancies between fuel usage for multiple engine groups. Review and revise fuel usage rates as appropriate to resolve discrepancies. Discrepancies were noted with the following TEUs:**
 - i. **Type A**
 - ii. **Type B**
 - iii. **Type E**
 - iv. **Type F**

During the development of the Inventory for this facility, it was discovered that the generator inventory required revision when compared to the existing permit. The 2023 annual report and ATEI incorrectly categorizes the following generators with the associated fuel usage:

Table 1. Original Generator Classification

Generator ID	Generator Type	Generator Model	Annual Fuel Usage (gal/yr)
PDX4-Gen5	Type A	Caterpillar C27 (750kW)	84.5
PDX4-Gen3	Type A	Caterpillar C27 (750kW)	83.7
PDX4-Gen2	Type A	Caterpillar C27 (750kW)	90.4
PDX4-13A	Type F	Caterpillar 3516C (2500kW)	302.7
PDX4-13B	Type F	Caterpillar 3516C (2500kW)	318.8
PDX4-16A	Type E	Caterpillar 3516C (2000kW)	504.5
PDX4-16B	Type E	Caterpillar 3516C (2000kW)	521.9

The revised generator type for each generator, as represented in the Inventory, is as follows:

Table 2. Revised Generator Classification

Generator ID	Generator Type	Generator Model	Annual Fuel Usage (gal/yr)
PDX4-Gen5	Type B	Caterpillar C27 (800kW)	84.5
PDX4-Gen3	Type B	Caterpillar C27 (800kW)	83.7
PDX4-Gen2	Type B	Caterpillar C27 (800kW)	90.4
PDX4-13A	Type E	Caterpillar 3516C (2000kW)	302.7
PDX4-13B	Type E	Caterpillar 3516C (2000kW)	318.8
PDX4-16A	Type F	Caterpillar 3516C (2500kW)	504.5
PDX4-16B	Type F	Caterpillar 3516C (2500kW)	521.9

This revision has been addressed in the facility renewal application; the updated generator inventory will be reflected in the renewed permit issuance. The generator inventory and fuel usage allocated to each generator type in the Inventory is based on the revised data in Table 2. Due to the low overall fuel usage of the facility, update to these designations did not change the total criteria pollutant emissions in the annual report required under the facilities’ permit.

- c. **2023 Daily Fuel Usage: Provide maximum daily fuel usage rates for each of the engine TEUs (TEU IDs: Type A through Type I). Per OAR 340-245-0040(a)(B)(i)(I), existing sources are required to submit maximum daily production activities and usage for the calendar year preceding the DEQ call in.**

Per discussion with Oregon DEQ on November 22, 2024, and written email confirmation received later that day (see email in Attachment 1), ADS has updated the Inventory to use the actual maximum daily fuel throughput for each generator type based on available data from September 2023 through September 2024. The actual annual fuel throughput is still based on calendar year 2023 throughput. Please see the associated AQ520 form, which is included electronically only, for updated actual daily calculations.

- d. **Diesel Tanks – Exempt TEU: Provide unique TEU identifiers for each of the diesel storage tank TEUs on Worksheet 2.**

Please see the associated AQ520 form, which is included electronically only, a list of TEU identifiers for each of the diesel storage tank types.

- e. **Belly Tanks-Exempt TEU: Provide unique TEU identifier for each of the engine oil storage tank TEUs on Worksheet 2.**

Please see the associated Excel Inventory, which is included electronically only, with a list of TEU identifiers for each of the engine oil storage tanks.

- f. **Type F Engine: Update reference on Worksheet 3 to distinguish the source of the emission factor for each Toxic Air Contaminant (TAC) for the Type F engines. Currently, all of the TAC emission factors have the reference of "2019 and 2021 Stack test data and Toxics ATEI Combustion Tool Emission Factor." Update the reference for each TAC emission factor to clarify the specific source of the data.**

Each individual TAC emission factor source reference has been updated to reflect the specific source of data. Please see the associated AQ520 form, which is included electronically only.

2. **Type F Engine Source Test: Provide a copy of the source test report for testing conducted by CAT on the CAT 3516C 2,500 kW generator in March 2019. Also provide a copy of correspondence with DEQ approving use of these source test results for permitting purposes.**

Please see Attachment 2 with the source test. Oregon DEQ approved the use of this data with CAO evaluation approval for other ADS Oregon facility, 30-0121.

3. **Generator Specifications: Provide vendor specifications for all generator types. Specifically, provide data supporting both particulate matter (PM) and hydrocarbon (HC) emission rates used in development of diesel particulate matter (DPM) emission rates.**

Please see Attachment 3 with vendor specification for all generator types.

4. **Facility Wide Limitation (TEU ID: FWL): Provide explanation supporting the development of annual and maximum daily PTE fuel usage rates and emission estimates for the facility-wide fuel use limitation.**

The following information regarding both annual and maximum daily PTE fuel usage rates was included with the original Inventory submission:

Emergency generators are expected to operate for short periods at low or no load for biweekly readiness testing and other infrequent scheduled maintenance and testing activities throughout the year. While ADS expects the fuel usage to generally be equally distributed amongst all generators from expected operations, conservatism is proposed in determining the fuel distribution among individual generators to ensure facility-wide potential risks are adequately captured and for the flexibility in operation ADS would like to retain (e.g. facility wide fuel limit). ADS proposes the maximum daily and annual fuel throughputs are determined based on the conservative assumption that the generators will be operated at 100% load (which requires the highest fuel throughput per hour).

Potential annual diesel throughput for each generator type is the minimum between the following:

- ▶ Non-emergency facility-wide fuel use (269,503 gallons/year) – calculated assuming all generators are operated the same number of hours per year at maximum capacity and remain within the PSEL limits (see Table 3), and
- ▶ The maximum hourly fuel throughput multiplied by the NSPS annual limitation of 100 hours/year for each individual source type.

Example calculation for all three permitted Type A generators using the NSPS limit:

$$53.60 \frac{\text{gal}}{\text{hr} * \text{gen}} * 100 \frac{\text{hrs}}{\text{yr}} * 3 \text{ gens} = 16,080 \frac{\text{gal}}{\text{yr}}$$

Table 3. Facility Wide Fuel Throughput Limit Determination

Type	Quantity	Non-Emergency		Non-Emergency Fuel Use (gal/yr)	Emission Rate (tpy)			
		Hours of Operation (hrs/yr/gen)	100% Load Fuel Use (gal/hr/gen)		NOx	CO	VOC	PM
Type A	3	17.1	53.60	2,757	0.41	0.14	0.03	0.03
Type B	3	17.1	57.30	2,947	0.43	0.15	0.02	0.03
Type C	1	17.1	71.90	1,233	0.16	0.14	0.02	0.01
Type D	1	17.1	128.40	2,201	0.31	0.17	0.04	0.03
Type E	6	17.1	138.90	14,289	1.79	0.61	0.20	0.17
Type F	79	17.1	173.50	235,003	34.26	17.34	3.60	1.99
Type G	3	17.1	163.00	8,384	1.23	0.17	0.02	0.10
Type H	1	17.1	53.60	919	0.12	0.23	0.09	0.11
Type I	1	17.1	103.20	1,769	0.28	0.19	0.03	0.02
Facility Total				269,503	39.0	19.1	4.1	2.5

Generators are expected to operate with no daily restriction for non-emergency purposes. ADS has evaluated historical operations across several of their other facilities in Oregon and determined facility-wide operations have not exceeded 20,000 gallons in a month. This is a very conservative estimate of potential fuel throughput on a daily basis for non-emergency operations. ADS would like to request a similar permit condition to other recently permitted ADS facilities that are new under the CAO program (e.g. Source Number 25-0063, Conditions 2.8.b and 6.3 and Source Number 30-0121 Condition 9.2) and resulted in the acute non-cancer risk to be below one. Source risk limits or permit conditions would allow the facility to record and report monthly diesel consumed for non-emergency purposes. Based on the other facility permits, if 20,000 gallons of diesel fuel for non-emergency purposes is exceeded for the campus in a single month, the facility would be required to verify daily throughput has not exceeded this level of consumption.

As such, potential daily throughput is calculated as the minimum value between:

- ▶ Maximum hourly fuel throughput multiplied by 24 hours/day for each individual source type, and
- ▶ 20,000 gallons per day.

5. **Engine Oil Belly Tanks: Provide the following information necessary to DEQ to make an Exempt TEU determination for the engine oil belly tanks:**
 - a. **Safety data sheet(s)**

Please see Attachment 4 with safety data sheets for the engine oil.

b. Estimated annual throughput volume (facility-wide)

Please see Attachment 4 with estimated annual throughput.

If you have any questions or comments about the information presented in this letter, please do not hesitate to call me at 541.303.2380 or Beth Ryder at 458.206.6770.

Sincerely,

Amazon Data Services, Inc.

A handwritten signature in blue ink, appearing to read 'Jason Bowker', with a long horizontal flourish extending to the right.

Jason Bowker, Senior Air Quality Engineer

cc: JR Giska, Oregon DEQ
Ania Loyd, Oregon DEQ
Tracy Drouin, Oregon DEQ
Owen Rudloff, Oregon DEQ
Garrett Koehler, Amazon
Shannon Moore, Amazon
Doka Bui, Amazon
Darren Wilton, Amazon
Beth Ryder, Trinity Consultants

ATTACHMENT 1

Oregon DEQ Correspondence

From: [Beth Ryder](#)
To: [Bui, Doka](#); [Maddie Coates](#); [Bowker, Jason](#)
Subject: FW: ADS PDX-4 - 9/23/2024 CAO Inventory Review
Date: Monday, November 25, 2024 9:55:15 AM
Attachments: [image001.png](#)

+ Doka, Maddie for your records

Beth Ryder
Principal Consultant

P 458.206.6770
8705 SW Nimbus Ave, Suite 350, Beaverton, OR 97008
Email: bryder@trinityconsultants.com

Upcoming Events:

[11/12/2024 – Industry Insights: Overcoming SPCC Challenges in Your Industry – Semiconductor \(ONLINE\)](#)
[12/12/2024 – Environmental Regulatory Outlook in Oregon: Hot Topics and Annual Compliance Reporting Updates for 2025 – Complimentary Luncheon \(PORTLAND\)](#)

From: DEVITA-MCBRIDE Amy * DEQ <Amy.DEVITA-MCBRIDE@deq.oregon.gov>

Sent: Friday, November 22, 2024 4:10 PM

To: khounnal@amazon.com

Cc: Sripada, Shri Vani <shrisrip@amazon.com>; Wilton, Darren <dcwilton@amazon.com>; jbowker@amazon.com; Beth Ryder <bRyder@trinityconsultants.com>; LOYD Ania * DEQ <Ania.Loyd@deq.Oregon.Gov>; DROUIN Tracy * DEQ <Tracy.Drouin@deq.oregon.gov>; BAILEY Mark * DEQ <Mark.BAILEY@deq.oregon.gov>; RUDLOFF Owen * DEQ <Owen.RUDLOFF@deq.oregon.gov>; GISKA JR * DEQ <JR.GISKA@deq.oregon.gov>

Subject: RE: ADS PDX-4 - 9/23/2024 CAO Inventory Review

Good afternoon,

I wanted to follow up on Item 1c from DEQ's October 29, 2024 Emissions Inventory response letter. In a call earlier today, DEQ was made aware of a new fuel tracking system implemented at PDX-4 in September 2023. During the call, Amazon Data Services, Inc. and Trinity Consultants requested that fuel usage data collected from this new system be used for reporting actual daily maximums in PDX-4's AQ520 CAO Emissions Inventory. DEQ will accept actual maximum daily fuel usage rates derived from an analysis of a full year of this newer data set (September 2023 through September 2024).

Please reach out if you have any questions.

Best,

Amy



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Portland, Oregon 97232 - 4100
P: 971.300.3653
Pronouns: She/Her

From: DEVITA-MCBRIDE Amy * DEQ

Sent: Tuesday, October 29, 2024 2:17 PM

To: khounnal@amazon.com

Cc: Sripada, Shri Vani <shrisrip@amazon.com>; Wilton, Darren <dcwilton@amazon.com>; jbowker@amazon.com; Beth Ryder <bRyder@trinityconsultants.com>; LOYD Ania * DEQ <Ania.Loyd@deq.Oregon.Gov>; DROUIN Tracy * DEQ <Tracy.Drouin@deq.oregon.gov>; BAILEY Mark * DEQ <Mark.BAILEY@deq.oregon.gov>; RUDLOFF Owen * DEQ <Owen.RUDLOFF@deq.oregon.gov>; GISKA JR * DEQ <JR.GISKA@deq.oregon.gov>

Subject: ADS PDX-4 - 9/23/2024 CAO Inventory Review

Good afternoon Shannon,

DEQ has completed an initial review of the Cleaner Air Oregon Emissions Inventory (Inventory) for the Amazon Data Services, Inc. PDX-4 facility. As outlined in the attached letter, DEQ is requesting additional information, corrections, and updates to the Inventory by November 27, 2024.

Please reach out if you have any questions or would like to discuss any of our comments further.

Best,

Amy



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ATTACHMENT 2

2019 Stack Test Data and Oregon DEQ Correspondence

Source Test Report

Caterpillar Inc.
Virginia Beach, Virginia

Source Tested: 3516HD Generator
Test Dates: March 5-8, 2019

AST Project No. 2019-0420

Prepared By
Alliance Source Testing, LLC
600 Roanoke Street
Salem, VA 24153

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stacktest.com

REGIONAL OFFICES

Anchorage, AK
Baton Rouge, LA
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Cedar Rapids, IA
Decatur, AL
Denver, CO
Houston, TX

Lewisville, TX
Little Rock, AR
Philadelphia, PA
Pittsburgh, PA
Roanoke, VA
Salt Lake City, UT



Source Information

Source Name
3516HD Generator Exhaust

Load Conditions
10%, 25%, 50%, 75%, 100%

Target Parameters
VOC, PM, PAH, Cr6, As, Cd, Ni, HCOH

Contact Information

Test Location
Caterpillar Inc.
Virginia Beach, VA

Facility Contact
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Weimer_Rodney_L@cat.com
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Test Company
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Alliance Source Testing, LLC (AST) has completed the source testing as described in this report. Results apply only to the source(s) tested and operating condition(s) for the specific test date(s) and time(s) identified within this report. All results are intended to be considered in their entirety, and AST is not responsible for use of less than the complete test report without written consent. This report shall not be reproduced in full or in part without written approval from the customer.

To the best of my knowledge and abilities, all information, facts and test data are correct. Data presented in this report has been checked for completeness and is accurate, error-free and legible. Onsite testing was conducted in accordance with approved internal Standard Operating Procedures. Any deviations or problems are detailed in the relevant sections on the test report.

This report is only considered valid once an authorized representative of AST has signed in the space provided below; any other version is considered draft. This document was prepared in portable document format (.pdf) and contains pages as identified in the bottom footer of this document.

Jeremy Hutchens
Alliance Source Testing, LLC

Date

TABLE OF CONTENTS

1.0	Introduction	1-1
1.1	Project Team	1-1
2.0	Summary of Results	2-1
3.0	Testing Methodology.....	3-1
3.1	U.S. EPA Reference Test Methods 1 and 2 – Sampling/Traverse Points and Volumetric Flow Rate	3-1
3.2	U.S. EPA Reference Test Method 3/3A – Oxygen/Carbon Dioxide.....	3-1
3.3	U.S. EPA Reference Test Method 4 – Moisture Content	3-1
3.4	U.S. EPA Reference Test Methods 5 and 202 – Total Particulate Matter.....	3-2
3.5	U.S. EPA Reference Test Method 18 – Speciated Volatile Organic Compounds.....	3-2
3.6	U.S. EPA Reference Test Method 323 – Formaldehyde	3-3
3.7	U.S. EPA Reference Test Method 29 – Metals	3-3
3.8	SW-846 Test Method 0010 – Polycyclic Aromatic Hydrocarbons and Naphthalene	3-3
3.9	SW-846 Test Method 0061 – Hexavalent Chrome	3-4
3.10	Quality Assurance/Quality Control – U.S. EPA Reference Test Method 3/3A	3-4

LIST OF TABLES

Table 1-1	Project Team.....	1-1
Table 2-1	Summary of Results – 10% Load	2-2
Table 2-2	Summary of Results – 25% Load	2-3
Table 2-3	Summary of Results – 50% Load	2-4
Table 2-4	Summary of Results – 75% Load	2-5
Table 2-5	Summary of Results – 100% Load	2-6
Table 3-1	Source Testing Methodology.....	3-1

APPENDICES

Appendix A	Sample Calculations
Appendix B	Field Data
Appendix C	Laboratory Data
Appendix D	Quality Assurance/Quality Control Data
Appendix E	Engine Data

Introduction

1.0 Introduction

Alliance Source Testing, LLC (AST) was retained by Caterpillar Inc. (Caterpillar) to conduct engineering testing at the Virginia Beach, Virginia facility. Testing was conducted to determine the emission rates of speciated volatile organic compounds (VOC), total particulate matter (PM – filterable and condensable), polycyclic aromatic hydrocarbons (PAH), arsenic (As), cadmium (Cd), nickel (Ni), hexavalent chromium (Cr6) and formaldehyde (HCOH) at the exhaust of one (1) 3516HD Generator at five (5) load conditions: 10%, 25%, 50%, 75% and 100%.

1.1 Project Team

Personnel involved in this project are identified in the following table.

**Table 1-1
Project Team**

Facility Personnel	Romeo Macatula – Caterpillar
AST Personnel	Kenji Kinoshita Jeremy Hutchens Tyler Branca Norton Geisler Mark Godman Michael Henry Hunter McKinney

Summary of Results

2.0 Summary of Results

AST conducted engineering testing at the Caterpillar facility in Virginia Beach, Virginia on March 5-8, 2019. Testing consisted of determining the emission rates of speciated VOC, PM, PAHs, As, Cd, Ni, Cr6 and HCOH at the exhaust of one (1) 3516HD generator at five (5) load conditions.

Table 2-1 through Table 2-5 provide summaries of the emission testing results. Any difference between the summary results listed in the following tables and the detailed results contained in appendices is due to rounding for presentation.

Laboratory QA/QC Notes

For 75% load Run 2 – 2,4,6-Tribromophenol surrogate results showed a matrix interference which reduced the recovery of this surrogate spike. Runs 1 and 3 did not show the same interference, and the general results across the three runs are reasonably comparable. We believe this recovery is an anomaly and not indicative of overall method performance.

For 10% Load Run 3 – High levels of nickel in the Method 29 analysis were confirmed by second analysis with dilution.

**Table 2-1
Summary of Results – 10% Load**

Run Number	Run 1	Run 2	Run 3	Average
Date	3/8/19	3/8/19	3/8/19	--
Particulate Matter Data				
Filterable PM Emission Rate, lb/hr	0.34	0.33	0.38	0.35
Condensable PM Emission Rate, lb/hr	0.25	0.30	0.39	0.31
Total PM Emission Rate, lb/hr	0.58	0.63	0.76	0.66
Metals Data				
Arsenic Emission Rate, lb/hr	<u>7.7E-06</u>	<u>7.8E-06</u>	5.7E-05	2.4E-05
Cadmium Emission Rate, lb/hr	<u>1.7E-06</u>	<u>1.7E-06</u>	<u>1.7E-06</u>	1.7E-06
Nickel Emission Rate, lb/hr	2.2E-05	2.2E-05	1.1E-04	5.1E-05
Hexavalent Chromium Emission Rate, lb/hr	<u>7.6E-05</u>	<u>3.9E-05</u>	<u>7.7E-05</u>	6.4E-05
Organics Data				
Formaldehyde Emission Rate, lb/hr	0.0051	0.039	0.043	0.029
1,3 Butadiene Emission Rate, lb/hr	<u>0.0025</u>	<u>0.0025</u>	<u>0.0026</u>	0.0025
Acetaldehyde Emission Rate, lb/hr	<u>0.037</u>	<u>0.037</u>	<u>0.038</u>	0.037
Benzene Emission Rate, lb/hr	<u>0.023</u>	<u>0.023</u>	<u>0.024</u>	0.023
Ethylbenzene Emission Rate, lb/hr	<u>0.023</u>	<u>0.023</u>	<u>0.024</u>	0.023
Hexane Emission Rate, lb/hr	<u>0.017</u>	<u>0.018</u>	<u>0.018</u>	0.018
Polycyclic Aromatic Hydrocarbons Data				
Acenaphthene Emission Rate, lb/hr	<u>2.8E-05</u>	<u>2.9E-05</u>	<u>2.8E-05</u>	2.8E-05
Acenaphthylene Emission Rate, lb/hr	<u>2.8E-05</u>	<u>2.9E-05</u>	<u>2.8E-05</u>	2.8E-05
Anthracene Emission Rate, lb/hr	<u>9.3E-06</u>	<u>9.5E-06</u>	<u>9.4E-06</u>	9.4E-06
Benz[a]anthracene Emission Rate, lb/hr	<u>7.4E-06</u>	<u>7.6E-06</u>	<u>7.5E-06</u>	7.5E-06
Benzo[a]pyrene Emission Rate, lb/hr	<u>9.3E-06</u>	<u>9.5E-06</u>	<u>9.4E-06</u>	9.4E-06
Benzo[a]fluoranthene Emission Rate, lb/hr	<u>7.4E-06</u>	<u>7.6E-06</u>	<u>7.5E-06</u>	7.5E-06
Benzo[g,h,i]perylene Emission Rate, lb/hr	<u>7.4E-06</u>	<u>7.6E-06</u>	<u>7.5E-06</u>	7.5E-06
Benzo[k]fluoranthene Emission Rate, lb/hr	<u>9.3E-06</u>	<u>9.5E-06</u>	<u>9.4E-06</u>	9.4E-06
Chrysene Emission Rate, lb/hr	<u>7.4E-06</u>	<u>7.6E-06</u>	<u>7.5E-06</u>	7.5E-06
Dibenz[a,h]anthracene Emission Rate, lb/hr	<u>7.4E-06</u>	<u>7.6E-06</u>	<u>7.5E-06</u>	7.5E-06
Fluoranthene Emission Rate, lb/hr	<u>1.9E-05</u>	<u>1.9E-05</u>	<u>1.9E-05</u>	1.9E-05
Fluorene Emission Rate, lb/hr	5.4E-05	6.4E-05	6.4E-05	6.0E-05
Indeno(1,2,3-cd)pyrene Emission Rate, lb/hr	<u>9.3E-06</u>	<u>9.5E-06</u>	<u>9.4E-06</u>	9.4E-06
Naphthalene Emission Rate, lb/hr	1.2E-03	1.6E-03	1.5E-03	1.5E-03
Phenanthrene Emission Rate, lb/hr	1.2E-04	1.3E-04	1.3E-04	1.3E-04
Pyrene Emission Rate, lb/hr	1.2E-04	1.2E-04	1.3E-04	1.3E-04

* Underlined values represent results below the detection limit. The detection limit was used for emission purposes.

**Table 2-2
Summary of Results – 25% Load**

Run Number	Run 1	Run 2	Run 3	Average
Date	3/7/19	3/7/19	3/7/19	--
Particulate Matter Data				
Filterable PM Emission Rate, lb/hr	0.36	0.32	0.34	0.34
Condensable PM Emission Rate, lb/hr	0.33	0.31	0.39	0.34
Total PM Emission Rate, lb/hr	0.68	0.62	0.73	0.68
Metals Data				
Arsenic Emission Rate, lb/hr	<u>1.1E-05</u>	<u>1.1E-05</u>	<u>1.1E-05</u>	1.1E-05
Cadmium Emission Rate, lb/hr	<u>2.5E-06</u>	<u>2.5E-06</u>	<u>2.4E-06</u>	2.5E-06
Nickel Emission Rate, lb/hr	2.5E-05	2.2E-05	2.0E-05	2.3E-05
Hexavalent Chromium Emission Rate, lb/hr	<u>5.3E-05</u>	<u>5.5E-05</u>	<u>5.5E-05</u>	5.4E-05
Organics Data				
Formaldehyde Emission Rate, lb/hr	0.041	0.040	0.043	0.042
1,3 Butadiene Emission Rate, lb/hr	<u>0.0034</u>	<u>0.0034</u>	<u>0.0033</u>	0.0034
Acetaldehyde Emission Rate, lb/hr	<u>0.049</u>	<u>0.050</u>	<u>0.049</u>	0.049
Benzene Emission Rate, lb/hr	<u>0.029</u>	<u>0.030</u>	<u>0.029</u>	0.029
Ethylbenzene Emission Rate, lb/hr	<u>0.031</u>	<u>0.031</u>	<u>0.031</u>	0.031
Hexane Emission Rate, lb/hr	<u>0.023</u>	<u>0.024</u>	<u>0.023</u>	0.023
Polycyclic Aromatic Hydrocarbons Data				
Acenaphthene Emission Rate, lb/hr	<u>4.3E-05</u>	<u>4.2E-05</u>	<u>4.3E-05</u>	4.3E-05
Acenaphthylene Emission Rate, lb/hr	<u>4.3E-05</u>	<u>4.2E-05</u>	<u>4.3E-05</u>	4.3E-05
Anthracene Emission Rate, lb/hr	<u>1.1E-05</u>	<u>1.1E-05</u>	<u>1.4E-05</u>	1.2E-05
Benz[a]anthracene Emission Rate, lb/hr	<u>1.1E-05</u>	<u>1.1E-05</u>	<u>1.2E-05</u>	1.1E-05
Benzo[a]pyrene Emission Rate, lb/hr	<u>1.4E-05</u>	<u>1.4E-05</u>	<u>1.4E-05</u>	1.4E-05
Benzo[a]fluoranthene Emission Rate, lb/hr	<u>1.1E-05</u>	<u>1.1E-05</u>	<u>1.2E-05</u>	1.1E-05
Benzo[g,h,i]perylene Emission Rate, lb/hr	<u>1.1E-05</u>	<u>1.1E-05</u>	<u>1.2E-05</u>	1.1E-05
Benzo[k]fluoranthene Emission Rate, lb/hr	<u>1.4E-05</u>	<u>1.4E-05</u>	<u>1.4E-05</u>	1.4E-05
Chrysene Emission Rate, lb/hr	<u>1.1E-05</u>	<u>1.1E-05</u>	<u>1.2E-05</u>	1.1E-05
Dibenz[a,h]anthracene Emission Rate, lb/hr	<u>1.1E-05</u>	<u>1.1E-05</u>	<u>1.2E-05</u>	1.1E-05
Fluoranthene Emission Rate, lb/hr	<u>1.1E-05</u>	<u>1.1E-05</u>	<u>2.9E-05</u>	1.7E-05
Fluorene Emission Rate, lb/hr	4.4E-05	4.4E-05	4.9E-05	4.6E-05
Indeno(1,2,3-cd)pyrene Emission Rate, lb/hr	<u>1.4E-05</u>	<u>1.4E-05</u>	<u>1.4E-05</u>	1.4E-05
Naphthalene Emission Rate, lb/hr	1.1E-03	1.2E-03	1.2E-03	1.2E-03
Phenanthrene Emission Rate, lb/hr	1.1E-04	1.0E-04	1.2E-04	1.1E-04
Pyrene Emission Rate, lb/hr	1.3E-04	9.8E-05	1.4E-04	1.2E-04

* Underlined values represent results below the detection limit. The detection limit was used for emission purposes.

**Table 2-3
Summary of Results – 50% Load**

Run Number	Run 1	Run 2	Run 3	Average
Date	3/6/19	3/6/19	3/6/19	--
Particulate Matter Data				
Filterable PM Emission Rate, lb/hr	0.22	0.38	0.54	0.38
Condensable PM Emission Rate, lb/hr	0.27	0.29	0.29	0.28
Total PM Emission Rate, lb/hr	0.49	0.67	0.83	0.66
Metals Data				
Arsenic Emission Rate, lb/hr	<u>2.0E-05</u>	<u>2.0E-05</u>	<u>2.0E-05</u>	2.0E-05
Cadmium Emission Rate, lb/hr	<u>4.5E-06</u>	4.6E-06	<u>4.5E-06</u>	4.5E-06
Nickel Emission Rate, lb/hr	6.2E-05	6.6E-05	8.9E-05	7.3E-05
Hexavalent Chromium Emission Rate, lb/hr	<u>4.9E-06</u>	<u>4.9E-06</u>	<u>1.2E-05</u>	7.4E-06
Organics Data				
Formaldehyde Emission Rate, lb/hr	0.028	0.037	0.037	0.034
1,3 Butadiene Emission Rate, lb/hr	<u>0.0049</u>	<u>0.0048</u>	<u>0.0048</u>	0.0048
Acetaldehyde Emission Rate, lb/hr	<u>0.072</u>	<u>0.070</u>	<u>0.071</u>	0.071
Benzene Emission Rate, lb/hr	<u>0.043</u>	<u>0.042</u>	<u>0.042</u>	0.043
Ethylbenzene Emission Rate, lb/hr	<u>0.045</u>	<u>0.044</u>	<u>0.044</u>	0.045
Hexane Emission Rate, lb/hr	<u>0.034</u>	<u>0.034</u>	<u>0.034</u>	0.034
Polycyclic Aromatic Hydrocarbons Data				
Acenaphthene Emission Rate, lb/hr	<u>6.3E-05</u>	<u>6.2E-05</u>	<u>6.3E-05</u>	6.3E-05
Acenaphthylene Emission Rate, lb/hr	<u>6.3E-05</u>	<u>6.2E-05</u>	<u>6.3E-05</u>	6.3E-05
Anthracene Emission Rate, lb/hr	<u>1.7E-05</u>	<u>1.7E-05</u>	<u>1.7E-05</u>	1.7E-05
Benz[a]anthracene Emission Rate, lb/hr	<u>1.7E-05</u>	<u>1.7E-05</u>	<u>1.7E-05</u>	1.7E-05
Benzo[a]pyrene Emission Rate, lb/hr	<u>2.1E-05</u>	<u>2.1E-05</u>	<u>2.1E-05</u>	2.1E-05
Benzo[a]fluoranthene Emission Rate, lb/hr	<u>1.7E-05</u>	<u>1.7E-05</u>	<u>1.7E-05</u>	1.7E-05
Benzo[g,h,i]perylene Emission Rate, lb/hr	<u>1.7E-05</u>	<u>1.7E-05</u>	<u>1.7E-05</u>	1.7E-05
Benzo[k]fluoranthene Emission Rate, lb/hr	<u>2.1E-05</u>	<u>2.1E-05</u>	<u>2.1E-05</u>	2.1E-05
Chrysene Emission Rate, lb/hr	<u>1.7E-05</u>	<u>1.7E-05</u>	<u>1.7E-05</u>	1.7E-05
Dibenz[a,h]anthracene Emission Rate, lb/hr	<u>1.7E-05</u>	<u>1.7E-05</u>	<u>1.7E-05</u>	1.7E-05
Fluoranthene Emission Rate, lb/hr	<u>1.7E-05</u>	<u>1.7E-05</u>	<u>1.7E-05</u>	1.7E-05
Fluorene Emission Rate, lb/hr	4.8E-05	4.2E-05	4.8E-05	4.6E-05
Indeno(1,2,3-cd)pyrene Emission Rate, lb/hr	<u>2.1E-05</u>	<u>2.1E-05</u>	<u>2.1E-05</u>	2.1E-05
Naphthalene Emission Rate, lb/hr	8.4E-04	9.2E-04	9.8E-04	9.1E-04
Phenanthrene Emission Rate, lb/hr	9.4E-05	9.2E-05	1.0E-04	9.5E-05
Pyrene Emission Rate, lb/hr	1.3E-04	1.0E-04	1.0E-04	1.1E-04

* Underlined values represent results below the detection limit. The detection limit was used for emission purposes.

Table 2-4
Summary of Results – 75% Load

Run Number	Run 1	Run 2	Run 3	Average
Date	3/6/19	3/6/19	3/6/19	--
Particulate Matter Data				
Filterable PM Emission Rate, lb/hr	0.33	0.23	0.21	0.26
Condensable PM Emission Rate, lb/hr	0.22	0.23	0.21	0.22
Total PM Emission Rate, lb/hr	0.54	0.46	0.42	0.47
Metals Data				
Arsenic Emission Rate, lb/hr	<u>1.9E-05</u>	<u>1.9E-05</u>	<u>1.9E-05</u>	1.9E-05
Cadmium Emission Rate, lb/hr	<u>4.3E-06</u>	<u>4.2E-06</u>	<u>4.3E-06</u>	4.3E-06
Nickel Emission Rate, lb/hr	7.1E-05	6.3E-05	6.9E-05	6.8E-05
Hexavalent Chromium Emission Rate, lb/hr	<u>9.9E-05</u>	<u>1.0E-04</u>	<u>2.5E-05</u>	7.5E-05
Organics Data				
Formaldehyde Emission Rate, lb/hr	0.029	0.020	0.036	0.028
1,3 Butadiene Emission Rate, lb/hr	<u>0.0062</u>	<u>0.0059</u>	<u>0.0059</u>	0.0060
Acetaldehyde Emission Rate, lb/hr	<u>0.091</u>	<u>0.087</u>	<u>0.086</u>	0.088
Benzene Emission Rate, lb/hr	<u>0.055</u>	<u>0.052</u>	<u>0.052</u>	0.053
Ethylbenzene Emission Rate, lb/hr	<u>0.058</u>	<u>0.055</u>	<u>0.054</u>	0.056
Hexane Emission Rate, lb/hr	<u>0.044</u>	<u>0.042</u>	<u>0.041</u>	0.042
Polycyclic Aromatic Hydrocarbons Data				
Acenaphthene Emission Rate, lb/hr	<u>4.2E-05</u>	<u>4.2E-05</u>	<u>4.2E-05</u>	4.2E-05
Acenaphthylene Emission Rate, lb/hr	<u>4.2E-05</u>	<u>4.2E-05</u>	<u>4.2E-05</u>	4.2E-05
Anthracene Emission Rate, lb/hr	<u>1.1E-05</u>	<u>1.1E-05</u>	<u>1.4E-05</u>	1.2E-05
Benz[a]anthracene Emission Rate, lb/hr	<u>1.1E-05</u>	<u>1.1E-05</u>	<u>1.1E-05</u>	1.1E-05
Benzo[a]pyrene Emission Rate, lb/hr	<u>1.4E-05</u>	<u>1.4E-05</u>	<u>1.4E-05</u>	1.4E-05
Benzo[a]fluoranthene Emission Rate, lb/hr	<u>1.1E-05</u>	<u>1.1E-05</u>	<u>1.1E-05</u>	1.1E-05
Benzo[g,h,i]perylene Emission Rate, lb/hr	<u>1.1E-05</u>	<u>1.1E-05</u>	<u>1.1E-05</u>	1.1E-05
Benzo[k]fluoranthene Emission Rate, lb/hr	<u>1.4E-05</u>	<u>1.4E-05</u>	<u>1.4E-05</u>	1.4E-05
Chrysene Emission Rate, lb/hr	<u>1.1E-05</u>	<u>1.1E-05</u>	<u>1.1E-05</u>	1.1E-05
Dibenz[a,h]anthracene Emission Rate, lb/hr	<u>1.1E-05</u>	<u>1.1E-05</u>	<u>1.1E-05</u>	1.1E-05
Fluoranthene Emission Rate, lb/hr	<u>1.1E-05</u>	<u>1.1E-05</u>	<u>1.1E-05</u>	1.1E-05
Fluorene Emission Rate, lb/hr	4.9E-05	4.8E-05	4.2E-05	4.6E-05
Indeno(1,2,3-cd)pyrene Emission Rate, lb/hr	<u>1.4E-05</u>	<u>1.4E-05</u>	<u>1.4E-05</u>	1.4E-05
Naphthalene Emission Rate, lb/hr	8.8E-04	8.4E-04	8.9E-04	8.7E-04
Phenanthrene Emission Rate, lb/hr	1.0E-04	8.8E-05	1.1E-04	1.0E-04
Pyrene Emission Rate, lb/hr	1.1E-04	9.8E-05	1.1E-04	1.1E-04

* Underlined values represent results below the detection limit. The detection limit was used for emission purposes.

**Table 2-5
Summary of Results – 100% Load**

Run Number	Run 1	Run 2	Run 3	Average
Date	3/5/19	3/5/19	3/5/19	--
Particulate Matter Data				
Filterable PM Emission Rate, lb/hr	0.33	0.44	0.35	0.37
Condensable PM Emission Rate, lb/hr	0.21	0.35	0.26	0.28
Total PM Emission Rate, lb/hr	0.54	0.79	0.61	0.65
Metals Data				
Arsenic Emission Rate, lb/hr	<u>2.0E-05</u>	<u>1.9E-05</u>	<u>1.9E-05</u>	1.9E-05
Cadmium Emission Rate, lb/hr	1.1E-05	<u>4.3E-06</u>	5.6E-06	7.1E-06
Nickel Emission Rate, lb/hr	1.8E-04	1.1E-04	1.5E-04	1.4E-04
Hexavalent Chromium Emission Rate, lb/hr	1.1E-04	<u>1.3E-04</u>	<u>1.3E-04</u>	1.2E-04
Organics Data				
Formaldehyde Emission Rate, lb/hr	0.037	0.035	0.024	0.032
1,3 Butadiene Emission Rate, lb/hr	<u>0.0070</u>	<u>0.0069</u>	<u>0.0069</u>	0.0069
Acetaldehyde Emission Rate, lb/hr	<u>0.10</u>	<u>0.10</u>	<u>0.10</u>	0.10
Benzene Emission Rate, lb/hr	<u>0.060</u>	<u>0.061</u>	<u>0.060</u>	0.061
Ethylbenzene Emission Rate, lb/hr	<u>0.063</u>	<u>0.064</u>	<u>0.063</u>	0.064
Hexane Emission Rate, lb/hr	<u>0.048</u>	<u>0.049</u>	<u>0.048</u>	0.048
Polycyclic Aromatic Hydrocarbons Data				
Acenaphthene Emission Rate, lb/hr	<u>4.4E-05</u>	<u>4.2E-05</u>	<u>4.2E-05</u>	4.3E-05
Acenaphthylene Emission Rate, lb/hr	<u>4.4E-05</u>	<u>4.2E-05</u>	<u>4.2E-05</u>	4.3E-05
Anthracene Emission Rate, lb/hr	<u>1.5E-05</u>	<u>1.4E-05</u>	<u>1.4E-05</u>	1.4E-05
Benz[a]anthracene Emission Rate, lb/hr	<u>1.2E-05</u>	<u>1.1E-05</u>	<u>1.1E-05</u>	1.1E-05
Benzo[a]pyrene Emission Rate, lb/hr	<u>1.5E-05</u>	<u>1.4E-05</u>	<u>1.4E-05</u>	1.4E-05
Benzo[a]fluoranthene Emission Rate, lb/hr	<u>1.2E-05</u>	<u>1.1E-05</u>	<u>1.1E-05</u>	1.1E-05
Benzo[g,h,i]perylene Emission Rate, lb/hr	<u>1.2E-05</u>	<u>1.1E-05</u>	<u>1.1E-05</u>	1.1E-05
Benzo[k]fluoranthene Emission Rate, lb/hr	<u>1.5E-05</u>	<u>1.4E-05</u>	<u>1.4E-05</u>	1.4E-05
Chrysene Emission Rate, lb/hr	<u>1.2E-05</u>	<u>1.1E-05</u>	<u>1.1E-05</u>	1.1E-05
Dibenz[a,h]anthracene Emission Rate, lb/hr	<u>1.2E-05</u>	<u>1.1E-05</u>	<u>1.1E-05</u>	1.1E-05
Fluoranthene Emission Rate, lb/hr	<u>3.0E-05</u>	<u>2.8E-05</u>	<u>2.8E-05</u>	2.9E-05
Fluorene Emission Rate, lb/hr	5.9E-05	8.5E-05	6.0E-05	6.8E-05
Indeno(1,2,3-cd)pyrene Emission Rate, lb/hr	<u>1.5E-05</u>	<u>1.4E-05</u>	<u>1.4E-05</u>	1.4E-05
Naphthalene Emission Rate, lb/hr	1.1E-03	1.0E-03	9.6E-04	1.0E-03
Phenanthrene Emission Rate, lb/hr	1.5E-04	1.6E-04	1.4E-04	1.5E-04
Pyrene Emission Rate, lb/hr	1.6E-04	1.6E-04	1.3E-04	1.5E-04

* Underlined values represent results below the detection limit. The detection limit was used for emission purposes.

Testing Methodology

3.0 Testing Methodology

The emission testing program was conducted in accordance with the test methods listed in Table 3-1. Method descriptions are provided below while quality assurance/quality control data is provided in Appendix D.

Table 3-1
Source Testing Methodology

Parameter	U.S. EPA Reference Test Methods	Notes/Remarks
Volumetric Flow Rate	1, 2	Full Velocity Traverses
Oxygen/Carbon Dioxide	3/3A	Integrated Bag / Instrumental Analysis
Moisture Content	4	Volumetric / Gravimetric Analysis
Total Particulate Matter	5 & 202	Isokinetic Sampling
Speciated Volatile Organic Compounds	18	Constant Rate Sampling
Formaldehyde	Modified 323	Constant Rate Sampling
Metals	29	Isokinetic Testing
Polycyclic Aromatic Hydrocarbons, Naphthalene	SW 846-0010	Isokinetic Sampling
Hexavalent Chromium	SW 846-0061	Isokinetic Sampling

3.1 U.S. EPA Reference Test Methods 1 and 2 – Sampling/Traverse Points and Volumetric Flow Rate

The sampling location and number of traverse (sampling) points were selected in accordance with U.S. EPA Reference Test Method 1. To determine the minimum number of traverse points, the upstream and downstream distances were equated into equivalent diameters and compared to Figure 1-1 in U.S. EPA Reference Test Method 1.

Full velocity traverses were conducted in accordance with U.S. EPA Reference Test Method 2 to determine the average stack gas velocity pressure, static pressure and temperature. The velocity and static pressure measurement system consisted of a pitot tube and inclined manometer. The stack gas temperature was measured with a K-type thermocouple and pyrometer. Stack gas velocity pressure and temperature readings were recorded during each test run. The data collected was utilized to calculate the volumetric flow rate in accordance with U.S. EPA Reference Test Method 2.

3.2 U.S. EPA Reference Test Method 3/3A – Oxygen/Carbon Dioxide

The oxygen (O₂) and carbon dioxide (CO₂) testing was conducted in accordance with U.S. EPA Reference Test Method 3/3A. One (1) integrated Tedlar bag sample was collected during each test run. The bag samples were analyzed on site with a gas analyzer. The remaining stack gas constituent was assumed to be nitrogen for the stack gas molecular weight determination. The quality control measures are described in Section 3.9.

3.3 U.S. EPA Reference Test Method 4 – Moisture Content

The stack gas moisture content was determined in accordance with U.S. EPA Reference Test Method 4. The gas conditioning train consisted of a series of chilled impingers. Prior to testing, each impinger was filled with a known quantity of water or silica gel. Post testing, the quantities of water and silica gel were measured to determine the

amount of moisture condensed during the test run. Alternatively, each impinger was analyzed gravimetrically before and after each test run on the same balance to determine the amount of moisture condensed.

3.4 U.S. EPA Reference Test Methods 5 and 202 – Total Particulate Matter

The total particulate matter (filterable and condensable PM) testing was conducted in accordance with U.S. EPA Reference Test Methods 5 and 202. The complete sampling system consisted of a stainless-steel nozzle, glass-lined probe, pre-weighed quartz filter, coil condenser, un-weighed Teflon filter, gas conditioning train, pump and calibrated dry gas meter. The gas conditioning train consisted of a coiled condenser and five (5) chilled impingers. The first, second and fourth impingers were initially empty, the third contained 100 mL of de-ionized water and the last impinger contained 200-300 grams of silica gel. The un-weighed 90 mm Teflon filter was placed between the second and third impingers. The probe liner heating system was maintained at a temperature of $248 \pm 25^{\circ}\text{F}$, and the impinger temperature was maintained at 68°F or less throughout testing. The temperature of the Teflon filter was maintained greater than 65°F but less than or equal to 85°F .

Following the completion of each test run, the sampling train was leak checked at a vacuum pressure greater than or equal to the highest vacuum pressure observed during the run. Condensate was collected in the first dry impinger, therefore the front-half of the sample train (the nozzle, probe, and heated pre-weighed filter) was removed in order to purge the back-half of the sample train (coil condenser, first and second impingers and CPM filter). A glass bubbler was inserted into the first impinger. If needed, de-ionized ultra-filtered (DIUF) water was added to the first impinger to raise the water level above the bubbler, then the coil condenser was replaced. Zero nitrogen was connected to the condenser, and a 60-minute purge at 14 liters per minute was conducted. After the completion of the nitrogen purge the impinger contents were measured for moisture gain.

The pre-weighed quartz filter was carefully removed and placed in container 1. The probe, nozzle and front half of the filter holder were rinsed three (3) times with acetone to remove any adhering particulate matter and these rinses were recovered in container 2. All containers were sealed, labeled and liquid levels marked for transport to the identified laboratory for filterable particulate matter analysis.

The contents of impingers 1 and 2 were recovered in container CPM Cont. #1. The back half of the filterable PM filter holder, the coil condenser, impingers 1 and 2 and all connecting glassware were rinsed with DIUF water and then rinsed with acetone, followed by hexane. The water rinses were added to container CPM Cont. #1 while the solvent rinses were recovered in container CPM Cont. #2. The Teflon filter was removed from the filter holder and placed in container CPM Cont. #3. The front half of the condensable PM filter holder was rinsed with DIUF water and then with acetone, followed by hexane. The water rinse was added to container CPM Cont. #1 while the solvent rinses were added to container CPM Cont. #2. All containers were sealed, labeled and liquid levels marked for transport to the identified laboratory for condensable particulate matter analysis.

3.5 U.S. EPA Reference Test Method 18 – Speciated Volatile Organic Compounds

The speciated volatile organic compound (VOC) testing was conducted in accordance with U.S. EPA Reference Test Method 18. The stack gas was withdrawn at a constant rate through a stainless sample probe, heated Teflon sample line and gas conditioning system and collected in a leak-free Tedlar bag. All samples were sealed and labeled for transport to the identified laboratory for analysis.

3.6 U.S. EPA Reference Test Method 323 – Formaldehyde

The formaldehyde (CH₂O) testing was conducted in accordance with U.S. EPA Reference Test Method 323. The formaldehyde in each stack gas was withdrawn at a constant sampling rate through a stainless steel nozzle, glass probe, Teflon tubing, impinger train and dry gas meter using a leak free pump. The impinger train consisted of three (3) midget impingers with the first being empty, the second containing 20 mL of reagent water and the third containing a known mass of silica gel.

Following the completion of each test run, the sample train was leaked checked at a vacuum pressure equal to or greater than the highest vacuum observed during the test run. The contents of the midget impingers were measured for moisture gain. The contents of impinger 1 and 2 were placed in a 40-mL vial. The impingers and all connecting glassware were rinsed with reagent water and these rinses were added to the sample vial. The samples were sealed, labeled, placed on ice and shipped to the identified laboratory for analysis.

3.7 U.S. EPA Reference Test Method 29 – Metals

The metals testing was conducted in accordance with U.S. EPA Reference Test Method 29. The complete sampling system consisted of a glass nozzle, heated quartz-lined probe, pre-cleaned quartz filter, gas conditioning system, pump and calibrated dry gas meter. The gas conditioning train consisted of four (4) chilled impingers. The first and second impingers contained 100 mL of HNO₃/H₂O₂, the third was empty and the fourth impinger contained 200-300 grams of silica gel. The probe liner and filter heating systems were maintained at a temperature of 120 ± 14°C (248 ± 25°F), and the impinger temperature was maintained at 20°C (68°F) or less throughout testing. Prior to testing, all glassware was cleaned and sealed in a controlled environment as outlined in the test method.

Following the completion of each test run, the sample train was leak checked at a vacuum pressure equal to or greater than the highest vacuum pressure observed during the run and the contents of the impingers were measured for moisture gain. The quartz filter was carefully removed and placed into container 1. The probe and nozzle were rinsed and brushed three (3) times with 0.1 N HNO₃ using a non-metallic brush and these rinses were placed in container 3. The front half of the filter holder was rinsed three (3) times with 0.1 N HNO₃ and these rinses were added to container 3. The contents of impingers 1, 2, and 3 were placed in container 4. Impingers 1, 2, and 3 along with the filter support, back half of the filter holder and all connecting glassware were triple-rinsed with 0.1 N HNO₃ and these rinses were added to container 4. All containers were sealed, labeled and liquid levels marked for transport to the identified laboratory for analysis.

3.8 SW-846 Test Method 0010 – Polycyclic Aromatic Hydrocarbons and Naphthalene

The Polycyclic Aromatic Hydrocarbons (PAH) and Naphthalene testing was conducted in accordance with SW-846 Test Method 0010. The sampling system consisted of a stainless steel or glass nozzle, heated glass or quartz-lined probe, glass filter holder with pre-cleaned glass-fiber filter, condenser coil, XAD sorbent module, gas conditioning train, pump and calibrated dry gas meter. The gas conditioning system consisted of six (6) chilled impingers. The first impinge consisted of a XAD trap. The second impinger (shortened stem) was empty and used for moisture knockout. The next two (2) impingers each contained 100 mL of water. The fifth impinger was empty while the sixth impinger was charged with 200-300 grams of silica gel. The probe liner and filter heating systems were maintained at a temperature of 120 ± 14°C (248 ± 25°F), and the impinger temperature will be maintained below at 20°C (68°F) or less throughout testing.

All glassware leading to the XAD adsorbing resin trap was cleaned and sealed before mobilizing to the site. The sampling train was assembled in the sample recovery area. The pre-cleaned quartz filter was placed in a glass filter holder with a Teflon filter support and connected to the condenser coil. All open ends of the sampling train were sealed with Teflon tape prior to complete assembly at the sampling location.

Following the completion of each test run, the sampling train was leak checked at vacuum pressure greater than or equal to the highest vacuum pressure observed during the run. The XAD sorbent module was sealed on both ends and placed on ice. The filter was removed from the filter holder and placed in container 1. The nozzle, probe liner and front half of the filter holder were triple-rinsed and brushed with methanol/methylene chloride (1:1 v/v), and these rinses were recovered in container 2. The contents of the impingers were measured for moisture gain along with any moisture collected in the back half of the filter housing and the gas-conditioning section of the organic module. The impinger contents and condensate were then be transferred to container 3. The back half of the filter holder and coil condenser glassware were triple-rinsed with methanol/methylene chloride and recovered in container 4. All samples were sealed, labeled and liquid levels marked for transport to the identified laboratory for analysis.

3.9 SW-846 Test Method 0061 – Hexavalent Chrome

The hexavalent chrome testing was conducted in accordance with SW-846 Test Method 0061. The complete sampling system consisted of a glass nozzle, heated quartz-lined probe, Teflon sample line, Teflon recirculation line, gas conditioning system, pump and calibrated dry gas meter. The gas conditioning train consisted of five (5) chilled Teflon impingers. The first impinger contained 150 mL of potassium hydroxide (KOH), second and third impingers contained between 75 mL of KOH, the fourth was empty and the fifth contained 200-300 grams of silica gel. The impinger temperature was maintained at 20°C (68°F) or less throughout testing. Prior to testing, all glassware was cleaned and sealed in a controlled environment as outlined in the test method.

Following the completion of each test run, the sample train was leak checked at a vacuum pressure equal to or greater than the highest vacuum pressure observed during the run and the contents of the impingers were measured for moisture gain. The contents of impingers 1-3 were transferred into Container 1. The probe, nozzle, aspirator, sampling and recirculation lines, impingers and connecting tubing were rinsed four (4) times with reagent water and transferred to Container 1. The final rinse was conducted using nitric acid (HNO₃) and placed in Container 2. This container was not analyzed. All containers were sealed, labeled and liquid levels marked for transport to the identified laboratory for analysis.

3.10 Quality Assurance/Quality Control – U.S. EPA Reference Test Method 3/3A

Cylinder calibration gases used met EPA Protocol 1 (+/- 2%) standards. Copies of all calibration gas certificates can be found in the Quality Assurance/Quality Control Appendix.

Low-Level gas was introduced directly to the analyzer. After adjusting the analyzer to the Low-Level gas concentration and once the analyzer reading was stable, the analyzer value was recorded. This process was repeated for the High-Level gas. For the Calibration Error Test, Low, Mid, and High-Level calibration gases were sequentially introduced directly to the analyzer. All values were within 2.0 percent of the Calibration Span or 0.5 ppmv absolute difference.

At the completion of testing, the data was also saved to the AST server. All data was reviewed by the Field Team Leader before leaving the facility. Once arriving at AST's office, all written and electronic data was relinquished to the report coordinator and then a final review was performed by the Project Manager.

Appendix A

Location: Caterpillar, Inc - Virginia Beach, VA
Source: 3516HD Generator (LC 100)
Project No.: 2019-0420
Run No.: 1
Parameter: PM/CPM

Meter Pressure (Pm), in. Hg

$$Pm = Pb + \frac{\Delta H}{13.6}$$

where,

Pb $\frac{30.10}{}$ = barometric pressure, in. Hg
 ΔH $\frac{2.333}{}$ = pressure differential of orifice, in H₂O
Pm $\frac{30.27}{}$ = in. Hg

Absolute Stack Gas Pressure (Ps), in. Hg

$$Ps = Pb + \frac{Pg}{13.6}$$

where,

Pb $\frac{30.10}{}$ = barometric pressure, in. Hg
Pg $\frac{-1.70}{}$ = static pressure, in. H₂O
Ps $\frac{29.98}{}$ = in. Hg

Standard Meter Volume (Vmstd), dscf

$$Vmstd = \frac{17.647 \times Y \times Vm \times Pm}{Tm}$$

where,

Y $\frac{0.989}{}$ = meter correction factor
Vm $\frac{51.470}{}$ = meter volume, cf
Pm $\frac{30.27}{}$ = absolute meter pressure, in. Hg
Tm $\frac{539.1}{}$ = absolute meter temperature, °R
Vmstd $\frac{50.443}{}$ = dscf

Standard Wet Volume (Vwstd), scf

$$Vwstd = 0.04707 \times Vlc$$

where,

Vlc $\frac{62.5}{}$ = volume of H₂O collected, ml
Vwstd $\frac{2.943}{}$ = scf

Moisture Fraction (BWSsat), dimensionless (theoretical at saturated conditions)

$$BWSsat = \frac{10^{6.37 - \left(\frac{2,827}{Ts + 365}\right)}}{Ps}$$

where,

Ts $\frac{726.8}{}$ = stack temperature, °F
Ps $\frac{29.98}{}$ = absolute stack gas pressure, in. Hg
BWSsat $\frac{201.161}{}$ = dimensionless

Moisture Fraction (BWS), dimensionless (measured)

$$BWS = \frac{Vwstd}{(Vwstd + Vmstd)}$$

where,

Vwstd $\frac{2.943}{}$ = standard wet volume, scf
Vmstd $\frac{50.443}{}$ = standard meter volume, dscf
BWS $\frac{0.055}{}$ = dimensionless

Location: Caterpillar, Inc - Virginia Beach, VA
Source: 3516HD Generator (LC 100)
Project No.: 2019-0420
Run No.: 1
Parameter: PM/CPM

Moisture Fraction (BWS), dimensionless

$$BWS = BWSmsd \text{ unless } BWSsat < BWSmsd$$

where,

$$BWSsat \frac{201.161}{\quad} = \text{moisture fraction (theoretical at saturated conditions)}$$

$$BWSmsd \frac{0.055}{\quad} = \text{moisture fraction (measured)}$$

$$BWS \frac{0.055}{\quad}$$

Molecular Weight (DRY) (Md), lb/lb-mole

$$Md = (0.44 \times \% CO_2) + (0.32 \times \% O_2) + (0.28 (100 - \% CO_2 - \% O_2))$$

where,

$$CO_2 \frac{6.8}{\quad} = \text{carbon dioxide concentration, \%}$$

$$O_2 \frac{11.4}{\quad} = \text{oxygen concentration, \%}$$

$$Md \frac{29.54}{\quad} = \text{lb/lb mol}$$

Molecular Weight (WET) (Ms), lb/lb-mole

$$Ms = Md (1 - BWS) + 18 (BWS)$$

where,

$$Md \frac{29.54}{\quad} = \text{molecular weight (DRY), lb/lb mol}$$

$$BWS \frac{0.055}{\quad} = \text{moisture fraction, dimensionless}$$

$$Ms \frac{28.90}{\quad} = \text{lb/lb mol}$$

Average Velocity (Vs), ft/sec

$$Vs = 85.49 \times Cp \times (\Delta P^{1/2})_{avg} \times \sqrt{\frac{Ts}{Ps \times Ms}}$$

where,

$$Cp \frac{0.840}{\quad} = \text{pitot tube coefficient}$$

$$\Delta P^{1/2} \frac{1.784}{\quad} = \text{velocity head of stack gas, (in. H}_2\text{O)}^{1/2}$$

$$Ts \frac{1186.8}{\quad} = \text{absolute stack temperature, } ^\circ\text{R}$$

$$Ps \frac{29.98}{\quad} = \text{absolute stack gas pressure, in. Hg}$$

$$Ms \frac{28.90}{\quad} = \text{molecular weight of stack gas, lb/lb mol}$$

$$Vs \frac{150.0}{\quad} = \text{ft/sec}$$

Average Stack Gas Flow at Stack Conditions (Qa), acfm

$$Qa = 60 \times Vs \times As$$

where,

$$Vs \frac{150.0}{\quad} = \text{stack gas velocity, ft/sec}$$

$$As \frac{2.18}{\quad} = \text{cross-sectional area of stack, ft}^2$$

$$Qa \frac{19,632}{\quad} = \text{acfm}$$

Average Stack Gas Flow at Standard Conditions (Qs), dscfm

$$Qs = 17.647 \times Qa \times (1 - BWS) \times \frac{Ps}{Ts}$$

where,

$$Qa \frac{19,632}{\quad} = \text{average stack gas flow at stack conditions, acfm}$$

$$BWS \frac{0.055}{\quad} = \text{moisture fraction, dimensionless}$$

$$Ps \frac{29.98}{\quad} = \text{absolute stack gas pressure, in. Hg}$$

$$Ts \frac{1186.8}{\quad} = \text{absolute stack temperature, } ^\circ\text{R}$$

$$Qs \frac{8,268}{\quad} = \text{dscfm}$$

Location: Caterpillar, Inc - Virginia Beach, VA
Source: 3516HD Generator (LC 100)
Project No.: 2019-0420
Run No.: 1
Parameter: PM/CPM

Dry Gas Meter Calibration Check (Yqa), dimensionless

$$Yqa = \frac{Y \cdot \left(\frac{\Theta}{V_m} \sqrt{\frac{0.0319 \times T_m \times 29}{\Delta H @ \times \left(P_b + \frac{\Delta H \text{ avg.}}{13.6} \right) \times M_d}} \sqrt{\Delta H \text{ avg.}} \right)}{Y} \times 100$$

where,

Y	0.989	= meter correction factor, dimensionless
Θ	60	= run time, min.
V _m	51.47	= total meter volume, cf
T _m	539.1	= absolute meter temperature, °R
ΔH@	1.746	= orifice meter calibration coefficient, in. H ₂ O
P _b	30.10	= barometric pressure, in. Hg
ΔH avg	2.333	= average pressure differential of orifice, in H ₂ O
M _d	29.54	= molecular weight (DRY), lb/lb mol
(ΔH) ^{1/2}	1.523	= average squareroot pressure differential of orifice, (in. H ₂ O) ^{1/2}
Yqa	-1.5	= dimensionless

Volume of Nozzle (Vn), ft³

$$V_n = \frac{T_s}{P_s} \left(0.002669 \times V_{lc} + \frac{V_m \times P_m \times Y}{T_m} \right)$$

where,

T _s	1186.8	= absolute stack temperature, °R
P _s	29.98	= absolute stack gas pressure, in. Hg
V _{lc}	62.5	= volume of H ₂ O collected, ml
V _m	51.470	= meter volume, cf
P _m	30.27	= absolute meter pressure, in. Hg
Y	0.989	= meter correction factor, unitless
T _m	539.1	= absolute meter temperature, °R
V _n	119.782	= volume of nozzle, ft ³

Isokinetic Sampling Rate (I), %

$$I = \left(\frac{V_n}{\theta \times 60 \times A_n \times V_s} \right) \times 100$$

where,

V _n	119.782	= nozzle volume, ft ³
θ	60.0	= run time, minutes
A _n	0.00024	= area of nozzle, ft ²
V _s	150.0	= average velocity, ft/sec
I	94.0	= %

Location: Caterpillar, Inc - Virginia Beach, VA
 Source: 3516HD Generator (LC 100)
 Project No.: 2019-0420
 Run No.: 1
 Parameter: PM/CPM

Filterable PM Concentration (C_s), grain/dscf

$$C_s = \frac{M_n \times 0.0154}{Vmstd}$$

where,

M_n 15.2 = filterable PM mass, mg
 $Vmstd$ 50.443 = standard meter volume, dscf
 C_s 0.0047 = grain/dscf

Filterable PM Emission Rate (PMR), lb/hr

$$PMR = \frac{C_s \times Q_s \times 60}{7.0E + 03}$$

where,

C_s 0.0047 = filterable PM concentration, grain/dscf
 Q_s 8,268 = average stack gas flow at standard conditions, dscfm
 PMR 0.33 = lb/hr

Condensable PM Concentration (C_{CPM}), grain/dscf

$$C_{CPM} = \frac{M_{CPM} \times 0.0154}{Vmstd}$$

where,

M_{CPM} 9.9 = condensable PM mass, mg
 $Vmstd$ 50.443 = standard meter volume, dscf
 C_{CPM} 0.0030 = grain/dscf

Condensable PM Emission Rate (ER_{CPM}), lb/hr

$$ER_{CPM} = \frac{C_{CPM} \times Q_s \times 60}{7.0E + 03}$$

where,

C_{CPM} 0.0030 = condensable PM concentration, grain/dscf
 Q_s 8,268 = average stack gas flow at standard conditions, dscfm
 ER_{CPM} 0.21 = lb/hr

Total PM Concentration (C_{TPM}), grain/dscf

$$C_{TPM} = C_s + C_{CPM}$$

where,

C_s 0.0047 = filterable PM concentration, grain/dscf
 C_{CPM} 0.0030 = condensable PM concentration, grain/dscf
 C_{TPM} 0.0077 = grain/dscf

Location: Caterpillar, Inc - Virginia Beach, VA
Source: 3516HD Generator (LC 100)
Project No.: 2019-0420
Run No.: 1
Parameter: PM/CPM

Total PM Emission Rate (ER_{TPM}), lb/hr

$$ER_{TPM} = PMR + ER_{CPM}$$

where,

PMR 0.33 = filterable PM emission rate, lb/hr
 ER_{CPM} 0.21 = condensable PM emission rate, lb/hr
 ER_{TPM} 0.54 = lb/hr

Location: Caterpillar, Inc - Virginia Beach, VA
 Source: 3516HD Generator (L100)
 Project No.: 2019-0420
 Run No.: 1
 Parameter: Arsenic, Cadmium, Nickel

Arsenic Concentration (C_{As}), ug/dscm

$$C_{As} = \frac{M_{As} \times 35.313}{Vmstd}$$

where,

M_{As} 0.80 = arsenic mass, ug
 $Vmstd$ 43.341 = standard meter volume, dscf
 C_{As} 0.65 = ug/dscm

Arsenic Emission Rate (ER_{As}), lb/hr

$$ER_{As} = \frac{M_{As} \times Qs \times 60}{Vmstd \times 4.54E + 08}$$

where,

M_{As} 0.80 = arsenic mass, ug
 Qs 8,368 = average stack gas flow at standard conditions, dscfm
 $Vmstd$ 43.341 = standard meter volume, dscf
 ER_{As} 2.0E-05 = lb/hr

Cadmium Concentration (C_{Cd}), ug/dscm

$$C_{Cd} = \frac{M_{Cd} \times 35.313}{Vmstd}$$

where,

M_{Cd} 0.44 = cadmium mass, ug
 $Vmstd$ 43.341 = standard meter volume, dscf
 C_{Cd} 0.36 = ug/dscm

Cadmium Emission Rate (ER_{Cd}), lb/hr

$$ER_{Cd} = \frac{M_{Cd} \times Qs \times 60}{Vmstd \times 4.54E + 08}$$

where,

M_{Cd} 0.44 = cadmium mass, ug
 Qs 8,368 = average stack gas flow at standard conditions, dscfm
 $Vmstd$ 43.341 = standard meter volume, dscf
 ER_{Cd} 1.1E-05 = lb/hr

Nickel Concentration (C_{Ni}), ug/dscm

$$C_{Ni} = \frac{M_{Ni} \times 35.313}{Vmstd}$$

where,

M_{Ni} 6.9 = nickel mass, ug
 $Vmstd$ 43.341 = standard meter volume, dscf
 C_{Ni} 5.6 = ug/dscm

Location: Caterpillar, Inc - Virginia Beach, VA
 Source: 3516HD Generator (L100)
 Project No.: 2019-0420
 Run No.: 1
 Parameter: Arsenic, Cadmium, Nickel

Nickel Emission Rate (ER_{Ni}), lb/hr

$$ER_{Ni} = \frac{M_{Ni} \times Q_s \times 60}{Vmstd \times 4.54E + 08}$$

where,

M_{Ni} 6.9 = nickel mass, ug
 Q_s 8,368 = average stack gas flow at standard conditions, dscfm
 $Vmstd$ 43.341 = standard meter volume, dscf
 ER_{Ni} 1.8E-04 = lb/hr

Location: Caterpillar, Inc - Virginia Beach, VA
 Source: 3516HD Generator (LC 100)
 Project No.: 2019-0420
 Run No.: 1
 Parameter: Hexavalent Chromium

Hexavalent Chromium Concentration (C_{Cr+6}), ug/dscm

$$C_{Cr+6} = \frac{M_{Cr+6} \times 35.313}{Vmstd}$$

where,

M_{Cr+6} 4.1 = hexavalent chromium mass, ug
 $Vmstd$ 41.755 = standard meter volume, dscf
 C_{Cr+6} 3.5 = ug/dscm

Hexavalent Chromium Emission Rate (ER_{Cr+6}), lb/hr

$$ER_{Cr+6} = \frac{M_{Cr+6} \times Q_s \times 60}{Vmstd \times 4.54E + 08}$$

where,

M_{Cr+6} 4.1 = hexavalent chromium mass, ug
 Q_s 8,334 = average stack gas flow at standard conditions, dscfm
 $Vmstd$ 41.755 = standard meter volume, dscf
 ER_{Cr+6} 1.1E-04 = lb/hr

Location Caterpillar, Inc - Virginia Beach, VA
Source 3516HD Generator (LC 100)
Project No. 2019-0420
Run No. 1
Parameter(s) Formaldehyde/ VOCs

Formaldehyde Concentration, ppmvd

$$C_{t1} = \frac{M_{t1} \times 24.04}{MW \times Vmstd \times 28.32}$$

M(CH₂O) $\frac{53}{30.0}$ = Formaldehyde Mass, ug
MW $\frac{30.0}{30.0}$ = molecular weight, g/g mol
Vmstd $\frac{1.563}{1.563}$ = standard meter volume, dscf
C(CH₂O) $\frac{0.96}{0.96}$ = ppmvd

Formaldehyde Emission Rate, lb/hr

$$ER_{t1} = \frac{M_{t1} \times Q_s \times 60}{Vmstd \times 4.54E + 08}$$

where,

M(CH₂O) $\frac{53}{8,268}$ = Formaldehyde Mass, ug
Q_s $\frac{8,268}{8,268}$ = average stack gas flow at standard conditions, dscfm
Vmstd $\frac{1.563}{1.563}$ = standard meter volume, dscf
ER(CH₂O) $\frac{0.04}{0.04}$ = lb/hr

1,3 Butadiene Concentration, ppmvd

$$C_{t2} = \frac{M_{t2} \times 24.04}{MW \times Vmstd \times 28.32}$$

where,

M(C₄H₆) $\frac{0.10}{54.1}$ = 1,3 Butadiene Mass, ug
MW $\frac{54.1}{54.1}$ = molecular weight, g/g mol
Vmstd $\frac{1.563}{1.563}$ = standard meter volume, dscf
C(C₄H₆) $\frac{0.10}{0.10}$ = ppmvd

1,3 Butadiene Emission Rate, lb/hr

$$EF_{t2} = \frac{M_{t2} \times Q_s \times 60}{Vmstd \times 4.54E + 08}$$

where,

M(C₄H₆) $\frac{0.10}{8,268}$ = 1,3 Butadiene Mass, ug
Q_s $\frac{8,268}{8,268}$ = average stack gas flow at standard conditions, dscfm
Vmstd $\frac{1.563}{1.563}$ = standard meter volume, dscf
ER(C₄H₆) $\frac{0.0070}{0.0070}$ = lb/hr

Acetaldehyde Concentration, ppmvd

$$C_{t3} = \frac{M_{t3} \times 24.04}{MW \times Vmstd \times 28.32}$$

where,

M(C₂H₄O) $\frac{63.96}{20.0}$ = Acetaldehyde Mass, ug
MW $\frac{20.0}{20.0}$ = molecular weight, g/g mol
Vmstd $\frac{1.563}{1.563}$ = standard meter volume, dscf
C(C₂H₄O) $\frac{0.79}{0.79}$ = ppmvd

Location Caterpillar, Inc - Virginia Beach, VA
Source 3516HD Generator (LC 100)
Project No. 2019-0420
Run No. 1
Parameter(s) Formaldehyde/ VOCs

Acetaldehyde Emission Rate, lb/hr

$$ER_{t3} = \frac{M_{t3} \times Qs \times 60}{Vmstd \times 4.54E + 08}$$

where,

$M(C_2H_4O) \frac{63.96}{8,268} =$ Acetaldehyde Mass, ug
 $Qs \frac{8,268}{1.563} =$ average stack gas flow at standard conditions, dscfm
 $Vmstd \frac{1.563}{0.10} =$ standard meter volume, dscf
 $ER(C_2H_4O) \frac{0.10}{0.10} =$ lb/hr

Benzene Concentration($C_{C_4H_6}$), ppmvd

$$C_{C_4H_6} = \frac{M_{C_4H_6} \times 24.04}{MW \times Vmstd \times 28.32}$$

where,

$M_{C_4H_6} \frac{71.75}{38.0} =$ fluorine mass, ug
 $MW \frac{38.0}{1.563} =$ molecular weight, g/g mol
 $Vmstd \frac{1.563}{0.50} =$ standard meter volume, dscf
 $C_{C_4H_6} \frac{0.50}{0.50} =$ ppmvd

Benzene Emission Rate ($E_{C_4H_6}$), lb/hr

$$ER_{C_4H_6} = \frac{M_{C_4H_6} \times Qs \times 60}{Vmstd \times 4.54E + 08}$$

where,

$M_{C_4H_6} \frac{71.75}{8,268} =$ fluorine mass, ug
 $Qs \frac{8,268}{1.563} =$ average stack gas flow at standard conditions, dscfm
 $Vmstd \frac{1.563}{0.060} =$ standard meter volume, dscf
 $EC_4H_6 \frac{0.060}{0.060} =$ lb/hr

Ethylbenzene Concentration ($C_{C_8H_{10}}$), ppmvd

$$C_{C_8H_{10}} = \frac{M_{C_8H_{10}} \times 24.04}{MW \times Vmstd \times 28.32}$$

where,

$M_{HBr} \frac{70.93}{80.91} =$ hydrogen bromide mass, ug
 $MW \frac{80.91}{1.563} =$ molecular weight, g/g mol
 $Vmstd \frac{1.563}{0.36} =$ standard meter volume, dscf
 $C_{HBr} \frac{0.36}{0.36} =$ ppmvd

Ethylbenzene Emission Rate ($ER_{C_8H_{10}}$), lb/hr

$$ER_{C_8H_{10}} = \frac{M_{C_8H_{10}} \times Qs \times 60}{24.04 \times 4.54E + 08}$$

where,

$M_{HBr} \frac{70.93}{8,268} =$ hydrogen bromide mass, ug
 $Qs \frac{8,268}{1.563} =$ average stack gas flow at standard conditions, dscfm
 $Vmstd \frac{1.563}{0.063} =$ standard meter volume, dscf
 $ER_{HBr} \frac{0.063}{0.063} =$ lb/hr

Location Caterpillar, Inc - Virginia Beach, VA
 Source 3516HD Generator (LC 100)
 Project No. 2019-0420
 Run No. 1
 Parameter(s) Formaldehyde/ VOCs

Hexane Concentration (C_{C6H14}), ppmvd

$$C_{C6H14} = \frac{M_{C6H14} \times 24.04}{MW \times Vmstd \times 28.32}$$

where,

M_{Br2} 52.89 = bromine mass, ug
 MW 159.8 = molecular weight, g/g mol
 $Vmstd$ 1.563 = standard meter volume, dscf
 C_{Br2p} 0.33 = ppmvd

Hexane Emission Rate (ER_{C6H14}), lb/hr

$$ER_{C6H14} = \frac{M_{C6H14} \times Qs \times 60}{24.04 \times 4.54E + 08}$$

where,

M_{Br2} 52.89 = bromine mass, ug
 Qs 8,268 = average stack gas flow at standard conditions, dscfm
 $Vmstd$ 1.563 = standard meter volume, dscf
 ER_{Br2} 0.048 = lb/hr

Location: Caterpillar, Inc - Virginia Beach, VA
 Source: 3516HD Generator (LC 100)
 Project No.: 2019-0420
 Run No.: 1
 Parameter: Polycyclic Aromatic Hydrocarbons, Naphthalene

Naphthalene Concentration ($C_{C_{10}H_8}$), ug/dscm

$$C_{C_{10}H_8} = \frac{M_{C_{10}H_8}}{Vmstd} \times 35.3147$$

where,

$$\begin{aligned} M_{C_{10}H_8} & \frac{73.0}{73.972} = \text{naphthalene mass, ug} \\ Vmstd & \frac{73.972}{73.972} = \text{standard meter volume, dscf} \\ C_{C_{10}H_8} & \frac{34.9}{73.972} = \text{ug/dscm} \end{aligned}$$

Naphthalene Emission Rate ($ER_{C_{10}H_8}$), lb/hr

$$ER_{C_{10}H_8} = \frac{M_{C_{10}H_8} \times Q_s \times 60}{Vmstd \times 4.54E + 08}$$

where,

$$\begin{aligned} M_{C_{10}H_8} & \frac{73.0}{8,258} = \text{naphthalene mass, ug} \\ Q_s & \frac{8,258}{8,258} = \text{average stack gas flow at standard conditions, dscfm} \\ Vmstd & \frac{73.972}{73.972} = \text{standard meter volume, dscf} \\ ER_{C_{10}H_8} & \frac{1.1E-03}{73.972} = \text{lb/hr} \end{aligned}$$

Naphthalene Emission Rate ($ER_{C_{10}H_8}$), kg/hr

$$ER_{C_{10}H_8} = \frac{M_{C_{10}H_8} \times Q_s \times 60}{Vmstd \times 1.0E + 09}$$

where,

$$\begin{aligned} M_{C_{10}H_8} & \frac{73.0}{8,258} = \text{naphthalene mass, ug} \\ Q_s & \frac{8,258}{8,258} = \text{average stack gas flow at standard conditions, dscfm} \\ Vmstd & \frac{73.972}{73.972} = \text{standard meter volume, dscf} \\ ER_{C_{10}H_8} & \frac{4.9E-04}{73.972} = \text{kg/hr} \end{aligned}$$

Appendix B

Load Condition: 10%

Location Caterpillar, Inc - Virginia Beach, VA
 Source 3516HD Generator (LC 10)
 Project No. 2019-0420
 Parameter PM/CPM

Run Number		Run 1	Run 2	Run 3	Average
Date		3/8/19	3/8/19	3/8/19	--
Start Time		9:40	11:15	13:04	--
Stop Time		10:40	12:15	14:04	--
Run Time, min	(θ)	60.0	60.0	60.0	60.0
INPUT DATA					
Barometric Pressure, in. Hg	(Pb)	30.37	30.37	30.37	30.37
Meter Correction Factor	(Y)	0.989	0.989	0.989	0.989
Orifice Calibration Value	($\Delta H @$)	1.746	1.746	1.746	1.746
Meter Volume, ft ³	(Vm)	41.845	42.385	42.530	42.253
Meter Temperature, °F	(Tm)	73.9	72.2	69.5	71.9
Meter Temperature, °R	(Tm)	533.9	532.2	529.5	531.9
Meter Orifice Pressure, in. WC	(ΔH)	1.542	1.558	1.608	1.569
Volume H ₂ O Collected, mL	(Vlc)	41.8	35.1	34.4	37.1
Nozzle Diameter, in	(Dn)	0.309	0.309	0.309	0.309
Area of Nozzle, ft ²	(An)	0.0005	0.0005	0.0005	0.0005
Filterable PM Mass, mg	(Mn)	35.8	35.4	39.3	36.8
Condensable PM Mass, mg	(M _{CPM})	26.0	31.8	40.8	32.9
ISOKINETIC DATA					
Standard Meter Volume, ft ³	(Vmstd)	41.697	42.375	42.739	42.270
Standard Water Volume, ft ³	(Vwstd)	1.968	1.653	1.620	1.747
Moisture Fraction Measured	(BWSmsd)	0.045	0.038	0.037	0.040
Moisture Fraction @ Saturation	(BWSsat)	31.963	31.617	30.667	31.416
Moisture Fraction	(BWS)	0.045	0.038	0.037	0.040
Meter Pressure, in Hg	(Pm)	30.48	30.48	30.49	30.49
Volume at Nozzle, ft ³	(Vn)	75.867	76.402	76.707	76.325
Isokinetic Sampling Rate, (%)	(I)	98.0	98.3	96.7	97.7
DGM Calibration Check Value, (+/- 5%)	(Y _{qa})	-1.3	-0.3	-1.4	-1.0
EMISSION CALCULATIONS					
Filterable PM Concentration, grain/dscf	(C _s)	0.013	0.013	0.014	0.013
Filterable PM Emission Rate, lb/hr	(PMR)	0.34	0.33	0.38	0.35
Condensable PM Concentration, grain/dscf	(C _{CPM})	0.0096	0.012	0.015	0.012
Condensable PM Emission Rate, lb/hr	(ER _{CPM})	0.25	0.30	0.39	0.31
Total PM Concentration, grain/dscf	(C _{TPM})	0.023	0.024	0.029	0.025
Total PM Emission Rate, lb/hr	(ER _{TPM})	0.58	0.63	0.76	0.66

Location Caterpillar, Inc - Virginia Beach, VA
Source 3516HD Generator (LC 10)
Project No. 2019-0420
Parameter PM/CPM

Run Number		Run 1	Run 2	Run 3	Average
Date		3/8/19	3/8/19	3/8/19	--
Start Time		9:40	11:15	13:04	--
Stop Time		10:40	12:15	14:04	--
Run Time, min		60.0	60.0	60.0	60.0
VELOCITY HEAD, in. WC					
Point 1		0.24	0.24	0.26	0.25
Point 2		0.29	0.29	0.34	0.31
Point 3		0.28	0.33	0.35	0.32
Point 4		0.34	0.34	0.31	0.33
Point 5		0.33	0.31	0.37	0.34
Point 6		0.30	0.36	0.35	0.34
Point 7		0.30	0.24	0.29	0.28
Point 8		0.31	0.35	0.33	0.33
Point 9		0.32	0.36	0.33	0.34
Point 10		0.36	0.34	0.36	0.35
Point 11		0.35	0.34	0.32	0.34
Point 12		0.31	0.28	0.33	0.31
CALCULATED DATA					
Square Root of ΔP , (in. WC) ^{1/2}	(ΔP)	0.557	0.560	0.572	0.563
Pitot Tube Coefficient	(Cp)	0.840	0.840	0.840	0.840
Barometric Pressure, in. Hg	(Pb)	30.37	30.37	30.37	30.37
Static Pressure, in. WC	(Pg)	-0.15	-0.15	-0.15	-0.15
Stack Pressure, in. Hg	(Ps)	30.36	30.36	30.36	30.36
Stack Cross-sectional Area, ft ²	(As)	2.18	2.18	2.18	2.18
Temperature, °F	(Ts)	470.8	469.7	466.4	469.0
Temperature, °R	(Ts)	930.8	929.7	926.4	929.0
Moisture Fraction Measured	(BWSmsd)	0.045	0.038	0.037	0.040
Moisture Fraction @ Saturation	(BWSsat)	31.963	31.617	30.667	31.416
Moisture Fraction	(BWS)	0.045	0.038	0.037	0.040
O ₂ Concentration, %	(O ₂)	15.8	15.8	15.8	15.8
CO ₂ Concentration, %	(CO ₂)	3.8	3.7	3.8	3.7
Molecular Weight, lb/lb-mole (dry)	(Md)	29.23	29.23	29.23	29.23
Molecular Weight, lb/lb-mole (wet)	(Ms)	28.72	28.80	28.82	28.78
Velocity, ft/sec	(Vs)	41.3	41.5	42.3	41.7
VOLUMETRIC FLOW RATE					
At Stack Conditions, acfm	(Qa)	5,407	5,427	5,537	5,457
At Standard Conditions, dscfm	(Qs)	2,972	3,010	3,085	3,022

Location Caterpillar, Inc - Virginia Beach, VA

Source 3516HD Generator (LC 10)

Project No. 2019-0420

Parameter PM/CPM

Analysis Volumetric

Run 1						
	Date: 3/8/19					
Impinger No.	1	2	3	4	5*	Total
Contents	Empty	Empty	H2O	Empty	Silica	--
Initial Volume, mL	0.0	0.0	100.0	0.0	233.2	333.2
Final Volume, mL	25.0	0.0	106.0	0.0	244.0	375.0
Gain	25.0	0.0	6.0	0.0	10.8	41.8
Run 2						
	Date: 3/8/19					
Impinger No.	1	2	3	4	5*	Total
Contents	Empty	Empty	H2O	Empty	Silica	--
Initial Volume, mL	0.0	0.0	100.0	0.0	240.1	340.1
Final Volume, mL	6.0	5.0	106.0	4.0	254.2	375.2
Gain	6.0	5.0	6.0	4.0	14.1	35.1
Run 3						
	Date: 3/8/19					
Impinger No.	1	2	3	4	5*	Total
Contents	Empty	Empty	H2O	Empty	Silica	--
Initial Volume, mL	0.0	0.0	100.0	0.0	227.3	327.3
Final Volume, mL	11.0	2.0	108.0	2.0	238.7	361.7
Gain	11.0	2.0	8.0	2.0	11.4	34.4



Isokinetic Field Data

Location: <u>Caterpillar, Inc - Virginia Beach, VA</u>			Start Time: <u>9:40</u>			Source: <u>3516HD Generator (LC 10)</u>		
Date: <u>3/8/19</u>		Run 1	VALID	End Time: <u>10:40</u>		Project No.: <u>2019-0420</u>		Parameter: <u>PM/CPM</u>

STACK DATA (EST)		EQUIPMENT		STACK DATA (EST)		FILTER NO.		STACK DATA (FINAL)		MOIST. DATA			
Moisture:	6.0 % est.	Meter Box ID:	2026	Est. Tm:	70 °F	11054		Pb:	30.37 in. Hg	Vlc (ml)			
Barometric:	30.37 in. Hg	Y:	0.989	Est. Ts:	470 °F			Pg:	-0.15 in. WC	41.8			
Static Press:	-0.15 in. WC	AH @ (in.WC):	1.746	Est. AP:	0.31 in. WC			O ₂ :	15.8 %	K-FACTOR			
Stack Press:	30.36 in. Hg	Probe ID:	PR-402-0	Est. Dn:	0.309 in.			CO ₂ :	3.8 %	4.880			
CO ₂ :	5.0 %	Liner Material:	glass	Target Rate:	0.69 scfm					Check Pt.	Initial	Final	Corr.
O ₂ :	14.0 %	Pitot ID:	P-403-2	u		Pre	Mid 1	Mid 2	Post	Mid 1 (cf)	--		
N ₂ /CO:	81.0 %	Pitot Cp/Type:	0.840 S-type	Leak Rate (cfm):		0.000	--	--	0.000	Mid 2 (cf)	--		
Md:	29.36 lb/lb-mole	Nozzle ID:	SS-603	Vacuum (in Hg):		10	--	--	10	Mid 3 (cf)	--		
Ms:	28.68 lb/lb-mole	Nozzle Dn (in.):	0.309	Pitot Tube:		Pass	--	--	Pass	Mid-Point Leak Check Vol (cf):	--		

Sample Pt.	Sample Time (minutes)		Dry Gas Meter Reading (ft ³)	Pitot Tube ΔP (in WC)	Gas Temperatures (°F)		Orifice Press. ΔH (in. WC)		Pump Vac (in. Hg)	Gas Temperatures (°F)				% ISO	Vs (fps)
					DGM Average	Stack	ΔH			Probe	Filter	Imp Exit	Aux		
	Amb.	Amb.			Ideal	Actual	Amb.	Amb.		Amb.	Amb.				
	70	72					71	70		69	69				
A-1	0.00	5.00	270.580	0.24	71	72	1.17	1.20	3	260	260	49	66	97.8	36.42
2	5.00	10.00	273.580	0.29	72	72	1.42	1.40	3	260	262	44	68	100.7	40.01
3	10.00	15.00	276.980	0.28	73	73	1.37	1.40	3	258	261	43	69	96.6	39.34
4	15.00	20.00	280.190	0.34	73	73	1.67	1.70	4	259	260	45	70	99.7	43.32
5	20.00	25.00	283.840	0.33	74	74	1.62	1.60	5	259	260	46	73	100.9	42.64
6	25.00	30.00	287.490	0.30	74	74	1.57	1.60	6	262	261	48	75	100.3	40.67
B-1	30.00	35.00	290.950	0.30	74	74	1.48	1.50	6	260	260	47	75	101.1	40.65
2	35.00	40.00	294.440	0.31	74	74	1.53	1.50	6	261	260	47	75	97.4	41.30
3	40.00	45.00	297.860	0.32	75	75	1.58	1.60	7	261	260	48	69	99.4	41.96
4	45.00	50.00	301.410	0.36	75	75	1.77	1.80	7	262	260	48	70	97.2	44.53
5	50.00	55.00	305.090	0.35	76	76	1.73	1.70	9	261	260	48	71	99.5	43.91
6	55.00	60.00	308.810	0.31	76	76	1.53	1.50	9	261	260	47	69	102.7	41.35
	60.00	--	312.425												--
Final DGM:			312.425												

RESULTS	Run Time		Vm	ΔP	Tm	Ts	Max Vac	ΔH	%ISO	BWS	Y _{qa}
	min	sec	ft ³	in. WC	°F	°F		in. WC			
	60.0		41.845	0.31	73.9	470.8	9	1.542	98.0	0.045	-1.3



Isokinetic Field Data

Location: Caterpillar, Inc - Virginia Beach, VA				Start Time: 11:15		Source: 3516HD Generator (LC 10)					
Date: 3/8/19		Run 2		VALID		End Time: 12:15		Project No.: 2019-0420		Parameter: PM/CPM	

STACK DATA (EST)		EQUIPMENT		STACK DATA (EST)		FILTER NO.		STACK DATA (FINAL)		MOIST. DATA			
Moisture:	6.0 % est.	Meter Box ID:	2026	Est. Tm:	74 °F	11087		Pb:	30.37 in. Hg	Vlc (ml)			
Barometric:	30.37 in. Hg	Y:	0.989	Est. Ts:	471 °F			Pg:	-0.15 in. WC	35.1			
Static Press:	-0.15 in. WC	ΔH @ (in.WC):	1.746	Est. ΔP:	0.31 in. WC			O ₂ :	15.8 %	K-FACTOR			
Stack Press:	30.36 in. Hg	Probe ID:	PR-402-0	Est. Dn:	0.306 in.			CO ₂ :	3.7 %	4.91			
CO ₂ :	5.0 %	Liner Material:	glass	Target Rate:	0.68 scfm					Check Pt.	Initial	Final	Corr.
O ₂ :	14.0 %	Pitot ID:	P-403-2	LEAK CHECKS		Pre	Mid 1	Mid 2	Post	Mid 1 (cf)	--		
N ₂ /CO:	81.0 %	Pitot Cp/Type:	0.840 S-type	Leak Rate (cfm):		0.000	--	--	0.000	Mid 2 (cf)	--		
Md:	29.36 lb/lb-mole	Nozzle ID:	SS-603	Vacuum (in Hg):		10	--	--	13	Mid 3 (cf)	--		
Ms:	28.68 lb/lb-mole	Nozzle Dn (in.):	0.309	Pitot Tube:		Pass	--	--	Pass	Mid-Point Leak Check Vol (cf):	--		

Sample Pt.	Sample Time (minutes)		Dry Gas Meter Reading (ft ³)	Pitot Tube ΔP (in WC)	Gas Temperatures (°F)		Orifice Press. ΔH (in. WC)		Pump Vac (in. Hg)	Gas Temperatures (°F)				% ISO	Vs (fps)
	Begin	End			DGM Average	Stack	Ideal	Actual		Probe	Filter	Imp Exit	Aux		
A-1	0.00	5.00	312.725	0.24	73	470	1.18	1.20	3	266	263	49	66	104.9	36.36
2	5.00	10.00	315.960	0.29	72	470	1.42	1.40	3	260	263	45	68	96.7	39.97
3	10.00	15.00	319.230	0.33	72	470	1.62	1.60	5	261	251	45	71	98.7	42.64
4	15.00	20.00	322.790	0.34	72	470	1.67	1.70	5	259	260	46	72	99.8	43.28
5	20.00	25.00	326.440	0.31	72	470	1.52	1.50	6	262	251	47	69	100.7	41.32
6	25.00	30.00	329.960	0.36	73	470	1.77	1.80	7	263	258	47	70	95.7	44.53
B-1	30.00	35.00	333.570	0.24	72	470	1.18	1.20	8	260	259	48	69	101.4	36.36
2	35.00	40.00	336.690	0.35	72	469	1.72	1.70	9	261	260	50	69	99.6	43.88
3	40.00	45.00	340.390	0.36	72	469	1.77	1.80	11	261	260	49	70	99.0	44.51
4	45.00	50.00	344.120	0.34	72	469	1.67	1.70	13	260	260	48	70	100.2	43.25
5	50.00	55.00	347.790	0.34	72	469	1.67	1.70	13	261	261	48	70	104.9	43.25
6	55.00	60.00	351.630	0.28	72	470	1.37	1.40	13	260	259	47	69	104.7	39.27
--	60.00	--	355.110												--
Final DGM:			355.110												

RESULTS	Run Time		Vm		ΔP		Tm		Ts		Max Vac	ΔH		%ISO	BWS	Y _{qa}
		60.0	min	42.385	ft ³	0.32	in. WC	72.2	°F	469.7	°F	13	1.558	in. WC	98.3	0.038



Isokinetic Field Data

Location: Caterpillar, Inc - Virginia Beach, VA				Start Time: 13:04		Source: 3516HD Generator (LC 10)									
Date: 3/8/19		Run 3		End Time: 14:04		Project No.: 2019-0420		Parameter: PM/CPM							
STACK DATA (EST)			EQUIPMENT			STACK DATA (EST)			FILTER NO.		STACK DATA (FINAL)			MOIST. DATA	
Moisture: 6.0 % est.			Meter Box ID: 2026			Est. Tm: 72 °F			11226		Pb: 30.37 in. Hg			Vlc (ml)	
Barometric: 30.37 in. Hg			Y: 0.989			Est. Ts: 470 °F					Pg: -0.15 in. WC			34.4	
Static Press: -0.15 in. WC			ΔH @ (in.WC): 1.746			Est. ΔP: 0.32 in. WC					O ₂ : 15.8 %			K-FACTOR	
Stack Press: 30.36 in. Hg			Probe ID: PR-402-0			Est. Dn: 0.308 in.					CO ₂ : 3.8 %			4.902	
CO ₂ : 5.0 %			Liner Material: glass			Target Rate: 0.69 scfm								Check Pt. Initial Final Corr.	
O ₂ : 14.0 %			Pitot ID: P-403-2			LEAK CHECKS Pre Mid 1 Mid 2 Post					Mid 1 (cf)			--	
N ₂ /CO: 81.0 %			Pitot Cp/Type: 0.840 S-type			Leak Rate (cfm): 0.000 -- -- 0.000					Mid 2 (cf)			--	
Md: 29.36 lb/lb-mole			Nozzle ID: SS-603			Vacuum (in Hg): 10 -- -- 10					Mid 3 (cf)			--	
Ms: 28.68 lb/lb-mole			Nozzle Dn (in.): 0.309			Pitot Tube: Pass -- -- Pass					Mid-Point Leak Check Vol (cf):			--	

Sample Pt.	Sample Time (minutes)		Dry Gas Meter Reading (ft ³)	Pitot Tube ΔP (in WC)	Gas Temperatures (°F)		Orifice Press. ΔH (in. WC)		Pump Vac (in. Hg)	Gas Temperatures (°F)				% ISO	Vs (fps)
					DGM Average	Stack	Ideal Actual			Probe	Filter	Imp Exit	Aux		
	Amb.	Amb.					Amb.	Amb.		Amb.	Amb.				
	Begin	End			--	--	--	--		--	--				
A-1	0.00	5.00	356.935	0.26	67	468	1.27	1.30	3	259	260	45	69	98.7	37.80
2	5.00	10.00	360.070	0.34	67	467	1.66	1.70	4	261	262	41	69	100.5	43.21
3	10.00	15.00	363.720	0.35	67	466	1.71	1.70	5	260	260	52	69	95.8	43.81
4	15.00	20.00	367.250	0.31	68	468	1.51	1.50	7	260	260	54	69	93.3	41.28
5	20.00	25.00	370.490	0.37	69	468	1.81	1.80	8	260	260	53	71	99.0	45.10
6	25.00	30.00	374.250	0.35	70	468	1.71	1.70	7	260	261	52	70	98.3	43.86
B-1	30.00	35.00	377.890	0.29	70	467	1.42	1.40	7	261	262	50	69	103.4	39.90
2	35.00	40.00	381.380	0.33	71	465	1.62	1.60	7	261	262	48	68	106.7	42.52
3	40.00	45.00	385.230	0.33	71	466	1.62	1.60	7	262	263	47	69	93.4	42.54
4	45.00	50.00	388.600	0.36	71	465	1.77	1.80	8	259	261	46	70	103.0	44.41
5	50.00	55.00	392.480	0.32	71	464	1.58	1.60	8	260	260	44	72	97.3	41.85
6	55.00	60.00	395.940	0.33	72	465	1.63	1.60	9	260	261	45	73	97.5	42.52
--	60.00	--	399.465												--
Final DGM:			399.465												

RESULTS	Run Time		Vm		ΔP		Tm		Ts		Max Vac	ΔH		%ISO	BWS	Y _{qa}
	min		ft ³		in. WC		°F		°F		in. WC					
	60.0		42.530		0.33		69.5		466.4		9	1.608		96.7	0.037	-1.4

Location Caterpillar, Inc - Virginia Beach, VA
 Source 3516HD Generator (L10)
 Project No. 2019-0420
 Parameter Arsenic, Cadmium, Nickel

Run Number		Run 1	Run 2	Run 3	Average
Date		3/8/19	3/8/19	3/8/19	--
Start Time		9:40	11:15	13:04	--
Stop Time		10:40	12:15	14:04	--
Run Time, min	(θ)	60.0	60.0	60.0	60.0
INPUT DATA					
Barometric Pressure, in. Hg	(Pb)	30.37	30.37	30.37	30.37
Meter Correction Factor	(Y)	0.994	0.994	0.994	0.994
Orifice Calibration Value	($\Delta H @$)	1.816	1.816	1.816	1.816
Meter Volume, ft ³	(Vm)	40.595	40.521	41.125	40.747
Meter Temperature, °F	(Tm)	71.8	66.8	62.7	67.1
Meter Temperature, °R	(Tm)	531.8	526.8	522.7	527.1
Meter Orifice Pressure, in. WC	(ΔH)	1.618	1.642	1.642	1.634
Volume H ₂ O Collected, mL	(Vlc)	35.8	33.3	33.3	34.1
Nozzle Diameter, in	(Dn)	0.310	0.310	0.310	0.310
Area of Nozzle, ft ²	(An)	0.0005	0.0005	0.0005	0.0005
Arsenic Mass, ug	(M _{As})	<u>0.80</u>	<u>0.80</u>	5.88	2.49
Cadmium Mass, ug	(M _{Cd})	<u>0.18</u>	<u>0.18</u>	<u>0.18</u>	0.18
Nickel Mass, ug	(M _{Ni})	2.3	2.3	11.3	5.3
ISOKINETIC DATA					
Standard Meter Volume, ft ³	(Vmstd)	40.823	41.143	42.083	41.350
Standard Water Volume, ft ³	(Vwstd)	1.685	1.568	1.568	1.607
Moisture Fraction Measured	(BWSmsd)	0.040	0.037	0.036	0.037
Moisture Fraction @ Saturation	(BWSsat)	32.040	31.054	31.079	31.391
Moisture Fraction	(BWS)	0.040	0.037	0.036	0.037
Meter Pressure, in Hg	(Pm)	30.49	30.49	30.49	30.49
Volume at Nozzle, ft ³	(Vn)	73.879	73.964	75.598	74.480
Isokinetic Sampling Rate, (%)	(I)	94.9	94.7	94.7	94.7
DGM Calibration Check Value, (+/- 5%)	(Y _{qa})	-4.1	-4.5	-2.6	-3.7
EMISSION CALCULATIONS					
Arsenic Concentration, ug/dscm	(C _{As})	0.7	0.7	4.9	2.1
Arsenic Emission Rate, lb/hr	(ER _{As})	7.7E-06	7.8E-06	5.7E-05	2.4E-05
Cadmium Concentration, ug/dscm	(C _{Cd})	0.16	0.15	0.15	0.15
Cadmium Emission Rate, lb/hr	(ER _{Cd})	1.7E-06	1.7E-06	1.7E-06	1.7E-06
Nickel Concentration, ug/dscm	(C _{Ni})	2.0	2.0	9.5	4.5
Nickel Emission Rate, lb/hr	(ER _{Ni})	2.2E-05	2.2E-05	1.1E-04	5.1E-05

Runs 1 & 2 for Arsenic and runs 1, 2, & 3 for Cadmium were below the detection limit. The detection limit was used for emissions purposes.

Location Caterpillar, Inc - Virginia Beach, VA
Source 3516HD Generator (L10)
Project No. 2019-0420
Parameter Arsenic, Cadmium, Nickel

Run Number		Run 1	Run 2	Run 3	Average
Date		3/8/19	3/8/19	3/8/19	--
Start Time		9:40	11:15	13:04	--
Stop Time		10:40	12:15	14:04	--
Run Time, min		60.0	60.0	60.0	60.0
VELOCITY HEAD, in. WC					
Point 1		0.24	0.24	0.26	0.25
Point 2		0.29	0.29	0.34	0.31
Point 3		0.28	0.33	0.35	0.32
Point 4		0.34	0.34	0.31	0.33
Point 5		0.33	0.31	0.37	0.34
Point 6		0.30	0.36	0.35	0.34
Point 7		0.30	0.24	0.29	0.28
Point 8		0.31	0.35	0.33	0.33
Point 9		0.32	0.36	0.33	0.34
Point 10		0.36	0.34	0.36	0.35
Point 11		0.35	0.34	0.32	0.34
Point 12		0.31	0.28	0.33	0.31
CALCULATED DATA					
Square Root of ΔP , (in. WC) ^{1/2}	(ΔP)	0.557	0.560	0.572	0.563
Pitot Tube Coefficient	(Cp)	0.840	0.840	0.840	0.840
Barometric Pressure, in. Hg	(Pb)	30.37	30.37	30.37	30.37
Static Pressure, in. WC	(Pg)	-0.15	-0.15	-0.15	-0.15
Stack Pressure, in. Hg	(Ps)	30.36	30.36	30.36	30.36
Stack Cross-sectional Area, ft ²	(As)	2.18	2.18	2.18	2.18
Temperature, °F	(Ts)	471.1	467.8	467.8	468.9
Temperature, °R	(Ts)	931.1	927.8	927.8	928.9
Moisture Fraction Measured	(BWSmsd)	0.040	0.037	0.036	0.037
Moisture Fraction @ Saturation	(BWSsat)	32.040	31.054	31.079	31.391
Moisture Fraction	(BWS)	0.040	0.037	0.036	0.037
O ₂ Concentration, %	(O ₂)	15.8	15.8	15.8	15.8
CO ₂ Concentration, %	(CO ₂)	3.8	3.7	3.8	3.8
Molecular Weight, lb/lb-mole (dry)	(Md)	29.24	29.22	29.24	29.23
Molecular Weight, lb/lb-mole (wet)	(Ms)	28.79	28.81	28.84	28.81
Velocity, ft/sec	(Vs)	41.3	41.4	42.3	41.7
VOLUMETRIC FLOW RATE					
At Stack Conditions, acfm	(Qa)	5,402	5,421	5,539	5,454
At Standard Conditions, dscfm	(Qs)	2,985	3,016	3,084	3,028

Location Caterpillar, Inc - Virginia Beach, VA
 Source 3516HD Generator (L10)
 Project No. 2019-0420
 Parameter Arsenic, Cadmium, Nickel
 Analysis --

Run 1		Date: 3/8/19			
Impinger No.	1	2	3	4*	Total
Contents	HNO3/H2O2	HNO3/H2O2	Empty	Silica	--
Initial Volume, mL	100.0	100.0	0.0	233.5	433.5
Final Volume, mL	118.0	108.0	2.0	241.3	469.3
Gain	18.0	8.0	2.0	7.8	35.8
Run 2		Date: 3/8/19			
Impinger No.	1	2	3	4*	Total
Contents	HNO3/H2O2	HNO3/H2O2	Empty	Silica	--
Initial Volume, mL	100.0	100.0	0.0	231.4	431.4
Final Volume, mL	118.0	106.0	2.0	238.7	464.7
Gain	18.0	6.0	2.0	7.3	33.3
Run 3		Date: 3/8/19			
Impinger No.	1	2	3	4*	Total
Contents	HNO3/H2O2	HNO3/H2O2	Empty	Silica	--
Initial Volume, mL	100.0	100.0	0.0	229.6	429.6
Final Volume, mL	116.0	108.0	2.0	236.9	462.9
Gain	16.0	8.0	2.0	7.3	33.3



Isokinetic Field Data

Location: <u>Caterpillar, Inc - Virginia Beach, VA</u>			Start Time: <u>9:40</u>			Source: <u>3516HD Generator (L10)</u>		
Date: <u>3/8/19</u>		Run 1	VALID	End Time: <u>10:40</u>		Project No.: <u>2019-0420</u>		Parameter: <u>Arsenic, Ca</u>

STACK DATA (EST)		EQUIPMENT		STACK DATA (EST)		FILTER NO.		STACK DATA (FINAL)		MOIST. DATA		
Moisture:	6.0 % est.	Meter Box ID:	1690	Est. Tm:	70 °F			Pb:	30.37 in. Hg	Vlc (ml)		
Barometric:	30.37 in. Hg	Y:	0.994	Est. Ts:	470 °F			Pg:	-0.15 in. WC	35.8		
Static Press:	-0.15 in. WC	AH @ (in.WC):	1.816	Est. AP:	0.31 in. WC			O ₂ :	15.8 %	K-FACTOR		
Stack Press:	30.36 in. Hg	Probe ID:	PR402-2	Est. Dn:	0.301 in.			CO ₂ :	3.8 %	5.142		
CO ₂ :	6.0 %	Liner Material:	quartz	Target Rate:	0.65 scfm			Check Pt.		Initial	Final	Corr.
O ₂ :	13.0 %	Pitot ID:	P403-2	LEAK CHECKS		Pre	Mid 1	Mid 2	Post	Mid 1 (cf)		
N ₂ /CO:	81.0 %	Pitot Cp/Type:	0.840 --	Leak Rate (cfm):		0.000	--	--	0.000	Mid 2 (cf)		
Md:	29.48 lb/lb-mole	Nozzle ID:	GL601	Vacuum (in Hg):		11	--	--	11	Mid 3 (cf)		
Ms:	28.79 lb/lb-mole	Nozzle Dn (in.):	0.310	Pitot Tube:		Pass	--	--	Pass	Mid-Point Leak Check Vol (cf):		

Sample Pt.	Sample Time (minutes)		Dry Gas Meter Reading (ft ³)	Pitot Tube ΔP (in WC)	Gas Temperatures (°F)		Orifice Press. ΔH (in. WC)		Pump Vac (in. Hg)	Gas Temperatures (°F)				% ISO	Vs (fps)
	Begin	End			DGM Average	Stack	Ideal	Actual		Probe	Filter	Imp Exit	Aux		
					Amb.	Amb.				Amb.	Amb.	Amb.	Amb.		
	0.00	5.00	185.948	0.24	69	472	1.23	1.20	2	250	261	53	-	93.3	36.33
	5.00	10.00	188.800	0.29	69	472	1.49	1.50	2	261	261	54	-	92.4	39.93
	10.00	15.00	191.900	0.28	71	473	1.44	1.40	2	265	259	57	-	93.7	39.26
	15.00	20.00	195.000	0.34	71	472	1.75	1.80	2	265	261	62	-	96.0	43.24
	20.00	25.00	198.500	0.33	71	470	1.70	1.70	2	264	261	62	-	94.5	42.55
	25.00	30.00	201.900	0.30	71	470	1.55	1.60	2	268	261	63	-	102.1	40.57
	30.00	35.00	205.400	0.30	72	470	1.55	1.60	2	264	258	64	-	90.2	40.57
	35.00	40.00	208.500	0.31	73	470	1.60	1.60	2	267	260	64	-	94.3	41.24
	40.00	45.00	211.800	0.32	74	473	1.65	1.70	2	264	266	66	-	95.6	41.97
	45.00	50.00	215.200	0.36	74	470	1.86	1.90	2	249	260	67	-	98.0	44.44
	50.00	55.00	218.900	0.35	75	470	1.82	1.80	2	257	261	61	-	96.5	43.82
	55.00	60.00	222.500	0.31			1.59						-	93.8	29.01
	60.00	--	226.543										-		--
Final DGM:			226.543												

RESULTS	Run Time		Vm	ΔP	Tm	Ts	Max Vac	ΔH	%ISO	BWS	Y _{qa}
	min	sec	ft ³	in. WC	°F	°F	in. Hg	in. WC			
	60.0		40.595	0.31	71.8	471.1	2	1.618	94.9	0.040	-4.1



Isokinetic Field Data

Location: Caterpillar, Inc - Virginia Beach, VA				Start Time: 11:15		Source: 3516HD Generator (L10)								
Date: 3/8/19		Run 2		End Time: 12:15		Project No.: 2019-0420		Parameter: Arsenic, C						
STACK DATA (EST)			EQUIPMENT			STACK DATA (EST)			FILTER NO.		STACK DATA (FINAL)		MOIST. DATA	
Moisture: 6.0 % est.			Meter Box ID: 1690			Est. Tm: 72 °F					Pb: 30.37 in. Hg		Vlc (ml)	
Barometric: 30.37 in. Hg			Y: 0.994			Est. Ts: 471 °F					Pg: -0.15 in. WC		33.3	
Static Press: -0.15 in. WC			ΔH @ (in.WC): 1.816			Est. ΔP: 0.31 in. WC					O ₂ : 15.8 %		K-FACTOR	
Stack Press: 30.36 in. Hg			Probe ID: PR402-2			Est. Dn: 0.300 in.					CO ₂ : 3.7 %		5.15	
CO ₂ : 6.0 %			Liner Material: quartz			Target Rate: 0.65 scfm					Check Pt.		Initial Final Corr.	
O ₂ : 13.0 %			Pitot ID: P403-2			LEAK CHECKS			Pre Mid 1 Mid 2 Post		Mid 1 (cf)		--	
N ₂ /CO: 81.0 %			Pitot Cp/Type: 0.840 --			Leak Rate (cfm): 0.000			-- -- 0.000		Mid 2 (cf)		--	
Md: 29.48 lb/lb-mole			Nozzle ID: GL601			Vacuum (in Hg): 9			-- -- 5		Mid 3 (cf)		--	
Ms: 28.79 lb/lb-mole			Nozzle Dn (in.): 0.310			Pitot Tube: Pass			-- -- Pass		Mid-Point Leak Check Vol (cf): --			

Sample Pt.	Sample Time (minutes)		Dry Gas Meter Reading (ft ³)	Pitot Tube ΔP (in WC)	Gas Temperatures (°F)		Orifice Press. ΔH (in. WC)		Pump Vac (in. Hg)	Gas Temperatures (°F)				% ISO	Vs (fps)
					DGM Average	Stack	Ideal Actual			Probe	Filter	Imp Exit	Aux		
	Amb.	Amb.					Amb.	Amb.		Amb.	Amb.				
	Begin	End			--	--	--	--		--	--				
--	0.00	5.00	226.965	0.24	69	464	1.24	1.30	2	243	261	46	-	95.7	36.17
--	5.00	10.00	229.900	0.29	67	468	1.49	1.50	2	249	262	43	-	92.5	39.85
--	10.00	15.00	233.000	0.33	67	468	1.69	1.70	2	267	261	43	-	95.2	42.51
--	15.00	20.00	236.400	0.34	67	469	1.74	1.80	2	264	260	44	-	96.6	43.17
--	20.00	25.00	239.900	0.31	67	468	1.59	1.60	2	267	261	46	-	98.2	41.20
--	25.00	30.00	243.300	0.36	67	468	1.84	1.90	2	267	261	47	-	96.5	44.40
--	30.00	35.00	246.900	0.24	67	468	1.23	1.20	2	259	259	48	-	104.9	36.25
--	35.00	40.00	250.100	0.35	66	468	1.79	1.80	2	263	259	49	-	95.3	43.78
--	40.00	45.00	253.600	0.36	66	468	1.84	1.90	2	258	260	50	-	91.3	44.40
--	45.00	50.00	257.000	0.34	66	468	1.74	1.80	2	257	261	52	-	99.5	43.15
--	50.00	55.00	260.600	0.34	66	468	1.74	1.80	2	265	260	52	-	96.7	43.15
--	55.00	60.00	264.100	0.28	66	468	1.43	1.40	2	262	260	53	-	103.0	39.15
--	60.00	--	267.486										-		--
Final DGM:			267.486												

RESULTS	Run Time		Vm		ΔP		Tm		Ts		Max Vac		ΔH		%ISO		BWS		Y _{qa}	
	60.0	min	40.521	ft ³	0.32	in. WC	66.8	°F	467.8	°F	2	1.642	in. WC	94.7	0.037			-4.5		



Isokinetic Field Data

Location: Caterpillar, Inc - Virginia Beach, VA				Start Time: 13:04		Source: 3516HD Generator (L10)								
Date: 3/8/19		Run 3		End Time: 14:04		Project No.: 2019-0420		Parameter: Arsenic, C						
STACK DATA (EST)			EQUIPMENT			STACK DATA (EST)			FILTER NO.		STACK DATA (FINAL)		MOIST. DATA	
Moisture: 6.0 % est.			Meter Box ID: 1690			Est. Tm: 67 °F					Pb: 30.37 in. Hg		Vlc (ml)	
Barometric: 30.37 in. Hg			Y: 0.994			Est. Ts: 468 °F					Pg: -0.15 in. WC		33.3	
Static Press: -0.15 in. WC			ΔH @ (in.WC): 1.816			Est. ΔP: 0.32 in. WC					O ₂ : 15.8 %		K-FACTOR	
Stack Press: 30.36 in. Hg			Probe ID: PR402-2			Est. Dn: 0.300 in.					CO ₂ : 3.8 %		5.123	
CO ₂ : 6.0 %			Liner Material: quartz			Target Rate: 0.65 scfm					Check Pt.		Initial Final Corr.	
O ₂ : 13.0 %			Pitot ID: P403-2			LEAK CHECKS			Pre Mid 1 Mid 2 Post		Mid 1 (cf)		--	
N ₂ /CO: 81.0 %			Pitot Cp/Type: 0.840 --			Leak Rate (cfm): 0.000			-- -- 0.000		Mid 2 (cf)		--	
Md: 29.48 lb/lb-mole			Nozzle ID: GL601			Vacuum (in Hg): 10			-- -- 8		Mid 3 (cf)		--	
Ms: 28.79 lb/lb-mole			Nozzle Dn (in.): 0.310			Pitot Tube: Pass			-- -- Pass		Mid-Point Leak Check Vol (cf): --			

Sample Pt.	Sample Time (minutes)		Dry Gas Meter Reading (ft ³)	Pitot Tube ΔP (in WC)	Gas Temperatures (°F)		Orifice Press. ΔH (in. WC)		Pump Vac (in. Hg)	Gas Temperatures (°F)				% ISO	Vs (fps)
					DGM Average	Stack	Ideal Actual			Probe	Filter	Imp Exit	Aux		
	Amb.	Amb.					Amb.	Amb.		Amb.	Amb.				
	Begin	End			--	--	--	--		--	--				
--	0.00	5.00	267.733	0.26	62	468	1.32	1.30	2	258	261	48	-	103.9	37.73
--	5.00	10.00	271.000	0.34	62	468	1.73	1.70	2	264	261	42	-	100.2	43.15
--	10.00	15.00	274.600	0.35	62	467	1.78	1.80	2	265	261	43	-	98.7	43.75
--	15.00	20.00	278.200	0.31	62	468	1.57	1.60	2	267	260	45	-	96.2	41.20
--	20.00	25.00	281.500	0.37	63	467	1.88	1.90	2	267	260	47	-	93.2	44.98
--	25.00	30.00	285.000	0.35	63	468	1.78	1.80	2	269	260	48	-	90.4	43.78
--	30.00	35.00	288.300	0.29	63	468	1.48	1.50	2	269	261	49	-	90.2	39.85
--	35.00	40.00	291.300	0.33	63	468	1.68	1.70	2	265	260	50	-	110.0	42.51
--	40.00	45.00	295.200	0.33	63	468	1.68	1.70	2	267	260	51	-	95.9	42.51
--	45.00	50.00	298.600	0.36	63	468	1.83	1.80	2	265	261	51	-	97.2	44.40
--	50.00	55.00	302.200	0.32	63	468	1.63	1.20	2	267	269	52	-	97.3	41.86
--	55.00	60.00	305.600	0.33	63	468	1.68	1.70	2	268	260	52	-	91.9	42.51
--	60.00	--	308.858										-		--
Final DGM:			308.858												

RESULTS	Run Time		Vm		ΔP		Tm		Ts		Max Vac		ΔH		%ISO		BWS		Y _{qa}	
	60.0	min	41.125	ft ³	0.33	in. WC	62.7	°F	467.8	°F	2	1.642	in. WC	94.7	0.036			-2.6		

Location Caterpillar, Inc - Virginia Beach, VA
 Source 3516HD Generator (L10)
 Project No. 2019-0420
 Parameter Hexavalent Chromium

Run Number		Run 1	Run 2	Run 3	Average
Date		3/8/19	3/8/19	3/8/19	--
Start Time		9:40	11:15	13:04	--
Stop Time		10:40	12:15	14:04	--
Run Time, min	(θ)	60.0	60.0	60.0	60.0
INPUT DATA					
Barometric Pressure, in. Hg	(Pb)	30.37	30.37	30.37	30.37
Meter Correction Factor	(Y)	1.000	1.000	1.000	1.000
Orifice Calibration Value	($\Delta H @$)	1.753	1.753	1.753	1.753
Meter Volume, ft ³	(Vm)	40.738	40.392	41.132	40.754
Meter Temperature, °F	(Tm)	71.6	66.0	61.9	66.5
Meter Temperature, °R	(Tm)	531.6	526.0	521.9	526.5
Meter Orifice Pressure, in. WC	(ΔH)	1.567	1.550	1.608	1.575
Volume H ₂ O Collected, mL	(Vlc)	37.9	34.1	32.7	34.9
Nozzle Diameter, in	(Dn)	0.310	0.310	0.310	0.310
Area of Nozzle, ft ²	(An)	0.0005	0.0005	0.0005	0.0005
Hexavalent Chromium, ug	(M _{Cr+6})	<u>8.0</u>	<u>4.0</u>	<u>8.0</u>	6.7
ISOKINETIC DATA					
Standard Meter Volume, ft ³	(Vmstd)	41.228	41.310	42.402	41.646
Standard Water Volume, ft ³	(Vwstd)	1.784	1.605	1.540	1.643
Moisture Fraction Measured	(BWSmsd)	0.041	0.037	0.035	0.038
Moisture Fraction @ Saturation	(BWSsat)	32.063	31.054	31.079	31.398
Moisture Fraction	(BWS)	0.041	0.037	0.035	0.038
Meter Pressure, in Hg	(Pm)	30.49	30.48	30.49	30.49
Volume at Nozzle, ft ³	(Vn)	74.759	74.317	76.101	75.059
Isokinetic Sampling Rate, (%)	(I)	96.0	95.1	95.3	95.5
DGM Calibration Check Value, (+/- 5%)	(Y _{qa})	-3.3	-2.9	-2.7	-3.0
EMISSION CALCULATIONS					
Hexavalent Chromium Concentration, ug/dscm	(C _{Cr+6})	6.9	3.4	6.7	5.6
Hexavalent Chromium Emission Rate, lb/hr	(ER _{Cr+6})	7.6E-05	3.9E-05	7.7E-05	6.4E-05

Results for Hexavalent Chromium were below the detection limit in all three runs. The detection limit was used for emissions purposes.

Location Caterpillar, Inc - Virginia Beach, VA
Source 3516HD Generator (L10)
Project No. 2019-0420
Parameter Hexavalent Chromium

Run Number		Run 1	Run 2	Run 3	Average
Date		3/8/19	3/8/19	3/8/19	--
Start Time		9:40	11:15	13:04	--
Stop Time		10:40	12:15	14:04	--
Run Time, min		60.0	60.0	60.0	60.0
VELOCITY HEAD, in. WC					
Point 1		0.24	0.24	0.26	0.25
Point 2		0.29	0.29	0.34	0.31
Point 3		0.28	0.33	0.35	0.32
Point 4		0.34	0.34	0.31	0.33
Point 5		0.33	0.31	0.37	0.34
Point 6		0.30	0.36	0.35	0.34
Point 7		0.30	0.24	0.29	0.28
Point 8		0.31	0.35	0.33	0.33
Point 9		0.32	0.36	0.33	0.34
Point 10		0.36	0.34	0.36	0.35
Point 11		0.35	0.34	0.32	0.34
Point 12		0.31	0.28	0.33	0.31
CALCULATED DATA					
Square Root of ΔP , (in. WC) ^{1/2}	(ΔP)	0.557	0.560	0.572	0.563
Pitot Tube Coefficient	(Cp)	0.840	0.840	0.840	0.840
Barometric Pressure, in. Hg	(Pb)	30.37	30.37	30.37	30.37
Static Pressure, in. WC	(Pg)	-0.15	-0.15	-0.15	-0.15
Stack Pressure, in. Hg	(Ps)	30.36	30.36	30.36	30.36
Stack Cross-sectional Area, ft ²	(As)	2.18	2.18	2.18	2.18
Temperature, °F	(Ts)	471.2	467.8	467.8	468.9
Temperature, °R	(Ts)	931.2	927.8	927.8	928.9
Moisture Fraction Measured	(BWSmsd)	0.041	0.037	0.035	0.038
Moisture Fraction @ Saturation	(BWSsat)	32.063	31.054	31.079	31.398
Moisture Fraction	(BWS)	0.041	0.037	0.035	0.038
O ₂ Concentration, %	(O ₂)	15.8	15.8	15.8	15.8
CO ₂ Concentration, %	(CO ₂)	3.8	3.7	3.8	3.8
Molecular Weight, lb/lb-mole (dry)	(Md)	29.24	29.22	29.24	29.23
Molecular Weight, lb/lb-mole (wet)	(Ms)	28.77	28.80	28.85	28.81
Velocity, ft/sec	(Vs)	41.3	41.4	42.3	41.7
VOLUMETRIC FLOW RATE					
At Stack Conditions, acfm	(Qa)	5,404	5,422	5,538	5,455
At Standard Conditions, dscfm	(Qs)	2,980	3,014	3,086	3,027

Location Caterpillar, Inc - Virginia Beach, VA

Source 3516HD Generator (L10)

Project No. 2019-0420

Parameter Hexavalent Chromium

Analysis Volumetric

Run 1		Date: 3/8/19				
Impinger No.	1	2	3	4	5*	Total
Contents	KOH	KOH	KOH	Empty	Silica	--
Initial Volume, mL	150.0	75.0	75.0	0.0	228.6	528.6
Final Volume, mL	154.0	98.0	76.0	2.0	236.5	566.5
Gain	4.0	23.0	1.0	2.0	7.9	37.9
Run 2		Date: 3/8/19				
Impinger No.	1	2	3	4	5*	Total
Contents	KOH	KOH	KOH	Empty	Silica	--
Initial Volume, mL	150.0	75.0	75.0	0.0	231.5	531.5
Final Volume, mL	152.0	100.0	75.0	0.0	238.6	565.6
Gain	2.0	25.0	0.0	0.0	7.1	34.1
Run 3		Date: 3/8/19				
Impinger No.	1	2	3	4	5*	Total
Contents	KOH	KOH	KOH	Empty	Silica	--
Initial Volume, mL	150.0	75.0	75.0	0.0	230.1	530.1
Final Volume, mL	152.0	98.0	75.0	0.0	237.8	562.8
Gain	2.0	23.0	0.0	0.0	7.7	32.7



Isokinetic Field Data

Location: <u>Caterpillar, Inc - Virginia Beach, VA</u>				Start Time: <u>9:40</u>		Source: <u>3516HD Generator (L10)</u>					
Date: <u>3/8/19</u>		Run 1		End Time: <u>10:40</u>		Project No.: <u>2019-0420</u>		Parameter: <u>Hexavalent</u>			
STACK DATA (EST)		EQUIPMENT		STACK DATA (EST)		FILTER NO.		STACK DATA (FINAL)		MOIST. DATA	
Moisture: <u>6.0</u> % est.		Meter Box ID: <u>2051</u>		Est. Tm: <u>70</u> °F				Pb: <u>30.37</u> in. Hg		Vlc (ml)	
Barometric: <u>30.37</u> in. Hg		Y: <u>1.000</u>		Est. Ts: <u>470</u> °F				Pg: <u>-0.15</u> in. WC		37.9	
Static Press: <u>-0.15</u> in. WC		AH @ (in.WC): <u>1.753</u>		Est. AP: <u>0.31</u> in. WC				O ₂ : <u>15.8</u> %		K-FACTOR	
Stack Press: <u>30.36</u> in. Hg		Probe ID: <u>PR403-2</u>		Est. Dn: <u>0.301</u> in.				CO ₂ : <u>3.8</u> %		4.964	
CO ₂ : <u>6.0</u> %		Liner Material: <u>quartz</u>		Target Rate: <u>0.65</u> scfm				Check Pt.		Initial Final Corr.	
O ₂ : <u>13.0</u> %		Pitot ID: <u>P403-2</u>		LEAK CHECKS		Pre Mid 1 Mid 2 Post		Mid 1 (cf)		--	
N ₂ /CO: <u>81.0</u> %		Pitot Cp/Type: <u>0.840</u> S-type		Leak Rate (cfm): <u>0.011</u>		-- -- --		Mid 2 (cf)		--	
Md: <u>29.48</u> lb/lb-mole		Nozzle ID: <u>GL602</u>		Vacuum (in Hg): <u>8</u>		-- -- --		Mid 3 (cf)		--	
Ms: <u>28.79</u> lb/lb-mole		Nozzle Dn (in.): <u>0.310</u>		Pitot Tube: <u>Pass</u>		-- -- --		Mid-Point Leak Check Vol (cf):		--	

Sample Pt.	Sample Time (minutes)		Dry Gas Meter Reading (ft ³)	Pitot Tube ΔP (in WC)	Gas Temperatures (°F)		Orifice Press. ΔH (in. WC)		Pump Vac (in. Hg)	Gas Temperatures (°F)				% ISO	Vs (fps)
					DGM Average	Stack	Ideal Actual			Probe	Filter	Imp Exit	Aux		
	Amb.	Amb.					Amb.	Amb.		Amb.	Amb.				
	Begin	End													
	0.00	5.00	656.230	0.24	69	472	1.19	1.20	3	NA	NA	47	-	97.8	36.33
	5.00	10.00	659.200	0.29	69	472	1.44	1.40	3	NA	NA	47	-	92.9	39.93
	10.00	15.00	662.300	0.28	70	473	1.39	1.40	3	NA	NA	45	-	94.4	39.26
	15.00	20.00	665.400	0.34	70	472	1.68	1.70	3	NA	NA	47	-	94.0	43.24
	20.00	25.00	668.800	0.33	70	470	1.64	1.70	3	NA	NA	49	-	98.1	42.55
	25.00	30.00	672.300	0.30	70	470	1.49	1.50	3	NA	NA	51	-	99.9	40.57
	30.00	35.00	675.700	0.30	72	470	1.50	1.50	3	NA	NA	52	-	102.5	40.57
	35.00	40.00	679.200	0.31	73	472	1.54	1.60	3	NA	NA	53	-	103.6	41.29
	40.00	45.00	682.800	0.32	73	473	1.59	1.60	3	NA	NA	53	-	99.2	41.97
	45.00	50.00	686.300	0.36	74	470	1.80	1.80	3	NA	NA	54	-	90.6	44.44
	50.00	55.00	689.700	0.35	74	470	1.75	1.80	3	NA	NA	55	-	97.3	43.82
	55.00	60.00	693.300	0.31	75	470	1.55	1.60	3	NA	NA	53	-	105.1	41.24
	60.00	--	696.968										-		--
Final DGM:			696.968												

RESULTS	Run Time		Vm	ΔP	Tm	Ts	Max Vac	ΔH	%ISO	BWS	Y _{qa}
	60.0	min	40.738 ft ³	0.31 in. WC	71.6 °F	471.2 °F	3	1.567 in. WC	96.0	0.041	-3.3



Isokinetic Field Data

Location: Caterpillar, Inc - Virginia Beach, VA				Start Time: 11:15		Source: 3516HD Generator (L10)					
Date: 3/8/19		Run 2		VALID		End Time: 12:15		Project No.: 2019-0420		Parameter: Hexavalent	

STACK DATA (EST)			EQUIPMENT			STACK DATA (EST)			FILTER NO.			STACK DATA (FINAL)			MOIST. DATA		
Moisture:	6.0	% est.	Meter Box ID:	2051		Est. Tm:	72	°F					Pb:	30.37	in. Hg	Vlc (ml)	
Barometric:	30.37	in. Hg	Y:	1.000		Est. Ts:	471	°F					Pg:	-0.15	in. WC	K-FACTOR	34.1
Static Press:	-0.15	in. WC	ΔH @ (in.WC):	1.753		Est. ΔP:	0.31	in. WC					O ₂ :	15.8	%		4.97
Stack Press:	30.36	in. Hg	Probe ID:	PR403-2		Est. Dn:	0.300	in.					CO ₂ :	3.7	%		
CO ₂ :	6.0	%	Liner Material:	quartz		Target Rate:	0.65	scfm					Check Pt. Initial Final Corr.				
O ₂ :	13.0	%	Pitot ID:	P403-2		LEAK CHECKS			Pre	Mid 1	Mid 2	Post	Mid 1 (cf)	--			
N ₂ /CO:	81.0	%	Pitot Cp/Type:	0.840	S-type	Leak Rate (cfm):	0.013	--	--	0.010	Mid 2 (cf)	--					
Md:	29.48	lb/lb-mole	Nozzle ID:	GL602		Vacuum (in Hg):	8	--	--	8	Mid 3 (cf)	--					
Ms:	28.79	lb/lb-mole	Nozzle Dn (in.):	0.310		Pitot Tube:	Pass	--	--	Pass	Mid-Point Leak Check Vol (cf):	--					

Sample Pt.	Sample Time (minutes)		Dry Gas Meter Reading (ft ³)	Pitot Tube ΔP (in WC)	Gas Temperatures (°F)		Orifice Press. ΔH (in. WC)		Pump Vac (in. Hg)	Gas Temperatures (°F)				% ISO	Vs (fps)
					DGM Average	Stack	Ideal			Actual	Probe	Filter	Imp Exit		
	Amb.	Amb.					Amb.	Amb.		Amb.	Amb.				
	Begin	End			--	--	--	--		--	--				
--	0.00	5.00	697.252	0.24	67	464	1.19	1.20	3	NA	NA	51	-	100.3	36.17
--	5.00	10.00	700.300	0.29	66	468	1.43	1.40	3	NA	NA	47	-	93.2	39.85
--	10.00	15.00	703.400	0.33	66	468	1.63	1.60	3	NA	NA	44	-	95.9	42.51
--	15.00	20.00	706.800	0.34	66	469	1.68	1.70	3	NA	NA	44	-	97.3	43.17
--	20.00	25.00	710.300	0.31	66	468	1.53	1.50	3	NA	NA	43	-	96.0	41.20
--	25.00	30.00	713.600	0.36	66	468	1.78	1.80	3	NA	NA	44	-	97.3	44.40
--	30.00	35.00	717.200	0.24	66	468	1.19	1.10	3	NA	NA	44	-	102.4	36.25
--	35.00	40.00	720.300	0.35	66	468	1.73	1.70	3	NA	NA	44	-	95.9	43.78
--	40.00	45.00	723.800	0.36	65	468	1.77	1.80	3	NA	NA	44	-	97.4	44.40
--	45.00	50.00	727.400	0.34	66	468	1.68	1.70	3	NA	NA	46	-	94.5	43.15
--	50.00	55.00	730.800	0.34	66	468	1.68	1.70	3	NA	NA	46	-	97.3	43.15
--	55.00	60.00	734.300	0.28	66	468	1.38	1.40	3	NA	NA	48	-	102.3	39.15
--	60.00	--	737.644										-		--
Final DGM:			737.644												

RESULTS	Run Time		Vm		ΔP		Tm		Ts		Max Vac	ΔH		%ISO	BWS	Y _{qa}
	min		ft ³		in. WC		°F		°F		in. WC					
	60.0		40.392		0.32		66.0		467.8		3	1.550		95.1	0.037	-2.9



Isokinetic Field Data

Location: Caterpillar, Inc - Virginia Beach, VA				Start Time: 13:04		Source: 3516HD Generator (L10)					
Date: 3/8/19		Run 3		VALID		End Time: 14:04		Project No.: 2019-0420		Parameter: Hexavalent	

STACK DATA (EST)	EQUIPMENT	STACK DATA (EST)	FILTER NO.	STACK DATA (FINAL)	MOIST. DATA																				
Moisture: 6.0 % est.	Meter Box ID: 2051	Est. Tm: 66 °F		Pb: 30.37 in. Hg	Vlc (ml)																				
Barometric: 30.37 in. Hg	Y: 1.000	Est. Ts: 468 °F		Pg: -0.15 in. WC	32.7																				
Static Press: -0.15 in. WC	ΔH @ (in.WC): 1.753	Est. ΔP: 0.32 in. WC		O ₂ : 15.8 %	K-FACTOR																				
Stack Press: 30.36 in. Hg	Probe ID: PR403-2	Est. Dn: 0.301 in.		CO ₂ : 3.8 %	4.939																				
CO ₂ : 6.0 %	Liner Material: quartz	Target Rate: 0.65 scfm		<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th>Check Pt.</th> <th>Initial</th> <th>Final</th> <th>Corr.</th> </tr> </thead> <tbody> <tr> <td>Mid 1 (cf)</td> <td></td> <td></td> <td>--</td> </tr> <tr> <td>Mid 2 (cf)</td> <td></td> <td></td> <td>--</td> </tr> <tr> <td>Mid 3 (cf)</td> <td></td> <td></td> <td>--</td> </tr> <tr> <td>Mid-Point Leak Check Vol (cf):</td> <td></td> <td></td> <td>--</td> </tr> </tbody> </table>		Check Pt.	Initial	Final	Corr.	Mid 1 (cf)			--	Mid 2 (cf)			--	Mid 3 (cf)			--	Mid-Point Leak Check Vol (cf):			--
Check Pt.	Initial	Final	Corr.																						
Mid 1 (cf)			--																						
Mid 2 (cf)			--																						
Mid 3 (cf)			--																						
Mid-Point Leak Check Vol (cf):			--																						
O ₂ : 13.0 %	Pitot ID: P403-2	LEAK CHECKS		Pre	Mid 1	Mid 2	Post																		
N ₂ /CO: 81.0 %	Pitot Cp/Type: 0.840 S-type	Leak Rate (cfm): 0.006		--	--	--	0.005																		
Md: 29.48 lb/lb-mole	Nozzle ID: GL602	Vacuum (in Hg): 8		--	--	--	8																		
Ms: 28.79 lb/lb-mole	Nozzle Dn (in.): 0.310	Pitot Tube: Pass		--	--	--	Pass																		

Sample Pt.	Sample Time (minutes)		Dry Gas Meter Reading (ft ³)	Pitot Tube ΔP (in WC)	Gas Temperatures (°F)		Orifice Press. ΔH (in. WC)		Pump Vac (in. Hg)	Gas Temperatures (°F)				% ISO	Vs (fps)
	Begin	End			DGM Average	Stack	Ideal	Actual		Probe	Filter	Imp Exit	Aux		
					Amb.	Amb.				Amb.	Amb.	Amb.	Amb.		
--	0.00	5.00	739.537	0.26	59	468	1.27	1.30	3	NA	NA	48	-	105.0	37.73
--	5.00	10.00	742.800	0.34	60	468	1.66	1.70	3	NA	NA	42	-	95.6	43.15
--	10.00	15.00	746.200	0.35	61	467	1.71	1.70	3	NA	NA	41	-	94.0	43.75
--	15.00	20.00	749.600	0.31	61	468	1.52	1.50	3	NA	NA	42	-	94.0	41.20
--	20.00	25.00	752.800	0.37	62	467	1.81	1.80	3	NA	NA	41	-	96.6	44.98
--	25.00	30.00	756.400	0.35	62	468	1.72	1.70	3	NA	NA	43	-	93.9	43.78
--	30.00	35.00	759.800	0.29	63	468	1.42	1.40	3	NA	NA	43	-	108.9	39.85
--	35.00	40.00	763.400	0.33	63	468	1.62	1.60	3	NA	NA	43	-	90.8	42.51
--	40.00	45.00	766.600	0.33	63	468	1.62	1.60	3	NA	NA	44	-	96.4	42.51
--	45.00	50.00	770.000	0.36	63	468	1.77	1.80	3	NA	NA	44	-	95.1	44.40
--	50.00	55.00	773.500	0.32	63	468	1.57	1.60	3	NA	NA	45	-	103.7	41.86
--	55.00	60.00	777.100	0.33	63	468	1.62	1.60	3	NA	NA	45	-	101.2	42.51
--	60.00	--	780.669										-		--
Final DGM:			780.669												

RESULTS	Run Time		Vm		ΔP		Tm		Ts		Max Vac	ΔH		%ISO	BWS	Y _{qa}
	min		ft ³		in. WC		°F		°F		in. WC					
	60.0		41.132		0.33		61.9		467.8		3	1.608		95.3	0.035	-2.7

Location Caterpillar, Inc - Virginia Beach, VA
Source 3516HD Generator (Assign Condition) LC 10
Project No. 2019-0420
Parameter(s): Formaldehyde/ VOCs

Run Number		Run 1	Run 2	Run 3	Average
Date		3/8/19	3/8/19	3/8/19	--
Start Time		9:40	11:15	13:04	--
Stop Time		10:40	12:15	14:04	--
Input Data					
Volumetric Flow Rate, dscfm	(Qs)	2,972	3,010	3,085	3,022
Standard Meter Volume, L	(Vmstd)	44.961	44.964	44.523	44.816
Formaldehyde Mass, ug	M(CH2O)	20.45	156.07	165.44	113.99
Acetaldehyde Mass, ug	M(C2H4O)	<u>65.5</u>	<u>65.5</u>	<u>65.5</u>	65.5
Benzene Mass, ug	M(C6H6)	<u>73.5</u>	<u>73.5</u>	<u>73.5</u>	73.5
Ethylbenzene Mass, ug	M(C8H10)	<u>72.7</u>	<u>72.7</u>	<u>72.7</u>	72.7
Hexane Mass, ug	M(C6H14)	<u>54.2</u>	<u>54.2</u>	<u>54.2</u>	54.2
Pollutant Concentration (Bag Samples)					
1,3 Butadiene Mass, ppmvd	M(C4H6)	<u>0.10</u>	<u>0.10</u>	<u>0.10</u>	0.10
Acetaldehyde Mass, ppmvd	M(C2H4O)	<u>1.00</u>	<u>1.00</u>	<u>1.00</u>	1.00
Benzene Mass, ppmvd	M(C6H6)	0.13	0.13	0.14	0.13
Ethylbenzene Mass, ppmvd	M(C8H10)	<u>0.10</u>	<u>0.10</u>	<u>0.10</u>	0.10
Hexane Mass, ppmvd	M(C6H14)	<u>0.10</u>	<u>0.10</u>	<u>0.10</u>	0.10
Emissions Calculations					
Formaldehyde Concentration, ppmvd	C(CH2O)	0.36	2.8	3.0	2.0
Formaldehyde Emission Rate, lb/hr	ER(CH2O)	0.0051	0.039	0.043	0.029
1,3 Butadiene Concentration, ppmvd	C(C4H6)	0.10	0.10	0.10	0.10
1,3 Butadiene Emission Rate, lb/hr	ER(C4H6)	0.0025	0.0025	0.0026	0.0025
Acetaldehyde Concentration, ppmvd	C(C2H4O)	0.80	0.80	0.80	0.80
Acetaldehyde Concentration, ppmvd (Combined)	C(C2H4O)	1.8	1.8	1.8	1.8
Acetaldehyde Emission Rate, lb/hr	ER(C2H4O)	0.037	0.037	0.038	0.037
Benzene Concentration, ppmvd	C(C6H6)	0.50	0.50	0.51	0.50
Benzene Concentration, ppmvd (Combined)	C(C6H6)	0.63	0.63	0.65	0.64
Benzene Emission Rate, lb/hr	ER(C6H6)	0.023	0.023	0.024	0.023
Ethylbenzene Concentration, ppmvd	C(C8H10)	0.37	0.37	0.37	0.37
Ethylbenzene Concentration, ppmvd (Combined)	C(C8H10)	0.47	0.47	0.47	0.47
Ethylbenzene Emission Rate, lb/hr	ER(C8H10)	0.023	0.023	0.024	0.023
Hexane Concentration, ppmvd	C(C6H14)	0.34	0.34	0.34	0.34
Hexane Concentration, ppmvd (Combined)	C(C6H14)	0.44	0.44	0.44	0.44
Hexane Emission Rate, lb/hr	ER(C6H14)	0.017	0.018	0.018	0.018

Underlined values indicate that the laboratory results were below the detection limit. The detection limit was used for emission calculation purposes.



Location Caterpillar, Inc - Virginia Beach, VA
 Source 3516HD Generator (Assign Condition) LC 10

Project No. 2019-0420
 Parameter(s): Formaldehyde/ VOCs
 Console Type Low Flow

Run No.	1					2					3				
Date	3/8/19					3/8/19					3/8/19				
Status	VALID					VALID					VALID				
Start Time	9:40					11:15					13:04				
End Time	10:40					12:15					14:04				
Run Time, min	(0) 60					60					60				
Meter ID	2071					2071					2071				
Meter Correction Factor	(Y) 1.000					1.000					1.000				
Orifice Calibration Value	(AH @) 1.800					1.800					1.800				
Max Vacuum, in. Hg	0					0					0				
Post Leak Check, L/min (at max vac.)	0.000					0.000					0.000				
Meter Volume, L															
0	0.000					0.000					0.000				
5	3.660					3.670					3.680				
10	7.390					7.370					7.290				
15	10.980					10.980					10.980				
20	14.750					14.790					14.650				
25	18.330					18.330					18.290				
30	22.110					22.150					22.110				
35	25.810					25.840					25.710				
40	29.340					29.420					29.230				
45	33.260					33.340					33.040				
50	36.970					37.020					36.780				
55	40.150					40.470					40.260				
60	44.360					44.460					43.820				
Total Meter Volume, L	(Vm) 44.360					44.460					43.820				
Temperature, °F	Meter	Probe	Filter	Vacuum	Imp. Exit	Meter	Probe	Filter	Vacuum	Imp. Exit	Meter	Probe	Filter	Vacuum	Imp. Exit
0	70	--	--	0	--	71	--	--	0	--	70	--	--	0	--
5	70	--	--	0	--	71	--	--	0	--	70	--	--	0	--
10	70	--	--	0	--	71	--	--	0	--	71	--	--	0	--
15	70	--	--	0	--	72	--	--	0	--	70	--	--	0	--
20	70	--	--	0	--	72	--	--	0	--	70	--	--	0	--
25	71	--	--	0	--	72	--	--	0	--	70	--	--	0	--
30	71	--	--	0	--	73	--	--	0	--	70	--	--	0	--
35	71	--	--	0	--	73	--	--	0	--	70	--	--	0	--
40	73	--	--	0	--	73	--	--	0	--	70	--	--	0	--
45	73	--	--	0	--	73	--	--	0	--	70	--	--	0	--
50	73	--	--	0	--	74	--	--	0	--	70	--	--	0	--
55	73	--	--	0	--	74	--	--	0	--	70	--	--	0	--
60	73	--	--	0	--	74	--	--	0	--	70	--	--	0	--
Average Temperature, °F	(Tm) 71	--	--	--	--	73	--	--	--	--	70	--	--	--	--
Average Temperature, °R	(Tm) 531	--	--	--	--	532	--	--	--	--	530	--	--	--	--
Minimum Temperature, °F	70	--	--	--	--	71	--	--	--	--	70	--	--	--	--
Maximum Temperature, °F	73	--	--	--	--	74	--	--	--	--	71	--	--	--	--
Barometric Pressure, in. Hg	(Pb)	30.37				30.37				30.37					
Meter Orifice Pressure, in. WC	(AH)	1.800				1.800				1.800					
Meter Pressure, in. Hg	(Pm)	30.50				30.50				30.50					
Standard Meter Volume, L	(Vmstd)	44.961				44.964				44.523					

Location Caterpillar, Inc - Virginia Beach, VA
 Source 3516HD Generator (LC 10)
 Project No. 2019-0420
 Parameter Polycyclic Aromatic Hydrocarbons, Naphthalene

Run Number		Run 1	Run 2	Run 3	Average
Date		3/8/19	3/8/19	3/8/19	--
Start Time		9:40	11:15	13:04	--
Stop Time		10:40	12:15	14:04	--
Run Time, min	(θ)	60.0	60.0	60.0	60.0
INPUT DATA					
Barometric Pressure, in. Hg	(Pb)	30.37	30.37	30.37	30.37
Meter Correction Factor	(Y)	1.008	1.008	1.008	1.008
Orifice Calibration Value	($\Delta H @$)	1.840	1.840	1.840	1.840
Meter Volume, ft ³	(Vm)	41.380	41.105	42.465	41.650
Meter Temperature, °F	(Tm)	72.8	71.6	70.8	71.7
Meter Temperature, °R	(Tm)	532.8	531.6	530.8	531.7
Meter Orifice Pressure, in. WC	(ΔH)	1.633	1.658	1.717	1.669
Volume H ₂ O Collected, mL	(Vlc)	46.9	33.9	37.8	39.5
Nozzle Diameter, in	(Dn)	0.312	0.312	0.312	0.312
Area of Nozzle, ft ²	(An)	0.0005	0.0005	0.0005	0.0005
Acenaphthene Mass, ug	(M _{C12H10})	<u>3.0</u>	<u>3.0</u>	<u>3.0</u>	3.0
Acenaphthylene Mass, ug	(M _{C12H8})	<u>3.0</u>	<u>3.0</u>	<u>3.0</u>	3.0
Anthracene Mass, ug	(M _{C14H10})	<u>1.0</u>	<u>1.0</u>	<u>1.0</u>	1.0
Benzo[a]anthracene Mass, ug	(M _{C18H12})	<u>0.8</u>	<u>0.8</u>	<u>0.8</u>	0.8
Benzo[a]pyrene Mass, ug	(M _{C20H12})	<u>1.0</u>	<u>1.0</u>	<u>1.0</u>	1.0
Benzo[b]fluoranthene Mass, ug	(M _{C20H12})	<u>0.8</u>	<u>0.8</u>	<u>0.8</u>	0.8
Benzo[g,h,i]perylene Mass, ug	(M _{C22H12})	<u>0.8</u>	<u>0.8</u>	<u>0.8</u>	0.8
Benzo[k]fluoranthene Mass, ug	(M _{C20H12})	<u>1.0</u>	<u>1.0</u>	<u>1.0</u>	1.0
Chrysene Mass, ug	(M _{C18H12})	<u>0.8</u>	<u>0.8</u>	<u>0.8</u>	0.8
Dibenz[a,h]anthracene Mass, ug	(M _{C22H14})	<u>0.8</u>	<u>0.8</u>	<u>0.8</u>	0.8
Fluoranthene Mass, ug	(M _{C16H10})	<u>2.0</u>	<u>2.0</u>	<u>2.0</u>	2.0
Fluorene Mass, ug	(M _{C13H10})	5.8	6.7	6.8	6.4
Indeno(1,2,3-cd)pyrene Mass, ug	(M _{C22H12})	<u>1.0</u>	<u>1.0</u>	<u>1.0</u>	1.0
Naphthalene Mass, ug	(M _{C10H8})	133.0	173.0	160.0	155.3
Phenanthrene Mass, ug	(M _{C14H10})	13.2	13.3	13.7	13.4
Pyrene Mass, ug	(M _{C16H10})	13.0	13.0	14.0	13.3
ISOKINETIC DATA					
Standard Meter Volume, ft ³	(Vmstd)	42.120	41.941	43.403	42.488
Standard Water Volume, ft ³	(Vwstd)	2.210	1.597	1.780	1.862
Moisture Fraction Measured	(BWSmsd)	0.050	0.037	0.039	0.042
Moisture Fraction @ Saturation	(BWSsat)	31.864	31.494	30.619	31.326
Moisture Fraction	(BWS)	0.050	0.037	0.039	0.042
Meter Pressure, in Hg	(Pm)	30.49	30.49	30.50	30.49
Volume at Nozzle, ft ³	(Vn)	76.992	75.516	78.117	76.875
Isokinetic Sampling Rate, (%)	(I)	97.5	95.3	96.6	96.5
DGM Calibration Check Value, (+/- 5%)	(Y _{qa})	-0.7	-1.9	-0.4	-1.0

Location Caterpillar, Inc - Virginia Beach, VA

Source 3516HD Generator (LC 10)

Project No. 2019-0420

Parameter Polycyclic Aromatic Hydrocarbons, Naphthalene

Run Number		Run 1	Run 2	Run 3	Average
Date		3/8/19	3/8/19	3/8/19	--
Start Time		9:40	11:15	13:04	--
Stop Time		10:40	12:15	14:04	--
Run Time, min	(θ)	60.0	60.0	60.0	60.0
EMISSION CALCULATIONS					
Acenaphthene Concentration, ug/dscm	($C_{C_{12}H_{10}}$)	2.5	2.5	2.4	2.5
Acenaphthene Emission Rate, kg/hr	($ER_{C_{12}H_{10}}$)	1.3E-05	1.3E-05	1.3E-05	1.3E-05
Acenaphthene Emission Rate, lb/hr	($ER_{C_{12}H_{10}}$)	2.8E-05	2.9E-05	2.8E-05	2.8E-05
Acenaphthylene Concentration, ug/dscm	($C_{C_{12}H_8}$)	2.5	2.5	2.4	2.5
Acenaphthylene Emission Rate, kg/hr	($ER_{C_{12}H_8}$)	1.3E-05	1.3E-05	1.3E-05	1.3E-05
Acenaphthylene Emission Rate, lb/hr	($ER_{C_{12}H_8}$)	2.8E-05	2.9E-05	2.8E-05	2.8E-05
Anthracene Concentration, ug/dscm	($C_{C_{14}H_{10}}$)	0.84	0.84	0.81	0.83
Anthracene Emission Rate, kg/hr	($ER_{C_{14}H_{10}}$)	4.2E-06	4.3E-06	4.3E-06	4.3E-06
Anthracene Emission Rate, lb/hr	($ER_{C_{14}H_{10}}$)	9.3E-06	9.5E-06	9.4E-06	9.4E-06
Benz[a]anthracene Concentration, ug/dscm	($C_{C_{18}H_{12}}$)	0.67	0.67	0.65	0.67
Benz[a]anthracene Emission Rate, kg/hr	($ER_{C_{18}H_{12}}$)	3.4E-06	3.4E-06	3.4E-06	3.4E-06
Benz[a]anthracene Emission Rate, lb/hr	($ER_{C_{18}H_{12}}$)	7.4E-06	7.6E-06	7.5E-06	7.5E-06
Benzo[a]pyrene Concentration, ug/dscm	($C_{C_{20}H_{12}}$)	0.84	0.84	0.81	0.83
Benzo[a]pyrene Emission Rate, kg/hr	($ER_{C_{20}H_{12}}$)	4.2E-06	4.3E-06	4.3E-06	4.3E-06
Benzo[a]pyrene Emission Rate, lb/hr	($ER_{C_{20}H_{12}}$)	9.3E-06	9.5E-06	9.4E-06	9.4E-06
Benzo[a]fluoranthene Concentration, ug/dscm	($C_{C_{20}H_{12}}$)	0.67	0.67	0.65	0.67
Benzo[a]fluoranthene Emission Rate, kg/hr	($ER_{C_{20}H_{12}}$)	3.4E-06	3.4E-06	3.4E-06	3.4E-06
Benzo[a]fluoranthene Emission Rate, lb/hr	($ER_{C_{20}H_{12}}$)	7.4E-06	7.6E-06	7.5E-06	7.5E-06
Benzo[g,h,i]perylene Concentration, ug/dscm	($C_{C_{22}H_{12}}$)	0.67	0.67	0.65	0.67
Benzo[g,h,i]perylene Emission Rate, kg/hr	($ER_{C_{22}H_{12}}$)	3.4E-06	3.4E-06	3.4E-06	3.4E-06
Benzo[g,h,i]perylene Emission Rate, lb/hr	($ER_{C_{22}H_{12}}$)	7.4E-06	7.6E-06	7.5E-06	7.5E-06
Benzo[k]fluoranthene Concentration, ug/dscm	($C_{C_{20}H_{12}}$)	0.84	0.84	0.81	0.83
Benzo[k]fluoranthene Emission Rate, kg/hr	($ER_{C_{20}H_{12}}$)	4.2E-06	4.3E-06	4.3E-06	4.3E-06
Benzo[k]fluoranthene Emission Rate, lb/hr	($ER_{C_{20}H_{12}}$)	9.3E-06	9.5E-06	9.4E-06	9.4E-06
Chrysene Concentration, ug/dscm	($C_{C_{18}H_{12}}$)	0.67	0.67	0.65	0.67
Chrysene Emission Rate, kg/hr	($ER_{C_{18}H_{12}}$)	3.4E-06	3.4E-06	3.4E-06	3.4E-06
Chrysene Emission Rate, lb/hr	($ER_{C_{18}H_{12}}$)	7.4E-06	7.6E-06	7.5E-06	7.5E-06
Dibenz[a,h]anthracene Concentration, ug/dscm	($C_{C_{22}H_{14}}$)	0.67	0.67	0.65	0.67
Dibenz[a,h]anthracene Emission Rate, kg/hr	($ER_{C_{22}H_{14}}$)	3.4E-06	3.4E-06	3.4E-06	3.4E-06
Dibenz[a,h]anthracene Emission Rate, lb/hr	($ER_{C_{22}H_{14}}$)	7.4E-06	7.6E-06	7.5E-06	7.5E-06
Fluoranthene Concentration, ug/dscm	($C_{C_{16}H_{10}}$)	1.7	1.7	1.6	1.7
Fluoranthene Emission Rate, kg/hr	($ER_{C_{16}H_{10}}$)	8.4E-06	8.6E-06	8.5E-06	8.5E-06
Fluoranthene Emission Rate, lb/hr	($ER_{C_{16}H_{10}}$)	1.9E-05	1.9E-05	1.9E-05	1.9E-05
Fluorene Concentration, ug/dscm	($C_{C_{13}H_{10}}$)	4.9	5.6	5.5	5.3
Fluorene Emission Rate, kg/hr	($ER_{C_{13}H_{10}}$)	2.4E-05	2.9E-05	2.9E-05	2.7E-05
Fluorene Emission Rate, lb/hr	($ER_{C_{13}H_{10}}$)	5.4E-05	6.4E-05	6.4E-05	6.0E-05
Indeno(1,2,3-cd)pyrene Concentration, ug/dscm	($C_{C_{22}H_{12}}$)	0.84	0.84	0.81	0.83
Indeno(1,2,3-cd)pyrene Emission Rate, kg/hr	($ER_{C_{22}H_{12}}$)	4.2E-06	4.3E-06	4.3E-06	4.3E-06
Indeno(1,2,3-cd)pyrene Emission Rate, lb/hr	($ER_{C_{22}H_{12}}$)	9.3E-06	9.5E-06	9.4E-06	9.4E-06
Naphthalene Concentration, ug/dscm	($C_{C_{10}H_8}$)	111.5	145.7	130.2	129.1
Naphthalene Emission Rate, kg/hr	($ER_{C_{10}H_8}$)	5.6E-04	7.5E-04	6.8E-04	6.6E-04
Naphthalene Emission Rate, lb/hr	($ER_{C_{10}H_8}$)	1.2E-03	1.6E-03	1.5E-03	1.5E-03
Phenanthrene Concentration, ug/dscm	($C_{C_{10}H_8}$)	11.1	11.2	11.1	11.1
Phenanthrene Emission Rate, kg/hr	($ER_{C_{10}H_8}$)	5.6E-05	5.7E-05	5.8E-05	5.7E-05
Phenanthrene Emission Rate, lb/hr	($ER_{C_{14}H_{10}}$)	1.2E-04	1.3E-04	1.3E-04	1.3E-04
Pyrene Concentration, ug/dscm	($C_{C_{14}H_{10}}$)	10.9	10.9	11.4	11.1
Pyrene Emission Rate, kg/hr	($ER_{C_{14}H_{10}}$)	5.5E-05	5.6E-05	6.0E-05	5.7E-05
Pyrene Emission Rate, lb/hr	($ER_{C_{16}H_{10}}$)	1.2E-04	1.2E-04	1.3E-04	1.3E-04

Underlined values represent results below the detection limit. The detection limit was used for emission purposes.

Location Caterpillar, Inc - Virginia Beach, VA

Source 3516HD Generator (LC 10)

Project No. 2019-0420

Parameter Polycyclic Aromatic Hydrocarbons, Naphthalene

Run Number		Run 1	Run 2	Run 3	Average
Date		3/8/19	3/8/19	3/8/19	--
Start Time		9:40	11:15	13:04	--
Stop Time		10:40	12:15	14:04	--
Run Time, min		60.0	60.0	60.0	60.0
VELOCITY HEAD, in. WC					
Point 1		0.24	0.24	0.26	0.25
Point 2		0.29	0.29	0.34	0.31
Point 3		0.28	0.33	0.35	0.32
Point 4		0.34	0.34	0.31	0.33
Point 5		0.33	0.31	0.37	0.34
Point 6		0.30	0.36	0.35	0.34
Point 7		0.30	0.24	0.29	0.28
Point 8		0.31	0.35	0.33	0.33
Point 9		0.32	0.36	0.33	0.34
Point 10		0.36	0.34	0.36	0.35
Point 11		0.35	0.34	0.32	0.34
Point 12		0.31	0.28	0.33	0.31
CALCULATED DATA					
Square Root of ΔP , (in. WC) ^{1/2}	(ΔP)	0.557	0.560	0.572	0.563
Pitot Tube Coefficient	(Cp)	0.840	0.840	0.840	0.840
Barometric Pressure, in. Hg	(Pb)	30.37	30.37	30.37	30.37
Static Pressure, in. WC	(Pg)	-0.15	-0.15	-0.15	-0.15
Stack Pressure, in. Hg	(Ps)	30.36	30.36	30.36	30.36
Stack Cross-sectional Area, ft ²	(As)	2.18	2.18	2.18	2.18
Temperature, °F	(Ts)	470.5	469.3	466.3	468.7
Temperature, °R	(Ts)	930.5	929.3	926.3	928.7
Moisture Fraction Measured	(BWSmsd)	0.050	0.037	0.039	0.042
Moisture Fraction @ Saturation	(BWSsat)	31.864	31.494	30.619	31.326
Moisture Fraction	(BWS)	0.050	0.037	0.039	0.042
O ₂ Concentration, %	(O ₂)	15.8	15.8	15.8	15.8
CO ₂ Concentration, %	(CO ₂)	3.8	3.7	3.8	3.8
Molecular Weight, lb/lb-mole (dry)	(Md)	29.24	29.22	29.24	29.23
Molecular Weight, lb/lb-mole (wet)	(Ms)	28.68	28.81	28.80	28.76
Velocity, ft/sec	(Vs)	41.3	41.4	42.3	41.7
VOLUMETRIC FLOW RATE					
At Stack Conditions, acfm	(Qa)	5,411	5,425	5,538	5,458
At Standard Conditions, dscfm	(Qs)	2,960	3,013	3,077	3,017

Location Caterpillar, Inc - Virginia Beach, VA

Source 3516HD Generator (LC 10)

Project No. 2019-0420

Parameter Polycyclic Aromatic Hydrocarbons, Naphthalene

Analysis Volumetric

Run 1		Date: 3/8/19					
Impinger No.	1*	2	3	4	5	6*	Total
Contents	XAD Trap	Empty	H2O	H2O	Empty	Silica	--
Initial Volume, mL	347.9	0.0	100.0	100.0	0.0	229.9	777.8
Final Volume, mL	349.3	12.0	108.0	100.0	0.0	255.4	824.7
Gain	1.4	12.0	8.0	0.0	0.0	25.5	46.9
Run 2		Date: 3/8/19					
Impinger No.	1*	2	3	4	5	6*	Total
Contents	XAD Trap	Empty	H2O	H2O	Empty	Silica	--
Initial Volume, mL	348.0	0.0	100.0	100.0	0.0	236.5	784.5
Final Volume, mL	358.7	12.0	94.0	108.0	0.0	245.7	818.4
Gain	10.7	12.0	-6.0	8.0	0.0	9.2	33.9
Run 3		Date: 3/8/19					
Impinger No.	1*	2	3	4	5	6*	Total
Contents	XAD Trap	Empty	H2O	H2O	Empty	Silica	--
Initial Volume, mL	348.0	0.0	100.0	100.0	0.0	231.7	779.7
Final Volume, mL	348.8	13.0	110.0	100.0	0.0	245.7	817.5
Gain	0.8	13.0	10.0	0.0	0.0	14.0	37.8



Isokinetic Field Data

Location: <u>Caterpillar, Inc - Virginia Beach, VA</u>			Start Time: <u>9:40</u>			Source: <u>3516HD Generator (LC 10)</u>		
Date: <u>3/8/19</u>		Run 1	VALID	End Time: <u>10:40</u>		Project No.: <u>2019-0420</u>		Parameter: <u>Polycyclic</u>

STACK DATA (EST)		EQUIPMENT		STACK DATA (EST)		FILTER NO.		STACK DATA (FINAL)		MOIST. DATA		
Moisture:	6.0 % est.	Meter Box ID:	2027	Est. Tm:	70 °F	NA		Pb:	30.37 in. Hg	Vlc (ml)		
Barometric:	30.37 in. Hg	Y:	1.008	Est. Ts:	470 °F			Pg:	-0.15 in. WC	46.9		
Static Press:	-0.15 in. WC	AH @ (in.WC):	1.840	Est. AP:	0.31 in. WC			O ₂ :	15.8 %	K-FACTOR		
Stack Press:	30.36 in. Hg	Probe ID:	PR-403	Est. Dn:	0.312 in.			CO ₂ :	3.8 %	5.344		
CO ₂ :	5.0 %	Liner Material:	glass	Target Rate:	0.70 scfm			Check Pt.		Initial	Final	Corr.
O ₂ :	14.0 %	Pitot ID:	P-403-2	LEAK CHECKS		Pre	Mid 1	Mid 2	Post	Mid 1 (cf)		--
N ₂ /CO:	81.0 %	Pitot Cp/Type:	0.840 S-type	Leak Rate (cfm):		0.000	--	--	0.000	Mid 2 (cf)		--
Md:	29.36 lb/lb-mole	Nozzle ID:	SS-402	Vacuum (in Hg):		10	--	--	10	Mid 3 (cf)		--
Ms:	28.68 lb/lb-mole	Nozzle Dn (in.):	0.312	Pitot Tube:		Pass	--	--	Pass	Mid-Point Leak Check Vol (cf):		--

Sample Pt.	Sample Time (minutes)		Dry Gas Meter Reading (ft ³)	Pitot Tube ΔP (in WC)	Gas Temperatures (°F)		Orifice Press. ΔH (in. WC)		Pump Vac (in. Hg)	Gas Temperatures (°F)				% ISO	Vs (fps)
	Begin	End			DGM Average	Stack	Ideal	Actual		Probe	Filter	Imp Exit	Aux		
					Amb.	Amb.				Amb.	Amb.	Amb.	Amb.		
A-1	0.00	5.00	495.250	0.24	72	472	1.29	1.30	4	260	261	51	54	96.3	36.40
2	5.00	10.00	498.210	0.29	72	472	1.55	1.50	4	260	261	54	64	98.6	40.01
3	10.00	15.00	501.540	0.28	73	472	1.50	1.50	6	259	261	57	60	96.5	39.32
4	15.00	20.00	504.750	0.34	71	471	1.82	1.80	7	259	260	60	60	98.6	43.30
5	20.00	25.00	508.350	0.33	70	470	1.76	1.70	8	260	260	62	63	98.0	42.64
6	25.00	30.00	511.870	0.30	72	471	1.61	1.60	8	260	261	63	64	101.0	40.67
B-1	30.00	35.00	515.340	0.30	72	469	1.61	1.60	8	259	258	64	63	100.3	40.63
2	35.00	40.00	518.790	0.31	73	469	1.67	1.60	8	260	259	60	59	97.3	41.30
3	40.00	45.00	522.200	0.32	74	470	1.72	1.70	8	261	260	64	60	97.9	41.98
4	45.00	50.00	525.690	0.36	74	469	1.94	1.90	9	261	259	63	60	97.9	44.51
5	50.00	55.00	529.390	0.35	75	470	1.89	1.80	10	260	260	61	59	99.1	43.91
6	55.00	60.00	533.090	0.31	76	471	1.67	1.60	10	261	261	58	59	100.6	41.35
60.00	--	--	536.630	--	--	--	--	--	--	--	--	--	--	--	--
Final DGM:			536.630												

RESULTS	Run Time		Vm	ΔP	Tm	Ts	Max Vac	ΔH	%ISO	BWS	Y _{qa}
	min	sec	ft ³	in. WC	°F	°F	in. Hg	in. WC			
	60.0		41.380	0.31	72.8	470.5	10	1.633	97.5	0.050	-0.7



Isokinetic Field Data

Location: Caterpillar, Inc - Virginia Beach, VA				Start Time: 11:15		Source: 3516HD Generator (LC 10)					
Date: 3/8/19		Run 2		VALID		End Time: 12:15		Project No.: 2019-0420		Parameter: Polycyclic	

STACK DATA (EST)			EQUIPMENT			STACK DATA (EST)			FILTER NO.		STACK DATA (FINAL)			MOIST. DATA			
Moisture:	6.0	% est.	Meter Box ID:	2027		Est. Tm:	73	°F	NA		Pb:	30.37	in. Hg	Vlc (ml)			
Barometric:	30.37	in. Hg	Y:	1.008		Est. Ts:	471	°F			Pg:	-0.15	in. WC	33.9			
Static Press:	-0.15	in. WC	ΔH @ (in.WC):	1.840		Est. ΔP:	0.31	in. WC			O ₂ :	15.8	%	K-FACTOR			
Stack Press:	30.36	in. Hg	Probe ID:	PR-403		Est. Dn:	0.311	in.			CO ₂ :	3.7	%	5.37			
CO ₂ :	5.0	%	Liner Material:	glass		Target Rate:	0.70	scfm						Check Pt.	Initial	Final	Corr.
O ₂ :	14.0	%	Pitot ID:	P-403-2		LEAK CHECKS			Pre	Mid 1	Mid 2	Post	Mid 1 (cf)				
N ₂ /CO:	81.0	%	Pitot Cp/Type:	0.840	S-type	Leak Rate (cfm):			0.000	--	--	0.000	Mid 2 (cf)				
Md:	29.36	lb/lb-mole	Nozzle ID:	SS-402		Vacuum (in Hg):			15	--	--	12	Mid 3 (cf)				
Ms:	28.68	lb/lb-mole	Nozzle Dn (in.):	0.312		Pitot Tube:			Pass	--	--	Pass	Mid-Point Leak Check Vol (cf):				
									--	--	--	--					

Sample Pt.	Sample Time (minutes)		Dry Gas Meter Reading (ft ³)	Pitot Tube ΔP (in WC)	Gas Temperatures (°F)		Orifice Press. ΔH (in. WC)		Pump Vac (in. Hg)	Gas Temperatures (°F)				% ISO	Vs (fps)
					DGM Average	Stack	ΔH			Probe	Filter	Imp Exit	Aux		
	Amb.	Amb.			Ideal	Actual	Amb.	Amb.		Amb.	Amb.				
	Begin	End			--	--	--	--		--	--				
A-1	0.00	5.00	537.035	0.24	73	470	1.29	1.30	4	260	260	48	52	99.4	36.36
2	5.00	10.00	540.100	0.29	72	470	1.56	1.50	6	257	262	52	57	95.8	39.97
3	10.00	15.00	543.340	0.33	71	470	1.77	1.70	7	259	261	54	58	98.6	42.64
4	15.00	20.00	546.890	0.34	71	470	1.82	1.80	7	260	260	58	60	98.8	43.28
5	20.00	25.00	550.500	0.31	71	469	1.66	1.60	7	261	253	61	62	98.3	41.30
6	25.00	30.00	553.930	0.36	71	469	1.93	1.90	9	260	260	62	62	95.5	44.51
B-1	30.00	35.00	557.520	0.24	71	469	1.29	1.30	8	261	260	63	61	99.5	36.34
2	35.00	40.00	560.580	0.35	71	469	1.88	1.80	8	258	260	62	60	94.9	43.88
3	40.00	45.00	564.100	0.36	72	469	1.93	1.90	10	258	260	62	60	95.1	44.51
4	45.00	50.00	567.680	0.34	72	469	1.83	1.80	11	259	259	61	60	99.1	43.25
5	50.00	55.00	571.310	0.34	72	468	1.83	1.80	12	258	258	59	62	97.5	43.23
6	55.00	60.00	574.880	0.28	72	469	1.50	1.50	12	261	263	59	63	98.1	39.25
--	60.00	--	578.140												--
Final DGM:			578.140												

RESULTS	Run Time		Vm		ΔP		Tm		Ts		Max Vac	ΔH		%ISO	BWS	Y _{qa}
	min		ft ³		in. WC		°F		°F		in. WC					
	60.0		41.105	ft ³	0.32	in. WC	71.6	°F	469.3	°F	12	1.658	in. WC	95.3	0.037	-1.9



Isokinetic Field Data

Location: Caterpillar, Inc - Virginia Beach, VA				Start Time: 13:04		Source: 3516HD Generator (LC 10)								
Date: 3/8/19		Run 3		End Time: 14:04		Project No.: 2019-0420		Parameter: Polycyclic						
STACK DATA (EST)			EQUIPMENT			STACK DATA (EST)			FILTER NO.		STACK DATA (FINAL)		MOIST. DATA	
Moisture: 6.0 % est.			Meter Box ID: 2027			Est. Tm: 72 °F			NA		Pb: 30.37 in. Hg		Vlc (ml)	
Barometric: 30.37 in. Hg			Y: 1.008			Est. Ts: 469 °F					Pg: -0.15 in. WC		37.8	
Static Press: -0.15 in. WC			ΔH @ (in.WC): 1.840			Est. ΔP: 0.32 in. WC					O ₂ : 15.8 %		K-FACTOR	
Stack Press: 30.36 in. Hg			Probe ID: PR-403			Est. Dn: 0.310 in.					CO ₂ : 3.8 %		5.365	
CO ₂ : 5.0 %			Liner Material: glass			Target Rate: 0.70 scfm					Check Pt.		Initial Final Corr.	
O ₂ : 14.0 %			Pitot ID: P-403-2			LEAK CHECKS			Pre Mid 1 Mid 2 Post		Mid 1 (cf)		--	
N ₂ /CO: 81.0 %			Pitot Cp/Type: 0.840 S-type			Leak Rate (cfm): 0.000			-- -- 0.000		Mid 2 (cf)		--	
Md: 29.36 lb/lb-mole			Nozzle ID: SS-402			Vacuum (in Hg): 15			-- -- 10		Mid 3 (cf)		--	
Ms: 28.68 lb/lb-mole			Nozzle Dn (in.): 0.312			Pitot Tube: Pass			-- -- Pass		Mid-Point Leak Check Vol (cf): --			

Sample Pt.	Sample Time (minutes)		Dry Gas Meter Reading (ft ³)	Pitot Tube ΔP (in WC)	Gas Temperatures (°F)		Orifice Press. ΔH (in. WC)		Pump Vac (in. Hg)	Gas Temperatures (°F)				% ISO	Vs (fps)
					DGM Average	Stack	Ideal Actual			Probe	Filter	Imp Exit	Aux		
	Amb.	Amb.					Amb.	Amb.		Amb.	Amb.				
	Begin	End			--	--	--	--		--	--				
A-1	0.00	5.00	578.885	0.26	68	468	1.39	1.40	4	261	260	46	43	99.5	37.80
2	5.00	10.00	582.050	0.34	69	467	1.82	1.80	6	260	259	47	46	94.7	43.21
3	10.00	15.00	585.500	0.35	70	465	1.88	1.80	6	262	260	48	49	101.1	43.79
4	15.00	20.00	589.250	0.31	70	466	1.66	1.60	6	259	258	49	50	97.7	41.23
5	20.00	25.00	592.660	0.37	71	466	1.99	2.00	8	261	259	49	50	96.4	45.05
6	25.00	30.00	596.340	0.35	71	466	1.88	1.80	8	261	260	47	52	102.1	43.81
B-1	30.00	35.00	600.130	0.29	71	467	1.56	1.50	8	261	259	47	50	99.7	39.90
2	35.00	40.00	603.500	0.33	71	466	1.78	1.70	8	261	259	46	49	95.7	42.54
3	40.00	45.00	606.950	0.33	72	466	1.78	1.70	8	261	260	44	49	100.7	42.54
4	45.00	50.00	610.590	0.36	72	465	1.94	1.90	9	260	261	47	47	96.7	44.41
5	50.00	55.00	614.240	0.32	72	466	1.72	1.70	10	261	262	48	49	99.2	41.89
6	55.00	60.00	617.770	0.33	72	467	1.78	1.70	10	263	259	49	51	99.1	42.57
--	60.00	--	621.350												--
Final DGM:			621.350												

RESULTS	Run Time		Vm		ΔP		Tm		Ts		Max Vac		ΔH		%ISO	BWS	Y _{qa}
	60.0	min	42.465	ft ³	0.33	in. WC	70.8	°F	466.3	°F	10	1.717	in. WC	96.6	0.039	-0.4	

Load Condition: 25%

Location Caterpillar, Inc - Virginia Beach, VA
 Source 3516HD Generator (LC 25)
 Project No. 2019-0420
 Parameter PM/CPM

Run Number		Run 1	Run 2	Run 3	Average
Date		3/7/19	3/7/19	3/7/19	--
Start Time		13:41	15:25	17:02	--
Stop Time		14:41	16:25	18:02	--
Run Time, min	(θ)	60.0	60.0	60.0	60.0
INPUT DATA					
Barometric Pressure, in. Hg	(Pb)	30.37	30.37	30.37	30.37
Meter Correction Factor	(Y)	0.989	0.989	0.989	0.989
Orifice Calibration Value	($\Delta H @$)	1.746	1.746	1.746	1.746
Meter Volume, ft ³	(Vm)	37.155	37.405	36.585	37.048
Meter Temperature, °F	(Tm)	70.8	70.4	67.6	69.6
Meter Temperature, °R	(Tm)	530.8	530.4	527.6	529.6
Meter Orifice Pressure, in. WC	(ΔH)	1.200	1.235	1.195	1.210
Volume H ₂ O Collected, mL	(Vlc)	42.0	40.3	42.0	41.4
Nozzle Diameter, in	(Dn)	0.251	0.251	0.251	0.251
Area of Nozzle, ft ²	(An)	0.0003	0.0003	0.0003	0.0003
Filterable PM Mass, mg	(Mn)	25.1	22.5	23.9	23.8
Condensable PM Mass, mg	(M _{CPM})	23.2	21.5	27.5	24.1
ISOKINETIC DATA					
Standard Meter Volume, ft ³	(Vmstd)	37.213	37.490	36.862	37.189
Standard Water Volume, ft ³	(Vwstd)	1.977	1.897	1.977	1.951
Moisture Fraction Measured	(BWSmsd)	0.050	0.048	0.051	0.050
Moisture Fraction @ Saturation	(BWSsat)	86.305	83.580	80.770	83.552
Moisture Fraction	(BWS)	0.050	0.048	0.051	0.050
Meter Pressure, in Hg	(Pm)	30.46	30.46	30.46	30.46
Volume at Nozzle, ft ³	(Vn)	77.049	77.105	75.687	76.614
Isokinetic Sampling Rate, (%)	(I)	98.9	98.6	98.5	98.7
DGM Calibration Check Value, (+/- 5%)	(Y _{qa})	-0.1	-0.8	-1.2	-0.7
EMISSION CALCULATIONS					
Filterable PM Concentration, grain/dscf	(C _s)	0.010	0.0093	0.010	0.0099
Filterable PM Emission Rate, lb/hr	(PMR)	0.36	0.32	0.34	0.34
Condensable PM Concentration, grain/dscf	(C _{CPM})	0.0096	0.0089	0.012	0.010
Condensable PM Emission Rate, lb/hr	(ER _{CPM})	0.33	0.31	0.39	0.34
Total PM Concentration, grain/dscf	(C _{TPM})	0.020	0.018	0.022	0.020
Total PM Emission Rate, lb/hr	(ER _{TPM})	0.68	0.62	0.73	0.68

Location Caterpillar, Inc - Virginia Beach, VA
Source 3516HD Generator (LC 25)
Project No. 2019-0420
Parameter PM/CPM

Run Number		Run 1	Run 2	Run 3	Average
Date		3/7/19	3/7/19	3/7/19	--
Start Time		13:41	15:25	17:02	--
Stop Time		14:41	16:25	18:02	--
Run Time, min		60.0	60.0	60.0	60.0
VELOCITY HEAD, in. WC					
Point 1		0.55	0.58	0.49	0.54
Point 2		0.60	0.59	0.54	0.58
Point 3		0.75	0.63	0.59	0.66
Point 4		0.70	0.76	0.75	0.74
Point 5		0.69	0.78	0.64	0.70
Point 6		0.60	0.60	0.53	0.58
Point 7		0.48	0.49	0.68	0.55
Point 8		0.63	0.67	0.67	0.66
Point 9		0.71	0.73	0.73	0.72
Point 10		0.67	0.63	0.68	0.66
Point 11		0.64	0.66	0.61	0.64
Point 12		0.66	0.66	0.63	0.65
CALCULATED DATA					
Square Root of ΔP , (in. WC) ^{1/2}	(ΔP)	0.799	0.804	0.791	0.798
Pitot Tube Coefficient	(Cp)	0.840	0.840	0.840	0.840
Barometric Pressure, in. Hg	(Pb)	30.37	30.37	30.37	30.37
Static Pressure, in. WC	(Pg)	-0.28	-0.28	-0.28	-0.28
Stack Pressure, in. Hg	(Ps)	30.35	30.35	30.35	30.35
Stack Cross-sectional Area, ft ²	(As)	2.18	2.18	2.18	2.18
Temperature, °F	(Ts)	592.9	588.4	583.7	588.3
Temperature, °R	(Ts)	1052.9	1048.4	1043.7	1048.3
Moisture Fraction Measured	(BWSmsd)	0.050	0.048	0.051	0.050
Moisture Fraction @ Saturation	(BWSsat)	86.305	83.580	80.770	83.552
Moisture Fraction	(BWS)	0.050	0.048	0.051	0.050
O ₂ Concentration, %	(O ₂)	14.5	14.4	14.4	14.4
CO ₂ Concentration, %	(CO ₂)	4.8	4.9	4.8	4.8
Molecular Weight, lb/lb-mole (dry)	(Md)	29.34	29.35	29.35	29.35
Molecular Weight, lb/lb-mole (wet)	(Ms)	28.77	28.80	28.77	28.78
Velocity, ft/sec	(Vs)	63.0	63.2	62.1	62.8
VOLUMETRIC FLOW RATE					
At Stack Conditions, acfm	(Qa)	8,244	8,274	8,131	8,216
At Standard Conditions, dscfm	(Qs)	3,982	4,023	3,960	3,988

Location Caterpillar, Inc - Virginia Beach, VA

Source 3516HD Generator (LC 25)

Project No. 2019-0420

Parameter PM/CPM

Analysis Volumetric

Run 1		Date: 3/7/19				
Impinger No.	1	2	3	4	5*	Total
Contents	Empty	Empty	H2O	Empty	Silica	--
Initial Volume, mL	0.0	0.0	100.0	0.0	235.8	335.8
Final Volume, mL	32.0	0.0	100.0	0.0	245.8	377.8
Gain	32.0	0.0	0.0	0.0	10.0	42.0
Run 2		Date: 3/7/19				
Impinger No.	1	2	3	4	5*	Total
Contents	Empty	Empty	H2O	Empty	Silica	--
Initial Volume, mL	0.0	0.0	100.0	0.0	226.6	326.6
Final Volume, mL	18.0	2.0	108.0	2.0	236.9	366.9
Gain	18.0	2.0	8.0	2.0	10.3	40.3
Run 3		Date: 3/7/19				
Impinger No.	1	2	3	4	5*	Total
Contents	Empty	Empty	H2O	Empty	Silica	--
Initial Volume, mL	0.0	0.0	100.0	0.0	234.0	334.0
Final Volume, mL	15.0	7.0	108.0	2.0	244.0	376.0
Gain	15.0	7.0	8.0	2.0	10.0	42.0

Isokinetic Field Data

Location: Caterpillar, Inc - Virginia Beach, VA				Start Time: 13:41		Source: 3516HD Generator (LC 25)					
Date: 3/7/19		Run 1		End Time: 14:41		Project No.: 2019-0420		Parameter: PM/CPM			
STACK DATA (EST)		EQUIPMENT		STACK DATA (EST)		FILTER NO.		STACK DATA (FINAL)		MOIST. DATA	
Moisture: 6.0 % est.		Meter Box ID: 2026		Est. Tm: 70 °F		10933		Pb: 30.37 in. Hg		Vlc (ml)	
Barometric: 30.37 in. Hg		Y: 0.989		Est. Ts: 590 °F				Pg: -0.28 in. WC		42.0	
Static Press: -0.28 in. WC		AH @ (in.WC): 1.746		Est. AP: 0.64 in. WC				O ₂ : 14.5 %		K-FACTOR	
Stack Press: 30.35 in. Hg		Probe ID: PR-402-0		Est. Dn: 0.252 in.				CO ₂ : 4.8 %		1.881	
CO ₂ : 5.0 %		Liner Material: glass		Target Rate: 0.62 scfm				Check Pt.		Initial Final Corr.	
O ₂ : 14.0 %		Pitot ID: P-403-2		LEAK CHECKS		Pre Mid 1 Mid 2 Post		Mid 1 (cf)		--	
N ₂ /CO: 81.0 %		Pitot Cp/Type: 0.840 S-type		Leak Rate (cfm): 0.000		-- -- -- 0.000		Mid 2 (cf)		--	
Md: 29.36 lb/lb-mole		Nozzle ID: S-15		Vacuum (in Hg): 8		-- -- -- 8		Mid 3 (cf)		--	
Ms: 28.68 lb/lb-mole		Nozzle Dn (in.): 0.251		Pitot Tube: Pass		-- -- -- Pass		Mid-Point Leak Check Vol (cf):		--	

Sample Pt.	Sample Time (minutes)		Dry Gas Meter Reading (ft ³)	Pitot Tube ΔP (in WC)	Gas Temperatures (°F)		Orifice Press. ΔH (in. WC)		Pump Vac (in. Hg)	Gas Temperatures (°F)				% ISO	Vs (fps)
					DGM Average	Stack	Ideal Actual			Probe	Filter	Imp Exit	Aux		
	Amb.	Amb.					Amb.	Amb.		Amb.	Amb.				
	69	70					71	70		69	69				
A-1	0.00	5.00	157.160	0.55	69	596	1.03	1.00	3	261	258	54	70	102.1	58.66
2	5.00	10.00	160.090	0.60	68	594	1.12	1.10	3	259	262	49	70	98.2	61.21
3	10.00	15.00	163.030	0.75	68	593	1.40	1.40	4	262	262	48	72	99.5	68.40
4	15.00	20.00	166.360	0.70	69	594	1.31	1.30	4	259	261	49	73	100.1	66.12
5	20.00	25.00	169.600	0.69	69	594	1.29	1.30	5	260	261	50	73	99.8	65.64
6	25.00	30.00	172.810	0.60	70	592	1.13	1.10	5	264	261	50	74	99.7	61.15
B-1	30.00	35.00	175.810	0.48	71	592	0.90	0.90	4	259	272	50	75	99.7	54.70
2	35.00	40.00	178.500	0.63	72	594	1.19	1.20	5	262	263	50	76	100.6	62.72
3	40.00	45.00	181.610	0.71	72	592	1.34	1.30	5	260	260	50	75	97.5	66.52
4	45.00	50.00	184.810	0.67	73	592	1.27	1.30	6	261	260	51	73	101.4	64.62
5	50.00	55.00	188.050	0.64	74	592	1.21	1.20	6	260	261	52	72	99.1	63.16
6	55.00	60.00	191.150	0.66	74	590	1.25	1.30	6	258	258	52	70	99.5	64.08
60.00	--	--	194.315												--
Final DGM:			194.315												

RESULTS	Run Time		Vm	ΔP	Tm	Ts	Max Vac	ΔH	%ISO	BWS	Y _{qs}				
	60.0	min	37.155	ft ³	0.64	in. WC	70.8	°F	592.9	°F	6	1.200	in. WC	98.9	0.050



Isokinetic Field Data

Location: Caterpillar, Inc - Virginia Beach, VA				Start Time: 15:25		Source: 3516HD Generator (LC 25)										
Date: 3/7/19		Run 2		VALID		End Time: 16:25		Project No.: 2019-0420		Parameter: PM/CPM						
STACK DATA (EST)			EQUIPMENT			STACK DATA (EST)			FILTER NO.		STACK DATA (FINAL)		MOIST. DATA			
Moisture: 6.0 % est.			Meter Box ID: 2026			Est. Tm: 71 °F			11086		Pb: 30.37 in. Hg		Vlc (ml)			
Barometric: 30.37 in. Hg			Y: 0.989			Est. Ts: 593 °F					Pg: -0.28 in. WC		40.3			
Static Press: -0.28 in. WC			ΔH @ (in.WC): 1.746			Est. ΔP: 0.64 in. WC					O ₂ : 14.4 %		K-FACTOR			
Stack Press: 30.35 in. Hg			Probe ID: PR-402-0			Est. Dn: 0.252 in.					CO ₂ : 4.9 %		1.88			
CO ₂ : 5.0 %			Liner Material: glass			Target Rate: 0.62 scfm										
O ₂ : 14.0 %			Pitot ID: P-403-2			LEAK CHECKS			Pre		Mid 1		Mid 2		Post	
N ₂ /CO: 81.0 %			Pitot Cp/Type: 0.840 S-type			Leak Rate (cfm): 0.000			--		--		0.000		Mid 1 (cf)	
Md: 29.36 lb/lb-mole			Nozzle ID: S-15			Vacuum (in Hg): 10			--		--		10		Mid 2 (cf)	
Ms: 28.68 lb/lb-mole			Nozzle Dn (in.): 0.251			Pitot Tube: Pass			--		--		Pass		Mid 3 (cf)	
												Check Pt. Initial Final Corr.				
												Mid 1 (cf)		--		
												Mid 2 (cf)		--		
												Mid 3 (cf)		--		
												Mid-Point Leak Check Vol (cf): --				

Sample Pt.	Sample Time (minutes)		Dry Gas Meter Reading (ft ³)	Pitot Tube ΔP (in WC)	Gas Temperatures (°F)		Orifice Press. ΔH (in. WC)		Pump Vac (in. Hg)	Gas Temperatures (°F)				% ISO	Vs (fps)
					DGM Average	Stack	Ideal			Actual	Probe	Filter	Imp Exit		
	Amb.	Amb.					Amb.	Amb.		Amb.	Amb.				
	Begin	End			--	--	--	--		--	--				
A-1	0.00	5.00	194.485	0.58	72	581	1.11	1.10	3	261	262	46	70	98.7	59.81
2	5.00	10.00	197.430	0.59	70	586	1.12	1.10	3	260	263	42	68	100.0	60.47
3	10.00	15.00	200.420	0.63	70	590	1.19	1.20	4	261	261	42	66	100.5	62.60
4	15.00	20.00	203.520	0.76	70	590	1.43	1.40	5	260	259	44	67	97.5	68.76
5	20.00	25.00	206.820	0.78	70	589	1.47	1.50	5	260	260	46	69	100.5	69.63
6	25.00	30.00	210.270	0.60	70	591	1.13	1.10	5	260	261	46	69	101.3	61.13
B-1	30.00	35.00	213.320	0.49	70	589	0.92	0.92	5	258	260	47	70	98.0	55.19
2	35.00	40.00	215.990	0.67	70	591	1.26	1.30	6	259	260	46	71	100.7	64.59
3	40.00	45.00	219.190	0.73	70	589	1.38	1.40	6	260	260	46	73	99.1	67.36
4	45.00	50.00	222.480	0.63	71	588	1.19	1.20	6	261	260	46	74	99.9	62.55
5	50.00	55.00	225.570	0.66	71	588	1.25	1.30	7	260	260	45	75	100.5	64.02
6	55.00	60.00	228.750	0.66	71	589	1.25	1.30	7	261	260	45	77	99.2	64.05
--	60.00	--	231.890												--
Final DGM:			231.890												

RESULTS	Run Time		Vm		ΔP		Tm		Ts		Max Vac		ΔH		%ISO		BWS		Y _{qa}	
	min		ft ³		in. WC		°F		°F		in. WC		in. WC							
	60.0		37.405		0.65		70.4		588.4		7		1.235		98.6		0.048		-0.8	



Isokinetic Field Data

Location: Caterpillar, Inc - Virginia Beach, VA				Start Time: 17:02		Source: 3516HD Generator (LC 25)					
Date: 3/7/19		Run 3		End Time: 18:02		Project No.: 2019-0420		Parameter: PM/CPM			
STACK DATA (EST)		EQUIPMENT		STACK DATA (EST)		FILTER NO.		STACK DATA (FINAL)		MOIST. DATA	
Moisture: 6.0 % est.		Meter Box ID: 2026		Est. Tm: 70 °F		11082		Pb: 30.37 in. Hg		Vlc (ml)	
Barometric: 30.37 in. Hg		Y: 0.989		Est. Ts: 588 °F				Pg: -0.28 in. WC		42.0	
Static Press: -0.28 in. WC		ΔH @ (in.WC): 1.746		Est. ΔP: 0.65 in. WC				O ₂ : 14.4 %		K-FACTOR	
Stack Press: 30.35 in. Hg		Probe ID: PR-402-0		Est. Dn: 0.251 in.				CO ₂ : 4.8 %		1.886	
CO ₂ : 5.0 %		Liner Material: glass		Target Rate: 0.62 scfm							
O ₂ : 14.0 %		Pitot ID: P-403-2		LEAK CHECKS		Pre		Mid 1		Mid 2	
N ₂ /CO: 81.0 %		Pitot Cp/Type: 0.840 S-type		Leak Rate (cfm): 0.000		--		--		0.000	
Md: 29.36 lb/lb-mole		Nozzle ID: S-15		Vacuum (in Hg): 10		--		--		8	
Ms: 28.68 lb/lb-mole		Nozzle Dn (in.): 0.251		Pitot Tube: Pass		--		--		Pass	
				Check Pt.		Initial		Final		Corr.	
				Mid 1 (cf)						--	
				Mid 2 (cf)						--	
				Mid 3 (cf)						--	
				Mid-Point Leak Check Vol (cf):						--	

Sample Pt.	Sample Time (minutes)		Dry Gas Meter Reading (ft ³)	Pitot Tube ΔP (in WC)	Gas Temperatures (°F)		Orifice Press. ΔH (in. WC)		Pump Vac (in. Hg)	Gas Temperatures (°F)				% ISO	Vs (fps)
					DGM Average	Stack	Ideal			Actual	Probe	Filter	Imp Exit		
	Amb.	Amb.					Amb.	Amb.		Amb.	Amb.				
	Begin	End			--	--	--	--		--	--				
A-1	0.00	5.00	233.190	0.49	67	565	0.94	0.94	2	258	257	46	66	92.7	54.55
2	5.00	10.00	235.730	0.54	67	576	1.03	1.00	2	261	265	44	69	106.6	57.57
3	10.00	15.00	238.780	0.59	67	583	1.11	1.10	3	259	262	44	69	95.0	60.38
4	15.00	20.00	241.610	0.75	67	586	1.41	1.40	5	258	261	45	70	99.7	68.18
5	20.00	25.00	244.950	0.64	67	586	1.20	1.20	5	260	261	46	70	100.4	62.98
6	25.00	30.00	248.060	0.53	68	586	1.00	1.00	4	259	260	47	72	100.2	57.31
B-1	30.00	35.00	250.890	0.68	68	587	1.28	1.30	4	260	260	47	76	97.9	64.95
2	35.00	40.00	254.020	0.67	68	587	1.26	1.30	5	260	259	47	78	100.2	64.47
3	40.00	45.00	257.200	0.73	68	587	1.37	1.40	6	260	259	47	75	99.1	67.29
4	45.00	50.00	260.480	0.68	68	587	1.28	1.30	6	260	260	47	75	100.4	64.95
5	50.00	55.00	263.690	0.61	68	587	1.15	1.20	6	261	260	47	72	101.1	61.51
6	55.00	60.00	266.750	0.63	68	587	1.19	1.20	6	260	260	47	70	98.3	62.52
--	60.00	--	269.775												--
Final DGM:			269.775												

RESULTS	Run Time		Vm		ΔP		Tm		Ts		Max Vac		ΔH		%ISO	BWS	Y _{qa}
	min		ft ³		in. WC		°F		°F		in. WC		in. WC				
	60.0		36.585	ft ³	0.63	in. WC	67.6	°F	583.7	°F	6	1.195	in. WC	98.5	0.051	-1.2	

Location Caterpillar, Inc - Virginia Beach, VA
 Source 3516HD Generator (L25)
 Project No. 2019-0420
 Parameter Arsenic, Cadmium, Nickel

Run Number		Run 1	Run 2	Run 3	Average
Date		3/7/19	3/7/19	3/7/19	--
Start Time		13:41	15:25	17:02	--
Stop Time		14:41	16:25	18:02	--
Run Time, min	(θ)	60.0	60.0	60.0	60.0
INPUT DATA					
Barometric Pressure, in. Hg	(Pb)	30.26	30.26	30.26	30.26
Meter Correction Factor	(Y)	0.994	0.994	0.994	0.994
Orifice Calibration Value	($\Delta H @$)	1.816	1.816	1.816	1.816
Meter Volume, ft ³	(Vm)	37.464	37.536	38.096	37.699
Meter Temperature, °F	(Tm)	68.2	65.3	61.8	65.1
Meter Temperature, °R	(Tm)	528.2	525.3	521.8	525.1
Meter Orifice Pressure, in. WC	(ΔH)	1.383	1.400	1.358	1.381
Volume H ₂ O Collected, mL	(Vlc)	45.6	41.7	43.0	43.4
Nozzle Diameter, in	(Dn)	0.257	0.257	0.257	0.257
Area of Nozzle, ft ²	(An)	0.0004	0.0004	0.0004	0.0004
Arsenic Mass, ug	(M _{As})	<u>0.80</u>	<u>0.80</u>	<u>0.80</u>	0.80
Cadmium Mass, ug	(M _{Cd})	<u>0.18</u>	<u>0.18</u>	<u>0.18</u>	0.18
Nickel Mass, ug	(M _{Ni})	1.8	1.6	1.5	1.6
ISOKINETIC DATA					
Standard Meter Volume, ft ³	(Vmstd)	37.777	38.055	38.878	38.237
Standard Water Volume, ft ³	(Vwstd)	2.147	1.963	2.024	2.045
Moisture Fraction Measured	(BWSmsd)	0.054	0.049	0.049	0.051
Moisture Fraction @ Saturation	(BWSsat)	82.887	81.996	81.554	82.145
Moisture Fraction	(BWS)	0.054	0.049	0.049	0.051
Meter Pressure, in Hg	(Pm)	30.36	30.36	30.36	30.36
Volume at Nozzle, ft ³	(Vn)	78.314	78.387	80.061	78.921
Isokinetic Sampling Rate, (%)	(I)	95.9	95.6	99.2	96.9
DGM Calibration Check Value, (+/- 5%)	(Y _{qa})	-4.0	-4.1	-0.6	-2.9
EMISSION CALCULATIONS					
Arsenic Concentration, ug/dscm	(C _{As})	0.75	0.74	0.73	0.74
Arsenic Emission Rate, lb/hr	(ER _{As})	1.1E-05	1.1E-05	1.1E-05	1.1E-05
Cadmium Concentration, ug/dscm	(C _{Cd})	0.17	0.17	0.16	0.17
Cadmium Emission Rate, lb/hr	(ER _{Cd})	2.5E-06	2.5E-06	2.4E-06	2.5E-06
Nickel Concentration, ug/dscm	(C _{Ni})	1.7	1.5	1.4	1.5
Nickel Emission Rate, lb/hr	(ER _{Ni})	2.5E-05	2.2E-05	2.0E-05	2.3E-05

Results for runs 1, 2, & 3 for Arsenic and Cadmium were below the detection limit. The detection limit was used for emissions purposes.

Location Caterpillar, Inc - Virginia Beach, VA
Source 3516HD Generator (L25)
Project No. 2019-0420
Parameter Arsenic, Cadmium, Nickel

Run Number		Run 1	Run 2	Run 3	Average
Date		3/7/19	3/7/19	3/7/19	--
Start Time		13:41	15:25	17:02	--
Stop Time		14:41	16:25	18:02	--
Run Time, min		60.0	60.0	60.0	60.0
VELOCITY HEAD, in. WC					
Point 1		0.55	0.58	0.49	0.54
Point 2		0.60	0.59	0.54	0.58
Point 3		0.75	0.63	0.59	0.66
Point 4		0.70	0.76	0.75	0.74
Point 5		0.69	0.78	0.64	0.70
Point 6		0.60	0.60	0.53	0.58
Point 7		0.48	0.49	0.68	0.55
Point 8		0.63	0.67	0.67	0.66
Point 9		0.71	0.73	0.73	0.72
Point 10		0.67	0.63	0.68	0.66
Point 11		0.64	0.66	0.61	0.64
Point 12		0.66	0.66	0.63	0.65
CALCULATED DATA					
Square Root of ΔP , (in. WC) ^{1/2}	(ΔP)	0.799	0.804	0.791	0.798
Pitot Tube Coefficient	(Cp)	0.840	0.840	0.840	0.840
Barometric Pressure, in. Hg	(Pb)	30.26	30.26	30.26	30.26
Static Pressure, in. WC	(Pg)	-0.28	-0.28	-0.28	-0.28
Stack Pressure, in. Hg	(Ps)	30.24	30.24	30.24	30.24
Stack Cross-sectional Area, ft ²	(As)	2.18	2.18	2.18	2.18
Temperature, °F	(Ts)	586.8	585.3	584.5	585.5
Temperature, °R	(Ts)	1046.8	1045.3	1044.5	1045.5
Moisture Fraction Measured	(BWSmsd)	0.054	0.049	0.049	0.051
Moisture Fraction @ Saturation	(BWSsat)	82.887	81.996	81.554	82.145
Moisture Fraction	(BWS)	0.054	0.049	0.049	0.051
O ₂ Concentration, %	(O ₂)	14.5	14.4	14.4	14.4
CO ₂ Concentration, %	(CO ₂)	4.8	4.9	4.8	4.8
Molecular Weight, lb/lb-mole (dry)	(Md)	29.34	29.35	29.35	29.35
Molecular Weight, lb/lb-mole (wet)	(Ms)	28.73	28.79	28.79	28.77
Velocity, ft/sec	(Vs)	63.0	63.2	62.2	62.8
VOLUMETRIC FLOW RATE					
At Stack Conditions, acfm	(Qa)	8,241	8,277	8,147	8,222
At Standard Conditions, dscfm	(Qs)	3,975	4,019	3,956	3,983

Location Caterpillar, Inc - Virginia Beach, VA
 Source 3516HD Generator (L25)
 Project No. 2019-0420
 Parameter Arsenic, Cadmium, Nickel
 Analysis --

Run 1		Date: 3/7/19			
Impinger No.	1	2	3	4*	Total
Contents	HNO3/H2O2	HNO3/H2O2	Empty	Silica	--
Initial Volume, mL	100.0	100.0	0.0	233.7	433.7
Final Volume, mL	120.0	112.0	4.0	243.3	479.3
Gain	20.0	12.0	4.0	9.6	45.6
Run 2		Date: 3/7/19			
Impinger No.	1	2	3	4*	Total
Contents	HNO3/H2O2	HNO3/H2O2	Empty	Silica	--
Initial Volume, mL	100.0	100.0	0.0	227.2	427.2
Final Volume, mL	120.0	110.0	2.0	236.9	468.9
Gain	20.0	10.0	2.0	9.7	41.7
Run 3		Date: 3/7/19			
Impinger No.	1	2	3	4*	Total
Contents	HNO3/H2O2	HNO3/H2O2	Empty	Silica	--
Initial Volume, mL	100.0	100.0	0.0	234.2	434.2
Final Volume, mL	122.0	110.0	2.0	243.2	477.2
Gain	22.0	10.0	2.0	9.0	43.0



Isokinetic Field Data

Location: Caterpillar, Inc - Virginia Beach, VA			Start Time: 13:41			Source: 3516HD Generator (L25)		
Date: 3/7/19		Run 1	VALID	End Time: 14:41		Project No.: 2019-0420		Parameter: Arsenic, Ca

STACK DATA (EST)		EQUIPMENT		STACK DATA (EST)		FILTER NO.		STACK DATA (FINAL)		MOIST. DATA			
Moisture:	6.0 % est.	Meter Box ID:	1690	Est. Tm:	70 °F			Pb:	30.26 in. Hg	Vlc (ml)			
Barometric:	30.26 in. Hg	Y:	0.994	Est. Ts:	550 °F			Pg:	-0.28 in. WC	45.6			
Static Press:	-0.28 in. WC	AH @ (in.WC):	1.816	Est. AP:	0.64 in. WC			O ₂ :	14.5 %	K-FACTOR			
Stack Press:	30.24 in. Hg	Probe ID:	PR402-2	Est. Dn:	0.256 in.			CO ₂ :	4.8 %	2.235			
CO ₂ :	6.0 %	Liner Material:	quartz	Target Rate:	0.65 scfm					Check Pt.	Initial	Final	Corr.
O ₂ :	11.0 %	Pitot ID:	P403-2	LEAK CHECKS		Pre	Mid 1	Mid 2	Post	Mid 1 (cf)		--	
N ₂ /CO:	83.0 %	Pitot Cp/Type:	0.840 --	Leak Rate (cfm):		0.000	--	--	0.000	Mid 2 (cf)		--	
Md:	29.40 lb/lb-mole	Nozzle ID:	.257	Vacuum (in Hg):		11	--	--	13	Mid 3 (cf)		--	
Ms:	28.72 lb/lb-mole	Nozzle Dn (in.):	0.257	Pitot Tube:		Pass	--	--	Pass	Mid-Point Leak Check Vol (cf): --			

Sample Pt.	Sample Time (minutes)		Dry Gas Meter Reading (ft ³)	Pitot Tube AP (in WC)	Gas Temperatures (°F)		Orifice Press. ΔH (in. WC)		Pump Vac (in. Hg)	Gas Temperatures (°F)				% ISO	Vs (fps)
	Begin	End			DGM Average	Stack	Ideal	Actual		Probe	Filter	Imp Exit	Aux		
					Amb.	Amb.				Amb.	Amb.	Amb.	Amb.		
	0.00	5.00	69.409	0.55	66	583	1.18	1.20	2	258	260	52	-	106.5	58.37
	5.00	10.00	72.600	0.60	66	587	1.29	1.30	2	268	260	46	-	96.0	61.08
	10.00	15.00	75.600	0.75	66	586	1.61	1.60	2	269	261	46	-	94.5	68.26
	15.00	20.00	78.900	0.70	66	588	1.50	1.50	2	253	255	46	-	92.0	66.00
	20.00	25.00	82.000	0.69	66	589	1.48	1.50	2	269	259	47	-	95.7	65.56
	25.00	30.00	85.200	0.60	66	587	1.29	1.30	2	257	265	49	-	99.2	61.08
	30.00	35.00	88.300	0.48	69	587	1.04	1.00	2	256	257	49	-	106.7	54.63
	35.00	40.00	91.300	0.63	70	587	1.36	1.40	2	267	257	51	-	93.0	62.59
	40.00	45.00	94.300	0.71	70	587	1.53	1.50	2	267	262	51	-	93.5	66.44
	45.00	50.00	97.500	0.67	70	587	1.45	1.50	2	269	261	52	-	93.3	64.54
	50.00	55.00	100.600	0.64	71	588	1.38	1.40	2	264	260	53	-	92.2	63.11
	55.00	60.00	103.600	0.66	72	585	1.43	1.40	2	263	260	54	-	98.7	64.00
	60.00	--	106.873										-		--
Final DGM:			106.873												

RESULTS	Run Time		Vm	AP	Tm	Ts	Max Vac	ΔH	%ISO	BWS	Y _{qa}
	min	sec	ft ³	in. WC	°F	°F		in. WC			
	60.0		37.464	0.64	68.2	586.8	2	1.383	95.9	0.054	-4.0



Isokinetic Field Data

Location: Caterpillar, Inc - Virginia Beach, VA				Start Time: 15:25		Source: 3516HD Generator (L25)					
Date: 3/7/19		Run 2		VALID		End Time: 16:25		Project No.: 2019-0420		Parameter: Arsenic, C	

STACK DATA (EST)		EQUIPMENT		STACK DATA (EST)		FILTER NO.		STACK DATA (FINAL)		MOIST. DATA				
Moisture:	6.0 % est.	Meter Box ID:	1690	Est. Tm:	68 °F			Pb:	30.26 in. Hg	Vlc (ml)				
Barometric:	30.26 in. Hg	Y:	0.994	Est. Ts:	587 °F			Pg:	-0.28 in. WC	41.7				
Static Press:	-0.28 in. WC	ΔH @ (in.WC):	1.816	Est. ΔP:	0.64 in. WC			O ₂ :	14.4 %	K-FACTOR				
Stack Press:	30.24 in. Hg	Probe ID:	PR402-2	Est. Dn:	0.259 in.			CO ₂ :	4.9 %	2.15				
CO ₂ :	6.0 %	Liner Material:	quartz	Target Rate:	0.65 scfm			Check Pt. Initial Final Corr.						
O ₂ :	11.0 %	Pitot ID:	P403-2	LEAK CHECKS				Pre	Mid 1	Mid 2	Post			
N ₂ /CO:	83.0 %	Pitot Cp/Type:	0.840 --	Leak Rate (cfm):				0.000	--	--	0.000	Mid 1 (cf)	--	
Md:	29.40 lb/lb-mole	Nozzle ID:	.257	Vacuum (in Hg):				9	--	--	10	Mid 2 (cf)	--	
Ms:	28.72 lb/lb-mole	Nozzle Dn (in.):	0.257	Pitot Tube:				Pass	--	--	Pass	Mid 3 (cf)	--	
												Mid-Point Leak Check Vol (cf):		--

Sample Pt.	Sample Time (minutes)		Dry Gas Meter Reading (ft ³)	Pitot Tube ΔP (in WC)	Gas Temperatures (°F)		Orifice Press. ΔH (in. WC)		Pump Vac (in. Hg)	Gas Temperatures (°F)				% ISO	Vs (fps)
	Begin	End			DGM Average	Stack	Ideal	Actual		Probe	Filter	Imp Exit	Aux		
--	0.00	5.00	107.244	0.58	65	580	1.25	1.30	2	229	257	46	-	99.4	59.85
--	5.00	10.00	110.300	0.59	65	583	1.27	1.30	2	248	265	43	-	93.6	60.45
--	10.00	15.00	113.200	0.63	67	587	1.35	1.40	2	258	264	43	-	93.6	62.59
--	15.00	20.00	116.200	0.76	67	586	1.63	1.60	2	258	259	45	-	96.6	68.71
--	20.00	25.00	119.600	0.78	64	584	1.67	1.70	2	262	260	46	-	95.8	69.54
--	25.00	30.00	123.000	0.60	64	588	1.28	1.30	2	264	261	48	-	102.9	61.11
--	30.00	35.00	126.200	0.49	64	584	1.05	1.00	2	267	259	49	-	102.9	55.12
--	35.00	40.00	129.100	0.67	65	588	1.43	1.40	2	267	260	51	-	94.2	64.57
--	40.00	45.00	132.200	0.73	65	586	1.56	1.60	2	266	259	52	-	93.1	67.34
--	45.00	50.00	135.400	0.63	66	586	1.35	1.40	2	267	260	53	-	100.3	62.56
--	50.00	55.00	138.610	0.66	66	586	1.42	1.40	2	267	259	54	-	97.4	64.03
--	55.00	60.00	141.800	0.66	66	585	1.42	1.40	2	257	260	54	-	90.9	64.00
--	60.00	--	144.780										-		--
Final DGM:			144.780												

RESULTS	Run Time		Vm		ΔP		Tm		Ts		Max Vac		ΔH		%ISO	BWS	Y _{qa}
	min		ft ³		in. WC		°F		°F		in. WC		in. WC				
	60.0		37.536	ft ³	0.65	in. WC	65.3	°F	585.3	°F	2	1.400	in. WC	95.6	0.049	-4.1	



Isokinetic Field Data

Location: Caterpillar, Inc - Virginia Beach, VA				Start Time: 17:02		Source: 3516HD Generator (L25)										
Date: 3/7/19		Run 3		End Time: 18:02		Project No.: 2019-0420		Parameter: Arsenic, C								
STACK DATA (EST)			EQUIPMENT			STACK DATA (EST)			FILTER NO.		STACK DATA (FINAL)		MOIST. DATA			
Moisture: 6.0 % est.			Meter Box ID: 1690			Est. Tm: 65 °F					Pb: 30.26 in. Hg		Vlc (ml)			
Barometric: 30.26 in. Hg			Y: 0.994			Est. Ts: 585 °F					Pg: -0.28 in. WC		K-FACTOR			
Static Press: -0.28 in. WC			ΔH @ (in.WC): 1.816			Est. ΔP: 0.65 in. WC					O ₂ : 14.4 %		2.141			
Stack Press: 30.24 in. Hg			Probe ID: PR402-2			Est. Dn: 0.258 in.					CO ₂ : 4.8 %					
CO ₂ : 6.0 %			Liner Material: quartz			Target Rate: 0.65 scfm										
O ₂ : 11.0 %			Pitot ID: P403-2			LEAK CHECKS			Pre		Mid 1		Mid 2		Post	
N ₂ /CO: 83.0 %			Pitot Cp/Type: 0.840 --			Leak Rate (cfm): 0.000			--		--		0.000		Mid 1 (cf)	
Md: 29.40 lb/lb-mole			Nozzle ID: .257			Vacuum (in Hg): 12			--		--		10		Mid 2 (cf)	
Ms: 28.72 lb/lb-mole			Nozzle Dn (in.): 0.257			Pitot Tube: Pass			--		--		Pass		Mid 3 (cf)	
												Mid-Point Leak Check Vol (cf):		--		

Sample Pt.	Sample Time (minutes)		Dry Gas Meter Reading (ft ³)	Pitot Tube ΔP (in WC)	Gas Temperatures (°F)		Orifice Press. ΔH (in. WC)		Pump Vac (in. Hg)	Gas Temperatures (°F)				% ISO	Vs (fps)
					DGM Average	Stack	Ideal			Actual	Probe	Filter	Imp Exit		
	Amb.	Amb.					Amb.	Amb.		Amb.	Amb.				
	Begin	End			--	--	--	--		--	--				
--	0.00	5.00	145.151	0.49	61	586	1.04	1.00	2	240	265	44	-	98.2	55.17
--	5.00	10.00	147.900	0.54	61	575	1.16	1.20	2	250	262	41	-	108.4	57.61
--	10.00	15.00	151.100	0.59	61	580	1.26	1.30	2	260	263	42	-	100.7	60.37
--	15.00	20.00	154.200	0.75	61	584	1.60	1.60	2	262	262	44	-	95.3	68.19
--	20.00	25.00	157.500	0.64	60	585	1.36	1.40	2	267	260	45	-	100.3	63.02
--	25.00	30.00	160.700	0.53	61	584	1.13	1.10	2	267	260	46	-	106.4	57.32
--	30.00	35.00	163.800	0.68	62	586	1.45	1.50	2	267	260	47	-	93.9	64.99
--	35.00	40.00	166.900	0.67	62	587	1.42	1.40	2	264	266	48	-	97.7	64.54
--	40.00	45.00	170.100	0.73	63	587	1.55	1.60	2	247	260	50	-	93.5	67.37
--	45.00	50.00	173.300	0.68	63	587	1.45	1.50	2	268	260	51	-	108.9	65.02
--	50.00	55.00	176.900	0.61	63	586	1.30	1.30	2	267	260	52	-	105.3	61.56
--	55.00	60.00	180.200	0.63	64	587	1.34	1.40	2	258	262	53	-	95.6	62.59
--	60.00	--	183.247										-		--
Final DGM:			183.247												

RESULTS	Run Time		Vm		ΔP		Tm		Ts		Max Vac	ΔH		%ISO	BWS	Y _{qa}
	min		ft ³		in. WC		°F		°F		in. WC					
	60.0		38.096	ft ³	0.63	in. WC	61.8	°F	584.5	°F	2	1.358	in. WC	99.2	0.049	-0.6

Location Caterpillar, Inc - Virginia Beach, VA
 Source 3516HD Generator (LC25)
 Project No. 2019-0420
 Parameter Hexavalent Chromium

Run Number		Run 1	Run 2	Run 3	Average
Date		3/7/19	3/7/19	3/7/19	--
Start Time		13:41	15:25	17:02	--
Stop Time		14:41	16:25	18:02	--
Run Time, min	(θ)	60.0	60.0	60.0	60.0
INPUT DATA					
Barometric Pressure, in. Hg	(Pb)	30.26	30.26	30.26	30.26
Meter Correction Factor	(Y)	1.000	1.000	1.000	1.000
Orifice Calibration Value	($\Delta H @$)	1.753	1.753	1.753	1.753
Meter Volume, ft ³	(Vm)	38.957	37.645	37.020	37.874
Meter Temperature, °F	(Tm)	67.6	63.9	60.1	63.9
Meter Temperature, °R	(Tm)	527.6	523.9	520.1	523.9
Meter Orifice Pressure, in. WC	(ΔH)	1.367	1.260	1.300	1.309
Volume H ₂ O Collected, mL	(Vlc)	45.6	43.9	46.6	45.4
Nozzle Diameter, in	(Dn)	0.258	0.258	0.258	0.258
Area of Nozzle, ft ²	(An)	0.0004	0.0004	0.0004	0.0004
Hexavalent Chromium, ug	(M _{Cr+6})	<u>4.0</u>	<u>4.0</u>	<u>4.0</u>	4.0
ISOKINETIC DATA					
Standard Meter Volume, ft ³	(Vmstd)	39.562	38.487	38.131	38.726
Standard Water Volume, ft ³	(Vwstd)	2.147	2.067	2.193	2.135
Moisture Fraction Measured	(BWSmsd)	0.051	0.051	0.054	0.052
Moisture Fraction @ Saturation	(BWSsat)	82.887	81.996	81.554	82.145
Moisture Fraction	(BWS)	0.051	0.051	0.054	0.052
Meter Pressure, in Hg	(Pm)	30.36	30.35	30.36	30.36
Volume at Nozzle, ft ³	(Vn)	81.815	79.436	78.930	80.060
Isokinetic Sampling Rate, (%)	(I)	99.5	96.1	96.9	97.5
DGM Calibration Check Value, (+/- 5%)	(Y _{qa})	-0.5	2.6	-2.4	-0.1
EMISSION CALCULATIONS					
Hexavalent Chromium Concentration, ug/dscm	(C _{Cr+6})	3.6	3.7	3.7	3.6
Hexavalent Chromium Emission Rate, lb/hr	(ER _{Cr+6})	5.3E-05	5.5E-05	5.5E-05	5.4E-05

Results for Hexavalent Chromium in all three runs were below the detection limit. The detection limit was used for emissions purposes.

Location Caterpillar, Inc - Virginia Beach, VA
Source 3516HD Generator (LC25)
Project No. 2019-0420
Parameter Hexavalent Chromium

Run Number		Run 1	Run 2	Run 3	Average
Date		3/7/19	3/7/19	3/7/19	--
Start Time		13:41	15:25	17:02	--
Stop Time		14:41	16:25	18:02	--
Run Time, min		60.0	60.0	60.0	60.0
VELOCITY HEAD, in. WC					
Point 1		0.55	0.58	0.49	0.54
Point 2		0.60	0.59	0.54	0.58
Point 3		0.75	0.63	0.59	0.66
Point 4		0.70	0.76	0.75	0.74
Point 5		0.69	0.78	0.64	0.70
Point 6		0.60	0.60	0.53	0.58
Point 7		0.48	0.49	0.68	0.55
Point 8		0.63	0.67	0.67	0.66
Point 9		0.71	0.73	0.73	0.72
Point 10		0.67	0.63	0.68	0.66
Point 11		0.64	0.66	0.61	0.64
Point 12		0.66	0.66	0.63	0.65
CALCULATED DATA					
Square Root of ΔP , (in. WC) ^{1/2}	(ΔP)	0.799	0.804	0.791	0.798
Pitot Tube Coefficient	(Cp)	0.840	0.840	0.840	0.840
Barometric Pressure, in. Hg	(Pb)	30.26	30.26	30.26	30.26
Static Pressure, in. WC	(Pg)	-0.28	-0.28	-0.28	-0.28
Stack Pressure, in. Hg	(Ps)	30.24	30.24	30.24	30.24
Stack Cross-sectional Area, ft ²	(As)	2.18	2.18	2.18	2.18
Temperature, °F	(Ts)	586.8	585.3	584.5	585.5
Temperature, °R	(Ts)	1046.8	1045.3	1044.5	1045.5
Moisture Fraction Measured	(BWSmsd)	0.051	0.051	0.054	0.052
Moisture Fraction @ Saturation	(BWSsat)	82.887	81.996	81.554	82.145
Moisture Fraction	(BWS)	0.051	0.051	0.054	0.052
O ₂ Concentration, %	(O ₂)	14.5	14.4	14.4	14.4
CO ₂ Concentration, %	(CO ₂)	4.8	4.9	4.8	4.8
Molecular Weight, lb/lb-mole (dry)	(Md)	29.34	29.35	29.35	29.35
Molecular Weight, lb/lb-mole (wet)	(Ms)	28.76	28.77	28.73	28.75
Velocity, ft/sec	(Vs)	62.9	63.3	62.3	62.8
VOLUMETRIC FLOW RATE					
At Stack Conditions, acfm	(Qa)	8,237	8,281	8,154	8,224
At Standard Conditions, dscfm	(Qs)	3,983	4,012	3,940	3,978

Location Caterpillar, Inc - Virginia Beach, VA

Source 3516HD Generator (LC25)

Project No. 2019-0420

Parameter Hexavalent Chromium

Analysis Volumetric

Run 1		Date: 3/7/19				
Impinger No.	1	2	3	4	5*	Total
Contents	KOH	KOH	KOH	Empty	Silica	--
Initial Volume, mL	150.0	75.0	75.0	0.0	231.4	531.4
Final Volume, mL	150.0	110.0	76.0	2.0	239.0	577.0
Gain	0.0	35.0	1.0	2.0	7.6	45.6
Run 2		Date: 3/7/19				
Impinger No.	1	2	3	4	5*	Total
Contents	KOH	KOH	KOH	Empty	Silica	--
Initial Volume, mL	150.0	75.0	75.0	0.0	232.1	532.1
Final Volume, mL	162.0	126.0	48.0	0.0	240.0	576.0
Gain	12.0	51.0	-27.0	0.0	7.9	43.9
Run 3		Date: 3/7/19				
Impinger No.	1	2	3	4	5*	Total
Contents	KOH	KOH	KOH	Empty	Silica	--
Initial Volume, mL	150.0	75.0	75.0	0.0	218.9	518.9
Final Volume, mL	164.0	84.0	84.0	12.0	221.5	565.5
Gain	14.0	9.0	9.0	12.0	2.6	46.6



Isokinetic Field Data

Location: <u>Caterpillar, Inc - Virginia Beach, VA</u>			Start Time: <u>13:41</u>			Source: <u>3516HD Generator (LC25)</u>		
Date: <u>3/7/19</u>		Run 1	VALID	End Time: <u>14:41</u>		Project No.: <u>2019-0420</u>		Parameter: <u>Hexavalent</u>

STACK DATA (EST)		EQUIPMENT		STACK DATA (EST)		FILTER NO.		STACK DATA (FINAL)		MOIST. DATA			
Moisture:	6.0 % est.	Meter Box ID:	2051	Est. Tm:	70 °F			Pb:	30.26 in. Hg	Vlc (ml)			
Barometric:	30.26 in. Hg	Y:	1.000	Est. Ts:	550 °F			Pg:	-0.28 in. WC	45.6			
Static Press:	-0.28 in. WC	AH @ (in.WC):	1.753	Est. AP:	0.64 in. WC			O ₂ :	14.5 %	K-FACTOR			
Stack Press:	30.24 in. Hg	Probe ID:	PR403-2	Est. Dn:	0.256 in.			CO ₂ :	4.8 %	2.192			
CO ₂ :	6.0 %	Liner Material:	quartz	Target Rate:	0.65 scfm					Check Pt.	Initial	Final	Corr.
O ₂ :	11.0 %	Pitot ID:	P403-2	LEAK CHECKS		Pre	Mid 1	Mid 2	Post	Mid 1 (cf)		--	
N ₂ /CO:	83.0 %	Pitot Cp/Type:	0.840 S-type	Leak Rate (cfm):		0.016	--	--	0.015	Mid 2 (cf)		--	
Md:	29.40 lb/lb-mole	Nozzle ID:	.258	Vacuum (in Hg):		8	--	--	8	Mid 3 (cf)		--	
Ms:	28.72 lb/lb-mole	Nozzle Dn (in.):	0.258	Pitot Tube:		Pass	--	--	Pass	Mid-Point Leak Check Vol (cf): --			

Sample Pt.	Sample Time (minutes)		Dry Gas Meter Reading (ft ³)	Pitot Tube ΔP (in WC)	Gas Temperatures (°F)		Orifice Press. ΔH (in. WC)		Pump Vac (in. Hg)	Gas Temperatures (°F)				% ISO	Vs (fps)
					DGM Average	Stack	Ideal			Actual	Probe	Filter	Imp Exit		
	Amb.	Amb.			Amb.	Amb.	Amb.	Amb.		Amb.	Amb.				
	Begin	End			65	583	1.16	1.20	3			43	-	105.7	58.37
	0.00	5.00	539.034	0.55	65	583	1.26	1.30	3			41	-	102.5	61.08
	5.00	10.00	542.200	0.60	65	587	1.57	1.60	3			41	-	100.3	68.26
	10.00	15.00	545.400	0.75	65	586	1.47	1.50	3			44	-	100.7	66.00
	15.00	20.00	548.900	0.70	66	588	1.45	1.50	3			47	-	95.3	65.56
	20.00	25.00	552.300	0.69	67	589	1.26	1.30	3			48	-	105.3	61.08
	25.00	30.00	555.500	0.60	67	587	1.01	1.00	3			48	-	106.7	54.63
	30.00	35.00	558.800	0.48	68	587	1.33	1.30	3			49	-	99.4	62.59
	35.00	40.00	561.800	0.63	68	587	1.50	1.50	3			51	-	93.5	66.44
	40.00	45.00	565.000	0.71	69	587	1.42	1.40	3			52	-	96.1	64.54
	45.00	50.00	568.200	0.67	70	587	1.35	1.40	3			53	-	104.5	63.11
	50.00	55.00	571.400	0.64	70	588	1.40	1.40	3			54	-	96.3	64.00
	55.00	60.00	574.800	0.66	71	585			3				-		
	60.00	--	577.991										-		--
Final DGM:			577.991												

RESULTS	Run Time		Vm	ΔP	Tm	Ts	Max Vac	ΔH	%ISO	BWS	Y _{qa}
	min		ft ³	in. WC	°F	°F		in. WC			
	60.0		38.957	0.64	67.6	586.8	3	1.367	99.5	0.051	-0.5



Isokinetic Field Data

Location: Caterpillar, Inc - Virginia Beach, VA				Start Time: 15:25		Source: 3516HD Generator (LC25)					
Date: 3/7/19		Run 2		VALID		End Time: 16:25		Project No.: 2019-0420		Parameter: Hexavalent	

STACK DATA (EST)			EQUIPMENT			STACK DATA (EST)			FILTER NO.		STACK DATA (FINAL)			MOIST. DATA	
Moisture:	6.0	% est.	Meter Box ID:	2051		Est. Tm:	68	°F			Pb:	30.26	in. Hg	Vlc (ml)	
Barometric:	30.26	in. Hg	Y:	1.000		Est. Ts:	587	°F			Pg:	-0.28	in. WC	43.9	
Static Press:	-0.28	in. WC	ΔH @ (in.WC):	1.753		Est. ΔP:	0.64	in. WC			O ₂ :	14.4	%	K-FACTOR	
Stack Press:	30.24	in. Hg	Probe ID:	PR403-2		Est. Dn:	0.259	in.			CO ₂ :	4.9	%	2.11	
CO ₂ :	6.0	%	Liner Material:	quartz		Target Rate:	0.65	scfm			Check Pt. Initial Final Corr.				
O ₂ :	11.0	%	Pitot ID:	P403-2		LEAK CHECKS			Pre	Mid 1	Mid 2	Post	Mid 1 (cf)	--	
N ₂ /CO:	83.0	%	Pitot Cp/Type:	0.840	S-type	Leak Rate (cfm):			0.007	--	--	0.009	Mid 2 (cf)	--	
Md:	29.40	lb/lb-mole	Nozzle ID:	.258		Vacuum (in Hg):			8	--	--	8	Mid 3 (cf)	--	
Ms:	28.72	lb/lb-mole	Nozzle Dn (in.):	0.258		Pitot Tube:			Pass	--	--	Pass	Mid-Point Leak Check Vol (cf):	--	

Sample Pt.	Sample Time (minutes)		Dry Gas Meter Reading (ft ³)	Pitot Tube ΔP (in WC)	Gas Temperatures (°F)		Orifice Press. ΔH (in. WC)		Pump Vac (in. Hg)	Gas Temperatures (°F)				% ISO	Vs (fps)
	Begin	End			DGM Average	Stack	Ideal	Actual		Probe	Filter	Imp Exit	Aux		
--	0.00	5.00	579.431	0.58	65	580	1.23	0.12	3	--	--	49	-	96.1	59.85
--	5.00	10.00	582.400	0.59	63	583	1.24	1.20	3	--	--	47	-	97.0	60.45
--	10.00	15.00	585.400	0.63	63	587	1.32	1.30	3	--	--	44	-	94.1	62.59
--	15.00	20.00	588.400	0.76	63	586	1.59	1.60	3	--	--	44	-	94.3	68.71
--	20.00	25.00	591.700	0.78	63	584	1.63	1.60	3	--	--	46	-	90.1	69.54
--	25.00	30.00	594.900	0.60	63	588	1.25	1.30	3	--	--	47	-	102.9	61.11
--	30.00	35.00	598.100	0.49	63	584	1.03	1.00	3	--	--	49	-	106.5	55.12
--	35.00	40.00	601.100	0.67	64	588	1.40	1.40	3	--	--	49	-	94.2	64.57
--	40.00	45.00	604.200	0.73	65	586	1.53	1.50	3	--	--	50	-	95.8	67.34
--	45.00	50.00	607.500	0.63	65	586	1.32	1.30	3	--	--	51	-	100.9	62.56
--	50.00	55.00	610.730	0.66	65	586	1.38	1.40	3	--	--	52	-	93.7	64.03
--	55.00	60.00	613.800	0.66	65	585	1.39	1.40	3	--	--	52	-	99.9	64.00
--	60.00	--	617.076							--	--		-		--
Final DGM:			617.076												

RESULTS	Run Time		Vm		ΔP		Tm		Ts		Max Vac		ΔH		%ISO		BWS		Y _{qa}	
		60.0	min	37.645	ft ³	0.65	in. WC	63.9	°F	585.3	°F	3		1.260	in. WC	96.1		0.051		2.6



Isokinetic Field Data

Location: Caterpillar, Inc - Virginia Beach, VA				Start Time: 17:02		Source: 3516HD Generator (LC25)										
Date: 3/7/19		Run 3		End Time: 18:02		Project No.: 2019-0420		Parameter: Hexavalent								
STACK DATA (EST)			EQUIPMENT			STACK DATA (EST)			FILTER NO.		STACK DATA (FINAL)		MOIST. DATA			
Moisture: 6.0 % est.			Meter Box ID: 2051			Est. Tm: 64 °F					Pb: 30.26 in. Hg		Vlc (ml)			
Barometric: 30.26 in. Hg			Y: 1.000			Est. Ts: 585 °F					Pg: -0.28 in. WC		K-FACTOR			
Static Press: -0.28 in. WC			ΔH @ (in.WC): 1.753			Est. ΔP: 0.65 in. WC					O ₂ : 14.4 %		2.094			
Stack Press: 30.24 in. Hg			Probe ID: PR403-2			Est. Dn: 0.259 in.					CO ₂ : 4.8 %					
CO ₂ : 6.0 %			Liner Material: quartz			Target Rate: 0.65 scfm										
O ₂ : 11.0 %			Pitot ID: P403-2			LEAK CHECKS			Pre		Mid 1		Mid 2		Post	
N ₂ /CO: 83.0 %			Pitot Cp/Type: 0.840 S-type			Leak Rate (cfm): 0.016			--		--		0.014		Mid 1 (cf)	
Md: 29.40 lb/lb-mole			Nozzle ID: .258			Vacuum (in Hg): 8			--		--		7		Mid 2 (cf)	
Ms: 28.72 lb/lb-mole			Nozzle Dn (in.): 0.258			Pitot Tube: Pass			--		--		Pass		Mid 3 (cf)	
											Mid-Point Leak Check Vol (cf):		--			

Sample Pt.	Sample Time (minutes)		Dry Gas Meter Reading (ft ³)	Pitot Tube ΔP (in WC)	Gas Temperatures (°F)		Orifice Press. ΔH (in. WC)		Pump Vac (in. Hg)	Gas Temperatures (°F)				% ISO	Vs (fps)
					DGM Average	Stack	Ideal			Actual	Probe	Filter	Imp Exit		
	Amb.	Amb.			Amb.	Amb.	Amb.	Amb.		Amb.	Amb.	Amb.			
	Begin	End			--	--	--	--		--	--	--			
--	0.00	5.00	617.690	0.49	61	586	1.02	1.00	3			46	-	100.2	55.17
--	5.00	10.00	620.500	0.54	59	575	1.13	1.10	2			46	-	91.6	57.61
--	10.00	15.00	623.200	0.59	59	580	1.23	1.20	3			43	-	97.6	60.37
--	15.00	20.00	626.200	0.75	59	584	1.56	1.60	3			43	-	95.5	68.19
--	20.00	25.00	629.500	0.64	59	585	1.33	1.30	3			44	-	100.3	63.02
--	25.00	30.00	632.700	0.53	60	584	1.10	1.10	3			45	-	106.4	57.32
--	30.00	35.00	635.800	0.68	60	586	1.41	1.40	3			45	-	94.1	64.99
--	35.00	40.00	638.900	0.67	60	587	1.39	1.40	3			45	-	91.8	64.54
--	40.00	45.00	641.900	0.73	61	587	1.52	1.50	3			45	-	96.6	67.37
--	45.00	50.00	645.200	0.68	61	587	1.41	1.40	3			47	-	100.0	65.02
--	50.00	55.00	648.500	0.61	61	586	1.27	1.30	3			47	-	99.2	61.56
--	55.00	60.00	651.600	0.63	61	587	1.31	1.30	3			47	-	97.9	62.59
--	60.00	--	654.710										-		--
Final DGM:			654.710												

RESULTS	Run Time		Vm		ΔP		Tm		Ts		Max Vac	ΔH		%ISO	BWS	Y _{qa}
	min		ft ³		in. WC		°F		°F		in. WC					
	60.0		37.020	ft ³	0.63	in. WC	60.1	°F	584.5	°F	3	1.300	in. WC	96.9	0.054	-2.4

Location Caterpillar, Inc - Virginia Beach, VA
Source 3516HD Generator (LC25)
Project No. 2019-0420
Parameter(s): Formaldehyde/ VOCs

Run Number		Run 1	Run 2	Run 3	Average
Date		3/7/19	3/7/19	3/7/19	--
Start Time		13:41	15:25	17:02	--
Stop Time		14:41	16:25	18:02	--
Input Data					
Volumetric Flow Rate, dscfm	(Qs)	3,982	4,023	3,960	3,988
Standard Meter Volume, L	(Vmstd)	44.723	44.751	44.715	44.730
Formaldehyde Mass, ug	M(CH2O)	124.03	119.87	131.21	125.04
Acetaldehyde Mass, ug	M(C2H4O)	<u>65.52</u>	<u>65.52</u>	<u>65.52</u>	65.52
Benzene Mass, ug	M(C6H6)	<u>73.5</u>	<u>73.5</u>	<u>73.5</u>	73.50
Ethylbenzene Mass, ug	M(C8H10)	<u>72.66</u>	<u>72.66</u>	<u>72.66</u>	72.66
Hexane Mass, ug	M(C6H14)	<u>54.18</u>	<u>54.18</u>	<u>54.18</u>	54.18
Pollutant Concentration (Bag Samples)					
1,3 Butadiene Mass, ppmvd	M(C4H6)	<u>0.10</u>	<u>0.10</u>	<u>0.10</u>	0.10
Acetaldehyde Mass, ppmvd	M(C2H4O)	<u>1.00</u>	<u>1.00</u>	<u>1.00</u>	1.00
Benzene Mass, ppmvd	M(C6H6)	<u>0.10</u>	<u>0.10</u>	<u>0.10</u>	0.10
Ethylbenzene Mass, ppmvd	M(C8H10)	<u>0.10</u>	<u>0.10</u>	<u>0.10</u>	0.10
Hexane Mass, ppmvd	M(C6H14)	<u>0.10</u>	<u>0.10</u>	<u>0.10</u>	0.10
Emissions Calculations					
Formaldehyde Concentration, ppmvd	C(CH2O)	2.2	2.1	2.3	2.2
Formaldehyde Emission Rate, lb/hr	ER(CH2O)	0.041	0.040	0.043	0.042
1,3 Butadiene Concentration, ppmvd	C(C4H6)	0.10	0.10	0.10	0.10
1,3 Butadiene Emission Rate, lb/hr	ER(C4H6)	0.0034	0.0034	0.0033	0.0034
Acetaldehyde Concentration, ppmvd	C(C2H4O)	0.80	0.80	0.80	0.80
Acetaldehyde Concentration, ppmvd (Combined)	C(C2H4O)	1.8	1.8	1.8	1.8
Acetaldehyde Emission Rate, lb/hr	ER(C2H4O)	0.049	0.050	0.049	0.049
Benzene Concentration, ppmvd	C(C6H6)	0.51	0.51	0.51	0.51
Benzene Concentration, ppmvd (Combined)	C(C6H6)	0.61	0.61	0.61	0.61
Benzene Emission Rate, lb/hr	ER(C6H6)	0.029	0.030	0.029	0.029
Ethylbenzene Concentration, ppmvd	C(C8H10)	0.37	0.37	0.37	0.37
Ethylbenzene Concentration, ppmvd (Combined)	C(C8H10)	0.47	0.47	0.47	0.47
Ethylbenzene Emission Rate, lb/hr	ER(C8H10)	0.031	0.031	0.031	0.031
Hexane Concentration, ppmvd	C(C6H14)	0.34	0.34	0.34	0.34
Hexane Concentration, ppmvd (Combined)	C(C6H14)	0.44	0.44	0.44	0.44
Hexane Emission Rate, lb/hr	ER(C6H14)	0.023	0.024	0.023	0.023

Underlined values indicate that the laboratory result was below the detection limit. The detection limit was used for emission calculation purposes.



Location Caterpillar, Inc - Virginia Beach, VA
 Source 3516HD Generator (LC25)

Project No. 2019-0420

Parameter(s): Formaldehyde/ VOCs

Console Type Low Flow

Run No.	1					2					3				
Date	3/7/19					3/7/19					3/7/19				
Status	VALID					VALID					VALID				
Start Time	13:41					15:25					17:02				
End Time	14:41					16:25					18:02				
Run Time, min	(0) 60					60					60				
Meter ID	2071					2071					2071				
Meter Correction Factor	(Y) 1.000					1.000					1.000				
Orifice Calibration Value	(AH @) 1.800					1.800					1.800				
Max Vacuum, in. Hg	0					0					0				
Post Leak Check, L/min (at max vac.)	0.000					0.000					0.000				
Meter Volume, L															
0	0.000					0.000					0.000				
5	3.670					3.690					3.680				
10	7.310					7.280					7.320				
15	10.980					10.930					10.950				
20	14.690					14.540					14.630				
25	18.250					18.190					18.370				
30	21.770					21.810					21.970				
35	25.630					25.410					25.560				
40	29.390					29.170					29.120				
45	33.230					32.980					32.860				
50	36.910					36.740					36.550				
55	40.630					40.500					40.270				
60	44.196					44.230					43.920				
Total Meter Volume, L	(Vm) 44.196					44.230					43.920				
Temperature, °F	Meter	Probe	Filter	Vacuum	Imp. Exit	Meter	Probe	Filter	Vacuum	Imp. Exit	Meter	Probe	Filter	Vacuum	Imp. Exit
0	71	--	--	0	--	73	--	--	0	--	69	--	--	0	--
5	71	--	--	0	--	73	--	--	0	--	69	--	--	0	--
10	70	--	--	0	--	72	--	--	0	--	69	--	--	0	--
15	71	--	--	0	--	72	--	--	0	--	69	--	--	0	--
20	71	--	--	0	--	72	--	--	0	--	69	--	--	0	--
25	72	--	--	0	--	72	--	--	0	--	69	--	--	0	--
30	72	--	--	0	--	72	--	--	0	--	69	--	--	0	--
35	72	--	--	0	--	72	--	--	0	--	69	--	--	0	--
40	73	--	--	0	--	72	--	--	0	--	69	--	--	0	--
45	73	--	--	0	--	72	--	--	0	--	69	--	--	0	--
50	74	--	--	0	--	72	--	--	0	--	69	--	--	0	--
55	74	--	--	0	--	73	--	--	0	--	69	--	--	0	--
60	75	--	--	0	--	73	--	--	0	--	69	--	--	0	--
Average Temperature, °F	(Tm) 72	--	--	--	--	72	--	--	--	--	69	--	--	--	--
Average Temperature, °R	(Tm) 532	--	--	--	--	532	--	--	--	--	529	--	--	--	--
Minimum Temperature, °F	70	--	--	--	--	72	--	--	--	--	69	--	--	--	--
Maximum Temperature, °F	75	--	--	--	--	73	--	--	--	--	69	--	--	--	--
Barometric Pressure, in. Hg	(Pb) 30.37					30.37					30.37				
Meter Orifice Pressure, in. WC	(AH) 1.800					1.800					1.800				
Meter Pressure, in. Hg	(Pm) 30.50					30.50					30.50				
Standard Meter Volume, L	(Vmstd) 44.723					44.751					44.715				
Static Pressure, in. WC	(Pg) -0.28					-0.28					-0.28				
Stack Pressure, in. Hg	(Ps) 30.35					30.35					30.35				
Stack Temperature, °F	(Ts) 586					586					586				
Gas Molecular Weight, lb/lb-mole (dry)	(Md) 29.34					29.35					29.35				
DGM Calibration Check Value	(Yqa) -0.7					-0.6					-1.0				

Location Caterpillar, Inc - Virginia Beach, VA
 Source 3516HD Generator (LC 25)
 Project No. 2019-0420
 Parameter Polycyclic Aromatic Hydrocarbons, Naphthalene

Run Number		Run 1	Run 2	Run 3	Average
Date		3/7/19	3/7/19	3/7/19	--
Start Time		13:41	15:25	17:02	--
Stop Time		14:41	16:25	18:02	--
Run Time, min	(θ)	60.0	60.0	60.0	60.0
INPUT DATA					
Barometric Pressure, in. Hg	(Pb)	30.37	30.37	30.37	30.37
Meter Correction Factor	(Y)	1.008	1.008	1.008	1.008
Orifice Calibration Value	($\Delta H @$)	1.840	1.840	1.840	1.840
Meter Volume, ft ³	(Vm)	35.705	36.115	35.235	35.685
Meter Temperature, °F	(Tm)	71.8	70.8	67.5	70.1
Meter Temperature, °R	(Tm)	531.8	530.8	527.5	530.1
Meter Orifice Pressure, in. WC	(ΔH)	1.218	1.236	1.194	1.216
Volume H ₂ O Collected, mL	(Vlc)	50.8	68.6	40.8	53.4
Nozzle Diameter, in	(Dn)	0.248	0.248	0.248	0.248
Area of Nozzle, ft ²	(An)	0.0003	0.0003	0.0003	0.0003
Acenaphthene Mass, ug	(M _{C12H10})	<u>3.0</u>	<u>3.0</u>	<u>3.0</u>	3.0
Acenaphthylene Mass, ug	(M _{C12H8})	<u>3.0</u>	<u>3.0</u>	<u>3.0</u>	3.0
Anthracene Mass, ug	(M _{C14H10})	<u>0.8</u>	<u>0.8</u>	<u>1.0</u>	0.9
Benzo[a]anthracene Mass, ug	(M _{C18H12})	<u>0.8</u>	<u>0.8</u>	<u>0.8</u>	0.8
Benzo[a]pyrene Mass, ug	(M _{C20H12})	<u>1.0</u>	<u>1.0</u>	<u>1.0</u>	1.0
Benzo[b]fluoranthene Mass, ug	(M _{C20H12})	<u>0.8</u>	<u>0.8</u>	<u>0.8</u>	0.8
Benzo[g,h,i]perylene Mass, ug	(M _{C22H12})	<u>0.8</u>	<u>0.8</u>	<u>0.8</u>	0.8
Benzo[k]fluoranthene Mass, ug	(M _{C20H12})	<u>1.0</u>	<u>1.0</u>	<u>1.0</u>	1.0
Chrysene Mass, ug	(M _{C18H12})	<u>0.8</u>	<u>0.8</u>	<u>0.8</u>	0.8
Dibenz[a,h]anthracene Mass, ug	(M _{C22H14})	<u>0.8</u>	<u>0.8</u>	<u>0.8</u>	0.8
Fluoranthene Mass, ug	(M _{C16H10})	<u>0.8</u>	<u>0.8</u>	<u>2.0</u>	1.2
Fluorene Mass, ug	(M _{C13H10})	3.1	3.1	3.4	3.2
Indeno(1,2,3-cd)pyrene Mass, ug	(M _{C22H12})	<u>1.0</u>	<u>1.0</u>	<u>1.0</u>	1.0
Naphthalene Mass, ug	(M _{C10H8})	77.0	84.0	83.0	81.3
Phenanthrene Mass, ug	(M _{C14H10})	8.0	7.1	8.2	7.8
Pyrene Mass, ug	(M _{C16H10})	9.0	7.0	10.0	8.7
ISOKINETIC DATA					
Standard Meter Volume, ft ³	(Vmstd)	36.375	36.864	36.189	36.476
Standard Water Volume, ft ³	(Vwstd)	2.393	3.232	1.920	2.515
Moisture Fraction Measured	(BWSmsd)	0.062	0.081	0.050	0.064
Moisture Fraction @ Saturation	(BWSsat)	86.510	83.480	80.575	83.522
Moisture Fraction	(BWS)	0.062	0.081	0.050	0.064
Meter Pressure, in Hg	(Pm)	30.46	30.46	30.46	30.46
Volume at Nozzle, ft ³	(Vn)	76.240	78.476	74.243	76.320
Isokinetic Sampling Rate, (%)	(I)	100.0	102.2	99.0	100.4
DGM Calibration Check Value, (+/- 5%)	(Y _{qa})	-0.4	0.1	-0.4	-0.2

Location Caterpillar, Inc - Virginia Beach, VA

Source 3516HD Generator (LC 25)

Project No. 2019-0420

Parameter Polycyclic Aromatic Hydrocarbons, Naphthalene

Run Number		Run 1	Run 2	Run 3	Average
Date		3/7/19	3/7/19	3/7/19	--
Start Time		13:41	15:25	17:02	--
Stop Time		14:41	16:25	18:02	--
Run Time, min	(θ)	60.0	60.0	60.0	60.0
EMISSION CALCULATIONS					
Acenaphthene Concentration, ug/dscm	($C_{C_{12}H_{10}}$)	2.9	2.9	2.9	2.9
Acenaphthene Emission Rate, kg/hr	($ER_{C_{12}H_{10}}$)	2.0E-05	1.9E-05	2.0E-05	1.9E-05
Acenaphthene Emission Rate, lb/hr	($ER_{C_{12}H_{10}}$)	4.3E-05	4.2E-05	4.3E-05	4.3E-05
Acenaphthylene Concentration, ug/dscm	($C_{C_{12}H_8}$)	2.9	2.9	2.9	2.9
Acenaphthylene Emission Rate, kg/hr	($ER_{C_{12}H_8}$)	2.0E-05	1.9E-05	2.0E-05	1.9E-05
Acenaphthylene Emission Rate, lb/hr	($ER_{C_{12}H_8}$)	4.3E-05	4.2E-05	4.3E-05	4.3E-05
Anthracene Concentration, ug/dscm	($C_{C_{14}H_{10}}$)	0.78	0.77	0.98	0.84
Anthracene Emission Rate, kg/hr	($ER_{C_{14}H_{10}}$)	5.2E-06	5.1E-06	6.6E-06	5.6E-06
Anthracene Emission Rate, lb/hr	($ER_{C_{14}H_{10}}$)	1.1E-05	1.1E-05	1.4E-05	1.2E-05
Benz[a]anthracene Concentration, ug/dscm	($C_{C_{18}H_{12}}$)	0.78	0.77	0.78	0.77
Benz[a]anthracene Emission Rate, kg/hr	($ER_{C_{18}H_{12}}$)	5.2E-06	5.1E-06	5.3E-06	5.2E-06
Benz[a]anthracene Emission Rate, lb/hr	($ER_{C_{18}H_{12}}$)	1.1E-05	1.1E-05	1.2E-05	1.1E-05
Benzo[a]pyrene Concentration, ug/dscm	($C_{C_{20}H_{12}}$)	0.97	0.96	0.98	0.97
Benzo[a]pyrene Emission Rate, kg/hr	($ER_{C_{20}H_{12}}$)	6.5E-06	6.4E-06	6.6E-06	6.5E-06
Benzo[a]pyrene Emission Rate, lb/hr	($ER_{C_{20}H_{12}}$)	1.4E-05	1.4E-05	1.4E-05	1.4E-05
Benzo[a]fluoranthene Concentration, ug/dscm	($C_{C_{20}H_{12}}$)	0.78	0.77	0.78	0.77
Benzo[a]fluoranthene Emission Rate, kg/hr	($ER_{C_{20}H_{12}}$)	5.2E-06	5.1E-06	5.3E-06	5.2E-06
Benzo[a]fluoranthene Emission Rate, lb/hr	($ER_{C_{20}H_{12}}$)	1.1E-05	1.1E-05	1.2E-05	1.1E-05
Benzo[g,h,i]perylene Concentration, ug/dscm	($C_{C_{22}H_{12}}$)	0.78	0.77	0.78	0.77
Benzo[g,h,i]perylene Emission Rate, kg/hr	($ER_{C_{22}H_{12}}$)	5.2E-06	5.1E-06	5.3E-06	5.2E-06
Benzo[g,h,i]perylene Emission Rate, lb/hr	($ER_{C_{22}H_{12}}$)	1.1E-05	1.1E-05	1.2E-05	1.1E-05
Benzo[k]fluoranthene Concentration, ug/dscm	($C_{C_{20}H_{12}}$)	0.97	0.96	0.98	0.97
Benzo[k]fluoranthene Emission Rate, kg/hr	($ER_{C_{20}H_{12}}$)	6.5E-06	6.4E-06	6.6E-06	6.5E-06
Benzo[k]fluoranthene Emission Rate, lb/hr	($ER_{C_{20}H_{12}}$)	1.4E-05	1.4E-05	1.4E-05	1.4E-05
Chrysene Concentration, ug/dscm	($C_{C_{18}H_{12}}$)	0.78	0.77	0.78	0.77
Chrysene Emission Rate, kg/hr	($ER_{C_{18}H_{12}}$)	5.2E-06	5.1E-06	5.3E-06	5.2E-06
Chrysene Emission Rate, lb/hr	($ER_{C_{18}H_{12}}$)	1.1E-05	1.1E-05	1.2E-05	1.1E-05
Dibenz[a,h]anthracene Concentration, ug/dscm	($C_{C_{22}H_{14}}$)	0.78	0.77	0.78	0.77
Dibenz[a,h]anthracene Emission Rate, kg/hr	($ER_{C_{22}H_{14}}$)	5.2E-06	5.1E-06	5.3E-06	5.2E-06
Dibenz[a,h]anthracene Emission Rate, lb/hr	($ER_{C_{22}H_{14}}$)	1.1E-05	1.1E-05	1.2E-05	1.1E-05
Fluoranthene Concentration, ug/dscm	($C_{C_{16}H_{10}}$)	0.78	0.77	2.0	1.2
Fluoranthene Emission Rate, kg/hr	($ER_{C_{16}H_{10}}$)	5.2E-06	5.1E-06	1.3E-05	7.8E-06
Fluoranthene Emission Rate, lb/hr	($ER_{C_{16}H_{10}}$)	1.1E-05	1.1E-05	2.9E-05	1.7E-05
Fluorene Concentration, ug/dscm	($C_{C_{13}H_{10}}$)	3.0	3.0	3.3	3.1
Fluorene Emission Rate, kg/hr	($ER_{C_{13}H_{10}}$)	2.0E-05	2.0E-05	2.2E-05	2.1E-05
Fluorene Emission Rate, lb/hr	($ER_{C_{13}H_{10}}$)	4.4E-05	4.4E-05	4.9E-05	4.6E-05
Indeno(1,2,3-cd)pyrene Concentration, ug/dscm	($C_{C_{22}H_{12}}$)	0.97	0.96	0.98	0.97
Indeno(1,2,3-cd)pyrene Emission Rate, kg/hr	($ER_{C_{22}H_{12}}$)	6.5E-06	6.4E-06	6.6E-06	6.5E-06
Indeno(1,2,3-cd)pyrene Emission Rate, lb/hr	($ER_{C_{22}H_{12}}$)	1.4E-05	1.4E-05	1.4E-05	1.4E-05
Naphthalene Concentration, ug/dscm	($C_{C_{10}H_8}$)	74.8	80.5	81.0	78.7
Naphthalene Emission Rate, kg/hr	($ER_{C_{10}H_8}$)	5.0E-04	5.3E-04	5.5E-04	5.3E-04
Naphthalene Emission Rate, lb/hr	($ER_{C_{10}H_8}$)	1.1E-03	1.2E-03	1.2E-03	1.2E-03
Phenanthrene Concentration, ug/dscm	($C_{C_{10}H_8}$)	7.8	6.8	8.0	7.5
Phenanthrene Emission Rate, kg/hr	($ER_{C_{10}H_8}$)	5.2E-05	4.5E-05	5.4E-05	5.0E-05
Phenanthrene Emission Rate, lb/hr	($ER_{C_{14}H_{10}}$)	1.1E-04	1.0E-04	1.2E-04	1.1E-04
Pyrene Concentration, ug/dscm	($C_{C_{14}H_{10}}$)	8.7	6.7	9.8	8.4
Pyrene Emission Rate, kg/hr	($ER_{C_{14}H_{10}}$)	5.9E-05	4.5E-05	6.6E-05	5.6E-05
Pyrene Emission Rate, lb/hr	($ER_{C_{16}H_{10}}$)	1.3E-04	9.8E-05	1.4E-04	1.2E-04

Underlined values represent results below the detection limit. The detection limit was used for emission purposes.

Location Caterpillar, Inc - Virginia Beach, VA

Source 3516HD Generator (LC 25)

Project No. 2019-0420

Parameter Polycyclic Aromatic Hydrocarbons, Naphthalene

Run Number		Run 1	Run 2	Run 3	Average
Date		3/7/19	3/7/19	3/7/19	--
Start Time		13:41	15:25	17:02	--
Stop Time		14:41	16:25	18:02	--
Run Time, min		60.0	60.0	60.0	60.0
VELOCITY HEAD, in. WC					
Point 1		0.55	0.58	0.49	0.54
Point 2		0.60	0.59	0.54	0.58
Point 3		0.75	0.63	0.59	0.66
Point 4		0.70	0.76	0.75	0.74
Point 5		0.69	0.78	0.64	0.70
Point 6		0.60	0.60	0.53	0.58
Point 7		0.48	0.49	0.68	0.55
Point 8		0.63	0.67	0.67	0.66
Point 9		0.71	0.73	0.73	0.72
Point 10		0.67	0.63	0.68	0.66
Point 11		0.64	0.66	0.61	0.64
Point 12		0.66	0.66	0.63	0.65
CALCULATED DATA					
Square Root of ΔP , (in. WC) ^{1/2}	(ΔP)	0.799	0.804	0.791	0.798
Pitot Tube Coefficient	(Cp)	0.840	0.840	0.840	0.840
Barometric Pressure, in. Hg	(Pb)	30.37	30.37	30.37	30.37
Static Pressure, in. WC	(Pg)	-0.28	-0.28	-0.28	-0.28
Stack Pressure, in. Hg	(Ps)	30.35	30.35	30.35	30.35
Stack Cross-sectional Area, ft ²	(As)	2.18	2.18	2.18	2.18
Temperature, °F	(Ts)	593.3	588.3	583.3	588.3
Temperature, °R	(Ts)	1053.3	1048.3	1043.3	1048.3
Moisture Fraction Measured	(BWSmsd)	0.062	0.081	0.050	0.064
Moisture Fraction @ Saturation	(BWSsat)	86.510	83.480	80.575	83.522
Moisture Fraction	(BWS)	0.062	0.081	0.050	0.064
O ₂ Concentration, %	(O ₂)	14.5	14.4	14.4	14.4
CO ₂ Concentration, %	(CO ₂)	4.8	4.9	4.8	4.8
Molecular Weight, lb/lb-mole (dry)	(Md)	29.34	29.35	29.35	29.35
Molecular Weight, lb/lb-mole (wet)	(Ms)	28.64	28.44	28.78	28.62
Velocity, ft/sec	(Vs)	63.1	63.6	62.1	62.9
VOLUMETRIC FLOW RATE					
At Stack Conditions, acfm	(Qa)	8,264	8,326	8,129	8,240
At Standard Conditions, dscfm	(Qs)	3,943	3,911	3,962	3,939

Location Caterpillar, Inc - Virginia Beach, VA

Source 3516HD Generator (LC 25)

Project No. 2019-0420

Parameter Polycyclic Aromatic Hydrocarbons, Naphthalene

Analysis Volumetric

Run 1		Date: 3/7/19					
Impinger No.	1*	2	3	4	5	6*	Total
Contents	XAD Trap	Empty	H2O	H2O	Empty	Silica	--
Initial Volume, mL	353.0	0.0	100.0	100.0	0.0	231.3	784.3
Final Volume, mL	364.3	26.0	124.0	74.0	0.0	246.8	835.1
Gain	11.3	26.0	24.0	-26.0	0.0	15.5	50.8
Run 2		Date: 3/7/19					
Impinger No.	1*	2	3	4	5	6*	Total
Contents	XAD Trap	Empty	H2O	H2O	Empty	Silica	--
Initial Volume, mL	342.2	0.0	100.0	100.0	0.0	228.2	770.4
Final Volume, mL	366.7	28.0	34.0	168.0	0.0	242.3	839.0
Gain	24.5	28.0	-66.0	68.0	0.0	14.1	68.6
Run 3		Date: 3/7/19					
Impinger No.	1*	2	3	4	5	6*	Total
Contents	XAD Trap	Empty	H2O	H2O	Empty	Silica	--
Initial Volume, mL	345.0	0.0	100.0	100.0	0.0	237.3	782.3
Final Volume, mL	346.6	28.0	102.0	106.0	2.0	238.5	823.1
Gain	1.6	28.0	2.0	6.0	2.0	1.2	40.8



Isokinetic Field Data

Location: <u>Caterpillar, Inc - Virginia Beach, VA</u>				Start Time: <u>13:41</u>		Source: <u>3516HD Generator (LC 25)</u>														
Date: <u>3/7/19</u>		Run 1		End Time: <u>14:41</u>		Project No.: <u>2019-0420</u>		Parameter: <u>Polycyclic</u>												
STACK DATA (EST)			EQUIPMENT			STACK DATA (EST)			FILTER NO.		STACK DATA (FINAL)			MOIST. DATA						
Moisture: <u>6.0</u> % est.			Meter Box ID: <u>2027</u>			Est. Tm: <u>70</u> °F			NA		Pb: <u>30.37</u> in. Hg			Vlc (ml)						
Barometric: <u>30.37</u> in. Hg			Y: <u>1.008</u>			Est. Ts: <u>590</u> °F					Pg: <u>-0.28</u> in. WC			50.8						
Static Press: <u>-0.28</u> in. WC			AH @ (in.WC): <u>1.840</u>			Est. AP: <u>0.64</u> in. WC					O ₂ : <u>14.5</u> %			K-FACTOR						
Stack Press: <u>30.35</u> in. Hg			Probe ID: <u>PR-403</u>			Est. Dn: <u>0.248</u> in.					CO ₂ : <u>4.8</u> %			1.889						
CO ₂ : <u>5.0</u> %			Liner Material: <u>glass</u>			Target Rate: <u>0.60</u> scfm					Check Pt.		Initial		Final		Corr.			
O ₂ : <u>14.0</u> %			Pitot ID: <u>P-403-2</u>			LEAK CHECKS			Pre		Mid 1		Mid 2		Post		Mid 1 (cf)		--	
N ₂ /CO: <u>81.0</u> %			Pitot Cp/Type: <u>0.840</u> S-type			Leak Rate (cfm): <u>0.000</u>			--		--		--		0.000		Mid 2 (cf)		--	
Md: <u>29.36</u> lb/lb-mole			Nozzle ID: <u>SS-402</u>			Vacuum (in Hg): <u>10</u>			--		--		8				Mid 3 (cf)		--	
Ms: <u>28.68</u> lb/lb-mole			Nozzle Dn (in.): <u>0.248</u>			Pitot Tube: <u>Pass</u>			--		--		Pass				Mid-Point Leak Check Vol (cf):		--	

Sample Pt.	Sample Time (minutes)		Dry Gas Meter Reading (ft ³)	Pitot Tube ΔP (in WC)	Gas Temperatures (°F)		Orifice Press. ΔH (in. WC)		Pump Vac (in. Hg)	Gas Temperatures (°F)				% ISO	Vs (fps)
					DGM Average	Stack				Probe	Filter	Imp Exit	Aux		
	Amb.	Amb.			Amb.	Amb.	Amb.	Amb.							
	Ideal	Actual													
A-1	0.00	5.00	381.275	0.55	69	595	1.03	1.10	3	262	262	53	46	96.9	58.63
2	5.00	10.00	383.940	0.60	69	595	1.13	1.10	3	262	261	50	47	101.3	61.24
3	10.00	15.00	386.850	0.75	69	594	1.41	1.40	5	260	260	50	48	97.8	68.44
4	15.00	20.00	389.990	0.70	70	594	1.32	1.30	6	260	264	51	48	102.0	66.12
5	20.00	25.00	393.160	0.69	70	594	1.30	1.30	6	260	260	52	52	100.2	65.64
6	25.00	30.00	396.250	0.60	71	593	1.13	1.10	6	261	258	54	54	99.8	61.18
B-1	30.00	35.00	399.130	0.48	72	593	0.91	0.91	5	260	257	54	55	100.5	54.72
2	35.00	40.00	401.730	0.63	73	593	1.20	1.20	6	261	260	55	56	98.1	62.69
3	40.00	45.00	404.640	0.71	74	592	1.35	1.40	6	258	260	56	57	100.8	66.52
4	45.00	50.00	407.820	0.67	74	593	1.27	1.30	6	262	260	59	59	102.1	64.65
5	50.00	55.00	410.950	0.64	75	593	1.22	1.20	6	262	258	60	60	98.6	63.19
6	55.00	60.00	413.910	0.66	76	590	1.26	1.30	6	261	261	60	60	100.4	64.08
	60.00	--	416.980												--
Final DGM:			416.980												

RESULTS	Run Time		Vm	ΔP	Tm	Ts	Max Vac	ΔH	%ISO	BWS	Y _{qa}
	60.0	min	35.705 ft ³	0.64 in. WC	71.8 °F	593.3 °F	6	1.218 in. WC	100.0	0.062	-0.4



Isokinetic Field Data

Location: Caterpillar, Inc - Virginia Beach, VA				Start Time: 15:25		Source: 3516HD Generator (LC 25)					
Date: 3/7/19		Run 2		VALID		End Time: 16:25		Project No.: 2019-0420		Parameter: Polycyclic	

STACK DATA (EST)			EQUIPMENT			STACK DATA (EST)			FILTER NO.		STACK DATA (FINAL)			MOIST. DATA			
Moisture:	6.0	% est.	Meter Box ID:	2027		Est. Tm:	72	°F	NA		Pb:	30.37	in. Hg	Vlc (ml)			
Barometric:	30.37	in. Hg	Y:	1.008		Est. Ts:	593	°F			Pg:	-0.28	in. WC	68.6			
Static Press:	-0.28	in. WC	ΔH @ (in.WC):	1.840		Est. ΔP:	0.64	in. WC			O ₂ :	14.4	%	K-FACTOR			
Stack Press:	30.35	in. Hg	Probe ID:	PR-403		Est. Dn:	0.248	in.			CO ₂ :	4.9	%	1.89			
CO ₂ :	5.0	%	Liner Material:	glass		Target Rate:	0.60	scfm						Check Pt.	Initial	Final	Corr.
O ₂ :	14.0	%	Pitot ID:	P-403-2		LEAK CHECKS			Pre	Mid 1	Mid 2	Post	Mid 1 (cf)				
N ₂ /CO:	81.0	%	Pitot Cp/Type:	0.840	S-type	Leak Rate (cfm):			0.000	--	--	0.000	Mid 2 (cf)				
Md:	29.36	lb/lb-mole	Nozzle ID:	SS-402		Vacuum (in Hg):			8	--	--	10	Mid 3 (cf)				
Ms:	28.68	lb/lb-mole	Nozzle Dn (in.):	0.248		Pitot Tube:			Pass	--	--	Pass	Mid-Point Leak Check Vol (cf):				
									--	--	--	--					

Sample Pt.	Sample Time (minutes)		Dry Gas Meter Reading (ft ³)	Pitot Tube ΔP (in WC)	Gas Temperatures (°F)		Orifice Press. ΔH (in. WC)		Pump Vac (in. Hg)	Gas Temperatures (°F)				% ISO	Vs (fps)
					DGM Average	Stack	Ideal			Actual	Probe	Filter	Imp Exit		
	Amb.	Amb.						Amb.		Amb.	Amb.	Amb.			
	Begin	End													
A-1	0.00	5.00	421.650	0.58	74	581	1.12	1.10	4	259	260	44	42	99.3	59.81
2	5.00	10.00	424.500	0.59	70	586	1.12	1.10	4	260	263	42	44	96.0	60.47
3	10.00	15.00	427.250	0.63	70	591	1.19	1.20	4	260	261	43	47	103.6	62.63
4	15.00	20.00	430.310	0.76	69	590	1.43	1.40	6	260	259	43	49	98.5	68.76
5	20.00	25.00	433.500	0.78	70	589	1.48	1.50	7	261	259	42	52	102.5	69.63
6	25.00	30.00	436.870	0.60	70	590	1.14	1.10	7	260	256	43	54	102.3	61.10
B-1	30.00	35.00	439.820	0.49	70	589	0.93	0.93	6	260	261	44	53	98.5	55.19
2	35.00	40.00	442.390	0.67	71	591	1.27	1.30	8	259	258	45	53	102.3	64.59
3	40.00	45.00	445.510	0.73	71	589	1.38	1.40	8	261	264	45	55	99.2	67.36
4	45.00	50.00	448.670	0.63	71	588	1.20	1.20	8	261	265	46	55	102.3	62.55
5	50.00	55.00	451.700	0.66	72	588	1.26	1.30	8	258	256	46	57	99.8	64.02
6	55.00	60.00	454.730	0.66	72	587	1.26	1.30	8	260	254	47	57	99.9	63.99
--	60.00	--	457.765												--
Final DGM:			457.765												

RESULTS	Run Time		Vm		ΔP		Tm		Ts		Max Vac		ΔH		%ISO	BWS	Y _{qa}
	min		ft ³		in. WC		°F		°F		in. WC		in. WC				
	60.0		36.115	ft ³	0.65	in. WC	70.8	°F	588.3	°F	8	1.236	in. WC	102.2	0.081	0.1	



Isokinetic Field Data

Location: Caterpillar, Inc - Virginia Beach, VA				Start Time: 17:02		Source: 3516HD Generator (LC 25)										
Date: 3/7/19		Run 3		End Time: 18:02		Project No.: 2019-0420		Parameter: Polycyclic								
STACK DATA (EST)			EQUIPMENT			STACK DATA (EST)			FILTER NO.		STACK DATA (FINAL)		MOIST. DATA			
Moisture: 6.0 % est.			Meter Box ID: 2027			Est. Tm: 71 °F			NA		Pb: 30.37 in. Hg		Vlc (ml)			
Barometric: 30.37 in. Hg			Y: 1.008			Est. Ts: 588 °F					Pg: -0.28 in. WC		K-FACTOR			
Static Press: -0.28 in. WC			ΔH @ (in.WC): 1.840			Est. ΔP: 0.65 in. WC					O ₂ : 14.4 %		1.895			
Stack Press: 30.35 in. Hg			Probe ID: PR-403			Est. Dn: 0.249 in.					CO ₂ : 4.8 %					
CO ₂ : 5.0 %			Liner Material: glass			Target Rate: 0.61 scfm										
O ₂ : 14.0 %			Pitot ID: P-403-2			LEAK CHECKS			Pre		Mid 1		Mid 2		Post	
N ₂ /CO: 81.0 %			Pitot Cp/Type: 0.840 S-type			Leak Rate (cfm): 0.000			--		--		0.000		Mid 1 (cf)	
Md: 29.36 lb/lb-mole			Nozzle ID: SS-402			Vacuum (in Hg): 12			--		--		10		Mid 2 (cf)	
Ms: 28.68 lb/lb-mole			Nozzle Dn (in.): 0.248			Pitot Tube: Pass			--		--		Pass		Mid 3 (cf)	
											Mid-Point Leak Check Vol (cf):		--			

Sample Pt.	Sample Time (minutes)		Dry Gas Meter Reading (ft ³)	Pitot Tube ΔP (in WC)	Gas Temperatures (°F)		Orifice Press. ΔH (in. WC)		Pump Vac (in. Hg)	Gas Temperatures (°F)				% ISO	Vs (fps)
					DGM Average	Stack	Ideal			Actual	Probe	Filter	Imp Exit		
	Amb.	Amb.					Amb.	Amb.		Amb.	Amb.				
	Begin	End			--	--	--	--		--	--				
A-1	0.00	5.00	459.250	0.49	69	557	0.96	0.93	3	259	259	39	44	93.8	54.34
2	5.00	10.00	461.730	0.54	67	579	1.03	1.00	3	257	261	36	42	106.7	57.66
3	10.00	15.00	464.650	0.59	66	584	1.11	1.10	5	261	260	37	43	95.2	60.41
4	15.00	20.00	467.360	0.75	66	586	1.41	1.40	5	258	261	37	44	101.1	68.18
5	20.00	25.00	470.600	0.64	66	587	1.21	1.20	5	260	261	37	44	100.4	63.01
6	25.00	30.00	473.570	0.53	67	586	1.00	1.00	5	259	262	38	44	99.6	57.31
B-1	30.00	35.00	476.260	0.68	67	587	1.28	1.30	6	260	261	38	44	99.2	64.95
2	35.00	40.00	479.290	0.67	68	588	1.26	1.30	6	261	261	39	44	102.7	64.50
3	40.00	45.00	482.410	0.73	68	587	1.38	1.40	6	260	260	39	45	99.3	67.29
4	45.00	50.00	485.560	0.68	68	587	1.29	1.30	7	261	261	41	46	100.3	64.95
5	50.00	55.00	488.630	0.61	69	586	1.16	1.20	7	260	262	42	47	102.2	61.49
6	55.00	60.00	491.600	0.63	69	586	1.19	1.20	7	260	258	43	48	97.6	62.49
--	60.00	--	494.485												--
Final DGM:			494.485												

RESULTS	Run Time		Vm		ΔP		Tm		Ts		Max Vac	ΔH		%ISO	BWS	Y _{qa}
	min		ft ³		in. WC		°F		°F		in. WC					
	60.0		35.235		0.63		67.5		583.3		7	1.194		99.0	0.050	-0.4

Load Condition: 50%

Location Caterpillar, Inc - Virginia Beach, VA
 Source 3516HD Generator (LC 50)
 Project No. 2019-0420
 Parameter PM/CPM

Run Number		Run 1	Run 2	Run 3	Average
Date		3/6/19	3/7/19	3/7/19	--
Start Time		17:05	8:58	10:49	--
Stop Time		18:05	9:58	11:49	--
Run Time, min	(θ)	60.0	60.0	60.0	60.0
INPUT DATA					
Barometric Pressure, in. Hg	(Pb)	30.26	30.37	30.37	30.33
Meter Correction Factor	(Y)	0.989	0.989	0.989	0.989
Orifice Calibration Value	($\Delta H @$)	1.746	1.746	1.746	1.746
Meter Volume, ft ³	(Vm)	37.210	36.505	36.610	36.775
Meter Temperature, °F	(Tm)	71.1	68.6	70.5	70.1
Meter Temperature, °R	(Tm)	531.1	528.6	530.5	530.1
Meter Orifice Pressure, in. WC	(ΔH)	1.218	1.194	1.177	1.196
Volume H ₂ O Collected, mL	(Vlc)	40.1	44.7	41.0	41.9
Nozzle Diameter, in	(Dn)	0.208	0.208	0.208	0.208
Area of Nozzle, ft ²	(An)	0.0002	0.0002	0.0002	0.0002
Filterable PM Mass, mg	(Mn)	10.5	18.6	26.1	18.4
Condensable PM Mass, mg	(M _{CPM})	13.3	13.9	14.1	13.8
ISOKINETIC DATA					
Standard Meter Volume, ft ³	(Vmstd)	37.112	36.712	36.683	36.836
Standard Water Volume, ft ³	(Vwstd)	1.888	2.105	1.930	1.974
Moisture Fraction Measured	(BWSmsd)	0.048	0.054	0.050	0.051
Moisture Fraction @ Saturation	(BWSsat)	99.377	123.729	130.892	117.999
Moisture Fraction	(BWS)	0.048	0.054	0.050	0.051
Meter Pressure, in Hg	(Pm)	30.35	30.46	30.46	30.42
Volume at Nozzle, ft ³	(Vn)	78.440	80.275	80.499	79.738
Isokinetic Sampling Rate, (%)	(I)	98.8	99.2	99.0	99.0
DGM Calibration Check Value, (+/- 5%)	(Y _{qa})	-0.7	-1.4	-0.4	-0.8
EMISSION CALCULATIONS					
Filterable PM Concentration, grain/dscf	(C _s)	0.0044	0.0078	0.0110	0.0077
Filterable PM Emission Rate, lb/hr	(PMR)	0.22	0.38	0.54	0.38
Condensable PM Concentration, grain/dscf	(C _{CPM})	0.0055	0.0058	0.0059	0.0058
Condensable PM Emission Rate, lb/hr	(ER _{CPM})	0.27	0.29	0.29	0.28
Total PM Concentration, grain/dscf	(C _{TPM})	0.010	0.014	0.017	0.013
Total PM Emission Rate, lb/hr	(ER _{TPM})	0.49	0.67	0.83	0.66

Location Caterpillar, Inc - Virginia Beach, VA
Source 3516HD Generator (LC 50)
Project No. 2019-0420
Parameter PM/CPM

Run Number		Run 1	Run 2	Run 3	Average
Date		3/6/19	3/7/19	3/7/19	--
Start Time		17:05	8:58	10:49	--
Stop Time		18:05	9:58	11:49	--
Run Time, min		60.0	60.0	60.0	60.0
VELOCITY HEAD, in. WC					
Point 1		1.10	1.20	1.30	1.20
Point 2		1.20	1.30	1.50	1.33
Point 3		1.20	1.50	1.60	1.43
Point 4		1.50	1.50	1.60	1.53
Point 5		1.60	1.40	1.40	1.47
Point 6		1.40	1.30	1.20	1.30
Point 7		1.30	1.10	1.10	1.17
Point 8		1.70	1.40	1.30	1.47
Point 9		1.70	1.50	1.50	1.57
Point 10		1.40	1.60	1.70	1.57
Point 11		1.30	1.50	1.40	1.40
Point 12		1.20	1.40	1.20	1.27
CALCULATED DATA					
Square Root of ΔP , (in. WC) ^{1/2}	(ΔP)	1.173	1.178	1.181	1.177
Pitot Tube Coefficient	(Cp)	0.840	0.840	0.840	0.840
Barometric Pressure, in. Hg	(Pb)	30.26	30.37	30.37	30.33
Static Pressure, in. WC	(Pg)	-0.54	-0.75	-0.75	-0.68
Stack Pressure, in. Hg	(Ps)	30.22	30.31	30.31	30.28
Stack Cross-sectional Area, ft ²	(As)	2.18	2.18	2.18	2.18
Temperature, °F	(Ts)	612.6	646.3	655.3	638.1
Temperature, °R	(Ts)	1072.6	1106.3	1115.3	1098.1
Moisture Fraction Measured	(BWSmsd)	0.048	0.054	0.050	0.051
Moisture Fraction @ Saturation	(BWSsat)	99.377	123.729	130.892	117.999
Moisture Fraction	(BWS)	0.048	0.054	0.050	0.051
O ₂ Concentration, %	(O ₂)	13.3	13.2	13.3	13.3
CO ₂ Concentration, %	(CO ₂)	5.5	5.6	5.7	5.6
Molecular Weight, lb/lb-mole (dry)	(Md)	29.42	29.42	29.44	29.43
Molecular Weight, lb/lb-mole (wet)	(Ms)	28.86	28.80	28.87	28.85
Velocity, ft/sec	(Vs)	93.4	95.2	95.7	94.8
VOLUMETRIC FLOW RATE					
At Stack Conditions, acfm	(Qa)	12,230	12,466	12,529	12,408
At Standard Conditions, dscfm	(Qs)	5,786	5,701	5,710	5,732

Location Caterpillar, Inc - Virginia Beach, VA

Source 3516HD Generator (LC 50)

Project No. 2019-0420

Parameter PM/CPM

Analysis Volumetric

Run 1	Date: 3/6/19					
Impinger No.	1	2	3	4	5*	Total
Contents	Empty	Empty	H2O	Empty	Silica	--
Initial Volume, mL	0.0	0.0	100.0	0.0	221.3	321.3
Final Volume, mL	24.0	1.0	102.0	4.0	230.4	361.4
Gain	24.0	1.0	2.0	4.0	9.1	40.1
Run 2	Date: 3/7/19					
Impinger No.	1	2	3	4	5*	Total
Contents	Empty	Empty	H2O	Empty	Silica	--
Initial Volume, mL	0.0	0.0	100.0	0.0	230.4	330.4
Final Volume, mL	21.0	1.0	106.0	6.0	241.1	375.1
Gain	21.0	1.0	6.0	6.0	10.7	44.7
Run 3	Date: 3/7/19					
Impinger No.	1	2	3	4	5*	Total
Contents	Empty	Empty	H2O	Empty	Silica	--
Initial Volume, mL	0.0	0.0	100.0	0.0	236.4	336.4
Final Volume, mL	33.0	1.0	100.0	0.0	243.4	377.4
Gain	33.0	1.0	0.0	0.0	7.0	41.0



Isokinetic Field Data

Location: <u>Caterpillar, Inc - Virginia Beach, VA</u>				Start Time: <u>17:05</u>		Source: <u>3516HD Generator (LC 50)</u>							
Date: <u>3/6/19</u>		Run 1		End Time: <u>18:05</u>		Project No.: <u>2019-0420</u>		Parameter: <u>PM/CPM</u>					
STACK DATA (EST)			EQUIPMENT		STACK DATA (EST)			FILTER NO.		STACK DATA (FINAL)		MOIST. DATA	
Moisture: <u>6.0</u> % est.			Meter Box ID: <u>2026</u>		Est. Tm: <u>70</u> °F			11562		Pb: <u>30.26</u> in. Hg		Vlc (ml)	
Barometric: <u>30.37</u> in. Hg			Y: <u>0.989</u>		Est. Ts: <u>635</u> °F					Pg: <u>-0.54</u> in. WC		40.1	
Static Press: <u>-0.54</u> in. WC			AH @ (in.WC): <u>1.746</u>		Est. AP: <u>1.38</u> in. WC					O ₂ : <u>13.3</u> %		K-FACTOR	
Stack Press: <u>30.33</u> in. Hg			Probe ID: <u>PR-402-0</u>		Est. Dn: <u>0.215</u> in.					CO ₂ : <u>5.5</u> %		0.850	
CO ₂ : <u>5.5</u> %			Liner Material: <u>glass</u>		Target Rate: <u>0.65</u> scfm					Check Pt.		Initial Final Corr.	
O ₂ : <u>13.3</u> %			Pitot ID: <u>P-403-2</u>		LEAK CHECKS			Pre Mid 1 Mid 2 Post		Mid 1 (cf)		--	
N ₂ /CO: <u>81.2</u> %			Pitot Cp/Type: <u>0.840</u> S-type		Leak Rate (cfm): <u>0.000</u>			-- -- -- 0.000		Mid 2 (cf)		--	
Md: <u>29.42</u> lb/lb-mole			Nozzle ID: <u>#7</u>		Vacuum (in Hg): <u>10</u>			-- -- -- 10		Mid 3 (cf)		--	
Ms: <u>28.73</u> lb/lb-mole			Nozzle Dn (in.): <u>0.208</u>		Pitot Tube: <u>Pass</u>			-- -- -- Pass		Mid-Point Leak Check Vol (cf):		--	

Sample Pt.	Sample Time (minutes)		Dry Gas Meter Reading (ft ³)	Pitot Tube ΔP (in WC)	Gas Temperatures (°F)		Orifice Press. ΔH (in. WC)		Pump Vac (in. Hg)	Gas Temperatures (°F)				% ISO	Vs (fps)
					DGM Average	Stack				Probe	Filter	Imp Exit	Aux		
	Amb.	Amb.			Amb.	Amb.	Amb.	Amb.							
	67	67			Ideal	Actual	68	69		70	69				
A-1	0.00	5.00	45.040	1.10	69	658	0.92	0.92	4	266	266	53	66	93.9	85.31
2	5.00	10.00	47.580	1.20	68	645	1.01	1.00	3	260	264	42	67	100.8	88.58
3	10.00	15.00	50.440	1.20	69	642	1.01	1.00	3	259	260	41	68	100.1	88.46
4	15.00	20.00	53.290	1.50	69	644	1.26	1.30	4	261	265	40	68	102.6	98.99
5	20.00	25.00	56.550	1.60	70	642	1.35	1.40	4	258	255	41	68	99.7	102.15
6	25.00	30.00	59.830	1.40	71	642	1.19	1.20	4	258	258	41	69	101.2	95.55
B-1	30.00	35.00	62.950	1.30	71	643	1.10	1.10	4	260	261	42	70	99.6	92.11
2	35.00	40.00	65.910	1.70	72	644	1.44	1.40	4	260	261	42	72	98.2	105.38
3	40.00	45.00	69.250	1.70	73	644	1.44	1.40	5	260	259	42	73	99.8	105.38
4	45.00	50.00	72.650	1.40	73	643	1.19	1.20	5	260	262	42	73	100.5	95.59
5	50.00	55.00	75.760	1.30	74	643	1.11	1.10	4	259	259	42	73	99.4	92.11
6	55.00	60.00	78.730	1.20	74	261	1.56	1.60	5	260	258	42	68	99.3	71.55
	60.00	--	82.250												--
Final DGM:			82.250												

RESULTS	Run Time		Vm	ΔP	Tm	Ts	Max Vac	ΔH	%ISO	BWS	Y _{qa}
	60.0	min	37.210 ft ³	1.38 in. WC	71.1 °F	612.6 °F	5	1.218 in. WC	98.8	0.048	-0.7



Isokinetic Field Data

Location: Caterpillar, Inc - Virginia Beach, VA				Start Time: 8:58		Source: 3516HD Generator (LC 50)					
Date: 3/7/19		Run 2		VALID		End Time: 9:58		Project No.: 2019-0420		Parameter: PM/CPM	

STACK DATA (EST)	EQUIPMENT	STACK DATA (EST)	FILTER NO.	STACK DATA (FINAL)	MOIST. DATA																				
Moisture: 6.0 % est.	Meter Box ID: 2026	Est. Tm: 71 °F	11563	Pb: 30.37 in. Hg	Vlc (ml)																				
Barometric: 30.37 in. Hg	Y: 0.989	Est. Ts: 613 °F		Pg: -0.75 in. WC	44.7																				
Static Press: -0.54 in. WC	ΔH @ (in.WC): 1.746	Est. ΔP: 1.38 in. WC		O ₂ : 13.2 %	K-FACTOR																				
Stack Press: 30.33 in. Hg	Probe ID: PR-402-0	Est. Dn: 0.230 in.		CO ₂ : 5.6 %	0.87																				
CO ₂ : 5.5 %	Liner Material: glass	Target Rate: 0.75 scfm		<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th>Check Pt.</th> <th>Initial</th> <th>Final</th> <th>Corr.</th> </tr> </thead> <tbody> <tr> <td>Mid 1 (cf)</td> <td></td> <td></td> <td>--</td> </tr> <tr> <td>Mid 2 (cf)</td> <td></td> <td></td> <td>--</td> </tr> <tr> <td>Mid 3 (cf)</td> <td></td> <td></td> <td>--</td> </tr> <tr> <td>Mid-Point Leak Check Vol (cf):</td> <td></td> <td></td> <td>--</td> </tr> </tbody> </table>		Check Pt.	Initial	Final	Corr.	Mid 1 (cf)			--	Mid 2 (cf)			--	Mid 3 (cf)			--	Mid-Point Leak Check Vol (cf):			--
Check Pt.	Initial	Final	Corr.																						
Mid 1 (cf)			--																						
Mid 2 (cf)			--																						
Mid 3 (cf)			--																						
Mid-Point Leak Check Vol (cf):			--																						
O ₂ : 13.3 %	Pitot ID: P-403-2	LEAK CHECKS		Pre	Mid 1	Mid 2	Post																		
N ₂ /CO: 81.2 %	Pitot Cp/Type: 0.840 S-type	Leak Rate (cfm): 0.000		--	--	--	0.000																		
Md: 29.42 lb/lb-mole	Nozzle ID: #7	Vacuum (in Hg): 9		--	--	--	8																		
Ms: 28.73 lb/lb-mole	Nozzle Dn (in.): 0.208	Pitot Tube: Pass		--	--	--	Pass																		

Sample Pt.	Sample Time (minutes)		Dry Gas Meter Reading (ft ³)	Pitot Tube ΔP (in WC)	Gas Temperatures (°F)		Orifice Press. ΔH (in. WC)		Pump Vac (in. Hg)	Gas Temperatures (°F)				% ISO	Vs (fps)	
	Begin	End			DGM Average	Stack	Ideal	Actual		Probe	Filter	Imp Exit	Aux			
					Amb.	Amb.				Amb.	Amb.	Amb.	Amb.			
A-1	0.00	5.00	82.850	1.20	64	644	1.00	1.00	3	262	262	52	66	100.1	88.54	
2	5.00	10.00	85.670	1.30	64	643	1.09	1.10	3	262	260	49	67	101.3	92.11	
3	10.00	15.00	88.640	1.50	65	645	1.25	1.30	4	258	264	50	67	100.3	99.04	
4	15.00	20.00	91.800	1.50	66	645	1.26	1.30	4	259	261	51	67	98.2	99.04	
5	20.00	25.00	94.900	1.40	67	646	1.17	1.20	4	261	260	58	67	101.5	95.72	
6	25.00	30.00	98.000	1.30	68	647	1.09	1.10	4	260	261	59	68	98.3	92.28	
B-1	30.00	35.00	100.900	1.10	69	647	0.93	0.93	4	259	260	57	69	99.7	84.89	
2	35.00	40.00	103.610	1.40	70	646	1.18	1.20	4	261	262	49	70	99.6	95.72	
3	40.00	45.00	106.670	1.50	71	648	1.26	1.30	5	260	265	46	71	99.0	99.17	
4	45.00	50.00	109.820	1.60	72	649	1.35	1.40	5	261	260	45	70	99.7	102.47	
5	50.00	55.00	113.100	1.50	73	648	1.27	1.30	5	260	260	46	68	99.8	99.17	
6	55.00	60.00	116.290	1.40	74	648	1.19	1.20	5	258	261	47	67	99.1	95.81	
--	60.00	--	119.355												--	
Final DGM:			119.355													

RESULTS	Run Time		Vm		ΔP		Tm		Ts		Max Vac	ΔH		%ISO	BWS	Y _{qa}
	min		ft ³		in. WC		°F		°F		in. WC					
	60.0		36.505		1.39		68.6		646.3		5	1.194		99.2	0.054	-1.4



Isokinetic Field Data

Location: Caterpillar, Inc - Virginia Beach, VA				Start Time: 10:49		Source: 3516HD Generator (LC 50)								
Date: 3/7/19		Run 3		End Time: 11:49		Project No.: 2019-0420		Parameter: PM/CPM						
STACK DATA (EST)			EQUIPMENT			STACK DATA (EST)			FILTER NO.	STACK DATA (FINAL)		MOIST. DATA		
Moisture: 6.0 % est.			Meter Box ID: 2026			Est. Tm: 69 °F			11235	Pb: 30.37 in. Hg		Vlc (ml)		
Barometric: 30.37 in. Hg			Y: 0.989			Est. Ts: 646 °F				Pg: -0.75 in. WC		41.0		
Static Press: -0.54 in. WC			ΔH @ (in.WC): 1.746			Est. ΔP: 1.39 in. WC				O ₂ : 13.3 %		K-FACTOR		
Stack Press: 30.33 in. Hg			Probe ID: PR-402-0			Est. Dn: 0.208 in.				CO ₂ : 5.7 %		0.839		
CO ₂ : 5.5 %			Liner Material: glass			Target Rate: 0.60 scfm								
O ₂ : 13.3 %			Pitot ID: P-403-2			LEAK CHECKS			Pre	Mid 1	Mid 2	Post	Check Pt. Initial Final Corr.	
N ₂ /CO: 81.2 %			Pitot Cp/Type: 0.840 S-type			Leak Rate (cfm): 0.000			--	--	--	0.000	Mid 1 (cf) --	
Md: 29.42 lb/lb-mole			Nozzle ID: #7			Vacuum (in Hg): 6			--	--	--	6	Mid 2 (cf) --	
Ms: 28.73 lb/lb-mole			Nozzle Dn (in.): 0.208			Pitot Tube: Pass			--	--	--	Pass	Mid 3 (cf) --	
											Mid-Point Leak Check Vol (cf): --			

Sample Pt.	Sample Time (minutes)		Dry Gas Meter Reading (ft ³)	Pitot Tube ΔP (in WC)	Gas Temperatures (°F)		Orifice Press. ΔH (in. WC)		Pump Vac (in. Hg)	Gas Temperatures (°F)				% ISO	Vs (fps)
					DGM Average	Stack	Ideal			Actual	Probe	Filter	Imp Exit		
	Amb.	Amb.					Amb.	Amb.		Amb.	Amb.				
	Begin	End			--	--	--	--		--	--				
A-1	0.00	5.00	119.765	1.30	71	646	1.10	1.10	3	264	257	47	67	98.9	92.24
2	5.00	10.00	122.700	1.50	69	645	1.26	1.30	3	261	263	44	66	100.1	99.04
3	10.00	15.00	125.880	1.60	68	653	1.33	1.30	3	263	262	46	69	97.2	102.65
4	15.00	20.00	129.050	1.60	69	656	1.33	1.30	3	260	261	47	73	99.6	102.79
5	20.00	25.00	132.300	1.40	69	657	1.17	1.20	4	260	262	48	73	101.9	96.20
6	25.00	30.00	135.410	1.20	70	656	1.00	1.00	3	260	259	47	74	98.1	89.02
B-1	30.00	35.00	138.190	1.10	70	657	0.92	0.92	3	258	261	47	74	99.9	85.27
2	35.00	40.00	140.900	1.30	71	656	1.09	1.10	3	260	260	49	75	100.9	92.66
3	40.00	45.00	143.880	1.50	71	658	1.25	1.30	4	261	260	50	75	99.4	99.62
4	45.00	50.00	147.030	1.70	72	660	1.42	1.40	4	259	261	52	75	101.3	106.15
5	50.00	55.00	150.450	1.40	73	663	1.17	1.20	4	261	261	54	75	97.8	96.45
6	55.00	60.00	153.450	1.20	73	656	1.01	1.00	4	260	260	54	72	102.7	89.02
--	60.00	--	156.375												--
Final DGM:			156.375												

RESULTS	Run Time		Vm		ΔP		Tm		Ts		Max Vac	ΔH		%ISO	BWS	Y _{qa}
	min		ft ³		in. WC		°F		°F		in. WC					
	60.0		36.610		1.40		70.5		655.3		4	1.177		99.0	0.050	-0.4

Location Caterpillar, Inc - Virginia Beach, VA
 Source 3561HD Generator (L50)
 Project No. 2019-0420
 Parameter Arsenic, Cadmium, Nickel

Run Number		Run 1	Run 2	Run 3	Average
Date		3/6/19	3/7/19	3/7/19	--
Start Time		17:05	8:58	10:49	--
Stop Time		18:05	9:58	11:49	--
Run Time, min	(θ)	60.0	60.0	60.0	60.0
INPUT DATA					
Barometric Pressure, in. Hg	(Pb)	30.26	30.37	30.26	30.30
Meter Correction Factor	(Y)	0.994	0.994	0.994	0.994
Orifice Calibration Value	($\Delta H @$)	1.816	1.816	1.816	1.816
Meter Volume, ft ³	(Vm)	29.824	30.259	29.892	29.992
Meter Temperature, °F	(Tm)	67.8	68.3	67.8	67.9
Meter Temperature, °R	(Tm)	527.8	528.3	527.8	527.9
Meter Orifice Pressure, in. WC	(ΔH)	0.818	0.821	0.819	0.819
Volume H ₂ O Collected, mL	(Vlc)	39.4	44.9	43.0	42.4
Nozzle Diameter, in	(Dn)	0.195	0.195	0.195	0.195
Area of Nozzle, ft ²	(An)	0.0002	0.0002	0.0002	0.0002
Arsenic Mass, ug	(M _{As})	<u>0.80</u>	<u>0.80</u>	<u>0.80</u>	0.80
Cadmium Mass, ug	(M _{Cd})	<u>0.18</u>	0.19	<u>0.18</u>	0.18
Nickel Mass, ug	(M _{Ni})	2.5	2.7	3.6	2.9
ISOKINETIC DATA					
Standard Meter Volume, ft ³	(Vmstd)	30.056	30.576	30.120	30.250
Standard Water Volume, ft ³	(Vwstd)	1.855	2.114	2.024	1.998
Moisture Fraction Measured	(BWSmsd)	0.058	0.065	0.063	0.062
Moisture Fraction @ Saturation	(BWSsat)	118.733	123.401	128.513	123.549
Moisture Fraction	(BWS)	0.058	0.065	0.063	0.062
Meter Pressure, in Hg	(Pm)	30.32	30.43	30.32	30.36
Volume at Nozzle, ft ³	(Vn)	65.787	67.580	67.046	66.804
Isokinetic Sampling Rate, (%)	(I)	93.0	94.9	93.6	93.8
DGM Calibration Check Value, (+/- 5%)	(Y _{qa})	-0.2	1.1	-0.1	0.2
EMISSION CALCULATIONS					
Arsenic Concentration, ug/dscm	(C _{As})	0.94	0.92	0.94	0.93
Arsenic Emission Rate, lb/hr	(ER _{As})	2.0E-05	2.0E-05	2.0E-05	2.0E-05
Cadmium Concentration, ug/dscm	(C _{Cd})	0.21	0.22	0.21	0.21
Cadmium Emission Rate, lb/hr	(ER _{Cd})	4.5E-06	4.6E-06	4.5E-06	4.5E-06
Nickel Concentration, ug/dscm	(C _{Ni})	2.9	3.1	4.2	3.4
Nickel Emission Rate, lb/hr	(ER _{Ni})	6.2E-05	6.6E-05	8.9E-05	7.3E-05

Results for runs 1, 2, & 3 for Arsenic and runs 1 & 3 for Cadmium were below the detection limit. The detection limit was used for emission purposes.

Location Caterpillar, Inc - Virginia Beach, VA
Source 3561HD Generator (L50)
Project No. 2019-0420
Parameter Arsenic, Cadmium, Nickel

Run Number		Run 1	Run 2	Run 3	Average
Date		3/6/19	3/7/19	3/7/19	--
Start Time		17:05	8:58	10:49	--
Stop Time		18:05	9:58	11:49	--
Run Time, min		60.0	60.0	60.0	60.0
VELOCITY HEAD, in. WC					
Point 1		1.10	1.20	1.30	1.20
Point 2		1.20	1.30	1.50	1.33
Point 3		1.20	1.50	1.60	1.43
Point 4		1.50	1.50	1.60	1.53
Point 5		1.60	1.40	1.40	1.47
Point 6		1.40	1.30	1.20	1.30
Point 7		1.30	1.10	1.10	1.17
Point 8		1.70	1.40	1.30	1.47
Point 9		1.70	1.50	1.50	1.57
Point 10		1.40	1.60	1.70	1.57
Point 11		1.30	1.50	1.40	1.40
Point 12		1.20	1.40	1.20	1.27
CALCULATED DATA					
Square Root of ΔP , (in. WC) ^{1/2}	(ΔP)	1.173	1.178	1.181	1.177
Pitot Tube Coefficient	(Cp)	0.840	0.840	0.840	0.840
Barometric Pressure, in. Hg	(Pb)	30.26	30.37	30.26	30.30
Static Pressure, in. WC	(Pg)	-0.54	-0.75	-0.75	-0.68
Stack Pressure, in. Hg	(Ps)	30.22	30.31	30.20	30.25
Stack Cross-sectional Area, ft ²	(As)	2.18	2.18	2.18	2.18
Temperature, °F	(Ts)	639.4	645.9	651.8	645.7
Temperature, °R	(Ts)	1099.4	1105.9	1111.8	1105.7
Moisture Fraction Measured	(BWSmsd)	0.058	0.065	0.063	0.062
Moisture Fraction @ Saturation	(BWSsat)	118.733	123.401	128.513	123.549
Moisture Fraction	(BWS)	0.058	0.065	0.063	0.062
O ₂ Concentration, %	(O ₂)	13.3	13.2	13.3	13.3
CO ₂ Concentration, %	(CO ₂)	5.5	5.6	5.7	5.6
Molecular Weight, lb/lb-mole (dry)	(Md)	29.42	29.42	29.44	29.43
Molecular Weight, lb/lb-mole (wet)	(Ms)	28.75	28.69	28.72	28.72
Velocity, ft/sec	(Vs)	94.8	95.4	96.0	95.4
VOLUMETRIC FLOW RATE					
At Stack Conditions, acfm	(Qa)	12,406	12,490	12,565	12,487
At Standard Conditions, dscfm	(Qs)	5,668	5,651	5,645	5,655

Location Caterpillar, Inc - Virginia Beach, VA
 Source 3561HD Generator (L50)
 Project No. 2019-0420
 Parameter Arsenic, Cadmium, Nickel
 Analysis Volumetric

Run 1		Date: 3/6/19			
Impinger No.	1	2	3	4*	Total
Contents	HNO3/H2O2	HNO3/H2O2	Empty	Silica	--
Initial Volume, mL	100.0	100.0	0.0	248.0	448.0
Final Volume, mL	120.0	108.0	4.0	255.4	487.4
Gain	20.0	8.0	4.0	7.4	39.4
Run 2		Date: 3/7/19			
Impinger No.	1	2	3	4*	Total
Contents	HNO3/H2O2	HNO3/H2O2	Empty	Silica	--
Initial Volume, mL	100.0	100.0	0.0	223.7	423.7
Final Volume, mL	124.0	106.0	2.0	236.6	468.6
Gain	24.0	6.0	2.0	12.9	44.9
Run 3		Date: 3/7/19			
Impinger No.	1	2	3	4*	Total
Contents	HNO3/H2O2	HNO3/H2O2	Empty	Silica	--
Initial Volume, mL	100.0	100.0	0.0	236.4	436.4
Final Volume, mL	122.0	108.0	6.0	243.4	479.4
Gain	22.0	8.0	6.0	7.0	43.0



Isokinetic Field Data

Location: <u>Caterpillar, Inc - Virginia Beach, VA</u>			Start Time: <u>17:05</u>		Source: <u>3561HD Generator (L50)</u>		
Date: <u>3/6/19</u>		Run 1	VALID	End Time: <u>18:05</u>		Project No.: <u>2019-0420</u>	Parameter: <u>Arsenic, Ca</u>

STACK DATA (EST)	EQUIPMENT	STACK DATA (EST)	FILTER NO.	STACK DATA (FINAL)	MOIST. DATA
Moisture: <u>6.0</u> % est.	Meter Box ID: <u>1690</u>	Est. Tm: <u>70</u> °F		Pb: <u>30.26</u> in. Hg	Vlc (ml)
Barometric: <u>30.26</u> in. Hg	Y: <u>0.994</u>	Est. Ts: <u>635</u> °F		Pg: <u>-0.54</u> in. WC	<u>39.4</u>
Static Press: <u>-54.00</u> in. WC	AH @ (in.WC): <u>1.816</u>	Est. AP: <u>1.38</u> in. WC		O ₂ : <u>13.3</u> %	K-FACTOR
Stack Press: <u>26.29</u> in. Hg	Probe ID: <u>PR402-2</u>	Est. Dn: <u>0.239</u> in.		CO ₂ : <u>5.5</u> %	<u>0.594</u>
CO ₂ : <u>6.0</u> %	Liner Material: <u>quartz</u>	Target Rate: <u>0.75</u> scfm		Check Pt.	Initial
O ₂ : <u>11.0</u> %	Pitot ID: <u>P403-2</u>			Final	Corr.
N ₂ /CO: <u>83.0</u> %	Pitot Cp/Type: <u>0.840</u> S-type	LEAK CHECKS	Pre	Mid 1	Mid 2
Md: <u>29.40</u> lb/lb-mole	Nozzle ID: <u>GL202</u>	Leak Rate (cfm): <u>0.000</u>	--	--	<u>0.000</u>
Ms: <u>28.72</u> lb/lb-mole	Nozzle Dn (in.): <u>0.195</u>	Vacuum (in Hg): <u>10</u>	--	--	<u>5</u>
		Pitot Tube: <u>Pass</u>	--	--	<u>Pass</u>
				Mid 3 (cf)	--
				Mid-Point Leak Check Vol (cf):	--

Sample Pt.	Sample Time (minutes)		Dry Gas Meter Reading (ft ³)	Pitot Tube ΔP (in WC)	Gas Temperatures (°F)		Orifice Press. ΔH (in. WC)		Pump Vac (in. Hg)	Gas Temperatures (°F)				% ISO	Vs (fps)
					DGM Average	Stack	ΔH			Probe	Filter	Imp Exit	Aux		
	Amb.	Amb.			(in. WC)		Amb.	Amb.		Amb.	Amb.				
	65	636			Ideal	Actual	257	256		40	-				
	0.00	5.00	978.566	1.10	65	636	0.65	0.65	2	257	256	40	-	100.7	90.75
	5.00	10.00	980.800	1.20	65	640	0.70	0.71	2	252	260	39	-	103.8	94.96
	10.00	15.00	983.200	1.20	65	638	0.71	0.71	2	264	258	39	-	103.7	94.87
	15.00	20.00	985.600	1.50	65	641	0.88	0.88	2	267	261	39	-	92.9	106.21
	20.00	25.00	988.000	1.60	65	638	0.94	0.94	2	270	257	40	-	97.3	109.55
	25.00	30.00	990.600	1.40	68	639	0.83	0.83	2	269	259	41	-	103.5	102.52
	30.00	35.00	993.200	1.30	68	641	0.77	0.77	2	268	261	42	-	103.3	98.88
	35.00	40.00	995.700	1.70	69	641	1.00	1.00	2	268	260	44	-	97.5	113.07
	40.00	45.00	998.400	1.70	69	641	1.00	1.00	2	269	259	45	-	93.9	113.07
	45.00	50.00	1001.000	1.40	71	640	0.83	0.83	2	269	261	46	-	106.9	102.57
	50.00	55.00	1003.700	1.30	71	640	0.77	0.77	2	268	260	47	-	98.6	98.83
	55.00	60.00	1006.100	1.20	72	638	0.72	0.72	2	268	261	47	-	97.6	94.87
	60.00	--	1008.390										-		--
Final DGM:			1008.390												

RESULTS	Run Time		Vm	ΔP	Tm	Ts	Max Vac	ΔH	%ISO	BWS	Y _{qa}
	min		ft ³	in. WC	°F	°F		in. WC			
	60.0		29.824	1.38	67.8	639.4	2	0.818	93.0	0.058	-0.2



Isokinetic Field Data

Location: Caterpillar, Inc - Virginia Beach, VA				Start Time: 8:58		Source: 3561HD Generator (L50)					
Date: 3/7/19		Run 2		VALID		End Time: 9:58		Project No.: 2019-0420		Parameter: Arsenic, C	

STACK DATA (EST)			EQUIPMENT			STACK DATA (EST)			FILTER NO.		STACK DATA (FINAL)			MOIST. DATA		
Moisture:	6.0	% est.	Meter Box ID:	1690		Est. Tm:	68	°F			Pb:	30.37	in. Hg	Vlc (ml)		
Barometric:	30.26	in. Hg	Y:	0.994		Est. Ts:	639	°F			Pg:	-0.75	in. WC	44.9		
Static Press:	-54.00	in. WC	ΔH @ (in.WC):	1.816		Est. ΔP:	1.38	in. WC			O ₂ :	13.2	%	K-FACTOR		
Stack Press:	26.29	in. Hg	Probe ID:	PR402-2		Est. Dn:	0.240	in.			CO ₂ :	5.6	%	0.59		
CO ₂ :	6.0	%	Liner Material:	quartz		Target Rate:	0.75	scfm								
O ₂ :	11.0	%	Pitot ID:	P403-2		LEAK CHECKS			Pre	Mid 1	Mid 2	Post	Check Pt.	Initial	Final	Corr.
N ₂ /CO:	83.0	%	Pitot Cp/Type:	0.840	S-type	Leak Rate (cfm):			0.000	--	--	0.000	Mid 1 (cf)	--		
Md:	29.40	lb/lb-mole	Nozzle ID:	GL202		Vacuum (in Hg):			8	--	--	9	Mid 2 (cf)	--		
Ms:	28.72	lb/lb-mole	Nozzle Dn (in.):	0.195		Pitot Tube:			Pass	--	--	Pass	Mid 3 (cf)	--		
												Mid-Point Leak Check Vol (cf):				--

Sample Pt.	Sample Time (minutes)		Dry Gas Meter Reading (ft ³)	Pitot Tube ΔP (in WC)	Gas Temperatures (°F)		Orifice Press. ΔH (in. WC)		Pump Vac (in. Hg)	Gas Temperatures (°F)				% ISO	Vs (fps)
					DGM Average	Stack	ΔH			Probe	Filter	Imp Exit	Aux		
	Amb.	Amb.			Ideal	Actual	Amb.	Amb.		Amb.	Amb.				
	Begin	End			--	--	--	--		--	--				
--	0.00	5.00	8.701	1.20	64	644	0.70	0.70	2	253	264	59	-	95.5	95.13
--	5.00	10.00	10.900	1.30	65	643	0.76	0.76	2	267	260	52	-	104.0	98.97
--	10.00	15.00	13.400	1.50	65	645	0.88	0.88	2	257	259	52	-	100.8	106.41
--	15.00	20.00	16.000	1.50	65	644	0.88	0.88	2	257	260	52	-	104.7	106.36
--	20.00	25.00	18.700	1.40	67	646	0.82	0.82	2	267	260	58	-	92.0	102.85
--	25.00	30.00	21.000	1.30	68	646	0.76	0.77	2	276	260	54	-	103.6	99.10
--	30.00	35.00	23.500	1.10	69	646	0.65	0.65	2	262	260	50	-	103.4	91.16
--	35.00	40.00	25.800	1.40	69	645	0.82	0.83	2	257	260	47	-	99.6	102.80
--	40.00	45.00	28.300	1.50	71	648	0.88	0.89	2	265	260	44	-	99.8	106.55
--	45.00	50.00	30.900	1.60	72	648	0.95	0.95	2	260	260	46	-	100.2	110.05
--	50.00	55.00	33.600	1.50	72	648	0.89	0.89	2	259	260	46	-	103.5	106.55
--	55.00	60.00	36.300	1.40	72	648	0.83	0.83	2	266	260	47	-	105.5	102.94
--	60.00	--	38.960										-		--
Final DGM:			38.960												

RESULTS	Run Time		Vm		ΔP		Tm		Ts		Max Vac		ΔH		%ISO	BWS	Y _{qa}
	min		ft ³		in. WC		°F		°F		in. WC		in. WC				
	60.0		30.259	ft ³	1.39	in. WC	68.3	°F	645.9	°F	2	0.821	in. WC	94.9	0.065	1.1	



Isokinetic Field Data

Location: Caterpillar, Inc - Virginia Beach, VA				Start Time: 10:49		Source: 3561HD Generator (L50)					
Date: 3/7/19		Run 3		End Time: 11:49		Project No.: 2019-0420		Parameter: Arsenic, C			
STACK DATA (EST)		EQUIPMENT		STACK DATA (EST)		FILTER NO.		STACK DATA (FINAL)		MOIST. DATA	
Moisture: 6.0 % est.		Meter Box ID: 1690		Est. Tm: 68 °F				Pb: 30.26 in. Hg		Vlc (ml)	
Barometric: 30.26 in. Hg		Y: 0.994		Est. Ts: 646 °F				Pg: -0.75 in. WC		K-FACTOR	
Static Press: -54.00 in. WC		ΔH @ (in.WC): 1.816		Est. ΔP: 1.39 in. WC				O ₂ : 13.3 %		0.586	
Stack Press: 26.29 in. Hg		Probe ID: PR402-2		Est. Dn: 0.240 in.				CO ₂ : 5.7 %		Check Pt. Initial Final Corr.	
CO ₂ : 6.0 %		Liner Material: quartz		Target Rate: 0.75 scfm						Mid 1 (cf) --	
O ₂ : 11.0 %		Pitot ID: P403-2		LEAK CHECKS Pre Mid 1 Mid 2 Post						Mid 2 (cf) --	
N ₂ /CO: 83.0 %		Pitot Cp/Type: 0.840 S-type		Leak Rate (cfm): 0.000 -- -- 0.000						Mid 3 (cf) --	
Md: 29.40 lb/lb-mole		Nozzle ID: GL202		Vacuum (in Hg): 9 -- -- 8						Mid-Point Leak Check Vol (cf): --	
Ms: 28.72 lb/lb-mole		Nozzle Dn (in.): 0.195		Pitot Tube: Pass -- -- Pass							

Sample Pt.	Sample Time (minutes)		Dry Gas Meter Reading (ft ³)	Pitot Tube ΔP (in WC)	Gas Temperatures (°F)		Orifice Press. ΔH (in. WC)		Pump Vac (in. Hg)	Gas Temperatures (°F)				% ISO	Vs (fps)
					DGM Average	Stack	ΔH			Probe	Filter	Imp Exit	Aux		
	Amb.	Amb.			Ideal	Actual	Amb.	Amb.		Amb.	Amb.				
	Begin	End			--	--	--	--		--	--				
--	0.00	5.00	39.320	1.30	66	640	0.77	0.77	2	256	263	47	-	94.6	98.83
--	5.00	10.00	41.600	1.50	66	641	0.88	0.88	2	261	263	43	-	100.5	106.21
--	10.00	15.00	44.200	1.60	66	651	0.93	0.93	2	268	259	44	-	101.5	110.19
--	15.00	20.00	46.900	1.60	66	653	0.93	0.93	2	257	262	45	-	101.6	110.29
--	20.00	25.00	49.600	1.40	66	654	0.81	0.82	2	252	261	46	-	100.6	103.22
--	25.00	30.00	52.100	1.20	66	654	0.70	0.70	2	270	259	46	-	99.9	95.56
--	30.00	35.00	54.400	1.10	69	653	0.64	0.64	2	259	261	47	-	94.7	91.45
--	35.00	40.00	56.500	1.30	69	652	0.76	0.76	2	266	260	49	-	103.7	99.37
--	40.00	45.00	59.000	1.50	70	654	0.88	0.88	2	260	260	50	-	100.3	106.84
--	45.00	50.00	61.600	1.70	70	656	0.99	1.00	2	267	260	51	-	108.8	113.84
--	50.00	55.00	64.600	1.40	70	659	0.82	0.82	2	267	260	52	-	100.0	103.45
--	55.00	60.00	67.100	1.20	70	654	0.70	0.70	2	257	259	52	-	91.0	95.56
--	60.00	--	69.212										-		--
Final DGM:			69.212												

RESULTS	Run Time		Vm		ΔP		Tm		Ts		Max Vac	ΔH		%ISO	BWS	Y _{qa}
	min		ft ³		in. WC		°F		°F		in. WC					
	60.0		29.892		1.40		67.8		651.8		2	0.819		93.6	0.063	-0.1

Location Caterpillar, Inc - Virginia Beach, VA
 Source 3561HD Generator (L50)
 Project No. 2019-0420
 Parameter Hexavalent Chromium

Run Number		Run 1	Run 2	Run 3	Average
Date		3/6/19	3/7/19	3/7/19	--
Start Time		17:05	8:58	10:49	--
Stop Time		18:05	9:58	11:49	--
Run Time, min	(θ)	60.0	60.0	60.0	60.0
INPUT DATA					
Barometric Pressure, in. Hg	(Pb)	30.26	30.37	30.26	30.30
Meter Correction Factor	(Y)	1.000	1.000	1.000	1.000
Orifice Calibration Value	($\Delta H @$)	1.753	1.753	1.753	1.753
Meter Volume, ft ³	(Vm)	29.910	29.996	29.589	29.832
Meter Temperature, °F	(Tm)	67.7	68.6	66.0	67.4
Meter Temperature, °R	(Tm)	527.7	528.6	526.0	527.4
Meter Orifice Pressure, in. WC	(ΔH)	0.818	0.820	0.817	0.818
Volume H ₂ O Collected, mL	(Vlc)	43.2	51.6	49.6	48.1
Nozzle Diameter, in	(Dn)	0.190	0.190	0.190	0.190
Area of Nozzle, ft ²	(An)	0.0002	0.0002	0.0002	0.0002
Hexavalent Chromium, ug	(M _{Cr+6})	<u>0.2</u>	<u>0.2</u>	<u>0.5</u>	0.3
ISOKINETIC DATA					
Standard Meter Volume, ft ³	(Vmstd)	30.329	30.474	30.099	30.300
Standard Water Volume, ft ³	(Vwstd)	2.033	2.430	2.335	2.266
Moisture Fraction Measured	(BWSmsd)	0.063	0.074	0.072	0.070
Moisture Fraction @ Saturation	(BWSsat)	118.733	123.401	128.379	123.504
Moisture Fraction	(BWS)	0.063	0.074	0.072	0.070
Meter Pressure, in Hg	(Pm)	30.32	30.43	30.32	30.36
Volume at Nozzle, ft ³	(Vn)	66.719	68.022	67.640	67.460
Isokinetic Sampling Rate, (%)	(I)	99.2	100.4	99.2	99.6
DGM Calibration Check Value, (+/- 5%)	(Y _{qa})	-1.2	-1.0	-2.0	-1.4
EMISSION CALCULATIONS					
Hexavalent Chromium Concentration, ug/dscm	(C _{Cr+6})	0.23	0.23	0.59	0.35
Hexavalent Chromium Emission Rate, lb/hr	(ER _{Cr+6})	4.9E-06	4.9E-06	1.2E-05	7.4E-06

Results for Hexavalent Chromium in all three runs were below the detection limit. The detection limit was used for emissions purposes.

Location Caterpillar, Inc - Virginia Beach, VA
Source 3561HD Generator (L50)
Project No. 2019-0420
Parameter Hexavalent Chromium

Run Number		Run 1	Run 2	Run 3	Average
Date		3/6/19	3/7/19	3/7/19	--
Start Time		17:05	8:58	10:49	--
Stop Time		18:05	9:58	11:49	--
Run Time, min		60.0	60.0	60.0	60.0
VELOCITY HEAD, in. WC					
Point 1		1.10	1.20	1.30	1.20
Point 2		1.20	1.30	1.50	1.33
Point 3		1.20	1.50	1.60	1.43
Point 4		1.50	1.50	1.60	1.53
Point 5		1.60	1.40	1.40	1.47
Point 6		1.40	1.30	1.20	1.30
Point 7		1.30	1.10	1.10	1.17
Point 8		1.70	1.40	1.30	1.47
Point 9		1.70	1.50	1.50	1.57
Point 10		1.40	1.60	1.70	1.57
Point 11		1.30	1.50	1.40	1.40
Point 12		1.20	1.40	1.20	1.27
CALCULATED DATA					
Square Root of ΔP , (in. WC) ^{1/2}	(ΔP)	1.173	1.178	1.181	1.177
Pitot Tube Coefficient	(Cp)	0.840	0.840	0.840	0.840
Barometric Pressure, in. Hg	(Pb)	30.26	30.37	30.26	30.30
Static Pressure, in. WC	(Pg)	-0.54	-0.75	-0.75	-0.68
Stack Pressure, in. Hg	(Ps)	30.22	30.31	30.20	30.25
Stack Cross-sectional Area, ft ²	(As)	2.18	2.18	2.18	2.18
Temperature, °F	(Ts)	639.4	645.9	651.6	645.6
Temperature, °R	(Ts)	1099.4	1105.9	1111.6	1105.6
Moisture Fraction Measured	(BWSmsd)	0.063	0.074	0.072	0.070
Moisture Fraction @ Saturation	(BWSsat)	118.733	123.401	128.379	123.504
Moisture Fraction	(BWS)	0.063	0.074	0.072	0.070
O ₂ Concentration, %	(O ₂)	13.3	13.2	13.3	13.3
CO ₂ Concentration, %	(CO ₂)	5.5	5.6	5.7	5.6
Molecular Weight, lb/lb-mole (dry)	(Md)	29.42	29.42	29.45	29.43
Molecular Weight, lb/lb-mole (wet)	(Ms)	28.70	28.58	28.62	28.63
Velocity, ft/sec	(Vs)	94.9	95.6	96.1	95.5
VOLUMETRIC FLOW RATE					
At Stack Conditions, acfm	(Qa)	12,417	12,512	12,586	12,505
At Standard Conditions, dscfm	(Qs)	5,645	5,606	5,601	5,617

Location Caterpillar, Inc - Virginia Beach, VA

Source 3561HD Generator (L50)

Project No. 2019-0420

Parameter Hexavalent Chromium

Analysis Volumetric

Run 1		Date: 3/6/19				
Impinger No.	1	2	3	4	5*	Total
Contents	KOH	KOH	KOH	Empty	Silica	--
Initial Volume, mL	150.0	75.0	75.0	0.0	225.9	525.9
Final Volume, mL	180.0	79.0	80.0	0.0	230.1	569.1
Gain	30.0	4.0	5.0	0.0	4.2	43.2
Run 2		Date: 3/7/19				
Impinger No.	1	2	3	4	5*	Total
Contents	KOH	KOH	KOH	Empty	Silica	--
Initial Volume, mL	150.0	75.0	75.0	0.0	224.2	524.2
Final Volume, mL	176.0	80.0	80.0	2.0	237.8	575.8
Gain	26.0	5.0	5.0	2.0	13.6	51.6
Run 3		Date: 3/7/19				
Impinger No.	1	2	3	4	5*	Total
Contents	KOH	KOH	KOH	Empty	Silica	--
Initial Volume, mL	150.0	75.0	75.0	0.0	237.0	537.0
Final Volume, mL	178.0	82.0	80.0	0.0	246.6	586.6
Gain	28.0	7.0	5.0	0.0	9.6	49.6



Isokinetic Field Data

Location: <u>Caterpillar, Inc - Virginia Beach, VA</u>				Start Time: <u>17:05</u>		Source: <u>3561HD Generator (L50)</u>								
Date: <u>3/6/19</u>		Run 1		End Time: <u>18:05</u>		Project No.: <u>2019-0420</u>		Parameter: <u>Hexavalent</u>						
STACK DATA (EST)			EQUIPMENT			STACK DATA (EST)			FILTER NO.		STACK DATA (FINAL)		MOIST. DATA	
Moisture: <u>6.0</u> % est.			Meter Box ID: <u>2051</u>			Est. Tm: <u>70</u> °F					Pb: <u>30.26</u> in. Hg		Vlc (ml)	
Barometric: <u>30.26</u> in. Hg			Y: <u>1.000</u>			Est. Ts: <u>635</u> °F					Pg: <u>-0.54</u> in. WC		43.2	
Static Press: <u>-0.50</u> in. WC			AH @ (in.WC): <u>1.753</u>			Est. AP: <u>1.38</u> in. WC					O ₂ : <u>13.3</u> %		K-FACTOR	
Stack Press: <u>30.22</u> in. Hg			Probe ID: <u>PR403-2</u>			Est. Dn: <u>0.231</u> in.					CO ₂ : <u>5.5</u> %		<u>0.594</u>	
CO ₂ : <u>6.0</u> %			Liner Material: <u>quartz</u>			Target Rate: <u>0.75</u> scfm					Check Pt.		Initial Final Corr.	
O ₂ : <u>11.0</u> %			Pitot ID: <u>P403-2</u>			LEAK CHECKS			Pre Mid 1 Mid 2 Post		Mid 1 (cf)		--	
N ₂ /CO: <u>83.0</u> %			Pitot Cp/Type: <u>0.840</u> S-type			Leak Rate (cfm): <u>0.016</u>			-- -- 0.008		Mid 2 (cf)		--	
Md: <u>29.40</u> lb/lb-mole			Nozzle ID: <u>GL208</u>			Vacuum (in Hg): <u>8</u>			-- -- 9		Mid 3 (cf)		--	
Ms: <u>28.72</u> lb/lb-mole			Nozzle Dn (in.): <u>0.190</u>			Pitot Tube: <u>Pass</u>			-- -- Pass		Mid-Point Leak Check Vol (cf): --			

Sample Pt.	Sample Time (minutes)		Dry Gas Meter Reading (ft ³)	Pitot Tube ΔP (in WC)	Gas Temperatures (°F)		Orifice Press. ΔH (in. WC)		Pump Vac (in. Hg)	Gas Temperatures (°F)				% ISO	Vs (fps)
					DGM Average	Stack	Ideal Actual			Probe	Filter	Imp Exit	Aux		
	Amb.	Amb.					Amb.	Amb.		Amb.	Amb.				
	Begin	End													
	0.00	5.00	442.888	1.10	65	636	0.65	0.65	3			39	-	94.1	84.64
	5.00	10.00	445.000	1.20	65	640	0.71	0.71	3			41	-	94.0	88.56
	10.00	15.00	447.200	1.20	65	638	0.71	0.71	3			41	-	106.8	88.48
	15.00	20.00	449.700	1.50	66	641	0.88	0.88	3			41	-	99.3	99.06
	20.00	25.00	452.300	1.60	66	638	0.94	0.95	3			44	-	103.4	102.17
	25.00	30.00	455.100	1.40	67	639	0.83	0.83	3			45	-	98.5	95.61
	30.00	35.00	457.600	1.30	68	641	0.77	0.77	3			46	-	98.1	92.22
	35.00	40.00	460.000	1.70	69	641	1.00	1.00	3			48	-	96.3	105.46
	40.00	45.00	462.700	1.70	69	641	1.00	1.00	3			49	-	99.9	105.46
	45.00	50.00	465.500	1.40	70	640	0.83	0.83	3			50	-	98.0	95.66
	50.00	55.00	468.000	1.30	71	640	0.77	0.77	3			51	-	97.5	92.18
	55.00	60.00	470.400	1.20	71	638	0.71	0.72	3			50	-	101.2	88.48
	60.00	--	472.798												--
Final DGM:			472.798												

RESULTS	Run Time		Vm	ΔP	Tm	Ts	Max Vac	ΔH	%ISO	BWS	Y _{qa}
	60.0	min	29.910 ft ³	1.38 in. WC	67.7 °F	639.4 °F	3	0.818 in. WC	99.2	0.063	-1.2



Isokinetic Field Data

Location: Caterpillar, Inc - Virginia Beach, VA				Start Time: 8:58		Source: 3561HD Generator (L50)					
Date: 3/7/19		Run 2		VALID		End Time: 9:58		Project No.: 2019-0420		Parameter: Hexavalent	

STACK DATA (EST)			EQUIPMENT			STACK DATA (EST)			FILTER NO.		STACK DATA (FINAL)			MOIST. DATA		
Moisture:	6.0	% est.	Meter Box ID:	2051		Est. Tm:	68	°F			Pb:	30.37	in. Hg	Vlc (ml)		
Barometric:	30.26	in. Hg	Y:	1.000		Est. Ts:	639	°F			Pg:	-0.75	in. WC	51.6		
Static Press:	-0.50	in. WC	ΔH @ (in.WC):	1.753		Est. ΔP:	1.38	in. WC			O ₂ :	13.2	%	K-FACTOR		
Stack Press:	30.22	in. Hg	Probe ID:	PR403-2		Est. Dn:	0.232	in.			CO ₂ :	5.6	%	0.59		
CO ₂ :	6.0	%	Liner Material:	quartz		Target Rate:	0.75	scfm			Check Pt.			Initial	Final	Corr.
O ₂ :	11.0	%	Pitot ID:	P403-2		LEAK CHECKS			Pre	Mid 1	Mid 2	Post	Mid 1 (cf)			--
N ₂ /CO:	83.0	%	Pitot Cp/Type:	0.840	S-type	Leak Rate (cfm):			0.013	--	--	0.010	Mid 2 (cf)			--
Md:	29.40	lb/lb-mole	Nozzle ID:	GL208		Vacuum (in Hg):			8	--	--	8	Mid 3 (cf)			--
Ms:	28.72	lb/lb-mole	Nozzle Dn (in.):	0.190		Pitot Tube:			Pass	--	--	Pass	Mid-Point Leak Check Vol (cf):			--

Sample Pt.	Sample Time (minutes)		Dry Gas Meter Reading (ft ³)	Pitot Tube ΔP (in WC)	Gas Temperatures (°F)		Orifice Press. ΔH (in. WC)		Pump Vac (in. Hg)	Gas Temperatures (°F)				% ISO	Vs (fps)
					DGM Average	Stack				Probe	Filter	Imp Exit	Aux		
	Amb.	Amb.			Amb.	Amb.	Amb.	Amb.							
	Begin	End			Ideal	Actual	Amb.	Amb.		Amb.	Amb.				
--	0.00	5.00	473.878	1.20	64	644	0.70	0.70	3	--	--	--	--	95.3	88.72
--	5.00	10.00	476.100	1.30	65	643	0.76	0.76	3	--	--	--	--	106.9	92.30
--	10.00	15.00	478.700	1.50	65	645	0.88	0.88	3	--	--	--	--	92.0	99.24
--	15.00	20.00	481.100	1.50	66	644	0.88	0.88	3	--	--	--	--	91.8	99.20
--	20.00	25.00	483.500	1.40	67	646	0.82	0.82	3	--	--	--	--	98.8	95.92
--	25.00	30.00	486.000	1.30	69	646	0.77	0.77	3	--	--	--	--	102.2	92.43
--	30.00	35.00	488.500	1.10	70	646	0.65	0.65	3	--	--	--	--	97.5	85.02
--	35.00	40.00	490.700	1.40	71	645	0.83	0.83	3	--	--	--	--	98.1	95.88
--	40.00	45.00	493.200	1.50	71	648	0.88	0.89	3	--	--	--	--	106.3	99.38
--	45.00	50.00	496.000	1.60	71	648	0.94	0.94	3	--	--	--	--	102.9	102.63
--	50.00	55.00	498.800	1.50	72	648	0.89	0.89	3	--	--	--	--	102.3	99.38
--	55.00	60.00	501.500	1.40	72	648	0.83	0.83	3	--	--	--	--	93.1	96.01
--	60.00	--	503.874							--	--	--	--		--
Final DGM:			503.874												

RESULTS	Run Time		Vm		ΔP		Tm		Ts		Max Vac		ΔH		%ISO	BWS	Y _{qa}
		60.0	min	29.996	ft ³	1.39	in. WC	68.6	°F	645.9	°F	3	0.820	in. WC	100.4	0.074	-1.0



Isokinetic Field Data

Location: Caterpillar, Inc - Virginia Beach, VA				Start Time: 10:49		Source: 3561HD Generator (L50)					
Date: 3/7/19		Run 3		VALID		End Time: 11:49		Project No.: 2019-0420		Parameter: Hexavalent	

STACK DATA (EST)			EQUIPMENT			STACK DATA (EST)			FILTER NO.		STACK DATA (FINAL)		MOIST. DATA		
Moisture:	6.0	% est.	Meter Box ID:	2051		Est. Tm:	69	°F			Pb:	30.26	in. Hg	Vlc (ml)	
Barometric:	30.26	in. Hg	Y:	1.000		Est. Ts:	646	°F			Pg:	-0.75	in. WC	49.6	
Static Press:	-0.50	in. WC	ΔH @ (in.WC):	1.753		Est. ΔP:	1.39	in. WC			O ₂ :	13.3	%	K-FACTOR	
Stack Press:	30.22	in. Hg	Probe ID:	PR403-2		Est. Dn:	0.232	in.			CO ₂ :	5.7	%	0.587	
CO ₂ :	6.0	%	Liner Material:	quartz		Target Rate:	0.75	scfm			Check Pt. Initial Final Corr.				
O ₂ :	11.0	%	Pitot ID:	P403-2		LEAK CHECKS				Pre	Mid 1	Mid 2	Post	Mid 1 (cf)	--
N ₂ /CO:	83.0	%	Pitot Cp/Type:	0.840	S-type	Leak Rate (cfm):				0.007	--	--	0.005	Mid 2 (cf)	--
Md:	29.40	lb/lb-mole	Nozzle ID:	GL208		Vacuum (in Hg):				8	--	--	8	Mid 3 (cf)	--
Ms:	28.72	lb/lb-mole	Nozzle Dn (in.):	0.190		Pitot Tube:				Pass	--	--	Pass	Mid-Point Leak Check Vol (cf):	--

Sample Pt.	Sample Time (minutes)		Dry Gas Meter Reading (ft ³)	Pitot Tube ΔP (in WC)	Gas Temperatures (°F)		Orifice Press. ΔH (in. WC)		Pump Vac (in. Hg)	Gas Temperatures (°F)				% ISO	Vs (fps)
	Begin	End			DGM Average	Stack	Ideal	Actual		Probe	Filter	Imp Exit	Aux		
--	0.00	5.00	509.303	1.30	63	640	0.76	0.76	3	--	--	50	-	94.7	92.18
--	5.00	10.00	511.600	1.50	63	641	0.88	0.88	3	--	--	46	-	96.0	99.06
--	10.00	15.00	514.100	1.60	63	651	0.93	0.93	3	--	--	43	-	97.1	102.77
--	15.00	20.00	516.700	1.60	64	653	0.93	0.93	3	--	--	44	-	97.0	102.87
--	20.00	25.00	519.300	1.40	65	654	0.81	0.81	3	--	--	45	-	99.6	96.27
--	25.00	30.00	521.800	1.20	66	652	0.70	0.70	3	--	--	46	-	94.4	89.04
--	30.00	35.00	524.000	1.10	67	653	0.64	0.64	3	--	--	47	-	93.9	85.29
--	35.00	40.00	526.100	1.30	67	652	0.76	0.76	3	--	--	50	-	94.6	92.68
--	40.00	45.00	528.400	1.50	68	654	0.87	0.88	3	--	--	51	-	107.2	99.64
--	45.00	50.00	531.200	1.70	68	656	0.99	0.99	3	--	--	52	-	93.6	106.17
--	50.00	55.00	533.800	1.40	69	659	0.81	0.82	3	--	--	56	-	107.0	96.48
--	55.00	60.00	536.500	1.20	69	654	0.70	0.70	3	--	--	58	-	102.1	89.12
--	60.00	--	538.892							--	--		-		--
Final DGM:			538.892												

RESULTS	Run Time		Vm		ΔP		Tm		Ts		Max Vac		ΔH		%ISO	BWS	Y _{qa}
		60.0	min	29.589	ft ³	1.40	in. WC	66.0	°F	651.6	°F	3	0.817	in. WC	99.2	0.072	-2.0

Location Caterpillar, Inc - Virginia Beach, VA
Source 3561HD Generator (Assign Condition) LC 50
Project No. 2019-0420
Parameter(s): Formaldehyde/ VOCs

Run Number		Run 1	Run 2	Run 3	Average
Date		3/6/19	3/7/19	3/7/19	--
Start Time		17:05	8:58	10:49	--
Stop Time		18:05	9:58	11:49	--
Input Data					
Volumetric Flow Rate, dscfm	(Qs)	5,786	5,701	5,710	5,732
Standard Meter Volume, L	(Vmstd)	44.021	44.688	44.404	44.371
Formaldehyde Mass, ug	M(CH2O)	57.71	78.46	76.52	70.90
Acetaldehyde Mass, ug	M(C2H4O)	<u>65.52</u>	<u>65.52</u>	<u>65.52</u>	65.52
Benzene Mass, ug	M(C6H6)	<u>73.5</u>	<u>73.5</u>	<u>73.5</u>	73.50
Ethylbenzene Mass, ug	M(C8H10)	<u>72.66</u>	<u>72.66</u>	<u>72.66</u>	72.66
Hexane Mass, ug	M(C6H14)	<u>54.18</u>	<u>54.18</u>	<u>54.18</u>	54.18
Pollutant Concentration (Bag Samples)					
1,3 Butadiene Mass, ppmvd	M(C4H6)	<u>0.10</u>	<u>0.10</u>	<u>0.10</u>	0.10
Acetaldehyde Mass, ppmvd	M(C2H4O)	<u>1.00</u>	<u>1.00</u>	<u>1.00</u>	1.00
Benzene Mass, ppmvd	M(C6H6)	<u>0.10</u>	<u>0.10</u>	<u>0.10</u>	0.10
Ethylbenzene Mass, ppmvd	M(C8H10)	<u>0.10</u>	<u>0.10</u>	<u>0.10</u>	0.10
Hexane Mass, ppmvd	M(C6H14)	<u>0.10</u>	<u>0.10</u>	<u>0.10</u>	0.10
Emissions Calculations					
Formaldehyde Concentration, ppmvd	C(CH2O)	1.0	1.4	1.4	1.3
Formaldehyde Emission Rate, lb/hr	ER(CH2O)	0.028	0.037	0.037	0.034
1,3 Butadiene Concentration, ppmvd (Combined)	C(C4H6)	0.10	0.10	0.10	0.10
1,3 Butadiene Emission Rate, lb/hr	ER(C4H6)	0.0049	0.0048	0.0048	0.0048
Acetaldehyde Concentration, ppmvd	C(C2H4O)	0.81	0.80	0.81	0.81
Acetaldehyde Concentration, ppmvd (Combined)	C(C2H4O)	1.8	1.8	1.8	1.8
Acetaldehyde Emission Rate, lb/hr	ER(C2H4O)	0.072	0.070	0.071	0.071
Benzene Concentration, ppmvd	C(C6H6)	0.51	0.51	0.51	0.51
Benzene Concentration, ppmvd (Combined)	C(C6H6)	0.61	0.61	0.61	0.61
Benzene Emission Rate, lb/hr	ER(C6H6)	0.043	0.042	0.042	0.043
Ethylbenzene Concentration, ppmvd	C(C8H10)	0.37	0.37	0.37	0.37
Ethylbenzene Concentration, ppmvd (Combined)	C(C8H10)	0.47	0.47	0.47	0.47
Ethylbenzene Emission Rate, lb/hr	ER(C8H10)	0.045	0.044	0.044	0.045
Hexane Concentration, ppmvd	C(C6H14)	0.34	0.34	0.34	0.34
Hexane Concentration, ppmvd (Combined)	C(C6H14)	0.44	0.44	0.44	0.44
Hexane Emission Rate, lb/hr	ER(C6H14)	0.034	0.034	0.034	0.034

Underlined values indicate that the laboratory results were below the detection limit. The detection limit was used for emission calculation purposes.



Location Caterpillar, Inc - Virginia Beach, VA
 Source 3561HD Generator (Assign Condition) LC 50

Project No. 2019-0420
 Parameter(s): Formaldehyde/ VOCs
 Console Type Low Flow

Run No.	1					2					3					
Date	3/6/19					3/7/19					3/7/19					
Status	VALID					VALID					VALID					
Start Time	17:05					8:58					10:49					
End Time	18:05					9:58					11:49					
Run Time, min	(0) 60					60					60					
Meter ID	2071					2071					2071					
Meter Correction Factor	(Y) 1.000					1.000					1.000					
Orifice Calibration Value	(AH @) 1.800					1.800					1.800					
Max Vacuum, in. Hg	0					0					0					
Post Leak Check, L/min (at max vac.)	0.000					0.000					0.000					
Meter Volume, L																
0	0.000					0.000					0.000					
5	3.690					3.600					3.670					
10	7.380					7.210					7.270					
15	11.020					10.850					10.920					
20	14.730					14.500					14.560					
25	18.410					17.910					18.140					
30	22.040					21.450					21.950					
35	25.690					25.260					25.540					
40	29.260					28.950					29.330					
45	32.890					32.710					32.980					
50	36.730					36.380					36.620					
55	40.360					40.050					40.210					
60	43.590					43.670					43.830					
Total Meter Volume, L	(Vm) 43.590					43.670					43.830					
Temperature, °F	Meter	Probe	Filter	Vacuum	Imp. Exit	Meter	Probe	Filter	Vacuum	Imp. Exit	Meter	Probe	Filter	Vacuum	Imp. Exit	
0	70	--	--	0	--	61	--	--	0	--	71	--	--	0	--	
5	70	--	--	0	--	63	--	--	0	--	71	--	--	0	--	
10	70	--	--	0	--	63	--	--	0	--	70	--	--	0	--	
15	70	--	--	0	--	64	--	--	0	--	70	--	--	0	--	
20	70	--	--	0	--	64	--	--	0	--	70	--	--	0	--	
25	71	--	--	0	--	65	--	--	0	--	71	--	--	0	--	
30	71	--	--	0	--	66	--	--	0	--	71	--	--	0	--	
35	71	--	--	0	--	67	--	--	0	--	72	--	--	0	--	
40	72	--	--	0	--	68	--	--	0	--	72	--	--	0	--	
45	72	--	--	0	--	69	--	--	0	--	72	--	--	0	--	
50	73	--	--	0	--	70	--	--	0	--	73	--	--	0	--	
55	74	--	--	0	--	71	--	--	0	--	74	--	--	0	--	
60	74	--	--	0	--	71	--	--	0	--	74	--	--	0	--	
Average Temperature, °F	(Tm) 71	--	--	--	--	66	--	--	--	--	72	--	--	--	--	
Average Temperature, °R	(Tm) 531	--	--	--	--	526	--	--	--	--	531	--	--	--	--	
Minimum Temperature, °F	70	--	--	--	--	61	--	--	--	--	70	--	--	--	--	
Maximum Temperature, °F	74	--	--	--	--	71	--	--	--	--	74	--	--	--	--	
Barometric Pressure, in. Hg	(Pb)	30.26					30.37					30.37				
Meter Orifice Pressure, in. WC	(AH)	1.800					1.800					1.800				
Meter Pressure, in. Hg	(Pm)	30.39					30.50					30.50				
Standard Meter Volume, L	(Vmstd)	44.021					44.688					44.404				

Location Caterpillar, Inc - Virginia Beach, VA
 Source 3561HD Generator (LC 50)
 Project No. 2019-0420
 Parameter Polycyclic Aromatic Hydrocarbons, Naphthalene

Run Number		Run 1	Run 2	Run 3	Average
Date		3/6/19	3/7/19	3/7/19	--
Start Time		17:05	8:58	10:49	--
Stop Time		18:05	9:58	11:49	--
Run Time, min	(θ)	60.0	60.0	60.0	60.0
INPUT DATA					
Barometric Pressure, in. Hg	(Pb)	30.26	30.37	30.37	30.33
Meter Correction Factor	(Y)	1.008	1.008	1.008	1.008
Orifice Calibration Value	($\Delta H @$)	1.840	1.840	1.840	1.840
Meter Volume, ft ³	(Vm)	35.065	35.205	35.130	35.133
Meter Temperature, °F	(Tm)	72.0	69.5	71.1	70.9
Meter Temperature, °R	(Tm)	532.0	529.5	531.1	530.9
Meter Orifice Pressure, in. WC	(ΔH)	1.168	1.193	1.177	1.179
Volume H ₂ O Collected, mL	(Vlc)	51.0	50.0	49.3	50.1
Nozzle Diameter, in	(Dn)	0.205	0.205	0.205	0.205
Area of Nozzle, ft ²	(An)	0.0002	0.0002	0.0002	0.0002
Acenaphthene Mass, ug	(M _{C12H10})	<u>3.0</u>	<u>3.0</u>	<u>3.0</u>	3.0
Acenaphthylene Mass, ug	(M _{C12H8})	<u>3.0</u>	<u>3.0</u>	<u>3.0</u>	3.0
Anthracene Mass, ug	(M _{C14H10})	<u>0.8</u>	<u>0.8</u>	<u>0.8</u>	0.8
Benzo[a]anthracene Mass, ug	(M _{C18H12})	<u>0.8</u>	<u>0.8</u>	<u>0.8</u>	0.8
Benzo[a]pyrene Mass, ug	(M _{C20H12})	<u>1.0</u>	<u>1.0</u>	<u>1.0</u>	1.0
Benzo[b]fluoranthene Mass, ug	(M _{C20H12})	<u>0.8</u>	<u>0.8</u>	<u>0.8</u>	0.8
Benzo[g,h,i]perylene Mass, ug	(M _{C22H12})	<u>0.8</u>	<u>0.8</u>	<u>0.8</u>	0.8
Benzo[k]fluoranthene Mass, ug	(M _{C20H12})	<u>1.0</u>	<u>1.0</u>	<u>1.0</u>	1.0
Chrysene Mass, ug	(M _{C18H12})	<u>0.8</u>	<u>0.8</u>	<u>0.8</u>	0.8
Dibenz[a,h]anthracene Mass, ug	(M _{C22H14})	<u>0.8</u>	<u>0.8</u>	<u>0.8</u>	0.8
Fluoranthene Mass, ug	(M _{C16H10})	<u>0.8</u>	<u>0.8</u>	<u>0.8</u>	0.8
Fluorene Mass, ug	(M _{C13H10})	2.3	2.0	2.3	2.2
Indeno(1,2,3-cd)pyrene Mass, ug	(M _{C22H12})	<u>1.0</u>	<u>1.0</u>	<u>1.0</u>	1.0
Napthalene Mass, ug	(M _{C10H8})	40.0	44.0	47.0	43.7
Phenanthrene Mass, ug	(M _{C14H10})	4.5	4.4	4.8	4.6
Pyrene Mass, ug	(M _{C16H10})	6.0	5.0	5.0	5.3
ISOKINETIC DATA					
Standard Meter Volume, ft ³	(Vmstd)	35.579	36.022	35.837	35.813
Standard Water Volume, ft ³	(Vwstd)	2.402	2.354	2.321	2.359
Moisture Fraction Measured	(BWSmsd)	0.063	0.061	0.061	0.062
Moisture Fraction @ Saturation	(BWSsat)	121.761	123.598	130.483	125.281
Moisture Fraction	(BWS)	0.063	0.061	0.061	0.062
Meter Pressure, in Hg	(Pm)	30.35	30.46	30.46	30.42
Volume at Nozzle, ft ³	(Vn)	78.579	79.353	79.514	79.149
Isokinetic Sampling Rate, (%)	(I)	100.2	100.8	100.5	100.5
DGM Calibration Check Value, (+/- 5%)	(Y _{qa})	-0.2	-0.5	-0.1	-0.3

Location Caterpillar, Inc - Virginia Beach, VA

Source 3561HD Generator (LC 50)

Project No. 2019-0420

Parameter Polycyclic Aromatic Hydrocarbons, Naphthalene

Run Number		Run 1	Run 2	Run 3	Average
Date		3/6/19	3/7/19	3/7/19	--
Start Time		17:05	8:58	10:49	--
Stop Time		18:05	9:58	11:49	--
Run Time, min	(θ)	60.0	60.0	60.0	60.0
EMISSION CALCULATIONS					
Acenaphthene Concentration, ug/dscm	(C _{C12H10})	3.0	2.9	3.0	3.0
Acenaphthene Emission Rate, kg/hr	(ER _{C12H10})	2.8E-05	2.8E-05	2.8E-05	2.8E-05
Acenaphthene Emission Rate, lb/hr	(ER _{C12H10})	6.3E-05	6.2E-05	6.3E-05	6.3E-05
Acenaphthylene Concentration, ug/dscm	(C _{C12H8})	3.0	2.9	3.0	3.0
Acenaphthylene Emission Rate, kg/hr	(ER _{C12H8})	2.8E-05	2.8E-05	2.8E-05	2.8E-05
Acenaphthylene Emission Rate, lb/hr	(ER _{C12H8})	6.3E-05	6.2E-05	6.3E-05	6.3E-05
Anthracene Concentration, ug/dscm	(C _{C14H10})	0.79	0.78	0.79	0.79
Anthracene Emission Rate, kg/hr	(ER _{C14H10})	7.6E-06	7.6E-06	7.6E-06	7.6E-06
Anthracene Emission Rate, lb/hr	(ER _{C14H10})	1.7E-05	1.7E-05	1.7E-05	1.7E-05
Benz[a]anthracene Concentration, ug/dscm	(C _{C18H12})	0.79	0.78	0.79	0.79
Benz[a]anthracene Emission Rate, kg/hr	(ER _{C18H12})	7.6E-06	7.6E-06	7.6E-06	7.6E-06
Benz[a]anthracene Emission Rate, lb/hr	(ER _{C18H12})	1.7E-05	1.7E-05	1.7E-05	1.7E-05
Benzo[a]pyrene Concentration, ug/dscm	(C _{C20H12})	0.99	0.98	0.99	0.99
Benzo[a]pyrene Emission Rate, kg/hr	(ER _{C20H12})	9.5E-06	9.4E-06	9.5E-06	9.5E-06
Benzo[a]pyrene Emission Rate, lb/hr	(ER _{C20H12})	2.1E-05	2.1E-05	2.1E-05	2.1E-05
Benzo[a]fluoranthene Concentration, ug/dscm	(C _{C20H12})	0.79	0.78	0.79	0.79
Benzo[a]fluoranthene Emission Rate, kg/hr	(ER _{C20H12})	7.6E-06	7.6E-06	7.6E-06	7.6E-06
Benzo[a]fluoranthene Emission Rate, lb/hr	(ER _{C20H12})	1.7E-05	1.7E-05	1.7E-05	1.7E-05
Benzo[g,h,i]perylene Concentration, ug/dscm	(C _{C22H12})	0.79	0.78	0.79	0.79
Benzo[g,h,i]perylene Emission Rate, kg/hr	(ER _{C22H12})	7.6E-06	7.6E-06	7.6E-06	7.6E-06
Benzo[g,h,i]perylene Emission Rate, lb/hr	(ER _{C22H12})	1.7E-05	1.7E-05	1.7E-05	1.7E-05
Benzo[k]fluoranthene Concentration, ug/dscm	(C _{C20H12})	0.99	0.98	0.99	0.99
Benzo[k]fluoranthene Emission Rate, kg/hr	(ER _{C20H12})	9.5E-06	9.4E-06	9.5E-06	9.5E-06
Benzo[k]fluoranthene Emission Rate, lb/hr	(ER _{C20H12})	2.1E-05	2.1E-05	2.1E-05	2.1E-05
Chrysene Concentration, ug/dscm	(C _{C18H12})	0.79	0.78	0.79	0.79
Chrysene Emission Rate, kg/hr	(ER _{C18H12})	7.6E-06	7.6E-06	7.6E-06	7.6E-06
Chrysene Emission Rate, lb/hr	(ER _{C18H12})	1.7E-05	1.7E-05	1.7E-05	1.7E-05
Dibenz[a,h]anthracene Concentration, ug/dscm	(C _{C22H14})	0.79	0.78	0.79	0.79
Dibenz[a,h]anthracene Emission Rate, kg/hr	(ER _{C22H14})	7.6E-06	7.6E-06	7.6E-06	7.6E-06
Dibenz[a,h]anthracene Emission Rate, lb/hr	(ER _{C22H14})	1.7E-05	1.7E-05	1.7E-05	1.7E-05
Fluoranthene Concentration, ug/dscm	(C _{C16H10})	0.8	0.8	0.8	0.8
Fluoranthene Emission Rate, kg/hr	(ER _{C16H10})	7.6E-06	7.6E-06	7.6E-06	7.6E-06
Fluoranthene Emission Rate, lb/hr	(ER _{C16H10})	1.7E-05	1.7E-05	1.7E-05	1.7E-05
Fluorene Concentration, ug/dscm	(C _{C13H10})	2.3	2.0	2.3	2.2
Fluorene Emission Rate, kg/hr	(ER _{C13H10})	2.2E-05	1.9E-05	2.2E-05	2.1E-05
Fluorene Emission Rate, lb/hr	(ER _{C13H10})	4.8E-05	4.2E-05	4.8E-05	4.6E-05
Indeno(1,2,3-cd)pyrene Concentration, ug/dscm	(C _{C22H12})	0.99	0.98	0.99	0.99
Indeno(1,2,3-cd)pyrene Emission Rate, kg/hr	(ER _{C22H12})	9.5E-06	9.4E-06	9.5E-06	9.5E-06
Indeno(1,2,3-cd)pyrene Emission Rate, lb/hr	(ER _{C22H12})	2.1E-05	2.1E-05	2.1E-05	2.1E-05
Naphthalene Concentration, ug/dscm	(C _{C10H8})	39.7	43.1	46.3	43.1
Naphthalene Emission Rate, kg/hr	(ER _{C10H8})	3.8E-04	4.2E-04	4.5E-04	4.1E-04
Naphthalene Emission Rate, lb/hr	(ER _{C10H8})	8.4E-04	9.2E-04	9.8E-04	9.1E-04
Phenanthrene Concentration, ug/dscm	(C _{C10H8})	4.5	4.3	4.7	4.5
Phenanthrene Emission Rate, kg/hr	(ER _{C10H8})	4.3E-05	4.2E-05	4.5E-05	4.3E-05
Phenanthrene Emission Rate, lb/hr	(ER _{C14H10})	9.4E-05	9.2E-05	1.0E-04	9.5E-05
Pyrene Concentration, ug/dscm	(C _{C14H10})	6.0	4.9	4.9	5.3
Pyrene Emission Rate, kg/hr	(ER _{C14H10})	5.7E-05	4.7E-05	4.7E-05	5.1E-05
Pyrene Emission Rate, lb/hr	(ER _{C16H10})	1.3E-04	1.0E-04	1.0E-04	1.1E-04

Underlined values represent results below the detection limit. The detection limit was used for emission purposes.

Location Caterpillar, Inc - Virginia Beach, VA

Source 3561HD Generator (LC 50)

Project No. 2019-0420

Parameter Polycyclic Aromatic Hydrocarbons, Naphthalene

Run Number		Run 1	Run 2	Run 3	Average
Date		3/6/19	3/7/19	3/7/19	--
Start Time		17:05	8:58	10:49	--
Stop Time		18:05	9:58	11:49	--
Run Time, min		60.0	60.0	60.0	60.0
VELOCITY HEAD, in. WC					
Point 1		1.10	1.20	1.30	1.20
Point 2		1.20	1.30	1.50	1.33
Point 3		1.20	1.50	1.60	1.43
Point 4		1.50	1.50	1.60	1.53
Point 5		1.60	1.40	1.40	1.47
Point 6		1.40	1.30	1.20	1.30
Point 7		1.30	1.10	1.10	1.17
Point 8		1.70	1.40	1.30	1.47
Point 9		1.70	1.50	1.50	1.57
Point 10		1.40	1.60	1.70	1.57
Point 11		1.30	1.50	1.40	1.40
Point 12		1.20	1.40	1.20	1.27
CALCULATED DATA					
Square Root of ΔP , (in. WC) ^{1/2}	(ΔP)	1.173	1.178	1.181	1.177
Pitot Tube Coefficient	(Cp)	0.840	0.840	0.840	0.840
Barometric Pressure, in. Hg	(Pb)	30.26	30.37	30.37	30.33
Static Pressure, in. WC	(Pg)	-0.54	-0.75	-0.75	-0.68
Stack Pressure, in. Hg	(Ps)	30.22	30.31	30.31	30.28
Stack Cross-sectional Area, ft ²	(As)	2.18	2.18	2.18	2.18
Temperature, °F	(Ts)	643.3	646.2	654.8	648.1
Temperature, °R	(Ts)	1103.3	1106.2	1114.8	1108.1
Moisture Fraction Measured	(BWSmsd)	0.063	0.061	0.061	0.062
Moisture Fraction @ Saturation	(BWSsat)	121.761	123.598	130.483	125.281
Moisture Fraction	(BWS)	0.063	0.061	0.061	0.062
O ₂ Concentration, %	(O ₂)	13.3	13.2	13.3	13.3
CO ₂ Concentration, %	(CO ₂)	5.5	5.6	5.7	5.6
Molecular Weight, lb/lb-mole (dry)	(Md)	29.42	29.42	29.44	29.43
Molecular Weight, lb/lb-mole (wet)	(Ms)	28.70	28.72	28.75	28.72
Velocity, ft/sec	(Vs)	95.0	95.4	95.9	95.4
VOLUMETRIC FLOW RATE					
At Stack Conditions, acfm	(Qa)	12,440	12,483	12,554	12,492
At Standard Conditions, dscfm	(Qs)	5,633	5,667	5,658	5,652

Location Caterpillar, Inc - Virginia Beach, VA

Source 3561HD Generator (LC 50)

Project No. 2019-0420

Parameter Polycyclic Aromatic Hydrocarbons, Naphthalene

Analysis Volumetric

Run 1							
	Date: 3/6/19						
Impinger No.	1*	2	3	4	5	6*	Total
Contents	XAD Trap	Empty	H2O	H2O	Empty	Silica	--
Initial Volume, mL	354.6	0.0	100.0	100.0	0.0	222.9	777.5
Final Volume, mL	361.8	30.0	110.0	88.0	0.0	238.7	828.5
Gain	7.2	30.0	10.0	-12.0	0.0	15.8	51.0
Run 2							
	Date: 3/7/19						
Impinger No.	1*	2	3	4	5	6*	Total
Contents	XAD Trap	Empty	H2O	H2O	Empty	Silica	--
Initial Volume, mL	344.4	0.0	100.0	100.0	0.0	228.6	773.0
Final Volume, mL	347.3	30.0	102.0	108.0	0.0	235.7	823.0
Gain	2.9	30.0	2.0	8.0	0.0	7.1	50.0
Run 3							
	Date: 3/7/19						
Impinger No.	1*	2	3	4	5	6*	Total
Contents	XAD Trap	Empty	H2O	H2O	Empty	Silica	--
Initial Volume, mL	336.6	0.0	100.0	100.0	0.0	233.3	769.9
Final Volume, mL	342.3	32.0	94.0	106.0	2.0	242.9	819.2
Gain	5.7	32.0	-6.0	6.0	2.0	9.6	49.3



Isokinetic Field Data

Location: Caterpillar, Inc - Virginia Beach, VA				Start Time: 17:05		Source: 3561HD Generator (LC 50)				
Date: 3/6/19		Run 1		End Time: 18:05		Project No.: 2019-0420		Parameter: Polycyclic		

STACK DATA (EST)			EQUIPMENT			STACK DATA (EST)			FILTER NO.	STACK DATA (FINAL)			MOIST. DATA	
Moisture:	6.0	% est.	Meter Box ID: 2027			Est. Tm:	70	°F	NA	Pb:	30.26	in. Hg	Vlc (ml)	
Barometric:	30.37	in. Hg	Y: 1.008			Est. Ts:	635	°F		Pg:	-0.54	in. WC	51.0	
Static Press:	-0.54	in. WC	AH @ (in.WC): 1.840			Est. AP:	1.38	in. WC		O ₂ :	13.3	%	K-FACTOR	
Stack Press:	30.33	in. Hg	Probe ID: PR-403			Est. Dn:	0.215	in.		CO ₂ :	5.5	%	0.845	
CO ₂ :	6.0	%	Liner Material: glass			Target Rate:	0.65	scfm	Check Pt. Initial Final Corr.					
O ₂ :	11.0	%	Pitot ID: P-403-2			LEAK CHECKS			Pre	Mid 1	Mid 2	Post	Mid 1 (cf)	
N ₂ /CO:	83.0	%	Pitot Cp/Type: 0.840 S-type			Leak Rate (cfm):			0.000	--	--	0.000	Mid 2 (cf)	
Md:	29.40	lb/lb-mole	Nozzle ID: SS-303			Vacuum (in Hg):			9	--	--	10	Mid 3 (cf)	
Ms:	28.72	lb/lb-mole	Nozzle Dn (in.): 0.205			Pitot Tube: Pass			--	--	Pass	Mid-Point Leak Check Vol (cf): --		

Sample Pt.	Sample Time (minutes)		Dry Gas Meter Reading (ft ³)	Pitot Tube ΔP (in WC)	Gas Temperatures (°F)		Orifice Press. ΔH (in. WC)		Pump Vac (in. Hg)	Gas Temperatures (°F)				% ISO	Vs (fps)
	Begin	End			DGM Average	Stack	Ideal	Actual		Probe	Filter	Imp Exit	Aux		
					Amb.	Amb.				Amb.	Amb.	Amb.	Amb.		
A-1	0.00	5.00	272.800	1.10	70	646	0.92	0.92	3	259	249	41	46	98.5	84.87
2	5.00	10.00	275.360	1.20	70	645	1.01	1.00	5	261	260	46	49	98.7	88.61
3	10.00	15.00	278.040	1.20	69	641	1.01	1.00	5	258	260	46	48	100.2	88.45
4	15.00	20.00	280.760	1.50	70	645	1.26	1.30	6	260	261	48	53	101.9	99.07
5	20.00	25.00	283.850	1.60	70	642	1.35	1.40	6	264	258	49	52	100.1	102.18
6	25.00	30.00	286.990	1.40	71	642	1.18	1.20	6	260	260	50	54	102.0	95.58
B-1	30.00	35.00	289.990	1.30	72	644	1.10	1.10	5	259	260	51	57	96.9	92.18
2	35.00	40.00	292.740	1.70	73	644	1.43	1.40	7	260	260	51	56	99.1	105.42
3	40.00	45.00	295.960	1.70	74	643	1.44	1.40	7	259	258	52	57	100.1	105.37
4	45.00	50.00	299.220	1.40	74	644	1.18	1.20	7	261	261	53	59	102.2	95.66
5	50.00	55.00	302.240	1.30	75	643	1.10	1.10	6	261	260	53	60	98.8	92.14
6	55.00	60.00	305.060	1.20	76	641	1.02	1.00	5	264	262	53	59	102.0	88.45
	60.00	--	307.865												--
Final DGM:			307.865												

RESULTS	Run Time		Vm	ΔP	Tm	Ts	Max Vac	ΔH	%ISO	BWS	Y _{qa}					
		60.0	min	35.065	ft ³	1.38	in. WC	72.0	°F	643.3	°F	7	1.168	in. WC	100.2	0.063

Isokinetic Field Data

Location: Caterpillar, Inc - Virginia Beach, VA			Start Time: 8:58	Source: 3561HD Generator (LC 50)		
Date: 3/7/19	Run 2	VALID	End Time: 9:58	Project No.: 2019-0420	Parameter: Polycyclic	

STACK DATA (EST)	EQUIPMENT	STACK DATA (EST)	FILTER NO.	STACK DATA (FINAL)	MOIST. DATA
Moisture: 6.0 % est.	Meter Box ID: 2027	Est. Tm: 72 °F	NA	Pb: 30.37 in. Hg	Vlc (ml)
Barometric: 30.37 in. Hg	Y: 1.008	Est. Ts: 643 °F		Pg: -0.75 in. WC	50.0
Static Press: -0.54 in. WC	ΔH @ (in.WC): 1.840	Est. ΔP: 1.38 in. WC		O ₂ : 13.2 %	K-FACTOR
Stack Press: 30.33 in. Hg	Probe ID: PR-403	Est. Dn: 0.231 in.		CO ₂ : 5.6 %	0.84
CO ₂ : 6.0 %	Liner Material: glass	Target Rate: 0.75 scfm			
O ₂ : 11.0 %	Pitot ID: P-403-2	LEAK CHECKS			Check Pt. Initial Final Corr.
N ₂ /CO: 83.0 %	Pitot Cp/Type: 0.840 S-type	Pre Mid 1 Mid 2 Post			
Md: 29.40 lb/lb-mole	Nozzle ID: SS-303	Leak Rate (cfm): 0.000 -- -- 0.000	Mid 1 (cf) --		
Ms: 28.72 lb/lb-mole	Nozzle Dn (in.): 0.205	Vacuum (in Hg): 10 -- -- 8	Mid 2 (cf) --		
		Pitot Tube: Pass -- -- Pass	Mid 3 (cf) --		
			Mid-Point Leak Check Vol (cf): --		

Sample Pt.	Sample Time (minutes)		Dry Gas Meter Reading (ft ³)	Pitot Tube ΔP (in WC)	Gas Temperatures (°F)		Orifice Press. ΔH (in. WC)		Pump Vac (in. Hg)	Gas Temperatures (°F)				% ISO	Vs (fps)
	Begin	End			DGM Average	Stack	Ideal	Actual		Probe	Filter	Imp Exit	Aux		
					Amb.	Amb.				Amb.	Amb.	Amb.	Amb.		
A-1	0.00	5.00	309.555	1.20	64	644	1.00	1.00	4	262	263	54	63	99.3	88.57
2	5.00	10.00	312.220	1.30	65	643	1.08	1.10	4	260	260	53	60	103.5	92.14
3	10.00	15.00	315.120	1.50	66	645	1.25	1.30	4	260	258	58	62	100.3	99.07
4	15.00	20.00	318.140	1.50	67	645	1.25	1.30	4	260	262	63	63	100.5	99.07
5	20.00	25.00	321.170	1.40	68	646	1.17	1.20	4	261	262	61	60	102.5	95.75
6	25.00	30.00	324.160	1.30	69	647	1.09	1.10	4	261	261	58	42	98.7	92.31
B-1	30.00	35.00	326.940	1.10	70	646	0.92	0.92	4	260	261	52	40	100.1	84.87
2	35.00	40.00	329.540	1.40	71	646	1.18	1.20	5	260	263	47	39	100.9	95.75
3	40.00	45.00	332.500	1.50	72	648	1.26	1.30	6	261	260	45	41	100.7	99.20
4	45.00	50.00	335.560	1.60	73	648	1.35	1.40	6	261	262	46	42	101.4	102.45
5	50.00	55.00	338.750	1.50	74	647	1.27	1.30	7	260	260	46	42	100.2	99.15
6	55.00	60.00	341.810	1.40	75	649	1.18	1.20	7	259	262	47	42	99.9	95.88
--	60.00	--	344.760												--

Final DGM: 344.760

RESULTS	Run Time		Vm		ΔP		Tm		Ts		Max Vac	ΔH		%ISO	BWS	Y _{qa}
		60.0	min	35.205	ft³	1.39	in. WC	69.5	°F	646.2	°F	7	1.193	in. WC	100.8	0.061



Isokinetic Field Data

Location: Caterpillar, Inc - Virginia Beach, VA				Start Time: 10:49			Source: 3561HD Generator (LC 50)					
Date: 3/7/19			Run 3	VALID		End Time: 11:49			Project No.: 2019-0420		Parameter: Polycyclic	

STACK DATA (EST)	EQUIPMENT	STACK DATA (EST)	FILTER NO.	STACK DATA (FINAL)	MOIST. DATA
Moisture: 6.0 % est.	Meter Box ID: 2027	Est. Tm: 70 °F	NA	Pb: 30.37 in. Hg	Vlc (ml)
Barometric: 30.37 in. Hg	Y: 1.008	Est. Ts: 646 °F		Pg: -0.75 in. WC	49.3
Static Press: -0.54 in. WC	ΔH @ (in.WC): 1.840	Est. ΔP: 1.39 in. WC		O ₂ : 13.3 %	K-FACTOR
Stack Press: 30.33 in. Hg	Probe ID: PR-403	Est. Dn: 0.232 in.		CO ₂ : 5.7 %	0.836
CO ₂ : 6.0 %	Liner Material: glass	Target Rate: 0.75 scfm		Check Pt. Initial Final Corr.	
O ₂ : 11.0 %	Pitot ID: P-403-2	LEAK CHECKS Pre Mid 1 Mid 2 Post		Mid 1 (cf)	--
N ₂ /CO: 83.0 %	Pitot Cp/Type: 0.840 S-type	Leak Rate (cfm): 0.000 -- -- 0.000		Mid 2 (cf)	--
Md: 29.40 lb/lb-mole	Nozzle ID: SS-303	Vacuum (in Hg): 8 -- -- 8		Mid 3 (cf)	--
Ms: 28.72 lb/lb-mole	Nozzle Dn (in.): 0.205	Pitot Tube: Pass -- -- Pass		Mid-Point Leak Check Vol (cf):	--

Sample Pt.	Sample Time (minutes)		Dry Gas Meter Reading (ft ³)	Pitot Tube ΔP (in WC)	Gas Temperatures (°F)		Orifice Press. ΔH (in. WC)		Pump Vac (in. Hg)	Gas Temperatures (°F)				% ISO	Vs (fps)
	Begin	End			DGM Average	Stack	Ideal	Actual		Probe	Filter	Imp Exit	Aux		
					Amb.	Amb.				Amb.	Amb.	Amb.	Amb.		
A-1	0.00	5.00	345.550	1.30	72	644	1.10	1.10	4	262	261	46	47	97.6	92.18
2	5.00	10.00	348.320	1.50	69	646	1.25	1.30	5	259	259	42	42	101.5	99.11
3	10.00	15.00	351.390	1.60	68	654	1.33	1.30	5	260	263	42	41	98.8	102.73
4	15.00	20.00	354.460	1.60	69	658	1.32	1.30	5	259	261	42	42	100.7	102.91
5	20.00	25.00	357.590	1.40	69	657	1.16	1.20	6	261	264	42	41	101.4	96.22
6	25.00	30.00	360.540	1.20	70	655	1.00	1.00	5	256	263	42	40	99.5	89.01
B-1	30.00	35.00	363.230	1.10	71	657	0.92	0.92	5	261	259	42	42	100.4	85.29
2	35.00	40.00	365.830	1.30	72	656	1.08	1.10	5	260	261	43	44	101.7	92.68
3	40.00	45.00	368.700	1.50	72	658	1.25	1.30	6	261	259	43	44	99.8	99.65
4	45.00	50.00	371.720	1.70	73	659	1.42	1.40	6	259	260	44	45	100.1	106.13
5	50.00	55.00	374.950	1.40	74	657	1.17	1.20	6	257	256	45	45	101.8	96.22
6	55.00	60.00	377.940	1.20	74	656	1.00	1.00	5	261	264	45	44	100.7	89.05
--	60.00	--	380.680												--
Final DGM:			380.680												

RESULTS	Run Time		Vm		ΔP		Tm		Ts		Max Vac	ΔH		%ISO	BWS	Y _{qa}
		60.0	min	35.130	ft³	1.40	in. WC	71.1	°F	654.8	°F	6	1.177	in. WC	100.5	0.061

Load Condition: 75%

Location Caterpillar, Inc - Virginia Beach, VA
 Source 3516HD Generator (LC 75)
 Project No. 2019-0420
 Parameter PM/CPM

Run Number		Run 1	Run 2	Run 3	Average
Date		3/6/19	3/6/19	3/6/19	--
Start Time		10:12	12:29	14:42	--
Stop Time		11:12	13:29	15:42	--
Run Time, min	(θ)	60.0	60.0	60.0	60.0
INPUT DATA					
Barometric Pressure, in. Hg	(Pb)	30.26	30.26	30.26	30.26
Meter Correction Factor	(Y)	0.989	0.989	0.989	0.989
Orifice Calibration Value	($\Delta H @$)	1.746	1.746	1.746	1.746
Meter Volume, ft ³	(Vm)	46.940	45.105	44.530	45.525
Meter Temperature, °F	(Tm)	73.4	73.0	73.1	73.2
Meter Temperature, °R	(Tm)	533.4	533.0	533.1	533.2
Meter Orifice Pressure, in. WC	(ΔH)	1.950	1.783	1.750	1.828
Volume H ₂ O Collected, mL	(Vlc)	55.1	52.7	46.4	51.4
Nozzle Diameter, in	(Dn)	0.208	0.208	0.208	0.208
Area of Nozzle, ft ²	(An)	0.0002	0.0002	0.0002	0.0002
Filterable PM Mass, mg	(Mn)	15.7	11.3	10.1	12.4
Condensable PM Mass, mg	(M _{CPM})	10.4	11.0	10.2	10.5
ISOKINETIC DATA					
Standard Meter Volume, ft ³	(Vmstd)	46.694	44.886	44.303	45.295
Standard Water Volume, ft ³	(Vwstd)	2.594	2.481	2.185	2.420
Moisture Fraction Measured	(BWSmsd)	0.053	0.052	0.047	0.051
Moisture Fraction @ Saturation	(BWSsat)	138.885	148.125	152.370	146.460
Moisture Fraction	(BWS)	0.053	0.052	0.047	0.051
Meter Pressure, in Hg	(Pm)	30.40	30.39	30.39	30.39
Volume at Nozzle, ft ³	(Vn)	104.034	100.920	99.396	101.450
Isokinetic Sampling Rate, (%)	(I)	98.2	99.2	98.1	98.5
DGM Calibration Check Value, (+/- 5%)	(Y _{qa})	-0.9	-0.5	-0.7	-0.7
EMISSION CALCULATIONS					
Filterable PM Concentration, grain/dscf	(C _s)	0.0052	0.0039	0.0035	0.0042
Filterable PM Emission Rate, lb/hr	(PMR)	0.33	0.23	0.21	0.26
Condensable PM Concentration, grain/dscf	(C _{CPM})	0.0034	0.0038	0.0036	0.0036
Condensable PM Emission Rate, lb/hr	(ER _{CPM})	0.22	0.23	0.21	0.22
Total PM Concentration, grain/dscf	(C _{TPM})	0.0086	0.0077	0.0071	0.0078
Total PM Emission Rate, lb/hr	(ER _{TPM})	0.54	0.46	0.42	0.47

Location Caterpillar, Inc - Virginia Beach, VA
Source 3516HD Generator (LC 75)
Project No. 2019-0420
Parameter PM/CPM

Run Number		Run 1	Run 2	Run 3	Average
Date		3/6/19	3/6/19	3/6/19	--
Start Time		10:12	12:29	14:42	--
Stop Time		11:12	13:29	15:42	--
Run Time, min		60.0	60.0	60.0	60.0
VELOCITY HEAD, in. WC					
Point 1		2.40	1.50	1.50	1.80
Point 2		2.60	1.60	1.60	1.93
Point 3		2.60	1.70	1.80	2.03
Point 4		1.90	2.30	2.20	2.13
Point 5		1.70	2.40	2.00	2.03
Point 6		1.40	2.20	2.20	1.93
Point 7		2.20	2.10	1.90	2.07
Point 8		2.60	2.40	2.00	2.33
Point 9		2.90	2.60	2.50	2.67
Point 10		2.80	2.40	2.80	2.67
Point 11		2.70	2.30	2.60	2.53
Point 12		2.50	2.30	2.50	2.43
CALCULATED DATA					
Square Root of ΔP , (in. WC) ^{1/2}	(ΔP)	1.528	1.461	1.454	1.481
Pitot Tube Coefficient	(Cp)	0.840	0.840	0.840	0.840
Barometric Pressure, in. Hg	(Pb)	30.26	30.26	30.26	30.26
Static Pressure, in. WC	(Pg)	-1.10	-1.10	-0.80	-1.00
Stack Pressure, in. Hg	(Ps)	30.18	30.18	30.20	30.19
Stack Cross-sectional Area, ft ²	(As)	2.18	2.18	2.18	2.18
Temperature, °F	(Ts)	664.1	674.7	679.5	672.8
Temperature, °R	(Ts)	1124.1	1134.7	1139.5	1132.8
Moisture Fraction Measured	(BWSmsd)	0.053	0.052	0.047	0.051
Moisture Fraction @ Saturation	(BWSsat)	138.885	148.125	152.370	146.460
Moisture Fraction	(BWS)	0.053	0.052	0.047	0.051
O ₂ Concentration, %	(O ₂)	12.6	12.6	12.5	12.6
CO ₂ Concentration, %	(CO ₂)	6.0	6.2	6.1	6.1
Molecular Weight, lb/lb-mole (dry)	(Md)	29.47	29.50	29.48	29.48
Molecular Weight, lb/lb-mole (wet)	(Ms)	28.86	28.89	28.94	28.90
Velocity, ft/sec	(Vs)	124.7	119.7	119.2	121.2
VOLUMETRIC FLOW RATE					
At Stack Conditions, acfm	(Qa)	16,317	15,669	15,609	15,865
At Standard Conditions, dscfm	(Qs)	7,324	6,969	6,958	7,084

Location Caterpillar, Inc - Virginia Beach, VA

Source 3516HD Generator (LC 75)

Project No. 2019-0420

Parameter PM/CPM

Analysis Volumetric

Run 1						
	Date: 3/6/19					
Impinger No.	1	2	3	4	5*	Total
Contents	Empty	Empty	H2O	Empty	Silica	--
Initial Volume, mL	0.0	0.0	100.0	0.0	224.6	324.6
Final Volume, mL	33.0	4.0	106.0	2.0	234.7	379.7
Gain	33.0	4.0	6.0	2.0	10.1	55.1
Run 2						
	Date: 3/6/19					
Impinger No.	1	2	3	4	5*	Total
Contents	Empty	Empty	H2O	Empty	Silica	--
Initial Volume, mL	0.0	0.0	100.0	0.0	232.6	332.6
Final Volume, mL	31.0	5.0	106.0	0.0	243.3	385.3
Gain	31.0	5.0	6.0	0.0	10.7	52.7
Run 3						
	Date: 3/6/19					
Impinger No.	1	2	3	4	5*	Total
Contents	Empty	Empty	H2O	Empty	Silica	--
Initial Volume, mL	0.0	0.0	100.0	0.0	246.9	346.9
Final Volume, mL	31.0	3.0	100.0	2.0	257.3	393.3
Gain	31.0	3.0	0.0	2.0	10.4	46.4



Isokinetic Field Data

Location: <u>Caterpillar, Inc - Virginia Beach, VA</u>				Start Time: <u>10:12</u>		Source: <u>3516HD Generator (LC 75)</u>				
Date: <u>3/6/19</u>		Run 1	VALID	End Time: <u>11:12</u>		Project No.: <u>2019-0420</u>		Parameter: <u>PM/CPM</u>		

STACK DATA (EST)		EQUIPMENT		STACK DATA (EST)		FILTER NO.	STACK DATA (FINAL)			MOIST. DATA	
Moisture:	6.0 % est.	Meter Box ID:	2026	Est. Tm:	70 °F	11234	Pb:	30.26	in. Hg	Vlc (ml)	
Barometric:	30.26 in. Hg	Y:	0.989	Est. Ts:	656 °F		Pg:	-1.10	in. WC	55.1	
Static Press:	-1.10 in. WC	AH @ (in.WC):	1.746	Est. AP:	2.36 in. WC		O ₂ :	12.6	%	K-FACTOR	
Stack Press:	30.18 in. Hg	Probe ID:	PR-402-0	Est. Dn:	0.203 in.		CO ₂ :	6.0	%	0.833	
CO ₂ :	6.0 %	Liner Material:	glass	Target Rate:	0.75 scfm		Check Pt.		Initial	Final	Corr.
O ₂ :	11.0 %	Pitot ID:	P-403-2	LEAK CHECKS		Pre	Mid 1	Mid 2	Post	Mid 1 (cf)	
N ₂ /CO:	83.0 %	Pitot Cp/Type:	0.840 S-type	Leak Rate (cfm):		0.000	--	--	0.000	Mid 2 (cf)	
Md:	29.40 lb/lb-mole	Nozzle ID:	#7	Vacuum (in Hg):		8	--	--	8	Mid 3 (cf)	
Ms:	28.72 lb/lb-mole	Nozzle Dn (in.):	0.208	Pitot Tube:		Pass	--	--	Pass	Mid-Point Leak Check Vol (cf):	

Sample Pt.	Sample Time (minutes)		Dry Gas Meter Reading (ft ³)	Pitot Tube ΔP (in WC)	Gas Temperatures (°F)		Orifice Press. ΔH (in. WC)		Pump Vac (in. Hg)	Gas Temperatures (°F)				% ISO	Vs (fps)
					DGM Average	Stack				Probe	Filter	Imp Exit	Aux		
	Amb.	Amb.			Amb.	Amb.	Amb.	Amb.							
	69	65			Ideal	Actual	65	266		35	65				
A-1	0.00	5.00	904.535	2.40	69	658	1.99	1.90	4	266	266	53	66	96.5	126.36
2	5.00	10.00	908.390	2.60	70	662	2.15	2.00	4	263	269	48	66	96.7	131.75
3	10.00	15.00	912.410	2.60	72	669	2.15	2.20	5	259	260	49	67	98.2	132.16
4	15.00	20.00	916.490	1.90	72	666	1.58	1.60	4	259	255	47	68	101.9	112.83
5	20.00	25.00	920.120	1.70	73	666	1.41	1.40	4	260	259	45	68	99.5	106.73
6	25.00	30.00	923.480	1.40	73	663	1.17	1.20	4	260	251	42	69	102.9	96.72
B-1	30.00	35.00	926.640	2.20	74	663	1.83	1.80	5	261	262	41	69	96.3	121.25
2	35.00	40.00	930.350	2.60	74	664	2.16	2.20	5	261	260	42	70	99.0	131.87
3	40.00	45.00	934.490	2.90	76	665	2.42	2.40	5	259	252	42	70	97.8	139.33
4	45.00	50.00	938.820	2.80	76	664	2.34	2.30	6	260	263	42	71	98.3	136.85
5	50.00	55.00	943.100	2.70	76	663	2.26	2.30	6	260	259	42	71	99.6	134.32
6	55.00	60.00	947.360	2.50	76	666	2.09	2.10	6	260	270	42	72	100.1	129.43
	60.00	--	951.475												--
Final DGM:			951.475												

RESULTS	Run Time		Vm	ΔP	Tm	Ts	Max Vac	ΔH	%ISO	BWS	Y _{qa}
	min	sec	ft ³	in. WC	°F	°F		in. WC			
	60.0		46.940	2.36	73.4	664.1	6	1.950	98.2	0.053	-0.9



Isokinetic Field Data

Location: Caterpillar, Inc - Virginia Beach, VA				Start Time: 12:29		Source: 3516HD Generator (LC 75)								
Date: 3/6/19		Run 2		VALID		End Time: 13:29		Project No.: 2019-0420		Parameter: PM/CPM				
STACK DATA (EST)			EQUIPMENT			STACK DATA (EST)			FILTER NO.		STACK DATA (FINAL)		MOIST. DATA	
Moisture: 6.0 % est.			Meter Box ID: 2026			Est. Tm: 73 °F			11337		Pb: 30.26 in. Hg		Vlc (ml)	
Barometric: 30.26 in. Hg			Y: 0.989			Est. Ts: 664 °F					Pg: -1.10 in. WC		52.7	
Static Press: -1.10 in. WC			ΔH @ (in.WC): 1.746			Est. ΔP: 2.36 in. WC					O ₂ : 12.6 %		K-FACTOR	
Stack Press: 30.18 in. Hg			Probe ID: PR-402-0			Est. Dn: 0.203 in.					CO ₂ : 6.2 %		0.83	
CO ₂ : 6.0 %			Liner Material: glass			Target Rate: 0.75 scfm					Check Pt.		Initial Final Corr.	
O ₂ : 11.0 %			Pitot ID: P-403-2			LEAK CHECKS			Pre Mid 1 Mid 2 Post		Mid 1 (cf)		--	
N ₂ /CO: 83.0 %			Pitot Cp/Type: 0.840 S-type			Leak Rate (cfm): 0.000			-- -- 0.000		Mid 2 (cf)		--	
Md: 29.40 lb/lb-mole			Nozzle ID: #7			Vacuum (in Hg): 10			-- -- 10		Mid 3 (cf)		--	
Ms: 28.72 lb/lb-mole			Nozzle Dn (in.): 0.208			Pitot Tube: Pass			-- -- Pass		Mid-Point Leak Check Vol (cf): --			

Sample Pt.	Sample Time (minutes)		Dry Gas Meter Reading (ft ³)	Pitot Tube ΔP (in WC)	Gas Temperatures (°F)		Orifice Press. ΔH (in. WC)		Pump Vac (in. Hg)	Gas Temperatures (°F)				% ISO	Vs (fps)
					DGM Average	Stack	Ideal Actual			Probe	Filter	Imp Exit	Aux		
	Amb.	Amb.					Amb.	Amb.		Amb.	Amb.				
	Begin	End			--	--	--	--		--	--				
A-1	0.00	5.00	951.835	1.50	73	664	1.25	1.30	3	258	267	49	65	100.9	100.16
2	5.00	10.00	955.040	1.60	71	679	1.31	1.30	3	261	267	42	66	97.9	104.14
3	10.00	15.00	958.220	1.70	71	676	1.40	1.40	3	260	263	41	66	100.0	107.20
4	15.00	20.00	961.570	2.30	72	677	1.89	1.90	5	262	262	42	68	99.3	124.75
5	20.00	25.00	965.440	2.40	72	677	1.97	2.00	5	260	261	43	69	100.2	127.43
6	25.00	30.00	969.430	2.20	73	674	1.81	1.80	5	261	261	43	69	99.3	121.84
B-1	30.00	35.00	973.230	2.10	73	671	1.74	1.70	5	259	259	43	70	98.8	118.88
2	35.00	40.00	976.930	2.40	73	676	1.97	2.00	6	261	263	43	71	100.2	127.37
3	40.00	45.00	980.930	2.60	74	672	2.15	2.20	6	259	261	43	72	99.1	132.34
4	45.00	50.00	985.060	2.40	74	676	1.98	2.00	6	260	261	43	72	100.8	127.37
5	50.00	55.00	989.090	2.30	75	679	1.89	1.90	6	260	256	44	72	100.1	124.85
6	55.00	60.00	993.010	2.30	75	675	1.90	1.90	6	259	259	45	72	100.2	124.64
--	60.00	--	996.940												--
Final DGM:			996.940												

RESULTS	Run Time		Vm		ΔP		Tm		Ts		Max Vac		ΔH		%ISO		BWS		Y _{qa}	
	60.0	min	45.105	ft ³	2.15	in. WC	73.0	°F	674.7	°F	6	1.783	in. WC	99.2	0.052			-0.5		

Isokinetic Field Data

Location: Caterpillar, Inc - Virginia Beach, VA			Start Time: 14:42			Source: 3516HD Generator (LC 75)					
Date: 3/6/19		Run 3	VALID	End Time: 15:42		Project No.: 2019-0420		Parameter: PM/CPM			
STACK DATA (EST)			EQUIPMENT		STACK DATA (EST)		FILTER NO.	STACK DATA (FINAL)	MOIST. DATA		
Moisture:	6.0	% est.	Meter Box ID: 2026		Est. Tm:	73	°F	Pb:	30.26	in. Hg	Vlc (ml)
Barometric:	30.26	in. Hg	Y: 0.989		Est. Ts:	675	°F	Pg:	-0.80	in. WC	46.4
Static Press:	-1.10	in. WC	ΔH @ (in.WC): 1.746		Est. ΔP:	2.15	in. WC	O ₂ :	12.5	%	K-FACTOR
Stack Press:	30.18	in. Hg	Probe ID: PR-402-0		Est. Dn:	0.208	in.	CO ₂ :	6.1	%	0.824
CO ₂ :	6.0	%	Liner Material: glass		Target Rate:	0.75	scfm				
O ₂ :	11.0	%	Pitot ID: P-403-2		LEAK CHECKS			Pre	Mid 1	Mid 2	Post
N ₂ /CO:	83.0	%	Pitot Cp/Type: 0.840 S-type		Leak Rate (cfm): 0.000			--	--	0.000	
Md:	29.40	lb/lb-mole	Nozzle ID: #7		Vacuum (in Hg): 10			--	--	10	
Ms:	28.72	lb/lb-mole	Nozzle Dn (in.): 0.208		Pitot Tube: Pass			--	--	Pass	
						Check Pt.			Initial	Final	Corr.
						Mid 1 (cf)					--
						Mid 2 (cf)					--
						Mid 3 (cf)					--
						Mid-Point Leak Check Vol (cf):					--

Sample Pt.	Sample Time (minutes)		Dry Gas Meter Reading (ft ³)	Pitot Tube ΔP (in WC)	Gas Temperatures (°F)		Orifice Press. ΔH (in. WC)		Pump Vac (in. Hg)	Gas Temperatures (°F)				% ISO	Vs (fps)				
	Begin	End			DGM Average	Stack	Ideal	Actual		Probe	Filter	Imp Exit	Aux						
																Amb.	Amb.	Amb.	Amb.
																--	--	--	--
A-1	0.00	5.00	999.830	1.50	72	678	1.23	1.20	3	262	259	49	65	91.1	100.79				
2	5.00	10.00	1002.700	1.60	71	681	1.31	1.30	3	261	265	45	66	106.7	104.23				
3	10.00	15.00	1006.160	1.80	71	679	1.47	1.50	3	261	263	43	68	100.5	110.45				
4	15.00	20.00	1009.620	2.20	72	677	1.81	1.80	4	260	259	44	68	98.6	122.00				
5	20.00	25.00	1013.380	2.00	72	678	1.64	1.60	4	261	260	43	69	99.0	116.38				
6	25.00	30.00	1016.980	2.20	73	680	1.80	1.80	4	260	261	44	69	99.6	122.16				
B-1	30.00	35.00	1020.780	1.90	73	680	1.56	1.60	4	260	258	44	69	101.2	113.53				
2	35.00	40.00	1024.370	2.00	74	680	1.64	1.60	4	260	260	45	70	98.5	116.48				
3	40.00	45.00	1027.960	2.50	74	680	2.05	2.10	5	260	262	44	70	96.0	130.23				
4	45.00	50.00	1031.870	2.80	75	680	2.30	2.30	6	260	258	45	70	99.4	137.82				
5	50.00	55.00	1036.160	2.60	75	680	2.14	2.10	6	260	262	45	71	98.8	132.81				
6	55.00	60.00	1040.270	2.50	75	681	2.05	2.10	6	260	259	46	72	100.3	130.28				
--	60.00	--	1044.360												--				

Final DGM: 1044.360

RESULTS	Run Time		Vm		ΔP		Tm		Ts		Max Vac		ΔH		%ISO		BWS		Y _{qa}	
	min		ft ³		in. WC		°F		°F		in. WC									
	60.0		44.530		2.13		73.1		679.5		6		1.750		98.1		0.047		-0.7	

Location Caterpillar, Inc - Virginia Beach, VA
 Source 3516HD Generator (L75)
 Project No. 2019-0420
 Parameter Arsenic, Cadmium, Nickel

Run Number		Run 1	Run 2	Run 3	Average
Date		3/6/19	3/6/19	3/6/19	--
Start Time		10:12	12:29	14:42	--
Stop Time		11:12	13:29	15:42	--
Run Time, min	(θ)	60.0	60.0	60.0	60.0
INPUT DATA					
Barometric Pressure, in. Hg	(Pb)	30.26	30.26	30.26	30.26
Meter Correction Factor	(Y)	0.994	0.994	0.994	0.994
Orifice Calibration Value	($\Delta H @$)	1.816	1.816	1.816	1.816
Meter Volume, ft ³	(Vm)	40.764	38.746	37.982	39.164
Meter Temperature, °F	(Tm)	71.4	69.9	69.1	70.1
Meter Temperature, °R	(Tm)	531.4	529.9	529.1	530.1
Meter Orifice Pressure, in. WC	(ΔH)	1.553	1.417	1.433	1.468
Volume H ₂ O Collected, mL	(Vlc)	48.6	54.5	51.5	51.5
Nozzle Diameter, in	(Dn)	0.195	0.195	0.195	0.195
Area of Nozzle, ft ²	(An)	0.0002	0.0002	0.0002	0.0002
Arsenic Mass, ug	(M _{As})	<u>0.80</u>	<u>0.80</u>	<u>0.80</u>	0.80
Cadmium Mass, ug	(M _{Cd})	<u>0.18</u>	<u>0.18</u>	<u>0.18</u>	0.18
Nickel Mass, ug	(M _{Ni})	3.0	2.7	2.9	2.9
ISOKINETIC DATA					
Standard Meter Volume, ft ³	(Vmstd)	40.870	38.944	38.237	39.350
Standard Water Volume, ft ³	(Vwstd)	2.288	2.566	2.424	2.426
Moisture Fraction Measured	(BWSmsd)	0.053	0.062	0.060	0.058
Moisture Fraction @ Saturation	(BWSsat)	138.245	145.612	147.943	143.933
Moisture Fraction	(BWS)	0.053	0.062	0.060	0.058
Meter Pressure, in Hg	(Pm)	30.37	30.36	30.37	30.37
Volume at Nozzle, ft ³	(Vn)	91.034	88.220	86.565	88.606
Isokinetic Sampling Rate, (%)	(I)	98.0	98.9	97.2	98.0
DGM Calibration Check Value, (+/- 5%)	(Y _{qa})	-1.0	-1.4	-3.9	-2.1
EMISSION CALCULATIONS					
Arsenic Concentration, ug/dscm	(C _{As})	0.69	0.73	0.74	0.72
Arsenic Emission Rate, lb/hr	(ER _{As})	1.9E-05	1.9E-05	1.9E-05	1.9E-05
Cadmium Concentration, ug/dscm	(C _{Cd})	0.16	0.16	0.17	0.16
Cadmium Emission Rate, lb/hr	(ER _{Cd})	4.3E-06	4.2E-06	4.3E-06	4.3E-06
Nickel Concentration, ug/dscm	(C _{Ni})	2.6	2.4	2.7	2.6
Nickel Emission Rate, lb/hr	(ER _{Ni})	7.1E-05	6.3E-05	6.9E-05	6.8E-05

Results for Arsenic and Cadmium were below the detection limit in all three runs. The detection limit was used for emission purposes.

Location Caterpillar, Inc - Virginia Beach, VA
Source 3516HD Generator (L75)
Project No. 2019-0420
Parameter Arsenic, Cadmium, Nickel

Run Number		Run 1	Run 2	Run 3	Average
Date		3/6/19	3/6/19	3/6/19	--
Start Time		10:12	12:29	14:42	--
Stop Time		11:12	13:29	15:42	--
Run Time, min		60.0	60.0	60.0	60.0
VELOCITY HEAD, in. WC					
Point 1		2.40	1.50	1.50	1.80
Point 2		2.60	1.60	1.60	1.93
Point 3		2.60	1.60	1.80	2.00
Point 4		1.90	2.30	2.20	2.13
Point 5		1.70	2.40	2.00	2.03
Point 6		1.40	2.20	2.20	1.93
Point 7		2.20	2.10	1.90	2.07
Point 8		2.60	2.40	2.00	2.33
Point 9		2.90	2.60	2.50	2.67
Point 10		2.80	2.40	2.80	2.67
Point 11		2.70	2.30	2.60	2.53
Point 12		2.40	2.30	2.50	2.40
CALCULATED DATA					
Square Root of ΔP , (in. WC) ^{1/2}	(ΔP)	1.525	1.458	1.454	1.479
Pitot Tube Coefficient	(Cp)	0.840	0.840	0.840	0.840
Barometric Pressure, in. Hg	(Pb)	30.26	30.26	30.26	30.26
Static Pressure, in. WC	(Pg)	-1.10	-1.10	-0.80	-1.00
Stack Pressure, in. Hg	(Ps)	30.18	30.18	30.20	30.19
Stack Cross-sectional Area, ft ²	(As)	2.18	2.18	2.18	2.18
Temperature, °F	(Ts)	663.3	671.8	674.6	669.9
Temperature, °R	(Ts)	1123.3	1131.8	1134.6	1129.9
Moisture Fraction Measured	(BWSmsd)	0.053	0.062	0.060	0.058
Moisture Fraction @ Saturation	(BWSsat)	138.245	145.612	147.943	143.933
Moisture Fraction	(BWS)	0.053	0.062	0.060	0.058
O ₂ Concentration, %	(O ₂)	12.6	12.6	12.5	12.6
CO ₂ Concentration, %	(CO ₂)	6.0	6.2	6.1	6.1
Molecular Weight, lb/lb-mole (dry)	(Md)	29.47	29.50	29.48	29.48
Molecular Weight, lb/lb-mole (wet)	(Ms)	28.86	28.79	28.80	28.81
Velocity, ft/sec	(Vs)	124.4	119.5	119.3	121.1
VOLUMETRIC FLOW RATE					
At Stack Conditions, acfm	(Qa)	16,284	15,644	15,615	15,848
At Standard Conditions, dscfm	(Qs)	7,311	6,906	6,898	7,038

Location Caterpillar, Inc - Virginia Beach, VA
 Source 3516HD Generator (L75)
 Project No. 2019-0420
 Parameter Arsenic, Cadmium, Nickel
 Analysis Volumetric

Run 1		Date: 3/6/19			
Impinger No.	1	2	3	4*	Total
Contents	HNO3/H2O2	HNO3/H2O2	Empty	Silica	--
Initial Volume, mL	100.0	100.0	0.0	227.6	427.6
Final Volume, mL	124.0	114.0	2.0	236.2	476.2
Gain	24.0	14.0	2.0	8.6	48.6
Run 2		Date: 3/6/19			
Impinger No.	1	2	3	4*	Total
Contents	HNO3/H2O2	HNO3/H2O2	Empty	Silica	--
Initial Volume, mL	100.0	100.0	0.0	233.6	433.6
Final Volume, mL	134.0	110.0	2.0	242.1	488.1
Gain	34.0	10.0	2.0	8.5	54.5
Run 3		Date: 3/6/19			
Impinger No.	1	2	3	4*	Total
Contents	HNO3/H2O2	HNO3/H2O2	Empty	Silica	--
Initial Volume, mL	100.0	100.0	0.0	223.6	423.6
Final Volume, mL	130.0	112.0	2.0	231.1	475.1
Gain	30.0	12.0	2.0	7.5	51.5



Isokinetic Field Data

Location: <u>Caterpillar, Inc - Virginia Beach, VA</u>				Start Time: <u>10:12</u>		Source: <u>3516HD Generator (L75)</u>				
Date: <u>3/6/19</u>		Run 1	VALID	End Time: <u>11:12</u>		Project No.: <u>2019-0420</u>		Parameter: <u>Arsenic, Ca</u>		

STACK DATA (EST)		EQUIPMENT		STACK DATA (EST)		FILTER NO.		STACK DATA (FINAL)		MOIST. DATA		
Moisture:	6.0 % est.	Meter Box ID:	1690	Est. Tm:	70 °F	Pb:	30.26 in. Hg	Vlc (ml)	-			
Barometric:	30.26 in. Hg	Y:	0.994	Est. Ts:	660 °F	Pg:	-1.10 in. WC	48.6	-			
Static Press:	-1.10 in. WC	AH @ (in.WC):	1.816	Est. AP:	2.35 in. WC	O ₂ :	12.6 %	K-FACTOR	-			
Stack Press:	30.18 in. Hg	Probe ID:	PR4022	Est. Dn:	0.204 in.	CO ₂ :	6.0 %	0.667	-			
CO ₂ :	6.0 %	Liner Material:	quartz	Target Rate:	0.75 scfm			Check Pt.		Initial	Final	Corr.
O ₂ :	11.0 %	Pitot ID:	P403-2	LEAK CHECKS		Pre	Mid 1	Mid 2	Post	Mid 1 (cf)	-	
N ₂ /CO:	83.0 %	Pitot Cp/Type:	0.840 S-type	Leak Rate (cfm):		0.000	--	--	0.000	Mid 2 (cf)	-	
Md:	29.40 lb/lb-mole	Nozzle ID:	GL202	Vacuum (in Hg):		10	--	--	10	Mid 3 (cf)	-	
Ms:	28.72 lb/lb-mole	Nozzle Dn (in.):	0.195	Pitot Tube:		Pass	--	--	Pass	Mid-Point Leak Check Vol (cf):	-	

Sample Pt.	Sample Time (minutes)		Dry Gas Meter Reading (ft ³)	Pitot Tube AP (in WC)	Gas Temperatures (°F)		Orifice Press. ΔH (in. WC)		Pump Vac (in. Hg)	Gas Temperatures (°F)				% ISO	Vs (fps)
					DGM Average	Stack	Ideal			Probe	Filter	Imp Exit	Aux		
	Amb.	Amb.					Amb.	Amb.		Amb.	Amb.				
	69	657			69	657	1.60	1.60		2	257	226	37		
	0.00	5.00	853.917	2.40	69	657	1.60	1.60	2	257	226	37	-	96.8	126.30
	5.00	10.00	857.300	2.60	69	662	1.73	1.50	2	256	258	39	-	107.4	131.75
	10.00	15.00	861.200	2.60	69	666	1.72	1.70	2	261	254	40	-	102.1	131.99
	15.00	20.00	864.900	1.90	71	666	1.26	1.30	2	261	232	43	-	96.4	112.83
	20.00	25.00	867.900	1.70	71	664	1.13	1.10	2	268	239	40	-	101.8	106.63
	25.00	30.00	870.900	1.40	71	662	0.94	0.94	2	266	236	40	-	93.3	96.68
	30.00	35.00	873.400	2.20	71	664	1.47	1.50	2	268	249	40	-	92.5	121.30
	35.00	40.00	876.500	2.60	73	664	1.74	1.80	2	257	232	40	-	93.1	131.87
	40.00	45.00	879.900	2.90	73	665	1.94	1.90	2	269	231	41	-	101.2	139.33
	45.00	50.00	883.800	2.80	73	663	1.87	1.90	2	269	257	42	-	97.6	136.79
	50.00	55.00	887.500	2.70	73	661	1.81	1.80	2	267	263	43	-	96.6	134.20
	55.00	60.00	891.100	2.40	74	666	1.60	1.60	2	268	257	44	-	101.9	126.81
	60.00	--	894.681										-		--
Final DGM:			894.681												

RESULTS	Run Time		Vm	AP	Tm	Ts	Max Vac	ΔH	%ISO	BWS	Y _{qa}
	min		ft ³	in. WC	°F	°F		in. WC			
	60.0		40.764	2.35	71.4	663.3	2	1.553	98.0	0.053	-1.0



Isokinetic Field Data

Location: Caterpillar, Inc - Virginia Beach, VA				Start Time: 12:29		Source: 3516HD Generator (L75)					
Date: 3/6/19		Run 2		VALID		End Time: 13:29		Project No.: 2019-0420		Parameter: Arsenic, C	

STACK DATA (EST)			EQUIPMENT			STACK DATA (EST)			FILTER NO.		STACK DATA (FINAL)			MOIST. DATA	
Moisture:	6.0	% est.	Meter Box ID:	1690		Est. Tm:	71	°F			Pb:	30.26	in. Hg	Vlc (ml)	
Barometric:	30.26	in. Hg	Y:	0.994		Est. Ts:	663	°F			Pg:	-1.10	in. WC	54.5	
Static Press:	-1.10	in. WC	ΔH @ (in.WC):	1.816		Est. ΔP:	2.35	in. WC			O ₂ :	12.6	%	K-FACTOR	
Stack Press:	30.18	in. Hg	Probe ID:	PR4022		Est. Dn:	0.204	in.			CO ₂ :	6.2	%	0.67	
CO ₂ :	6.0	%	Liner Material:	quartz		Target Rate:	0.75	scfm			Check Pt. Initial Final Corr.				
O ₂ :	11.0	%	Pitot ID:	P403-2		LEAK CHECKS			Pre	Mid 1	Mid 2	Post	Mid 1 (cf)	--	
N ₂ /CO:	83.0	%	Pitot Cp/Type:	0.840	S-type	Leak Rate (cfm):			0.000	--	--	0.000	Mid 2 (cf)	--	
Md:	29.40	lb/lb-mole	Nozzle ID:	GL202		Vacuum (in Hg):			11	--	--	10	Mid 3 (cf)	--	
Ms:	28.72	lb/lb-mole	Nozzle Dn (in.):	0.195		Pitot Tube:			Pass	--	--	Pass	Mid-Point Leak Check Vol (cf):	--	

Sample Pt.	Sample Time (minutes)		Dry Gas Meter Reading (ft ³)	Pitot Tube ΔP (in WC)	Gas Temperatures (°F)		Orifice Press. ΔH (in. WC)		Pump Vac (in. Hg)	Gas Temperatures (°F)				% ISO	Vs (fps)
	Begin	End			DGM Average	Stack	Ideal	Actual		Probe	Filter	Imp Exit	Aux		
					Amb.	Amb.				Amb.	Amb.	Amb.	Amb.		
--	0.00	5.00	895.700	1.50	70	655	1.01	1.00	2	268	252	39	-	104.5	99.76
--	5.00	10.00	898.600	1.60	67	676	1.05	1.00	2	257	269	40	-	92.1	104.00
--	10.00	15.00	901.200	1.60	69	673	1.05	1.10	2	253	268	40	-	98.7	103.86
--	15.00	20.00	904.000	2.30	69	675	1.51	1.50	2	252	266	40	-	91.3	124.64
--	20.00	25.00	907.100	2.40	69	676	1.58	1.60	2	251	263	40	-	103.9	127.37
--	25.00	30.00	910.700	2.20	70	672	1.45	1.50	2	269	236	41	-	99.0	121.73
--	30.00	35.00	914.000	2.10	70	668	1.39	1.40	2	257	229	41	-	101.2	118.73
--	35.00	40.00	917.300	2.40	71	674	1.58	1.60	2	267	238	41	-	100.5	127.26
--	40.00	45.00	920.800	2.60	71	670	1.72	1.70	2	267	240	41	-	93.7	132.22
--	45.00	50.00	924.200	2.40	71	674	1.58	1.60	2	257	248	42	-	100.5	127.26
--	50.00	55.00	927.700	2.30	71	676	1.52	1.50	2	269	247	44	-	96.9	124.69
--	55.00	60.00	931.000	2.30	71	673	1.52	1.50	2	264	228	45	-	101.0	124.53
--	60.00	--	934.446										-		--
Final DGM:			934.446												

RESULTS	Run Time		Vm		ΔP		Tm		Ts		Max Vac		ΔH		%ISO	BWS	Y _{qa}
		60.0	min	38.746	ft ³	2.14	in. WC	69.9	°F	671.8	°F	2	1.417	in. WC	98.9	0.062	-1.4



Isokinetic Field Data

Location: Caterpillar, Inc - Virginia Beach, VA				Start Time: 14:42		Source: 3516HD Generator (L75)					
Date: 3/6/19		Run 3		VALID		End Time: 15:42		Project No.: 2019-0420		Parameter: Arsenic, C	

STACK DATA (EST)			EQUIPMENT			STACK DATA (EST)			FILTER NO.		STACK DATA (FINAL)			MOIST. DATA			
Moisture:	6.0	% est.	Meter Box ID:	1690		Est. Tm:	70	°F			Pb:	30.26	in. Hg	Vlc (ml)			
Barometric:	30.26	in. Hg	Y:	0.994		Est. Ts:	672	°F			Pg:	-0.80	in. WC	51.5			
Static Press:	-1.10	in. WC	ΔH @ (in.WC):	1.816		Est. ΔP:	2.14	in. WC			O ₂ :	12.5	%	K-FACTOR			
Stack Press:	30.18	in. Hg	Probe ID:	PR4022		Est. Dn:	0.209	in.			CO ₂ :	6.1	%	0.660			
CO ₂ :	6.0	%	Liner Material:	quartz		Target Rate:	0.75	scfm									
O ₂ :	11.0	%	Pitot ID:	P403-2		LEAK CHECKS			Pre	Mid 1	Mid 2	Post	Check Pt.	Initial	Final	Corr.	
N ₂ /CO:	83.0	%	Pitot Cp/Type:	0.840	S-type	Leak Rate (cfm):			0.000	--	--	0.000	Mid 1 (cf)	--			
Md:	29.40	lb/lb-mole	Nozzle ID:	GL202		Vacuum (in Hg):			9	--	--	9	Mid 2 (cf)	--			
Ms:	28.72	lb/lb-mole	Nozzle Dn (in.):	0.195		Pitot Tube:			Pass	--	--		Mid 3 (cf)	--			
													Mid-Point Leak Check Vol (cf):			--	

Sample Pt.	Sample Time (minutes)		Dry Gas Meter Reading (ft ³)	Pitot Tube ΔP (in WC)	Gas Temperatures (°F)		Orifice Press. ΔH (in. WC)		Pump Vac (in. Hg)	Gas Temperatures (°F)				% ISO	Vs (fps)
					DGM Average	Stack	Ideal			Actual	Probe	Filter	Imp Exit		
	Amb.	Amb.					Amb.	Amb.		Amb.	Amb.				
	Begin	End			--	--	--	--		--	--				
--	0.00	5.00	934.702	1.50	68	675	0.99	0.99	2	266	260	40	-	105.7	100.65
--	5.00	10.00	937.600	1.60	68	675	1.05	1.10	2	257	261	40	-	91.9	103.95
--	10.00	15.00	940.200	1.80	68	674	1.18	1.20	2	257	260	38	-	96.6	110.21
--	15.00	20.00	943.100	2.20	68	671	1.45	1.50	2	264	257	39	-	93.4	121.68
--	20.00	25.00	946.200	2.00	68	674	1.31	1.30	2	264	260	39	-	91.7	116.17
--	25.00	30.00	949.100	2.20	69	676	1.44	1.50	2	261	261	42	-	102.4	121.95
--	30.00	35.00	952.500	1.90	70	674	1.25	1.30	2	270	260	43	-	106.6	113.23
--	35.00	40.00	955.800	2.00	70	675	1.32	1.30	2	268	260	45	-	100.8	116.22
--	40.00	45.00	959.000	2.50	70	674	1.65	1.70	2	268	260	42	-	98.7	129.88
--	45.00	50.00	962.500	2.80	70	676	1.84	1.90	2	269	261	44	-	90.7	137.58
--	50.00	55.00	965.900	2.60	70	675	1.71	1.70	2	269	261	45	-	94.0	132.51
--	55.00	60.00	969.300	2.50	70	676	1.64	1.70	2	264	253	48	-	95.5	130.00
--	60.00	--	972.684										-		--
Final DGM:			972.684												

RESULTS	Run Time		Vm		ΔP		Tm		Ts		Max Vac	ΔH		%ISO	BWS	Y _{qa}
	min		ft ³		in. WC		°F		°F		in. WC					
	60.0		37.982		2.13		69.1		674.6		2	1.433		97.2	0.060	-3.9

Location Caterpillar, Inc - Virginia Beach, VA
 Source 3516HD Generator (L75)
 Project No. 2019-0420
 Parameter Hexavalent Chromium

Run Number		Run 1	Run 2	Run 3	Average
Date		3/6/19	3/6/19	3/6/19	--
Start Time		10:12	12:29	14:42	--
Stop Time		11:12	13:29	15:42	--
Run Time, min	(θ)	60.0	60.0	60.0	60.0
INPUT DATA					
Barometric Pressure, in. Hg	(Pb)	30.26	30.26	30.26	30.26
Meter Correction Factor	(Y)	1.000	1.000	1.000	1.000
Orifice Calibration Value	($\Delta H @$)	1.753	1.753	1.753	1.753
Meter Volume, ft ³	(Vm)	38.399	36.131	36.514	37.015
Meter Temperature, °F	(Tm)	69.8	68.3	67.6	68.5
Meter Temperature, °R	(Tm)	529.8	528.3	527.6	528.5
Meter Orifice Pressure, in. WC	(ΔH)	1.359	1.238	1.214	1.270
Volume H ₂ O Collected, mL	(Vlc)	50.7	43.9	48.4	47.7
Nozzle Diameter, in	(Dn)	0.190	0.190	0.190	0.190
Area of Nozzle, ft ²	(An)	0.0002	0.0002	0.0002	0.0002
Hexavalent Chromium, ug	(M _{Cr+6})	<u>4.0</u>	<u>4.0</u>	<u>1.0</u>	3.0
ISOKINETIC DATA					
Standard Meter Volume, ft ³	(Vmstd)	38.835	36.634	37.067	37.512
Standard Water Volume, ft ³	(Vwstd)	2.386	2.066	2.279	2.244
Moisture Fraction Measured	(BWSmsd)	0.058	0.053	0.058	0.056
Moisture Fraction @ Saturation	(BWSsat)	138.245	145.612	154.885	146.247
Moisture Fraction	(BWS)	0.058	0.053	0.058	0.056
Meter Pressure, in Hg	(Pm)	30.36	30.35	30.35	30.35
Volume at Nozzle, ft ³	(Vn)	86.950	82.250	84.328	84.509
Isokinetic Sampling Rate, (%)	(I)	98.5	97.0	99.4	98.3
DGM Calibration Check Value, (+/- 5%)	(Y _{qa})	-1.3	-2.7	-0.6	-1.5
EMISSION CALCULATIONS					
Hexavalent Chromium Concentration, ug/dscm	(C _{Cr+6})	3.6	3.9	1.0	2.8
Hexavalent Chromium Emission Rate, lb/hr	(ER _{Cr+6})	9.9E-05	1.0E-04	2.5E-05	7.5E-05

Results for Hexavalent Chromium in all three runs were below the detection limit. The detection limit was used for emission purposes.

Location Caterpillar, Inc - Virginia Beach, VA
Source 3516HD Generator (L75)
Project No. 2019-0420
Parameter Hexavalent Chromium

Run Number		Run 1	Run 2	Run 3	Average
Date		3/6/19	3/6/19	3/6/19	--
Start Time		10:12	12:29	14:42	--
Stop Time		11:12	13:29	15:42	--
Run Time, min		60.0	60.0	60.0	60.0
VELOCITY HEAD, in. WC					
Point 1		2.40	1.50	1.50	1.80
Point 2		2.60	1.60	1.60	1.93
Point 3		2.60	1.70	1.80	2.03
Point 4		1.90	2.30	2.20	2.13
Point 5		1.70	2.40	2.00	2.03
Point 6		1.40	2.20	2.20	1.93
Point 7		2.20	2.10	1.90	2.07
Point 8		2.60	2.40	2.00	2.33
Point 9		2.90	2.60	2.50	2.67
Point 10		2.80	2.40	2.80	2.67
Point 11		2.70	2.30	2.60	2.53
Point 12		2.40	2.30	2.50	2.40
CALCULATED DATA					
Square Root of ΔP , (in. WC) ^{1/2}	(ΔP)	1.525	1.461	1.454	1.480
Pitot Tube Coefficient	(Cp)	0.840	0.840	0.840	0.840
Barometric Pressure, in. Hg	(Pb)	30.26	30.26	30.26	30.26
Static Pressure, in. WC	(Pg)	-1.10	-1.10	-0.80	-1.00
Stack Pressure, in. Hg	(Ps)	30.18	30.18	30.20	30.19
Stack Cross-sectional Area, ft ²	(As)	2.18	2.18	2.18	2.18
Temperature, °F	(Ts)	663.3	671.8	682.3	672.5
Temperature, °R	(Ts)	1123.3	1131.8	1142.3	1132.5
Moisture Fraction Measured	(BWSmsd)	0.058	0.053	0.058	0.056
Moisture Fraction @ Saturation	(BWSsat)	138.245	145.612	154.885	146.247
Moisture Fraction	(BWS)	0.058	0.053	0.058	0.056
O ₂ Concentration, %	(O ₂)	12.6	12.6	12.5	12.6
CO ₂ Concentration, %	(CO ₂)	6.0	6.2	6.1	6.1
Molecular Weight, lb/lb-mole (dry)	(Md)	29.47	29.50	29.48	29.48
Molecular Weight, lb/lb-mole (wet)	(Ms)	28.80	28.88	28.82	28.83
Velocity, ft/sec	(Vs)	124.5	119.6	119.6	121.3
VOLUMETRIC FLOW RATE					
At Stack Conditions, acfm	(Qa)	16,300	15,653	15,662	15,872
At Standard Conditions, dscfm	(Qs)	7,280	6,972	6,885	7,046

Location Caterpillar, Inc - Virginia Beach, VA

Source 3516HD Generator (L75)

Project No. 2019-0420

Parameter Hexavalent Chromium

Analysis Volumetric

Run 1		Date: 3/6/19				
Impinger No.	1	2	3	4	5*	Total
Contents	KOH	KOH	KOH	Empty	Silica	--
Initial Volume, mL	150.0	75.0	75.0	0.0	248.5	548.5
Final Volume, mL	186.0	83.0	76.0	0.0	254.2	599.2
Gain	36.0	8.0	1.0	0.0	5.7	50.7
Run 2		Date: 3/6/19				
Impinger No.	1	2	3	4	5*	Total
Contents	KOH	KOH	KOH	Empty	Silica	--
Initial Volume, mL	150.0	75.0	75.0	0.0	251.3	551.3
Final Volume, mL	182.0	80.0	77.0	0.0	256.2	595.2
Gain	32.0	5.0	2.0	0.0	4.9	43.9
Run 3		Date: 3/6/19				
Impinger No.	1	2	3	4	5*	Total
Contents	KOH	KOH	KOH	Empty	Silica	--
Initial Volume, mL	150.0	75.0	75.0	0.0	237.4	537.4
Final Volume, mL	180.0	80.0	79.0	0.0	246.8	585.8
Gain	30.0	5.0	4.0	0.0	9.4	48.4



Isokinetic Field Data

Location: <u>Caterpillar, Inc - Virginia Beach, VA</u>				Start Time: <u>10:12</u>		Source: <u>3516HD Generator (L75)</u>				
Date: <u>3/6/19</u>		Run 1		End Time: <u>11:12</u>		Project No.: <u>2019-0420</u>		Parameter: <u>Hexavalent</u>		

STACK DATA (EST)		EQUIPMENT		STACK DATA (EST)		FILTER NO.		STACK DATA (FINAL)		MOIST. DATA	
Moisture:	6.0 % est.	Meter Box ID:	2051	Est. Tm:	70 °F			Pb:	30.26 in. Hg	Vlc (ml)	
Barometric:	30.26 in. Hg	Y:	1.000	Est. Ts:	660 °F			Pg:	-1.10 in. WC	50.7	
Static Press:	-1.10 in. WC	AH @ (in.WC):	1.753	Est. AP:	2.35 in. WC			O ₂ :	12.6 %	K-FACTOR	
Stack Press:	30.18 in. Hg	Probe ID:	PR403-2	Est. Dn:	0.204 in.			CO ₂ :	6.0 %	0.580	
CO ₂ :	6.0 %	Liner Material:	quartz	Target Rate:	0.75 scfm					Check Pt.	Initial
O ₂ :	11.0 %	Pitot ID:	P403-2	LEAK CHECKS		Pre	Mid 1	Mid 2	Post	Mid 1 (cf)	Final
N ₂ /CO:	83.0 %	Pitot Cp/Type:	0.840 --	Leak Rate (cfm):		0.013	--	--	0.010	Mid 2 (cf)	Corr.
Md:	29.40 lb/lb-mole	Nozzle ID:	GL208	Vacuum (in Hg):		8	--	--	8	Mid 3 (cf)	--
Ms:	28.72 lb/lb-mole	Nozzle Dn (in.):	0.190	Pitot Tube:		Pass	--	--	Pass	Mid-Point Leak Check Vol (cf):	--

Sample Pt.	Sample Time (minutes)		Dry Gas Meter Reading (ft ³)	Pitot Tube ΔP (in WC)	Gas Temperatures (°F)		Orifice Press. ΔH (in. WC)		Pump Vac (in. Hg)	Gas Temperatures (°F)				% ISO	Vs (fps)
	Begin	End			DGM Average	Stack	Ideal	Actual		Probe	Filter	Imp Exit	Aux		
					Amb.	Amb.				Amb.	Amb.	Amb.	Amb.		
	0.00	5.00	321.786	2.40	67	657	1.39	1.40	4	NA	NA	36	-	97.7	126.30
	5.00	10.00	325.000	2.60	69	662	1.50	1.50	4	NA	NA	36	-	96.3	131.75
	10.00	15.00	328.300	2.60	69	666	1.50	1.50	4	NA	NA	38	-	93.5	131.99
	15.00	20.00	331.500	1.90	68	666	1.09	1.10	4	NA	NA	38	-	102.7	112.83
	20.00	25.00	334.500	1.70	69	664	0.98	1.00	4	NA	NA	42	-	108.2	106.63
	25.00	30.00	337.500	1.40	70	662	0.81	0.81	4	NA	NA	41	-	99.1	96.68
	30.00	35.00	340.000	2.20	70	664	1.27	1.20	4	NA	NA	40	-	98.2	121.30
	35.00	40.00	343.100	2.60	71	664	1.51	1.50	4	NA	NA	41	-	98.9	131.87
	40.00	45.00	346.500	2.90	71	665	1.68	1.70	4	NA	NA	41	-	93.8	139.33
	45.00	50.00	349.900	2.80	71	663	1.62	1.60	4	NA	NA	42	-	98.1	136.79
	50.00	55.00	353.400	2.70	71	661	1.57	1.60	4	NA	NA	41	-	102.7	134.20
	55.00	60.00	357.000	2.40	71	666	1.39	1.40	4	NA	NA	43	-	96.5	126.81
	60.00	--	360.185							NA	NA		-		--
Final DGM:			360.185												

RESULTS	Run Time		Vm	ΔP	Tm	Ts	Max Vac	ΔH	%ISO	BWS	Y _{qa}
		60.0	min	38.399 ft ³	2.35 in. WC	69.8 °F	663.3 °F	4	1.359 in. WC	98.5	0.058



Isokinetic Field Data

Location: Caterpillar, Inc - Virginia Beach, VA				Start Time: 12:29		Source: 3516HD Generator (L75)										
Date: 3/6/19		Run 2		End Time: 13:29		Project No.: 2019-0420		Parameter: Hexavalent								
STACK DATA (EST)			EQUIPMENT			STACK DATA (EST)			FILTER NO.		STACK DATA (FINAL)		MOIST. DATA			
Moisture: 6.0 % est.			Meter Box ID: 2051			Est. Tm: 70 °F					Pb: 30.26 in. Hg		Vlc (ml)			
Barometric: 30.26 in. Hg			Y: 1.000			Est. Ts: 663 °F					Pg: -1.10 in. WC		K-FACTOR			
Static Press: -1.10 in. WC			ΔH @ (in.WC): 1.753			Est. ΔP: 2.35 in. WC					O ₂ : 12.6 %		0.58			
Stack Press: 30.18 in. Hg			Probe ID: PR403-2			Est. Dn: 0.204 in.					CO ₂ : 6.2 %					
CO ₂ : 6.0 %			Liner Material: quartz			Target Rate: 0.75 scfm										
O ₂ : 11.0 %			Pitot ID: P403-2			LEAK CHECKS			Pre		Mid 1		Mid 2		Post	
N ₂ /CO: 83.0 %			Pitot Cp/Type: 0.840 --			Leak Rate (cfm): 0.009			--		--		--		0.009	
Md: 29.40 lb/lb-mole			Nozzle ID: GL208			Vacuum (in Hg): 8			--		--		--		8	
Ms: 28.72 lb/lb-mole			Nozzle Dn (in.): 0.190			Pitot Tube: Pass			--		--		--		Pass	
													Check Pt. Initial Final Corr.			
													Mid 1 (cf)		--	
													Mid 2 (cf)		--	
													Mid 3 (cf)		--	
													Mid-Point Leak Check Vol (cf):		--	

Sample Pt.	Sample Time (minutes)		Dry Gas Meter Reading (ft ³)	Pitot Tube ΔP (in WC)	Gas Temperatures (°F)		Orifice Press. ΔH (in. WC)		Pump Vac (in. Hg)	Gas Temperatures (°F)				% ISO	Vs (fps)
					DGM Average	Stack	Ideal			Actual	Probe	Filter	Imp Exit		
	Amb.	Amb.			Amb.		Amb.	Amb.		Amb.	Amb.	Amb.	Amb.		
	Begin	End			--		--	--		--	--	--	--		
--	0.00	5.00	360.531	1.50	68	655	0.87	0.87	3	NA	NA	36	-	98.4	99.76
--	5.00	10.00	363.100	1.60	66	676	0.91	0.91	3	NA	NA	38	-	101.5	104.00
--	10.00	15.00	365.800	1.70	67	673	0.97	0.97	3	NA	NA	37	-	101.8	107.06
--	15.00	20.00	368.600	2.30	67	675	1.31	1.30	3	NA	NA	40	-	93.9	124.64
--	20.00	25.00	371.600	2.40	68	676	1.37	1.40	3	NA	NA	39	-	91.8	127.37
--	25.00	30.00	374.600	2.20	68	672	1.26	1.30	3	NA	NA	41	-	98.9	121.73
--	30.00	35.00	377.700	2.10	68	668	1.21	1.20	3	NA	NA	41	-	97.8	118.73
--	35.00	40.00	380.700	2.40	69	674	1.37	1.40	3	NA	NA	41	-	97.7	127.26
--	40.00	45.00	383.900	2.60	69	670	1.49	1.50	3	NA	NA	42	-	93.7	132.22
--	45.00	50.00	387.100	2.40	69	674	1.37	1.40	3	NA	NA	42	-	100.7	127.26
--	50.00	55.00	390.400	2.30	70	676	1.32	1.30	3	NA	NA	44	-	96.6	124.69
--	55.00	60.00	393.500	2.30	70	673	1.32	1.30	3	NA	NA	45	-	98.4	124.53
--	60.00	--	396.662							NA	NA		-		--
Final DGM:			396.662												

RESULTS	Run Time		Vm		ΔP		Tm		Ts		Max Vac		ΔH		%ISO		BWS		Y _{qa}	
	min		ft ³		in. WC		°F		°F		in. WC		in. WC							
	60.0		36.131		2.15		68.3		671.8		3		1.238		97.0		0.053		-2.7	



Isokinetic Field Data

Location: Caterpillar, Inc - Virginia Beach, VA				Start Time: 14:42		Source: 3516HD Generator (L75)					
Date: 3/6/19		Run 3		VALID		End Time: 15:42		Project No.: 2019-0420		Parameter: Hexavalent	

STACK DATA (EST)		EQUIPMENT		STACK DATA (EST)		FILTER NO.		STACK DATA (FINAL)		MOIST. DATA			
Moisture:	6.0 % est.	Meter Box ID:	2051	Est. Tm:	68 °F			Pb:	30.26 in. Hg	Vlc (ml)			
Barometric:	30.26 in. Hg	Y:	1.000	Est. Ts:	672 °F			Pg:	-0.80 in. WC	48.4			
Static Press:	-1.10 in. WC	ΔH @ (in.WC):	1.753	Est. ΔP:	2.15 in. WC			O ₂ :	12.5 %	K-FACTOR			
Stack Press:	30.18 in. Hg	Probe ID:	PR403-2	Est. Dn:	0.209 in.			CO ₂ :	6.1 %	0.572			
CO ₂ :	6.0 %	Liner Material:	quartz	Target Rate:	0.75 scfm			Check Pt. Initial Final Corr.					
O ₂ :	11.0 %	Pitot ID:	P403-2	LEAK CHECKS				Pre	Mid 1	Mid 2	Post		
N ₂ /CO:	83.0 %	Pitot Cp/Type:	0.840 --	Leak Rate (cfm):				0.014	--	--	0.012	Mid 1 (cf) --	
Md:	29.40 lb/lb-mole	Nozzle ID:	GL208	Vacuum (in Hg):				9	--	--	8	Mid 2 (cf) --	
Ms:	28.72 lb/lb-mole	Nozzle Dn (in.):	0.190	Pitot Tube:				Pass	--	--	Pass	Mid 3 (cf) --	
											Mid-Point Leak Check Vol (cf):		--

Sample Pt.	Sample Time (minutes)		Dry Gas Meter Reading (ft ³)	Pitot Tube ΔP (in WC)	Gas Temperatures (°F)		Orifice Press. ΔH (in. WC)		Pump Vac (in. Hg)	Gas Temperatures (°F)				% ISO	Vs (fps)
					DGM Average	Stack	ΔH			Probe	Filter	Imp Exit	Aux		
	Amb.	Amb.			Ideal	Actual	Amb.	Amb.		Amb.	Amb.				
	Begin	End			--	--	--	--		--	--				
--	0.00	5.00	400.619	1.50	67	675	0.86	0.86	4	NA	NA	39	-	100.0	100.65
--	5.00	10.00	403.200	1.60	66	675	0.91	0.91	4	NA	NA	42	-	105.2	103.95
--	10.00	15.00	406.000	1.80	66	674	1.03	1.00	4	NA	NA	40	-	95.6	110.21
--	15.00	20.00	408.700	2.20	67	671	1.26	1.30	4	NA	NA	41	-	95.9	121.68
--	20.00	25.00	411.700	2.00	67	674	1.14	1.10	4	NA	NA	42	-	90.6	116.17
--	25.00	30.00	414.400	2.20	67	676	1.25	1.30	4	NA	NA	43	-	102.5	121.95
--	30.00	35.00	417.600	1.90	68	674	1.09	1.10	4	NA	NA	44	-	109.9	113.23
--	35.00	40.00	420.800	2.00	68	675	1.14	1.20	4	NA	NA	49	-	107.2	116.22
--	40.00	45.00	424.000	2.50	68	674	1.43	1.40	4	NA	NA	52	-	95.9	129.88
--	45.00	50.00	427.200	2.80	69	767	1.48	1.50	4	NA	NA	54	-	97.0	142.98
--	50.00	55.00	430.500	2.60	69	675	1.49	1.50	4	NA	NA	55	-	91.0	132.51
--	55.00	60.00	433.600	2.50	69	677	1.43	1.40	4	NA	NA	60	-	105.8	130.06
--	60.00	--	437.133							NA	NA		-		--
Final DGM:			437.133												

RESULTS	Run Time		Vm		ΔP		Tm		Ts		Max Vac		ΔH		%ISO	BWS	Y _{qa}
	min		ft ³		in. WC		°F		°F		in. WC		in. WC				
	60.0		36.514		2.13		67.6		682.3		4		1.214		99.4	0.058	-0.6

Location Caterpillar, Inc - Virginia Beach, VA
Source 3516HD Generator (Assign Condition) LC 75
Project No. 2019-0420
Parameter(s): Formaldehyde/ VOCs

Run Number		Run 1	Run 2	Run 3	Average
Date		3/6/19	3/6/19	3/6/19	--
Start Time		10:12	12:29	14:42	--
Stop Time		11:12	13:29	15:42	--
Input Data					
Volumetric Flow Rate, dscfm	(Qs)	7,324	6,969	6,958	7,084
Standard Meter Volume, L	(Vmstd)	43.788	43.891	44.292	43.990
Formaldehyde Mass, ug	M(CH2O)	46.41	33.43	61.61	47.15
Acetaldehyde Mass, ug	M(C2H4O)	<u>65.52</u>	<u>65.52</u>	<u>65.52</u>	65.52
Benzene Mass, ug	M(C6H6)	<u>73.5</u>	<u>73.5</u>	<u>73.5</u>	73.50
Ethylbenzene Mass, ug	M(C8H10)	<u>72.66</u>	<u>72.66</u>	<u>72.66</u>	72.66
Hexane Mass, ug	M(C6H14)	<u>54.18</u>	<u>54.18</u>	<u>54.18</u>	54.18
Pollutant Concentration (Bag Samples)					
1,3 Butadiene Mass, ppmvd	M(C4H6)	<u>0.10</u>	<u>0.10</u>	<u>0.10</u>	0.10
Acetaldehyde Mass, ppmvd	M(C2H4O)	<u>1.00</u>	<u>1.00</u>	<u>1.00</u>	1.00
Benzene Mass, ppmvd	M(C6H6)	<u>0.10</u>	<u>0.10</u>	<u>0.10</u>	0.10
Ethylbenzene Mass, ppmvd	M(C8H10)	<u>0.10</u>	<u>0.10</u>	<u>0.10</u>	0.10
Hexane Mass, ppmvd	M(C6H14)	<u>0.10</u>	<u>0.10</u>	<u>0.10</u>	0.10
Emissions Calculations					
Formaldehyde Concentration, ppmvd	C(CH2O)	0.85	0.61	1.1	0.86
Formaldehyde Emission Rate, lb/hr	ER(CH2O)	0.029	0.020	0.036	0.028
1,3 Butadiene Concentration, ppmvd	C(C4H6)	0.10	0.10	0.10	0.10
1,3 Butadiene Emission Rate, lb/hr	ER(C4H6)	0.0062	0.0059	0.0059	0.0060
Acetaldehyde Concentration, ppmvd	C(C2H4O)	0.82	0.81	0.81	0.81
Acetaldehyde Concentration, ppmvd (Combined)	C(C2H4O)	1.8	1.8	1.8	1.8
Acetaldehyde Emission Rate, lb/hr	ER(C2H4O)	0.091	0.087	0.086	0.088
Benzene Concentration, ppmvd	C(C6H6)	0.52	0.52	0.51	0.51
Benzene Concentration, ppmvd (Combined)	C(C6H6)	0.62	0.62	0.61	0.61
Benzene Emission Rate, lb/hr	ER(C6H6)	0.055	0.052	0.052	0.053
Ethylbenzene Concentration, ppmvd	C(C8H10)	0.38	0.37	0.37	0.37
Ethylbenzene Concentration, ppmvd (Combined)	C(C8H10)	0.48	0.47	0.47	0.47
Ethylbenzene Emission Rate, lb/hr	ER(C8H10)	0.058	0.055	0.054	0.056
Hexane Concentration, ppmvd	C(C6H14)	0.35	0.34	0.34	0.34
Hexane Concentration, ppmvd (Combined)	C(C6H14)	0.45	0.44	0.44	0.44
Hexane Emission Rate, lb/hr	ER(C6H14)	0.044	0.042	0.041	0.042

Underlined values indicate the laboratory results were below the detection limit. The detection limit was used for emission calculation purposes.



Location Caterpillar, Inc - Virginia Beach, VA
 Source 3516HD Generator (Assign Condition) LC 75

Project No. 2019-0420
 Parameter(s): Formaldehyde/ VOCs
 Console Type Low Flow

Run No.	1					2					3				
Date	3/6/19					3/6/19					3/6/19				
Status	VALID					VALID					VALID				
Start Time	10:12					12:29					14:42				
End Time	11:12					13:29					15:42				
Run Time, min	(0) 60					60					60				
Meter ID	2071					2071					2071				
Meter Correction Factor	(Y) 1.000					1.000					1.000				
Orifice Calibration Value	(AH @) 1.800					1.800					1.800				
Max Vacuum, in. Hg	0					0					0				
Post Leak Check, L/min (at max vac.)	0.000					0.000					0.000				
Meter Volume, L															
0	0.000					0.000					0.000				
5	3.610					3.680					3.690				
10	7.230					7.350					7.360				
15	10.940					11.050					11.160				
20	14.650					14.600					14.740				
25	18.360					18.400					18.250				
30	21.820					22.100					21.950				
35	25.510					25.750					25.710				
40	29.400					29.330					29.370				
45	33.000					32.790					33.100				
50	36.350					36.300					36.800				
55	39.550					40.150					40.350				
60	43.120					43.600					44.040				
Total Meter Volume, L	(Vm) 43.120					43.600					44.040				
Temperature, °F	Meter	Probe	Filter	Vacuum	Imp. Exit	Meter	Probe	Filter	Vacuum	Imp. Exit	Meter	Probe	Filter	Vacuum	Imp. Exit
0	65	--	--	0	--	73	--	--	0	--	73	--	--	0	--
5	66	--	--	0	--	72	--	--	0	--	73	--	--	0	--
10	66	--	--	0	--	72	--	--	0	--	73	--	--	0	--
15	67	--	--	0	--	72	--	--	0	--	73	--	--	0	--
20	67	--	--	0	--	73	--	--	0	--	73	--	--	0	--
25	68	--	--	0	--	73	--	--	0	--	73	--	--	0	--
30	69	--	--	0	--	73	--	--	0	--	73	--	--	0	--
35	70	--	--	0	--	73	--	--	0	--	74	--	--	0	--
40	71	--	--	0	--	73	--	--	0	--	74	--	--	0	--
45	72	--	--	0	--	74	--	--	0	--	74	--	--	0	--
50	72	--	--	0	--	74	--	--	0	--	75	--	--	0	--
55	--	--	--	--	--	75	--	--	0	--	75	--	--	0	--
Average Temperature, °F	(Tm) 68	--	--	--	--	73	--	--	--	--	74	--	--	--	--
Average Temperature, °R	(Tm) 528	--	--	--	--	533	--	--	--	--	533	--	--	--	--
Minimum Temperature, °F	65	--	--	--	--	72	--	--	--	--	73	--	--	--	--
Maximum Temperature, °F	72	--	--	--	--	75	--	--	--	--	75	--	--	--	--
Barometric Pressure, in. Hg	(Pb) 30.26					30.26					30.26				
Meter Orifice Pressure, in. WC	(AH) 1.800					1.800					1.800				
Meter Pressure, in. Hg	(Pm) 30.39					30.39					30.39				
Standard Meter Volume, L	(Vmstd) 43.788					43.891					44.292				

Location Caterpillar, Inc - Virginia Beach, VA
 Source 3516HD Generator (LC 75)
 Project No. 2019-0420
 Parameter Polycyclic Aromatic Hydrocarbons, Naphthalene

Run Number		Run 1	Run 2	Run 3	Average
Date		3/6/19	3/6/19	3/6/19	--
Start Time		10:12	12:29	14:42	--
Stop Time		11:42	13:59	16:12	--
Run Time, min	(θ)	90.0	90.0	90.0	90.0
INPUT DATA					
Barometric Pressure, in. Hg	(Pb)	30.26	30.26	30.26	30.26
Meter Correction Factor	(Y)	1.008	1.008	1.008	1.008
Orifice Calibration Value	($\Delta H @$)	1.840	1.840	1.840	1.840
Meter Volume, ft ³	(Vm)	67.670	64.980	64.785	65.812
Meter Temperature, °F	(Tm)	73.6	74.8	74.3	74.2
Meter Temperature, °R	(Tm)	533.6	534.8	534.3	534.2
Meter Orifice Pressure, in. WC	(ΔH)	1.950	1.767	1.742	1.819
Volume H ₂ O Collected, mL	(Vlc)	77.2	81.7	84.6	81.2
Nozzle Diameter, in	(Dn)	0.205	0.205	0.205	0.205
Area of Nozzle, ft ²	(An)	0.0002	0.0002	0.0002	0.0002
Acenaphthene Mass, ug	(M _{C12H10})	<u>3.0</u>	<u>3.0</u>	<u>3.0</u>	3.0
Acenaphthylene Mass, ug	(M _{C12H8})	<u>3.0</u>	<u>3.0</u>	<u>3.0</u>	3.0
Anthracene Mass, ug	(M _{C14H10})	<u>0.8</u>	<u>0.8</u>	<u>1.0</u>	0.9
Benzo[a]anthracene Mass, ug	(M _{C18H12})	<u>0.8</u>	<u>0.8</u>	<u>0.8</u>	0.8
Benzo[a]pyrene Mass, ug	(M _{C20H12})	<u>1.0</u>	<u>1.0</u>	<u>1.0</u>	1.0
Benzo[b]fluoranthene Mass, ug	(M _{C20H12})	<u>0.8</u>	<u>0.8</u>	<u>0.8</u>	0.8
Benzo[g,h,i]perylene Mass, ug	(M _{C22H12})	<u>0.8</u>	<u>0.8</u>	<u>0.8</u>	0.8
Benzo[k]fluoranthene Mass, ug	(M _{C20H12})	<u>1.0</u>	<u>1.0</u>	<u>1.0</u>	1.0
Chrysene Mass, ug	(M _{C18H12})	<u>0.8</u>	<u>0.8</u>	<u>0.8</u>	0.8
Dibenz[a,h]anthracene Mass, ug	(M _{C22H14})	<u>0.8</u>	<u>0.8</u>	<u>0.8</u>	0.8
Fluoranthene Mass, ug	(M _{C16H10})	<u>0.8</u>	<u>0.8</u>	<u>0.8</u>	0.8
Fluorene Mass, ug	(M _{C13H10})	3.5	3.4	3.0	3.3
Indeno(1,2,3-cd)pyrene Mass, ug	(M _{C22H12})	<u>1.0</u>	<u>1.0</u>	<u>1.0</u>	1.0
Naphthalene Mass, ug	(M _{C10H8})	62.0	60.0	64.0	62.0
Phenanthrene Mass, ug	(M _{C14H10})	7.4	6.3	7.6	7.1
Pyrene Mass, ug	(M _{C16H10})	8.0	7.0	8.0	7.7
ISOKINETIC DATA					
Standard Meter Volume, ft ³	(Vmstd)	68.588	65.689	65.539	66.605
Standard Water Volume, ft ³	(Vwstd)	3.634	3.847	3.983	3.821
Moisture Fraction Measured	(BWSmsd)	0.050	0.055	0.057	0.054
Moisture Fraction @ Saturation	(BWSsat)	140.600	148.200	151.312	146.704
Moisture Fraction	(BWS)	0.050	0.055	0.057	0.054
Meter Pressure, in Hg	(Pm)	30.40	30.39	30.39	30.39
Volume at Nozzle, ft ³	(Vn)	152.712	148.162	148.492	149.789
Isokinetic Sampling Rate, (%)	(I)	98.9	99.9	100.5	99.8
DGM Calibration Check Value, (+/- 5%)	(Y _{qa})	-0.4	0.3	0.8	0.3

Location Caterpillar, Inc - Virginia Beach, VA

Source 3516HD Generator (LC 75)

Project No. 2019-0420

Parameter Polycyclic Aromatic Hydrocarbons, Naphthalene

Run Number		Run 1	Run 2	Run 3	Average
Date		3/6/19	3/6/19	3/6/19	--
Start Time		10:12	12:29	14:42	--
Stop Time		11:42	13:59	16:12	--
Run Time, min	(θ)	90.0	90.0	90.0	90.0
EMISSION CALCULATIONS					
Acenaphthene Concentration, ug/dscm	($C_{C_{12}H_{10}}$)	1.5	1.6	1.6	1.6
Acenaphthene Emission Rate, kg/hr	($ER_{C_{12}H_{10}}$)	1.9E-05	1.9E-05	1.9E-05	1.9E-05
Acenaphthene Emission Rate, lb/hr	($ER_{C_{12}H_{10}}$)	4.2E-05	4.2E-05	4.2E-05	4.2E-05
Acenaphthylene Concentration, ug/dscm	($C_{C_{12}H_8}$)	1.5	1.6	1.6	1.6
Acenaphthylene Emission Rate, kg/hr	($ER_{C_{12}H_8}$)	1.9E-05	1.9E-05	1.9E-05	1.9E-05
Acenaphthylene Emission Rate, lb/hr	($ER_{C_{12}H_8}$)	4.2E-05	4.2E-05	4.2E-05	4.2E-05
Anthracene Concentration, ug/dscm	($C_{C_{14}H_{10}}$)	0.41	0.43	0.54	0.46
Anthracene Emission Rate, kg/hr	($ER_{C_{14}H_{10}}$)	5.1E-06	5.1E-06	6.3E-06	5.5E-06
Anthracene Emission Rate, lb/hr	($ER_{C_{14}H_{10}}$)	1.1E-05	1.1E-05	1.4E-05	1.2E-05
Benz[a]anthracene Concentration, ug/dscm	($C_{C_{18}H_{12}}$)	0.41	0.43	0.43	0.42
Benz[a]anthracene Emission Rate, kg/hr	($ER_{C_{18}H_{12}}$)	5.1E-06	5.1E-06	5.1E-06	5.1E-06
Benz[a]anthracene Emission Rate, lb/hr	($ER_{C_{18}H_{12}}$)	1.1E-05	1.1E-05	1.1E-05	1.1E-05
Benzo[a]pyrene Concentration, ug/dscm	($C_{C_{20}H_{12}}$)	0.51	0.54	0.54	0.53
Benzo[a]pyrene Emission Rate, kg/hr	($ER_{C_{20}H_{12}}$)	6.4E-06	6.3E-06	6.3E-06	6.4E-06
Benzo[a]pyrene Emission Rate, lb/hr	($ER_{C_{20}H_{12}}$)	1.4E-05	1.4E-05	1.4E-05	1.4E-05
Benzo[a]fluoranthene Concentration, ug/dscm	($C_{C_{20}H_{12}}$)	0.41	0.43	0.43	0.42
Benzo[a]fluoranthene Emission Rate, kg/hr	($ER_{C_{20}H_{12}}$)	5.1E-06	5.1E-06	5.1E-06	5.1E-06
Benzo[a]fluoranthene Emission Rate, lb/hr	($ER_{C_{20}H_{12}}$)	1.1E-05	1.1E-05	1.1E-05	1.1E-05
Benzo[g,h,i]perylene Concentration, ug/dscm	($C_{C_{22}H_{12}}$)	0.41	0.43	0.43	0.42
Benzo[g,h,i]perylene Emission Rate, kg/hr	($ER_{C_{22}H_{12}}$)	5.1E-06	5.1E-06	5.1E-06	5.1E-06
Benzo[g,h,i]perylene Emission Rate, lb/hr	($ER_{C_{22}H_{12}}$)	1.1E-05	1.1E-05	1.1E-05	1.1E-05
Benzo[k]fluoranthene Concentration, ug/dscm	($C_{C_{20}H_{12}}$)	0.51	0.54	0.54	0.53
Benzo[k]fluoranthene Emission Rate, kg/hr	($ER_{C_{20}H_{12}}$)	6.4E-06	6.3E-06	6.3E-06	6.4E-06
Benzo[k]fluoranthene Emission Rate, lb/hr	($ER_{C_{20}H_{12}}$)	1.4E-05	1.4E-05	1.4E-05	1.4E-05
Chrysene Concentration, ug/dscm	($C_{C_{18}H_{12}}$)	0.41	0.43	0.43	0.42
Chrysene Emission Rate, kg/hr	($ER_{C_{18}H_{12}}$)	5.1E-06	5.1E-06	5.1E-06	5.1E-06
Chrysene Emission Rate, lb/hr	($ER_{C_{18}H_{12}}$)	1.1E-05	1.1E-05	1.1E-05	1.1E-05
Dibenz[a,h]anthracene Concentration, ug/dscm	($C_{C_{22}H_{14}}$)	0.41	0.43	0.43	0.42
Dibenz[a,h]anthracene Emission Rate, kg/hr	($ER_{C_{22}H_{14}}$)	5.1E-06	5.1E-06	5.1E-06	5.1E-06
Dibenz[a,h]anthracene Emission Rate, lb/hr	($ER_{C_{22}H_{14}}$)	1.1E-05	1.1E-05	1.1E-05	1.1E-05
Fluoranthene Concentration, ug/dscm	($C_{C_{16}H_{10}}$)	0.41	0.43	0.43	0.42
Fluoranthene Emission Rate, kg/hr	($ER_{C_{16}H_{10}}$)	5.1E-06	5.1E-06	5.1E-06	5.1E-06
Fluoranthene Emission Rate, lb/hr	($ER_{C_{16}H_{10}}$)	1.1E-05	1.1E-05	1.1E-05	1.1E-05
Fluorene Concentration, ug/dscm	($C_{C_{13}H_{10}}$)	1.8	1.8	1.6	1.7
Fluorene Emission Rate, kg/hr	($ER_{C_{13}H_{10}}$)	2.2E-05	2.2E-05	1.9E-05	2.1E-05
Fluorene Emission Rate, lb/hr	($ER_{C_{13}H_{10}}$)	4.9E-05	4.8E-05	4.2E-05	4.6E-05
Indeno(1,2,3-cd)pyrene Concentration, ug/dscm	($C_{C_{22}H_{12}}$)	0.51	0.54	0.54	0.53
Indeno(1,2,3-cd)pyrene Emission Rate, kg/hr	($ER_{C_{22}H_{12}}$)	6.4E-06	6.3E-06	6.3E-06	6.4E-06
Indeno(1,2,3-cd)pyrene Emission Rate, lb/hr	($ER_{C_{22}H_{12}}$)	1.4E-05	1.4E-05	1.4E-05	1.4E-05
Naphthalene Concentration, ug/dscm	($C_{C_{10}H_8}$)	31.9	32.3	34.5	32.9
Naphthalene Emission Rate, kg/hr	($ER_{C_{10}H_8}$)	4.0E-04	3.8E-04	4.0E-04	3.9E-04
Naphthalene Emission Rate, lb/hr	($ER_{C_{10}H_8}$)	8.8E-04	8.4E-04	8.9E-04	8.7E-04
Phenanthrene Concentration, ug/dscm	($C_{C_{10}H_8}$)	3.8	3.4	4.1	3.8
Phenanthrene Emission Rate, kg/hr	($ER_{C_{10}H_8}$)	4.7E-05	4.0E-05	4.8E-05	4.5E-05
Phenanthrene Emission Rate, lb/hr	($ER_{C_{14}H_{10}}$)	1.0E-04	8.8E-05	1.1E-04	1.0E-04
Pyrene Concentration, ug/dscm	($C_{C_{14}H_{10}}$)	4.1	3.8	4.3	4.1
Pyrene Emission Rate, kg/hr	($ER_{C_{14}H_{10}}$)	5.1E-05	4.4E-05	5.1E-05	4.9E-05
Pyrene Emission Rate, lb/hr	($ER_{C_{16}H_{10}}$)	1.1E-04	9.8E-05	1.1E-04	1.1E-04

Underlined values represent results below the detection limit. The detection limit was used for emission purposes.

Location Caterpillar, Inc - Virginia Beach, VA

Source 3516HD Generator (LC 75)

Project No. 2019-0420

Parameter Polycyclic Aromatic Hydrocarbons, Naphthalene

Run Number		Run 1	Run 2	Run 3	Average
Date		3/6/19	3/6/19	3/6/19	--
Start Time		10:12	12:29	14:42	--
Stop Time		11:42	13:59	16:12	--
Run Time, min		90.0	90.0	90.0	90.0
VELOCITY HEAD, in. WC					
Point 1		2.40	1.50	1.50	1.80
Point 2		2.60	1.60	1.60	1.93
Point 3		2.60	1.70	1.80	2.03
Point 4		1.90	2.30	2.20	2.13
Point 5		1.70	2.40	2.00	2.03
Point 6		1.40	2.20	2.20	1.93
Point 7		2.20	2.10	1.90	2.07
Point 8		2.60	2.40	2.00	2.33
Point 9		2.90	2.60	2.50	2.67
Point 10		2.80	2.40	2.80	2.67
Point 11		2.70	2.30	2.60	2.53
Point 12		2.50	2.30	2.50	2.43
CALCULATED DATA					
Square Root of ΔP , (in. WC) ^{1/2}	(ΔP)	1.528	1.461	1.454	1.481
Pitot Tube Coefficient	(Cp)	0.840	0.840	0.840	0.840
Barometric Pressure, in. Hg	(Pb)	30.26	30.26	30.26	30.26
Static Pressure, in. WC	(Pg)	-1.10	-1.10	-0.80	-1.00
Stack Pressure, in. Hg	(Ps)	30.18	30.18	30.20	30.19
Stack Cross-sectional Area, ft ²	(As)	2.18	2.18	2.18	2.18
Temperature, °F	(Ts)	666.1	674.8	678.3	673.1
Temperature, °R	(Ts)	1126.1	1134.8	1138.3	1133.1
Moisture Fraction Measured	(BWSmsd)	0.050	0.055	0.057	0.054
Moisture Fraction @ Saturation	(BWSsat)	140.600	148.200	151.312	146.704
Moisture Fraction	(BWS)	0.050	0.055	0.057	0.054
O ₂ Concentration, %	(O ₂)	12.6	12.6	12.5	12.6
CO ₂ Concentration, %	(CO ₂)	6.0	6.2	6.1	6.1
Molecular Weight, lb/lb-mole (dry)	(Md)	29.47	29.50	29.48	29.48
Molecular Weight, lb/lb-mole (wet)	(Ms)	28.89	28.86	28.83	28.86
Velocity, ft/sec	(Vs)	124.7	119.8	119.4	121.3
VOLUMETRIC FLOW RATE					
At Stack Conditions, acfm	(Qa)	16,324	15,679	15,633	15,879
At Standard Conditions, dscfm	(Qs)	7,332	6,952	6,900	7,061

Location Caterpillar, Inc - Virginia Beach, VA

Source 3516HD Generator (LC 75)

Project No. 2019-0420

Parameter Polycyclic Aromatic Hydrocarbons, Naphthalene

Analysis Volumetric

Run 1		Date: 3/6/19					
Impinger No.	1*	2	3	4	5	6*	Total
Contents	XAD Trap	Empty	H2O	H2O	Empty	Silica	--
Initial Volume, mL	342.0	0.0	100.0	100.0	0.0	225.2	767.2
Final Volume, mL	346.3	64.0	104.0	96.0	2.0	232.1	844.4
Gain	4.3	64.0	4.0	-4.0	2.0	6.9	77.2
Run 2		Date: 3/6/19					
Impinger No.	1*	2	3	4	5	6*	Total
Contents	XAD Trap	Empty	H2O	H2O	Empty	Silica	--
Initial Volume, mL	338.1	0.0	100.0	100.0	0.0	253.2	791.3
Final Volume, mL	351.3	62.0	94.0	106.0	0.0	259.7	873.0
Gain	13.2	62.0	-6.0	6.0	0.0	6.5	81.7
Run 3		Date: 3/6/19					
Impinger No.	1*	2	3	4	5	6*	Total
Contents	XAD Trap	Empty	H2O	H2O	Empty	Silica	--
Initial Volume, mL	337.5	0.0	100.0	100.0	0.0	225.1	762.6
Final Volume, mL	343.5	60.0	106.0	98.0	0.0	239.7	847.2
Gain	6.0	60.0	6.0	-2.0	0.0	14.6	84.6



Isokinetic Field Data

Location: <u>Caterpillar, Inc - Virginia Beach, VA</u>				Start Time: <u>10:12</u>		Source: <u>3516HD Generator (LC 75)</u>				
Date: <u>3/6/19</u>		Run 1		End Time: <u>11:42</u>		Project No.: <u>2019-0420</u>		Parameter: <u>Polycyclic</u>		

STACK DATA (EST)		EQUIPMENT		STACK DATA (EST)		FILTER NO.		STACK DATA (FINAL)		MOIST. DATA		
Moisture:	6.0 % est.	Meter Box ID:	2027	Est. Tm:	70 °F	NA		Pb:	30.26 in. Hg	Vlc (ml)		
Barometric:	30.26 in. Hg	Y:	1.008	Est. Ts:	646 °F			Pg:	-1.10 in. WC	77.2		
Static Press:	-1.10 in. WC	AH @ (in.WC):	1.840	Est. AP:	2.36 in. WC			O ₂ :	12.6 %	K-FACTOR		
Stack Press:	30.18 in. Hg	Probe ID:	PR-403	Est. Dn:	0.203 in.			CO ₂ :	6.0 %	0.835		
CO ₂ :	6.0 %	Liner Material:	glass	Target Rate:	0.75 scfm			Check Pt.		Initial	Final	Corr.
O ₂ :	11.0 %	Pitot ID:	P-403-2	LEAK CHECKS		Pre	Mid 1	Mid 2	Post	Mid 1 (cf)		
N ₂ /CO:	83.0 %	Pitot Cp/Type:	0.840 S-type	Leak Rate (cfm):		0.000	--	--	0.000	Mid 2 (cf)		
Md:	29.40 lb/lb-mole	Nozzle ID:	SS-303	Vacuum (in Hg):		9	--	--	13	Mid 3 (cf)		
Ms:	28.72 lb/lb-mole	Nozzle Dn (in.):	0.205	Pitot Tube:		Pass	--	--	Pass	Mid-Point Leak Check Vol (cf):		

Sample Pt.	Sample Time (minutes)		Dry Gas Meter Reading (ft ³)	Pitot Tube ΔP (in WC)	Gas Temperatures (°F)		Orifice Press. ΔH (in. WC)		Pump Vac (in. Hg)	Gas Temperatures (°F)				% ISO	Vs (fps)
					DGM Average	Stack				Probe	Filter	Imp Exit	Aux		
	Begin	End			Amb.	Amb.	Amb.	Amb.		Amb.	Amb.				
					65	65	Ideal	Actual		65	65	65	65		
A-1	0.00	7.50	74.620	2.40	68	661	1.97	2.00	7	269	262	39	47	97.0	126.53
2	7.50	15.00	80.140	2.60	69	666	2.13	2.10	8	257	259	41	47	99.9	131.99
3	15.00	22.50	86.050	2.60	70	668	2.13	2.10	8	260	257	43	48	99.1	132.11
4	22.50	30.00	91.920	1.90	71	662	1.57	1.60	7	261	262	42	50	103.1	112.63
5	30.00	37.50	97.170	1.70	72	669	1.40	1.40	7	261	259	41	50	100.1	106.87
6	37.50	45.00	101.990	1.40	74	666	1.16	1.20	7	253	260	41	49	106.3	96.85
B-1	45.00	52.50	106.660	2.20	75	664	1.83	1.80	8	257	260	40	48	96.5	121.30
2	52.50	60.00	111.980	2.60	76	662	2.16	2.20	8	264	262	40	49	95.6	131.75
3	60.00	67.50	117.720	2.90	77	671	2.40	2.40	12	260	261	44	54	103.6	139.70
4	67.50	75.00	124.270	2.80	77	671	2.32	2.30	11	264	260	47	58	98.0	137.27
5	75.00	82.50	130.360	2.70	77	667	2.24	2.20	11	253	257	48	58	98.4	134.56
6	82.50	90.00	136.380	2.50	77	666	2.08	2.10	11	263	257	46	58	100.3	129.43
	90.00	--	142.290												
Final DGM:			142.290												

RESULTS	Run Time		Vm	ΔP	Tm	Ts	Max Vac	ΔH	%ISO	BWS	Y _{qa}
	min	sec	ft ³	in. WC	°F	°F		in. WC			
	90.0		67.670	2.36	73.6	666.1	12	1.950	98.9	0.050	-0.4



Isokinetic Field Data

Location: Caterpillar, Inc - Virginia Beach, VA				Start Time: 12:29		Source: 3516HD Generator (LC 75)					
Date: 3/6/19		Run 2		VALID		End Time: 13:59		Project No.: 2019-0420		Parameter: Polycyclic	

STACK DATA (EST)		EQUIPMENT		STACK DATA (EST)		FILTER NO.		STACK DATA (FINAL)		MOIST. DATA			
Moisture:	6.0 % est.	Meter Box ID:	2027	Est. Tm:	74 °F	NA		Pb:	30.26 in. Hg	Vlc (ml)			
Barometric:	30.26 in. Hg	Y:	1.008	Est. Ts:	666 °F			Pg:	-1.10 in. WC	81.7			
Static Press:	-1.10 in. WC	ΔH @ (in.WC):	1.840	Est. ΔP:	2.36 in. WC			O ₂ :	12.6 %	K-FACTOR			
Stack Press:	30.18 in. Hg	Probe ID:	PR-403	Est. Dn:	0.203 in.			CO ₂ :	6.2 %	0.83			
CO ₂ :	6.0 %	Liner Material:	glass	Target Rate:	0.75 scfm					Check Pt.	Initial	Final	Corr.
O ₂ :	11.0 %	Pitot ID:	P-403-2	LEAK CHECKS		Pre	Mid 1	Mid 2	Post	Mid 1 (cf)	--		
N ₂ /CO:	83.0 %	Pitot Cp/Type:	0.840 S-type	Leak Rate (cfm):	0.000	--	--	0.000		Mid 2 (cf)	--		
Md:	29.40 lb/lb-mole	Nozzle ID:	SS-303	Vacuum (in Hg):	10	--	--	11		Mid 3 (cf)	--		
Ms:	28.72 lb/lb-mole	Nozzle Dn (in.):	0.205	Pitot Tube:		Pass	--	--	Pass	Mid-Point Leak Check Vol (cf):	--		

Sample Pt.	Sample Time (minutes)		Dry Gas Meter Reading (ft ³)	Pitot Tube ΔP (in WC)	Gas Temperatures (°F)		Orifice Press. ΔH (in. WC)		Pump Vac (in. Hg)	Gas Temperatures (°F)				% ISO	Vs (fps)
	Begin	End			DGM Average	Stack	Ideal	Actual		Probe	Filter	Imp Exit	Aux		
					Amb.	Amb.				Amb.	Amb.	Amb.	Amb.		
A-1	0.00	7.50	142.530	1.50	75	670	1.24	1.20	5	263	262	37	39	97.9	100.43
2	7.50	15.00	146.980	1.60	72	675	1.31	1.30	5	257	260	40	38	99.8	103.95
3	15.00	22.50	151.630	1.70	72	678	1.39	1.40	5	260	259	40	42	102.2	107.29
4	22.50	30.00	156.530	2.30	73	674	1.88	1.90	8	261	260	41	41	99.5	124.58
5	30.00	37.50	162.090	2.40	73	670	1.97	2.00	8	261	258	42	41	99.0	127.04
6	37.50	45.00	167.750	2.20	74	671	1.81	1.80	8	260	264	44	43	105.0	121.68
B-1	45.00	52.50	173.510	2.10	75	677	1.72	1.70	8	260	260	46	47	97.4	119.20
2	52.50	60.00	178.730	2.40	76	677	1.97	2.00	8	260	260	48	48	101.3	127.43
3	60.00	67.50	184.540	2.60	76	676	2.14	2.10	9	260	260	50	51	98.0	132.57
4	67.50	75.00	190.390	2.40	77	676	1.98	2.00	10	262	259	52	51	101.4	127.37
5	75.00	82.50	196.220	2.30	77	677	1.89	1.90	10	257	260	54	54	99.9	124.75
6	82.50	90.00	201.840	2.30	77	676	1.90	1.90	10	261	261	54	55	100.8	124.69
--	90.00	--	207.510												--
Final DGM:			207.510												

RESULTS	Run Time		Vm		ΔP		Tm		Ts		Max Vac	ΔH		%ISO	BWS	Y _{qa}
	min		ft ³		in. WC		°F		°F		in. WC					
	90.0		64.980		2.15		74.8		674.8		10	1.767		99.9	0.055	0.3



Isokinetic Field Data

Location: Caterpillar, Inc - Virginia Beach, VA				Start Time: 14:42		Source: 3516HD Generator (LC 75)					
Date: 3/6/19		Run 3		End Time: 16:12		Project No.: 2019-0420		Parameter: Polycyclic			
STACK DATA (EST)		EQUIPMENT		STACK DATA (EST)		FILTER NO.		STACK DATA (FINAL)		MOIST. DATA	
Moisture: 6.0 % est.		Meter Box ID: 2027		Est. Tm: 75 °F		NA		Pb: 30.26 in. Hg		Vlc (ml)	
Barometric: 30.26 in. Hg		Y: 1.008		Est. Ts: 675 °F				Pg: -0.80 in. WC		K-FACTOR	
Static Press: -1.10 in. WC		ΔH @ (in.WC): 1.840		Est. ΔP: 2.15 in. WC				O ₂ : 12.5 %		0.822	
Stack Press: 30.18 in. Hg		Probe ID: PR-403		Est. Dn: 0.208 in.				CO ₂ : 6.1 %		Check Pt. Initial Final Corr.	
CO ₂ : 6.0 %		Liner Material: glass		Target Rate: 0.75 scfm						Mid 1 (cf) --	
O ₂ : 11.0 %		Pitot ID: P-403-2		LEAK CHECKS Pre Mid 1 Mid 2 Post						Mid 2 (cf) --	
N ₂ /CO: 83.0 %		Pitot Cp/Type: 0.840 S-type		Leak Rate (cfm): 0.000 -- -- 0.000						Mid 3 (cf) --	
Md: 29.40 lb/lb-mole		Nozzle ID: SS-303		Vacuum (in Hg): 11 -- -- 11						Mid-Point Leak Check Vol (cf): --	
Ms: 28.72 lb/lb-mole		Nozzle Dn (in.): 0.205		Pitot Tube: Pass -- -- Pass							

Sample Pt.	Sample Time (minutes)		Dry Gas Meter Reading (ft ³)	Pitot Tube ΔP (in WC)	Gas Temperatures (°F)		Orifice Press. ΔH (in. WC)		Pump Vac (in. Hg)	Gas Temperatures (°F)				% ISO	Vs (fps)
	Begin	End			DGMAverage	Stack	Ideal	Actual		Probe	Filter	Imp Exit	Aux		
A-1	0.00	7.50	207.745	1.50	74	680	1.23	1.20	4	256	261	40	41	99.5	100.87
2	7.50	15.00	212.240	1.60	72	679	1.30	1.30	5	267	259	43	45	100.4	104.14
3	15.00	22.50	216.910	1.80	72	675	1.47	1.50	5	258	257	44	48	101.2	110.26
4	22.50	30.00	221.910	2.20	73	681	1.79	1.80	7	261	258	46	53	99.6	122.22
5	30.00	37.50	227.340	2.00	74	679	1.64	1.60	6	262	261	50	58	98.6	116.43
6	37.50	45.00	232.483	2.20	75	679	1.80	1.80	7	261	263	52	60	101.6	122.11
B-1	45.00	52.50	238.050	1.90	76	678	1.56	1.60	7	258	261	53	61	102.3	113.43
2	52.50	60.00	243.270	2.00	76	681	1.64	1.60	7	261	261	55	62	99.8	116.53
3	60.00	67.50	248.490	2.50	76	678	2.05	2.10	7	257	259	54	61	100.7	130.11
4	67.50	75.00	254.380	2.80	77	677	2.30	2.30	9	261	256	20	57	100.2	137.64
5	75.00	82.50	260.590	2.60	75	677	2.13	2.10	10	260	260	49	59	100.6	132.63
6	82.50	90.00	266.580	2.50	72	676	2.04	2.00	10	260	260	48	56	102.4	130.00
--	90.00	--	272.530												--
Final DGM:			272.530												

RESULTS	Run Time		Vm		ΔP		Tm		Ts		Max Vac	ΔH		%ISO	BWS	Y _{qa}
	min		ft ³		in. WC		°F		°F		in. WC					
	90.0		64.785		2.13		74.3		678.3		10	1.742		100.5	0.057	0.8

Load Condition: 100%

Location Caterpillar, Inc - Virginia Beach, VA

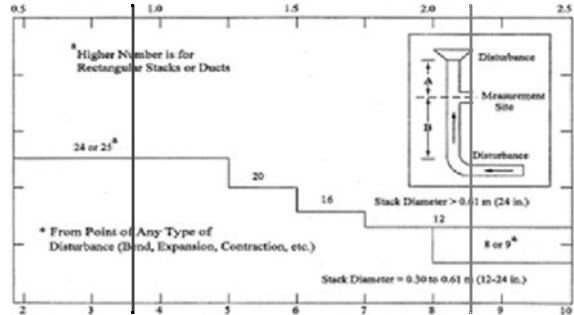
Source 3516HD Generator (LC 100)

Project No. 2019-0420

Date: 03/05/19

Stack Parameters

Duct Orientation:	Horizontal
Duct Design:	Circular
Distance from Far Wall to Outside of Port:	20.00 in
Nipple Length:	0.00 in
Depth of Duct:	20.00 in
Cross Sectional Area of Duct:	2.18 ft ²
No. of Test Ports:	2
Distance A:	1.5 ft
Distance A Duct Diameters:	0.9 (must be > 0.5)
Distance B:	14.2 ft
Distance B Duct Diameters:	8.5 (must be > 2)
Minimum Number of Traverse Points:	24
Actual Number of Traverse Points:	12
Number of Readings per Point:	1



CIRCULAR DUCT

LOCATION OF TRAVERSE POINTS

Number of traverse points on a diameter

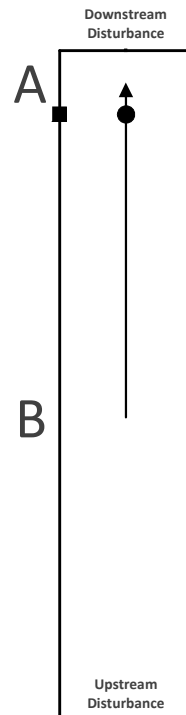
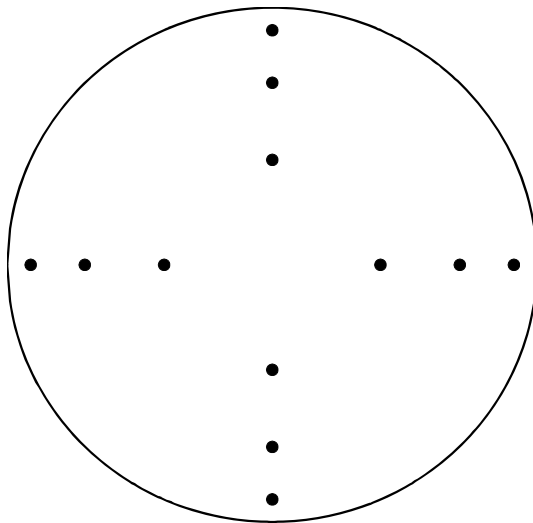
	2	3	4	5	6	7	8	9	10	11	12
1	14.6	--	6.7	--	4.4	--	3.2	--	2.6	--	2.1
2	85.4	--	25.0	--	14.6	--	10.5	--	8.2	--	6.7
3	--	--	75.0	--	29.6	--	19.4	--	14.6	--	11.8
4	--	--	93.3	--	70.4	--	32.3	--	22.6	--	17.7
5	--	--	--	--	85.4	--	67.7	--	34.2	--	25.0
6	--	--	--	--	95.6	--	80.6	--	65.8	--	35.6
7	--	--	--	--	--	--	89.5	--	77.4	--	64.4
8	--	--	--	--	--	--	96.8	--	85.4	--	75.0
9	--	--	--	--	--	--	--	--	91.8	--	82.3
10	--	--	--	--	--	--	--	--	97.4	--	88.2
11	--	--	--	--	--	--	--	--	--	--	93.3
12	--	--	--	--	--	--	--	--	--	--	97.9

*Percent of stack diameter from inside wall to traverse point.

Traverse Point	% of Diameter	Distance from inside wall	Distance from outside of port
1	4.4	0.88	0.88
2	14.6	2.92	2.92
3	29.6	5.92	5.92
4	70.4	14.08	14.08
5	85.4	17.08	17.08
6	95.6	19.12	19.12
7	--	--	--
8	--	--	--
9	--	--	--
10	--	--	--
11	--	--	--
12	--	--	--

Stack Diagram
A = 1.5 ft.
B = 14.208333;
Depth of Duct = 20 in.

Cross Sectional Area



Location Caterpillar, Inc - Virginia Beach, VA

Source 3516HD Generator (LC 100)

Project No. 2019-0420

Date 03/05/19

Sample Point	Angle ($\Delta P=0$)
1	5
2	5
3	5
4	8
5	10
6	10
7	5
8	5
9	5
10	5
11	0
12	0
Average	5

Location Caterpillar, Inc - Virginia Beach, VA
 Source 3516HD Generator (LC 100)
 Project No. 2019-0420
 Parameter PM/CPM

Run Number		Run 1	Run 2	Run 3	Average
Date		3/5/19	3/5/19	3/5/19	--
Start Time		11:05	14:00	16:02	--
Stop Time		12:05	15:00	17:02	--
Run Time, min	(θ)	60.0	60.0	60.0	60.0
INPUT DATA					
Barometric Pressure, in. Hg	(Pb)	30.10	30.10	30.10	30.10
Meter Correction Factor	(Y)	0.989	0.989	0.989	0.989
Orifice Calibration Value	($\Delta H @$)	1.746	1.746	1.746	1.746
Meter Volume, ft ³	(Vm)	51.470	54.295	53.320	53.028
Meter Temperature, °F	(Tm)	79.1	82.4	75.8	79.1
Meter Temperature, °R	(Tm)	539.1	542.4	535.8	539.1
Meter Orifice Pressure, in. WC	(ΔH)	2.333	2.575	2.492	2.467
Volume H ₂ O Collected, mL	(Vlc)	62.5	72.0	69.4	68.0
Nozzle Diameter, in	(Dn)	0.208	0.208	0.208	0.208
Area of Nozzle, ft ²	(An)	0.0002	0.0002	0.0002	0.0002
Filterable PM Mass, mg	(Mn)	15.2	21.2	17.1	17.8
Condensable PM Mass, mg	(M _{CPM})	9.9	17.0	12.7	13.2
ISOKINETIC DATA					
Standard Meter Volume, ft ³	(Vmstd)	50.443	52.916	52.593	51.984
Standard Water Volume, ft ³	(Vwstd)	2.943	3.390	3.267	3.200
Moisture Fraction Measured	(BWSmsd)	0.055	0.060	0.058	0.058
Moisture Fraction @ Saturation	(BWSsat)	201.161	198.608	202.446	200.738
Moisture Fraction	(BWS)	0.055	0.060	0.058	0.058
Meter Pressure, in Hg	(Pm)	30.27	30.29	30.28	30.28
Volume at Nozzle, ft ³	(Vn)	119.782	126.086	125.459	123.776
Isokinetic Sampling Rate, (%)	(I)	94.0	99.0	99.2	97.4
DGM Calibration Check Value, (+/- 5%)	(Y _{qa})	-1.5	-1.3	-1.0	-1.3
EMISSION CALCULATIONS					
Filterable PM Concentration, grain/dscf	(C _s)	0.0047	0.0062	0.0050	0.0053
Filterable PM Emission Rate, lb/hr	(PMR)	0.33	0.44	0.35	0.37
Condensable PM Concentration, grain/dscf	(C _{CPM})	0.0030	0.0050	0.0037	0.0039
Condensable PM Emission Rate, lb/hr	(ER _{CPM})	0.21	0.35	0.26	0.28
Total PM Concentration, grain/dscf	(C _{TPM})	0.0077	0.011	0.0087	0.0092
Total PM Emission Rate, lb/hr	(ER _{TPM})	0.54	0.79	0.61	0.65

Location Caterpillar, Inc - Virginia Beach, VA
Source 3516HD Generator (LC 100)
Project No. 2019-0420
Parameter PM/CPM

Run Number		Run 1	Run 2	Run 3	Average
Date		3/5/19	3/5/19	3/5/19	--
Start Time		11:05	14:00	16:02	--
Stop Time		12:05	15:00	17:02	--
Run Time, min		60.0	60.0	60.0	60.0
VELOCITY HEAD, in. WC					
Point 1		3.30	3.50	2.70	3.17
Point 2		3.50	3.60	3.10	3.40
Point 3		3.80	3.50	3.50	3.60
Point 4		3.70	2.70	3.40	3.27
Point 5		3.00	2.60	3.00	2.87
Point 6		2.80	2.40	2.70	2.63
Point 7		3.40	3.10	3.10	3.20
Point 8		3.40	3.70	3.50	3.53
Point 9		3.30	4.10	3.60	3.67
Point 10		3.10	3.50	3.30	3.30
Point 11		3.00	3.00	3.00	3.00
Point 12		2.10	2.70	2.80	2.53
CALCULATED DATA					
Square Root of ΔP , (in. WC) ^{1/2}	(ΔP)	1.784	1.783	1.770	1.779
Pitot Tube Coefficient	(Cp)	0.840	0.840	0.840	0.840
Barometric Pressure, in. Hg	(Pb)	30.10	30.10	30.10	30.10
Static Pressure, in. WC	(Pg)	-1.70	-1.70	-1.70	-1.70
Stack Pressure, in. Hg	(Ps)	29.98	29.98	29.98	29.98
Stack Cross-sectional Area, ft ²	(As)	2.18	2.18	2.18	2.18
Temperature, °F	(Ts)	726.8	724.5	728.0	726.4
Temperature, °R	(Ts)	1186.8	1184.5	1188.0	1186.4
Moisture Fraction Measured	(BWSmsd)	0.055	0.060	0.058	0.058
Moisture Fraction @ Saturation	(BWSsat)	201.161	198.608	202.446	200.738
Moisture Fraction	(BWS)	0.055	0.060	0.058	0.058
O ₂ Concentration, %	(O ₂)	11.4	11.3	11.2	11.3
CO ₂ Concentration, %	(CO ₂)	6.8	6.8	6.9	6.8
Molecular Weight, lb/lb-mole (dry)	(Md)	29.54	29.54	29.55	29.54
Molecular Weight, lb/lb-mole (wet)	(Ms)	28.90	28.85	28.88	28.87
Velocity, ft/sec	(Vs)	150.0	149.9	148.9	149.6
VOLUMETRIC FLOW RATE					
At Stack Conditions, acfm	(Qa)	19,632	19,619	19,497	19,583
At Standard Conditions, dscfm	(Qs)	8,268	8,234	8,173	8,225

Location Caterpillar, Inc - Virginia Beach, VA

Source 3516HD Generator (LC 100)

Project No. 2019-0420

Parameter PM/CPM

Analysis Volumetric

Run 1						
	Date: 3/5/19					
Impinger No.	1	2	3	4	5*	Total
Contents	Empty	Empty	H2O	Empty	Silica	--
Initial Volume, mL	0.0	0.0	100.0	0.0	245.2	345.2
Final Volume, mL	19.0	23.0	106.0	0.0	259.7	407.7
Gain	19.0	23.0	6.0	0.0	14.5	62.5
Run 2						
	Date: 3/5/19					
Impinger No.	1	2	3	4	5*	Total
Contents	Empty	Empty	H2O	Empty	Silica	--
Initial Volume, mL	0.0	0.0	100.0	0.0	228.9	328.9
Final Volume, mL	58.0	0.0	100.0	0.0	242.9	400.9
Gain	58.0	0.0	0.0	0.0	14.0	72.0
Run 3						
	Date: 3/5/19					
Impinger No.	1	2	3	4	5*	Total
Contents	Empty	Empty	H2O	Empty	Silica	--
Initial Volume, mL	0.0	0.0	100.0	0.0	234.3	334.3
Final Volume, mL	37.0	6.0	104.0	10.0	246.7	403.7
Gain	37.0	6.0	4.0	10.0	12.4	69.4



Isokinetic Field Data

Location: <u>Caterpillar, Inc - Virginia Beach, VA</u>			Start Time: <u>11:05</u>			Source: <u>3516HD Generator (LC 100)</u>			
Date: <u>3/5/19</u>		Run 1	VALID	End Time: <u>12:05</u>		Project No.: <u>2019-0420</u>		Parameter: <u>PM/CPM</u>	

STACK DATA (EST)		EQUIPMENT		STACK DATA (EST)		FILTER NO.		STACK DATA (FINAL)		MOIST. DATA			
Moisture:	11.0 % est.	Meter Box ID:	2026	Est. Tm:	70 °F	11574		Pb:	30.10 in. Hg	Vlc (ml)			
Barometric:	30.10 in. Hg	Y:	0.989	Est. Ts:	683 °F			Pg:	-1.70 in. WC	62.5			
Static Press:	-1.70 in. WC	AH @ (in.WC):	1.746	Est. AP:	3.20 in. WC			O ₂ :	11.4 %	K-FACTOR			
Stack Press:	29.98 in. Hg	Probe ID:	PR-402-0	Est. Dn:	0.194 in.			CO ₂ :	6.8 %	0.743			
CO ₂ :	6.8 %	Liner Material:	glass	Target Rate:	0.75 scfm					Check Pt.	Initial	Final	Corr.
O ₂ :	11.4 %	Pitot ID:	P-403-2	LEAK CHECKS		Pre	Mid 1	Mid 2	Post	Mid 1 (cf)	--		
N ₂ /CO:	81.9 %	Pitot Cp/Type:	0.840 S-type	Leak Rate (cfm):		0.000	--	--	0.000	Mid 2 (cf)	--		
Md:	29.54 lb/lb-mole	Nozzle ID:	#7	Vacuum (in Hg):		8	--	--	8	Mid 3 (cf)	--		
Ms:	28.27 lb/lb-mole	Nozzle Dn (in.):	0.208	Pitot Tube:		Pass	--	--	Pass	Mid-Point Leak Check Vol (cf):	--		

Sample Pt.	Sample Time (minutes)		Dry Gas Meter Reading (ft ³)	Pitot Tube AP (in WC)	Gas Temperatures (°F)		Orifice Press. ΔH (in. WC)		Pump Vac (in. Hg)	Gas Temperatures (°F)				% ISO	Vs (fps)
					DGM Average	Stack	Ideal			Actual	Probe	Filter	Imp Exit		
	Amb.	Amb.						Amb.		Amb.	Amb.	Amb.			
	73	73						73		73	73	73			
A-1	0.00	5.00	744.730	3.30	74	722	2.39	2.40	4	259	251	40	66	96.6	154.08
2	5.00	10.00	748.970	3.50	77	727	2.53	2.50	6	261	266	38	66	97.9	159.01
3	10.00	15.00	753.410	3.80	78	726	2.76	2.80	6	260	260	40	67	98.9	165.62
4	15.00	20.00	758.090	3.70	78	727	2.68	2.70	7	260	259	42	65	98.7	163.49
5	20.00	25.00	762.700	3.00	79	727	2.18	2.20	7	260	256	44	65	101.0	147.22
6	25.00	30.00	766.960	2.80	79	727	2.04	2.00	6	261	271	45	65	97.9	142.23
B-1	30.00	35.00	770.950	3.40	80	729	2.47	2.50	6	262	266	47	66	96.9	156.86
2	35.00	40.00	775.300	3.40	80	730	2.47	2.50	6	258	255	48	65	100.7	156.92
3	40.00	45.00	779.820	3.30	80	726	2.40	2.40	6	261	264	48	65	97.7	154.34
4	45.00	50.00	784.150	3.10	81	727	2.26	2.30	7	261	269	48	66	100.0	149.65
5	50.00	55.00	788.450	3.00	81	725	2.19	2.20	7	259	264	47	67	98.4	147.09
6	55.00	60.00	792.620	2.10	82	729	1.53	1.50	5	261	268	47	68	100.8	123.28
	60.00	--	796.200												--
Final DGM:			796.200												

RESULTS	Run Time		Vm	ΔP	Tm	Ts	Max Vac	ΔH	%ISO	BWS	Y _{qa}
	min	min	ft ³	in. WC	°F	°F		in. WC			
	60.0		51.470	3.20	79.1	726.8	7	2.333	94.0	0.055	-1.5



Isokinetic Field Data

Location: Caterpillar, Inc - Virginia Beach, VA				Start Time: 14:00		Source: 3516HD Generator (LC 100)										
Date: 3/5/19		Run 2		End Time: 15:00		Project No.: 2019-0420		Parameter: PM/CPM								
STACK DATA (EST)			EQUIPMENT			STACK DATA (EST)			FILTER NO.		STACK DATA (FINAL)			MOIST. DATA		
Moisture: 6.0 % est.			Meter Box ID: 2026			Est. Tm: 79 °F			11573		Pb: 30.10 in. Hg			Vlc (ml)		
Barometric: 30.10 in. Hg			Y: 0.989			Est. Ts: 727 °F					Pg: -1.70 in. WC			72.0		
Static Press: -1.70 in. WC			ΔH @ (in.WC): 1.746			Est. ΔP: 3.20 in. WC					O ₂ : 11.3 %			K-FACTOR		
Stack Press: 29.98 in. Hg			Probe ID: PR-402-0			Est. Dn: 0.190 in.					CO ₂ : 6.8 %			0.80		
CO ₂ : 6.8 %			Liner Material: glass			Target Rate: 0.75 scfm										
O ₂ : 11.4 %			Pitot ID: P-403-2			LEAK CHECKS			Pre		Mid 1		Mid 2		Post	
N ₂ /CO: 81.9 %			Pitot Cp/Type: 0.840 S-type			Leak Rate (cfm): 0.000			--		--		0.000		Mid 1 (cf) --	
Md: 29.54 lb/lb-mole			Nozzle ID: #7			Vacuum (in Hg): 8			--		--		9		Mid 2 (cf) --	
Ms: 28.84 lb/lb-mole			Nozzle Dn (in.): 0.208			Pitot Tube: Pass			--		--		Pass		Mid 3 (cf) --	
											Mid-Point Leak Check Vol (cf): --					

Sample Pt.	Sample Time (minutes)		Dry Gas Meter Reading (ft ³)	Pitot Tube ΔP (in WC)	Gas Temperatures (°F)		Orifice Press. ΔH (in. WC)		Pump Vac (in. Hg)	Gas Temperatures (°F)				% ISO	Vs (fps)
					DGM Average	Stack				Probe	Filter	Imp Exit	Aux		
	Amb.	Amb.			Amb.	Amb.	Amb.	Amb.							
	Begin	End			Ideal	Actual	Amb.	Amb.		Amb.	Amb.				
A-1	0.00	5.00	796.360	3.50	81	724	2.79	2.80	6	259	261	40	65	97.1	157.22
2	5.00	10.00	801.000	3.60	82	724	2.88	2.90	6	260	272	40	66	99.1	159.45
3	10.00	15.00	805.810	3.50	83	724	2.80	2.80	6	259	262	47	66	98.6	157.22
4	15.00	20.00	810.540	2.70	83	724	2.17	2.20	6	258	267	49	68	101.0	138.08
5	20.00	25.00	814.800	2.60	83	726	2.08	2.10	6	261	262	49	68	98.3	135.62
6	25.00	30.00	818.870	2.40	83	724	1.93	1.90	6	261	262	52	69	99.2	130.19
B-1	30.00	35.00	822.820	3.10	83	725	2.48	2.50	7	259	259	55	70	98.3	148.02
2	35.00	40.00	827.260	3.70	83	724	2.96	3.00	8	261	260	57	70	98.4	161.65
3	40.00	45.00	832.110	4.10	83	724	3.28	3.30	8	260	260	57	71	98.5	170.16
4	45.00	50.00	837.220	3.50	82	726	2.79	2.80	8	258	264	53	71	100.5	157.35
5	50.00	55.00	842.030	3.00	82	726	2.40	2.40	8	261	262	54	73	99.5	145.68
6	55.00	60.00	846.440	2.70	81	723	2.16	2.20	8	260	250	54	73	100.2	138.03
--	60.00	--	850.655												--
Final DGM:			850.655												

RESULTS	Run Time		Vm		ΔP		Tm		Ts		Max Vac	ΔH		%ISO	BWS	Y _{qa}
	min		ft ³		in. WC		°F		°F		in. WC					
	60.0		54.295	ft³	3.20	in. WC	82.4	°F	724.5	°F	8	2.575	in. WC	99.0	0.060	-1.3



Isokinetic Field Data

Location: Caterpillar, Inc - Virginia Beach, VA				Start Time: 16:02		Source: 3516HD Generator (LC 100)									
Date: 3/5/19		Run 3		End Time: 17:02		Project No.: 2019-0420		Parameter: PM/CPM							
STACK DATA (EST)			EQUIPMENT			STACK DATA (EST)			FILTER NO.		STACK DATA (FINAL)			MOIST. DATA	
Moisture: 6.0 % est.			Meter Box ID: 2026			Est. Tm: 82 °F			11572		Pb: 30.10 in. Hg			Vlc (ml)	
Barometric: 30.10 in. Hg			Y: 0.989			Est. Ts: 725 °F					Pg: -1.70 in. WC			69.4	
Static Press: -1.70 in. WC			ΔH @ (in.WC): 1.746			Est. ΔP: 3.20 in. WC					O ₂ : 11.2 %			K-FACTOR	
Stack Press: 29.98 in. Hg			Probe ID: PR-402-0			Est. Dn: 0.189 in.					CO ₂ : 6.9 %			0.802	
CO ₂ : 6.8 %			Liner Material: glass			Target Rate: 0.75 scfm								Check Pt. Initial Final Corr.	
O ₂ : 11.4 %			Pitot ID: P-403-2			LEAK CHECKS Pre Mid 1 Mid 2 Post					Mid 1 (cf)			--	
N ₂ /CO: 81.9 %			Pitot Cp/Type: 0.840 S-type			Leak Rate (cfm): 0.000 -- -- 0.000					Mid 2 (cf)			--	
Md: 29.54 lb/lb-mole			Nozzle ID: #7			Vacuum (in Hg): 10 -- -- 10					Mid 3 (cf)			--	
Ms: 28.84 lb/lb-mole			Nozzle Dn (in.): 0.208			Pitot Tube: Pass -- -- Pass					Mid-Point Leak Check Vol (cf):			--	

Sample Pt.	Sample Time (minutes)		Dry Gas Meter Reading (ft ³)	Pitot Tube ΔP (in WC)	Gas Temperatures (°F)		Orifice Press. ΔH (in. WC)		Pump Vac (in. Hg)	Gas Temperatures (°F)				% ISO	Vs (fps)
					DGM Average	Stack				Probe	Filter	Imp Exit	Aux		
	Amb.	Amb.			Amb.	Amb.	Amb.	Amb.							
	Begin	End			Ideal	Actual	Probe	Filter		Imp Exit	Aux				
A-1	0.00	5.00	850.725	2.70	75	731	2.12	2.20	4	260	261	39	66	105.3	138.49
2	5.00	10.00	855.090	3.10	76	729	2.44	2.40	5	261	261	41	66	100.6	148.27
3	10.00	15.00	859.570	3.50	76	730	2.75	2.80	6	259	265	45	67	94.0	157.61
4	15.00	20.00	864.010	3.40	77	728	2.69	2.70	6	262	257	47	67	99.2	155.22
5	20.00	25.00	868.640	3.00	76	728	2.37	2.40	6	260	261	48	69	99.3	145.80
6	25.00	30.00	872.990	2.70	76	728	2.13	2.10	6	258	260	49	70	98.8	138.32
B-1	30.00	35.00	877.100	3.10	76	728	2.45	2.50	7	260	260	50	70	100.4	148.21
2	35.00	40.00	881.570	3.50	76	728	2.76	2.80	7	261	266	52	67	98.4	157.48
3	40.00	45.00	886.220	3.60	76	727	2.84	2.80	8	258	260	53	66	98.2	159.65
4	45.00	50.00	890.930	3.30	76	727	2.61	2.60	8	260	259	55	66	99.2	152.85
5	50.00	55.00	895.490	3.00	75	726	2.37	2.40	8	261	261	57	68	100.1	145.68
6	55.00	60.00	899.870	2.80	75	726	2.21	2.20	7	262	261	59	-	98.7	140.74
--	60.00	--	904.045										-		--
Final DGM:			904.045												

RESULTS	Run Time		Vm		ΔP		Tm		Ts		Max Vac		ΔH		%ISO	BWS	Y _{qa}
	min		ft ³		in. WC		°F		°F		in. WC		in. WC				
	60.0		53.320	ft ³	3.14	in. WC	75.8	°F	728.0	°F	8	2.492	in. WC	99.2	0.058	-1.0	

Location Caterpillar, Inc - Virginia Beach, VA

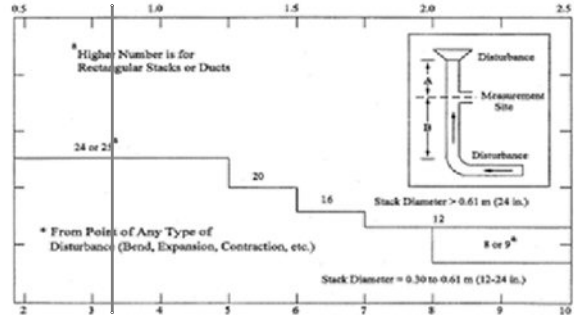
Source 3516HD Generator (L100)

Project No. 2019-0420

Date: 03/05/19

Stack Parameters

Duct Orientation:	Horizontal
Duct Design:	Circular
Distance from Far Wall to Outside of Port:	20.00 in
Nipple Length:	0.00 in
Depth of Duct:	20.00 in
Cross Sectional Area of Duct:	2.18 ft ²
No. of Test Ports:	2
Distance A:	10.2 ft
Distance A Duct Diameters:	6.1 (must be > 0.5)
Distance B:	5.5 ft
Distance B Duct Diameters:	3.3 (must be > 2)
Minimum Number of Traverse Points:	24
Actual Number of Traverse Points:	12
Number of Readings per Point:	1



CIRCULAR DUCT

LOCATION OF TRAVERSE POINTS

Number of traverse points on a diameter

	2	3	4	5	6	7	8	9	10	11	12
1	14.6	--	6.7	--	4.4	--	3.2	--	2.6	--	2.1
2	85.4	--	25.0	--	14.6	--	10.5	--	8.2	--	6.7
3	--	--	75.0	--	29.6	--	19.4	--	14.6	--	11.8
4	--	--	93.3	--	70.4	--	32.3	--	22.6	--	17.7
5	--	--	--	--	85.4	--	67.7	--	34.2	--	25.0
6	--	--	--	--	95.6	--	80.6	--	65.8	--	35.6
7	--	--	--	--	--	--	89.5	--	77.4	--	64.4
8	--	--	--	--	--	--	96.8	--	85.4	--	75.0
9	--	--	--	--	--	--	--	--	91.8	--	82.3
10	--	--	--	--	--	--	--	--	97.4	--	88.2
11	--	--	--	--	--	--	--	--	--	--	93.3
12	--	--	--	--	--	--	--	--	--	--	97.9

*Percent of stack diameter from inside wall to traverse point.

Traverse Point	% of Diameter	Distance from inside wall	Distance from outside of port
1	4.4	0.88	0.88
2	14.6	2.92	2.92
3	29.6	5.92	5.92
4	70.4	14.08	14.08
5	85.4	17.08	17.08
6	95.6	19.12	19.12
7	--	--	--
8	--	--	--
9	--	--	--
10	--	--	--
11	--	--	--
12	--	--	--

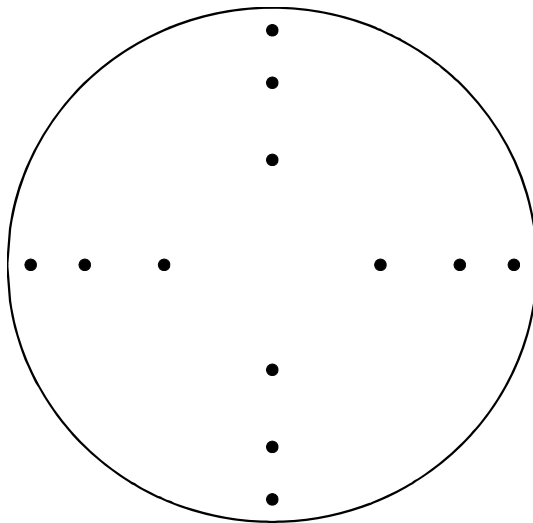
Stack Diagram

A = 10.208333;

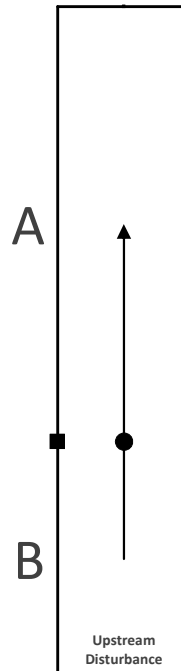
B = 5.5 ft.

Depth of Duct = 20 in.

Cross Sectional Area



Downstream Disturbance



Location Caterpillar, Inc - Virginia Beach, VA
 Source 3516HD Generator (L100)
 Project No. 2019-0420
 Parameter Arsenic, Cadmium, Nickel

Run Number		Run 1	Run 2	Run 3	Average
Date		3/5/19	3/5/19	3/5/19	--
Start Time		11:05	13:59	16:02	--
Stop Time		12:05	14:59	17:02	--
Run Time, min	(θ)	60.0	60.0	60.0	60.0
INPUT DATA					
Barometric Pressure, in. Hg	(Pb)	30.10	30.10	30.10	30.10
Meter Correction Factor	(Y)	0.994	0.994	0.994	0.994
Orifice Calibration Value	($\Delta H @$)	1.816	1.816	1.816	1.816
Meter Volume, ft ³	(Vm)	43.804	46.244	45.835	45.294
Meter Temperature, °F	(Tm)	76.2	77.6	69.6	74.4
Meter Temperature, °R	(Tm)	536.2	537.6	529.6	534.4
Meter Orifice Pressure, in. WC	(ΔH)	1.950	2.050	1.992	1.997
Volume H ₂ O Collected, mL	(Vlc)	57.9	57.5	63.5	59.6
Nozzle Diameter, in	(Dn)	0.195	0.195	0.195	0.195
Area of Nozzle, ft ²	(An)	0.0002	0.0002	0.0002	0.0002
Arsenic Mass, ug	(M _{As})	<u>0.80</u>	<u>0.80</u>	<u>0.80</u>	0.80
Cadmium Mass, ug	(M _{Cd})	0.44	<u>0.18</u>	0.24	0.29
Nickel Mass, ug	(M _{Ni})	6.9	4.7	6.2	5.9
ISOKINETIC DATA					
Standard Meter Volume, ft ³	(Vmstd)	43.341	45.646	45.919	44.969
Standard Water Volume, ft ³	(Vwstd)	2.726	2.707	2.989	2.808
Moisture Fraction Measured	(BWSmsd)	0.059	0.056	0.061	0.059
Moisture Fraction @ Saturation	(BWSsat)	202.814	201.344	201.527	201.895
Moisture Fraction	(BWS)	0.059	0.056	0.061	0.059
Meter Pressure, in Hg	(Pm)	30.24	30.25	30.25	30.25
Volume at Nozzle, ft ³	(Vn)	103.493	108.506	109.769	107.256
Isokinetic Sampling Rate, (%)	(I)	90.8	96.9	98.7	95.5
DGM Calibration Check Value, (+/- 5%)	(Y _{qa})	-6.4	-3.1	-2.0	-3.8
EMISSION CALCULATIONS					
Arsenic Concentration, ug/dscm	(C _{As})	0.65	0.62	0.62	0.63
Arsenic Emission Rate, lb/hr	(ER _{As})	2.0E-05	1.9E-05	1.9E-05	1.9E-05
Cadmium Concentration, ug/dscm	(C _{Cd})	0.36	0.14	0.18	0.23
Cadmium Emission Rate, lb/hr	(ER _{Cd})	1.1E-05	4.3E-06	5.6E-06	7.1E-06
Nickel Concentration, ug/dscm	(C _{Ni})	5.6	3.6	4.8	4.7
Nickel Emission Rate, lb/hr	(ER _{Ni})	1.8E-04	1.1E-04	1.5E-04	1.4E-04

Results for Arsenic in runs 1, 2, & 3 and Cadmium run 2 were below the detection limit. The detection limit was used for emission purposes.

Location Caterpillar, Inc - Virginia Beach, VA
Source 3516HD Generator (L100)
Project No. 2019-0420
Parameter Arsenic, Cadmium, Nickel

Run Number		Run 1	Run 2	Run 3	Average
Date		3/5/19	3/5/19	3/5/19	--
Start Time		11:05	13:59	16:02	--
Stop Time		12:05	14:59	17:02	--
Run Time, min		60.0	60.0	60.0	60.0
VELOCITY HEAD, in. WC					
Point 1		3.90	3.50	2.70	3.37
Point 2		3.20	3.60	3.10	3.30
Point 3		3.20	3.50	3.50	3.40
Point 4		3.20	2.70	3.40	3.10
Point 5		3.20	2.60	3.00	2.93
Point 6		3.20	2.40	2.70	2.77
Point 7		3.20	3.10	3.10	3.13
Point 8		3.30	3.70	3.50	3.50
Point 9		3.50	4.10	3.60	3.73
Point 10		3.20	3.50	3.30	3.33
Point 11		3.20	3.00	3.00	3.07
Point 12		3.20	2.70	2.80	2.90
CALCULATED DATA					
Square Root of ΔP , (in. WC) ^{1/2}	(ΔP)	1.813	1.783	1.770	1.789
Pitot Tube Coefficient	(Cp)	0.840	0.840	0.840	0.840
Barometric Pressure, in. Hg	(Pb)	30.10	30.10	30.10	30.10
Static Pressure, in. WC	(Pg)	-1.70	-1.70	-1.70	-1.70
Stack Pressure, in. Hg	(Ps)	29.98	29.98	29.98	29.98
Stack Cross-sectional Area, ft ²	(As)	2.18	2.18	2.18	2.18
Temperature, °F	(Ts)	728.3	727.0	727.2	727.5
Temperature, °R	(Ts)	1188.3	1187.0	1187.2	1187.5
Moisture Fraction Measured	(BWSmsd)	0.059	0.056	0.061	0.059
Moisture Fraction @ Saturation	(BWSsat)	202.814	201.344	201.527	201.895
Moisture Fraction	(BWS)	0.059	0.056	0.061	0.059
O ₂ Concentration, %	(O ₂)	11.4	11.3	11.3	11.4
CO ₂ Concentration, %	(CO ₂)	6.8	6.8	6.8	6.8
Molecular Weight, lb/lb-mole (dry)	(Md)	29.54	29.54	29.54	29.54
Molecular Weight, lb/lb-mole (wet)	(Ms)	28.85	28.90	28.84	28.86
Velocity, ft/sec	(Vs)	152.7	149.9	149.0	150.5
VOLUMETRIC FLOW RATE					
At Stack Conditions, acfm	(Qa)	19,982	19,623	19,503	19,703
At Standard Conditions, dscfm	(Qs)	8,368	8,255	8,159	8,261

Location Caterpillar, Inc - Virginia Beach, VA
 Source 3516HD Generator (L100)
 Project No. 2019-0420
 Parameter Arsenic, Cadmium, Nickel
 Analysis --

Run 1		Date: 3/5/19			
Impinger No.	1	2	3	4*	Total
Contents	HNO3/H2O2	HNO3/H2O2	Empty	Silica	--
Initial Volume, mL	100.0	100.0	0.0	225.6	425.6
Final Volume, mL	110.0	132.0	2.0	239.5	483.5
Gain	10.0	32.0	2.0	13.9	57.9
Run 2		Date: 3/5/19			
Impinger No.	1	2	3	4*	Total
Contents	HNO3/H2O2	HNO3/H2O2	Empty	Silica	--
Initial Volume, mL	100.0	100.0	0.0	226.7	426.7
Final Volume, mL	106.0	134.0	4.0	240.2	484.2
Gain	6.0	34.0	4.0	13.5	57.5
Run 3		Date: 3/5/19			
Impinger No.	1	2	3	4*	Total
Contents	HNO3/H2O2	HNO3/H2O2	Empty	Silica	--
Initial Volume, mL	100.0	100.0	0.0	222.5	422.5
Final Volume, mL	122.0	126.0	4.0	234.0	486.0
Gain	22.0	26.0	4.0	11.5	63.5



Isokinetic Field Data

Location: <u>Caterpillar, Inc - Virginia Beach, VA</u>			Start Time: <u>11:05</u>			Source: <u>3516HD Generator (L100)</u>		
Date: <u>3/5/19</u>		Run 1	VALID	End Time: <u>12:05</u>		Project No.: <u>2019-0420</u>		Parameter: <u>Arsenic, Ca</u>

STACK DATA (EST)		EQUIPMENT		STACK DATA (EST)		FILTER NO.		STACK DATA (FINAL)		MOIST. DATA		
Moisture:	11.0 % est.	Meter Box ID:	1690	Est. Tm:	70 °F			Pb:	30.10 in. Hg	Vlc (ml)		
Barometric:	30.10 in. Hg	Y:	0.994	Est. Ts:	709 °F			Pg:	-1.70 in. WC	57.9		
Static Press:	-1.70 in. WC	AH @ (in.WC):	1.816	Est. AP:	3.20 in. WC			O ₂ :	11.4 %	K-FACTOR		
Stack Press:	29.98 in. Hg	Probe ID:	PR402-1	Est. Dn:	0.195 in.			CO ₂ :	6.8 %	0.584		
CO ₂ :	10.0 %	Liner Material:	quartz	Target Rate:	0.75 scfm			Check Pt.		Initial	Final	Corr.
O ₂ :	5.0 %	Pitot ID:	P403-2	LEAK CHECKS		Pre	Mid 1	Mid 2	Post	Mid 1 (cf)		--
N ₂ /CO:	85.0 %	Pitot Cp/Type:	0.840 S-type	Leak Rate (cfm):		0.000	--	--	0.000	Mid 2 (cf)		--
Md:	29.80 lb/lb-mole	Nozzle ID:	GI202	Vacuum (in Hg):		10	--	--	8	Mid 3 (cf)		--
Ms:	28.50 lb/lb-mole	Nozzle Dn (in.):	0.195	Pitot Tube:		Pass	--	--	Pass	Mid-Point Leak Check Vol (cf):		--

Sample Pt.	Sample Time (minutes)		Dry Gas Meter Reading (ft ³)	Pitot Tube ΔP (in WC)	Gas Temperatures (°F)		Orifice Press. ΔH (in. WC)		Pump Vac (in. Hg)	Gas Temperatures (°F)				% ISO	Vs (fps)
	Begin	End			DGM Average	Stack	Ideal	Actual		Probe	Filter	Imp Exit	Aux		
					Amb.	Amb.				Amb.	Amb.	Amb.	Amb.		
A1	0.00	5.00	716.250	3.90	73	727	2.25	2.30	3	264	255	39	-	90.6	167.16
2	5.00	10.00	720.000	3.20	75	728	1.86	1.90	3	261	257	36	-	100.9	151.48
3	10.00	15.00	723.800	3.20	75	728	1.86	1.90	3	268	256	37	-	92.9	151.48
4	15.00	20.00	727.300	3.20	75	728	1.86	1.90	3	257	259	40	-	92.9	151.48
5	20.00	25.00	730.800	3.20	76	728	1.86	1.90	3	252	260	43	-	92.8	151.48
6	25.00	30.00	734.300	3.20	76	729	1.86	1.90	3	257	265	44	-	98.1	151.55
B1	30.00	35.00	738.000	3.20	77	729	1.86	1.90	3	269	258	48	-	95.3	151.55
2	35.00	40.00	741.600	3.30	77	730	1.92	1.90	3	266	254	50	-	93.9	153.96
3	40.00	45.00	745.200	3.50	77	727	2.04	2.10	3	264	263	51	-	96.1	158.36
4	45.00	50.00	749.000	3.20	78	729	1.86	1.90	3	261	259	50	-	97.7	151.55
5	50.00	55.00	752.700	3.20	78	727	1.87	1.90	3	259	260	50	-	95.0	151.42
6	55.00	60.00	756.300	3.20	77	730	1.86	1.90	3	260	261	50	-	99.4	151.61
	60.00	--	760.054										-		--
Final DGM:			760.054												

RESULTS	Run Time		Vm	ΔP	Tm	Ts	Max Vac	ΔH	%ISO	BWS	Y _{qa}
	min	sec	ft ³	in. WC	°F	°F		in. WC			
	60.0		43.804	3.29	76.2	728.3	3	1.950	90.8	0.059	-6.4



Isokinetic Field Data

Location: Caterpillar, Inc - Virginia Beach, VA				Start Time: 13:59		Source: 3516HD Generator (L100)										
Date: 3/5/19		Run 2		End Time: 14:59		Project No.: 2019-0420		Parameter: Arsenic, C								
STACK DATA (EST)			EQUIPMENT			STACK DATA (EST)			FILTER NO.		STACK DATA (FINAL)		MOIST. DATA			
Moisture: 6.0 % est.			Meter Box ID: 1690			Est. Tm: 76 °F					Pb: 30.10 in. Hg		Vlc (ml)			
Barometric: 30.10 in. Hg			Y: 0.994			Est. Ts: 728 °F					Pg: -1.70 in. WC		K-FACTOR			
Static Press: -1.70 in. WC			ΔH @ (in.WC): 1.816			Est. ΔP: 3.29 in. WC					O ₂ : 11.3 %		0.64			
Stack Press: 29.98 in. Hg			Probe ID: PR402-1			Est. Dn: 0.189 in.					CO ₂ : 6.8 %					
CO ₂ : 10.0 %			Liner Material: quartz			Target Rate: 0.75 scfm										
O ₂ : 5.0 %			Pitot ID: P403-2			LEAK CHECKS			Pre		Mid 1		Mid 2		Post	
N ₂ /CO: 85.0 %			Pitot Cp/Type: 0.840 S-type			Leak Rate (cfm): 0.000			--		--		0.000		Mid 1 (cf) --	
Md: 29.80 lb/lb-mole			Nozzle ID: GI202			Vacuum (in Hg): 8			--		--		9		Mid 2 (cf) --	
Ms: 29.09 lb/lb-mole			Nozzle Dn (in.): 0.195			Pitot Tube: Pass			--		--		Pass		Mid 3 (cf) --	
															Mid-Point Leak Check Vol (cf): --	

Sample Pt.	Sample Time (minutes)		Dry Gas Meter Reading (ft ³)	Pitot Tube ΔP (in WC)	Gas Temperatures (°F)		Orifice Press. ΔH (in. WC)		Pump Vac (in. Hg)	Gas Temperatures (°F)				% ISO	Vs (fps)
					DGM Average	Stack				Probe	Filter	Imp Exit	Aux		
	Amb.	Amb.			Amb.	Amb.	Amb.	Amb.							
	Begin	End			--	--	--	--							
A1	0.00	5.00	760.335	3.50	79	726	2.24	2.30	2	257	265	39	-	90.8	156.68
2	5.00	10.00	764.100	3.60	77	725	2.29	2.30	2	258	262	39	-	90.6	158.83
3	10.00	15.00	767.900	3.50	79	727	2.23	2.30	3	258	261	38	-	98.9	156.74
4	15.00	20.00	772.000	2.70	78	727	1.72	1.70	3	257	260	39	-	98.9	137.67
5	20.00	25.00	775.600	2.60	78	728	1.66	1.70	3	265	260	46	-	103.6	135.15
6	25.00	30.00	779.300	2.40	79	726	1.54	1.50	3	264	260	52	-	98.8	129.74
B1	30.00	35.00	782.700	3.10	79	728	1.98	2.00	3	263	259	56	-	105.0	147.58
2	35.00	40.00	786.800	3.70	77	733	2.34	2.40	3	267	262	57	-	96.8	161.57
3	40.00	45.00	790.900	4.10	77	726	2.61	2.60	3	258	261	57	-	96.2	169.58
4	45.00	50.00	795.200	3.50	77	726	2.23	2.20	3	259	264	57	-	94.3	156.68
5	50.00	55.00	799.100	3.00	76	726	1.91	1.90	3	265	261	59	-	96.8	145.05
6	55.00	60.00	802.800	2.70	75	726	1.72	1.70	3	261	257	62	-	104.3	137.61
--	60.00	--	806.579										-		--
Final DGM:			806.579												

RESULTS	Run Time		Vm		ΔP		Tm		Ts		Max Vac	ΔH		%ISO	BWS	Y _{qa}
	min		ft ³		in. WC		°F		°F		in. WC					
	60.0		46.244		3.20		77.6		727.0		3	2.050		96.9	0.056	-3.1



Isokinetic Field Data

Location: Caterpillar, Inc - Virginia Beach, VA				Start Time: 16:02		Source: 3516HD Generator (L100)					
Date: 3/5/19		Run 3		VALID		End Time: 17:02		Project No.: 2019-0420		Parameter: Arsenic, C	

STACK DATA (EST)		EQUIPMENT		STACK DATA (EST)		FILTER NO.		STACK DATA (FINAL)		MOIST. DATA			
Moisture:	6.0 % est.	Meter Box ID:	1690	Est. Tm:	78 °F			Pb:	30.10 in. Hg	Vlc (ml)			
Barometric:	30.10 in. Hg	Y:	0.994	Est. Ts:	727 °F			Pg:	-1.70 in. WC	63.5			
Static Press:	-1.70 in. WC	ΔH @ (in.WC):	1.816	Est. ΔP:	3.20 in. WC			O ₂ :	11.3 %	K-FACTOR			
Stack Press:	29.98 in. Hg	Probe ID:	PR402-1	Est. Dn:	0.190 in.			CO ₂ :	6.8 %	0.638			
CO ₂ :	10.0 %	Liner Material:	quartz	Target Rate:	0.75 scfm			Check Pt. Initial Final Corr.					
O ₂ :	5.0 %	Pitot ID:	P403-2	LEAK CHECKS				Pre	Mid 1	Mid 2	Post	Mid 1 (cf)	--
N ₂ /CO:	85.0 %	Pitot Cp/Type:	0.840 S-type	Leak Rate (cfm):		0.000	--	--	0.000		Mid 2 (cf)	--	
Md:	29.80 lb/lb-mole	Nozzle ID:	GI202	Vacuum (in Hg):		10	--	--	8		Mid 3 (cf)	--	
Ms:	29.09 lb/lb-mole	Nozzle Dn (in.):	0.195	Pitot Tube:		Pass	--	--	Pass		Mid-Point Leak Check Vol (cf):	--	

Sample Pt.	Sample Time (minutes)		Dry Gas Meter Reading (ft ³)	Pitot Tube ΔP (in WC)	Gas Temperatures (°F)		Orifice Press. ΔH (in. WC)		Pump Vac (in. Hg)	Gas Temperatures (°F)				% ISO	Vs (fps)
	Begin	End			DGM Average		Ideal	Actual		Probe	Filter	Imp Exit	Aux		
					Amb.	Stack									
A1	0.00	5.00	806.840	2.70	70	728	1.70	1.70	3	266	261	41	-	93.7	137.73
2	5.00	10.00	810.200	3.10	69	727	1.94	2.00	3	258	260	48	-	96.5	147.51
3	10.00	15.00	813.900	3.50	70	727	2.20	2.20	3	257	260	46	-	93.2	156.74
4	15.00	20.00	817.700	3.40	69	728	2.13	2.10	3	254	260	46	-	102.2	154.55
5	20.00	25.00	821.800	3.00	70	726	1.89	1.90	3	257	260	47	-	103.2	145.05
6	25.00	30.00	825.700	2.70	71	728	1.70	1.70	3	254	268	49	-	100.2	137.73
B1	30.00	35.00	829.300	3.10	69	726	1.95	2.00	3	254	249	51	-	91.3	147.45
2	35.00	40.00	832.800	3.50	70	728	2.20	2.20	3	256	267	52	-	98.1	156.81
3	40.00	45.00	836.800	3.60	70	728	2.26	2.30	4	266	259	55	-	91.9	159.03
4	45.00	50.00	840.600	3.30	69	726	2.07	2.10	5	257	259	56	-	108.7	152.13
5	50.00	55.00	844.900	3.00	69	726	1.88	1.90	5	256	259	58	-	106.0	145.05
6	55.00	60.00	848.900	2.80	69	728	1.76	1.80	5	264	260	60	-	103.6	140.25
--	60.00	--	852.675										-		--
Final DGM:			852.675												

RESULTS	Run Time		Vm		ΔP		Tm		Ts		Max Vac		ΔH		%ISO	BWS	Y _{qa}
		60.0	min	45.835	ft ³	3.14	in. WC	69.6	°F	727.2	°F	5		1.992	in. WC	98.7	0.061

Location Caterpillar, Inc - Virginia Beach, VA

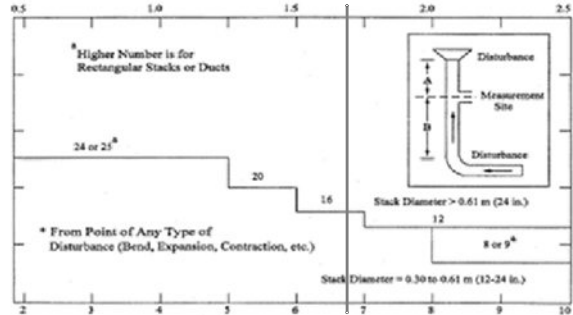
Source 3516HD Generator (LC 100)

Project No. 2019-0420

Date: 03/05/19

Stack Parameters

Duct Orientation:	Horizontal
Duct Design:	Circular
Distance from Far Wall to Outside of Port:	20.00 in
Nipple Length:	0.00 in
Depth of Duct:	20.00 in
Cross Sectional Area of Duct:	2.18 ft ²
No. of Test Ports:	2
Distance A:	4.5 ft
Distance A Duct Diameters:	2.7 (must be > 0.5)
Distance B:	11.2 ft
Distance B Duct Diameters:	6.7 (must be > 2)
Minimum Number of Traverse Points:	16
Actual Number of Traverse Points:	12
Number of Readings per Point:	1



CIRCULAR DUCT

LOCATION OF TRAVERSE POINTS

Number of traverse points on a diameter

	2	3	4	5	6	7	8	9	10	11	12
1	14.6	--	6.7	--	4.4	--	3.2	--	2.6	--	2.1
2	85.4	--	25.0	--	14.6	--	10.5	--	8.2	--	6.7
3	--	--	75.0	--	29.6	--	19.4	--	14.6	--	11.8
4	--	--	93.3	--	70.4	--	32.3	--	22.6	--	17.7
5	--	--	--	--	85.4	--	67.7	--	34.2	--	25.0
6	--	--	--	--	95.6	--	80.6	--	65.8	--	35.6
7	--	--	--	--	--	--	89.5	--	77.4	--	64.4
8	--	--	--	--	--	--	96.8	--	85.4	--	75.0
9	--	--	--	--	--	--	--	--	91.8	--	82.3
10	--	--	--	--	--	--	--	--	97.4	--	88.2
11	--	--	--	--	--	--	--	--	--	--	93.3
12	--	--	--	--	--	--	--	--	--	--	97.9

Traverse Point	% of Diameter	Distance from inside wall	Distance from outside of port
1	4.4	0.88	0.88
2	14.6	2.92	2.92
3	29.6	5.92	5.92
4	70.4	14.08	14.08
5	85.4	17.08	17.08
6	95.6	19.12	19.12
7	--	--	--
8	--	--	--
9	--	--	--
10	--	--	--
11	--	--	--
12	--	--	--

*Percent of stack diameter from inside wall to traverse point.

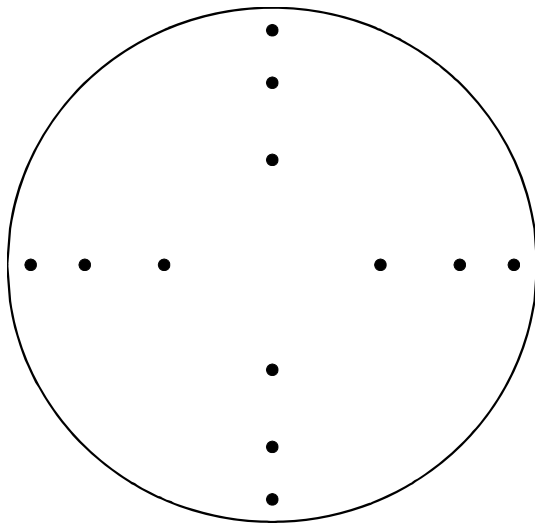
Stack Diagram

A = 4.5 ft.

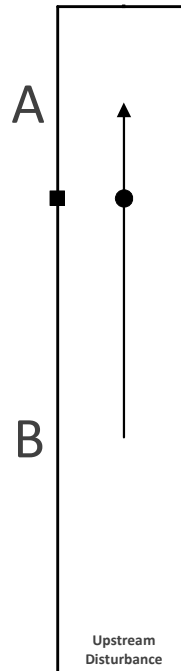
B = 11.208333;

Depth of Duct = 20 in.

Cross Sectional Area



Downstream Disturbance



Upstream Disturbance

Location Caterpillar, Inc - Virginia Beach, VA
 Source 3516HD Generator (LC 100)
 Project No. 2019-0420
 Parameter Hexavalent Chromium

Run Number		Run 1	Run 2	Run 3	Average
Date		3/5/19	3/5/19	3/5/19	--
Start Time		11:05	13:59	16:02	--
Stop Time		12:05	14:59	17:02	--
Run Time, min	(θ)	60.0	60.0	60.0	60.0
INPUT DATA					
Barometric Pressure, in. Hg	(Pb)	30.10	30.10	30.10	30.10
Meter Correction Factor	(Y)	1.000	1.000	1.000	1.000
Orifice Calibration Value	($\Delta H @$)	1.753	1.753	1.753	1.753
Meter Volume, ft ³	(Vm)	42.207	44.144	40.628	42.326
Meter Temperature, °F	(Tm)	79.1	82.1	71.8	77.6
Meter Temperature, °R	(Tm)	539.1	542.1	531.8	537.6
Meter Orifice Pressure, in. WC	(ΔH)	1.650	1.800	1.742	1.731
Volume H ₂ O Collected, mL	(Vlc)	58.0	57.9	57.3	57.7
Nozzle Diameter, in	(Dn)	0.190	0.190	0.190	0.190
Area of Nozzle, ft ²	(An)	0.0002	0.0002	0.0002	0.0002
Hexavalent Chromium, ug	(M _{Cr+6})	4.1	<u>5.0</u>	<u>5.0</u>	4.7
ISOKINETIC DATA					
Standard Meter Volume, ft ³	(Vmstd)	41.755	43.446	40.757	41.986
Standard Water Volume, ft ³	(Vwstd)	2.730	2.725	2.698	2.718
Moisture Fraction Measured	(BWSmsd)	0.061	0.059	0.062	0.061
Moisture Fraction @ Saturation	(BWSsat)	202.814	201.344	201.161	201.773
Moisture Fraction	(BWS)	0.061	0.059	0.062	0.061
Meter Pressure, in Hg	(Pm)	30.22	30.23	30.23	30.23
Volume at Nozzle, ft ³	(Vn)	99.941	103.612	97.500	100.351
Isokinetic Sampling Rate, (%)	(I)	92.5	97.4	92.3	94.1
DGM Calibration Check Value, (+/- 5%)	(Y _{qa})	-3.1	-2.9	-9.1	-5.0
EMISSION CALCULATIONS					
Hexavalent Chromium Concentration, ug/dscm	(C _{Cr+6})	3.5	4.1	4.3	4.0
Hexavalent Chromium Emission Rate, lb/hr	(ER _{Cr+6})	1.1E-04	1.3E-04	1.3E-04	1.2E-04

Results for Hexavalent Chromium in runs 2 & 3 were below the detection limit. The detection limit was used for emissions purposes.

Location Caterpillar, Inc - Virginia Beach, VA
Source 3516HD Generator (LC 100)
Project No. 2019-0420
Parameter Hexavalent Chromium

Run Number		Run 1	Run 2	Run 3	Average
Date		3/5/19	3/5/19	3/5/19	--
Start Time		11:05	13:59	16:02	--
Stop Time		12:05	14:59	17:02	--
Run Time, min		60.0	60.0	60.0	60.0
VELOCITY HEAD, in. WC					
Point 1		3.50	3.50	2.70	3.23
Point 2		3.40	3.60	3.10	3.37
Point 3		3.20	3.50	3.50	3.40
Point 4		3.20	2.70	3.40	3.10
Point 5		3.20	2.60	3.00	2.93
Point 6		3.20	2.40	2.70	2.77
Point 7		3.20	3.10	3.10	3.13
Point 8		3.30	3.70	3.50	3.50
Point 9		3.50	4.10	3.60	3.73
Point 10		3.20	3.50	3.30	3.33
Point 11		3.20	3.00	3.00	3.07
Point 12		3.20	2.70	2.80	2.90
CALCULATED DATA					
Square Root of ΔP , (in. WC) ^{1/2}	(ΔP)	1.809	1.783	1.770	1.788
Pitot Tube Coefficient	(Cp)	0.840	0.840	0.840	0.840
Barometric Pressure, in. Hg	(Pb)	30.10	30.10	30.10	30.10
Static Pressure, in. WC	(Pg)	-1.70	-1.70	-1.70	-1.70
Stack Pressure, in. Hg	(Ps)	29.98	29.98	29.98	29.98
Stack Cross-sectional Area, ft ²	(As)	2.18	2.18	2.18	2.18
Temperature, °F	(Ts)	728.3	727.0	726.8	727.4
Temperature, °R	(Ts)	1188.3	1187.0	1186.8	1187.4
Moisture Fraction Measured	(BWSmsd)	0.061	0.059	0.062	0.061
Moisture Fraction @ Saturation	(BWSsat)	202.814	201.344	201.161	201.773
Moisture Fraction	(BWS)	0.061	0.059	0.062	0.061
O ₂ Concentration, %	(O ₂)	11.4	11.3	11.2	11.3
CO ₂ Concentration, %	(CO ₂)	6.8	6.8	6.9	6.8
Molecular Weight, lb/lb-mole (dry)	(Md)	29.54	29.54	29.55	29.54
Molecular Weight, lb/lb-mole (wet)	(Ms)	28.83	28.86	28.83	28.84
Velocity, ft/sec	(Vs)	152.4	150.0	149.0	150.5
VOLUMETRIC FLOW RATE					
At Stack Conditions, acfm	(Qa)	19,946	19,635	19,501	19,694
At Standard Conditions, dscfm	(Qs)	8,334	8,234	8,152	8,240

Location Caterpillar, Inc - Virginia Beach, VA

Source 3516HD Generator (LC 100)

Project No. 2019-0420

Parameter Hexavalent Chromium

Analysis Volumetric

Run 1						
	Date: 3/5/19					
Impinger No.	1	2	3	4	5*	Total
Contents	KOH	KOH	KOH	Empty	Silica	--
Initial Volume, mL	150.0	75.0	75.0	0.0	232.0	532.0
Final Volume, mL	183.0	94.0	77.0	0.0	236.0	590.0
Gain	33.0	19.0	2.0	0.0	4.0	58.0
Run 2						
	Date: 3/5/19					
Impinger No.	1	2	3	4	5*	Total
Contents	KOH	KOH	KOH	Empty	Silica	--
Initial Volume, mL	150.0	75.0	75.0	0.0	254.8	554.8
Final Volume, mL	186.0	89.0	78.0	0.0	259.7	612.7
Gain	36.0	14.0	3.0	0.0	4.9	57.9
Run 3						
	Date: 3/5/19					
Impinger No.	1	2	3	4	5*	Total
Contents	KOH	KOH	KOH	Empty	Silica	--
Initial Volume, mL	150.0	75.0	75.0	0.0	225.4	525.4
Final Volume, mL	180.0	88.0	76.0	0.0	238.7	582.7
Gain	30.0	13.0	1.0	0.0	13.3	57.3



Isokinetic Field Data

Location: Caterpillar, Inc - Virginia Beach, VA			Start Time: 11:05			Source: 3516HD Generator (LC 100)			
Date: 3/5/19		Run 1	VALID	End Time: 12:05		Project No.: 2019-0420		Parameter: Hexavalent	

STACK DATA (EST)		EQUIPMENT		STACK DATA (EST)		FILTER NO.		STACK DATA (FINAL)		MOIST. DATA			
Moisture:	11.0 % est.	Meter Box ID:	2051	Est. Tm:	70 °F			Pb:	30.10 in. Hg	Vlc (ml)			
Barometric:	30.10 in. Hg	Y:	1.000	Est. Ts:	709 °F			Pg:	-1.70 in. WC	58.0			
Static Press:	-1.70 in. WC	AH @ (in.WC):	1.753	Est. AP:	3.20 in. WC			O ₂ :	11.4 %	K-FACTOR			
Stack Press:	29.98 in. Hg	Probe ID:	PR403-2	Est. Dn:	0.195 in.			CO ₂ :	6.8 %	0.508			
CO ₂ :	10.0 %	Liner Material:	quartz	Target Rate:	0.75 scfm					Check Pt.	Initial	Final	Corr.
O ₂ :	5.0 %	Pitot ID:	P403-2	LEAK CHECKS		Pre	Mid 1	Mid 2	Post	Mid 1 (cf)		--	
N ₂ /CO:	85.0 %	Pitot Cp/Type:	0.840 S-type	Leak Rate (cfm):		0.015	--	--	0.010	Mid 2 (cf)		--	
Md:	29.80 lb/lb-mole	Nozzle ID:	GL208	Vacuum (in Hg):		8	--	--	4	Mid 3 (cf)		--	
Ms:	28.50 lb/lb-mole	Nozzle Dn (in.):	0.190	Pitot Tube:		Pass	--	--	Pass	Mid-Point Leak Check Vol (cf): --			

Sample Pt.	Sample Time (minutes)		Dry Gas Meter Reading (ft ³)	Pitot Tube ΔP (in WC)	Gas Temperatures (°F)		Orifice Press. ΔH (in. WC)		Pump Vac (in. Hg)	Gas Temperatures (°F)				% ISO	Vs (fps)
					DGM Average	Stack	Ideal			Probe	Filter	Imp Exit	Aux		
	Amb.	Amb.					Amb.	Amb.		Amb.	Amb.				
	Begin	End			NA	NA	NA	NA		NA	NA				
A1	0.00	5.00	193.532	3.50	72	727	1.76	1.80	4	NA	NA	41	-	91.1	158.36
2	5.00	10.00	196.900	3.40	76	728	1.72	1.70	4	NA	NA	38	-	98.0	156.14
3	10.00	15.00	200.500	3.20	77	728	1.62	1.60	4	NA	NA	42	-	100.8	151.48
4	15.00	20.00	204.100	3.20	77	728	1.62	1.60	4	NA	NA	44	-	98.0	151.48
5	20.00	25.00	207.600	3.20	79	728	1.63	1.60	4	NA	NA	45	-	100.5	151.48
6	25.00	30.00	211.200	3.20	80	729	1.63	1.60	4	NA	NA	48	-	94.7	151.55
B1	30.00	35.00	214.600	3.20	80	729	1.63	1.60	4	NA	NA	50	-	94.7	151.55
2	35.00	40.00	218.000	3.30	81	730	1.68	1.70	4	NA	NA	51	-	95.9	153.96
3	40.00	45.00	221.500	3.50	81	727	1.79	1.80	4	NA	NA	53	-	101.0	158.36
4	45.00	50.00	225.300	3.20	82	729	1.64	1.60	4	NA	NA	56	-	97.2	151.55
5	50.00	55.00	228.800	3.20	82	727	1.64	1.60	4	NA	NA	57	-	99.9	151.42
6	55.00	60.00	232.400	3.20	82	730	1.63	1.60	4	NA	NA	57	-	92.7	151.61
	60.00	--	235.739							NA	NA		-		--
Final DGM:			235.739												

RESULTS	Run Time		Vm	ΔP	Tm	Ts	Max Vac	ΔH	%ISO	BWS	Y _{qa}
	min	sec	ft ³	in. WC	°F	°F		in. WC			
	60.0		42.207	3.28	79.1	728.3	4	1.650	92.5	0.061	-3.1



Isokinetic Field Data

Location: Caterpillar, Inc - Virginia Beach, VA				Start Time: 13:59		Source: 3516HD Generator (LC 100)										
Date: 3/5/19		Run 2		End Time: 14:59		Project No.: 2019-0420		Parameter: Hexavalent								
STACK DATA (EST)			EQUIPMENT			STACK DATA (EST)			FILTER NO.		STACK DATA (FINAL)		MOIST. DATA			
Moisture: 6.0 % est.			Meter Box ID: 2051			Est. Tm: 79 °F					Pb: 30.10 in. Hg		Vlc (ml)			
Barometric: 30.10 in. Hg			Y: 1.000			Est. Ts: 728 °F					Pg: -1.70 in. WC		K-FACTOR			
Static Press: -1.70 in. WC			ΔH @ (in.WC): 1.753			Est. ΔP: 3.28 in. WC					O ₂ : 11.3 %		0.56			
Stack Press: 29.98 in. Hg			Probe ID: PR403-2			Est. Dn: 0.189 in.					CO ₂ : 6.8 %					
CO ₂ : 10.0 %			Liner Material: quartz			Target Rate: 0.75 scfm										
O ₂ : 5.0 %			Pitot ID: P403-2			LEAK CHECKS			Pre		Mid 1		Mid 2		Post	
N ₂ /CO: 85.0 %			Pitot Cp/Type: 0.840 S-type			Leak Rate (cfm): 0.013			--		--		0.010		Mid 1 (cf)	
Md: 29.80 lb/lb-mole			Nozzle ID: GL208			Vacuum (in Hg): 9			--		--		5		Mid 2 (cf)	
Ms: 29.09 lb/lb-mole			Nozzle Dn (in.): 0.190			Pitot Tube: Pass			--		--		Pass		Mid 3 (cf)	
											Mid-Point Leak Check Vol (cf):		--			

Sample Pt.	Sample Time (minutes)		Dry Gas Meter Reading (ft ³)	Pitot Tube ΔP (in WC)	Gas Temperatures (°F)		Orifice Press. ΔH (in. WC)		Pump Vac (in. Hg)	Gas Temperatures (°F)				% ISO	Vs (fps)
					DGM Average	Stack	Ideal			Actual	Probe	Filter	Imp Exit		
	Amb.	Amb.					Amb.	Amb.		Amb.	Amb.				
	Begin	End			--	--	--	--		--	--				
A1	0.00	5.00	235.948	3.50	80	726	1.95	1.90	4	NA	NA	42	-	95.6	156.68
2	5.00	10.00	239.700	3.60	82	725	2.02	2.00	4	NA	NA	38	-	95.1	158.83
3	10.00	15.00	243.500	3.50	84	727	1.96	2.00	4	NA	NA	39	-	98.7	156.74
4	15.00	20.00	247.400	2.70	84	727	1.52	1.50	5	NA	NA	44	-	106.5	137.67
5	20.00	25.00	251.100	2.60	83	728	1.46	1.50	5	NA	NA	44	-	97.0	135.15
6	25.00	30.00	254.400	2.40	83	726	1.35	1.40	5	NA	NA	51	-	97.8	129.74
B1	30.00	35.00	257.600	3.10	82	728	1.73	1.70	5	NA	NA	56	-	99.8	147.58
2	35.00	40.00	261.300	3.70	82	733	2.06	2.10	5	NA	NA	56	-	96.6	161.57
3	40.00	45.00	265.200	4.10	82	726	2.29	2.30	5	NA	NA	61	-	93.9	169.58
4	45.00	50.00	269.200	3.50	82	726	1.96	2.00	5	NA	NA	63	-	91.4	156.68
5	50.00	55.00	272.800	3.00	81	726	1.68	1.70	5	NA	NA	64	-	101.6	145.05
6	55.00	60.00	276.500	2.70	80	726	1.51	1.50	5	NA	NA	66	-	104.1	137.61
--	60.00	--	280.092							NA	NA		-		--
Final DGM:			280.092												

RESULTS	Run Time		Vm		ΔP		Tm		Ts		Max Vac	ΔH		%ISO	BWS	Y _{qa}
	min		ft ³		in. WC		°F		°F		in. WC					
	60.0		44.144		3.20		82.1		727.0		5	1.800		97.4	0.059	-2.9



Isokinetic Field Data

Location: Caterpillar, Inc - Virginia Beach, VA				Start Time: 16:02		Source: 3516HD Generator (LC 100)								
Date: 3/5/19		Run 3		End Time: 17:02		Project No.: 2019-0420		Parameter: Hexavalent						
STACK DATA (EST)			EQUIPMENT			STACK DATA (EST)			FILTER NO.		STACK DATA (FINAL)		MOIST. DATA	
Moisture: 6.0 % est.			Meter Box ID: 2051			Est. Tm: 82 °F					Pb: 30.10 in. Hg		Vlc (ml)	
Barometric: 30.10 in. Hg			Y: 1.000			Est. Ts: 727 °F					Pg: -1.70 in. WC		57.3	
Static Press: -1.70 in. WC			ΔH @ (in.WC): 1.753			Est. ΔP: 3.20 in. WC					O ₂ : 11.2 %		K-FACTOR	
Stack Press: 29.98 in. Hg			Probe ID: PR403-2			Est. Dn: 0.190 in.					CO ₂ : 6.9 %		0.559	
CO ₂ : 10.0 %			Liner Material: quartz			Target Rate: 0.75 scfm					Check Pt.		Initial Final Corr.	
O ₂ : 5.0 %			Pitot ID: P403-2			LEAK CHECKS			Pre Mid 1 Mid 2 Post		Mid 1 (cf)		--	
N ₂ /CO: 85.0 %			Pitot Cp/Type: 0.840 S-type			Leak Rate (cfm): 0.016			-- -- 0.010		Mid 2 (cf)		--	
Md: 29.80 lb/lb-mole			Nozzle ID: GL208			Vacuum (in Hg): 8			-- -- 5		Mid 3 (cf)		--	
Ms: 29.09 lb/lb-mole			Nozzle Dn (in.): 0.190			Pitot Tube: Pass			-- -- Pass		Mid-Point Leak Check Vol (cf): --			

Sample Pt.	Sample Time (minutes)		Dry Gas Meter Reading (ft ³)	Pitot Tube ΔP (in WC)	Gas Temperatures (°F)		Orifice Press. ΔH (in. WC)		Pump Vac (in. Hg)	Gas Temperatures (°F)				% ISO	Vs (fps)
					DGM Average	Stack	Ideal Actual			Probe	Filter	Imp Exit	Aux		
	Amb.	Amb.					Amb.	Amb.		Amb.	Amb.				
	Begin	End			--	--	--	--		--	--				
A1	0.00	5.00	280.724	2.70	70	728	1.48	1.50	4	NA	NA	41	-	102.7	137.73
2	5.00	10.00	284.200	3.10	71	727	1.70	1.70	4	NA	NA	44	-	90.8	147.51
3	10.00	15.00	287.500	3.50	72	727	1.92	2.00	4	NA	NA	45	-	95.7	156.74
4	15.00	20.00	291.200	3.40	72	727	1.87	1.90	4	NA	NA	50	-	94.5	154.49
5	20.00	25.00	294.800	3.00	72	723	1.65	1.70	4	NA	NA	52	-	103.2	144.87
6	25.00	30.00	298.500	2.70	72	728	1.48	1.50	4	NA	NA	53	-	106.0	137.73
B1	30.00	35.00	302.100	3.10	72	726	1.70	1.70	5	NA	NA	55	-	109.8	147.45
2	35.00	40.00	306.100	3.50	72	728	1.92	1.90	5	NA	NA	55	-	100.9	156.81
3	40.00	45.00	310.000	3.60	72	728	1.97	2.00	5	NA	NA	58	-	94.4	159.03
4	45.00	50.00	313.700	3.30	72	726	1.81	1.80	5	NA	NA	59	-	101.2	152.13
5	50.00	55.00	317.500	3.00	72	726	1.65	1.70	5	NA	NA	60	-	107.5	145.05
6	55.00	60.00	321.352	2.80	72	728	1.54	1.50	5	NA	NA	63	-	0.0	140.25
--	60.00	--	321.352							NA	NA		-		--
Final DGM:			321.352												

RESULTS	Run Time		Vm		ΔP		Tm		Ts		Max Vac	ΔH		%ISO	BWS	Y _{qa}
	60.0	min	40.628	ft ³	3.14	in. WC	71.8	°F	726.8	°F	5	1.742	in. WC	92.3	0.062	-9.1

Location Caterpillar, Inc - Virginia Beach, VA
Source 3516HD Generator (LC 100)
Project No. 2019-0420
Parameter(s): Formaldehyde/ VOCs

Run Number		Run 1	Run 2	Run 3	Average
Date		3/5/19	3/5/19	3/5/19	--
Start Time		11:05	13:59	16:02	--
Stop Time		12:05	14:59	17:02	--
Input Data					
Volumetric Flow Rate, dscfm	(Qs)	8,268	8,234	8,173	8,225
Standard Meter Volume, L	(Vmstd)	44.269	44.281	44.502	44.351
Formaldehyde Mass, ug	M(CH2O)	52.85	49.98	35.62	46.15
Acetaldehyde Mass, ug	M(C2H4O)	<u>63.96</u>	<u>65.52</u>	<u>65.52</u>	65.00
Benzene Mass, ug	M(C6H6)	<u>71.75</u>	<u>73.5</u>	<u>73.5</u>	72.92
Ethylbenzene Mass, ug	M(C8H10)	<u>70.93</u>	<u>72.66</u>	<u>72.66</u>	72.08
Hexane Mass, ug	M(C6H14)	<u>52.89</u>	<u>54.18</u>	<u>54.18</u>	53.75
Pollutant Concentration (Bag Samples)					
1,3 Butadiene Mass, ppmvd	M(C4H6)	<u>0.10</u>	<u>0.10</u>	<u>0.10</u>	0.10
Acetaldehyde Mass, ppmvd	M(C2H4O)	<u>1.00</u>	<u>1.00</u>	<u>1.00</u>	1.00
Benzene Mass, ppmvd	M(C6H6)	<u>0.10</u>	<u>0.10</u>	<u>0.10</u>	0.10
Ethylbenzene Mass, ppmvd	M(C8H10)	<u>0.10</u>	<u>0.10</u>	<u>0.10</u>	0.10
Hexane Mass, ppmvd	M(C6H14)	<u>0.10</u>	<u>0.10</u>	<u>0.10</u>	0.10
Emissions Calculations					
Formaldehyde Concentration, ppmvd	C(CH2O)	0.96	0.90	0.64	0.83
Formaldehyde Emission Rate, lb/hr	ER(CH2O)	0.037	0.035	0.024	0.032
1,3 Butadiene Concentration, ppmvd	C(C4H6)	0.10	0.10	0.10	0.10
1,3 Butadiene Emission Rate, lb/hr	ER(C4H6)	0.0070	0.0069	0.0069	0.0069
Acetaldehyde Concentration, ppmvd	C(C2H4O)	0.79	0.81	0.80	0.80
Acetaldehyde Concentration, ppmvd (Combined)	C(C2H4O)	1.8	1.8	1.8	1.8
Acetaldehyde Emission Rate, lb/hr	ER(C2H4O)	0.10	0.10	0.10	0.10
Benzene Concentration, ppmvd	C(C6H6)	0.50	0.51	0.51	0.51
Benzene Concentration, ppmvd (Combined)	C(C6H6)	0.60	0.61	0.61	0.61
Benzene Emission Rate, lb/hr	ER(C6H6)	0.060	0.061	0.060	0.061
Ethylbenzene Concentration, ppmvd	C(C8H10)	0.36	0.37	0.37	0.37
Ethylbenzene Concentration, ppmvd (Combined)	C(C8H10)	0.46	0.47	0.47	0.47
Ethylbenzene Emission Rate, lb/hr	ER(C8H10)	0.063	0.064	0.063	0.064
Hexane Concentration, ppmvd	C(C6H14)	0.33	0.34	0.34	0.34
Hexane Concentration, ppmvd (Combined)	C(C6H14)	0.43	0.44	0.44	0.44
Hexane Emission Rate, lb/hr	ER(C6H14)	0.048	0.049	0.048	0.048

Undelined values indicate that the laboratory result was below the detection limit. The detection limit was used for emission calculation purposes.



Location Caterpillar, Inc - Virginia Beach, VA
 Source 3516HD Generator (LC 100)

Project No. 2019-0420

Parameter(s): Formaldehyde/ VOCs
 Console Type Low Flow

Run No.	1					2					3				
Date	3/5/19					3/5/19					3/5/19				
Status	VALID					VALID					VALID				
Start Time	11:05					13:59					16:02				
End Time	12:05					14:59					17:02				
Run Time, min (0)	60					60					60				
Meter ID	2071					2071					2071				
Meter Correction Factor (Y)	0.985					0.985					0.985				
Orifice Calibration Value (AH @)	1.800					1.800					1.800				
Max Vacuum, in. Hg	0					0					0				
Post Leak Check, L/min (at max vac.)	0.000					0.000					0.000				
Meter Volume, L															
0	0.000					0.000					0.000				
5	3.760					3.750					3.760				
10	7.490					7.570					7.450				
15	11.150					11.380					11.300				
20	14.570					15.210					15.050				
25	18.680					18.910					18.880				
30	22.600					22.560					22.600				
35	26.390					26.360					26.410				
40	30.190					30.050					30.060				
45	33.920					33.930					33.700				
50	37.680					37.740					37.560				
55	41.290					41.600					41.420				
60	44.940					45.470					45.300				
Total Meter Volume, L (Vm)	44.940					45.470					45.300				
Temperature, °F	Meter	Probe	Filter	Vacuum	Imp. Exit	Meter	Probe	Filter	Vacuum	Imp. Exit	Meter	Probe	Filter	Vacuum	Imp. Exit
0	68	--	--	0	--	79	--	--	0	--	76	--	--	0	--
5	71	--	--	0	--	79	--	--	0	--	76	--	--	0	--
10	72	--	--	0	--	79	--	--	0	--	76	--	--	0	--
15	72	--	--	0	--	79	--	--	0	--	75	--	--	0	--
20	73	--	--	0	--	79	--	--	0	--	75	--	--	0	--
25	73	--	--	0	--	80	--	--	0	--	75	--	--	0	--
30	74	--	--	0	--	80	--	--	0	--	75	--	--	0	--
35	74	--	--	0	--	80	--	--	0	--	75	--	--	0	--
40	75	--	--	0	--	80	--	--	0	--	75	--	--	0	--
45	76	--	--	0	--	81	--	--	0	--	75	--	--	0	--
50	76	--	--	0	--	81	--	--	0	--	75	--	--	0	--
55	77	--	--	0	--	81	--	--	0	--	75	--	--	0	--
60	78	--	--	0	--	81	--	--	0	--	75	--	--	0	--
Average Temperature, °F (Tm)	74	--	--	--	--	80	--	--	--	--	75	--	--	--	--
Average Temperature, °R (Tm)	533	--	--	--	--	540	--	--	--	--	535	--	--	--	--
Minimum Temperature, °F	68	--	--	--	--	79	--	--	--	--	75	--	--	--	--
Maximum Temperature, °F	78	--	--	--	--	81	--	--	--	--	76	--	--	--	--
Barometric Pressure, in. Hg (Pb)	30.10					30.10					30.10				
Meter Orifice Pressure, in. WC (AH)	1.800					1.800					1.800				
Meter Pressure, in. Hg (Pm)	30.23					30.23					30.23				
Standard Meter Volume, L (Vmstd)	44.269					44.281					44.502				

Location Caterpillar, Inc - Virginia Beach, VA

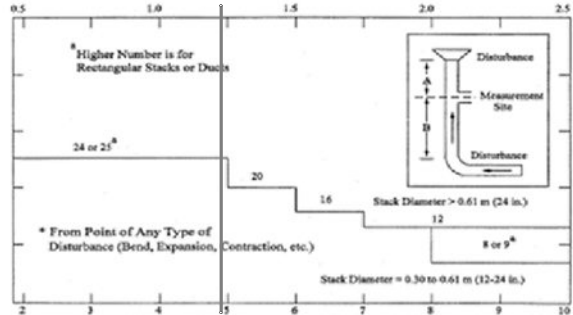
Source 3516HD Generator (LC 100)

Project No. 2019-0420

Date: 03/05/19

Stack Parameters

Duct Orientation:	Horizontal
Duct Design:	Circular
Distance from Far Wall to Outside of Port:	20.00 in
Nipple Length:	0.00 in
Depth of Duct:	20.00 in
Cross Sectional Area of Duct:	2.18 ft ²
No. of Test Ports:	2
Distance A:	7.5 ft
Distance A Duct Diameters:	4.5 (must be > 0.5)
Distance B:	8.2 ft
Distance B Duct Diameters:	4.9 (must be > 2)
Minimum Number of Traverse Points:	24
Actual Number of Traverse Points:	12
Number of Readings per Point:	1



CIRCULAR DUCT

LOCATION OF TRAVERSE POINTS

Number of traverse points on a diameter

	2	3	4	5	6	7	8	9	10	11	12
1	14.6	--	6.7	--	4.4	--	3.2	--	2.6	--	2.1
2	85.4	--	25.0	--	14.6	--	10.5	--	8.2	--	6.7
3	--	--	75.0	--	29.6	--	19.4	--	14.6	--	11.8
4	--	--	93.3	--	70.4	--	32.3	--	22.6	--	17.7
5	--	--	--	--	85.4	--	67.7	--	34.2	--	25.0
6	--	--	--	--	95.6	--	80.6	--	65.8	--	35.6
7	--	--	--	--	--	--	89.5	--	77.4	--	64.4
8	--	--	--	--	--	--	96.8	--	85.4	--	75.0
9	--	--	--	--	--	--	--	--	91.8	--	82.3
10	--	--	--	--	--	--	--	--	97.4	--	88.2
11	--	--	--	--	--	--	--	--	--	--	93.3
12	--	--	--	--	--	--	--	--	--	--	97.9

Traverse Point	% of Diameter	Distance from inside wall	Distance from outside of port
1	4.4	0.88	0.88
2	14.6	2.92	2.92
3	29.6	5.92	5.92
4	70.4	14.08	14.08
5	85.4	17.08	17.08
6	95.6	19.12	19.12
7	--	--	--
8	--	--	--
9	--	--	--
10	--	--	--
11	--	--	--
12	--	--	--

*Percent of stack diameter from inside wall to traverse point.

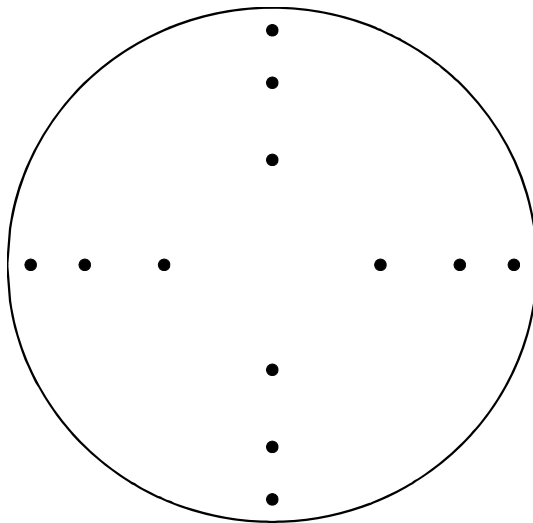
Stack Diagram

A = 7.54166666

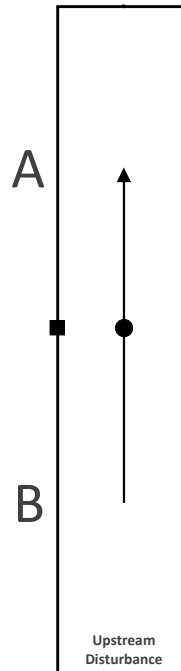
B = 8.16666666

Depth of Duct = 20 in.

Cross Sectional Area



Downstream Disturbance



Location Caterpillar, Inc - Virginia Beach, VA
 Source 3516HD Generator (LC 100)
 Project No. 2019-0420
 Parameter Polycyclic Aromatic Hydrocarbons, Naphthalene

Run Number		Run 1	Run 2	Run 3	Average
Date		3/5/19	3/5/19	3/5/19	--
Start Time		11:05	14:00	16:02	--
Stop Time		12:35	15:30	17:32	--
Run Time, min	(θ)	90.0	90.0	90.0	90.0
INPUT DATA					
Barometric Pressure, in. Hg	(Pb)	30.10	30.10	30.10	30.10
Meter Correction Factor	(Y)	1.008	1.008	1.008	1.008
Orifice Calibration Value	($\Delta H @$)	1.840	1.840	1.840	1.840
Meter Volume, ft ³	(Vm)	73.885	77.555	76.370	75.937
Meter Temperature, °F	(Tm)	77.8	80.8	75.3	78.0
Meter Temperature, °R	(Tm)	537.8	540.8	535.3	538.0
Meter Orifice Pressure, in. WC	(ΔH)	2.325	2.558	2.467	2.450
Volume H ₂ O Collected, mL	(Vlc)	94.0	103.0	101.8	99.6
Nozzle Diameter, in	(Dn)	0.205	0.205	0.205	0.205
Area of Nozzle, ft ²	(An)	0.0002	0.0002	0.0002	0.0002
Acenaphthene Mass, ug	(M _{C12H10})	<u>3.0</u>	<u>3.0</u>	<u>3.0</u>	3.0
Acenaphthylene Mass, ug	(M _{C12H8})	<u>3.0</u>	<u>3.0</u>	<u>3.0</u>	3.0
Anthracene Mass, ug	(M _{C14H10})	<u>1.0</u>	<u>1.0</u>	<u>1.0</u>	1.0
Benzo[a]anthracene Mass, ug	(M _{C18H12})	<u>0.8</u>	<u>0.8</u>	<u>0.8</u>	0.8
Benzo[a]pyrene Mass, ug	(M _{C20H12})	<u>1.0</u>	<u>1.0</u>	<u>1.0</u>	1.0
Benzo[b]fluoranthene Mass, ug	(M _{C20H12})	<u>0.8</u>	<u>0.8</u>	<u>0.8</u>	0.8
Benzo[g,h,i]perylene Mass, ug	(M _{C22H12})	<u>0.8</u>	<u>0.8</u>	<u>0.8</u>	0.8
Benzo[k]fluoranthene Mass, ug	(M _{C20H12})	<u>1.0</u>	<u>1.0</u>	<u>1.0</u>	1.0
Chrysene Mass, ug	(M _{C18H12})	<u>0.8</u>	<u>0.8</u>	<u>0.8</u>	0.8
Dibenz[a,h]anthracene Mass, ug	(M _{C22H14})	<u>0.8</u>	<u>0.8</u>	<u>0.8</u>	0.8
Fluoranthene Mass, ug	(M _{C16H10})	<u>2.0</u>	<u>2.0</u>	<u>2.0</u>	2.0
Fluorene Mass, ug	(M _{C13H10})	4.0	6.0	4.3	4.8
Indeno(1,2,3-cd)pyrene Mass, ug	(M _{C22H12})	<u>1.0</u>	<u>1.0</u>	<u>1.0</u>	1.0
Naphthalene Mass, ug	(M _{C10H8})	73.0	72.0	68.0	71.0
Phenanthrene Mass, ug	(M _{C14H10})	10.1	11.0	9.9	10.3
Pyrene Mass, ug	(M _{C16H10})	11.0	11.0	9.0	10.3
ISOKINETIC DATA					
Standard Meter Volume, ft ³	(Vmstd)	73.972	77.259	76.855	76.029
Standard Water Volume, ft ³	(Vwstd)	4.425	4.849	4.792	4.689
Moisture Fraction Measured	(BWSmsd)	0.056	0.059	0.059	0.058
Moisture Fraction @ Saturation	(BWSsat)	201.069	199.244	202.629	200.981
Moisture Fraction	(BWS)	0.056	0.059	0.059	0.058
Meter Pressure, in Hg	(Pm)	30.27	30.29	30.28	30.28
Volume at Nozzle, ft ³	(Vn)	175.890	183.957	183.402	181.083
Isokinetic Sampling Rate, (%)	(I)	94.7	99.2	99.5	97.8
DGM Calibration Check Value, (+/- 5%)	(Y _{qa})	-1.1	-1.2	-0.6	-0.9

Location Caterpillar, Inc - Virginia Beach, VA

Source 3516HD Generator (LC 100)

Project No. 2019-0420

Parameter Polycyclic Aromatic Hydrocarbons, Naphthalene

Run Number		Run 1	Run 2	Run 3	Average
Date		3/5/19	3/5/19	3/5/19	--
Start Time		11:05	14:00	16:02	--
Stop Time		12:35	15:30	17:32	--
Run Time, min	(θ)	90.0	90.0	90.0	90.0
EMISSION CALCULATIONS					
Acenaphthene Concentration, ug/dscm	($C_{C_{12}H_{10}}$)	1.4	1.4	1.4	1.4
Acenaphthene Emission Rate, kg/hr	($ER_{C_{12}H_{10}}$)	2.0E-05	1.9E-05	1.9E-05	1.9E-05
Acenaphthene Emission Rate, lb/hr	($ER_{C_{12}H_{10}}$)	4.4E-05	4.2E-05	4.2E-05	4.3E-05
Acenaphthylene Concentration, ug/dscm	($C_{C_{12}H_8}$)	1.4	1.4	1.4	1.4
Acenaphthylene Emission Rate, kg/hr	($ER_{C_{12}H_8}$)	2.0E-05	1.9E-05	1.9E-05	1.9E-05
Acenaphthylene Emission Rate, lb/hr	($ER_{C_{12}H_8}$)	4.4E-05	4.2E-05	4.2E-05	4.3E-05
Anthracene Concentration, ug/dscm	($C_{C_{14}H_{10}}$)	0.48	0.46	0.46	0.46
Anthracene Emission Rate, kg/hr	($ER_{C_{14}H_{10}}$)	6.7E-06	6.4E-06	6.4E-06	6.5E-06
Anthracene Emission Rate, lb/hr	($ER_{C_{14}H_{10}}$)	1.5E-05	1.4E-05	1.4E-05	1.4E-05
Benz[a]anthracene Concentration, ug/dscm	($C_{C_{18}H_{12}}$)	0.38	0.37	0.37	0.37
Benz[a]anthracene Emission Rate, kg/hr	($ER_{C_{18}H_{12}}$)	5.4E-06	5.1E-06	5.1E-06	5.2E-06
Benz[a]anthracene Emission Rate, lb/hr	($ER_{C_{18}H_{12}}$)	1.2E-05	1.1E-05	1.1E-05	1.1E-05
Benzo[a]pyrene Concentration, ug/dscm	($C_{C_{20}H_{12}}$)	0.48	0.46	0.46	0.46
Benzo[a]pyrene Emission Rate, kg/hr	($ER_{C_{20}H_{12}}$)	6.7E-06	6.4E-06	6.4E-06	6.5E-06
Benzo[a]pyrene Emission Rate, lb/hr	($ER_{C_{20}H_{12}}$)	1.5E-05	1.4E-05	1.4E-05	1.4E-05
Benzo[a]fluoranthene Concentration, ug/dscm	($C_{C_{20}H_{12}}$)	0.38	0.37	0.37	0.37
Benzo[a]fluoranthene Emission Rate, kg/hr	($ER_{C_{20}H_{12}}$)	5.4E-06	5.1E-06	5.1E-06	5.2E-06
Benzo[a]fluoranthene Emission Rate, lb/hr	($ER_{C_{20}H_{12}}$)	1.2E-05	1.1E-05	1.1E-05	1.1E-05
Benzo[g,h,i]perylene Concentration, ug/dscm	($C_{C_{22}H_{12}}$)	0.38	0.37	0.37	0.37
Benzo[g,h,i]perylene Emission Rate, kg/hr	($ER_{C_{22}H_{12}}$)	5.4E-06	5.1E-06	5.1E-06	5.2E-06
Benzo[g,h,i]perylene Emission Rate, lb/hr	($ER_{C_{22}H_{12}}$)	1.2E-05	1.1E-05	1.1E-05	1.1E-05
Benzo[k]fluoranthene Concentration, ug/dscm	($C_{C_{20}H_{12}}$)	0.48	0.46	0.46	0.46
Benzo[k]fluoranthene Emission Rate, kg/hr	($ER_{C_{20}H_{12}}$)	6.7E-06	6.4E-06	6.4E-06	6.5E-06
Benzo[k]fluoranthene Emission Rate, lb/hr	($ER_{C_{20}H_{12}}$)	1.5E-05	1.4E-05	1.4E-05	1.4E-05
Chrysene Concentration, ug/dscm	($C_{C_{18}H_{12}}$)	0.38	0.37	0.37	0.37
Chrysene Emission Rate, kg/hr	($ER_{C_{18}H_{12}}$)	5.4E-06	5.1E-06	5.1E-06	5.2E-06
Chrysene Emission Rate, lb/hr	($ER_{C_{18}H_{12}}$)	1.2E-05	1.1E-05	1.1E-05	1.1E-05
Dibenz[a,h]anthracene Concentration, ug/dscm	($C_{C_{22}H_{14}}$)	0.38	0.37	0.37	0.37
Dibenz[a,h]anthracene Emission Rate, kg/hr	($ER_{C_{22}H_{14}}$)	5.4E-06	5.1E-06	5.1E-06	5.2E-06
Dibenz[a,h]anthracene Emission Rate, lb/hr	($ER_{C_{22}H_{14}}$)	1.2E-05	1.1E-05	1.1E-05	1.1E-05
Fluoranthene Concentration, ug/dscm	($C_{C_{16}H_{10}}$)	1.0	0.91	0.92	0.93
Fluoranthene Emission Rate, kg/hr	($ER_{C_{16}H_{10}}$)	1.3E-05	1.3E-05	1.3E-05	1.3E-05
Fluoranthene Emission Rate, lb/hr	($ER_{C_{16}H_{10}}$)	3.0E-05	2.8E-05	2.8E-05	2.9E-05
Fluorene Concentration, ug/dscm	($C_{C_{13}H_{10}}$)	1.9	2.7	2.0	2.2
Fluorene Emission Rate, kg/hr	($ER_{C_{13}H_{10}}$)	2.7E-05	3.8E-05	2.7E-05	3.1E-05
Fluorene Emission Rate, lb/hr	($ER_{C_{13}H_{10}}$)	5.9E-05	8.5E-05	6.0E-05	6.8E-05
Indeno(1,2,3-cd)pyrene Concentration, ug/dscm	($C_{C_{22}H_{12}}$)	0.48	0.46	0.46	0.46
Indeno(1,2,3-cd)pyrene Emission Rate, kg/hr	($ER_{C_{22}H_{12}}$)	6.7E-06	6.4E-06	6.4E-06	6.5E-06
Indeno(1,2,3-cd)pyrene Emission Rate, lb/hr	($ER_{C_{22}H_{12}}$)	1.5E-05	1.4E-05	1.4E-05	1.4E-05
Naphthalene Concentration, ug/dscm	($C_{C_{10}H_8}$)	34.9	32.9	31.2	33.0
Naphthalene Emission Rate, kg/hr	($ER_{C_{10}H_8}$)	4.9E-04	4.6E-04	4.3E-04	4.6E-04
Naphthalene Emission Rate, lb/hr	($ER_{C_{10}H_8}$)	1.1E-03	1.0E-03	9.6E-04	1.0E-03
Phenanthrene Concentration, ug/dscm	($C_{C_{10}H_8}$)	4.8	5.0	4.5	4.8
Phenanthrene Emission Rate, kg/hr	($ER_{C_{10}H_8}$)	6.8E-05	7.0E-05	6.3E-05	6.7E-05
Phenanthrene Emission Rate, lb/hr	($ER_{C_{14}H_{10}}$)	1.5E-04	1.6E-04	1.4E-04	1.5E-04
Pyrene Concentration, ug/dscm	($C_{C_{14}H_{10}}$)	5.3	5.0	4.1	4.8
Pyrene Emission Rate, kg/hr	($ER_{C_{14}H_{10}}$)	7.4E-05	7.0E-05	5.7E-05	6.7E-05
Pyrene Emission Rate, lb/hr	($ER_{C_{16}H_{10}}$)	1.6E-04	1.6E-04	1.3E-04	1.5E-04

Underlined values represent results below the detection limit. The detection limit was used for emission purposes.

Location Caterpillar, Inc - Virginia Beach, VA

Source 3516HD Generator (LC 100)

Project No. 2019-0420

Parameter Polycyclic Aromatic Hydrocarbons, Naphthalene

Run Number		Run 1	Run 2	Run 3	Average
Date		3/5/19	3/5/19	3/5/19	--
Start Time		11:05	14:00	16:02	--
Stop Time		12:35	15:30	17:32	--
Run Time, min		90.0	90.0	90.0	90.0
VELOCITY HEAD, in. WC					
Point 1		3.30	3.50	2.70	3.17
Point 2		3.50	3.60	3.10	3.40
Point 3		3.80	3.50	3.50	3.60
Point 4		3.70	2.70	3.40	3.27
Point 5		3.00	2.60	3.00	2.87
Point 6		2.80	2.40	2.70	2.63
Point 7		3.40	3.10	3.10	3.20
Point 8		3.40	3.70	3.50	3.53
Point 9		3.30	4.10	3.60	3.67
Point 10		3.10	3.50	3.30	3.30
Point 11		3.00	3.00	3.00	3.00
Point 12		2.10	2.70	2.80	2.53
CALCULATED DATA					
Square Root of ΔP , (in. WC) ^{1/2}	(ΔP)	1.784	1.783	1.770	1.779
Pitot Tube Coefficient	(Cp)	0.840	0.840	0.840	0.840
Barometric Pressure, in. Hg	(Pb)	30.10	30.10	30.10	30.10
Static Pressure, in. WC	(Pg)	-1.70	-1.70	-1.70	-1.70
Stack Pressure, in. Hg	(Ps)	29.98	29.98	29.98	29.98
Stack Cross-sectional Area, ft ²	(As)	2.18	2.18	2.18	2.18
Temperature, °F	(Ts)	726.8	725.1	728.2	726.7
Temperature, °R	(Ts)	1186.8	1185.1	1188.2	1186.7
Moisture Fraction Measured	(BWSmsd)	0.056	0.059	0.059	0.058
Moisture Fraction @ Saturation	(BWSsat)	201.069	199.244	202.629	200.981
Moisture Fraction	(BWS)	0.056	0.059	0.059	0.058
O ₂ Concentration, %	(O ₂)	11.4	11.3	11.2	11.3
CO ₂ Concentration, %	(CO ₂)	6.8	6.8	6.9	6.8
Molecular Weight, lb/lb-mole (dry)	(Md)	29.54	29.54	29.55	29.55
Molecular Weight, lb/lb-mole (wet)	(Ms)	28.89	28.86	28.87	28.88
Velocity, ft/sec	(Vs)	150.0	149.9	149.0	149.6
VOLUMETRIC FLOW RATE					
At Stack Conditions, acfm	(Qa)	19,634	19,620	19,499	19,584
At Standard Conditions, dscfm	(Qs)	8,258	8,240	8,171	8,223

Location Caterpillar, Inc - Virginia Beach, VA

Source 3516HD Generator (LC 100)

Project No. 2019-0420

Parameter Polycyclic Aromatic Hydrocarbons, Naphthalene

Analysis Volumetric

Run 1		Date: 3/5/19					
Impinger No.	1*	2	3	4	5	6*	Total
Contents	XAD Trap	Empty	H2O	H2O	Empty	Silica	--
Initial Volume, mL	339.3	0.0	100.0	100.0	0.0	232.5	771.8
Final Volume, mL	343.9	82.0	98.0	94.0	2.0	245.9	865.8
Gain	4.6	82.0	-2.0	-6.0	2.0	13.4	94.0
Run 2		Date: 3/5/19					
Impinger No.	1*	2	3	4	5	6*	Total
Contents	XAD Trap	Empty	H2O	H2O	Empty	Silica	--
Initial Volume, mL	338.4	0.0	100.0	100.0	0.0	248.4	786.8
Final Volume, mL	348.2	92.0	94.0	94.0	0.0	261.6	889.8
Gain	9.8	92.0	-6.0	-6.0	0.0	13.2	103.0
Run 3		Date: 3/5/19					
Impinger No.	1*	2	3	4	5	6*	Total
Contents	XAD Trap	Empty	H2O	H2O	Empty	Silica	--
Initial Volume, mL	292.5	0.0	100.0	100.0	0.0	241.0	733.5
Final Volume, mL	297.1	94.0	94.0	96.0	0.0	254.2	835.3
Gain	4.6	94.0	-6.0	-4.0	0.0	13.2	101.8



Isokinetic Field Data

Location: Caterpillar, Inc - Virginia Beach, VA			Start Time: 11:05			Source: 3516HD Generator (LC 100)		
Date: 3/5/19		Run 1	VALID	End Time: 12:35		Project No.: 2019-0420		Parameter: Polycyclic

STACK DATA (EST)		EQUIPMENT		STACK DATA (EST)		FILTER NO.		STACK DATA (FINAL)		MOIST. DATA			
Moisture:	11.0 % est.	Meter Box ID:	2027	Est. Tm:	70 °F	NA		Pb:	30.10 in. Hg	Vlc (ml)			
Barometric:	30.10 in. Hg	Y:	1.008	Est. Ts:	683 °F			Pg:	-1.70 in. WC	94.0			
Static Press:	-1.70 in. WC	AH @ (in.WC):	1.840	Est. AP:	3.20 in. WC			O ₂ :	11.4 %	K-FACTOR			
Stack Press:	29.98 in. Hg	Probe ID:	PR-403	Est. Dn:	0.194 in.			CO ₂ :	6.8 %	0.739			
CO ₂ :	10.0 %	Liner Material:	glass	Target Rate:	0.75 scfm					Check Pt.	Initial	Final	Corr.
O ₂ :	5.0 %	Pitot ID:	P-403-2	LEAK CHECKS		Pre	Mid 1	Mid 2	Post	Mid 1 (cf)	--		
N ₂ /CO:	85.0 %	Pitot Cp/Type:	0.840 S-type	Leak Rate (cfm):		0.000	--	--	0.000	Mid 2 (cf)	--		
Md:	29.80 lb/lb-mole	Nozzle ID:	SS-303	Vacuum (in Hg):		9	--	--	12	Mid 3 (cf)	--		
Ms:	28.50 lb/lb-mole	Nozzle Dn (in.):	0.205	Pitot Tube:		Pass	--	--	Pass	Mid-Point Leak Check Vol (cf):	--		

Sample Pt.	Sample Time (minutes)		Dry Gas Meter Reading (ft ³)	Pitot Tube ΔP (in WC)	Gas Temperatures (°F)		Orifice Press. ΔH (in. WC)		Pump Vac (in. Hg)	Gas Temperatures (°F)				% ISO	Vs (fps)
					DGM Average	Stack				Probe	Filter	Imp Exit	Aux		
	Amb.	Amb.			Amb.	Amb.	Amb.	Amb.							
	71	71			Ideal	Actual	71	71		71	71				
A-1	0.00	7.50	838.700	3.30	72	724	2.36	2.40	7	250	257	42	44	94.0	153.57
2	7.50	15.00	844.550	3.50	74	726	2.51	2.50	10	270	263	39	44	99.8	158.29
3	15.00	22.50	850.960	3.80	74	727	2.72	2.70	9	259	259	42	43	98.4	165.00
4	22.50	30.00	857.540	3.70	76	727	2.66	2.70	10	260	257	42	42	101.0	162.82
5	30.00	37.50	864.230	3.00	77	728	2.16	2.20	9	258	260	42	43	101.0	146.67
6	37.50	45.00	870.270	2.80	78	727	2.02	2.00	9	260	259	42	41	99.4	141.64
B-1	45.00	52.50	876.030	3.40	79	727	2.46	2.50	9	260	259	41	38	99.7	156.08
2	52.50	60.00	882.400	3.40	80	727	2.46	2.50	11	260	259	41	40	100.8	156.08
3	60.00	67.50	888.850	3.30	80	729	2.39	2.40	11	260	261	44	41	99.8	153.90
4	67.50	75.00	895.140	3.10	81	726	2.25	2.30	11	259	260	43	40	101.5	148.97
5	75.00	82.50	901.360	3.00	81	726	2.18	2.20	11	261	261	42	42	100.2	146.55
6	82.50	90.00	907.400	2.10	82	727	1.53	1.50	9	259	259	43	38	102.5	122.66
	90.00	--	912.585											-	--
Final DGM:			912.585												

RESULTS	Run Time		Vm	ΔP	Tm	Ts	Max Vac	ΔH	%ISO	BWS	Y _{qa}
	min	min	ft ³	in. WC	°F	°F		in. WC			
	90.0		73.885	3.20	77.8	726.8	11	2.325	94.7	0.056	-1.1



Isokinetic Field Data

Location: Caterpillar, Inc - Virginia Beach, VA				Start Time: 14:00		Source: 3516HD Generator (LC 100)					
Date: 3/5/19		Run 2		VALID		End Time: 15:30		Project No.: 2019-0420		Parameter: Polycyclic	

STACK DATA (EST)		EQUIPMENT		STACK DATA (EST)		FILTER NO.		STACK DATA (FINAL)		MOIST. DATA			
Moisture:	6.0 % est.	Meter Box ID:	2027	Est. Tm:	78 °F	NA		Pb:	30.10 in. Hg	Vlc (ml)			
Barometric:	30.10 in. Hg	Y:	1.008	Est. Ts:	727 °F			Pg:	-1.70 in. WC	103.0			
Static Press:	-1.70 in. WC	ΔH @ (in.WC):	1.840	Est. ΔP:	3.20 in. WC			O ₂ :	11.3 %	K-FACTOR			
Stack Press:	29.98 in. Hg	Probe ID:	PR-403	Est. Dn:	0.190 in.			CO ₂ :	6.8 %	0.79			
CO ₂ :	10.0 %	Liner Material:	glass	Target Rate:	0.75 scfm					Check Pt.	Initial	Final	Corr.
O ₂ :	5.0 %	Pitot ID:	P-403-2	LEAK CHECKS		Pre	Mid 1	Mid 2	Post	Mid 1 (cf)			--
N ₂ /CO:	85.0 %	Pitot Cp/Type:	0.840 S-type	Leak Rate (cfm):	0.000	--	--	--	0.000	Mid 2 (cf)			--
Md:	29.80 lb/lb-mole	Nozzle ID:	SS-303	Vacuum (in Hg):	12	--	--	--	12	Mid 3 (cf)			--
Ms:	29.09 lb/lb-mole	Nozzle Dn (in.):	0.205	Pitot Tube:		Pass	--	--	Pass	Mid-Point Leak Check Vol (cf):			--

Sample Pt.	Sample Time (minutes)		Dry Gas Meter Reading (ft ³)	Pitot Tube ΔP (in WC)	Gas Temperatures (°F)		Orifice Press. ΔH (in. WC)		Pump Vac (in. Hg)	Gas Temperatures (°F)				% ISO	Vs (fps)
	Begin	End			DGM Average	Stack	Ideal	Actual		Probe	Filter	Imp Exit	Aux		
					Amb.	Amb.				Amb.	Amb.	Amb.	Amb.		
A-1	0.00	7.50	914.175	3.50	81	724	2.78	2.80	8	256	259	38	37	92.1	156.54
2	7.50	15.00	920.440	3.60	81	724	2.86	2.90	8	261	261	35	38	100.5	158.77
3	15.00	22.50	927.370	3.50	81	727	2.77	2.80	8	259	260	39	40	101.4	156.74
4	22.50	30.00	934.260	2.70	81	728	2.14	2.20	7	257	259	42	40	101.6	137.73
5	30.00	37.50	940.330	2.60	81	726	2.06	2.10	7	258	260	43	41	100.0	135.04
6	37.50	45.00	946.200	2.40	81	725	1.91	1.90	7	260	260	43	41	100.8	129.69
B-1	45.00	52.50	951.890	3.10	81	724	2.46	2.50	8	260	259	41	39	99.9	147.33
2	52.50	60.00	958.290	3.70	81	725	2.94	2.90	10	260	260	43	43	98.6	161.02
3	60.00	67.50	965.180	4.10	81	724	3.25	3.30	11	263	260	42	42	100.7	169.43
4	67.50	75.00	972.590	3.50	81	724	2.78	2.80	11	264	261	42	40	100.7	156.54
5	75.00	82.50	979.440	3.00	80	725	2.38	2.40	10	260	259	41	39	102.1	144.99
6	82.50	90.00	985.860	2.70	80	725	2.14	2.10	9	259	260	40	38	98.3	137.55
--	90.00	--	991.730												--
Final DGM:			991.730												

RESULTS	Run Time		Vm		ΔP		Tm		Ts		Max Vac	ΔH		%ISO	BWS	Y _{qa}
	min		ft ³		in. WC		°F		°F		in. WC					
	90.0		77.555	ft ³	3.20	in. WC	80.8	°F	725.1	°F	11	2.558	in. WC	99.2	0.059	-1.2



Isokinetic Field Data

Location: Caterpillar, Inc - Virginia Beach, VA				Start Time: 16:02		Source: 3516HD Generator (LC 100)										
Date: 3/5/19		Run 3		End Time: 17:32		Project No.: 2019-0420		Parameter: Polycyclic								
STACK DATA (EST)			EQUIPMENT			STACK DATA (EST)			FILTER NO.		STACK DATA (FINAL)		MOIST. DATA			
Moisture: 6.0 % est.			Meter Box ID: 2027			Est. Tm: 81 °F			NA		Pb: 30.10 in. Hg		Vlc (ml)			
Barometric: 30.10 in. Hg			Y: 1.008			Est. Ts: 725 °F					Pg: -1.70 in. WC		101.8			
Static Press: -1.70 in. WC			ΔH @ (in.WC): 1.840			Est. ΔP: 3.20 in. WC					O ₂ : 11.2 %		K-FACTOR			
Stack Press: 29.98 in. Hg			Probe ID: PR-403			Est. Dn: 0.190 in.					CO ₂ : 6.9 %		0.795			
CO ₂ : 10.0 %			Liner Material: glass			Target Rate: 0.75 scfm										
O ₂ : 5.0 %			Pitot ID: P-403-2			LEAK CHECKS			Pre		Mid 1		Mid 2		Post	
N ₂ /CO: 85.0 %			Pitot Cp/Type: 0.840 S-type			Leak Rate (cfm): 0.000			--		--		0.000		Mid 1 (cf) --	
Md: 29.80 lb/lb-mole			Nozzle ID: SS-303			Vacuum (in Hg): 10			--		--		9		Mid 2 (cf) --	
Ms: 29.09 lb/lb-mole			Nozzle Dn (in.): 0.205			Pitot Tube: Pass			--		--		Pass		Mid 3 (cf) --	
											Mid-Point Leak Check Vol (cf): --					

Sample Pt.	Sample Time (minutes)		Dry Gas Meter Reading (ft ³)	Pitot Tube ΔP (in WC)	Gas Temperatures (°F)		Orifice Press. ΔH (in. WC)		Pump Vac (in. Hg)	Gas Temperatures (°F)				% ISO	Vs (fps)
					DGM Average	Stack				Probe	Filter	Imp Exit	Aux		
	Amb.	Amb.			Amb.	Amb.	Amb.	Amb.							
	Begin	End			Ideal	Actual	--	--		--	--				
A-1	0.00	7.50	992.155	2.70	76	732	2.11	2.10	6	258	257	49	47	97.0	137.96
2	7.50	15.00	997.890	3.10	76	730	2.43	2.40	6	262	262	49	45	97.1	147.70
3	15.00	22.50	1004.040	3.50	75	728	2.74	2.70	8	262	260	47	43	100.3	156.81
4	22.50	30.00	1010.780	3.40	75	729	2.66	2.70	8	258	262	45	44	101.1	154.62
5	30.00	37.50	1017.470	3.00	75	728	2.35	2.40	7	262	261	46	44	101.2	145.18
6	37.50	45.00	1023.770	2.70	75	729	2.12	2.10	7	261	258	47	45	100.2	137.78
B-1	45.00	52.50	1029.690	3.10	75	726	2.43	2.40	7	259	258	46	45	99.6	147.45
2	52.50	60.00	1036.000	3.50	76	727	2.75	2.80	8	262	265	44	44	101.2	156.74
3	60.00	67.50	1042.810	3.60	76	727	2.83	2.80	9	260	261	41	45	100.6	158.97
4	67.50	75.00	1049.680	3.30	75	728	2.58	2.60	8	261	258	45	48	100.2	152.26
5	75.00	82.50	1056.220	3.00	75	727	2.35	2.40	8	261	261	45	49	101.0	145.12
6	82.50	90.00	1062.510	2.80	74	727	2.19	2.20	7	261	260	47	53	100.1	140.20
--	90.00	--	1068.525											-	--
Final DGM:			1068.525												

RESULTS	Run Time		Vm		ΔP		Tm		Ts		Max Vac		ΔH		%ISO	BWS	Y _{qa}
	min		ft ³		in. WC		°F		°F		in. WC		in. WC				
	90.0		76.370		3.14		75.3		728.2		9		2.467		99.5	0.059	-0.6

Appendix C

Alliance Source Testing, LLC
Lab Services
214 Central Circle
Decatur, AL 35603
(256) 351-0121
www.stacktest.com

Analytical Laboratory Report

Caterpillar Inc
4525 South Blvd.
Virginia Beach, Virginia 23452

Project No. 2019-0420LS



Certification Statement

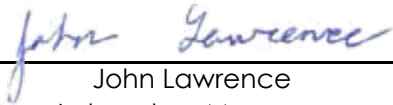
Alliance Source Testing, LLC (AST) has completed the analysis as described in this report. Results apply only to the source(s) tested and operating condition(s) for the specific test date(s) and time(s) identified within this report. All results are intended to be considered in their entirety, and AST is not responsible for use of less than the complete test report without written consent. This report shall not be reproduced in full or in part without written approval from the customer.

To the best of my knowledge and abilities, all information, facts and test data are correct. Data presented in this report has been checked for completeness and is accurate, error-free and legible. Any deviations or problems are detailed in the relevant sections on the test report.

This document was prepared in portable document format (.pdf) and contains pages as identified in the bottom footer of this document.

Validation Signature

The analytical data and all QC contained within this report was reviewed and validated by the following individual.



John Lawrence
Laboratory Manager

03/25/2019

Date

Project Narrative

Analytical Method(s):

Method 5 - Determination of Particulate Matter Emissions From Stationary Sources
Method 202 - Dry Impinger Method for Determining Condensable Particulate Matter Emissions From Stationary Sources

Filterable

The filter(s) were either oven dried and/or desiccated per the method until a final weight was obtained. The liquid fractions were extracted if required, evaporated and cooled until a final weight was obtained. These fractions were summed together to provide the total Particulate Matter collected.

Condensable

The filter(s) were cut up and extracted per the method. The organic extract was added to the organic rinse, and the inorganic extract was added to the inorganic rinse. The inorganic fraction was extracted with solvent per the method. Extracts were combined with the organic rinse. The organic and inorganic fractions were evaporated and desiccated until a final weight was obtained.

MDL

The Minimum Detection Level (MDL) is 0.5 mg per fraction. If the measured result for a fraction is less than the MDL, the MDL was used in ensuing calculations.

Blank Correction

If blank correction is performed, only blank values returned higher than the MDL are used. If a blank returns a value less than the MDL, no correction is included.

Custody:

The samples were received by Rebecca Pope on 3/13/19 in Decatur, AL. The samples were received in good condition with proper Chain-of-Custody documentation. No apparent container problems were noted upon receipt. Prior to analysis, the samples were kept secure with access limited to authorized personnel of AST.

Number of Samples:

81

Labeling:

Acceptable

Analyst:

Rebecca Pope- Laboratory Analyst

Equipment:

Denver Instruments Balance APX, SN A24014059. This scale was used for analytical determinations.
A&D Weighing AND EJ-1500, S/N 5A2845843. This scale was only used to measure the total mass of rinse collected.
Analysis was performed on the same balance as the associated tare.

QC Notes:

The samples met the minimum criteria established by the relevant method.


Reporting Notes:

Certifications:

Primary Accreditation:
Louisiana Environmental Laboratory Accreditation Program (LELAP)
Agency Interest (AI) No. 194891 Certificate: 05054, Expiration Date: 6/30/19
Secondary Accreditation:
Texas Commission on Environmental Quality
Certificate: T104704540-19-4, Expiration Date: 2/29/20
Virginia Environmental Laboratory Accreditation Program (VELAP)
VA Laboratory ID: 460299, Expiration Date: 9/14/2019


State Registrations:

PADEP # 68-04598

	Client	Caterpillar, Inc.
	City, State	Peoria, IL
	Project No.	2019-0420
	Method	EPA Method 5


Front Half Filter						
Lab ID	2019-0420-2369		2019-0420-2370		2019-0420-2371	
Field ID	3516HD G LC 10-Run 1		3516HD G LC 10-Run 2		3516HD G LC 10-Run 3	
Filter ID	11054		11087		11226	
Filter Tare Weight, g	0.3710		0.4059		0.3511	
Date - Oven	3/14/19		3/14/19		3/14/19	
Time - Oven	8:15		8:15		8:15	
Date of Weighing	3/14/19		3/14/19		3/14/19	
Time of Weighing	11:40		11:41		11:42	
Filter Weight, g	0.4016		0.4378		0.3829	
Filter PM Mass, mg*	30.6		31.9		31.8	
Front Half Rinse						
Lab ID	2019-0420-2384		2019-0420-2385		2019-0420-2386	
Field ID	3516HD G LC 10-Run 1		3516HD G LC 10-Run 2		3516HD G LC 10-Run 3	
Beaker ID	2384		2385		2386	
Beaker tare, g	4.0268		3.9940		3.9933	
Beaker with Acetone, g	128.6		90.8		104.9	
Acetone Mass, g	124.6		86.8		100.9	
Date - Dessicator	3/14/19		3/14/19		3/14/19	
Time - Dessicator	8:40		8:40		8:40	
Date of Weighing	3/15/19	3/15/19	3/15/19	3/15/19	3/15/19	3/15/19
Time of Weighing	9:00	15:01	9:01	15:02	9:02	15:03
Weight, g	4.0319	4.0321	3.9974	3.9977	4.0007	4.0010
Rinse PM Mass, mg*	5.2		3.5		7.5	
Blank Corrected	Yes					
Residue from Blank (mg/g)	0.0024		0.0024		0.0024	
Acetone residue from rinse (mg)	0.3		0.2		0.2	
Max Acetone Residue (mg)	1.2		0.9		1.0	
Amount Subtracted for Blank (mg)	0		0		0	
Total PM Mass, mg	35.8		35.4		39.3	

*All fractions were analyzed and returned values greater than the MDL of 0.5 mg.

	Client	Caterpillar, Inc.
	City, State	Peoria, IL
	Project No.	2019-0420
	Method	EPA Method 5


Front Half Filter							
Lab ID	2019-0420-2372		2019-0420-2373		2019-0420-2374		
Field ID	3516HD G LC 25-Run 1		3516HD G LC 25-Run 2		3516HD G LC 25-Run 3		
Filter ID	10933		11086		11082		
Filter Tare Weight, g	0.3785		0.4064		0.4057		
Date - Oven	3/14/19		3/14/19		3/14/19		
Time - Oven	8:15		8:15		8:15		
Date of Weighing	3/14/19		3/14/19		3/14/19		
Time of Weighing	11:43		11:44		11:45		
Filter Weight, g	0.3981		0.4241		0.4245		
Filter PM Mass, mg*	19.6		17.7		18.8		
Front Half Rinse							
Lab ID	2019-0420-2387		2019-0420-2388		2019-0420-2389		
Field ID	3516HD G LC 25-Run 1		3516HD G LC 25-Run 2		3516HD G LC 25-Run 3		
Beaker ID	2387		2388		2389		
Beaker tare, g	4.0231		4.0501		4.0329		
Beaker with Acetone, g	138.2		1564.0		185.0		
Acetone Mass, g	134.2		1559.9		181.0		
Date - Dessicator	3/14/19		3/14/19		3/14/19		
Time - Dessicator	8:40		8:40		8:40		
Date of Weighing	3/15/19	3/15/19	3/15/19	3/15/19	3/15/19	3/15/19	
Time of Weighing	9:03	15:04	9:04	15:05	9:05	15:06	
Weight, g	4.0284	4.0288	4.0548	4.0550	4.0378	4.0381	
Rinse PM Mass, mg*	5.5		4.8		5.1		
Blank Corrected	Yes						
Residue from Blank (mg/g)	0.0024		0.0024		0.0024		
Acetone residue from rinse (mg)	0.3		3.8		0.4		
Max Acetone Residue (mg)	1.3		15.6		1.8		
Amount Subtracted for Blank (mg)	0		0		0		
Total PM Mass, mg	25.1		22.5		23.9		

*All fractions were analyzed and returned values greater than the MDL of 0.5 mg.

	Client	Caterpillar, Inc.
	City, State	Peoria, IL
	Project No.	2019-0420
	Method	EPA Method 5


Front Half Filter						
Lab ID	2019-0420-2375		2019-0420-2376		2019-0420-2377	
Field ID	3516HD G LC 50-Run 1		3516HD G LC 50-Run 2		3516HD G LC 50-Run 3	
Filter ID	11562		11563		11235	
Filter Tare Weight, g	0.3515		0.3503		0.3526	
Date - Oven	3/14/19		3/14/19		3/14/19	
Time - Oven	8:15		8:15		8:15	
Date of Weighing	3/14/19		3/14/19		3/14/19	
Time of Weighing	11:46		11:47		11:48	
Filter Weight, g	0.3570		0.3599		0.3638	
Filter PM Mass, mg*	5.5		9.6		11.2	
Front Half Rinse						
Lab ID	2019-0420-2390		2019-0420-2391		2019-0420-2392	
Field ID	3516HD G LC 50-Run 1		3516HD G LC 50-Run 2		3516HD G LC 50-Run 3	
Beaker ID	2390		2391		2392	
Beaker tare, g	4.0526		4.0478		4.0659	
Beaker with Acetone, g	178.6		134.5		138.4	
Acetone Mass, g	174.5		130.5		134.3	
Date - Dessicator	3/14/19		3/14/19		3/14/19	
Time - Dessicator	8:40		8:40		8:40	
Date of Weighing	3/15/19	3/15/19	3/15/19	3/15/19	3/15/19	3/15/19
Time of Weighing	9:06	15:07	9:07	15:08	9:08	15:09
Weight, g	4.0573	4.0578	4.0566	4.0570	4.0807	4.0809
Rinse PM Mass, mg*	5.0		9.0		14.9	
Blank Corrected	Yes					
Residue from Blank (mg/g)	0.0024		0.0024		0.0024	
Acetone residue from rinse (mg)	0.4		0.3		0.3	
Max Acetone Residue (mg)	1.7		1.3		1.3	
Amount Subtracted for Blank (mg)	0		0		0	
Total PM Mass, mg	10.5		18.6		26.1	

*All fractions were analyzed and returned values greater than the MDL of 0.5 mg.

	Client	Caterpillar, Inc.
	City, State	Peoria, IL
	Project No.	2019-0420
	Method	EPA Method 5

Front Half Filter						
Lab ID	2019-0420-2378		2019-0420-2379		2019-0420-2380	
Field ID	3516HD G LC 75-Run 1		3516HD G LC 75-Run 2		3516HD G LC 75-Run 3	
Filter ID	11234		11337		10832	
Filter Tare Weight, g	0.3541		0.3571		0.3959	
Date - Oven	3/14/19		3/14/19		3/14/19	
Time - Oven	8:15		8:15		8:15	
Date of Weighing	3/14/19		3/14/19		3/14/19	
Time of Weighing	11:49		11:50		11:51	
Filter Weight, g	0.3636		0.3652		0.4032	
Filter PM Mass, mg*	9.5		8.1		7.3	
Front Half Rinse						
Lab ID	2019-0420-2393		2019-0420-2394		2019-0420-2395	
Field ID	3516HD G LC 75-Run 1		3516HD G LC 75-Run 2		3516HD G LC 75-Run 3	
Beaker ID	2393		2394		2395	
Beaker tare, g	4.0121		4.0598		4.0409	
Beaker with Acetone, g	111.1		146.6		116.8	
Acetone Mass, g	107.1		142.5		112.8	
Date - Dessicator	3/14/19		3/14/19		3/14/19	
Time - Dessicator	8:40		8:40		8:40	
Date of Weighing	3/15/19	3/15/19	3/15/19	3/15/19	3/15/19	3/15/19
Time of Weighing	9:09	15:10	9:10	15:11	9:11	15:12
Weight, g	4.0182	4.0185	4.0629	4.0631	4.0435	4.0440
Rinse PM Mass, mg*	6.2		3.2		2.8	
Blank Corrected	Yes					
Residue from Blank (mg/g)	0.0024		0.0024		0.0024	
Acetone residue from rinse (mg)	0.3		0.3		0.3	
Max Acetone Residue (mg)	1.1		1.4		1.1	
Amount Subtracted for Blank (mg)	0		0		0	
Total PM Mass, mg	15.7		11.3		10.1	

*All fractions were analyzed and returned values greater than the MDL of 0.5 mg.


	Client	Caterpillar, Inc.
	City, State	Peoria, IL
	Project No.	2019-0420
	Method	EPA Method 5

Front Half Filter						
Lab ID	2019-0420-2381		2019-0420-2382		2019-0420-2383	
Field ID	3516HD G LC 100-Run 1		3516HD G LC 100-Run 2		3516HD G LC 100-Run 3	
Filter ID	11574		11573		11572	
Filter Tare Weight, g	0.3802		0.3772		0.3818	
Date - Oven	3/14/19		3/14/19		3/14/19	
Time - Oven	8:15		8:15		8:15	
Date of Weighing	3/14/19		3/14/19		3/14/19	
Time of Weighing	11:52		11:53		11:54	
Filter Weight, g	0.3912		0.3881		0.3916	
Filter PM Mass, mg*	11.0		10.9		9.8	
Front Half Rinse						
Lab ID	2019-0420-2396		2019-0420-2397		2019-0420-2398	
Field ID	3516HD G LC 100-Run 1		3516HD G LC 100-Run 2		3516HD G LC 100-Run 3	
Beaker ID	2396		2397		2398	
Beaker tare, g	4.0376		4.0187		4.0470	
Beaker with Acetone, g	116.0		168.2		107.6	
Acetone Mass, g	112.0		164.2		103.6	
Date - Dessicator	3/14/19		3/14/19		3/14/19	
Time - Dessicator	8:40		8:40		8:40	
Date of Weighing	3/15/19	3/15/19	3/15/19	3/15/19	3/15/19	3/15/19
Time of Weighing	9:12	15:13	9:13	15:14	9:14	15:15
Weight, g	4.0416	4.0420	4.0289	4.0290	4.0540	4.0545
Rinse PM Mass, mg*	4.2		10.3		7.2	
Blank Corrected	Yes					
Residue from Blank (mg/g)	0.0024		0.0024		0.0024	
Acetone residue from rinse (mg)	0.3		0.4		0.2	
Max Acetone Residue (mg)	1.1		1.6		1.0	
Amount Subtracted for Blank (mg)	0		0		0	
Total PM Mass, mg	15.2		21.2		17.1	

*All fractions were analyzed and returned values greater than the MDL of 0.5 mg.


	Client	Caterpillar, Inc.
	City, State	Peoria, IL
	Project No.	2019-0420
	Method	EPA Method 5

Blank Rinse		
Lab ID	2019-0420-2399	
Field ID	Acetone Blank	
Beaker ID	2399	
Beaker tare, g	4.0207	
Beaker with Acetone, g	128.8	
Acetone Mass, g	124.8	
Date - Dessicator	3/14/19	
Time - Dessicator	8:40	
Date of Weighing	3/15/19	3/15/19
Time of Weighing	9:15	15:16
Weight, g	4.0208	4.0212
Measured Blank Mass, mg	0.3	
Blank Mass, mg*	0.3	
Blank Mass, mg/g	0.0024	

	Client	Caterpillar, Inc.
	City, State	Peoria, IL
	Project No.	2019-0420
	Method	US EPA Method 202


Teflon Filter						
Lab ID	2019-0420-2400		2019-0420-2401		2019-0420-2402	
Field ID	3516HD G LC 10-Run 1		3516HD G LC 10-Run 2		3516HD G LC 10-Run 3	
Organic Fraction						
Lab ID	2019-0420-2415		2019-0420-2416		2019-0420-2417	
Field ID	3516HD G LC 10-Run 1		3516HD G LC 10-Run 2		3516HD G LC 10-Run 3	
Beaker ID	2415		2416		2417	
Beaker tare, g	4.0188		4.0115		4.0263	
Beaker Solvent, g	88.5		89.1		72.1	
Solvent Mass, g	84.5		85.1		68.1	
Date - Dessicator	3/18/19		3/18/19		3/18/19	
Time - Dessicator	8:10		8:10		8:10	
Date of Weighing	3/19/19	3/19/19	3/19/19	3/19/19	3/19/19	3/19/19
Time of Weighing	8:15	14:20	8:16	14:21	8:17	14:22
Weight, g	4.0332	4.0337	4.0311	4.0312	4.0550	4.0553
Organic PM Mass, mg*	14.7		19.7		28.8	
Inorganic Fraction						
Lab ID	2019-0420-2430		2019-0420-2431		2019-0420-2432	
Field ID	3516HD G LC 10-Run 1		3516HD G LC 10-Run 2		3516HD G LC 10-Run 3	
Beaker ID	2430		2431		2432	
Beaker tare, g	4.0255		3.9708		4.0667	
Beaker Water, g	211.1		314.5		190.5	
Water Mass, g	207.1		310.5		186.4	
Date - Dessicator	3/20/19		3/20/19		3/20/19	
Time - Dessicator	15:20		15:20		15:20	
Date of Weighing	3/21/19	3/22/19	3/21/19	3/22/19	3/21/19	3/22/19
Time of Weighing	15:25	8:00	15:26	8:01	15:27	8:02
Weight, g	4.0390	4.0386	3.9850	3.9849	4.0809	4.0804
Inorganic Mass, mg*	13.3		14.1		14.0	
Blank Corrected	Yes					
Total PM Mass, mg	26.0		31.8		40.8	

*All fractions were analyzed and returned values greater than the MDL of 0.5 mg.

	Client	Caterpillar, Inc.
	City, State	Peoria, IL
	Project No.	2019-0420
	Method	US EPA Method 202


Teflon Filter						
Lab ID	2019-0420-2403		2019-0420-2404		2019-0420-2405	
Field ID	3516HD G LC 25-Run 1		3516HD G LC 25-Run 2		3516HD G LC 25-Run 3	
Organic Fraction						
Lab ID	2019-0420-2418		2019-0420-2419		2019-0420-2420	
Field ID	3516HD G LC 25-Run 1		3516HD G LC 25-Run 2		3516HD G LC 25-Run 3	
Beaker ID	2418		2419		2420	
Beaker tare, g	4.0236		4.0254		4.0254	
Beaker Solvent, g	95.4		103.3		101.6	
Solvent Mass, g	91.4		99.3		97.6	
Date - Dessicator	3/18/19		3/18/19		3/18/19	
Time - Dessicator	8:10		8:10		8:10	
Date of Weighing	3/19/19	3/19/19	3/19/19	3/19/19	3/19/19	3/19/19
Time of Weighing	8:18	14:23	8:19	14:24	8:20	14:25
Weight, g	4.0414	4.0416	4.0407	4.0406	4.0470	4.0466
Organic PM Mass, mg*	17.9		15.3		21.4	
Inorganic Fraction						
Lab ID	2019-0420-2433		2019-0420-2434		2019-0420-2435	
Field ID	3516HD G LC 25-Run 1		3516HD G LC 25-Run 2		3516HD G LC 25-Run 3	
Beaker ID	2433		2434		2435	
Beaker tare, g	4.0552		4.0680		4.0350	
Beaker Water, g	231.7		316.8		199.4	
Water Mass, g	227.6		312.7		195.4	
Date - Dessicator	3/20/19		3/20/19		3/20/19	
Time - Dessicator	15:20		15:20		15:20	
Date of Weighing	3/21/19	3/22/19	3/21/19	3/22/19	3/21/19	3/22/19
Time of Weighing	15:28	8:03	15:29	8:04	15:30	8:05
Weight, g	4.0627	4.0623	4.0763	4.0761	4.0433	4.0429
Inorganic Mass, mg*	7.3		8.2		8.1	
Blank Corrected	Yes					
Total PM Mass, mg	23.2		21.5		27.5	

*All fractions were analyzed and returned values greater than the MDL of 0.5 mg.

	Client	Caterpillar, Inc.
	City, State	Peoria, IL
	Project No.	2019-0420
	Method	US EPA Method 202


Teflon Filter						
Lab ID	2019-0420-2406		2019-0420-2407		2019-0420-2408	
Field ID	3516HD G LC 50-Run 1		3516HD G LC 50-Run 2		3516HD G LC 50-Run 3	
Organic Fraction						
Lab ID	2019-0420-2421		2019-0420-2422		2019-0420-2423	
Field ID	3516HD G LC 50-Run 1		3516HD G LC 50-Run 2		3516HD G LC 50-Run 3	
Beaker ID	2421		2422		2423	
Beaker tare, g	4.0090		4.0044		4.0218	
Beaker Solvent, g	89.2		68.1		95.1	
Solvent Mass, g	85.2		64.1		91.1	
Date - Dessicator	3/18/19		3/18/19		3/18/19	
Time - Dessicator	8:10		8:10		8:10	
Date of Weighing	3/19/19	3/19/19	3/19/19	3/19/19	3/19/19	3/19/19
Time of Weighing	8:21	14:26	8:22	14:27	8:23	14:28
Weight, g	4.0202	4.0203	4.0160	4.0161	4.0334	4.0334
Organic PM Mass, mg*	11.2		11.6		11.6	
Inorganic Fraction						
Lab ID	2019-0420-2436		2019-0420-2437		2019-0420-2438	
Field ID	3516HD G LC 50-Run 1		3516HD G LC 50-Run 2		3516HD G LC 50-Run 3	
Beaker ID	2436		2437		2438	
Beaker tare, g	4.0576		4.0607		4.0723	
Beaker Water, g	314.6		200.7		225.4	
Water Mass, g	310.5		196.6		221.3	
Date - Dessicator	3/20/19		3/20/19		3/20/19	
Time - Dessicator	15:20		15:20		15:20	
Date of Weighing	3/21/19	3/22/19	3/21/19	3/22/19	3/21/19	3/22/19
Time of Weighing	15:31	8:06	15:32	8:07	15:33	8:08
Weight, g	4.0618	4.0616	4.0652	4.0647	4.0770	4.0765
Inorganic Mass, mg*	4.1		4.2		4.5	
Blank Corrected	Yes					
Total PM Mass, mg	13.3		13.9		14.1	

*All fractions were analyzed and returned values greater than the MDL of 0.5 mg.

	Client	Caterpillar, Inc.
	City, State	Peoria, IL
	Project No.	2019-0420
	Method	US EPA Method 202


Teflon Filter						
Lab ID	2019-0420-2409		2019-0420-2410		2019-0420-2411	
Field ID	3516HD G LC 75-Run 1		3516HD G LC 75-Run 2		3516HD G LC 75-Run 3	
Organic Fraction						
Lab ID	2019-0420-2424		2019-0420-2425		2019-0420-2426	
Field ID	3516HD G LC 75-Run 1		3516HD G LC 75-Run 2		3516HD G LC 75-Run 3	
Beaker ID	2424		2425		2426	
Beaker tare, g	4.0317		4.0191		4.0252	
Beaker Solvent, g	105.6		105.8		119.2	
Solvent Mass, g	101.6		101.8		115.2	
Date - Dessicator	3/18/19		3/18/19		3/18/19	
Time - Dessicator	8:10		8:10		8:10	
Date of Weighing	3/19/19	3/19/19	3/19/19	3/19/19	3/19/19	3/19/19
Time of Weighing	8:24	14:29	8:25	14:30	8:26	14:31
Weight, g	4.0398	4.0396	4.0281	4.0285	4.0345	4.0350
Organic PM Mass, mg*	8.0		9.2		9.6	
Inorganic Fraction						
Lab ID	2019-0420-2439		2019-0420-2440		2019-0420-2441	
Field ID	3516HD G LC 75-Run 1		3516HD G LC 75-Run 2		3516HD G LC 75-Run 3	
Beaker ID	2439		2440		2441	
Beaker tare, g	4.0625		4.0156		4.0350	
Beaker Water, g	234.0		226.5		246.5	
Water Mass, g	229.9		222.5		242.5	
Date - Dessicator	3/20/19		3/20/19		3/20/19	
Time - Dessicator	15:20		15:20		15:20	
Date of Weighing	3/21/19	3/22/19	3/21/19	3/22/19	3/21/19	3/22/19
Time of Weighing	15:34	8:09	15:35	8:10	15:36	8:11
Weight, g	4.0671	4.0666	4.0196	4.0192	4.0377	4.0375
Inorganic Mass, mg*	4.4		3.8		2.6	
Blank Corrected	Yes					
Total PM Mass, mg	10.4		11.0		10.2	

*All fractions were analyzed and returned values greater than the MDL of 0.5 mg.

	Client	Caterpillar, Inc.
	City, State	Peoria, IL
	Project No.	2019-0420
	Method	US EPA Method 202

Teflon Filter						
Lab ID	2019-0420-2412		2019-0420-2413		2019-0420-2414	
Field ID	3516HD G LC 100-Run 1		3516HD G LC 100-Run 2		3516HD G LC 100-Run 3	
Organic Fraction						
Lab ID	2019-0420-2427		2019-0420-2428		2019-0420-2429	
Field ID	3516HD G LC 100-Run 1		3516HD G LC 100-Run 2		3516HD G LC 100-Run 3	
Beaker ID	2427		2428		2429	
Beaker tare, g	4.0263		4.0196		4.0317	
Beaker Solvent, g	106.0		86.3		87.9	
Solvent Mass, g	102.0		82.3		83.9	
Date - Dessicator	3/18/19		3/18/19		3/18/19	
Time - Dessicator	8:10		8:10		8:10	
Date of Weighing	3/19/19	3/19/19	3/19/19	3/19/19	3/19/19	3/19/19
Time of Weighing	8:27	14:32	8:28	14:33	8:29	14:34
Weight, g	4.0333	4.0336	4.0280	4.0283	4.0390	4.0393
Organic PM Mass, mg*	7.2		8.6		7.4	
Inorganic Fraction						
Lab ID	2019-0420-2442		2019-0420-2443		2019-0420-2444	
Field ID	3516HD G LC 100-Run 1		3516HD G LC 100-Run 2		3516HD G LC 100-Run 3	
Beaker ID	2442		2443		2444	
Beaker tare, g	4.0276		4.0294		4.0223	
Beaker Water, g	251.4		240.7		231.2	
Water Mass, g	247.4		236.7		227.2	
Date - Dessicator	3/20/19		3/20/19		3/20/19	
Time - Dessicator	15:20		15:20		15:20	
Date of Weighing	3/21/19	3/22/19	3/21/19	3/22/19	3/21/19	3/22/19
Time of Weighing	15:37	8:12	15:38	8:13	15:39	8:14
Weight, g	4.0324	4.0323	4.0400	4.0397	4.0298	4.0293
Inorganic Mass, mg*	4.8		10.4		7.2	
Blank Corrected	Yes					
Total PM Mass, mg	9.9		17.0		12.7	

*All fractions were analyzed and returned values greater than the MDL of 0.5 mg.

	Client	Caterpillar, Inc.
	City, State	Peoria, IL
	Project No.	2019-0420
	Method	US EPA Method 202

Teflon Filter Blanks				
	Field Train Blank		Proof Blank	
Lab ID	2019-0420-2445		N/A	
Field ID	Field Train Blank		N/A	
Organic Fraction Blanks				
	Field Train Blank		Proof Blank	
Lab ID	2019-0420-2446		2019-0420-2448	
Field ID	Field Train Blank		Proof Blank	
Beaker ID	2446		2448	
Beaker tare, g	4.0409		4.0235	
Beaker Solvent, g	110.6		77.5	
Solvent Mass, g	106.6		73.5	
Date - Dessicator	3/18/19		3/18/19	
Time - Dessicator	8:10		8:10	
Date of Weighing	3/19/19	3/19/19	3/19/19	3/19/19
Time of Weighing	8:30	14:35	8:31	14:36
Weight, g	4.0427	4.0430	4.0245	4.0248
Measured Organic Mass, mg	1.9		1.1	
Organic Mass, mg*	1.9		1.1	
Inorganic Fraction Blanks				
	Field Train Blank		Proof Blank	
Lab ID	2019-0420-2447		2019-0420-2449	
Field ID	Field Train Blank		Proof Blank	
Beaker ID	2447		2449	
Beaker tare, g	4.0312		4.0204	
Beaker Water g	182.0		148.9	
Water Mass, g	178.0		144.9	
Date - Dessicator	3/20/19		3/20/19	
Time - Dessicator	15:20		15:20	
Date of Weighing	3/21/19	3/22/19	3/21/19	3/22/19
Time of Weighing	15:40	8:15	15:41	8:16
Weight, g	4.0322	4.0318	4.0217	4.0216
Measured Inorganic Mass, mg	0.8		1.2	
Inorganic Mass, mg*	0.8		1.2	

Chain-Of-Custody

Version No. LT 2017-01_17.0

Alliance Source Testing, LLC - Lab Services
214 Central Circle SW Decatur, AL 35603
Phone (256) 351-0121 Fax (256) 351-0121

Client Name Caterpillar, Inc.

City, State ~~Decatur~~ Virginia Beach, VA 3-23-19 RMP

Source 3516HD Generator Exhaust

Project No. 19-0420

Turn Around Time Standard Expedited _____ days

Blank Manuf./Lot # Acetone / Fisher / 180349

Blank Manuf./Lot # Hexanes / Fisher / 175123

Sample ID	Number of Containers	Date Collected	Time Recovered	Collector Initials	Method 5	Method 17	Method/Media			Method 202			
							Method 201A	Method 201A	Method 202				
M5/202 - 3516HD Generator LC 10 - Run 1	3	3/8/19	12:00	KK	Filter Number - 83mm Quartz	Probe Nozzle Rinse - Acetone	Filter Number - 47mm Quartz	Nozzle Rinse - Acetone	PM 2.5 Filter Number - 47mm Quartz	PM 10 Rinse - Acetone	CPM Filter - 83mm Teflon	Condensate Catch - DUF	Solvent Rinse - Acetone/Hexane
M5/202 - 3516HD Generator LC 10 - Run 2	3	3/8/19	13:30	KK	Probe Nozzle Rinse - Acetone	Probe Nozzle Rinse - Acetone	Probe Nozzle Rinse - Acetone	Probe Nozzle Rinse - Acetone	Probe Nozzle Rinse - Acetone	Probe Nozzle Rinse - Acetone	Probe Nozzle Rinse - Acetone	Probe Nozzle Rinse - Acetone	Probe Nozzle Rinse - Acetone
M5/202 - 3516HD Generator LC 10 - Run 3	3	3/8/19	15:15	KK	Filter Number - 83mm Quartz	Filter Number - 83mm Quartz	Filter Number - 83mm Quartz	Filter Number - 83mm Quartz	Filter Number - 83mm Quartz	Filter Number - 83mm Quartz	Filter Number - 83mm Quartz	Filter Number - 83mm Quartz	Filter Number - 83mm Quartz
M5/202 - 3516HD Generator LC 25 - Run 1	3	3/7/19	16:10	KK									
M5/202 - 3516HD Generator LC 25 - Run 2	3	3/7/19	18:00	KK									
M5/202 - 3516HD Generator LC 25 - Run 3	3	3/7/19	19:15	KK									
M5/202 - 3516HD Generator LC 50 - Run 1	3	3/6/19	18:40	KK									
M5/202 - 3516HD Generator LC 50 - Run 2	3	3/7/19	11:00	KK									
M5/202 - 3516HD Generator LC 50 - Run 3	3	3/7/19	13:20	KK									

Relinquished By Aden R
Received By Andrew Taylor
Sample Container Received Temperature (°F) 106.5

Date 3/16/19
Date 3-13-19

Notes

Page 1 of 2



Chain-Of-Custody

Version No. LT 2017-01_17.0

Alliance Source Testing, LLC - Lab Services
 214 Central Circle SW Decatur, AL 35603
 Phone (256) 351-0121 Fax (256) 351-0121

Client Name Caterpillar, Inc.

City, State Decatur, IL Virginia Beach, VA 3-13-19 EMP

Source 3516HD Generator Exhaust

Project No. 19-0420

Turn Around Time

Standard

Expedited

_____ days

Blank Manuf/Lot # Acetone / Fisher / 180349

Blank Manuf/Lot # Hexanes / Fisher / 175123

Sample ID	Number of Containers	Date Collected	Time Recovered	Collector Initials	HOLD	Method/Media													
						Method 5		Method 17		Method 201A		Method 202							
M5/202 - 3516HD Generator LC 10 - Run 1	2	3/8/19	12:00	KK		Filter Number - 83mm Quartz	Filter Number - 83mm Teflon	Probe Nozzle Rinse - Acetone	Probe Nozzle Rinse - 1-bromopropane	Filter Number - 47mm Quartz	Nozzle Rinse - Acetone	PM 2.5 Filter Number - 47mm Quartz	PM 2.5 Rinse - Acetone	PM 10 Filter Number - 47mm Quartz	PM 10 Rinse - Acetone	CPM Filter - 83mm Teflon	Condensate Catch - DUF	Solvent Rinse - Acetone/Hexane	
M5/202 - 3516HD Generator LC 10 - Run 2	2	3/8/19	13:30	KK															
M5/202 - 3516HD Generator LC 10 - Run 3	2	3/8/19	15:15	KK															
M5/202 - 3516HD Generator LC 25 - Run 1	2	3/7/19	16:10	KK															
M5/202 - 3516HD Generator LC 25 - Run 2	2	3/7/19	18:00	KK															
M5/202 - 3516HD Generator LC 25 - Run 3	2	3/7/19	19:15	KK															
M5/202 - 3516HD Generator LC 50 - Run 1	2	3/6/19	18:40	KK															
M5/202 - 3516HD Generator LC 50 - Run 2	2	3/7/19	11:00	KK															
M5/202 - 3516HD Generator LC 50 - Run 3	2	3/7/19	13:20	KK															

Relinquished By AKR
 Received By Melissa Taylor
 Sample Container Received Temperature (°F) 63.5

Date 3/14/19
 Date 3-13-19

NOTES



Chain-Of-Custody

Version No. LT 2017-01_17.0

Alliance Source Testing, LLC - Lab Services
214 Central Circle SW Decatur, AL 35603
Phone (256) 351-0121 Fax (256) 351-0121

Client Name Caterpillar, Inc.

City, State Roanoke, Virginia Beach, VA 3-13-19 RMD

Source 3516HD Generator Exhaust

Project No. 19-0420

Turn Around Time

Standard

Expedited

_____ days

Blank Manuf/Lot # Acetone / Fisher / 180349

Blank Manuf/Lot # Hexanes / Fisher / 175123

Sample ID	Number of Containers	Date Collected	Time Recovered	Collector Initials	Method/Media											
					Method 5			Method 17			Method 201A			Method 202		
M5/202 - 3516HD Generator LC 75 - Run 1	3	3/6/19	12:10	KK	Filter Number - 83mm Quartz	Probe Nozzle Rinse - Acetone	Probe Nozzle Rinse - 1-bromopropane	Filter Number - 47mm Quartz	Nozzle Rinse - Acetone	PM 2.5 Filter Number- 47mm Quartz	PM 2.5 Rinse - Acetone	PM 10 Filter Number- 47mm Quartz	PM 10 Rinse - Acetone	CPM Filter - 83mm Teflon	Condensate Catch - DUF	Solvent Rinse - Acetone/Hexane
M5/202 - 3516HD Generator LC 75 - Run 2	3	3/6/19	14:45	KK	11234	<	<							<		
M5/202 - 3516HD Generator LC 75 - Run 3	3	3/6/19	17:15	KK	11337	<	<							<		
M5/202 - 3516HD Generator LC 100 - Run 1	3	3/5/19	13:45	KK	10832	<	<							<		
M5/202 - 3516HD Generator LC 100 - Run 2	3	3/5/19	15:50	KK	11574	<	<							<		
M5/202 - 3516HD Generator LC 100 - Run 3	3	3/6/19	9:00	KK	11573	<	<							<		
M5/202 - 3516HD Generator LC 100 - Run 3	3	3/6/19	9:00	KK	11572	<	<							<		
M5 Acetone Blank	1	3/5/19	11:00	KK		<	<							<		
M202 FT Recovery Blank	1	3/5/19	14:45	KK		<	<							<		

Relinquished By Walter Date 3/6/19

Received By Melissa Taylor Date 3-13-19

Sample Container Received Temperature (°F) 60.5

Notes _____

Page 2 of 2



Chain-Of-Custody

Version No. LT 2017-01_17.0

Alliance Source Testing, LLC - Lab Services
214 Central Circle SW Decatur, AL 35603
Phone (256) 351-0121 Fax (256) 351-0121

Client Name Caterpillar, Inc.

City, State Peoria, IL Virginia Beach, VA 3-13-19 RMP

Source 3516HD Generator Exhaust

Project No. 19-0420

Turn Around Time

Standard

Expedited

_____ days

Blank Manuf/Lot # Acetone / Fisher / 180349

Blank Manuf/Lot # Hexanes / Fisher / 175123

Sample ID	Number of Containers	Date Collected	Time Recovered	Collector Initials	HOLD	Method/Media						
						Method 5	Method 17	Method 201A	Method 202			
M5/202 - 3516HD Generator LC 75 - Run 1	2	3/6/19	12:10	KK		Filter Number - 83mm Quartz	Filter Number - 47mm Quartz	PM 2.5 Rinse - Acetone	PM 10 Rinse - Acetone	CPM Filter - 83mm Teflon	Condensate Catch - DUF	Solvent Rinse - Acetone/Hexane
M5/202 - 3516HD Generator LC 75 - Run 2	2	3/6/19	14:45	KK		Probe Nozzle Rinse - Acetone	Probe Nozzle Rinse - 1-bromopropane					
M5/202 - 3516HD Generator LC 75 - Run 3	2	3/6/19	17:15	KK								
M5/202 - 3516HD Generator LC 100 - Run 1	2	3/5/19	13:45	KK								
M5/202 - 3516HD Generator LC 100 - Run 2	2	3/5/19	15:50	KK								
M5/202 - 3516HD Generator LC 100 - Run 3	2	3/6/19	9:00	KK								
M202 FT Proof Blank	2	3/5/19	11:00	KK								
M202 FT Recovery Blank	2	3/5/19	14:45	KK								

Relinquished By [Signature]
 Received By [Signature]
 Sample Container Received Temperature (°F) 63.5

Date 3/14/19
 Date 3-13-19
 Page 2 of 2

Notes _____

Certificate Of Calibration and Traceability

Certificate #: HSV-4093-1551085-1

Calibration Performed By:

J.A. King & Company
511 Sparkman Drive
Huntsville, AL 35816
Toll Free: 800-327-7727

For:

Alliance Source Testing
214 Central Circle SW
Decatur, AL 35603
P. O. Number: Andy Roth

Procedure No.:	ICP-59-Laboratory Balances	Performed At:	Customer Loc.
Tolerance:	Handbook 44	Equipment ID:	A24014059
Temp./RH:	72.1 F / 43.2%	Manufacturer:	Denver Instruments
Cal Interval:	12 Month(s)	Model Number:	APX-200
Cal Date:	7/3/2018	Serial Number:	A24014059
Cal Due Date:	7/3/2019	Description:	Analytical Balance 200 x 0.0001 g
Calibration Result:	Pass	Capacity x Resolution:	200 x 0.0001 g
Technician:	Williams, Misty L	Department:	
Corner Test:	Pass	Return to Zero/Dec Load Test:	Pass

Remarks: In Tolerance - Meets The Manufacturer's Published Specifications.

Load Test

Description	Nominal	Tolerance -	Tolerance +	Results	As Found	As Left	Units
Increasing Load	40.0000	39.9997	40.0015	P	39.9999	39.9999	Grams
Increasing Load	80.0000	79.9997	80.0015	P	79.9999	79.9999	Grams
Increasing Load	120.0000	119.9997	120.0015	P	119.9999	119.9999	Grams
Increasing Load	160.0000	159.9997	160.0015	P	159.9999	159.9999	Grams
Increasing Load	200.0000	199.9997	200.0015	P	200.0000	200.0000	Grams
Decreasing Load	120.0000	119.9997	120.0015	P	119.9998	119.9998	Grams
Hysteresis	0.0000	0.0000	0.0003	P	0.0001	0.0001	Grams

P=Passed "As Found/As Left" A=Out of Tolerance "As Found" F=Out of Tolerance "As Found/As Left" R=Report of Actual Value

Standards Used To Calibrate Equipment

Traceability#	I.D.	Description	Last Cal.	Cal. Due Date
BHM-1418-10730-1	BHM30	Weight Kit Class 1 (1g thru 5kg)	3/28/2018	3/28/2019

This instrument has been processed and calibrated in accordance with the J. A. King & Co., LLC Quality Assurance manual and is traceable to the National Institute of Standards & Technology (NIST). Reported uncertainties are expressed as expanded uncertainty values at approximately the 95% confidence level using a coverage factor of K=2. Statements of compliance, where applicable, are based upon the test results falling within the specified limits with no reduction by the uncertainty of the measurement. The results contained herein relate only to the item calibrated. This certificate shall not be reproduced, except in full without the written permission of J. A. King & Co., LLC. Calibration due dates appearing on the Certificate of calibration and label are determined by the customer and do not imply continued conformance to specifications. The J. A. King & Co., LLC Quality Management system complies with the requirements of ISO/IEC 17025. View our Scope of Accreditation at www.jaking.com.

Certification Done and Authorized By: **Williams, Misty L Calibration Technician** (7/3/2018 19:34:34 UTC)

Certificate Of Calibration and Traceability

Certificate #: HSV-4093-1185064-1

Calibration Performed By:

J.A. King & Company
511 Sparkman Drive
Huntsville, AL 35816
Toll Free: 800-327-7727

For:

Alliance Source Testing
214 Central Circle SW
Decatur, AL 35603
P. O. Number: Andy Roth

Procedure No.:	ICP-26-Bench & Counting Scales	Performed At:	Customer Loc.
Tolerance:	Manufacturer's Specifications	Equipment ID:	5A2845843
Temp./RH:	72.1 F / 43.2%	Manufacturer:	A&D Weighing
Cal Interval:	1 Year(s)	Model Number:	EJ-1500
Cal Date:	7/3/2018	Serial Number:	5A2845843
Cal Due Date:	7/3/2019	Description:	Scale
Calibration Result:	Pass	Capacity x Resolution:	1500 x 0.1 g
Technician:	Williams, Misty L	Department:	N/A
Corner Test:	Pass	Return to Zero/Dec Load Test:	Pass

Remarks: In Tolerance - Meets The Manufacturer's Published Specifications.

Load Test

Description	Nominal	Tolerance -	Tolerance +	Results	As Found	As Left	Units
Increasing	300.0	299.7	300.3	P	300.0	300.0	g
Increasing	600.0	599.4	600.6	P	600.0	600.0	g
Increasing	900.0	899.1	900.9	P	900.0	900.0	g
Increasing	1200.0	1198.8	1201.2	P	1199.9	1199.9	g
Increasing	1500.0	1498.5	1501.5	P	1499.9	1499.9	g
Decreasing	900.0	899.1	900.9	P	899.9	899.9	g
Hysteresis	0.0	0.0	0.9	P	0.1	0.1	g

P=Passed "As Found/As Left" A=Out of Tolerance "As Found" F=Out of Tolerance "As Found/As Left" R=Report of Actual Value

Standards Used To Calibrate Equipment

Traceability#	I.D.	Description	Last Cal.	Cal. Due Date
BHM-1418-10730-1	BHM30	Weight Kit Class 1 (1g thru 5kg)	3/28/2018	3/28/2019

This instrument has been processed and calibrated in accordance with the J. A. King & Company, LLC Quality Assurance manual and is traceable to the International System of Units (SI) via national metrology institutes (e.g., NIST) that are signatories to the CIPM Mutual Recognition Arrangement. Reported uncertainties are expressed as expanded uncertainty values at approximately the 95% confidence level using a coverage factor of K=2. Statements of compliance, where applicable, are based upon the test results falling within the specified limits with no reduction by the uncertainty of the measurement. The results contained herein relate only to the item calibrated. This certificate shall not be reproduced, except in full without the written permission of J. A. King & Co., LLC. Calibration due dates appearing on the Certificate of Calibration and label are determined by the customer and do not imply continued conformance to specifications. The J. A. King & Co., LLC Quality Management system complies with the requirements of ISO/IEC 17025. View our Scope of Accreditation at www.jaking.com.

Certification Done and Authorized By: **Williams, Misty L Calibration Technician** (7/3/2018 20:6:0 UTC)

This is the last page of the report.

Your P.O. #: 19-0420
 Your Project #: 19-0420
 Site Location: CATERPILLAR INC.

Attention: Data Reports

Alliance Source Testing, LLC
 214 Central Circle SW
 Decatur, AL
 USA 35603

Report Date: 2019/03/27
 Report #: R5645681
 Version: 1 - Final

CERTIFICATE OF ANALYSIS

MAXXAM JOB #: B963792

Received: 2019/03/15, 14:30

Sample Matrix: Stack Sampling Train
 # Samples Received: 32

Analyses	Quantity	Date	Date	Laboratory Method	Reference
		Extracted	Analyzed		
Hexavalent Chromium (M0061)	17	2019/03/19	2019/03/18	BRL SOP-00106	EPA 7199/M0061 m
Metals in Combined Train (6020B m)	15	2019/03/21	2019/03/22	BRL SOP-00103/ BRL SOP-00102	EPA M29/CARB 436 m
Final Volume of KOH Impinger	17	N/A	2019/03/26		

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.



Your P.O. #: 19-0420
Your Project #: 19-0420
Site Location: CATERPILLAR INC.

Attention: Data Reports

Alliance Source Testing, LLC
214 Central Circle SW
Decatur, AL
USA 35603

Report Date: 2019/03/27
Report #: R5645681
Version: 1 - Final

CERTIFICATE OF ANALYSIS

MAXXAM JOB #: B963792
Received: 2019/03/15, 14:30

Encryption Key

Please direct all questions regarding this Certificate of Analysis to your Project Manager.
Clayton Johnson, Project Manager - Air Toxics, Source Evaluation
Email: CJohnson@maxxam.ca
Phone# (905)817-5769

=====
This report has been generated and distributed using a secure automated process.
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.

EPA M29 METALS (COMBINED TRAIN)

Maxxam ID		JEF374	JEF375	JEF376	JEF377	JEF378		
Sampling Date		2019/03/08 12:00	2019/03/08 13:30	2019/03/08 15:15	2019/03/07 15:45	2019/03/07 17:45		
	UNITS	M29- LC 10- R1	M29- LC 10- R2	M29- LC 10- R3	M29- LC 25- R1	M29- LC 25- R2	RDL	QC Batch
Combined Train Arsenic (As)	ug	<0.80	<0.80	5.88	<0.80	<0.80	0.80	6029996
Combined Train Cadmium (Cd)	ug	<0.18	<0.18	<0.18	<0.18	<0.18	0.18	6029996
Combined Train Nickel (Ni)	ug	2.3	2.3	11.3	1.8	1.6	1.0	6029996
RDL = Reportable Detection Limit QC Batch = Quality Control Batch								

Maxxam ID		JEF379	JEF380	JEF381	JEF382	JEF383		
Sampling Date		2019/03/07 19:00	2019/03/06 18:40	2019/03/07 11:00	2019/03/07 13:20	2019/03/06 12:00		
	UNITS	M29- LC 25- R3	M29- LC 50- R1	M29- LC 50- R2	M29- LC 50- R3	M29- LC 75- R1	RDL	QC Batch
Combined Train Arsenic (As)	ug	<0.80	<0.80	<0.80	<0.80	<0.80	0.80	6029996
Combined Train Cadmium (Cd)	ug	<0.18	<0.18	0.19	<0.18	<0.18	0.18	6029996
Combined Train Nickel (Ni)	ug	1.5	2.5	2.7	3.6	3.0	1.0	6029996
RDL = Reportable Detection Limit QC Batch = Quality Control Batch								

Maxxam ID		JEF384	JEF385	JEF386	JEF387	JEF388		
Sampling Date		2019/03/06 14:35	2019/03/06 17:15	2019/03/05 13:00	2019/03/05 16:00	2019/03/05 18:30		
	UNITS	M29- LC 75- R2	M29- LC 75- R3	M29- LC 100- R1	M29- LC 100- R2	M29- LC 100- R3	RDL	QC Batch
Combined Train Arsenic (As)	ug	<0.80	<0.80	<0.80	<0.80	<0.80	0.80	6029996
Combined Train Cadmium (Cd)	ug	<0.18	<0.18	0.44	<0.18	0.24	0.18	6029996
Combined Train Nickel (Ni)	ug	2.7	2.9	6.9	4.7	6.2	1.0	6029996
RDL = Reportable Detection Limit QC Batch = Quality Control Batch								

RESULTS OF ANALYSES OF STACK SAMPLING TRAIN

Maxxam ID		JFD840		JFD869		JFD877		
Sampling Date		2019/03/08 13:45		2019/03/08 13:45		2019/03/08 11:15		
	UNITS	M0061- DI H2O BLANK	RDL	M0061- KOH BLANK	RDL	M0061- LC 10%- R1	RDL	QC Batch
Potassium Hydroxide Volume	ml	287	1	150	1	307	1	6038453
Hexavalent Chromium (Cr 6+)	ug	<0.1	0.1	<0.08	0.08	<8	8	6023971
RDL = Reportable Detection Limit QC Batch = Quality Control Batch								

Maxxam ID		JFD878		JFD879		JFD880	JFD881		
Sampling Date		2019/03/08 12:25		2019/03/08 14:28		2019/03/07 15:45	2019/03/07 16:45		
	UNITS	M0061- LC 10%- R2	RDL	M0061- LC 10%- R3	RDL	M0061- LC 25%- R1	M0061- LC 25%- R2	RDL	QC Batch
Potassium Hydroxide Volume	ml	360	1	309	1	402	369	1	6038453
Hexavalent Chromium (Cr 6+)	ug	<4	4	<8	8	<4	<4	4	6023971
RDL = Reportable Detection Limit QC Batch = Quality Control Batch									

Maxxam ID		JFD882		JFD883		JFD884		JFD885		
Sampling Date		2019/03/07 18:25		2019/03/06 18:30		2019/03/07 10:30		2019/03/07 12:20		
	UNITS	M0061- LC 25%- R3	RDL	M0061- LC 50%- R1	M0061- LC 50%- R2	RDL	M0061- LC 50%- R3	RDL	QC Batch	
Potassium Hydroxide Volume	ml	396	1	453	375	1	480	1	6038453	
Hexavalent Chromium (Cr 6+)	ug	<4	4	<0.2	<0.2	0.2	<0.5	0.5	6023971	
RDL = Reportable Detection Limit QC Batch = Quality Control Batch										

Maxxam ID		JFD886	JFD887		JFD888		JFD889		
Sampling Date		2019/03/06 12:30	2019/03/06 14:00		2019/03/06 16:50		2019/03/05 13:00		
	UNITS	M0061- LC 75%- R1	M0061- LC 75%- R2	RDL	M0061- LC 75%- R3	RDL	M0061- LC 100%- R1	RDL	QC Batch
Potassium Hydroxide Volume	ml	365	400	1	389	1	428	1	6038453
Hexavalent Chromium (Cr 6+)	ug	<4	<4	4	<1	1	4.1	0.2	6023971
RDL = Reportable Detection Limit QC Batch = Quality Control Batch									

RESULTS OF ANALYSES OF STACK SAMPLING TRAIN

Maxxam ID		JFD890	JFD891		
Sampling Date		2019/03/05 15:00	2019/03/05 17:00		
	UNITS	M0061- LC 100%- R2	M0061- LC 100%- R3	RDL	QC Batch
Potassium Hydroxide Volume	ml	384	452	1	6038453
Hexavalent Chromium (Cr 6+)	ug	<5	<5	5	6023971
RDL = Reportable Detection Limit QC Batch = Quality Control Batch					

TEST SUMMARY

Maxxam ID: JEF374
Sample ID: M29- LC 10- R1
Matrix: Stack Sampling Train

Collected: 2019/03/08
Shipped:
Received: 2019/03/15

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Metals in Combined Train (6020B m)	ICP1/MS	6029996	2019/03/21	2019/03/22	Nan Raykha

Maxxam ID: JEF374 Dup
Sample ID: M29- LC 10- R1
Matrix: Stack Sampling Train

Collected: 2019/03/08
Shipped:
Received: 2019/03/15

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Metals in Combined Train (6020B m)	ICP1/MS	6029996	2019/03/22	2019/03/22	Nan Raykha

Maxxam ID: JEF375
Sample ID: M29- LC 10- R2
Matrix: Stack Sampling Train

Collected: 2019/03/08
Shipped:
Received: 2019/03/15

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Metals in Combined Train (6020B m)	ICP1/MS	6029996	2019/03/21	2019/03/22	Nan Raykha

Maxxam ID: JEF376
Sample ID: M29- LC 10- R3
Matrix: Stack Sampling Train

Collected: 2019/03/08
Shipped:
Received: 2019/03/15

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Metals in Combined Train (6020B m)	ICP1/MS	6029996	2019/03/21	2019/03/22	Nan Raykha

Maxxam ID: JEF377
Sample ID: M29- LC 25- R1
Matrix: Stack Sampling Train

Collected: 2019/03/07
Shipped:
Received: 2019/03/15

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Metals in Combined Train (6020B m)	ICP1/MS	6029996	2019/03/21	2019/03/22	Nan Raykha

Maxxam ID: JEF378
Sample ID: M29- LC 25- R2
Matrix: Stack Sampling Train

Collected: 2019/03/07
Shipped:
Received: 2019/03/15

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Metals in Combined Train (6020B m)	ICP1/MS	6029996	2019/03/21	2019/03/22	Nan Raykha

Maxxam ID: JEF379
Sample ID: M29- LC 25- R3
Matrix: Stack Sampling Train

Collected: 2019/03/07
Shipped:
Received: 2019/03/15

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Metals in Combined Train (6020B m)	ICP1/MS	6029996	2019/03/21	2019/03/22	Nan Raykha

TEST SUMMARY

Maxxam ID: JEF380
Sample ID: M29- LC 50- R1
Matrix: Stack Sampling Train

Collected: 2019/03/06
Shipped:
Received: 2019/03/15

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Metals in Combined Train (6020B m)	ICP1/MS	6029996	2019/03/21	2019/03/22	Nan Raykha

Maxxam ID: JEF381
Sample ID: M29- LC 50- R2
Matrix: Stack Sampling Train

Collected: 2019/03/07
Shipped:
Received: 2019/03/15

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Metals in Combined Train (6020B m)	ICP1/MS	6029996	2019/03/21	2019/03/22	Nan Raykha

Maxxam ID: JEF382
Sample ID: M29- LC 50- R3
Matrix: Stack Sampling Train

Collected: 2019/03/07
Shipped:
Received: 2019/03/15

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Metals in Combined Train (6020B m)	ICP1/MS	6029996	2019/03/21	2019/03/22	Nan Raykha

Maxxam ID: JEF383
Sample ID: M29- LC 75- R1
Matrix: Stack Sampling Train

Collected: 2019/03/06
Shipped:
Received: 2019/03/15

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Metals in Combined Train (6020B m)	ICP1/MS	6029996	2019/03/21	2019/03/22	Nan Raykha

Maxxam ID: JEF384
Sample ID: M29- LC 75- R2
Matrix: Stack Sampling Train

Collected: 2019/03/06
Shipped:
Received: 2019/03/15

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Metals in Combined Train (6020B m)	ICP1/MS	6029996	2019/03/21	2019/03/22	Nan Raykha

Maxxam ID: JEF385
Sample ID: M29- LC 75- R3
Matrix: Stack Sampling Train

Collected: 2019/03/06
Shipped:
Received: 2019/03/15

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Metals in Combined Train (6020B m)	ICP1/MS	6029996	2019/03/21	2019/03/22	Nan Raykha

Maxxam ID: JEF386
Sample ID: M29- LC 100- R1
Matrix: Stack Sampling Train

Collected: 2019/03/05
Shipped:
Received: 2019/03/15

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Metals in Combined Train (6020B m)	ICP1/MS	6029996	2019/03/21	2019/03/22	Nan Raykha

TEST SUMMARY

Maxxam ID: JEF387
Sample ID: M29- LC 100- R2
Matrix: Stack Sampling Train

Collected: 2019/03/05
Shipped:
Received: 2019/03/15

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Metals in Combined Train (6020B m)	ICP1/MS	6029996	2019/03/21	2019/03/22	Nan Raykha

Maxxam ID: JEF388
Sample ID: M29- LC 100- R3
Matrix: Stack Sampling Train

Collected: 2019/03/05
Shipped:
Received: 2019/03/15

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Metals in Combined Train (6020B m)	ICP1/MS	6029996	2019/03/21	2019/03/22	Nan Raykha

Maxxam ID: JFD840
Sample ID: M0061- DI H2O BLANK
Matrix: Stack Sampling Train

Collected: 2019/03/08
Shipped:
Received: 2019/03/15

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Hexavalent Chromium (M0061)	IC/SPEC	6023971	2019/03/19	2019/03/18	Lang Le
Final Volume of KOH Impinger		6038453	N/A	2019/03/26	Walt Wang

Maxxam ID: JFD869
Sample ID: M0061- KOH BLANK
Matrix: Stack Sampling Train

Collected: 2019/03/08
Shipped:
Received: 2019/03/15

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Hexavalent Chromium (M0061)	IC/SPEC	6023971	2019/03/19	2019/03/18	Lang Le
Final Volume of KOH Impinger		6038453	N/A	2019/03/26	Walt Wang

Maxxam ID: JFD877
Sample ID: M0061- LC 10%- R1
Matrix: Stack Sampling Train

Collected: 2019/03/08
Shipped:
Received: 2019/03/15

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Hexavalent Chromium (M0061)	IC/SPEC	6023971	2019/03/19	2019/03/18	Lang Le
Final Volume of KOH Impinger		6038453	N/A	2019/03/26	Walt Wang

Maxxam ID: JFD877 Dup
Sample ID: M0061- LC 10%- R1
Matrix: Stack Sampling Train

Collected: 2019/03/08
Shipped:
Received: 2019/03/15

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Hexavalent Chromium (M0061)	IC/SPEC	6023971	2019/03/19	2019/03/18	Lang Le

Maxxam ID: JFD878
Sample ID: M0061- LC 10%- R2
Matrix: Stack Sampling Train

Collected: 2019/03/08
Shipped:
Received: 2019/03/15

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Hexavalent Chromium (M0061)	IC/SPEC	6023971	2019/03/19	2019/03/18	Lang Le

TEST SUMMARY

Maxxam ID: JFD878
Sample ID: M0061- LC 10%- R2
Matrix: Stack Sampling Train

Collected: 2019/03/08
Shipped:
Received: 2019/03/15

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Final Volume of KOH Impinger		6038453	N/A	2019/03/26	Walt Wang

Maxxam ID: JFD879
Sample ID: M0061- LC 10%- R3
Matrix: Stack Sampling Train

Collected: 2019/03/08
Shipped:
Received: 2019/03/15

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Hexavalent Chromium (M0061)	IC/SPEC	6023971	2019/03/19	2019/03/18	Lang Le
Final Volume of KOH Impinger		6038453	N/A	2019/03/26	Walt Wang

Maxxam ID: JFD880
Sample ID: M0061- LC 25%- R1
Matrix: Stack Sampling Train

Collected: 2019/03/07
Shipped:
Received: 2019/03/15

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Hexavalent Chromium (M0061)	IC/SPEC	6023971	2019/03/19	2019/03/18	Lang Le
Final Volume of KOH Impinger		6038453	N/A	2019/03/26	Walt Wang

Maxxam ID: JFD881
Sample ID: M0061- LC 25%- R2
Matrix: Stack Sampling Train

Collected: 2019/03/07
Shipped:
Received: 2019/03/15

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Hexavalent Chromium (M0061)	IC/SPEC	6023971	2019/03/19	2019/03/18	Lang Le
Final Volume of KOH Impinger		6038453	N/A	2019/03/26	Walt Wang

Maxxam ID: JFD882
Sample ID: M0061- LC 25%- R3
Matrix: Stack Sampling Train

Collected: 2019/03/07
Shipped:
Received: 2019/03/15

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Hexavalent Chromium (M0061)	IC/SPEC	6023971	2019/03/19	2019/03/18	Lang Le
Final Volume of KOH Impinger		6038453	N/A	2019/03/26	Walt Wang

Maxxam ID: JFD883
Sample ID: M0061- LC 50%- R1
Matrix: Stack Sampling Train

Collected: 2019/03/06
Shipped:
Received: 2019/03/15

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Hexavalent Chromium (M0061)	IC/SPEC	6023971	2019/03/19	2019/03/18	Lang Le
Final Volume of KOH Impinger		6038453	N/A	2019/03/26	Walt Wang

TEST SUMMARY

Maxxam ID: JFD884
Sample ID: M0061- LC 50%- R2
Matrix: Stack Sampling Train

Collected: 2019/03/07
Shipped:
Received: 2019/03/15

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Hexavalent Chromium (M0061)	IC/SPEC	6023971	2019/03/19	2019/03/18	Lang Le
Final Volume of KOH Impinger		6038453	N/A	2019/03/26	Walt Wang

Maxxam ID: JFD885
Sample ID: M0061- LC 50%- R3
Matrix: Stack Sampling Train

Collected: 2019/03/07
Shipped:
Received: 2019/03/15

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Hexavalent Chromium (M0061)	IC/SPEC	6023971	2019/03/19	2019/03/18	Lang Le
Final Volume of KOH Impinger		6038453	N/A	2019/03/26	Walt Wang

Maxxam ID: JFD886
Sample ID: M0061- LC 75%- R1
Matrix: Stack Sampling Train

Collected: 2019/03/06
Shipped:
Received: 2019/03/15

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Hexavalent Chromium (M0061)	IC/SPEC	6023971	2019/03/19	2019/03/18	Lang Le
Final Volume of KOH Impinger		6038453	N/A	2019/03/26	Walt Wang

Maxxam ID: JFD887
Sample ID: M0061- LC 75%- R2
Matrix: Stack Sampling Train

Collected: 2019/03/06
Shipped:
Received: 2019/03/15

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Hexavalent Chromium (M0061)	IC/SPEC	6023971	2019/03/19	2019/03/18	Lang Le
Final Volume of KOH Impinger		6038453	N/A	2019/03/26	Walt Wang

Maxxam ID: JFD888
Sample ID: M0061- LC 75%- R3
Matrix: Stack Sampling Train

Collected: 2019/03/06
Shipped:
Received: 2019/03/15

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Hexavalent Chromium (M0061)	IC/SPEC	6023971	2019/03/19	2019/03/18	Lang Le
Final Volume of KOH Impinger		6038453	N/A	2019/03/26	Walt Wang

Maxxam ID: JFD889
Sample ID: M0061- LC 100%- R1
Matrix: Stack Sampling Train

Collected: 2019/03/05
Shipped:
Received: 2019/03/15

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Hexavalent Chromium (M0061)	IC/SPEC	6023971	2019/03/19	2019/03/18	Lang Le
Final Volume of KOH Impinger		6038453	N/A	2019/03/26	Walt Wang

TEST SUMMARY

Maxxam ID: JFD890
Sample ID: M0061- LC 100%- R2
Matrix: Stack Sampling Train

Collected: 2019/03/05
Shipped:
Received: 2019/03/15

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Hexavalent Chromium (M0061)	IC/SPEC	6023971	2019/03/19	2019/03/18	Lang Le
Final Volume of KOH Impinger		6038453	N/A	2019/03/26	Walt Wang

Maxxam ID: JFD891
Sample ID: M0061- LC 100%- R3
Matrix: Stack Sampling Train

Collected: 2019/03/05
Shipped:
Received: 2019/03/15

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Hexavalent Chromium (M0061)	IC/SPEC	6023971	2019/03/19	2019/03/18	Lang Le
Final Volume of KOH Impinger		6038453	N/A	2019/03/26	Walt Wang

GENERAL COMMENTS

Sample JEF376 [M29- LC 10- R3] : Much higher levels of Ca, Ti, B, Al, Mg etc are present.
Data confirmed by analyzing an extra 5x dilution.

EPA M29 METALS (COMBINED TRAIN)

Metals in Combined Train (6020B m): Post digestion duplicate and spike were done on sample JEF374.

RESULTS OF ANALYSES OF STACK SAMPLING TRAIN

Hexavalent Chromium (M0061): JFD877 to JFD891, all samples filtered prior to analysis due to color and particulates.

JFD869 measured pH>12

JFD883 measured pH=10.5

JFD877 to JFD891, all samples measured pH =8.5

Results relate only to the items tested.

QUALITY ASSURANCE REPORT

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	% Recovery	UNITS	QC Limits
6023971	LLE	Matrix Spike(JFD877)	Hexavalent Chromium (Cr 6+)	2019/03/18		98	%	80 - 120
6023971	LLE	Spiked Blank	Hexavalent Chromium (Cr 6+)	2019/03/18		97	%	90 - 110
6023971	LLE	Method Blank	Hexavalent Chromium (Cr 6+)	2019/03/18	<0.2		ug	
6023971	LLE	RPD - Sample/Sample Dup	Hexavalent Chromium (Cr 6+)	2019/03/18	NC		%	20
6029996	N_R	Matrix Spike(JEF374)	Combined Train Arsenic (As)	2019/03/22		98	%	75 - 125
			Combined Train Cadmium (Cd)	2019/03/22		103	%	75 - 125
			Combined Train Nickel (Ni)	2019/03/22		99	%	75 - 125
6029996	N_R	MS/MSD RPD	Combined Train Arsenic (As)	2019/03/22	1.3		%	20
			Combined Train Cadmium (Cd)	2019/03/22	2.7		%	20
			Combined Train Nickel (Ni)	2019/03/22	0.010		%	20
6029996	N_R	Spiked Blank	Combined Train Arsenic (As)	2019/03/22		102	%	85 - 115
			Combined Train Cadmium (Cd)	2019/03/22		103	%	85 - 115
			Combined Train Nickel (Ni)	2019/03/22		103	%	85 - 115
6029996	N_R	RPD	Combined Train Arsenic (As)	2019/03/22	0.69		%	20
			Combined Train Cadmium (Cd)	2019/03/22	0.16		%	20
			Combined Train Nickel (Ni)	2019/03/22	0.62		%	20
6029996	N_R	Method Blank	Combined Train Arsenic (As)	2019/03/22	<0.80		ug	
			Combined Train Cadmium (Cd)	2019/03/22	<0.18		ug	
			Combined Train Nickel (Ni)	2019/03/22	<1.0		ug	
6029996	N_R	RPD - Sample/Sample Dup	Combined Train Arsenic (As)	2019/03/22	NC		%	20
			Combined Train Cadmium (Cd)	2019/03/22	NC		%	20
			Combined Train Nickel (Ni)	2019/03/22	6.3		%	20

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

Matrix Spike: A sample to which a known amount of the analyte of interest has been added. Used to evaluate sample matrix interference.

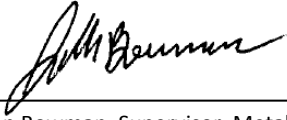
Spiked Blank: A blank matrix sample to which a known amount of the analyte, usually from a second source, has been added. Used to evaluate method accuracy.

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

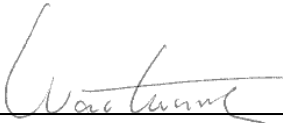
NC (Duplicate RPD): The duplicate RPD was not calculated. The concentration in the sample and/or duplicate was too low to permit a reliable RPD calculation (absolute difference <= 2x RDL).

VALIDATION SIGNATURE PAGE

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



John Bowman, Supervisor, Metals Group



Walt Wang, Scientific Specialist – Inorganic

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.



B963792

Chain of Custody

Project #: 2019-0420		Client/Plant Name: AST/Caterpillar, Inc. - Peoria, IL		Special Instructions: **LAB: Measure and report sample volume (mL) unless a volume is provided.															
Sampling Location: 3516HD Generator Exhaust - Load Condition 10				Report Turnaround Time: <input checked="" type="checkbox"/> Normal (10 business days) <input type="checkbox"/> 5 business days <input type="checkbox"/> Other:															
Sampled by (Print): <i>Kuj. Kinoshita</i>		Report Turnaround Time: <input checked="" type="checkbox"/> Normal (10 business days) <input type="checkbox"/> 5 business days <input type="checkbox"/> Other:		Analytical Deadline: <input checked="" type="checkbox"/> 7 days <input type="checkbox"/> 72 hrs. <input type="checkbox"/> 24 hrs. <input type="checkbox"/> Other:															
(Signature): <i>[Signature]</i>		Work Requested by: Adam Robinson		Phone: 256-351-0121															
Submit Report to: Above & AST Group		Phone: 503-715-7095		Fax: e-Mail: Adam.Robinson@stacktest.com; all emails: firstname.lastname@stacktest.com															
				e-Mail: AST group: Jordan Laster, Laura Aymett, Austin Abranovic															
Field Sample ID (include Run and Sample Fraction)	Lab Sample ID	Collection			Vol. (mL)	Tare Wt. (g)	EPA Method or Rule	Analysis								Comments: (Visual observation, canister start/stop pressures, additional analytes, etc.)			
		Date	Time(s)	Container Type*				TO-14A Method 18	Flare Gas Analysis (Method 18 + ASTM 1946D)	ASTM D1946	TO-15 Method 26A	Method 5	Method 202	CTM-027	Method 29				
3516HD Generator LC 10 - Cont. 1 - Run 1		3/8/19	12:00	F	NA	—	M29										✓	Arsenic, Cadmium and Nickel	
3516HD Generator LC 10 - Cont. 3 - Run 1		3/8/19	12:00	P	**	NA	M29											✓	
3516HD Generator LC 10 - Cont. 4 - Run 1		3/8/19	12:00	P	**	NA	M29											✓	
3516HD Generator LC 10 - Cont. 1 - Run 2		3/8/19	13:30	F	NA	—	M29											✓	
3516HD Generator LC 10 - Cont. 3 - Run 2		3/8/19	13:30	P	**	NA	M29											✓	
3516HD Generator LC 10 - Cont. 4 - Run 2		3/8/19	13:30	P	**	NA	M29											✓	
3516HD Generator LC 10 - Cont. 1 - Run 3		3/8/19	15:15	F	NA	—	M29											✓	
3516HD Generator LC 10 - Cont. 3 - Run 3		3/8/19	15:15	P	**	NA	M29											✓	
3516HD Generator LC 10 - Cont. 4 - Run 3		3/8/19	15:15	P	**	NA	M29											✓	
Relinquished by (signature)		Date	Time	Received by (signature)			Relinquished by (signature)		Date	Time	Received by (signature)								
<i>[Signature]</i>		3/11/15	15:30	<i>[Signature]</i>															
Relinquished by (signature)		Date	Time	Received by (signature)			Relinquished by (signature)		Date	Time	Received by (signature)								
									2/9/2015	14:30	<i>[Signature]</i>								

*Types - C: Canister T: Tedlar bag B: Bomb cylinder GA: Glass, amber GC: Glass, clear P: Plastic F: Filter O: Other

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Chain of Custody

GSINC-DR1001-001, Revision 2017-01, Effective 04/05/17

10.4/10.9/10.1
12.0/11.2/10.9
No ice
page 1 of 6



B963792

Chain of Custody

Project #: 2019-0420		Client/Plant Name: AST/Caterpillar, Inc. - Peoria, IL		Special Instructions: **LAB: Measure and report sample volume (mL) unless a volume is provided.													
Sampling Location: 3516HD Generator Exhaust – Load Condition 25				Report Turnaround Time: <input checked="" type="checkbox"/> Normal (10 business days) <input type="checkbox"/> 5 business days <input type="checkbox"/> Other:													
Sampled by (Print): <i>Kuji Kawashita</i>		Report Turnaround Time: <input type="checkbox"/> 7 days <input type="checkbox"/> 72 hrs. <input type="checkbox"/> 24 hrs. <input type="checkbox"/> Other:		Analytical Deadline: <input checked="" type="checkbox"/> 7 days <input type="checkbox"/> 72 hrs. <input type="checkbox"/> 24 hrs. <input type="checkbox"/> Other:													
(Signature): <i>[Signature]</i>		Work Requested by: Adam Robinson		Phone: 256-351-0121		Fax: e-Mail: Adam.Robinson@stacktest.com; all emails: firstname.lastname@stacktest.com											
Submit Report to: Above & AST Group		Phone: 503-715-7095		Fax: e-Mail: AST group: Jordan Laster, Laura Aymett, Austin Abranovic													
Field Sample ID (include Run and Sample Fraction)	Lab Sample ID	Collection			Vol. (mL)	Tare Wt. (g)	EPA Method or Rule	Analysis*							Comments: (Visual observation, canister start/stop pressures, additional analytes, etc.)		
		Date	Time(s)	Container Type*				TO-14A Method 18	Flare Gas Analysis (Method 18 + ASTM 1946D)	ASTM D1946	TO-15 Method 20A	Method 5	Method 202	CTM-027		Method 29	
3516HD Generator LC 25 - Cont. 1 - Run 1		3/7/19	15:45	F	NA	---	M29									✓	Arsenic, Cadmium and Nickel
3516HD Generator LC 25 - Cont. 3 - Run 1		3/7/19	15:45	P	**	NA	M29									✓	
3516HD Generator LC 25 - Cont. 4 - Run 1		3/7/19	15:45	P	**	NA	M29									✓	
3516HD Generator LC 25 - Cont. 1 - Run 2		3/7/19	17:45	F	NA	---	M29									✓	
3516HD Generator LC 25 - Cont. 3 - Run 2		3/7/19	17:45	P	**	NA	M29									✓	
3516HD Generator LC 25 - Cont. 4 - Run 2		3/7/19	17:45	P	**	NA	M29									✓	
3516HD Generator LC 25 - Cont. 1 - Run 3		3/7/19	19:00	F	NA	---	M29									✓	
3516HD Generator LC 25 - Cont. 3 - Run 3		3/7/19	19:00	P	**	NA	M29									✓	
3516HD Generator LC 25 - Cont. 4 - Run 3		3/7/19	19:00	P	**	NA	M29									✓	
Relinquished by (signature)		Date	Time	Received by (signature)			Relinquished by (signature)		Date	Time	Received by (signature)						
<i>[Signature]</i>		3/14/19	15:30	<i>[Signature]</i>													
Relinquished by (signature)		Date	Time	Received by (signature)			Relinquished by (signature)		Date	Time	Received by (signature)						
									2/9/2015	14:30	FIDELE NTAMWEMERU <i>[Signature]</i>						
Sample Pick-Up (Circle One): Yes / No by _____ (Print)								Canister Rental (Circle One): Yes / No									

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Chain of Custody

GSINC-DR1001-001, Revision 2017-01, Effective 04/05/17

10.4 / 10.7 / 10.1
12.0 / 11.2 / 10.9 No ice

page 2 of 6



B963792

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Project #: 2019-0420		Client/Plant Name: AST/Caterpillar, Inc. - Peoria, IL				Special Instructions: **LAB: Measure and report sample volume (mL) unless a volume is provided.												
Sampling Location: 3516HD Generator Exhaust - Load Condition 50						Report Turnaround Time: <input checked="" type="checkbox"/> Normal (10 business days) <input type="checkbox"/> 5 business days <input type="checkbox"/> Other:												
Sampled by (Print): <i>Konji Kinoshita</i> (Signature): <i>[Signature]</i>						Analytical Deadline: <input checked="" type="checkbox"/> 7 days <input type="checkbox"/> 72 hrs. <input type="checkbox"/> 24 hrs. <input type="checkbox"/> Other:												
Work Requested by: Adam Robinson			Phone: 256-351-0121			Fax:			e-Mail: Adam.Robinson@stacktest.com; all emails: firstname.lastname@stacktest.com									
Submit Report to: Above & AST Group			Phone: 503-715-7095			Fax:			e-Mail: AST group: Jordan Laster, Laura Aymett, Austin Abranovic									
Field Sample ID (Include Run and Sample Fraction)	Lab Sample ID	Collection				EPA Method or Rule	Analysis										Comments: (Visual observation, canister start/stop pressures, additional analytes, etc.)	
		Date	Time(s)	Container Type*	Vol. (mL)		Tare Wt. (g)	TO-14A	Method 18	Flare Gas Analysis (Method 18 + ASTM 1946D)	ASTM D1946	TO-15	Method 26A	Method 5	Method 202	CTM-027		Method 29
3516HD Generator LC 50 - Cont. 1 - Run 1		3/6/19	18:40	F	NA	M29												Arsenic, Cadmium and Nickel
3516HD Generator LC 50 - Cont. 3 - Run 1		3/7/19	18:40	P	**	NA	M29											"
3516HD Generator LC 50 - Cont. 4 - Run 1		3/6/19	18:40	P	**	NA	M29											"
3516HD Generator LC 50 - Cont. 1 - Run 2		3/7/19	11:00	F	NA	M29												"
3516HD Generator LC 50 - Cont. 3 - Run 2		3/7/19	11:00	P	**	NA	M29											"
3516HD Generator LC 50 - Cont. 4 - Run 2		3/7/19	11:00	P	**	NA	M29											"
3516HD Generator LC 50 - Cont. 1 - Run 3		3/7/19	13:20	F	NA	M29												"
3516HD Generator LC 50 - Cont. 3 - Run 3		3/7/19	13:20	P	**	NA	M29											"
3516HD Generator LC 50 - Cont. 4 - Run 3		3/7/19	13:20	P	**	NA	M29											"
Relinquished by (signature)		Date	Time	Received by (signature)			Relinquished by (signature)			Date	Time	Received by (signature)						
<i>[Signature]</i>		3/1/19	15:30	<i>[Signature]</i>														
Relinquished by (signature)		Date	Time	Received by (signature)			Relinquished by (signature)			Date	Time	Received by (signature)						
										2019/03/15	14:30	FIDELE NTAMWEMEZI <i>[Signature]</i>						
Sample Pick-Up (Circle One): Yes / No by _____ (Print)										Canister Rental (Circle One): Yes / No								

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GSINC-DR1001-001, Revision 2017-01, Effective 04/05/17

10.4/10.9/10.1
12.0/11.2/10.9 No ice

page 3 of 6



B963792

Chain of Custody

Project #: 2019-0420		Client/Plant Name: AST/Caterpillar, Inc. - Peoria, IL			Special Instructions: **LAB: Measure and report sample volume (mL) unless a volume is provided.															
Sampling Location: 3516HD Generator Exhaust - Load Condition 75					Report Turnaround Time: <input checked="" type="checkbox"/> Normal (10 business days) <input type="checkbox"/> 5 business days <input type="checkbox"/> Other:															
Sampled by (Print): <i>Koji Kinoshita</i>		Signature: <i>[Signature]</i>			Analytical Deadline: <input checked="" type="checkbox"/> 7 days <input type="checkbox"/> 72 hrs. <input type="checkbox"/> 24 hrs. <input type="checkbox"/> Other:															
Work Requested by: Adam Robinson		Phone: 256-351-0121			Fax:		e-Mail: Adam.Robinson@stacktest.com; all emails: firstname.lastname@stacktest.com													
Submit Report to: Above & AST Group		Phone: 503-715-7095			Fax:		e-Mail: AST group: Jordan Laster, Laura Aymett, Austin Abranovic													
Field Sample ID (Include Run and Sample Fraction)	Lab Sample ID	Collection				EPA Method or Rule	Analysis										Comments: (Visual observation, canister start/stop pressures, additional analytes, etc.)			
		Date	Time(s)	Container Type*	Vol. (mL)		Tare Wt. (g)	TO-14A	Method 18	Flare Gas Analysis (Method 18 + ASTM 1946D)	ASTM D1946	TO-15	Method 26A	Method 5	Method 202	CTM-027		Method 29		
3516HD Generator LC 75 - Cont. 1 - Run 1		3/6/19	12:00	F	NA	---	M29											✓	Arsenic, Cadmium and Nickel	
3516HD Generator LC 75 - Cont. 3 - Run 1		3/6/19	12:00	P	**	NA	M29											✓	"	
3516HD Generator LC 75 - Cont. 4 - Run 1		3/6/19	12:00	P	**	NA	M29											✓	"	
3516HD Generator LC 75 - Cont. 1 - Run 2		3/6/19	14:35	F	NA	---	M29											✓	"	
3516HD Generator LC 75 - Cont. 3 - Run 2		3/6/19	14:35	P	**	NA	M29											✓	"	
3516HD Generator LC 75 - Cont. 4 - Run 2		3/6/19	14:35	P	**	NA	M29											✓	"	
3516HD Generator LC 75 - Cont. 1 - Run 3		3/6/19	17:15	F	NA	---	M29											✓	"	
3516HD Generator LC 75 - Cont. 3 - Run 3		3/6/19	17:15	P	**	NA	M29											✓	"	
3516HD Generator LC 75 - Cont. 4 - Run 3		3/6/19	17:15	P	**	NA	M29											✓	"	
Relinquished by (signature)		Date	Time	Received by (signature)			Relinquished by (signature)		Date	Time	Received by (signature)									
<i>[Signature]</i>		3/7/19	15:30	<i>[Signature]</i>																
Relinquished by (signature)		Date	Time	Received by (signature)			Relinquished by (signature)		Date	Time	Received by (signature)									
									2019/02/15	14:30	FIDELE N. NAWWEMEZI <i>[Signature]</i>									
Sample Pick-Up (Circle One): Yes / No by _____ (Print)										Canister Rental (Circle One): Yes / No										

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GSINC-DR1001-001, Revision 2017-01, Effective 04/05/17

10.4/10.9/10.1
12.0/11.2/10.9 No ice
page 4 of 6



B963792

Chain of Custody

Project #: 2019-0420		Client/Plant Name: AST/Caterpillar, Inc. - Peoria, IL				Special Instructions: • **LAB: Measure and report sample volume (mL) unless a volume is provided.												
Sampling Location: 3516HD Generator Exhaust - Load Condition 100						Report Turnaround Time: <input checked="" type="checkbox"/> Normal (10 business days) <input type="checkbox"/> 5 business days <input type="checkbox"/> Other:												
Sampled by (Print): Kenji Kinoshita (Signature): <i>[Signature]</i>						Analytical Deadline: <input checked="" type="checkbox"/> 7 days <input type="checkbox"/> 72 hrs. <input type="checkbox"/> 24 hrs. <input type="checkbox"/> Other:												
Work Requested by: Adam Robinson			Phone: 256-351-0121			Fax:			e-Mail: Adam.Robinson@stacktest.com; all emails: firstname.lastname@stacktest.com									
Submit Report to: Above & AST Group			Phone: 503-715-7095			Fax:			e-Mail: AST group: Jordan Laster, Laura Aymett, Austin Abranovic									
Field Sample ID (include Run and Sample Fraction)	Lab Sample ID	Collection				EPA Method or Rule	Analysis										Comments: (Visual observance, canister start/stop pressures, additional analytes, etc.)	
		Date	Time(s)	Container Type*	Vol. (mL)		Tare Wt. (g)	TO-14A Method 18	Flare Gas Analysis (Method 18 + ASTM 1946D)	ASTM D1946	TO-15	Method 26A	Method 5	Method 202	CTM-027	Method 29		
3516HD Generator LC 100 - Cont. 1 - Run 1		3/5/19	13:00	F	NA	M29											✓	Arsenic, Cadmium and Nickel
3516HD Generator LC 100 - Cont. 3 - Run 1		3/5/19	17:00	P	**	NA	M29										✓	"
3516HD Generator LC 100 - Cont. 4 - Run 1		3/5/19	17:00	P	**	NA	M29										✓	"
3516HD Generator LC 100 - Cont. 1 - Run 2		3/5/19	16:00	F	NA	M29											✓	"
3516HD Generator LC 100 - Cont. 3 - Run 2		3/5/19	16:00	P	**	NA	M29										✓	"
3516HD Generator LC 100 - Cont. 4 - Run 2		3/5/19	16:00	P	**	NA	M29										✓	"
3516HD Generator LC 100 - Cont. 1 - Run 3		3/5/19	18:30	F	NA	M29											✓	"
3516HD Generator LC 100 - Cont. 3 - Run 3		3/5/19	18:30	P	**	NA	M29										✓	"
3516HD Generator LC 100 - Cont. 4 - Run 3		3/6/19	9:00	P	**	NA	M29										✓	"
Relinquished by (signature)		Date	Time	Received by (signature)			Relinquished by (signature)			Date	Time	Received by (signature)						
<i>[Signature]</i>		3/6/19	15:30	<i>[Signature]</i>														
Relinquished by (signature)		Date	Time	Received by (signature)			Relinquished by (signature)			Date	Time	Received by (signature)						
										2019/03/15	14:30	FISHER N. TAYLOR #1124 <i>[Signature]</i>						
Sample Pick-Up (Circle One): Yes / No by _____ (Print)										Canister Rental (Circle One): Yes / No								

FORM
Chain of Custody
GSINC-DR1001-001, Revision 2017-01, Effective 04/05/17

10.4/10.9/10.1
12.0/11.2/10.9 No ice
page 5 of 6



B 963792

Chain of Custody

Project #: 2019-0420		Client/Plant Name: AST/Caterpillar, Inc. - Peoria, IL			Special Instructions: **LAB: Measure and report sample volume (mL) unless a volume is provided.											
Sampling Location: 3516HD Generator Exhaust					Report Turnaround Time: <input checked="" type="checkbox"/> Normal (10 business days) <input type="checkbox"/> 5 business days <input type="checkbox"/> Other:											
Sampled by (Print): <i>Kanji Kinoshita</i>		Analytical Deadline: <input checked="" type="checkbox"/> 7 days <input type="checkbox"/> 72 hrs. <input type="checkbox"/> 24 hrs. <input type="checkbox"/> Other:														
(Signature): <i>[Signature]</i>																
Work Requested by: Adam Robinson		Phone: 256-351-0121		Fax:		e-Mail: Adam.Robinson@stacktest.com; all emails: firstname.lastname@stacktest.com										
Submit Report to: Above & AST Group		Phone: 503-715-7095		Fax:		e-Mail: AST group: Jordan Laster, Laura Aymett, Austin Abranovic										
Field Sample ID (include Run and Sample Fraction)	Lab Sample ID	Collection				Analysis								Comments: (Visual observation, canister start/stop pressures, additional analytes, etc.)		
		Date	Time(s)	Container Type*	Vol. (mL)	Tare Wt. (g)	EPA Method or Rule	TO-14A Method 18	Flare Gas Analysis (Method 18+ ASTM 1946D)	ASTM D1946	TO-15 Method 26A	Method 5	Method 202		CTM-027	Method 29
3516HD Generator LC 100 Cont. 8A		3/5/19	11:20	GC	**	NA	M29									0.1 HNO3 Blank - Hold
3516HD Generator LC 100 Cont. 12		3/5/19	11:20	GC	**	NA	M29									Quartz Filter Blanks - Hold
3516 HD Generator LC100 5% H2O2 (10% H2O2)		3/5/19	11:20	GC	**	NA	M29									5% H2O2 / 10% H2O2 Blank - Hold
Relinquished by (signature)		Date	Time	Received by (signature)		Relinquished by (signature)		Date	Time	Received by (signature)						
<i>[Signature]</i>		3/1/19	13:30													
Relinquished by (signature)		Date	Time	Received by (signature)		Relinquished by (signature)		Date	Time	Received by (signature)						
								2/9/2019	14:30	FIDELE NTAMWEMERU <i>[Signature]</i>						
Sample Pick-Up (Circle One): Yes / No by _____ (Print)										Canister Rental (Circle One): Yes / No						

FORM

Chain of Custody

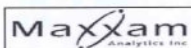
GSINC-DR1001-001, Revision 2017-01, Effective 04/05/17

10.4/10.7/10.1
12.0/11.2/10.9
No ICE
page 6 of 6

Chain of Custody Form

B963792

Page 1 of 1



5555 N. Service Road
Burlington, Ontario L7L 5H7
www.maxxamanalytics.com

Toll Free: 1-800-668-0639
Phone: (905) 332-8788
Fax: (905) 332-9169

ANALYSIS REQUESTED

CLIENT

Company Name: Alliance Source Testing, LLC

INFORMATION

Project Manager: Adam Robinson

e-mail: adam_robinson@stacktest.com

Address: 1201 Parkway View Drive

Pittsburgh, PA 15205

SECTION

Phone: (412) 668-4040 Fax: 903-747-3800

Sampled by: Kari Knudsen

SW-646 0061 - Hexavalent Chromium

MAXXAM use only	Field Sample ID	# Bottles	Collection Date	Collection Time	Initial Impinger Charge Volumes (mL)*													
	Generator LC 25% Run 1	2	3/7/19	1545	300	✓												
	Generator LC 25% Run 2	2	3/7/19	1645	300	✓												
	Generator LC 25% Run 3	2	3/7/19	1825	300	✓												
	Generator LC 10% Run 1	2	3/8/19	1115	300	✓												
	Generator LC 10% Run 2	2	3/8/19	1245	300	✓												
	Generator LC 10% Run 3	2	3/8/19	1428	300	✓												
	Generator Blank	3	3/8/19	1345														

TAT Requirement

- STD 10 Business day
- Rush 5 Business day
- Rush 2 Business day
- Rush 1 Business day
- Other (specify): _____

PROJECT INFORMATION

Project #: 19-0420
Name: Caterpillar Inc.
PO #: 19-0420
Maxxam Quote #: _____
Maxxam Contact: Clayton Johnson

REPORTING REQUIREMENTS

- Summary Report only
- Summary Report & Raw Data Package
- ** additional cost may apply

PROJECT SPECIFIC COMMENTS

* Initial Impinger charge volumes are required before the following analysis can be started: Method 26, CTM-027 & Method 8

Client Signature:

AJS

Date/Time: 3/11/19 15:30

Received by:

[Signature]

Date/Time: 3/11/19

Method 23 / TO9A

- 2005 WHO
- 1989 NATO TEF
- 1998 WHO

- TEF x DL
- TEF x 0 DL
- TEF x 0.5 DL

FIDELI NTAMWEMEZI 2019/03/15 10:4/10.9/10.1
 Fidele Ntamwemezi 14:30 12.0/11.2/10.9 No ice

Chain of Custody Form

B963792

		5555 N. Service Road Burlington, Ontario L7L 5H7 www.maxxamanalytics.com		Toll Free: 1-800-668-0639 Phone: (905) 332-8788 Fax: (905) 332-9169		Page <u>1</u> of <u>1</u>															
CLIENT Company Name: <u>Alliance Source Testing, LLC</u>		INFORMATION Project Manager: <u>Adam Robinson</u> e-mail: <u>adam.robinson@stacktest.com</u> Address: <u>1201 Parkway View Drive</u> <u>Pittsburgh, PA 15205</u>		SECTION Phone: <u>(412) 668-4040</u> Fax: <u>903-747-3800</u> Sampled by: <u>Kory Kenworthy</u>		ANALYSIS REQUESTED SW-448 0061 - Hexavalent Chromium															
MAXXAM use only	Field Sample ID	# Bottles	Collection Date	Collection Time	Initial Impinger Charge Volumes (mL)*																
	Generator-LC 100% Run 1	2	3/5/19	1700	300	✓															
	Generator-LC 100% Run 2	2	3/5/19	1500	300	✓															
	Generator-LC 100% Run 3	2	3/5/19	1700	300	✓															
	Generator-LC 75% Run 1	2	3/6/19	1230	300	✓															
	Generator-LC 75% Run 2	2	3/6/19	1400	300	✓															
	Generator-LC 75% Run 3	2	3/6/19	1650	300	✓															
	Generator-LC 50% Run 1	2	3/6/19	1430	300	✓															
	Generator-LC 50% Run 2	2	3/7/19	1030	300	✓															
	Generator-LC 50% Run 3	2	3/7/19	1220	300	✓															
TAT Requirement STD 10 Business day <input checked="" type="checkbox"/> Rush 5 Business day <input type="checkbox"/> Rush 2 Business day <input type="checkbox"/> Rush 1 Business day <input type="checkbox"/> Other (specify): _____		PROJECT INFORMATION Project #: <u>19-0420</u> Name: <u>Caterpillar Inc.</u> PO #: <u>19-0420</u> Maxxam Quote #: _____ Maxxam Contact: <u>Clayton Johnson</u>			REPORTING REQUIREMENTS Summary Report only <input checked="" type="checkbox"/> Summary Report & Raw Data Package ** <input type="checkbox"/> ** additional cost may apply			PROJECT SPECIFIC COMMENTS * Initial Impinger charge volumes are required before the following analysis can be started: Method 26, CTM-027 & Method 8 Method 23 / TO9A 2005 WHO <input type="checkbox"/> 1989 NATO TEF <input type="checkbox"/> 1998 WHO <input type="checkbox"/>													
Client Signature: <u>[Signature]</u> Affiliation: <u>A.S.T.</u> Date/Time: <u>3/11/19 15:30</u>		Received by: <u>[Signature]</u> Affiliation: <u>A.S.T.</u> Date/Time: <u>3/11/19</u>			FIDEL NTAHUMEZI 2019/03/15 10:4/10.9/10.1 12.0/11.2/10.9 No ice FIDEL NTAHUMEZI 14:30																



(281) 476-4769
goldenspecialty.com

Certificate No.
T104704255-18-15

Laboratory Analysis Report (III)

Report Date: 3/25/2019

Alliance Source Testing

Report No.: **GSL_190249**
Project: **2019-0420 - Caterpillar, Inc.**
Virginia Beach, VA

Prepared for: **Adam Robinson**
Alliance Source Testing
1201 Parkway View Drive
Pittsburgh, PA 15205

**Alliance Source Testing
Project: 2019-0420 - Caterpillar, Inc.
GSL Order ID: GSL_190239, 244, 247, 249, 252**

Adam Robinson
1201 Parkway View Drive
Pittsburgh, PA 15205

The samples submitted under the above referenced project name and identified by our Golden Specialty laboratory order number have been analyzed, and the data is enclosed. Only results for samples listed on the original Chain of Custody (at end of report) are included in this report. Raw data and subcontract data, if applicable, are attached to this report. Results provided in this report relate only to the samples.

All samples will be kept for no less than five business days after the final report is submitted, unless other arrangements have been made. Samples put on hold or held in canisters due to client issues will incur weekly canister rental fees. Golden Specialty reserves the right to return any unused samples due to hazardous sample matrices. Raw data and final reports will be filed for five years unless otherwise requested by client or regulatory mandates. To protect the integrity and completeness of this report, it must remain attached to this cover letter.

I certify to the best of my knowledge all analytical data presented in this report has been checked for completeness and accuracy, and is free of errors. Any deviations from the stated analytical protocols due to sample matrix have been documented in the laboratory narrative of this analytical report. Unless otherwise noted, any analysis performed by Golden Specialty falls within the scope of our NELAC accreditation and meets all NELAC requirements.

We thank you for selecting Golden Specialty to serve your analytical needs. If you have any questions concerning this report, please feel free to contact us at any time.

Respectfully,



James Haynes
Operations Manager

Laboratory Narrative

EPA Method 18 Spike and Recovery Procedure:

Typically Method 18 samples are received as three bags per sampling location. One bag is screened to determine an estimated concentration. The sample is spiked at 40-60% of the concentration of the highest target analyte, or half the midpoint of the calibration, whichever is higher. The calculation used to determine the aliquot volume of sample to which the spike will be added is as follows:

$$[\text{Sample}] * \text{Vol. Sample} + [\text{Spike}] * \text{Vol. Spike} = [\text{Spiked Sample}] * \text{Total Volume}$$

If a dilution is required for sample analysis, the sample with the highest dilution will be used to determine recoveries. If sample dilution is required for spike analysis due to matrix interference, raw data from sample analyses at the spiked dilution will be included with the sample chromatography. Spike recovery will be calculated prior to the inclusion of any dilution factors.

For the sample which will be spiked, the sample volume is removed via a large volume syringe. The appropriate sample volume and spike volume, taken from an existing standard, are combined in the original sample bag. Method 18 samples received as a single bag will be spiked according to an alternative procedure, with an aliquot of sample volume combined with the spike volume in a new 1L Tedlar bag. The spiked sample is analyzed at the appropriate time/date to correspond with Method 18 holding time criteria.

The calculation used to correct sample results for the matrix spike recovery is as follows:

$$[\text{Analyzed Average Result}] / [\text{Recovery}] = \text{Corrected Sample Result}$$

Respectfully,

A handwritten signature in black ink, appearing to be "JH", written over a horizontal line.

James Haynes
Operations Manager

Laboratory Narrative

Accreditation:

Golden Specialty is not currently accredited through the Virginia Department of General Services - Division of Consolidated Laboratory Services.

EPA Method 18 Liquid Samples:

Although the Method 18 liquid samples were received in a water sample matrix, the Method 18 hexane, benzene, ethylbenzene, and acetaldehyde liquid calibration solutions had to be prepared in a methanol matrix due to poor miscibility in water.

Respectfully,



James Haynes
Operations Manager

This analytical report and data associated has been reviewed and prepared specifically for you. The data package represents the best analytical and technical judgment and interpretations of our personnel, in accordance with the Golden Specialty Laboratory Quality Assurance Manual. Golden Specialty Inc. assumes no responsibility for the end use of this document or any portion extracted from it. Unless it is otherwise agreed upon, in writing, and prior to analytical work, Golden Specialty Inc. liability may not exceed the amount invoiced for this order.



Laboratory Analysis Report

Sample Results

Test:	Analysis by EPA Method 18		
Client Name:	Alliance Source Testing		
Sample Number:	GSL_190239-001		
Analytical SOP:	GSL_TM001	Source Sampled:	3516HD Generator Exhaust - LC 100
Analysis Location:	Deer Park, TX	Client Sample ID:	LC 100 Bag A - Run 1
Instrument ID:	GC #8 - Agilent	Date Sampled:	3/5/2019 at 12:08 PM
Sample Analyst:	Emily Decker	Date Analyzed:	3/7/2019
QC Batch ID:	QC_09743	Matrix:	Air

Parameter	MQL (ppmv)	DF	SQL (ppmv)	Run 1 (ppmv) 01:41 PM	Run 2 (ppmv) 02:13 PM	Run 3 (ppmv) 02:32 PM	Average (ppmv)	Matrix Spike Recovery (%)	Recovery-Corrected Result (ppmv)	CAS #
Benzene	0.10	1.00	0.10	< 0.10	< 0.10	< 0.10	< 0.10	99	< 0.10	71-43-2
Ethylbenzene	0.10	1.00	0.10	< 0.10	< 0.10	< 0.10	< 0.10	99	< 0.10	100-41-4
Acetaldehyde	1.00	1.00	1.00	< 1.00	< 1.00	< 1.00	< 1.00	99	< 1.00	75-07-0

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Laboratory Analysis Report

Sample Results

Test:	Analysis by EPA Method 18		
Client Name:	Alliance Source Testing		
Sample Number:	GSL_190239-001		
Analytical SOP:	GSL_TM001	Source Sampled:	3516HD Generator Exhaust - LC 100
Analysis Location:	Deer Park, TX	Client Sample ID:	LC 100 Bag A - Run 1
Instrument ID:	GC #1 - Agilent	Date Sampled:	3/5/2019 at 12:08 PM
Sample Analyst:	Dhan Yeddula	Date Analyzed:	3/6/2019
QC Batch ID:	QC_09749	Matrix:	Air

Parameter	ML (ppmv)	DF	SQL (ppmv)	Run 1 (ppmv) 11:21 AM	Run 2 (ppmv) 11:38 AM	Run 3 (ppmv) 11:55 AM	Average (ppmv)	Matrix Spike Recovery (%)	Recovery-Corrected Result (ppmv)	CAS #
1,3-Butadiene	0.10	1.00	0.10	< 0.10	< 0.10	< 0.10	< 0.10	91	< 0.10	106-99-0
Hexane	0.10	1.00	0.10	< 0.10	< 0.10	< 0.10	< 0.10	106	< 0.10	110-54-3

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Laboratory Analysis Report

Sample Results

Test:	Analysis by EPA Method 18		
Client Name:	Alliance Source Testing		
Sample Number:	GSL_190239-002		
Analytical SOP:	GSL_TM001	Source Sampled:	3516HD Generator Exhaust - LC 100
Analysis Location:	Deer Park, TX	Client Sample ID:	LC 100 Bag A - Run 2
Instrument ID:	GC #8 - Agilent	Date Sampled:	3/5/2019 at 03:00 PM
Sample Analyst:	Emily Decker	Date Analyzed:	3/7/2019
QC Batch ID:	QC_09743	Matrix:	Air

Parameter	MQL (ppmv)	DF	SQL (ppmv)	Run 1 (ppmv) 02:46 PM	Run 2 (ppmv) 03:04 PM	Run 3 (ppmv) 03:13 PM	Average (ppmv)	Matrix Spike Recovery (%)	Recovery-Corrected Result (ppmv)	CAS #
Benzene	0.10	1.00	0.10	< 0.10	< 0.10	< 0.10	< 0.10	99	< 0.10	71-43-2
Ethylbenzene	0.10	1.00	0.10	< 0.10	< 0.10	< 0.10	< 0.10	99	< 0.10	100-41-4
Acetaldehyde	1.00	1.00	1.00	< 1.00	< 1.00	< 1.00	< 1.00	99	< 1.00	75-07-0

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Laboratory Analysis Report

Sample Results

Test:	Analysis by EPA Method 18		
Client Name:	Alliance Source Testing		
Sample Number:	GSL_190239-002		
Analytical SOP:	GSL_TM001	Source Sampled:	3516HD Generator Exhaust - LC 100
Analysis Location:	Deer Park, TX	Client Sample ID:	LC 100 Bag A - Run 2
Instrument ID:	GC #1 - Agilent	Date Sampled:	3/5/2019 at 03:00 PM
Sample Analyst:	Dhan Yeddula	Date Analyzed:	3/6/2019
QC Batch ID:	QC_09749	Matrix:	Air

Parameter	MLL (ppmv)	DF	SQL (ppmv)	Run 1 (ppmv) 12:12 PM	Run 2 (ppmv) 12:29 PM	Run 3 (ppmv) 12:46 PM	Average (ppmv)	Matrix Spike Recovery (%)	Recovery- Corrected Result (ppmv)	CAS #
1,3-Butadiene	0.10	1.00	0.10	< 0.10	< 0.10	< 0.10	< 0.10	91	< 0.10	106-99-0
Hexane	0.10	1.00	0.10	< 0.10	< 0.10	< 0.10	< 0.10	106	< 0.10	110-54-3

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Laboratory Analysis Report

Sample Results

Test:	Analysis by EPA Method 18		
Client Name:	Alliance Source Testing		
Sample Number:	GSL_190239-003		
Analytical SOP:	GSL_TM001	Source Sampled:	3516HD Generator Exhaust - LC 100
Analysis Location:	Deer Park, TX	Client Sample ID:	LC 100 Bag A - Run 3
Instrument ID:	GC #8 - Agilent	Date Sampled:	3/5/2019 at 05:00 PM
Sample Analyst:	Emily Decker	Date Analyzed:	3/7/2019
QC Batch ID:	QC_09743	Matrix:	Air

Parameter	MQL (ppmv)	DF	SQL (ppmv)	Run 1 (ppmv) 03:23 PM	Run 2 (ppmv) 03:40 PM	Run 3 (ppmv) 03:53 PM	Average (ppmv)	Matrix Spike Recovery (%)	Recovery-Corrected Result (ppmv)	CAS #
Benzene	0.10	1.00	0.10	< 0.10	< 0.10	< 0.10	< 0.10	99	< 0.10	71-43-2
Ethylbenzene	0.10	1.00	0.10	< 0.10	< 0.10	< 0.10	< 0.10	99	< 0.10	100-41-4
Acetaldehyde	1.00	1.00	1.00	< 1.00	< 1.00	< 1.00	< 1.00	99	< 1.00	75-07-0

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Laboratory Analysis Report

Sample Results

Test:	Analysis by EPA Method 18		
Client Name:	Alliance Source Testing		
Sample Number:	GSL_190239-003		
Analytical SOP:	GSL_TM001	Source Sampled:	3516HD Generator Exhaust - LC 100
Analysis Location:	Deer Park, TX	Client Sample ID:	LC 100 Bag A - Run 3
Instrument ID:	GC #1 - Agilent	Date Sampled:	3/5/2019 at 05:00 PM
Sample Analyst:	Dhan Yeddula	Date Analyzed:	3/6/2019
QC Batch ID:	QC_09749	Matrix:	Air

Parameter	MLL (ppmv)	DF	SQL (ppmv)	Run 1 (ppmv) 01:03 PM	Run 2 (ppmv) 01:20 PM	Run 3 (ppmv) 01:37 PM	Average (ppmv)	Matrix Spike Recovery (%)	Recovery- Corrected Result (ppmv)	CAS #
1,3-Butadiene	0.10	1.00	0.10	< 0.10	< 0.10	< 0.10	< 0.10	91	< 0.10	106-99-0
Hexane	0.10	1.00	0.10	< 0.10	< 0.10	< 0.10	< 0.10	106	< 0.10	110-54-3

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Laboratory Analysis Report

Sample Results

Test:	Analysis by EPA Method 18		
Client Name:	Alliance Source Testing		
Sample Number:	GSL_190244-001		
Analytical SOP:	GSL_TM001	Source Sampled:	3516HD Generator Exhaust - LC 75
Analysis Location:	Deer Park, TX	Client Sample ID:	LC 75 Bag A - Run 1
Instrument ID:	GC #8 - Agilent	Date Sampled:	3/6/2019 at 11:25 AM
Sample Analyst:	Emily Decker	Date Analyzed:	3/7/2019
QC Batch ID:	QC_09743	Matrix:	Air

Parameter	MQL (ppmv)	DF	SQL (ppmv)	Run 1 (ppmv) 04:08 PM	Run 2 (ppmv) 04:25 PM	Run 3 (ppmv) 04:37 PM	Average (ppmv)	Matrix Spike Recovery (%)	Recovery-Corrected Result (ppmv)	CAS #
Benzene	0.10	1.00	0.10	< 0.10	< 0.10	< 0.10	< 0.10	99	< 0.10	71-43-2
Ethylbenzene	0.10	1.00	0.10	< 0.10	< 0.10	< 0.10	< 0.10	99	< 0.10	100-41-4
Acetaldehyde	1.00	1.00	1.00	< 1.00	< 1.00	< 1.00	< 1.00	99	< 1.00	75-07-0

This analytical report and data associated has been reviewed and prepared specifically for you. The data package represents the best analytical and technical judgment and interpretations of our personnel, in accordance with the Golden Specialty Laboratory Quality Assurance Manual. Golden Specialty Inc. assumes no responsibility for the end use of this document or any portion extracted from it. Unless it is otherwise agreed upon, in writing, and prior to analytical work, Golden Specialty Inc. liability may not exceed the amount invoiced for this order.



Laboratory Analysis Report

Sample Results

Test:	Analysis by EPA Method 18		
Client Name:	Alliance Source Testing		
Sample Number:	GSL_190244-001		
Analytical SOP:	GSL_TM001	Source Sampled:	3516HD Generator Exhaust - LC 75
Analysis Location:	Deer Park, TX	Client Sample ID:	LC 75 Bag A - Run 1
Instrument ID:	GC #1 - Agilent	Date Sampled:	3/6/2019 at 11:25 AM
Sample Analyst:	Dhan Yeddula	Date Analyzed:	3/8/2019
QC Batch ID:	QC_09749	Matrix:	Air

Parameter	MQL (ppmv)	DF	SQL (ppmv)	Run 1 (ppmv) 08:23 AM	Run 2 (ppmv) 08:40 AM	Run 3 (ppmv) 08:57 AM	Average (ppmv)	Matrix Spike Recovery (%)	Recovery- Corrected Result (ppmv)	CAS #
1,3-Butadiene	0.10	1.00	0.10	< 0.10	< 0.10	< 0.10	< 0.10	91	< 0.10	106-99-0
Hexane	0.10	1.00	0.10	< 0.10	< 0.10	< 0.10	< 0.10	106	< 0.10	110-54-3

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Laboratory Analysis Report

Sample Results

Test:	Analysis by EPA Method 18		
Client Name:	Alliance Source Testing		
Sample Number:	GSL_190244-002		
Analytical SOP:	GSL_TM001	Source Sampled:	3516HD Generator Exhaust - LC 75
Analysis Location:	Deer Park, TX	Client Sample ID:	LC 75 Bag A - Run 2
Instrument ID:	GC #8 - Agilent	Date Sampled:	3/6/2019 at 01:25 PM
Sample Analyst:	Emily Decker	Date Analyzed:	3/7/2019
QC Batch ID:	QC_09743	Matrix:	Air

Parameter	MQL (ppmv)	DF	SQL (ppmv)	Run 1 (ppmv) 04:54 PM	Run 2 (ppmv) 05:12 PM	Run 3 (ppmv) 05:32 PM	Average (ppmv)	Matrix Spike Recovery (%)	Recovery-Corrected Result (ppmv)	CAS #
Benzene	0.10	1.00	0.10	< 0.10	< 0.10	< 0.10	< 0.10	99	< 0.10	71-43-2
Ethylbenzene	0.10	1.00	0.10	< 0.10	< 0.10	< 0.10	< 0.10	99	< 0.10	100-41-4
Acetaldehyde	1.00	1.00	1.00	< 1.00	< 1.00	< 1.00	< 1.00	99	< 1.00	75-07-0

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Laboratory Analysis Report

Sample Results

Test:	Analysis by EPA Method 18		
Client Name:	Alliance Source Testing		
Sample Number:	GSL_190244-002		
Analytical SOP:	GSL_TM001	Source Sampled:	3516HD Generator Exhaust - LC 75
Analysis Location:	Deer Park, TX	Client Sample ID:	LC 75 Bag A - Run 2
Instrument ID:	GC #1 - Agilent	Date Sampled:	3/6/2019 at 01:25 PM
Sample Analyst:	Dhan Yeddula	Date Analyzed:	3/8/2019
QC Batch ID:	QC_09749	Matrix:	Air

Parameter	MQL (ppmv)	DF	SQL (ppmv)	Run 1 (ppmv) 09:13 AM	Run 2 (ppmv) 09:30 AM	Run 3 (ppmv) 09:47 AM	Average (ppmv)	Matrix Spike Recovery (%)	Recovery- Corrected Result (ppmv)	CAS #
1,3-Butadiene	0.10	1.00	0.10	< 0.10	< 0.10	< 0.10	< 0.10	91	< 0.10	106-99-0
Hexane	0.10	1.00	0.10	< 0.10	< 0.10	< 0.10	< 0.10	106	< 0.10	110-54-3

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Laboratory Analysis Report

Sample Results

Test:	Analysis by EPA Method 18		
Client Name:	Alliance Source Testing		
Sample Number:	GSL_190244-003		
Analytical SOP:	GSL_TM001	Source Sampled:	3516HD Generator Exhaust - LC 75
Analysis Location:	Deer Park, TX	Client Sample ID:	LC 75 Bag A - Run 3
Instrument ID:	GC #8 - Agilent	Date Sampled:	3/6/2019 at 04:25 PM
Sample Analyst:	Emily Decker	Date Analyzed:	3/7/2019
QC Batch ID:	QC_09743	Matrix:	Air

Parameter	MQL (ppmv)	DF	SQL (ppmv)	Run 1 (ppmv) 05:47 PM	Run 2 (ppmv) 06:05 PM	Run 3 (ppmv) 06:17 PM	Average (ppmv)	Matrix Spike Recovery (%)	Recovery-Corrected Result (ppmv)	CAS #
Benzene	0.10	1.00	0.10	< 0.10	< 0.10	< 0.10	< 0.10	99	< 0.10	71-43-2
Ethylbenzene	0.10	1.00	0.10	< 0.10	< 0.10	< 0.10	< 0.10	99	< 0.10	100-41-4
Acetaldehyde	1.00	1.00	1.00	< 1.00	< 1.00	< 1.00	< 1.00	99	< 1.00	75-07-0

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Laboratory Analysis Report

Sample Results

Test:	Analysis by EPA Method 18		
Client Name:	Alliance Source Testing		
Sample Number:	GSL_190244-003		
Analytical SOP:	GSL_TM001	Source Sampled:	3516HD Generator Exhaust - LC 75
Analysis Location:	Deer Park, TX	Client Sample ID:	LC 75 Bag A - Run 3
Instrument ID:	GC #1 - Agilent	Date Sampled:	3/6/2019 at 04:25 PM
Sample Analyst:	Dhan Yeddula	Date Analyzed:	3/8/2019
QC Batch ID:	QC_09749	Matrix:	Air

Parameter	MLL (ppmv)	DF	SQL (ppmv)	Run 1 (ppmv) 10:04 AM	Run 2 (ppmv) 10:20 AM	Run 3 (ppmv) 10:37 AM	Average (ppmv)	Matrix Spike Recovery (%)	Recovery- Corrected Result (ppmv)	CAS #
1,3-Butadiene	0.10	1.00	0.10	< 0.10	< 0.10	< 0.10	< 0.10	91	< 0.10	106-99-0
Hexane	0.10	1.00	0.10	< 0.10	< 0.10	< 0.10	< 0.10	106	< 0.10	110-54-3

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Laboratory Analysis Report

Sample Results

Test:	Analysis by EPA Method 18		
Client Name:	Alliance Source Testing		
Sample Number:	GSL_190244-004		
Analytical SOP:	GSL_TM001	Source Sampled:	3516HD Generator Exhaust - LC 50
Analysis Location:	Deer Park, TX	Client Sample ID:	LC 50 Bag A - Run 1
Instrument ID:	GC #8 - Agilent	Date Sampled:	3/6/2019 at 06:15 PM
Sample Analyst:	Emily Decker	Date Analyzed:	3/7/2019
QC Batch ID:	QC_09743	Matrix:	Air

Parameter	MQL (ppmv)	DF	SQL (ppmv)	Run 1 (ppmv) 06:29 PM	Run 2 (ppmv) 06:47 PM	Run 3 (ppmv) 07:01 PM	Average (ppmv)	Matrix Spike Recovery (%)	Recovery-Corrected Result (ppmv)	CAS #
Benzene	0.10	1.00	0.10	< 0.10	< 0.10	< 0.10	< 0.10	99	< 0.10	71-43-2
Ethylbenzene	0.10	1.00	0.10	< 0.10	< 0.10	< 0.10	< 0.10	99	< 0.10	100-41-4
Acetaldehyde	1.00	1.00	1.00	< 1.00	< 1.00	< 1.00	< 1.00	99	< 1.00	75-07-0

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Laboratory Analysis Report

Sample Results

Test:	Analysis by EPA Method 18		
Client Name:	Alliance Source Testing		
Sample Number:	GSL_190244-004		
Analytical SOP:	GSL_TM001	Source Sampled:	3516HD Generator Exhaust - LC 50
Analysis Location:	Deer Park, TX	Client Sample ID:	LC 50 Bag A - Run 1
Instrument ID:	GC #1 - Agilent	Date Sampled:	3/6/2019 at 06:15 PM
Sample Analyst:	Dhan Yeddula	Date Analyzed:	3/8/2019
QC Batch ID:	QC_09749	Matrix:	Air

Parameter	MQL (ppmv)	DF	SQL (ppmv)	Run 1 (ppmv) 10:54 AM	Run 2 (ppmv) 11:11 AM	Run 3 (ppmv) 11:27 AM	Average (ppmv)	Matrix Spike Recovery (%)	Recovery- Corrected Result (ppmv)	CAS #
1,3-Butadiene	0.10	1.00	0.10	< 0.10	< 0.10	< 0.10	< 0.10	91	< 0.10	106-99-0
Hexane	0.10	1.00	0.10	< 0.10	< 0.10	< 0.10	< 0.10	106	< 0.10	110-54-3

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Laboratory Analysis Report

Sample Results

Test:	Analysis by EPA Method 18		
Client Name:	Alliance Source Testing		
Sample Number:	GSL_190247-001		
Analytical SOP:	GSL_TM001	Source Sampled:	3516HD Generator Exhaust - LC 50
Analysis Location:	Deer Park, TX	Client Sample ID:	LC 50 Bag A - Run 2
Instrument ID:	GC #8 - Agilent	Date Sampled:	3/7/2019 at 10:00 AM
Sample Analyst:	Emily Decker	Date Analyzed:	3/11/2019
QC Batch ID:	QC_09743	Matrix:	Air

Parameter	MQL (ppmv)	DF	SQL (ppmv)	Run 1 (ppmv) 11:29 AM	Run 2 (ppmv) 11:45 AM	Run 3 (ppmv) 11:53 AM	Average (ppmv)	Matrix Spike Recovery (%)	Recovery- Corrected Result (ppmv)	CAS #
Benzene	0.10	1.00	0.10	< 0.10	< 0.10	< 0.10	< 0.10	99	< 0.10	71-43-2
Ethylbenzene	0.10	1.00	0.10	< 0.10	< 0.10	< 0.10	< 0.10	99	< 0.10	100-41-4
Acetaldehyde	1.00	1.00	1.00	< 1.00	< 1.00	< 1.00	< 1.00	99	< 1.00	75-07-0

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Laboratory Analysis Report

Sample Results

Test:	Analysis by EPA Method 18		
Client Name:	Alliance Source Testing		
Sample Number:	GSL_190247-001		
Analytical SOP:	GSL_TM001	Source Sampled:	3516HD Generator Exhaust - LC 50
Analysis Location:	Deer Park, TX	Client Sample ID:	LC 50 Bag A - Run 2
Instrument ID:	GC #1 - Agilent	Date Sampled:	3/7/2019 at 10:00 AM
Sample Analyst:	Dhan Yeddula	Date Analyzed:	3/8/2019
QC Batch ID:	QC_09749	Matrix:	Air

Parameter	MQL (ppmv)	DF	SQL (ppmv)	Run 1 (ppmv) 11:44 AM	Run 2 (ppmv) 12:00 PM	Run 3 (ppmv) 12:17 PM	Average (ppmv)	Matrix Spike Recovery (%)	Recovery- Corrected Result (ppmv)	CAS #
1,3-Butadiene	0.10	1.00	0.10	< 0.10	< 0.10	< 0.10	< 0.10	91	< 0.10	106-99-0
Hexane	0.10	1.00	0.10	< 0.10	< 0.10	< 0.10	< 0.10	106	< 0.10	110-54-3

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Laboratory Analysis Report

Sample Results

Test:	Analysis by EPA Method 18		
Client Name:	Alliance Source Testing		
Sample Number:	GSL_190247-002		
Analytical SOP:	GSL_TM001	Source Sampled:	3516HD Generator Exhaust - LC 50
Analysis Location:	Deer Park, TX	Client Sample ID:	LC 50 Bag A - Run 3
Instrument ID:	GC #8 - Agilent	Date Sampled:	3/7/2019 at 12:00 PM
Sample Analyst:	Emily Decker	Date Analyzed:	3/11/2019
QC Batch ID:	QC_09743	Matrix:	Air

Parameter	MQL (ppmv)	DF	SQL (ppmv)	Run 1 (ppmv) 12:00 PM	Run 2 (ppmv) 12:16 PM	Run 3 (ppmv) 12:23 PM	Average (ppmv)	Matrix Spike Recovery (%)	Recovery-Corrected Result (ppmv)	CAS #
Benzene	0.10	1.00	0.10	< 0.10	< 0.10	< 0.10	< 0.10	99	< 0.10	71-43-2
Ethylbenzene	0.10	1.00	0.10	< 0.10	< 0.10	< 0.10	< 0.10	99	< 0.10	100-41-4
Acetaldehyde	1.00	1.00	1.00	< 1.00	< 1.00	< 1.00	< 1.00	99	< 1.00	75-07-0

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Laboratory Analysis Report

Sample Results

Test:	Analysis by EPA Method 18		
Client Name:	Alliance Source Testing		
Sample Number:	GSL_190247-002		
Analytical SOP:	GSL_TM001	Source Sampled:	3516HD Generator Exhaust - LC 50
Analysis Location:	Deer Park, TX	Client Sample ID:	LC 50 Bag A - Run 3
Instrument ID:	GC #1 - Agilent	Date Sampled:	3/7/2019 at 12:00 PM
Sample Analyst:	Dhan Yeddula	Date Analyzed:	3/8/2019
QC Batch ID:	QC_09749	Matrix:	Air

Parameter	MLL (ppmv)	DF	SQL (ppmv)	Run 1 (ppmv) 12:34 PM	Run 2 (ppmv) 12:51 PM	Run 3 (ppmv) 01:07 PM	Average (ppmv)	Matrix Spike Recovery (%)	Recovery- Corrected Result (ppmv)	CAS #
1,3-Butadiene	0.10	1.00	0.10	< 0.10	< 0.10	< 0.10	< 0.10	91	< 0.10	106-99-0
Hexane	0.10	1.00	0.10	< 0.10	< 0.10	< 0.10	< 0.10	106	< 0.10	110-54-3

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Laboratory Analysis Report

Sample Results

Test:	Analysis by EPA Method 18		
Client Name:	Alliance Source Testing		
Sample Number:	GSL_190247-003		
Analytical SOP:	GSL_TM001	Source Sampled:	3516HD Generator Exhaust - LC 25
Analysis Location:	Deer Park, TX	Client Sample ID:	LC 25 Bag A - Run 1
Instrument ID:	GC #8 - Agilent	Date Sampled:	3/7/2019 at 02:45 PM
Sample Analyst:	Emily Decker	Date Analyzed:	3/11/2019
QC Batch ID:	QC_09743	Matrix:	Air

Parameter	MQL (ppmv)	DF	SQL (ppmv)	Run 1 (ppmv) 12:31 PM	Run 2 (ppmv) 12:46 PM	Run 3 (ppmv) 12:54 PM	Average (ppmv)	Matrix Spike Recovery (%)	Recovery-Corrected Result (ppmv)	CAS #
Benzene	0.10	1.00	0.10	< 0.10	< 0.10	< 0.10	< 0.10	99	< 0.10	71-43-2
Ethylbenzene	0.10	1.00	0.10	< 0.10	< 0.10	< 0.10	< 0.10	99	< 0.10	100-41-4
Acetaldehyde	1.00	1.00	1.00	< 1.00	< 1.00	< 1.00	< 1.00	99	< 1.00	75-07-0

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Laboratory Analysis Report

Sample Results

Test:	Analysis by EPA Method 18		
Client Name:	Alliance Source Testing		
Sample Number:	GSL_190247-003		
Analytical SOP:	GSL_TM001	Source Sampled:	3516HD Generator Exhaust - LC 25
Analysis Location:	Deer Park, TX	Client Sample ID:	LC 25 Bag A - Run 1
Instrument ID:	GC #1 - Agilent	Date Sampled:	3/7/2019 at 02:45 PM
Sample Analyst:	Dhan Yeddula	Date Analyzed:	3/8/2019
QC Batch ID:	QC_09749	Matrix:	Air

Parameter	MQL (ppmv)	DF	SQL (ppmv)	Run 1 (ppmv) 01:24 PM	Run 2 (ppmv) 01:41 PM	Run 3 (ppmv) 01:57 PM	Average (ppmv)	Matrix Spike Recovery (%)	Recovery- Corrected Result (ppmv)	CAS #
1,3-Butadiene	0.10	1.00	0.10	< 0.10	< 0.10	< 0.10	< 0.10	91	< 0.10	106-99-0
Hexane	0.10	1.00	0.10	< 0.10	< 0.10	< 0.10	< 0.10	106	< 0.10	110-54-3

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Laboratory Analysis Report

Sample Results

Test:	Analysis by EPA Method 18		
Client Name:	Alliance Source Testing		
Sample Number:	GSL_190247-004		
Analytical SOP:	GSL_TM001	Source Sampled:	3516HD Generator Exhaust - LC 25
Analysis Location:	Deer Park, TX	Client Sample ID:	LC 25 Bag A - Run 2
Instrument ID:	GC #8 - Agilent	Date Sampled:	3/7/2019 at 04:30 PM
Sample Analyst:	Emily Decker	Date Analyzed:	3/11/2019
QC Batch ID:	QC_09743	Matrix:	Air

Parameter	MQL (ppmv)	DF	SQL (ppmv)	Run 1 (ppmv) 01:01 PM	Run 2 (ppmv) 01:19 PM	Run 3 (ppmv) 01:26 PM	Average (ppmv)	Matrix Spike Recovery (%)	Recovery-Corrected Result (ppmv)	CAS #
Benzene	0.10	1.00	0.10	< 0.10	< 0.10	< 0.10	< 0.10	99	< 0.10	71-43-2
Ethylbenzene	0.10	1.00	0.10	< 0.10	< 0.10	< 0.10	< 0.10	99	< 0.10	100-41-4
Acetaldehyde	1.00	1.00	1.00	< 1.00	< 1.00	< 1.00	< 1.00	99	< 1.00	75-07-0

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Laboratory Analysis Report

Sample Results

Test: Analysis by EPA Method 18
Client Name: Alliance Source Testing
Sample Number: **GSL_190247-004**
Analytical SOP: GSL_TM001 **Source Sampled:** 3516HD Generator Exhaust - LC 25
Analysis Location: Deer Park, TX **Client Sample ID:** LC 25 Bag A - Run 2
Instrument ID: GC #1 - Agilent **Date Sampled:** 3/7/2019 at 04:30 PM
Sample Analyst: Dhan Yeddula **Date Analyzed:** 3/8/2019
QC Batch ID: QC_09749 **Matrix:** Air

Parameter	MQL (ppmv)	DF	SQL (ppmv)	Run 1 (ppmv) 02:14 PM	Run 2 (ppmv) 02:31 PM	Run 3 (ppmv) 02:47 PM	Average (ppmv)	Matrix Spike Recovery (%)	Recovery-Corrected Result (ppmv)	CAS #
1,3-Butadiene	0.10	1.00	0.10	< 0.10	< 0.10	< 0.10	< 0.10	91	< 0.10	106-99-0
Hexane	0.10	1.00	0.10	< 0.10	< 0.10	< 0.10	< 0.10	106	< 0.10	110-54-3

Laboratory Analysis Report

Sample Results

Test:	Analysis by EPA Method 18		
Client Name:	Alliance Source Testing		
Sample Number:	GSL_190247-005		
Analytical SOP:	GSL_TM001	Source Sampled:	3516HD Generator Exhaust - LC 25
Analysis Location:	Deer Park, TX	Client Sample ID:	LC 25 Bag A - Run 3
Instrument ID:	GC #8 - Agilent	Date Sampled:	3/7/2019 at 06:10 PM
Sample Analyst:	Emily Decker	Date Analyzed:	3/11/2019
QC Batch ID:	QC_09743	Matrix:	Air

Parameter	MQL (ppmv)	DF	SQL (ppmv)	Run 1 (ppmv) 01:33 PM	Run 2 (ppmv) 01:49 PM	Run 3 (ppmv) 01:57 PM	Average (ppmv)	Matrix Spike Recovery (%)	Recovery-Corrected Result (ppmv)	CAS #
Benzene	0.10	1.00	0.10	< 0.10	< 0.10	< 0.10	< 0.10	99	< 0.10	71-43-2
Ethylbenzene	0.10	1.00	0.10	< 0.10	< 0.10	< 0.10	< 0.10	99	< 0.10	100-41-4
Acetaldehyde	1.00	1.00	1.00	< 1.00	< 1.00	< 1.00	< 1.00	99	< 1.00	75-07-0

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Laboratory Analysis Report

Sample Results

Test:	Analysis by EPA Method 18		
Client Name:	Alliance Source Testing		
Sample Number:	GSL_190247-005		
Analytical SOP:	GSL_TM001	Source Sampled:	3516HD Generator Exhaust - LC 25
Analysis Location:	Deer Park, TX	Client Sample ID:	LC 25 Bag A - Run 3
Instrument ID:	GC #1 - Agilent	Date Sampled:	3/7/2019 at 06:10 PM
Sample Analyst:	Dhan Yeddula	Date Analyzed:	3/8/2019
QC Batch ID:	QC_09749	Matrix:	Air

Parameter	MQL (ppmv)	DF	SQL (ppmv)	Run 1 (ppmv) 03:04 PM	Run 2 (ppmv) 03:21 PM	Run 3 (ppmv) 03:37 PM	Average (ppmv)	Matrix Spike Recovery (%)	Recovery-Corrected Result (ppmv)	CAS #
1,3-Butadiene	0.10	1.00	0.10	< 0.10	< 0.10	< 0.10	< 0.10	91	< 0.10	106-99-0
Hexane	0.10	1.00	0.10	< 0.10	< 0.10	< 0.10	< 0.10	106	< 0.10	110-54-3

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Laboratory Analysis Report

Sample Results

Test:	Analysis by EPA Method 18		
Client Name:	Alliance Source Testing		
Sample Number:	GSL_190249-001		
Analytical SOP:	GSL_TM001	Source Sampled:	3516HD Generator Exhaust - LC 10
Analysis Location:	Deer Park, TX	Client Sample ID:	LC 10 Bag A - Run 1
Instrument ID:	GC #8 - Agilent	Date Sampled:	3/8/2019 at 10:45 AM
Sample Analyst:	Emily Decker	Date Analyzed:	3/11/2019
QC Batch ID:	QC_09743	Matrix:	Air

Parameter	MQL (ppmv)	DF	SQL (ppmv)	Run 1 (ppmv) 02:06 PM	Run 2 (ppmv) 02:22 PM	Run 3 (ppmv) 02:30 PM	Average (ppmv)	Matrix Spike Recovery (%)	Recovery-Corrected Result (ppmv)	CAS #
Benzene	0.10	1.00	0.10	0.13	0.13	0.13	0.13	99	0.13	71-43-2
Ethylbenzene	0.10	1.00	0.10	< 0.10	< 0.10	< 0.10	< 0.10	99	< 0.10	100-41-4
Acetaldehyde	1.00	1.00	1.00	< 1.00	< 1.00	< 1.00	< 1.00	99	< 1.00	75-07-0

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Laboratory Analysis Report

Sample Results

Test:	Analysis by EPA Method 18		
Client Name:	Alliance Source Testing		
Sample Number:	GSL_190249-001		
Analytical SOP:	GSL_TM001	Source Sampled:	3516HD Generator Exhaust - LC 10
Analysis Location:	Deer Park, TX	Client Sample ID:	LC 10 Bag A - Run 1
Instrument ID:	GC #1 - Agilent	Date Sampled:	3/8/2019 at 10:45 AM
Sample Analyst:	Dhan Yeddula	Date Analyzed:	3/12/2019
QC Batch ID:	QC_09749	Matrix:	Air

Parameter	MQL (ppmv)	DF	SQL (ppmv)	Run 1 (ppmv) 09:41 AM	Run 2 (ppmv) 09:57 AM	Run 3 (ppmv) 10:14 AM	Average (ppmv)	Matrix Spike Recovery (%)	Recovery- Corrected Result (ppmv)	CAS #
1,3-Butadiene	0.10	1.00	0.10	< 0.10	< 0.10	< 0.10	< 0.10	91	< 0.10	106-99-0
Hexane	0.10	1.00	0.10	< 0.10	< 0.10	< 0.10	< 0.10	106	< 0.10	110-54-3

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Laboratory Analysis Report

Sample Results

Test:	Analysis by EPA Method 18		
Client Name:	Alliance Source Testing		
Sample Number:	GSL_190249-002		
Analytical SOP:	GSL_TM001	Source Sampled:	3516HD Generator Exhaust - LC 10
Analysis Location:	Deer Park, TX	Client Sample ID:	LC 10 Bag A - Run 2
Instrument ID:	GC #8 - Agilent	Date Sampled:	3/8/2019 at 12:20 PM
Sample Analyst:	Emily Decker	Date Analyzed:	3/11/2019
QC Batch ID:	QC_09743	Matrix:	Air

Parameter	MQL (ppmv)	DF	SQL (ppmv)	Run 1 (ppmv) 02:38 PM	Run 2 (ppmv) 02:55 PM	Run 3 (ppmv) 03:02 PM	Average (ppmv)	Matrix Spike Recovery (%)	Recovery-Corrected Result (ppmv)	CAS #
Benzene	0.10	1.00	0.10	0.13	0.13	0.13	0.13	99	0.13	71-43-2
Ethylbenzene	0.10	1.00	0.10	< 0.10	< 0.10	< 0.10	< 0.10	99	< 0.10	100-41-4
Acetaldehyde	1.00	1.00	1.00	< 1.00	< 1.00	< 1.00	< 1.00	99	< 1.00	75-07-0

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Laboratory Analysis Report

Sample Results

Test:	Analysis by EPA Method 18		
Client Name:	Alliance Source Testing		
Sample Number:	GSL_190249-002		
Analytical SOP:	GSL_TM001	Source Sampled:	3516HD Generator Exhaust - LC 10
Analysis Location:	Deer Park, TX	Client Sample ID:	LC 10 Bag A - Run 2
Instrument ID:	GC #1 - Agilent	Date Sampled:	3/8/2019 at 12:20 PM
Sample Analyst:	Dhan Yeddula	Date Analyzed:	3/12/2019
QC Batch ID:	QC_09749	Matrix:	Air

Parameter	MQL (ppmv)	DF	SQL (ppmv)	Run 1 (ppmv) 10:31 AM	Run 2 (ppmv) 10:49 AM	Run 3 (ppmv) 11:06 AM	Average (ppmv)	Matrix Spike Recovery (%)	Recovery- Corrected Result (ppmv)	CAS #
1,3-Butadiene	0.10	1.00	0.10	< 0.10	< 0.10	< 0.10	< 0.10	91	< 0.10	106-99-0
Hexane	0.10	1.00	0.10	< 0.10	< 0.10	< 0.10	< 0.10	106	< 0.10	110-54-3

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Laboratory Analysis Report

Sample Results

Test:	Analysis by EPA Method 18		
Client Name:	Alliance Source Testing		
Sample Number:	GSL_190249-003		
Analytical SOP:	GSL_TM001	Source Sampled:	3516HD Generator Exhaust - LC 10
Analysis Location:	Deer Park, TX	Client Sample ID:	LC 10 Bag A - Run 3
Instrument ID:	GC #8 - Agilent	Date Sampled:	3/8/2019 at 02:15 PM
Sample Analyst:	Emily Decker	Date Analyzed:	3/11/2019
QC Batch ID:	QC_09743	Matrix:	Air

Parameter	MQL (ppmv)	DF	SQL (ppmv)	Run 1 (ppmv) 03:13 PM	Run 2 (ppmv) 03:29 PM	Run 3 (ppmv) 03:37 PM	Average (ppmv)	Matrix Spike Recovery (%)	Recovery-Corrected Result (ppmv)	CAS #
Benzene	0.10	1.00	0.10	0.14	0.13	0.14	0.13	99	0.14	71-43-2
Ethylbenzene	0.10	1.00	0.10	< 0.10	< 0.10	< 0.10	< 0.10	99	< 0.10	100-41-4
Acetaldehyde	1.00	1.00	1.00	< 1.00	< 1.00	< 1.00	< 1.00	99	< 1.00	75-07-0

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Laboratory Analysis Report

Sample Results

Test:	Analysis by EPA Method 18		
Client Name:	Alliance Source Testing		
Sample Number:	GSL_190249-003		
Analytical SOP:	GSL_TM001	Source Sampled:	3516HD Generator Exhaust - LC 10
Analysis Location:	Deer Park, TX	Client Sample ID:	LC 10 Bag A - Run 3
Instrument ID:	GC #1 - Agilent	Date Sampled:	3/8/2019 at 02:15 PM
Sample Analyst:	Dhan Yeddula	Date Analyzed:	3/12/2019
QC Batch ID:	QC_09749	Matrix:	Air

Parameter	MQL (ppmv)	DF	SQL (ppmv)	Run 1 (ppmv) 11:23 AM	Run 2 (ppmv) 11:40 AM	Run 3 (ppmv) 11:57 AM	Average (ppmv)	Matrix Spike Recovery (%)	Recovery- Corrected Result (ppmv)	CAS #
1,3-Butadiene	0.10	1.00	0.10	< 0.10	< 0.10	< 0.10	< 0.10	91	< 0.10	106-99-0
Hexane	0.10	1.00	0.10	< 0.10	< 0.10	< 0.10	< 0.10	106	< 0.10	110-54-3

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Laboratory Analysis Report

Sample Results

Test:	Analysis by EPA Method 18		
Client Name:	Alliance Source Testing		
Sample Number:	GSL_190252-001		
Analytical SOP:	GSL_TM001	Source Sampled:	3516HD Generator Exhaust - LC 10
Analysis Location:	Deer Park, TX	Client Sample ID:	LC 10 - Run 1
Instrument ID:	GC #10 - Agilent	Date Sampled:	3/8/2019 at 10:45 AM
Sample Analyst:	Emily Decker	Date Analyzed:	3/26/2019
QC Batch ID:	QC_09760	Matrix:	Liquid

Parameter	MQL (ug/mL)	DF	SQL (ug/mL)	Run 1 (ug/mL) 04:37 PM	Run 2 (ug/mL) 05:00 PM	Run 3 (ug/mL) 05:21 PM	Average (ug/mL)	CAS #
Hexane	1.29	1.00	1.29	< 1.29	< 1.29	< 1.29	< 1.29	110-54-3
Benzene	1.75	1.00	1.75	< 1.75	< 1.75	< 1.75	< 1.75	71-43-2
Acetaldehyde	1.56	1.00	1.56	< 1.56	< 1.56	< 1.56	< 1.56	75-07-0
Ethylbenzene	1.73	1.00	1.73	< 1.73	< 1.73	< 1.73	< 1.73	100-41-4

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Laboratory Analysis Report

Sample Results

Test:	Analysis by EPA Method 18		
Client Name:	Alliance Source Testing		
Sample Number:	GSL_190252-002		
Analytical SOP:	GSL_TM001	Source Sampled:	3516HD Generator Exhaust - LC 10
Analysis Location:	Deer Park, TX	Client Sample ID:	LC 10 - Run 2
Instrument ID:	GC #10 - Agilent	Date Sampled:	3/8/2019 at 12:20 PM
Sample Analyst:	Emily Decker	Date Analyzed:	3/26/2019
QC Batch ID:	QC_09760	Matrix:	Liquid

Parameter	MQL (ug/mL)	DF	SQL (ug/mL)	Run 1 (ug/mL) 05:43 PM	Run 2 (ug/mL) 06:05 PM	Run 3 (ug/mL) 06:26 PM	Average (ug/mL)	CAS #
Hexane	1.29	1.00	1.29	< 1.29	< 1.29	< 1.29	< 1.29	110-54-3
Benzene	1.75	1.00	1.75	< 1.75	< 1.75	< 1.75	< 1.75	71-43-2
Acetaldehyde	1.56	1.00	1.56	< 1.56	< 1.56	< 1.56	< 1.56	75-07-0
Ethylbenzene	1.73	1.00	1.73	< 1.73	< 1.73	< 1.73	< 1.73	100-41-4

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Laboratory Analysis Report

Sample Results

Test:	Analysis by EPA Method 18		
Client Name:	Alliance Source Testing		
Sample Number:	GSL_190252-003		
Analytical SOP:	GSL_TM001	Source Sampled:	3516HD Generator Exhaust - LC 10
Analysis Location:	Deer Park, TX	Client Sample ID:	LC 10 - Run 3
Instrument ID:	GC #10 - Agilent	Date Sampled:	3/8/2019 at 02:15 PM
Sample Analyst:	Emily Decker	Date Analyzed:	3/26/2019
QC Batch ID:	QC_09760	Matrix:	Liquid

Parameter	MQL (ug/mL)	DF	SQL (ug/mL)	Run 1 (ug/mL) 06:47 PM	Run 2 (ug/mL) 07:09 PM	Run 3 (ug/mL) 07:30 PM	Average (ug/mL)	CAS #
Hexane	1.29	1.00	1.29	< 1.29	< 1.29	< 1.29	< 1.29	110-54-3
Benzene	1.75	1.00	1.75	< 1.75	< 1.75	< 1.75	< 1.75	71-43-2
Acetaldehyde	1.56	1.00	1.56	< 1.56	< 1.56	< 1.56	< 1.56	75-07-0
Ethylbenzene	1.73	1.00	1.73	< 1.73	< 1.73	< 1.73	< 1.73	100-41-4

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Laboratory Analysis Report

Sample Results

Test:	Analysis by EPA Method 18		
Client Name:	Alliance Source Testing		
Sample Number:	GSL_190252-004		
Analytical SOP:	GSL_TM001	Source Sampled:	3516HD Generator Exhaust - LC 25
Analysis Location:	Deer Park, TX	Client Sample ID:	LC 25 - Run 1
Instrument ID:	GC #10 - Agilent	Date Sampled:	3/7/2019 at 02:45 PM
Sample Analyst:	Emily Decker	Date Analyzed:	3/26/2019
QC Batch ID:	QC_09760	Matrix:	Liquid

Parameter	MQL (ug/mL)	DF	SQL (ug/mL)	Run 1 (ug/mL) 07:51 PM	Run 2 (ug/mL) 08:13 PM	Run 3 (ug/mL) 08:35 PM	Average (ug/mL)	CAS #
Hexane	1.29	1.00	1.29	< 1.29	< 1.29	< 1.29	< 1.29	110-54-3
Benzene	1.75	1.00	1.75	< 1.75	< 1.75	< 1.75	< 1.75	71-43-2
Acetaldehyde	1.56	1.00	1.56	< 1.56	< 1.56	< 1.56	< 1.56	75-07-0
Ethylbenzene	1.73	1.00	1.73	< 1.73	< 1.73	< 1.73	< 1.73	100-41-4

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Laboratory Analysis Report

Sample Results

Test: Analysis by EPA Method 18
Client Name: Alliance Source Testing
Sample Number: **GSL_190252-005**
Analytical SOP: GSL_TM001 **Source Sampled:** 3516HD Generator Exhaust - LC 25
Analysis Location: Deer Park, TX **Client Sample ID:** LC 25 - Run 2
Instrument ID: GC #10 - Agilent **Date Sampled:** 3/7/2019 at 04:30 PM
Sample Analyst: Emily Decker **Date Analyzed:** 3/26/2019
QC Batch ID: QC_09760 **Matrix:** Liquid

Parameter	MQL (ug/mL)	DF	SQL (ug/mL)	Run 1 (ug/mL) 08:56 PM	Run 2 (ug/mL) 09:18 PM	Run 3 (ug/mL) 09:40 PM	Average (ug/mL)	CAS #
Hexane	1.29	1.00	1.29	< 1.29	< 1.29	< 1.29	< 1.29	110-54-3
Benzene	1.75	1.00	1.75	< 1.75	< 1.75	< 1.75	< 1.75	71-43-2
Acetaldehyde	1.56	1.00	1.56	< 1.56	< 1.56	< 1.56	< 1.56	75-07-0
Ethylbenzene	1.73	1.00	1.73	< 1.73	< 1.73	< 1.73	< 1.73	100-41-4

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Laboratory Analysis Report

Sample Results

Test:	Analysis by EPA Method 18		
Client Name:	Alliance Source Testing		
Sample Number:	GSL_190252-006		
Analytical SOP:	GSL_TM001	Source Sampled:	3516HD Generator Exhaust - LC 25
Analysis Location:	Deer Park, TX	Client Sample ID:	LC 25 - Run 3
Instrument ID:	GC #10 - Agilent	Date Sampled:	3/7/2019 at 06:10 PM
Sample Analyst:	Emily Decker	Date Analyzed:	3/26/2019
QC Batch ID:	QC_09760	Matrix:	Liquid

Parameter	MQL (ug/mL)	DF	SQL (ug/mL)	Run 1 (ug/mL) 10:02 PM	Run 2 (ug/mL) 10:24 PM	Run 3 (ug/mL) 10:46 PM	Average (ug/mL)	CAS #
Hexane	1.29	1.00	1.29	< 1.29	< 1.29	< 1.29	< 1.29	110-54-3
Benzene	1.75	1.00	1.75	< 1.75	< 1.75	< 1.75	< 1.75	71-43-2
Acetaldehyde	1.56	1.00	1.56	< 1.56	< 1.56	< 1.56	< 1.56	75-07-0
Ethylbenzene	1.73	1.00	1.73	< 1.73	< 1.73	< 1.73	< 1.73	100-41-4

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Laboratory Analysis Report

Sample Results

Test:	Analysis by EPA Method 18		
Client Name:	Alliance Source Testing		
Sample Number:	GSL_190252-007		
Analytical SOP:	GSL_TM001	Source Sampled:	3516HD Generator Exhaust - LC 50
Analysis Location:	Deer Park, TX	Client Sample ID:	LC 50 - Run 1
Instrument ID:	GC #10 - Agilent	Date Sampled:	3/6/2019 at 06:15 PM
Sample Analyst:	Emily Decker	Date Analyzed:	3/26/2019
QC Batch ID:	QC_09760	Matrix:	Liquid

Parameter	MQL (ug/mL)	DF	SQL (ug/mL)	Run 1 (ug/mL) 11:07 PM	Run 2 (ug/mL) 11:29 PM	Run 3 (ug/mL) 11:50 PM	Average (ug/mL)	CAS #
Hexane	1.29	1.00	1.29	< 1.29	< 1.29	< 1.29	< 1.29	110-54-3
Benzene	1.75	1.00	1.75	< 1.75	< 1.75	< 1.75	< 1.75	71-43-2
Acetaldehyde	1.56	1.00	1.56	< 1.56	< 1.56	< 1.56	< 1.56	75-07-0
Ethylbenzene	1.73	1.00	1.73	< 1.73	< 1.73	< 1.73	< 1.73	100-41-4

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Laboratory Analysis Report

Sample Results

Test: Analysis by EPA Method 18
Client Name: Alliance Source Testing
Sample Number: **GSL_190252-008**
Analytical SOP: GSL_TM001
Analysis Location: Deer Park, TX
Instrument ID: GC #10 - Agilent
Sample Analyst: Emily Decker
QC Batch ID: QC_09760

Source Sampled: 3516HD Generator Exhaust - LC 50
Client Sample ID: LC 50 - Run 2
Date Sampled: 3/7/2019 at 10:15 AM
Date Analyzed: 3/27/2019
Matrix: Liquid

Parameter	MQL (ug/mL)	DF	SQL (ug/mL)	Run 1 (ug/mL) 12:11 AM	Run 2 (ug/mL) 12:33 AM	Run 3 (ug/mL) 12:55 AM	Average (ug/mL)	CAS #
Hexane	1.29	1.00	1.29	< 1.29	< 1.29	< 1.29	< 1.29	110-54-3
Benzene	1.75	1.00	1.75	< 1.75	< 1.75	< 1.75	< 1.75	71-43-2
Acetaldehyde	1.56	1.00	1.56	< 1.56	< 1.56	< 1.56	< 1.56	75-07-0
Ethylbenzene	1.73	1.00	1.73	< 1.73	< 1.73	< 1.73	< 1.73	100-41-4

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Laboratory Analysis Report

Sample Results

Test:	Analysis by EPA Method 18		
Client Name:	Alliance Source Testing		
Sample Number:	GSL_190252-009		
Analytical SOP:	GSL_TM001	Source Sampled:	3516HD Generator Exhaust - LC 50
Analysis Location:	Deer Park, TX	Client Sample ID:	LC 50 - Run 3
Instrument ID:	GC #10 - Agilent	Date Sampled:	3/7/2019 at 12:00 PM
Sample Analyst:	Emily Decker	Date Analyzed:	3/27/2019
QC Batch ID:	QC_09760	Matrix:	Liquid

Parameter	MQL (ug/mL)	DF	SQL (ug/mL)	Run 1 (ug/mL) 01:17 AM	Run 2 (ug/mL) 01:39 AM	Run 3 (ug/mL) 02:01 AM	Average (ug/mL)	CAS #
Hexane	1.29	1.00	1.29	< 1.29	< 1.29	< 1.29	< 1.29	110-54-3
Benzene	1.75	1.00	1.75	< 1.75	< 1.75	< 1.75	< 1.75	71-43-2
Acetaldehyde	1.56	1.00	1.56	< 1.56	< 1.56	< 1.56	< 1.56	75-07-0
Ethylbenzene	1.73	1.00	1.73	< 1.73	< 1.73	< 1.73	< 1.73	100-41-4

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Laboratory Analysis Report

Sample Results

Test: Analysis by EPA Method 18
Client Name: Alliance Source Testing
Sample Number: **GSL_190252-010**
Analytical SOP: GSL_TM001 **Source Sampled:** 3516HD Generator Exhaust - LC 75
Analysis Location: Deer Park, TX **Client Sample ID:** LC 75 - Run 1
Instrument ID: GC #10 - Agilent **Date Sampled:** 3/6/2019 at 12:00 PM
Sample Analyst: Emily Decker **Date Analyzed:** 3/27/2019
QC Batch ID: QC_09760 **Matrix:** Liquid

Parameter	MQL (ug/mL)	DF	SQL (ug/mL)	Run 1 (ug/mL) 02:22 AM	Run 2 (ug/mL) 02:44 AM	Run 3 (ug/mL) 03:06 AM	Average (ug/mL)	CAS #
Hexane	1.29	1.00	1.29	< 1.29	< 1.29	< 1.29	< 1.29	110-54-3
Benzene	1.75	1.00	1.75	< 1.75	< 1.75	< 1.75	< 1.75	71-43-2
Acetaldehyde	1.56	1.00	1.56	< 1.56	< 1.56	< 1.56	< 1.56	75-07-0
Ethylbenzene	1.73	1.00	1.73	< 1.73	< 1.73	< 1.73	< 1.73	100-41-4

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Laboratory Analysis Report

Sample Results

Test: Analysis by EPA Method 18
Client Name: Alliance Source Testing
Sample Number: **GSL_190252-011**
Analytical SOP: GSL_TM001
Analysis Location: Deer Park, TX
Instrument ID: GC #10 - Agilent
Sample Analyst: Emily Decker
QC Batch ID: QC_09760

Source Sampled: 3516HD Generator Exhaust - LC 75
Client Sample ID: LC 75 - Run 2
Date Sampled: 3/6/2019 at 02:00 PM
Date Analyzed: 3/27/2019
Matrix: Liquid

Parameter	MQL (ug/mL)	DF	SQL (ug/mL)	Run 1 (ug/mL) 03:28 AM	Run 2 (ug/mL) 03:50 AM	Run 3 (ug/mL) 04:12 AM	Average (ug/mL)	CAS #
Hexane	1.29	1.00	1.29	< 1.29	< 1.29	< 1.29	< 1.29	110-54-3
Benzene	1.75	1.00	1.75	< 1.75	< 1.75	< 1.75	< 1.75	71-43-2
Acetaldehyde	1.56	1.00	1.56	< 1.56	< 1.56	< 1.56	< 1.56	75-07-0
Ethylbenzene	1.73	1.00	1.73	< 1.73	< 1.73	< 1.73	< 1.73	100-41-4

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Laboratory Analysis Report

Sample Results

Test: Analysis by EPA Method 18
Client Name: Alliance Source Testing
Sample Number: **GSL_190252-012**
Analytical SOP: GSL_TM001 **Source Sampled:** 3516HD Generator Exhaust - LC 75
Analysis Location: Deer Park, TX **Client Sample ID:** LC 75 - Run 3
Instrument ID: GC #10 - Agilent **Date Sampled:** 3/6/2019 at 04:25 PM
Sample Analyst: Emily Decker **Date Analyzed:** 3/27/2019
QC Batch ID: QC_09760 **Matrix:** Liquid

Parameter	MQL (ug/mL)	DF	SQL (ug/mL)	Run 1 (ug/mL) 04:34 AM	Run 2 (ug/mL) 04:56 AM	Run 3 (ug/mL) 05:18 AM	Average (ug/mL)	CAS #
Hexane	1.29	1.00	1.29	< 1.29	< 1.29	< 1.29	< 1.29	110-54-3
Benzene	1.75	1.00	1.75	< 1.75	< 1.75	< 1.75	< 1.75	71-43-2
Acetaldehyde	1.56	1.00	1.56	< 1.56	< 1.56	< 1.56	< 1.56	75-07-0
Ethylbenzene	1.73	1.00	1.73	< 1.73	< 1.73	< 1.73	< 1.73	100-41-4

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Laboratory Analysis Report

Sample Results

Test:	Analysis by EPA Method 18		
Client Name:	Alliance Source Testing		
Sample Number:	GSL_190252-013		
Analytical SOP:	GSL_TM001	Source Sampled:	3516HD Generator Exhaust - LC 100
Analysis Location:	Deer Park, TX	Client Sample ID:	LC 100 - Run 1
Instrument ID:	GC #10 - Agilent	Date Sampled:	3/5/2019 at 12:10 PM
Sample Analyst:	Emily Decker	Date Analyzed:	3/27/2019
QC Batch ID:	QC_09760	Matrix:	Liquid

Parameter	MQL (ug/mL)	DF	SQL (ug/mL)	Run 1 (ug/mL) 05:40 AM	Run 2 (ug/mL) 06:02 AM	Run 3 (ug/mL) 06:24 AM	Average (ug/mL)	CAS #
Hexane	1.29	1.00	1.29	< 1.29	< 1.29	< 1.29	< 1.29	110-54-3
Benzene	1.75	1.00	1.75	< 1.75	< 1.75	< 1.75	< 1.75	71-43-2
Acetaldehyde	1.56	1.00	1.56	< 1.56	< 1.56	< 1.56	< 1.56	75-07-0
Ethylbenzene	1.73	1.00	1.73	< 1.73	< 1.73	< 1.73	< 1.73	100-41-4

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Laboratory Analysis Report

Sample Results

Test:	Analysis by EPA Method 18		
Client Name:	Alliance Source Testing		
Sample Number:	GSL_190252-014		
Analytical SOP:	GSL_TM001	Source Sampled:	3516HD Generator Exhaust - LC 100
Analysis Location:	Deer Park, TX	Client Sample ID:	LC 100 - Run 2
Instrument ID:	GC #10 - Agilent	Date Sampled:	3/5/2019 at 02:45 PM
Sample Analyst:	Emily Decker	Date Analyzed:	3/27/2019
QC Batch ID:	QC_09760	Matrix:	Liquid

Parameter	MQL (ug/mL)	DF	SQL (ug/mL)	Run 1 (ug/mL) 06:46 AM	Run 2 (ug/mL) 07:08 AM	Run 3 (ug/mL) 07:30 AM	Average (ug/mL)	CAS #
Hexane	1.29	1.00	1.29	< 1.29	< 1.29	< 1.29	< 1.29	110-54-3
Benzene	1.75	1.00	1.75	< 1.75	< 1.75	< 1.75	< 1.75	71-43-2
Acetaldehyde	1.56	1.00	1.56	< 1.56	< 1.56	< 1.56	< 1.56	75-07-0
Ethylbenzene	1.73	1.00	1.73	< 1.73	< 1.73	< 1.73	< 1.73	100-41-4

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Laboratory Analysis Report

Sample Results

Test: Analysis by EPA Method 18
Client Name: Alliance Source Testing
Sample Number: **GSL_190252-015**
Analytical SOP: GSL_TM001 **Source Sampled:** 3516HD Generator Exhaust - LC 100
Analysis Location: Deer Park, TX **Client Sample ID:** LC 100 - Run 3
Instrument ID: GC #10 - Agilent **Date Sampled:** 3/5/2019 at 05:15 PM
Sample Analyst: Emily Decker **Date Analyzed:** 3/27/2019
QC Batch ID: QC_09760 **Matrix:** Liquid

Parameter	MQL (ug/mL)	DF	SQL (ug/mL)	Run 1 (ug/mL) 07:52 AM	Run 2 (ug/mL) 08:14 AM	Run 3 (ug/mL) 08:37 AM	Average (ug/mL)	CAS #
Hexane	1.29	1.00	1.29	< 1.29	< 1.29	< 1.29	< 1.29	110-54-3
Benzene	1.75	1.00	1.75	< 1.75	< 1.75	< 1.75	< 1.75	71-43-2
Acetaldehyde	1.56	1.00	1.56	< 1.56	< 1.56	< 1.56	< 1.56	75-07-0
Ethylbenzene	1.73	1.00	1.73	< 1.73	< 1.73	< 1.73	< 1.73	100-41-4

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Laboratory Analysis Report

Sample Results

Test: Analysis by EPA Method 323
Client Name: Alliance Source Testing
Order ID: **GSL_190252**
Analytical SOP: GSL_TM033
Analysis Location: Deer Park, TX **Source Sampled:** 3516HD Generator Exhaust - LC 10
Instrument ID: UV/VIS #1 - Thermo **Date Sampled:** 3/8/2019
Sample Analyst: Jacob Perry **Date Analyzed:** 3/14/2019
QC Batch ID: QC_09761 **Matrix:** Liquid

Sample ID	Sample Number	Parameter	MQL (ug/ml)	DF	SQL (ug/ml)	Result (ug/ml)	Sample Volume (ml)	Result (ug/sample)
LC 10 - Run 1	001	Formaldehyde	0.10	1.00	0.10	0.49	42	20.45
LC 10 - Run 2	002	Formaldehyde	0.10	1.00	0.10	3.72	42	156.07
LC 10 - Run 3	003	Formaldehyde	0.10	1.00	0.10	3.94	42	165.44

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Laboratory Analysis Report

Sample Results

Test: Analysis by EPA Method 323
Client Name: Alliance Source Testing
Order ID: **GSL_190252**
Analytical SOP: GSL_TM033
Analysis Location: Deer Park, TX
Instrument ID: UV/VIS #1 - Thermo
Sample Analyst: Jacob Perry
QC Batch ID: QC_09761

Source Sampled: 3516HD Generator Exhaust - LC 25
Date Sampled: 3/7/2019
Date Analyzed: 3/14/2019
Matrix: Liquid

Sample ID	Sample Number	Parameter	MQL (ug/ml)	DF	SQL (ug/ml)	Result (ug/ml)	Sample Volume (ml)	Result (ug/sample)
LC 25 - Run 1	004	Formaldehyde	0.10	1.00	0.10	2.95	42	124.03
LC 25 - Run 2	005	Formaldehyde	0.10	1.00	0.10	2.85	42	119.87
LC 25 - Run 3	006	Formaldehyde	0.10	1.00	0.10	3.12	42	131.21

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Laboratory Analysis Report

Sample Results

Test: Analysis by EPA Method 323
Client Name: Alliance Source Testing
Order ID: **GSL_190252**
Analytical SOP: GSL_TM033
Analysis Location: Deer Park, TX
Instrument ID: UV/VIS #1 - Thermo
Sample Analyst: Jacob Perry
QC Batch ID: QC_09761

Source Sampled: 3516HD Generator Exhaust - LC 50
Date Sampled: 3/6/2019
Date Analyzed: 3/14/2019
Matrix: Liquid

Sample ID	Sample Number	Parameter	MQL (ug/ml)	DF	SQL (ug/ml)	Result (ug/ml)	Sample Volume (ml)	Result (ug/sample)
LC 50 - Run 1	007	Formaldehyde	0.10	1.00	0.10	1.37	42	57.71

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Laboratory Analysis Report

Sample Results

Test: Analysis by EPA Method 323
Client Name: Alliance Source Testing
Order ID: **GSL_190252**
Analytical SOP: GSL_TM033
Analysis Location: Deer Park, TX
Instrument ID: UV/VIS #1 - Thermo
Sample Analyst: Jacob Perry
QC Batch ID: QC_09761

Source Sampled: 3516HD Generator Exhaust - LC 50
Date Sampled: 3/7/2019
Date Analyzed: 3/14/2019
Matrix: Liquid

Sample ID	Sample Number	Parameter	MQL (ug/ml)	DF	SQL (ug/ml)	Result (ug/ml)	Sample Volume (ml)	Result (ug/sample)
LC 50 - Run 2	008	Formaldehyde	0.10	1.00	0.10	1.87	42	78.46
LC 50 - Run 3	009	Formaldehyde	0.10	1.00	0.10	1.82	42	76.52

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Laboratory Analysis Report

Sample Results

Test: Analysis by EPA Method 323
Client Name: Alliance Source Testing
Order ID: **GSL_190252**
Analytical SOP: GSL_TM033
Analysis Location: Deer Park, TX
Instrument ID: UV/VIS #1 - Thermo
Sample Analyst: Jacob Perry
QC Batch ID: QC_09761

Source Sampled: 3516HD Generator Exhaust - LC 75
Date Sampled: 3/6/2019
Date Analyzed: 3/14/2019
Matrix: Liquid

Sample ID	Sample Number	Parameter	MQL (ug/ml)	DF	SQL (ug/ml)	Result (ug/ml)	Sample Volume (ml)	Result (ug/sample)
LC 75 - Run 1	010	Formaldehyde	0.10	1.00	0.10	1.11	42	46.41
LC 75 - Run 2	011	Formaldehyde	0.10	1.00	0.10	0.80	42	33.43
LC 75 - Run 3	012	Formaldehyde	0.10	1.00	0.10	1.47	42	61.61

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Laboratory Analysis Report

Sample Results

Test: Analysis by EPA Method 323
Client Name: Alliance Source Testing
Order ID: **GSL_190252**
Analytical SOP: GSL_TM033
Analysis Location: Deer Park, TX
Instrument ID: UV/VIS #1 - Thermo
Sample Analyst: Jacob Perry
QC Batch ID: QC_09761

Source Sampled: 3516HD Generator Exhaust - LC 100
Date Sampled: 3/5/2019
Date Analyzed: 3/14/2019
Matrix: Liquid

Sample ID	Sample Number	Parameter	MQL (ug/ml)	DF	SQL (ug/ml)	Result (ug/ml)	Sample Volume (ml)	Result (ug/sample)
LC 100 - Run 1	013	Formaldehyde	0.10	1.00	0.10	1.29	41	52.85
LC 100 - Run 2	014	Formaldehyde	0.10	1.00	0.10	1.19	42	49.98
LC 100 - Run 3	015	Formaldehyde	0.10	1.00	0.10	0.85	42	35.62

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Laboratory Analysis Report

Quality Control Information

Sample Duplicate Recovery

Test: Analysis by EPA Method 323
Duplicate Sample Number: GSL_190252-002
Duplicate Sample Dilution: 1.00x
Date Analyzed: 3/14/2019
Matrix: Liquid
Instrument ID: UV/VIS #1 - Thermo
Analyst: Jacob Perry
QC Batch ID: QC_09761

Parameter	SQL (ug/ml)	Sample Result (ug/ml)	Duplicate Result (ug/ml)	RPD (%)	RPD Limit (%)	Flag
Formaldehyde	0.10	3.72	3.73	0	10	

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Laboratory Analysis Report

Quality Control Information

Sample Duplicate Recovery

Test: Analysis by EPA Method 323
Duplicate Sample Number: GSL_190252-003
Duplicate Sample Dilution: 1.00x
Date Analyzed: 3/14/2019
Matrix: Liquid
Instrument ID: UV/VIS #1 - Thermo
Analyst: Jacob Perry
QC Batch ID: QC_09761

Parameter	SQL (ug/ml)	Sample Result (ug/ml)	Duplicate Result (ug/ml)	RPD (%)	RPD Limit (%)	Flag
Formaldehyde	0.10	3.94	3.93	0	10	

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Laboratory Analysis Report

Quality Control Information

Matrix Spike Recovery

Test:	Analysis by EPA Method 18		
Client Name:	Alliance Source Testing		
Spiked Sample:	GSL_190239-001		
Sample Dilution:	1.00x		
Analytical SOP:	GSL_TM001	Source Sampled:	3516HD Generator Exhaust - LC 100
Instrument ID:	GC #8 - Agilent	Spike Prepared:	3/7/2019
Sample Analyst:	Emily Decker	Spike Analyzed:	3/11/2019
QC Batch ID:	QC_09743	Matrix:	Air

Parameter	MQL (ppmv)	Spike Run 1 (ppmv) 04:11 PM	Spike Run 2 (ppmv) 04:17 PM	Spike Run 3 (ppmv) 04:50 PM	Spike Average (ppmv)	Sample Average (ppmv)	Spike Amount (ppmv)	Percent Recovery	Flag
Benzene	0.10	5.07	4.95	5.00	5.01	< 0.10	5.00	99	
Ethylbenzene	0.10	5.11	4.84	4.91	4.95	< 0.10	5.00	99	

Spike Recovery Limits: 70-130%

Laboratory Analysis Report

Quality Control Information

Matrix Spike Recovery

Test:	Analysis by EPA Method 18		
Client Name:	Alliance Source Testing		
Spiked Sample:	GSL_190239-001		
Sample Dilution:	1.00x		
Analytical SOP:	GSL_TM001	Source Sampled:	3516HD Generator Exhaust - LC 100
Instrument ID:	GC #8 - Agilent	Spike Prepared:	3/7/2019
Sample Analyst:	Emily Decker	Spike Analyzed:	3/11/2019
QC Batch ID:	QC_09743	Matrix:	Air

Parameter	MQL (ppmv)	Spike Run 1 (ppmv) 05:17 PM	Spike Run 2 (ppmv) 05:23 PM	Spike Run 3 (ppmv) 05:29 PM	Spike Average (ppmv)	Sample Average (ppmv)	Spike Amount (ppmv)	Percent Recovery	Flag
Acetaldehyde	1.00	48.29	50.46	49.79	49.51	< 1.00	50.00	99	

Spike Recovery Limits: 70-130%



Laboratory Analysis Report

Quality Control Information

Matrix Spike Recovery

Test:	Analysis by EPA Method 18		
Client Name:	Alliance Source Testing		
Spiked Sample:	GSL_190239-003		
Sample Dilution:	1.00x		
Analytical SOP:	GSL_TM001	Source Sampled:	3516HD Generator Exhaust - LC 100
Instrument ID:	GC #1 - Agilent	Spike Prepared:	3/5/2019
Sample Analyst:	Dhan Yeddula	Spike Analyzed:	3/12/2019
QC Batch ID:	QC_09749	Matrix:	Air

Parameter	MQL (ppmv)	Spike Run 1 (ppmv) 12:14 PM	Spike Run 2 (ppmv) 12:31 PM	Spike Run 3 (ppmv) 12:48 PM	Spike Average (ppmv)	Sample Average (ppmv)	Spike Amount (ppmv)	Percent Recovery	Flag
1,3-Butadiene	0.10	4.63	4.58	4.45	4.55	< 0.10	5.00	91	
Hexane	0.10	5.28	5.35	5.31	5.31	< 0.10	5.00	106	

Spike Recovery Limits: 70-130%

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Laboratory Analysis Report

Quality Control Information

Matrix Spike Recovery

Test: Analysis by EPA Method 323
Spiked Sample Number: GSL_190252-002
Spiked Sample Dilution: 1.00x
Spiked Sample Volumes: 1.6ml sample, 0.4ml spike
Date Analyzed: 3/14/2019
Matrix: Liquid
Instrument ID: UV/VIS #1 - Thermo
Analyst: Jacob Perry
QC Batch ID: QC_09761

Parameter	MQL (ug/ml)	Sample Result (ug/ml)	Spike Amount (ug/ml)	Spike Result (ug/ml)	Percent Recovery	Percent Recovery Limits	Flag
Formaldehyde	0.10	3.72	2.00	4.95	99	80 - 120	

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Laboratory Analysis Report

Quality Control Information

Matrix Spike Recovery

Test: Analysis by EPA Method 323
Spiked Sample Number: GSL_190252-003
Spiked Sample Dilution: 1.00x
Spiked Sample Volumes: 1.6ml sample, 0.4ml spike
Date Analyzed: 3/14/2019
Matrix: Liquid
Instrument ID: UV/VIS #1 - Thermo
Analyst: Jacob Perry
QC Batch ID: QC_09761

Parameter	MQL (ug/ml)	Sample Result (ug/ml)	Spike Amount (ug/ml)	Spike Result (ug/ml)	Percent Recovery	Percent Recovery Limits	Flag
Formaldehyde	0.10	3.94	2.00	5.12	99	80 - 120	

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Laboratory Analysis Report

Quality Control Information

Continuing Calibration Verification

Test: Analysis by EPA Method 18
Date Analyzed: 3/7/2019 at 01:03 PM
Matrix: Air
Instrument ID: GC #8 - Agilent
Analyst: Emily Decker
QC Batch ID: QC_09743

Parameter	CCV Area Result	Initial Calibration Area Result	Percent Recovery	Percent Recovery Limit	Flag
Benzene	8.96	8.86	101	95 - 105	
Ethylbenzene	10.81	10.54	103	95 - 105	

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Laboratory Analysis Report

Quality Control Information

Continuing Calibration Verification

Test: Analysis by EPA Method 18
Date Analyzed: 3/7/2019 at 12:38 PM
Matrix: Air
Instrument ID: GC #8 - Agilent
Analyst: Emily Decker
QC Batch ID: QC_09743

Parameter	CCV Area Result	Initial Calibration Area Result	Percent Recovery	Percent Recovery Limit	Flag
Acetaldehyde	4.55	4.62	99	95 - 105	

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Laboratory Analysis Report

Quality Control Information

Continuing Calibration Verification

Test: Analysis by EPA Method 18
Date Analyzed: 3/11/2019 at 10:24 AM
Matrix: Air
Instrument ID: GC #8 - Agilent
Analyst: Emily Decker
QC Batch ID: QC_09743

Parameter	CCV Area Result	Initial Calibration Area Result	Percent Recovery	Percent Recovery Limit	Flag
Acetaldehyde	4.73	4.62	102	95 - 105	

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Laboratory Analysis Report

Quality Control Information

Continuing Calibration Verification

Test: Analysis by EPA Method 18
Date Analyzed: 3/11/2019 at 11:00 AM
Matrix: Air
Instrument ID: GC #8 - Agilent
Analyst: Emily Decker
QC Batch ID: QC_09743

Parameter	CCV Area Result	Initial Calibration Area Result	Percent Recovery	Percent Recovery Limit	Flag
Benzene	8.90	8.86	100	95 - 105	
Ethylbenzene	10.82	10.54	103	95 - 105	

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Laboratory Analysis Report

Quality Control Information

Continuing Calibration Verification

Test: Analysis by EPA Method 18
Date Analyzed: 3/6/2019 at 10:29 AM
Matrix: Air
Instrument ID: GC #1 - Agilent
Analyst: Dhan Yeddula
QC Batch ID: QC_09749

Parameter	CCV Area Result	Initial Calibration Area Result	Percent Recovery	Percent Recovery Limit	Flag
1,3-Butadiene	30.12	29.35	103	95 - 105	
Hexane	42.90	42.60	101	95 - 105	

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Laboratory Analysis Report

Quality Control Information

Continuing Calibration Verification

Test: Analysis by EPA Method 18
Date Analyzed: 3/8/2019 at 07:33 AM
Matrix: Air
Instrument ID: GC #1 - Agilent
Analyst: Dhan Yeddula
QC Batch ID: QC_09749

Parameter	CCV Area Result	Initial Calibration Area Result	Percent Recovery	Percent Recovery Limit	Flag
1,3-Butadiene	29.93	29.35	102	95 - 105	
Hexane	42.80	42.60	100	95 - 105	

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Laboratory Analysis Report

Quality Control Information

Continuing Calibration Verification

Test: Analysis by EPA Method 18
Date Analyzed: 3/12/2019 at 07:24 AM
Matrix: Air
Instrument ID: GC #1 - Agilent
Analyst: Dhan Yeddula
QC Batch ID: QC_09749

Parameter	CCV Area Result	Initial Calibration Area Result	Percent Recovery	Percent Recovery Limit	Flag
1,3-Butadiene	29.72	29.35	101	95 - 105	
Hexane	42.71	42.60	100	95 - 105	

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Laboratory Analysis Report

Quality Control Information

Continuing Calibration Verification

Test: Analysis by EPA Method 18
Date Analyzed: 3/26/2019 at 03:07 PM
Matrix: Liquid
Instrument ID: GC #10 - Agilent
Analyst: Emily Decker
QC Batch ID: QC_09760

Parameter	CCV Area Result	Initial Calibration Area Result	Percent Recovery	Percent Recovery Limit	Flag
Hexane	150.06	145.14	103	95 - 105	
Benzene	251.91	240.25	105	95 - 105	
Acetaldehyde	59.49	58.55	102	95 - 105	
Ethylbenzene	263.10	260.93	101	95 - 105	

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Laboratory Analysis Report

Quality Control Information

Blank Analysis

Test: Analysis by EPA Method 18
Date Analyzed: 3/7/2019 at 01:24 PM
Matrix: Air
Instrument ID: GC #8 - Agilent
Analyst: Emily Decker
QC Batch ID: QC_09743

Parameter	CAS #	MQL (ppmv)	Blank Result (ppmv)	Flag
Benzene	71-43-2	0.10	< 0.10	
Ethylbenzene	100-41-4	0.10	< 0.10	
Acetaldehyde	75-07-0	1.00	< 1.00	

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Laboratory Analysis Report

Quality Control Information

Blank Analysis

Test: Analysis by EPA Method 18
Date Analyzed: 3/11/2019 at 11:16 AM
Matrix: Air
Instrument ID: GC #8 - Agilent
Analyst: Emily Decker
QC Batch ID: QC_09743

Parameter	CAS #	MQL (ppmv)	Blank Result (ppmv)	Flag
Benzene	71-43-2	0.10	< 0.10	
Ethylbenzene	100-41-4	0.10	< 0.10	
Acetaldehyde	75-07-0	1.00	< 1.00	

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Laboratory Analysis Report

Quality Control Information

Blank Analysis

Test: Analysis by EPA Method 18
Date Analyzed: 3/6/2019 at 11:04 AM
Matrix: Air
Instrument ID: GC #1 - Agilent
Analyst: Dhan Yeddula
QC Batch ID: QC_09749

Parameter	CAS #	MQL (ppmv)	Blank Result (ppmv)	Flag
1,3-Butadiene	106-99-0	0.10	< 0.10	
Hexane	110-54-3	0.10	< 0.10	

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Laboratory Analysis Report

Quality Control Information

Blank Analysis

Test: Analysis by EPA Method 18
Date Analyzed: 3/8/2019 at 08:07 AM
Matrix: Air
Instrument ID: GC #1 - Agilent
Analyst: Dhan Yeddula
QC Batch ID: QC_09749

Parameter	CAS #	MQL (ppmv)	Blank Result (ppmv)	Flag
1,3-Butadiene	106-99-0	0.10	< 0.10	
Hexane	110-54-3	0.10	< 0.10	

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Laboratory Analysis Report

Quality Control Information

Blank Analysis

Test: Analysis by EPA Method 18
Date Analyzed: 3/12/2019 at 08:01 AM
Matrix: Air
Instrument ID: GC #1 - Agilent
Analyst: Dhan Yeddula
QC Batch ID: QC_09749

Parameter	CAS #	MQL (ppmv)	Blank Result (ppmv)	Flag
1,3-Butadiene	106-99-0	0.10	< 0.10	
Hexane	110-54-3	0.10	< 0.10	

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Laboratory Analysis Report

Quality Control Information

MeOH Blank Analysis

Test: Analysis by EPA Method 18
Date Analyzed: 3/26/2019 at 03:54 PM
Matrix: Liquid
Instrument ID: GC #10 - Agilent
Analyst: Emily Decker
QC Batch ID: QC_09760

Parameter	CAS #	MQL (ug/mL)	Blank Result (ug/mL)	Flag
Hexane	110-54-3	1.29	< 1.29	
Benzene	71-43-2	1.75	< 1.75	
Acetaldehyde	75-07-0	1.56	< 1.56	
Ethylbenzene	100-41-4	1.73	< 1.73	

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Laboratory Analysis Report

Quality Control Information

DI H2O Blank Analysis

Test: Analysis by EPA Method 18
Date Analyzed: 3/26/2019 at 04:15 PM
Matrix: Liquid
Instrument ID: GC #10 - Agilent
Analyst: Emily Decker
QC Batch ID: QC_09760

Parameter	CAS #	MQL (ug/mL)	Blank Result (ug/mL)	Flag
Hexane	110-54-3	1.29	< 1.29	
Benzene	71-43-2	1.75	< 1.75	
Acetaldehyde	75-07-0	1.56	< 1.56	
Ethylbenzene	100-41-4	1.73	< 1.73	

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Laboratory Analysis Report

Quality Control Information

Blank Analysis

Test: Analysis by EPA Method 323
Date Analyzed: 3/14/2019
Matrix: Liquid
Instrument ID: UV/VIS #1 - Thermo
Analyst: Jacob Perry
QC Batch ID: QC_09761

Parameter	CAS #	MQL (ug/ml)	Blank Result (ug/ml)	Flag
Formaldehyde	50-00-0	0.10	< 0.10	

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Laboratory Analysis Report

Quality Control Information

Laboratory Control Sample

Test: Analysis by EPA Method 18
Date Analyzed: 3/7/2019 at 01:11 PM
Matrix: Air
Instrument ID: GC #8 - Agilent
Analyst: Emily Decker
QC Batch ID: QC_09743

Parameter	LCS Result (ppmv)	Spike Amount (ppmv)	Percent Recovery	Percent Recovery Limit	Flag
Benzene	9.96	10.00	100	80 - 120	
Ethylbenzene	10.44	10.00	104	80 - 120	
Acetaldehyde	101.99	100.00	102	80 - 120	

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Laboratory Analysis Report

Quality Control Information

Laboratory Control Sample

Test: Analysis by EPA Method 18
Date Analyzed: 3/11/2019 at 11:09 AM
Matrix: Air
Instrument ID: GC #8 - Agilent
Analyst: Emily Decker
QC Batch ID: QC_09743

Parameter	LCS Result (ppmv)	Spike Amount (ppmv)	Percent Recovery	Percent Recovery Limit	Flag
Benzene	9.71	10.00	97	80 - 120	
Ethylbenzene	9.81	10.00	98	80 - 120	
Acetaldehyde	106.49	100.00	106	80 - 120	

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Laboratory Analysis Report

Quality Control Information

Laboratory Control Sample

Test: Analysis by EPA Method 18
Date Analyzed: 3/6/2019 at 10:47 AM
Matrix: Air
Instrument ID: GC #1 - Agilent
Analyst: Dhan Yeddula
QC Batch ID: QC_09749

Parameter	LCS Result (ppmv)	Spike Amount (ppmv)	Percent Recovery	Percent Recovery Limit	Flag
1,3-Butadiene	11.51	10.00	115	80 - 120	
Hexane	11.23	10.00	112	80 - 120	

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Laboratory Analysis Report

Quality Control Information

Laboratory Control Sample

Test: Analysis by EPA Method 18
Date Analyzed: 3/8/2019 at 07:50 AM
Matrix: Air
Instrument ID: GC #1 - Agilent
Analyst: Dhan Yeddula
QC Batch ID: QC_09749

Parameter	LCS Result (ppmv)	Spike Amount (ppmv)	Percent Recovery	Percent Recovery Limit	Flag
1,3-Butadiene	10.10	10.00	101	80 - 120	
Hexane	10.07	10.00	101	80 - 120	

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Laboratory Analysis Report

Quality Control Information

Laboratory Control Sample

Test: Analysis by EPA Method 18
Date Analyzed: 3/12/2019 at 07:44 AM
Matrix: Air
Instrument ID: GC #1 - Agilent
Analyst: Dhan Yeddula
QC Batch ID: QC_09749

Parameter	LCS Result (ppmv)	Spike Amount (ppmv)	Percent Recovery	Percent Recovery Limit	Flag
1,3-Butadiene	11.28	10.00	113	80 - 120	
Hexane	10.86	10.00	109	80 - 120	

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Laboratory Analysis Report

Quality Control Information

Laboratory Control Sample

Test: Analysis by EPA Method 18
Date Analyzed: 3/26/2019 at 03:30 PM
Matrix: Liquid
Instrument ID: GC #10 - Agilent
Analyst: Emily Decker
QC Batch ID: QC_09760

Parameter	LCS Result (ug/mL)	Spike Amount (ug/mL)	Percent Recovery	Percent Recovery Limit	Flag
Hexane	328.81	313.50	105	80 - 120	
Benzene	445.41	439.37	101	80 - 120	
Acetaldehyde	387.41	389.22	100	80 - 120	
Ethylbenzene	424.90	433.33	98	80 - 120	

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Laboratory Analysis Report

Quality Control Information

Initial Calibration Verification

Test: Analysis by EPA Method 323
Date Analyzed: 3/14/2019
Matrix: Liquid
Instrument ID: UV/VIS #1 - Thermo
Analyst: Jacob Perry
QC Batch ID: QC_09761

Parameter	ICV Result (ug/ml)	Spike Amount (ug/ml)	Percent Recovery	Percent Recovery Limit	Flag
Formaldehyde	1.97	2.00	98	90 - 110	

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Laboratory Analysis Report

Quality Control Information

Post Analysis Continuing Calibration Verification

Test: Analysis by EPA Method 18
Date Analyzed: 3/7/2019 at 08:14 PM
Matrix: Air
Instrument ID: GC #8 - Agilent
Analyst: Emily Decker
QC Batch ID: QC_09743

Parameter	Post CCV Area Result	CCV Area Result	RPD (%)	RPD Limit	Flag
Benzene	8.97	8.96	0	5	
Ethylbenzene	10.76	10.81	1	5	

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Laboratory Analysis Report

Quality Control Information

Post Analysis Continuing Calibration Verification

Test: Analysis by EPA Method 18
Date Analyzed: 3/7/2019 at 08:56 PM
Matrix: Air
Instrument ID: GC #8 - Agilent
Analyst: Emily Decker
QC Batch ID: QC_09743

Parameter	Post CCV Area Result	CCV Area Result	RPD (%)	RPD Limit	Flag
Acetaldehyde	4.59	4.55	1	5	

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Laboratory Analysis Report

Quality Control Information

Post Analysis Continuing Calibration Verification

Test: Analysis by EPA Method 18
Date Analyzed: 3/11/2019 at 05:09 PM
Matrix: Air
Instrument ID: GC #8 - Agilent
Analyst: Emily Decker
QC Batch ID: QC_09743

Parameter	Post CCV Area Result	CCV Area Result	RPD (%)	RPD Limit	Flag
Benzene	8.86	8.90	1	5	
Ethylbenzene	10.74	10.82	1	5	

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Laboratory Analysis Report

Quality Control Information

Post Analysis Continuing Calibration Verification

Test: Analysis by EPA Method 18
Date Analyzed: 3/11/2019 at 05:53 PM
Matrix: Air
Instrument ID: GC #8 - Agilent
Analyst: Emily Decker
QC Batch ID: QC_09743

Parameter	Post CCV Area Result	CCV Area Result	RPD (%)	RPD Limit	Flag
Acetaldehyde	4.81	4.73	2	5	

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Laboratory Analysis Report

Quality Control Information

Post Analysis Continuing Calibration Verification

Test: Analysis by EPA Method 18
Date Analyzed: 3/6/2019 at 01:54 PM
Matrix: Air
Instrument ID: GC #1 - Agilent
Analyst: Dhan Yeddula
QC Batch ID: QC_09749

Parameter	Post CCV Area Result	CCV Area Result	RPD (%)	RPD Limit	Flag
1,3-Butadiene	29.69	30.12	1	5	
Hexane	42.34	42.90	1	5	

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Laboratory Analysis Report

Quality Control Information

Post Analysis Continuing Calibration Verification

Test: Analysis by EPA Method 18
Date Analyzed: 3/8/2019 at 03:54 PM
Matrix: Air
Instrument ID: GC #1 - Agilent
Analyst: Dhan Yeddula
QC Batch ID: QC_09749

Parameter	Post CCV Area Result	CCV Area Result	RPD (%)	RPD Limit	Flag
1,3-Butadiene	29.02	29.93	3	5	
Hexane	41.24	42.80	4	5	

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Laboratory Analysis Report

Quality Control Information

Post Analysis Continuing Calibration Verification

Test: Analysis by EPA Method 18
Date Analyzed: 3/12/2019 at 03:09 PM
Matrix: Air
Instrument ID: GC #1 - Agilent
Analyst: Dhan Yeddula
QC Batch ID: QC_09749

Parameter	Post CCV Area Result	CCV Area Result	RPD (%)	RPD Limit	Flag
1,3-Butadiene	30.34	29.72	2	5	
Hexane	42.79	42.71	0	5	

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Laboratory Analysis Report

Quality Control Information

Post Analysis Continuing Calibration Verification

Test: Analysis by EPA Method 18
Date Analyzed: 3/27/2019 at 09:22 AM
Matrix: Liquid
Instrument ID: GC #10 - Agilent
Analyst: Emily Decker
QC Batch ID: QC_09760

Parameter	Post CCV Area Result	CCV Area Result	RPD (%)	RPD Limit	Flag
Hexane	156.77	150.06	4	5	
Benzene	261.30	251.91	4	5	
Acetaldehyde	60.67	59.49	2	5	
Ethylbenzene	272.94	263.10	4	5	

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Laboratory Analysis Report

Quality Control Information

Post Analysis Continuing Calibration Verification

Test: Analysis by EPA Method 323
Date Analyzed: 3/14/2019
Matrix: Liquid
Instrument ID: UV/VIS #1 - Thermo
Analyst: Jacob Perry
QC Batch ID: QC_09761

Parameter	CCV Result (ug/ml)	Spike Amount (ug/ml)	Percent Recovery	Percent Recovery Limit	Flag
Formaldehyde	1.99	2.00	99	90 - 110	

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Laboratory Analysis Report

Data Qualifiers and Flags

- MDL - Method Detection Limit
- MQL - Method Quantitation Limit
- SDL - Sample Detection Limit
- SQL - Sample Quantitation Limit
- RPD - Relative Percent Difference
- J - Target analyte is between the MDL and SQL values.
- L - Target analyte recovered below the recovery limits.
- H - Target analyte recovered above the recovery limits.
- B - Target analyte identified in blank run.
- F - RPD/RSD is outside the control limits.
- NC - Not calculated due to division by zero, or negative spike recovery.
- M - Target analyte reported outside control limit due to matrix interference.
- E - Estimated; Target analyte is above the Upper Quantitation Limit, or estimated due to other issue(s) noted in narrative.
- ND - Non-detect; analyte is below the MDL value, or TIC not detected in GC/MS scan.
- A - Sample analyzed outside holding time.
- C - Sample analyzed by FTIR; results estimated.
- I - Internal standard outside acceptable response range.



GSL190239 (1&2)

Chain of Custody

Project #: 2019-0420	Client/Plant Name: AST/Caterpillar, Inc. - Virginia Beach, Virginia		Special Instructions:														
Sampling Location: 3516HD Generator Exhaust - Load Condition 100																	
Sampled by (Print): Kenji Kinoshita		Report Turnaround Time: <input checked="" type="checkbox"/> Normal (10 business days) <input type="checkbox"/> 5 business days <input type="checkbox"/> Other:															
(Signature):		Analytical Deadline: <input type="checkbox"/> 7 days <input type="checkbox"/> 72 hrs. (bags) <input type="checkbox"/> 24 hrs. <input type="checkbox"/> Other:															
Work Requested by: Adam Robinson / PA Phone: 256-351-0121		e-Mail: Adam.Robinson@stacktest.com; all emails: firstname.lastname@stacktest.com															
Submit Report to: Above & AST Group Phone: 503-715-7095		e-Mail: AST group; Jordan Laster, Laura Aymett, Austin Abranovic															
Field Sample ID (Include Run and Sample Fraction)	Lab Sample ID	Collection		Analysis					Comments: (Visual observation, canister start/stop pressures, additional analytes, etc.)								
		Date	Time(s)	Container Type*	Vol. (mL)	Tare Wt. (g)	EPA Method or Rule	Method 18		Flare Gas Analysis (Method 18 + ASTM 1946D)	ASTM D1946	TO-15	Method 26A	Method 5	Method 202	CTM-027	Hold
LC 100 Run 1 - Bag A	001	3/5/19	15:08	T		M18	<										1,3-Butadiene, Acetaldehyde, Benzene, Ethyl Benzene, and Hexane
LC 100 Run 2 - Bag A	002	3/5/19	15:00	T		M18	<										"
LC 100 Run 3 - Bag A	003	3/5/19	17:00	T		M18	<										"
Relinquished by (signature)		Date	Time	Received by (signature)	Date	Time	Relinquished by (signature)	Date	Time	Received by (signature)							
		3/5/19	18:00	Megan Stand													
Relinquished by (signature)		Date	Time	Received by (signature)	Date	Time	Relinquished by (signature)	Date	Time	Received by (signature)							

Sample Pick-Up (Circle One): Yes / No by GC: Glass, clear GA: Glass, amber B: Bomb cylinder P: Plastic F: Filter O: Other

(Print)



Chain of Custody

GSL-190244 (10f2)

Project #: 2019-0420		Client/Plant Name: AST/Caterpillar, Inc. - Virginia Beach, Virginia		Special Instructions:																			
Sampling Location: 3516HD Generator Exhaust - Load Condition <u>TS + SD</u>		Report Turnaround Time: <input checked="" type="checkbox"/> Normal (10 business days) <input type="checkbox"/> 5 business days <input type="checkbox"/> Other:		Analytical Deadline: <input type="checkbox"/> 7 days <input type="checkbox"/> 72 hrs. (bags) <input type="checkbox"/> 24 hrs. <input type="checkbox"/> Other:																			
Sampled by (Print): Kenji Kinoshita (Signature):		Phone: 256-351-0121		e-Mail: Adam.Robinson@stacktest.com; all emails: firstname.lastname@stacktest.com																			
Work Requested by: Adam Robinson / PA		Phone: 503-715-7095		e-Mail: AST group; Jordan Laster, Laura Aymett, Austin Abranovic																			
Submit Report to: Above & AST Group		Analysis																					
Field Sample ID (Include Run and Sample Fraction)	Lab Sample ID	Collection		EPA Method or Rule	Tare Wt. (g)	Vol. (mL)	Container Type*	Analysis						Comments: (Visual observation, canister start/stop pressures, additional analytes, etc.)									
		Date	Time(s)					Method 18	Flare Gas Analysis (Method 18 + ASTM 1946D)	TO-15	Method 26A	Method 5	Method 202		CTM-027	Hold							
LC 75-Run 1 - BAGA	001	3/6/19	11:25	M18			T	✓							1,3-Butadiene, Acetaldehyde, Benzene, Ethyl Benzene, and Hexane								
LC 75-Run 2 - BAGA	002	3/6/19	13:35	M18			T	✓							"								
LC 75-Run 3 - BAGA	003	3/6/19	16:28	M18			T	✓							"								
LC 50-Run 1 - BAGA	004	3/6/19	18:15	M18			T	✓							"								
Refiniquished by (signature)		Date	Time	Received by (signature)		Date	Time	Refiniquished by (signature)		Date	Time	Received by (signature)											
		3/6/19	18:45	Megan Steward																			
Refiniquished by (signature)		Date	Time	Received by (signature)		Date	Time	Refiniquished by (signature)		Date	Time	Received by (signature)											
Sample Pick-Up (Circle One): Yes / No by _____ (Print)												Canister Rental (Circle One): Yes / No											
T: Tedlar bag				B: Bomb cylinder				GA: Glass, amber				P: Plastic				F: Filter				O: Other			

*Types - C: Canister
 T: Tedlar bag B: Bomb cylinder GA: Glass, amber P: Plastic F: Filter O: Other



GSL190244(2012)

Chain of Custody

Project #: 2019-0420

Client/Plant Name: AST/Caterpillar, Inc. - Virginia Beach, Virginia

Sampling Location: 3516HD Generator Exhaust - Load Condition 75 + 50

Special Instructions: HOLD AS ARCHIVE OR ONLY USE IF BAG A SAMPLES ARE COMPLETED

Sampled by (Print): Kenji Kinoshita

(Signature): *[Signature]*

Report Turnaround Time: Normal (10 business days) 5 business days Other:

Analytical Deadline: 7 days 72 hrs. (bags) 24 hrs. Other:

Work Requested by: Adam Robinson / PA

Phone: 256-351-0121

e-Mail: Adam.Robinson@stacktest.com; all emails: firstname.lastname@stacktest.com

Submit Report to: Above & AST Group

Phone: 503-715-7095

e-Mail: AST group; Jordan Laster, Laura Aymett, Austin Abranovic

Field Sample ID (include Run and Sample Fraction)	Lab Sample ID	Collection		Container Type*	Vol. (mL)	Tare Wt. (g)	EPA Method or Rule	Method 18	Flare Gas Analysis (Method 18 + ASTM 1946D)	ASTM D1946	TO-15	Method 26A	Method 5	Method 202	CTM-027	Hold	Comments: (Visual observation, canister start/stop pressures, additional analytes, etc.)
		Date	Time(s)														
LC 75-RUN 1-BAG B	005	3/6/19	11:25	T			M18	✓								✓	1,3-Butadiene, Acetaldehyde, Benzene, Ethyl Benzene, and Hexane
LC 75-RUN 2-BAG B	000	3/6/19	13:35	T			M18	✓								✓	"
LC 75-RUN 3-BAG B	001	3/6/19	16:25	T			M18	✓								✓	"
LC 50-RUN 1-BAG B	008	3/6/19	18:15	T			M18	✓								✓	"

Relinquished by (signature)	Date	Time	Received by (signature)	Date	Time	Relinquished by (signature)	Date	Time	Received by (signature)
<i>[Signature]</i>	3/6/19	18:45	Megan Steward 3718 PD910						

Sample Pick-Up (Circle One): Yes / No by _____ (Print)
 T: Tedlar bag B: Bomb cylinder GA: Glass, amber GC: Glass, clear P: Plastic F: Filter O: Other

Canister Rental (Circle One): Yes / No
 F: Filter O: Other

MAR 07 2019 09:10



GSL-190247

page 1 of 2

Chain of Custody

Project #: 2019-0420		Client/Plant Name: AST/Caterpillar, Inc. - Virginia Beach, Virginia														
Sampling Location: 3516HD Generator Exhaust - Load Condition <u>SO</u> <u>425</u>																
Sampled by (Print): Kenji Kinoshita		Report Turnaround Time: <input checked="" type="checkbox"/> Normal (10 business days) <input type="checkbox"/> 5 business days <input type="checkbox"/> Other:														
(Signature):		Analytical Deadline: <input type="checkbox"/> 7 days <input type="checkbox"/> 72 hrs. (bags) <input type="checkbox"/> 24 hrs. <input type="checkbox"/> Other:														
Work Requested by: Adam Robinson / PA		e-Mail: Adam.Robinson@stacktest.com; all emails: firstname.lastname@stacktest.com														
Submit Report to: Above & AST Group		e-Mail: AST group, Jordan Laster, Laura Aymett, Austin Abranovic														
Phone: 256-351-0121		Fax:														
Phone: 503-715-7095		Fax:														
Field Sample ID (include Run and Sample Fraction)	Lab Sample ID	Collection		Container Type*	Vol. (mL)	Tare Wt. (g)	EPA Method or Rule	Analysis						Comments: (Visual observation, canister start/stop pressures, additional analytes, etc.)		
		Date	Time(s)					Method 18	Flare Gas Analysis (Method 18 + ASTM 1946D)	ASTM D1946	TO-15	Method 26A	Method 5		Method 202	CTM-027
LC 50 - RUN 2 - BAG A	-001	3/7/19	10:00	T			M18	✓								1,3-Butadiene, Acetaldehyde, Benzene, Ethyl Benzene, and Hexane
LC 50 - RUN 3 - BAG A	-002	3/7/19	12:00	T			M18	✓								"
LC 25 - RUN 1 - BAG A	-003	3/7/19	14:45	T			M18	✓								"
LC 25 - RUN 2 - BAG A	-004	3/7/19	16:30	T			M18	✓								"
LC 25 - RUN 3 - BAG A	-005	3/7/19	18:10	T			M18	✓								"
Relinquished by (signature):		Date	Time	Received by (signature):		Date	Time	Relinquished by (signature)		Date	Time	Received by (signature)				
Relinquished by (signature):		3/7/19	18:45	amiey deen												
Relinquished by (signature):		Date	Time	Received by (signature)		Date	Time	Relinquished by (signature)		Date	Time	Received by (signature)				
Sample Pick-Up (Circle One): Yes / No by _____		(Print)		GC: Glass, clear		P: Plastic		F: Filter		O: Other		Canister Rental (Circle One): Yes / No				
T: Tedlar bag		B: Bomb cylinder		GA: Glass, amber		GC: Glass, clear		P: Plastic		F: Filter		O: Other				

FBRM

Chain of Custody



GSL-190247

page 2 of 2

Chain of Custody

Project #: 2019-0420 Sampling Location: 3516HD Generator Exhaust - Load Condition <u>50 & 25</u>	Client/Plant Name: AST/Caterpillar, Inc. - Virginia Beach, Virginia Special Instructions: HOLD FOR ARCHIVE OR ONLY ANALYZE IF BAG A SAMPLES ARE COMPROMISED	Report Turnaround Time: <input checked="" type="checkbox"/> Normal (10 business days) <input type="checkbox"/> 5 business days <input type="checkbox"/> Other: Analytical Deadline: <input type="checkbox"/> 7 days <input type="checkbox"/> 72 hrs. (bags) <input type="checkbox"/> 24 hrs.	e-Mail: Adam.Robinson@stacktest.com; all emails: firstname.lastname@stacktest.com e-Mail: AST group.; Jordan Laster, Laura Aymett, Austin Abranovic																								
Sampled by (Print): Kenji Kinoshita (Signature):	Work Requested by: Adam Robinson/ PA Phone: 256-351-0121	Submit Report to: Above & AST Group Phone: 503-715-7095	e-Mail: AST group.; Jordan Laster, Laura Aymett, Austin Abranovic																								
Field Sample ID (include Run and Sample Fraction)		Collection		Container Type*	Vol. (mL)	Tare Wt. (g)	EPA Method or Rule	Analysis						Comments: (Visual observation, canister start/stop pressures, additional analytes, etc.)													
		Lab Sample ID	Date					Time(s)	Method 18	Flare Gas Analysis (Method 18 + ASTM 1946D)	ASTM D1946	TO-15	Method 26A		Method 5	Method 202	CTM-027	Hold									
LC 50 - RUN 2 - BAG B	-006	3/7/19	10:00	T			M18	✓								1,3-Butadiene, Acetaldehyde, Benzene, Ethyl Benzene, and Hexane											
LC 50 - RUN 3 - BAG B	-007	3/7/19	12:00	T			M18	✓								"											
LC 25 - RUN 1 - BAG B	-008	3/7/19	14:45	T			M18	✓								"											
LC 25 - RUN 2 - BAG B	-009	3/7/19	16:30	T			M18	✓								"											
LC 25 - RUN 3 - BAG B	-010	3/7/19	18:10	T			M18	✓								"											
Relinquished by (signature)	Date	Time	Received by (signature)	Date	Time	Relinquished by (signature)	Date	Time	Received by (signature)	Date	Time	Relinquished by (signature)	Date	Time													
	3/7/19	18:45																									
Sample Pick-Up (Circle One): Yes / No by (Print)												Canister Rental (Circle One): Yes / No															
T: Tedlar bag				B: Bomb cylinder				GA: Glass, amber				GC: Glass, clear				P: Plastic				F: Filter				O: Other			



Chain of Custody

GSL-190249 (1012)

Project #: 2019-0420

Client/Plant Name: AST/Caterpillar, Inc. - Virginia Beach, Virginia

Sampling Location: 3516HD Generator Exhaust - Load Condition 60

Special Instructions:

Sampled by (Print): Kenji Kinoshita
(Signature): *[Signature]*

Report Turnaround Time: Normal (10 business days) 5 business days Other:
Analytical Deadline: 7 days 24 hrs. 72 hrs. (bags) 24 hrs. Other:

Work Requested by: Adam Robinson / PA Phone: 256-351-0121
Submit Report to: Above & AST Group Phone: 503-715-7095
Fax: e-Mail: Adam.Robinson@stacktest.com; all emails: firstname.lastname@stacktest.com
Fax: e-Mail: AST group: Jordan Laster, Laura Aymett, Austin Abranovic

Field Sample ID (include Run and Sample Fraction)	Lab Sample ID	Collection		Container Type*	Vol. (mL)	Tare Wt. (g)	EPA Method or Rule	Analysis							Comments: (Visual observance, canister start/stop pressures, additional analytes, etc.)	
		Date	Time(s)					Method 18	Flare Gas Analysis (Method 18+ ASTM 1946D)	ASTM D1946	TO-15	Method 26A	Method 5	Method 202		CTM-027
LC10 - RUN 1 - BAGA	001	3/8/19	10:45	T			M18	✓								1,3-Butadiene, Acetaldehyde, Benzene, Ethyl Benzene, and Hexane
LC10 - RUN 2 - BAGA	002	3/8/19	12:20	T			M18	✓								"
LC10 - RUN 3 - BAGA	003	3/8/19	14:15	T			M18	✓								"

Relinquished by (signature) *[Signature]* **Date** 3/8/19 **Time** 16:00 **Received by (signature)** *[Signature]* **Date** **Time**

Relinquished by (signature) *[Signature]* **Date** **Time** **Received by (signature)** **Date** **Time**

Sample Pick-Up (Circle One): Yes / No by **(Print)**

*Types - C: Canister T: Tedlar bag B: Bomb cylinder GA: Glass, amber GC: Glass, clear P: Plastic F: Filter

Canister Rental (Circle One): Yes / No



Chain of Custody

GSL-190249 (2 of 2)

Special Instructions: **HOLD FOR ARCHIVE OR ONLY ANALYZE IF BAG A SAMPLE IS COMPROMISED**

Project #: 2019-0420 Client/Plant Name: AST/Caterpillar, Inc. - Virginia Beach, Virginia

Sampling Location: 3516HD Generator Exhaust - Load Condition CO

Sampled by (Print): Kenji Kinoshita

(Signature):

Work Requested by: Adam Robinson / PA

Phone: 256-351-0121

Submit Report to: Above & AST Group

Phone: 503-715-7095

Report Turnaround Time: Normal (10 business days) 5 business days Other:
 Analytical Deadline: 7 days 72 hrs. (bags) 24 hrs. Other:

Fax: e-Mail: Adam.Robinson@stacktest.com; all emails: firstname.lastname@stacktest.com

Fax: e-Mail: AST group; Jordan Laster, Laura Aymett, Austin Abranovic

Field Sample ID (include Run and Sample Fraction)	Collection		Container Type*	Vol. (mL)	Tare Wt. (g)	EPA Method or Rule	Analysis						Comments: (Visual observation, canister start/stop pressures, additional analytes, etc.)		
	Lab Sample ID	Date					Time(s)	Method 18	Flare Gas Analysis (Method 18 + ASTM 1946D)	ASTM D1946	TO-15	Method 26A		Method 5	Method 202
LC10-RUN 1 - BAG B	004	3/8/19	00:45	T		M18	✓								1,3-Butadiene, Acetaldehyde, Benzene, Ethyl Benzene, and Hexane
LC10-RUN 2 - BAG B	005	3/8/19	12:20	T		M18	✓								"
LC10-RUN 3 - BAG B	006	3/8/19	14:15	T		M18	✓								"

Relinquished by (signature)	Date	Time	Received by (signature)	Date	Time	Relinquished by (signature)	Date	Time	Received by (signature)
	3/8/19	16:08							

Sample Pick-Up (Circle One): Yes / No by _____ (Print)

*Types - C: Canister B: Bomb cylinder GA: Glass, amber P: Plastic GC: Glass, clear F: Filter O: Other

Canister Rental (Circle One): Yes / No



Chain of Custody

GSL-190252 (10F2)

Project #: 2019-0420 Client/Plant Name: AST/Caterpillar, Inc. - Virginia Beach, Virginia

Sampling Location: 3516HD Generator Exhaust - Load Condition 19 25, 50

Special Instructions: IMPS LOADED WITH 15 ML D₂O
N 050 LPM SAMPLED

Report Turnaround Time: Normal (10 business days) 5 business days Other:

Analytical Deadline: 7 days 72 hrs. (bags) 24 hrs. Other:

Work Requested by: Adam Robinson/PA Phone: 256-351-0121 e-Mail: Adam.Robinson@stacktest.com

Submit Report to: Above & AST Group Phone: 503-715-7095 e-Mail: AST group, Jordan Laster, Laura Aymett, Austin Abranovic

Field Sample ID (include Run and Sample Fraction)	Lab Sample ID	Collection		Container Type*	Vol. (mL)	Tare Wt. (g)	EPA Method or Rule	Analysis						Comments: (Visual observation, canister start/stop pressures, additional analytes, etc.)	
		Date	Time(s)					Method 18	Flare Gas Analysis (Method 18 + ASTM 1946D)	TO-15	Method 26A	Method 5	Method 202		Method 323
LC 10 - RUN 1	001	3/8/19	10:45	V01A			M18 & M323	✓							Formaldehyde / 1,3-Butadiene, Acetaldehyde, Benzene, Ethyl Benzene, and Hexane
LC 10 - RUN 2	002	3/8/19	12:20	"			M18 & M323	✓							"
LC 10 - RUN 3	003	3/8/19	14:15	"			M18 & M323	✓							"
LC 25 - RUN 1	004	3/7/19	14:45	V01A			"	✓							"
LC 25 - RUN 2	005	3/7/19	16:30	"			"	✓							"
LC 25 - RUN 3	006	3/7/19	18:10	"			"	✓							"
LC 50 - RUN 1	007	3/6/19	18:15	"			"	✓							"
LC 50 - RUN 2	008	3/7/19	10:15	"			"	✓							"
LC 50 - RUN 3	009	3/7/19	12:00	"			"	✓							"
Relinquished by (signature)		Date	Time	Received by (signature)				Relinquished by (signature)	Date	Time	Received by (signature)				
<i>Adam R.</i>		3/11/19	16:15	<i>[Signature]</i>											
Relinquished by (signature)		Date	Time	Received by (signature)				Relinquished by (signature)	Date	Time	Received by (signature)				

Sample Pick-Up (Circle One): Yes / **No** by (Print)

*Types - C: Canister T: Tedlar bag B: Bomb cylinder GA: Glass, amber GC: Glass, clear P: Plastic F: Filter O: Other

Canister Rental (Circle One): Yes / **No**

FORM of 10

Chain of Custody

GSINC-DR1001-001, Revision 2017-01, Effective 04/05/17

page 1 of 1



Chain of Custody

GSL 190252 (2012)

Project #: 2019-0420 Client/Plant Name: AST/Caterpillar, Inc. - Virginia Beach, Virginia

Sampling Location: 3516HD Generator Exhaust - Load Condition 75, 100 Special Instructions: IMPS LOADED WITH 15 AL DI H2O ~0.50 LPM SAMPLED

Sampled by (Print): Kenji Kinoshita (Signature):

Report Turnaround Time: Normal (10 business days) 5 business days Other:
 Analytical Deadline: 7 days 72 hrs. (bags) 24 hrs. Other:

Work Requested by: Adam Robinson / PA Phone: 256-351-0121 e-Mail: Adam.Robinson@stacktest.com; all emails: firstname.lastname@stacktest.com

Submit Report to: Above & AST Group Phone: 503-715-7095 e-Mail: AST group, Jordan Laster, Laura Aymett, Austin Abranovic

Field Sample ID (Include Run and Sample Fraction)	Lab Sample ID	Collection		Container Type*	Vol. (ml)	Tare Wt. (g)	EPA Method or Rule	Analysis						Comments: (Visual observance, canister start/stop pressures, additional analytes, etc.)		
		Date	Time(s)					Method 18	Flare Gas Analysis (Method 18 + ASTM 1946D)	ASTM D1946 TO-15	Method 26A	Method 5	Method 202		Method 323	Hold
LC 75 - RUN 1	010	3/4/19	12:00	VGA			M18 & M323	✓								Formaldehyde / 1,3-Butadiene, Acetaldehyde, Benzene, Ethyl Benzene, and Hexane
LC 75 - RUN 2	011	3/4/19	14:00	"			M18 & M323	✓								"
LC 75 - RUN 3	012	3/6/19	16:25	"			M18 & M232	✓								"
LC 100 - RUN 1	013	3/5/19	12:00	"			"	✓								"
LC 100 - RUN 2	014	3/5/19	14:45	"			"	✓								"
LC 100 - RUN 3	015	3/5/19	17:15	"			"	✓								"
Relinquished by (signature)		Date	Time	Received by (signature)				Relinquished by (signature)	Date	Time	Received by (signature)					
		3/11/19	6:15													
Relinquished by (signature)		Date	Time	Received by (signature)				Relinquished by (signature)	Date	Time	Received by (signature)					

Sample Pick-up (Circle One): Yes / No by (Print)

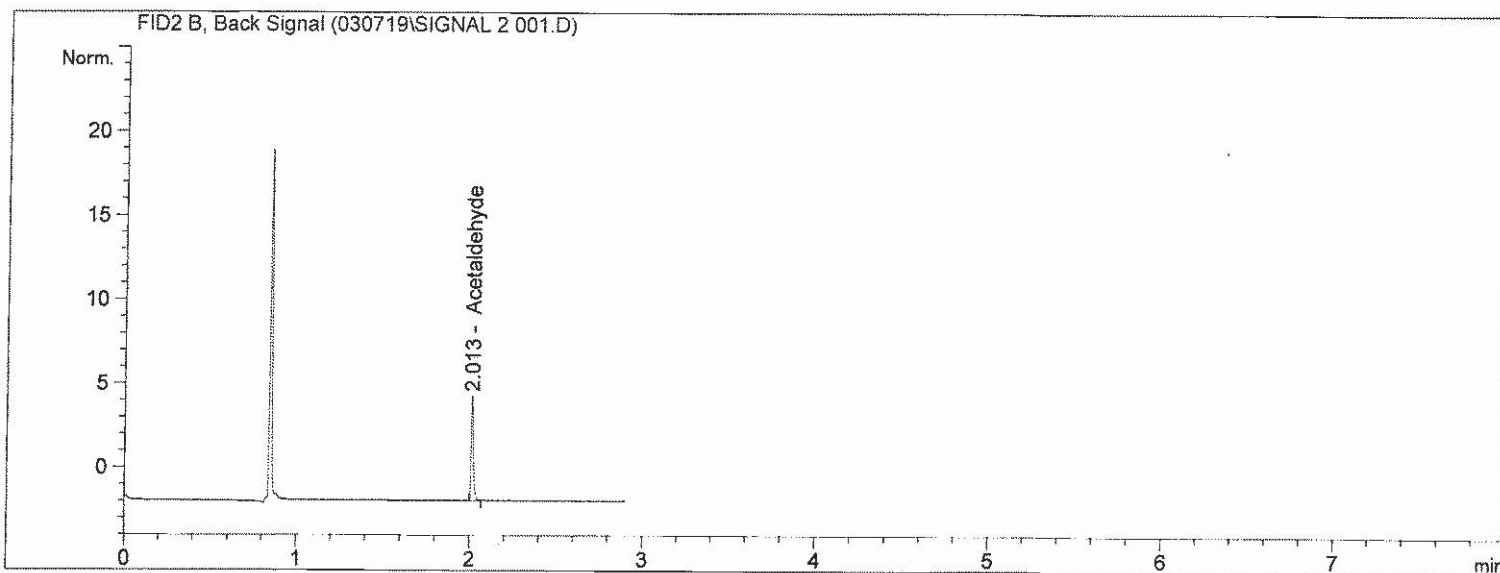
*Types - C: Canister T: Tedlar bag B: Bomb cylinder GA: Glass, amber P: Plastic GC: Glass, clear F: Filter O: Other

Sample Name: CCV

```

=====
Acq. Operator   : Emily Decker
Sample Operator : Emily Decker
Acq. Instrument : GC8
Injection Date  : 3/7/2019 12:38:03 PM
Location        : Vial 1
Inj Volume     : Manually

Acq. Method    : C:\CHEM32\1\METHODS\REAR_BTEX_ACETALD_M18_030619.M
Last changed   : 3/7/2019 12:32:44 PM by Emily Decker
Analysis Method : C:\CHEM32\1\METHODS\REAR_BTEX_ACETALD_M18_030619.M
Last changed   : 3/7/2019 12:42:03 PM by Emily Decker
                (modified after loading)
Sample Info    : CCV(100ppmv Acetaldehyde)
                Method:M18
=====
    
```



External Standard Report

```

Sorted By      : Signal
Calib. Data Modified : 3/7/2019 12:32:36 PM
Multiplier     : 1.0000
Dilution       : 1.0000
Do not use Multiplier & Dilution Factor with ISTDs
    
```

Signal 1: FID2 B, Back Signal

RetTime [min]	Type	Area [pA*s]	Amt/Area	Amount [ppmv]	Grp	Name
1.278	-	-	-	-	-	Benzene
1.866	-	-	-	-	-	Toluene
2.013	BB	4.55222	21.61679	98.40446	-	Acetaldehyde
2.810	-	-	-	-	-	Ethylbenzene
2.910	-	-	-	-	-	m,p-Xylenes
3.222	-	-	-	-	-	o-Xylene

Totals : 98.40446

Uncalibrated Peaks : compound name not specified

aw
3/11/19

Sample Name: CCV

```
=====
Acq. Operator   : Emily Decker
Sample Operator : Emily Decker
Acq. Instrument : GC8                      Location : Vial 1
Injection Date  : 3/7/2019 12:38:03 PM
                                           Inj Volume : Manually
Acq. Method     : C:\CHEM32\1\METHODS\REAR_BTEX_ACETALD_M18_030619.M
Last changed    : 3/7/2019 12:32:44 PM by Emily Decker
Analysis Method : C:\CHEM32\1\METHODS\REAR_BTEX_ACETALD_M18_030619.M
Last changed    : 3/7/2019 12:42:03 PM by Emily Decker
                 (modified after loading)
Sample Info     : CCV(100ppmv Acetaldehyde)
                 Method:M18
=====
```

2 Warnings or Errors :

Warning : Calibration warnings (see calibration table listing)

Warning : Calibrated compound(s) not found

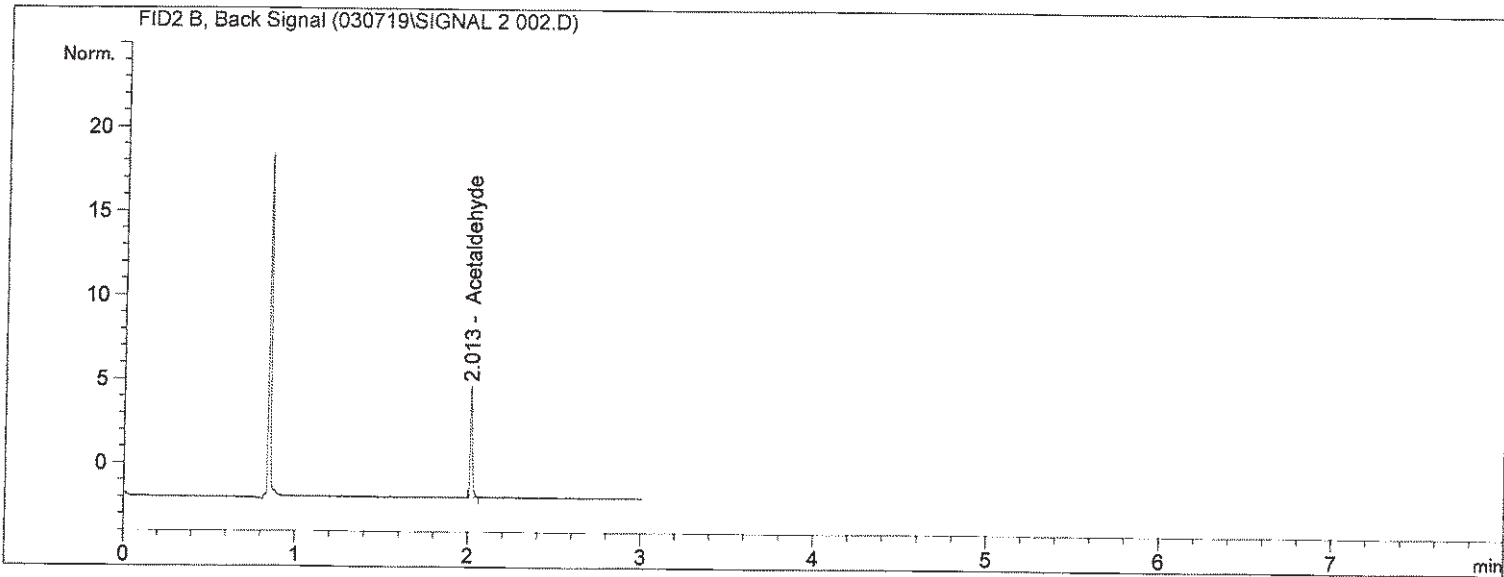
```
=====
*** End of Report ***
```

```

=====
Acq. Operator   : Emily Decker
Sample Operator : Emily Decker
Acq. Instrument : GC8
Injection Date  : 3/7/2019 12:45:04 PM
Location       : Vial 1
Inj Volume     : Manually

Acq. Method    : C:\CHEM32\1\METHODS\REAR_BTEX_ACETALD_M18_030619.M
Last changed   : 3/7/2019 12:32:44 PM by Emily Decker
Analysis Method: C:\CHEM32\1\METHODS\REAR_BTEX_ACETALD_M18_030619.M
Last changed   : 3/7/2019 12:42:03 PM by Emily Decker
                (modified after loading)

Sample Info    : ICV/LCS(100ppmv Acetaldehyde)
                Method:M18
=====
  
```



External Standard Report

```

Sorted By      : Signal
Calib. Data Modified : 3/7/2019 12:32:36 PM
Multiplier     : 1.0000
Dilution       : 1.0000
Do not use Multiplier & Dilution Factor with ISTDs
  
```

Signal 1: FID2 B, Back Signal

RetTime [min]	Type	Area [pA*s]	Amt/Area	Amount [ppmv]	Grp	Name
1.278	-	-	-	-	-	Benzene
1.866	-	-	-	-	-	Toluene
2.013	BB	4.71817	21.61679	101.99167	-	Acetaldehyde
2.810	-	-	-	-	-	Ethylbenzene
2.910	-	-	-	-	-	m,p-Xylenes
3.222	-	-	-	-	-	o-Xylene

Totals : 101.99167

Uncalibrated Peaks : compound name not specified

aw
3/11/19

Sample Name: ICV/LCS

```
=====
Acq. Operator   : Emily Decker
Sample Operator : Emily Decker
Acq. Instrument : GC8                      Location : Vial 1
Injection Date  : 3/7/2019 12:45:04 PM
                                           Inj Volume : Manually
Acq. Method     : C:\CHEM32\1\METHODS\REAR_BTEX_ACETALD_M18_030619.M
Last changed    : 3/7/2019 12:32:44 PM by Emily Decker
Analysis Method : C:\CHEM32\1\METHODS\REAR_BTEX_ACETALD_M18_030619.M
Last changed    : 3/7/2019 12:42:03 PM by Emily Decker
                 (modified after loading)
Sample Info     : ICV/LCS(100ppmv Acetaldehyde)
                 Method:M18
=====
```

2 Warnings or Errors :

Warning : Calibration warnings (see calibration table listing)

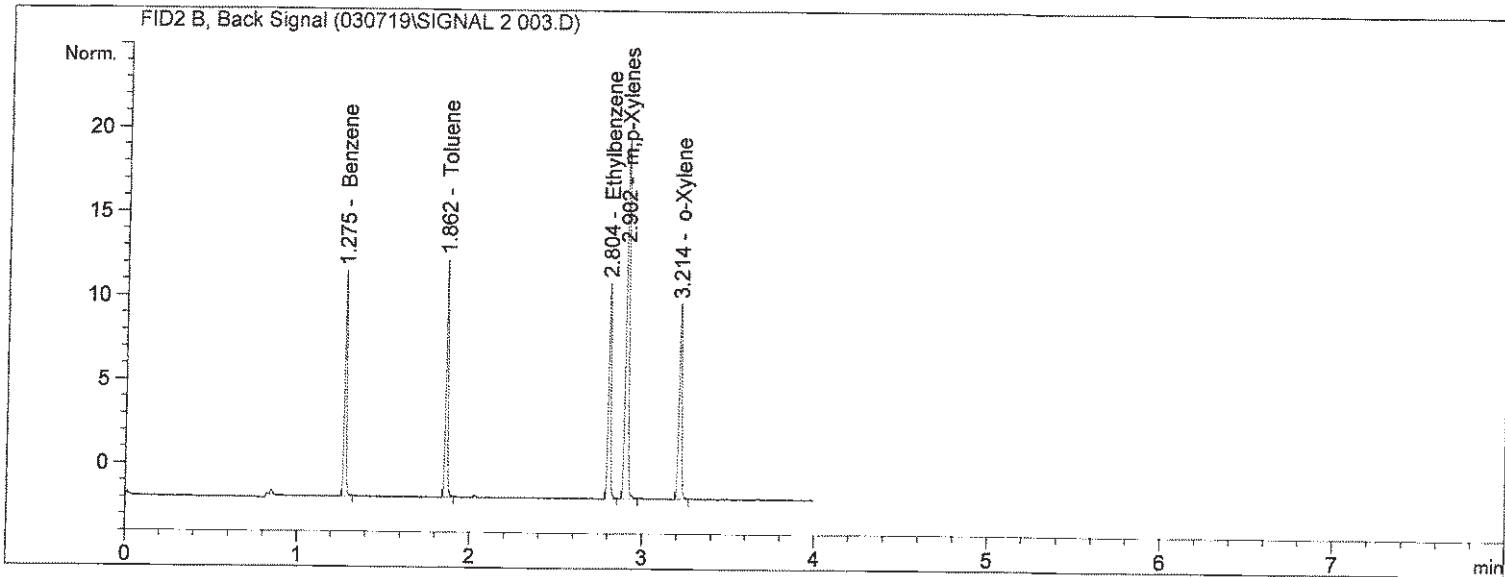
Warning : Calibrated compound(s) not found

```
=====
*** End of Report ***
```

Sample Name: CCV

```

=====
Acq. Operator   : Emily Decker
Sample Operator : Emily Decker
Acq. Instrument : GC8
Injection Date  : 3/7/2019 1:03:30 PM
Location       : Vial 1
Inj Volume     : Manually
Acq. Method    : C:\CHEM32\1\METHODS\REAR_BTEX_ACETALD_M18_030619.M
Last changed   : 3/7/2019 12:32:44 PM by Emily Decker
Analysis Method: C:\CHEM32\1\METHODS\REAR_BTEX_ACETALD_M18_030619.M
Last changed   : 3/7/2019 1:08:13 PM by Emily Decker
                (modified after loading)
Sample Info    : CCV(10ppmv BTEX)
                Method:M18
=====
    
```



External Standard Report

```

Sorted By      : Signal
Calib. Data Modified : 3/7/2019 12:32:36 PM
Multiplier     : 1.0000
Dilution      : 1.0000
Do not use Multiplier & Dilution Factor with ISTDs
    
```

Signal 1: FID2 B, Back Signal

RetTime [min]	Type	Area [pA*s]	Amt/Area	Amount [ppmv]	Grp	Name
1.275	BB	8.95977	1.11651	10.00370		Benzene
1.862	BB	10.02434	1.02218	10.24665		Toluene
2.006		-	-	-		Acetaldehyde
2.804	BB	10.81293	9.81706e-1	10.61512		Ethylbenzene
2.902	BB	20.97984	1.02577	21.52048		m,p-Xylenes
3.214	BB	10.42057	1.04696	10.90994		o-Xylene

Totals : 63.29588

EW
3/11/19

Uncalibrated Peaks : compound name not specified

Sample Name: CCV

```
=====
Acq. Operator   : Emily Decker
Sample Operator : Emily Decker
Acq. Instrument : GC8                               Location : Vial 1
Injection Date  : 3/7/2019 1:03:30 PM
                                                    Inj Volume : Manually
Acq. Method     : C:\CHEM32\1\METHODS\REAR_BTEX_ACETALD_M18_030619.M
Last changed    : 3/7/2019 12:32:44 PM by Emily Decker
Analysis Method : C:\CHEM32\1\METHODS\REAR_BTEX_ACETALD_M18_030619.M
Last changed    : 3/7/2019 1:08:13 PM by Emily Decker
                (modified after loading)
Sample Info     : CCV(10ppmv BTEX)
                Method:M18
=====
```

2 Warnings or Errors :

Warning : Calibration warnings (see calibration table listing)

Warning : Calibrated compound(s) not found

```
=====
*** End of Report ***
```

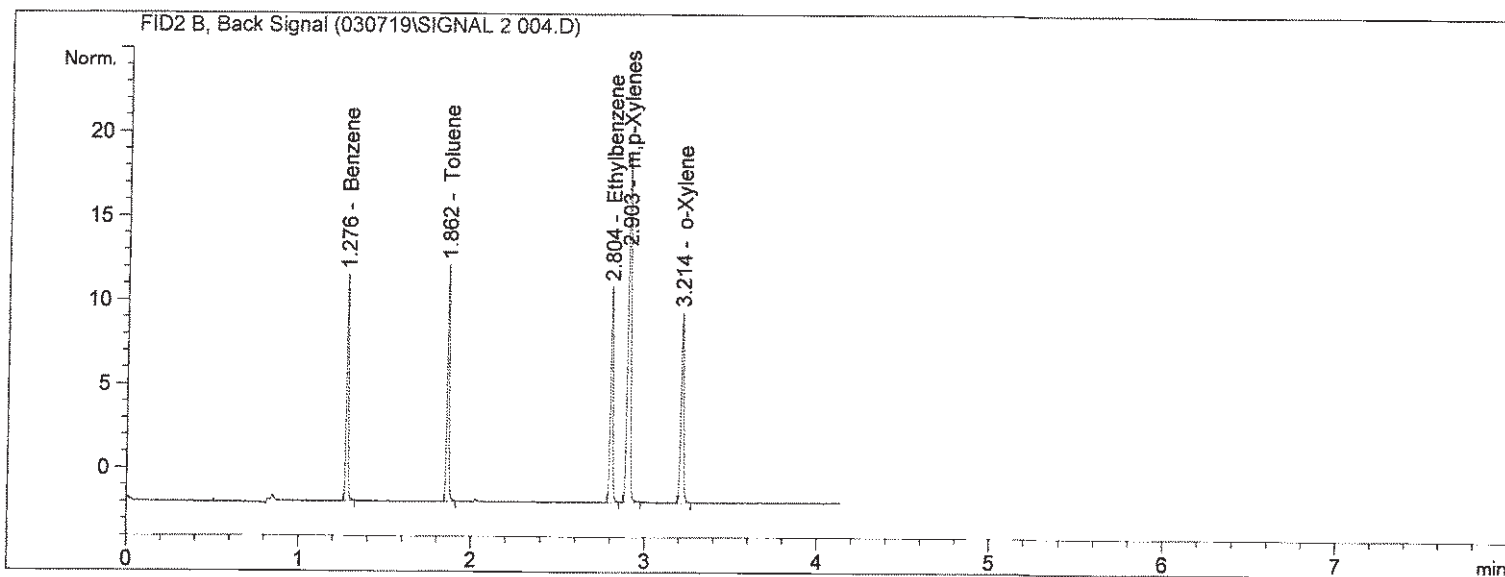
Sample Name: LCS

```

=====
Acq. Operator   : Emily Decker
Sample Operator : Emily Decker
Acq. Instrument : GC8
Injection Date  : 3/7/2019 1:11:33 PM
Location       : Vial 1
Inj Volume     : Manually

Acq. Method    : C:\CHEM32\1\METHODS\REAR_BTEX_ACETALD_M18_030619.M
Last changed   : 3/7/2019 12:32:44 PM by Emily Decker
Analysis Method : C:\CHEM32\1\METHODS\REAR_BTEX_ACETALD_M18_030619.M
Last changed   : 3/7/2019 1:08:13 PM by Emily Decker
                (modified after loading)

Sample Info    : LCS(10ppmv BTEX)
                Method:M18
=====
    
```



External Standard Report

```

Sorted By      : Signal
Calib. Data Modified : 3/7/2019 12:32:36 PM
Multiplier     : 1.0000
Dilution       : 1.0000
Do not use Multiplier & Dilution Factor with ISTDs
    
```

Signal 1: FID2 B, Back Signal

RetTime [min]	Type	Area [pA*s]	Amt/Area	Amount [ppmv]	Grp	Name
1.276	BB	8.91862	1.11651	9.95776		Benzene
1.862	BB	9.93777	1.02218	10.15816		Toluene
2.006		-	-	-		Acetaldehyde
2.804	BB	10.63521	9.81706e-1	10.44065		Ethylbenzene
2.903	BB	20.52081	1.02577	21.04962		m,p-Xylenes
3.214	BB	10.17998	1.04696	10.65805		o-Xylene

Totals : 62.26423

ew
3/11/19

Uncalibrated Peaks : compound name not specified

Sample Name: LCS

```
=====
Acq. Operator   : Emily Decker
Sample Operator : Emily Decker
Acq. Instrument : GC8                      Location : Vial 1
Injection Date  : 3/7/2019 1:11:33 PM
                                           Inj Volume : Manually
Acq. Method     : C:\CHEM32\1\METHODS\REAR_BTEX_ACETALD_M18_030619.M
Last changed    : 3/7/2019 12:32:44 PM by Emily Decker
Analysis Method : C:\CHEM32\1\METHODS\REAR_BTEX_ACETALD_M18_030619.M
Last changed    : 3/7/2019 1:08:13 PM by Emily Decker
                 (modified after loading)
Sample Info     : LCS(10ppmv BTEX)
                 Method:M18
=====
```

2 Warnings or Errors :

Warning : Calibration warnings (see calibration table listing)

Warning : Calibrated compound(s) not found

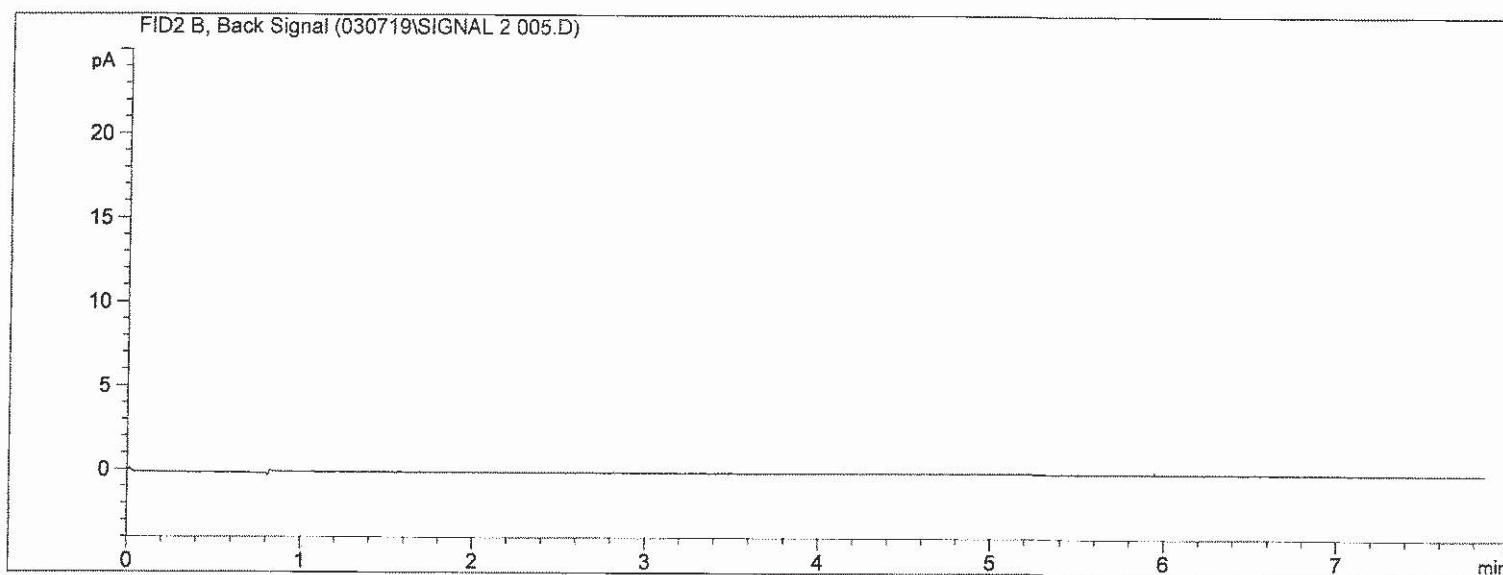
```
=====
*** End of Report ***
```


Sample Name: BLANK

```

=====
Acq. Operator   : Emily Decker
Sample Operator : Emily Decker
Acq. Instrument : GC8                      Location : Vial 1
Injection Date  : 3/7/2019 1:24:03 PM
                                           Inj Volume : Manually
Acq. Method     : C:\CHEM32\1\METHODS\REAR_BTEX_ACETALD_M18_030619.M
Last changed    : 3/7/2019 12:32:44 PM by Emily Decker
Analysis Method : C:\CHEM32\1\METHODS\REAR_BTEX_ACETALD_M18_030619.M
Last changed    : 3/7/2019 1:36:36 PM by Emily Decker
                 (modified after loading)
Sample Info     : BLANK
                 Method:M18
=====

```



```

=====
External Standard Report
=====

```

```

Sorted By           : Signal
Calib. Data Modified : 3/7/2019 1:36:23 PM
Multiplier          : 1.0000
Dilution            : 1.0000
Do not use Multiplier & Dilution Factor with ISTDs

```

Signal 1: FID2 B, Back Signal

RetTime [min]	Type	Area [pA*s]	Amt/Area	Amount [ppmv]	Grp	Name
1.278	-	-	-	-	-	Benzene
1.866	-	-	-	-	-	Toluene
2.006	-	-	-	-	-	Acetaldehyde
2.810	-	-	-	-	-	Ethylbenzene
2.910	-	-	-	-	-	m,p-Xylenes
3.222	-	-	-	-	-	o-Xylene

Totals : 0.00000

Uncalibrated Peaks : compound name not specified

ans
3/11/19

Sample Name: BLANK

```

=====
Acq. Operator   : Emily Decker
Sample Operator : Emily Decker
Acq. Instrument : GC8                      Location : Vial 1
Injection Date  : 3/7/2019 1:24:03 PM
                                           Inj Volume : Manually
Acq. Method     : C:\CHEM32\1\METHODS\REAR_BTEX_ACETALD_M18_030619.M
Last changed    : 3/7/2019 12:32:44 PM by Emily Decker
Analysis Method : C:\CHEM32\1\METHODS\REAR_BTEX_ACETALD_M18_030619.M
Last changed    : 3/7/2019 1:36:36 PM by Emily Decker
                                           (modified after loading)
Sample Info     : BLANK
                                           Method:M18
=====

```

2 Warnings or Errors :

Warning : Calibration warnings (see calibration table listing)

Warning : Calibrated compound(s) not found

```

=====
                          Area Percent Report
=====

```

```

Sorted By           :      Signal
Calib. Data Modified :      3/7/2019 1:36:23 PM
Multiplier          :      1.0000
Dilution            :      1.0000
Do not use Multiplier & Dilution Factor with ISTDs

```

Signal 1: FID2 B, Back Signal

Peak #	RetTime [min]	Type	Width [min]	Area [pA*s]	Area %	Name
1	1.278		0.0000	0.00000	0.00000	Benzene
2	1.866		0.0000	0.00000	0.00000	Toluene
3	2.006		0.0000	0.00000	0.00000	Acetaldehyde
4	2.810		0.0000	0.00000	0.00000	Ethylbenzene
5	2.910		0.0000	0.00000	0.00000	m,p-Xylenes
6	3.222		0.0000	0.00000	0.00000	o-Xylene

Totals : 0.00000 0.0000

Uncalibrated Peaks: n.a.

2 Warnings or Errors :

Warning : Calibration warnings (see calibration table listing)

Warning : Calibrated compound(s) not found

```

=====
*** End of Report ***

```

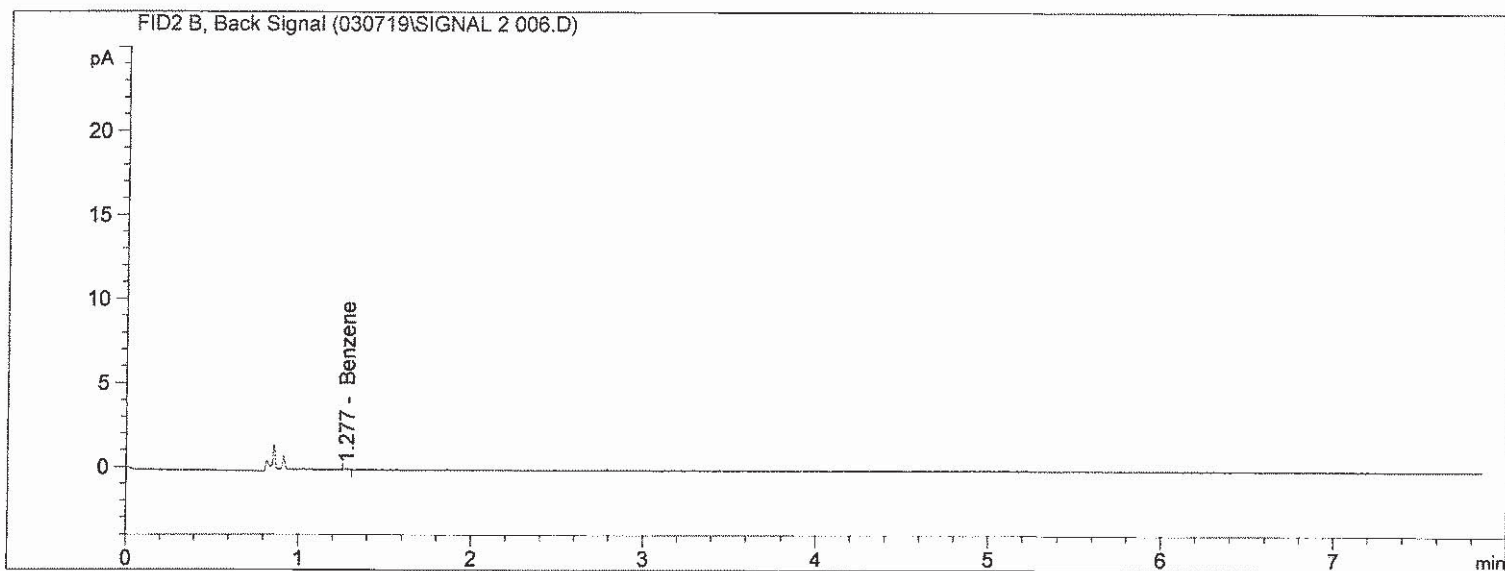
Sample Name: GSL_190239-001

```

=====
Acq. Operator   : Emily Decker
Sample Operator : Emily Decker
Acq. Instrument : GC8
Injection Date  : 3/7/2019 1:41:10 PM
Location       : Vial 1
Inj Volume     : Manually

Acq. Method    : C:\CHEM32\1\METHODS\REAR_BTEX_ACETALD_M18_030619.M
Last changed   : 3/7/2019 12:32:44 PM by Emily Decker
Analysis Method : C:\CHEM32\1\METHODS\REAR_BTEX_ACETALD_M18_030619.M
Last changed   : 3/11/2019 1:53:14 PM by Emily Decker
                (modified after loading)

Sample Info    : GSL_190239-001
                Method:M18
=====
    
```



External Standard Report

```

Sorted By      : Signal
Calib. Data Modified : 3/7/2019 1:36:23 PM
Multiplier    : 1.0000
Dilution      : 1.0000
Do not use Multiplier & Dilution Factor with ISTDs
    
```

Signal 1: FID2 B, Back Signal

RetTime [min]	Type	Area [pA*s]	Amt/Area	Amount [ppmv]	Grp	Name
1.277	BB	7.03440e-2	1.11651	7.85400e-2		Benzene
1.866	-	-	-	-		Toluene
2.006	-	-	-	-		Acetaldehyde
2.810	-	-	-	-		Ethylbenzene
2.910	-	-	-	-		m,p-Xylenes
3.222	-	-	-	-		o-Xylene

Totals : 7.85400e-2

Uncalibrated Peaks : compound name not specified

aw
3/11/19

Sample Name: GSL_190239-001

```
=====
Acq. Operator   : Emily Decker
Sample Operator : Emily Decker
Acq. Instrument : GC8                      Location : Vial 1
Injection Date  : 3/7/2019 1:41:10 PM
                                           Inj Volume : Manually
Acq. Method     : C:\CHEM32\1\METHODS\REAR_BTEX_ACETALD_M18_030619.M
Last changed    : 3/7/2019 12:32:44 PM by Emily Decker
Analysis Method : C:\CHEM32\1\METHODS\REAR_BTEX_ACETALD_M18_030619.M
Last changed    : 3/11/2019 1:53:14 PM by Emily Decker
                 (modified after loading)
Sample Info     : GSL_190239-001
                 Method:M18
=====
```

2 Warnings or Errors :

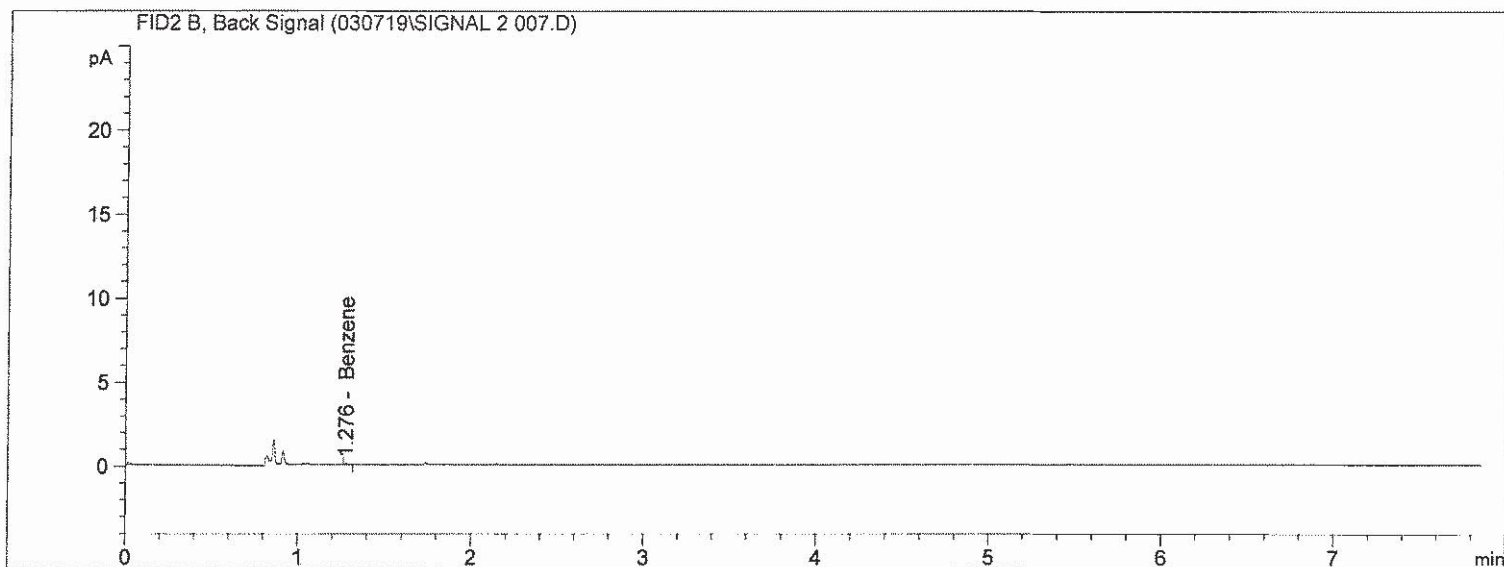
Warning : Calibration warnings (see calibration table listing)
Warning : Calibrated compound(s) not found

```
=====
*** End of Report ***
```

Sample Name: GSL_190239-001

```

=====
Acq. Operator   : Emily Decker
Sample Operator : Emily Decker
Acq. Instrument : GC8                      Location : Vial 1
Injection Date  : 3/7/2019 2:13:23 PM
                                           Inj Volume : Manually
Acq. Method     : C:\CHEM32\1\METHODS\REAR_BTEX_ACETALD_M18_030619.M
Last changed    : 3/7/2019 12:32:44 PM by Emily Decker
Analysis Method : C:\CHEM32\1\METHODS\REAR_BTEX_ACETALD_M18_030619.M
Last changed    : 3/11/2019 1:55:40 PM by Emily Decker
                 (modified after loading)
Sample Info     : GSL_190239-001
                 Method:M18
=====
    
```



External Standard Report

```

Sorted By           : Signal
Calib. Data Modified : 3/7/2019 1:36:23 PM
Multiplier          : 1.0000
Dilution            : 1.0000
Do not use Multiplier & Dilution Factor with ISTDs
    
```

Signal 1: FID2 B, Back Signal

RetTime [min]	Type	Area [pA*s]	Amt/Area	Amount [ppmv]	Grp	Name
1.276	BB	6.98760e-2	1.11651	7.80175e-2		Benzene
1.866		-	-	-		Toluene
2.006		-	-	-		Acetaldehyde
2.810		-	-	-		Ethylbenzene
2.910		-	-	-		m,p-Xylenes
3.222		-	-	-		o-Xylene

Totals : 7.80175e-2

Uncalibrated Peaks : compound name not specified

as
3/11/19

Sample Name: GSL_190239-001

```
=====
Acq. Operator   : Emily Decker
Sample Operator : Emily Decker
Acq. Instrument : GC8                      Location : Vial 1
Injection Date  : 3/7/2019 2:13:23 PM
                                           Inj Volume : Manually
Acq. Method     : C:\CHEM32\1\METHODS\REAR_BTEX_ACETALD_M18_030619.M
Last changed    : 3/7/2019 12:32:44 PM by Emily Decker
Analysis Method : C:\CHEM32\1\METHODS\REAR_BTEX_ACETALD_M18_030619.M
Last changed    : 3/11/2019 1:55:40 PM by Emily Decker
                 (modified after loading)
Sample Info     : GSL_190239-001
                 Method:M18
=====
```

2 Warnings or Errors :

Warning : Calibration warnings (see calibration table listing)

Warning : Calibrated compound(s) not found

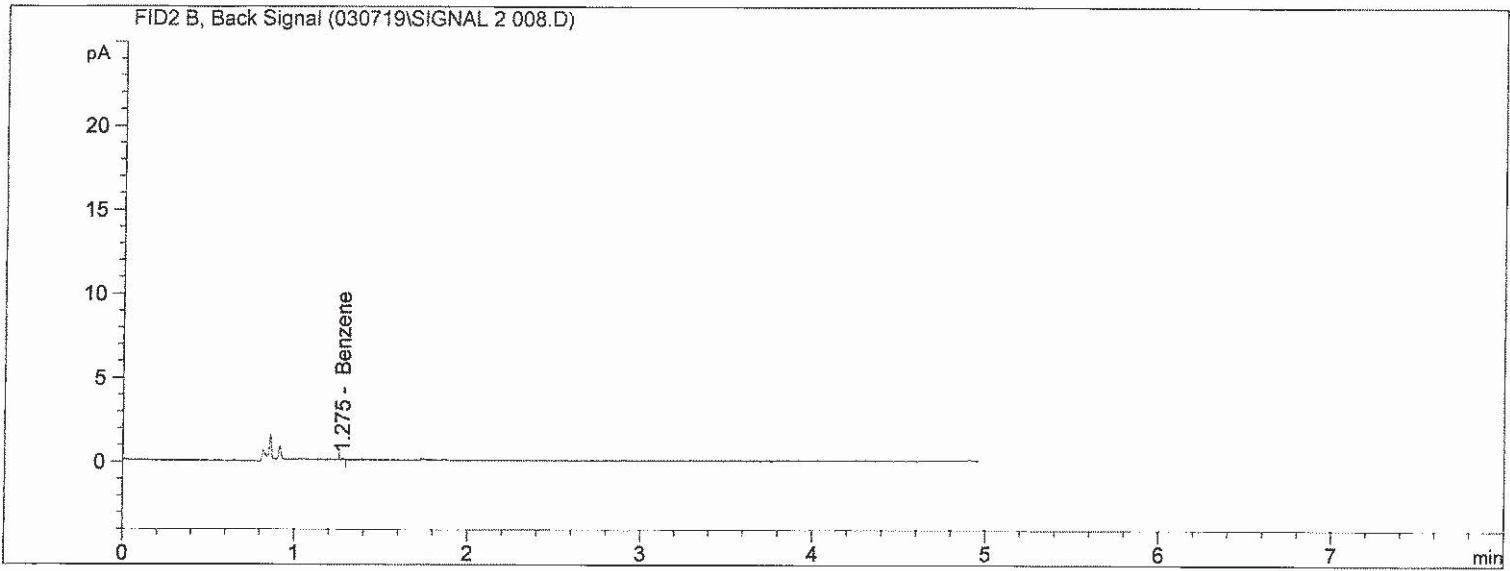
```
=====
*** End of Report ***
```

Sample Name: GSL_190239-001

```

=====
Acq. Operator   : Emily Decker
Sample Operator : Emily Decker
Acq. Instrument : GC8                      Location : Vial 1
Injection Date  : 3/7/2019 2:32:25 PM
                                           Inj Volume : Manually
Acq. Method     : C:\CHEM32\1\METHODS\REAR_BTEX_ACETALD_M18_030619.M
Last changed    : 3/7/2019 12:32:44 PM by Emily Decker
Analysis Method : C:\CHEM32\1\METHODS\REAR_BTEX_ACETALD_M18_030619.M
Last changed    : 3/11/2019 1:56:35 PM by Emily Decker
                  (modified after loading)
Sample Info     : GSL_190239-001
                  Method:M18
=====

```



=====
External Standard Report
=====

```

Sorted By           : Signal
Calib. Data Modified : 3/7/2019 1:36:23 PM
Multiplier          : 1.0000
Dilution            : 1.0000
Do not use Multiplier & Dilution Factor with ISTDs

```

Signal 1: FID2 B, Back Signal

RetTime [min]	Type	Area [pA*s]	Amt/Area	Amount [ppmv]	Grp	Name
1.275	BBA	7.00334e-2	1.11651	7.81931e-2		Benzene
1.866	-	-	-	-		Toluene
2.006	-	-	-	-		Acetaldehyde
2.810	-	-	-	-		Ethylbenzene
2.910	-	-	-	-		m,p-Xylenes
3.222	-	-	-	-		o-Xylene

Totals : 7.81931e-2

Uncalibrated Peaks : compound name not specified

as
3/11/19

Sample Name: GSL_190239-001

```
=====
Acq. Operator   : Emily Decker
Sample Operator : Emily Decker
Acq. Instrument : GC8                      Location : Vial 1
Injection Date  : 3/7/2019 2:32:25 PM
                                           Inj Volume : Manually
Acq. Method     : C:\CHEM32\1\METHODS\REAR_BTEX_ACETALD_M18_030619.M
Last changed    : 3/7/2019 12:32:44 PM by Emily Decker
Analysis Method : C:\CHEM32\1\METHODS\REAR_BTEX_ACETALD_M18_030619.M
Last changed    : 3/11/2019 1:56:35 PM by Emily Decker
                 (modified after loading)
Sample Info     : GSL_190239-001
                 Method:M18
=====
```

2 Warnings or Errors :

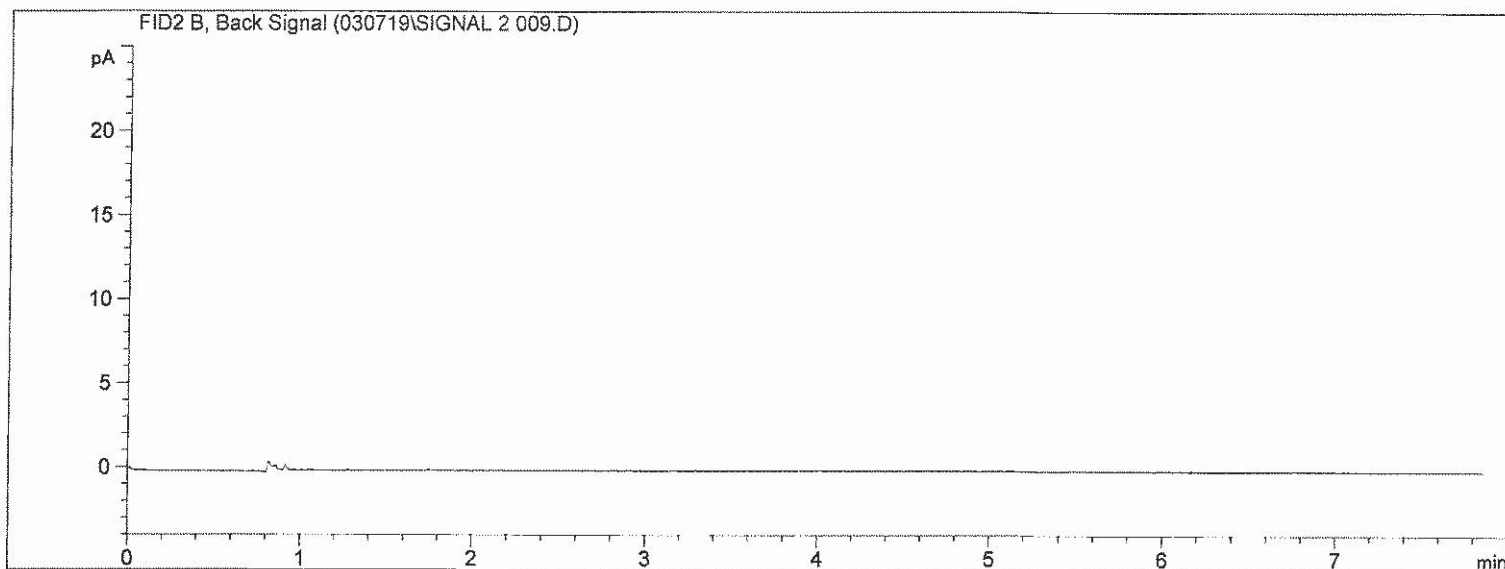
- Warning : Calibration warnings (see calibration table listing)
- Warning : Calibrated compound(s) not found

```
=====
*** End of Report ***
=====
```


Sample Name: GSL_190239-002

```

=====
Acq. Operator   : Emily Decker
Sample Operator : Emily Decker
Acq. Instrument : GC8                      Location : Vial 1
Injection Date  : 3/7/2019 2:46:55 PM
                                           Inj Volume : Manually
Acq. Method     : C:\CHEM32\1\METHODS\REAR_BTEX_ACETALD_M18_030619.M
Last changed    : 3/7/2019 12:32:44 PM by Emily Decker
Analysis Method : C:\CHEM32\1\METHODS\REAR_BTEX_ACETALD_M18_030619.M
Last changed    : 3/11/2019 1:58:08 PM by Emily Decker
                 (modified after loading)
Sample Info     : GSL_190239-002
                 Method:M18
=====
    
```



External Standard Report

```

Sorted By           : Signal
Calib. Data Modified : 3/7/2019 1:36:23 PM
Multiplier          : 1.0000
Dilution            : 1.0000
Do not use Multiplier & Dilution Factor with ISTDs
    
```

Signal 1: FID2 B, Back Signal

RetTime [min]	Type	Area [pA*s]	Amt/Area	Amount [ppmv]	Grp	Name
1.278	-	-	-	-	-	Benzene
1.866	-	-	-	-	-	Toluene
2.006	-	-	-	-	-	Acetaldehyde
2.810	-	-	-	-	-	Ethylbenzene
2.910	-	-	-	-	-	m,p-Xylenes
3.222	-	-	-	-	-	o-Xylene

Totals : 0.00000

aw
3/11/19

Uncalibrated Peaks : compound name not specified

Sample Name: GSL_190239-002

```

=====
Acq. Operator   : Emily Decker
Sample Operator : Emily Decker
Acq. Instrument : GC8                      Location : Vial 1
Injection Date  : 3/7/2019 2:46:55 PM
                                           Inj Volume : Manually
Acq. Method     : C:\CHEM32\1\METHODS\REAR_BTEX_ACETALD_M18_030619.M
Last changed    : 3/7/2019 12:32:44 PM by Emily Decker
Analysis Method : C:\CHEM32\1\METHODS\REAR_BTEX_ACETALD_M18_030619.M
Last changed    : 3/11/2019 1:58:08 PM by Emily Decker
                 (modified after loading)
Sample Info     : GSL_190239-002
                 Method:M18
=====

```

2 Warnings or Errors :

Warning : Calibration warnings (see calibration table listing)
Warning : Calibrated compound(s) not found

```

=====
                          Area Percent Report
=====

```

```

Sorted By           : Signal
Calib. Data Modified : 3/7/2019 1:36:23 PM
Multiplier          : 1.0000
Dilution            : 1.0000
Do not use Multiplier & Dilution Factor with ISTDs

```

Signal 1: FID2 B, Back Signal

Peak #	RetTime [min]	Type	Width [min]	Area [pA*s]	Area %	Name
1	1.278		0.0000	0.00000	0.00000	Benzene
2	1.866		0.0000	0.00000	0.00000	Toluene
3	2.006		0.0000	0.00000	0.00000	Acetaldehyde
4	2.810		0.0000	0.00000	0.00000	Ethylbenzene
5	2.910		0.0000	0.00000	0.00000	m,p-Xylenes
6	3.222		0.0000	0.00000	0.00000	o-Xylene

Totals : 0.00000 0.0000
Uncalibrated Peaks: n.a.

2 Warnings or Errors :

Warning : Calibration warnings (see calibration table listing)
Warning : Calibrated compound(s) not found

```

=====
*** End of Report ***

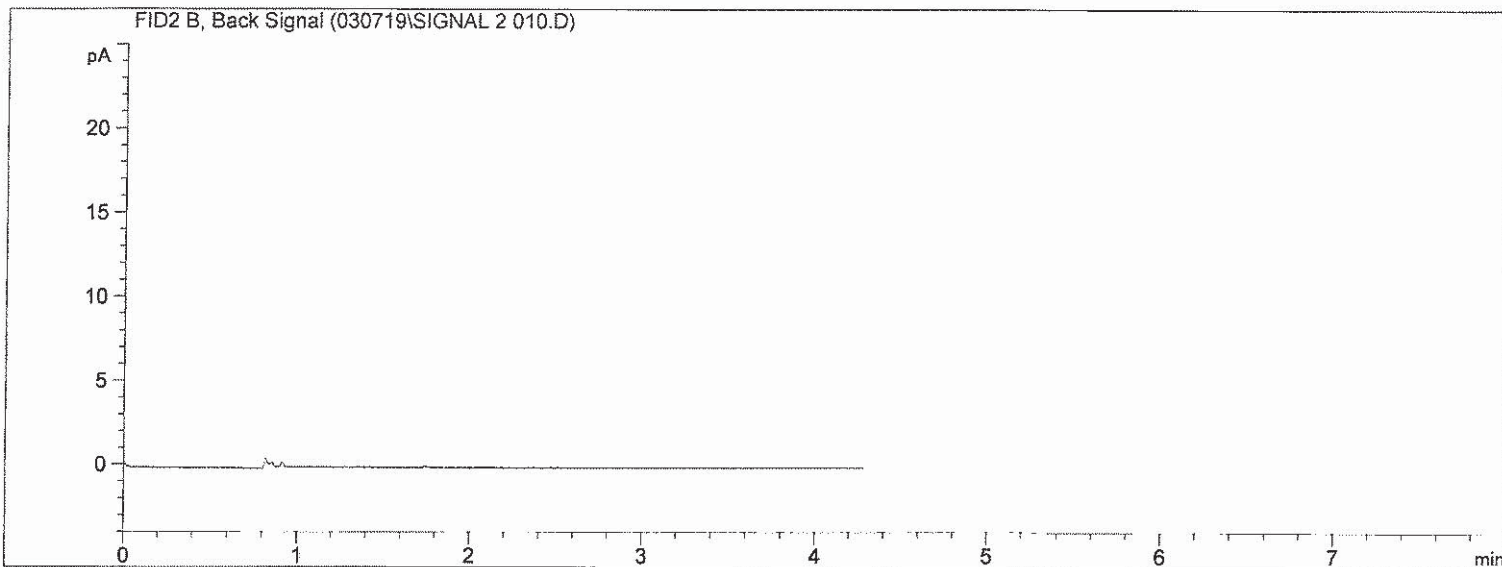
```

Sample Name: GSL_190239-002

```

=====
Acq. Operator   : Emily Decker
Sample Operator : Emily Decker
Acq. Instrument : GC8                      Location : Vial 1
Injection Date  : 3/7/2019 3:04:41 PM
                                           Inj Volume : Manually
Acq. Method     : C:\CHEM32\1\METHODS\REAR_BTEX_ACETALD_M18_030619.M
Last changed    : 3/7/2019 12:32:44 PM by Emily Decker
Analysis Method : C:\CHEM32\1\METHODS\REAR_BTEX_ACETALD_M18_030619.M
Last changed    : 3/11/2019 1:58:08 PM by Emily Decker
                 (modified after loading)
Sample Info     : GSL_190239-002
                 Method:M18
=====

```



```

=====
External Standard Report
=====

```

```

Sorted By           : Signal
Calib. Data Modified : 3/7/2019 1:36:23 PM
Multiplier          : 1.0000
Dilution            : 1.0000
Do not use Multiplier & Dilution Factor with ISTDs

```

Signal 1: FID2 B, Back Signal

RetTime [min]	Type	Area [pA*s]	Amt/Area	Amount [ppmv]	Grp	Name
1.278	-	-	-	-	-	Benzene
1.866	-	-	-	-	-	Toluene
2.006	-	-	-	-	-	Acetaldehyde
2.810	-	-	-	-	-	Ethylbenzene
2.910	-	-	-	-	-	m,p-Xylenes
3.222	-	-	-	-	-	o-Xylene

Totals : 0.00000

Uncalibrated Peaks : compound name not specified

aw
3/11/19

Sample Name: GSL_190239-002

```

=====
Acq. Operator   : Emily Decker
Sample Operator : Emily Decker
Acq. Instrument : GC8                      Location : Vial 1
Injection Date  : 3/7/2019 3:04:41 PM
                                           Inj Volume : Manually
Acq. Method     : C:\CHEM32\1\METHODS\REAR_BTEX_ACETALD_M18_030619.M
Last changed    : 3/7/2019 12:32:44 PM by Emily Decker
Analysis Method : C:\CHEM32\1\METHODS\REAR_BTEX_ACETALD_M18_030619.M
Last changed    : 3/11/2019 1:58:08 PM by Emily Decker
                 (modified after loading)
Sample Info     : GSL_190239-002
                 Method:M18
=====

```

2 Warnings or Errors :

Warning : Calibration warnings (see calibration table listing)
Warning : Calibrated compound(s) not found

```

=====
                          Area Percent Report
=====

```

```

Sorted By           : Signal
Calib. Data Modified : 3/7/2019 1:36:23 PM
Multiplier          : 1.0000
Dilution            : 1.0000
Do not use Multiplier & Dilution Factor with ISTDs

```

Signal 1: FID2 B, Back Signal

Peak #	RetTime [min]	Type	Width [min]	Area [pA*s]	Area %	Name
1	1.278		0.0000	0.00000	0.00000	Benzene
2	1.866		0.0000	0.00000	0.00000	Toluene
3	2.006		0.0000	0.00000	0.00000	Acetaldehyde
4	2.810		0.0000	0.00000	0.00000	Ethylbenzene
5	2.910		0.0000	0.00000	0.00000	m,p-Xylenes
6	3.222		0.0000	0.00000	0.00000	o-Xylene

Totals : 0.00000 0.0000
Uncalibrated Peaks: n.a.

2 Warnings or Errors :

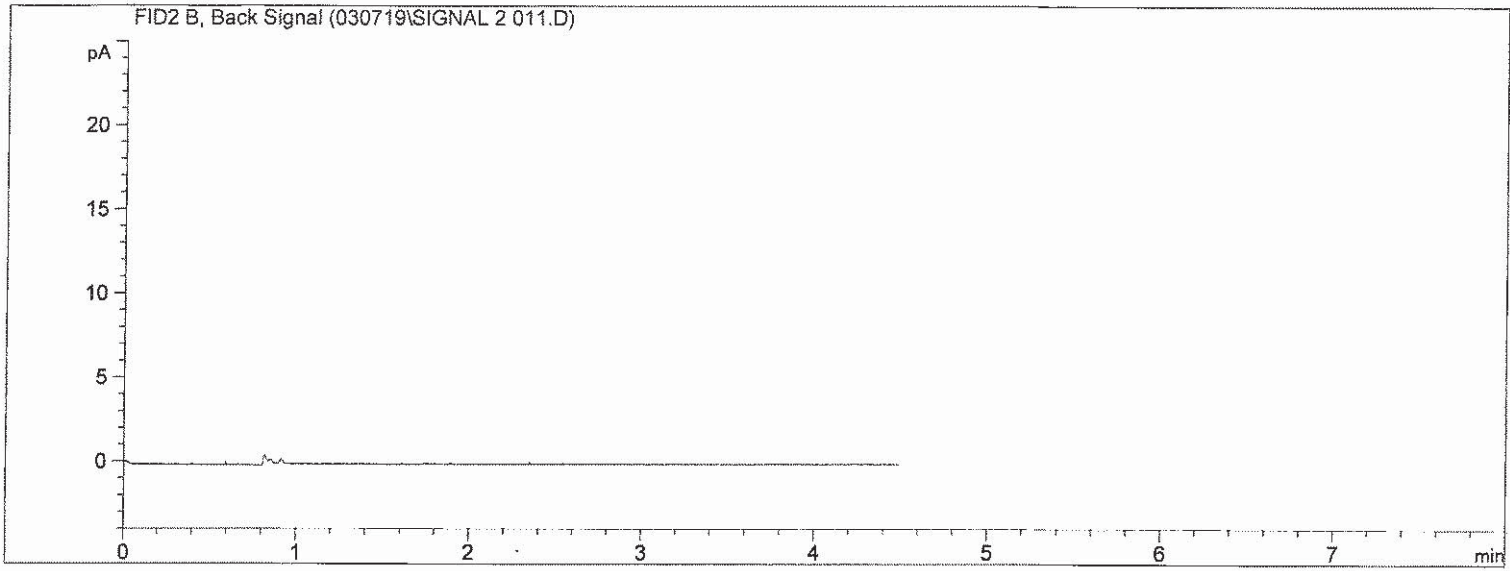
Warning : Calibration warnings (see calibration table listing)
Warning : Calibrated compound(s) not found

```

=====
*** End of Report ***

```

=====
Acq. Operator : Emily Decker
Sample Operator : Emily Decker
Acq. Instrument : GC8 Location : Vial 1
Injection Date : 3/7/2019 3:13:25 PM
Inj Volume : Manually
Acq. Method : C:\CHEM32\1\METHODS\REAR_BTEX_ACETALD_M18_030619.M
Last changed : 3/7/2019 12:32:44 PM by Emily Decker
Analysis Method : C:\CHEM32\1\METHODS\REAR_BTEX_ACETALD_M18_030619.M
Last changed : 3/11/2019 1:58:08 PM by Emily Decker
(modified after loading)
Sample Info : GSL_190239-002
Method:M18
=====



=====
External Standard Report
=====

Sorted By : Signal
Calib. Data Modified : 3/7/2019 1:36:23 PM
Multiplier : 1.0000
Dilution : 1.0000
Do not use Multiplier & Dilution Factor with ISTDs

Signal 1: FID2 B, Back Signal

RetTime [min]	Type	Area [pA*s]	Amt/Area	Amount [ppmv]	Grp	Name
1.278	-	-	-	-	-	Benzene
1.866	-	-	-	-	-	Toluene
2.006	-	-	-	-	-	Acetaldehyde
2.810	-	-	-	-	-	Ethylbenzene
2.910	-	-	-	-	-	m,p-Xylenes
3.222	-	-	-	-	-	o-Xylene

Totals : 0.00000

Uncalibrated Peaks : compound name not specified

aw
3/11/19

=====
Acq. Operator : Emily Decker
Sample Operator : Emily Decker
Acq. Instrument : GC8 Location : Vial 1
Injection Date : 3/7/2019 3:13:25 PM
Inj Volume : Manually
Acq. Method : C:\CHEM32\1\METHODS\REAR_BTEX_ACETALD_M18_030619.M
Last changed : 3/7/2019 12:32:44 PM by Emily Decker
Analysis Method : C:\CHEM32\1\METHODS\REAR_BTEX_ACETALD_M18_030619.M
Last changed : 3/11/2019 1:58:08 PM by Emily Decker
(modified after loading)
Sample Info : GSL_190239-002
Method:M18
=====

2 Warnings or Errors :

Warning : Calibration warnings (see calibration table listing)
Warning : Calibrated compound(s) not found

=====
=====
Area Percent Report
=====

Sorted By : Signal
Calib. Data Modified : 3/7/2019 1:36:23 PM
Multiplier : 1.0000
Dilution : 1.0000
Do not use Multiplier & Dilution Factor with ISTDs

Signal 1: FID2 B, Back Signal

Peak #	RetTime [min]	Type	Width [min]	Area [pA*s]	Area %	Name
1	1.278		0.0000	0.00000	0.00000	Benzene
2	1.866		0.0000	0.00000	0.00000	Toluene
3	2.006		0.0000	0.00000	0.00000	Acetaldehyde
4	2.810		0.0000	0.00000	0.00000	Ethylbenzene
5	2.910		0.0000	0.00000	0.00000	m,p-Xylenes
6	3.222		0.0000	0.00000	0.00000	o-Xylene

Totals : 0.00000 0.0000
Uncalibrated Peaks: n.a.

2 Warnings or Errors :

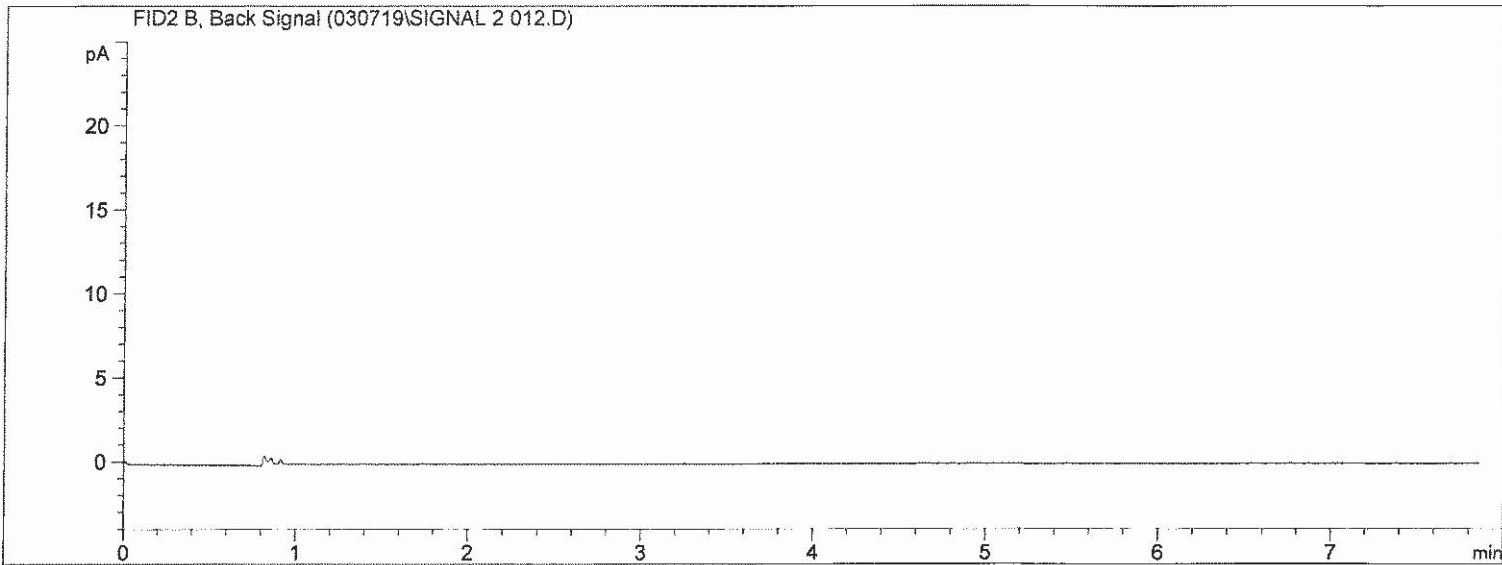
Warning : Calibration warnings (see calibration table listing)
Warning : Calibrated compound(s) not found

=====
*** End of Report ***

Sample Name: GSL_190239-003

```

=====
Acq. Operator   : Emily Decker
Sample Operator : Emily Decker
Acq. Instrument : GC8                      Location : Vial 1
Injection Date  : 3/7/2019 3:23:37 PM
                                           Inj Volume : Manually
Acq. Method     : C:\CHEM32\1\METHODS\REAR_BTEX_ACETALD_M18_030619.M
Last changed    : 3/7/2019 12:32:44 PM by Emily Decker
Analysis Method : C:\CHEM32\1\METHODS\REAR_BTEX_ACETALD_M18_030619.M
Last changed    : 3/11/2019 1:58:08 PM by Emily Decker
                 (modified after loading)
Sample Info     : GSL_190239-003
                 Method:M18
=====
    
```



External Standard Report

```

Sorted By           : Signal
Calib. Data Modified : 3/7/2019 1:36:23 PM
Multiplier          : 1.0000
Dilution            : 1.0000
Do not use Multiplier & Dilution Factor with ISTDs
    
```

Signal 1: FID2 B, Back Signal

RetTime [min]	Type	Area [pA*s]	Amt/Area	Amount [ppmv]	Grp	Name
1.278	-	-	-	-	-	Benzene
1.866	-	-	-	-	-	Toluene
2.006	-	-	-	-	-	Acetaldehyde
2.810	-	-	-	-	-	Ethylbenzene
2.910	-	-	-	-	-	m,p-Xylenes
3.222	-	-	-	-	-	o-Xylene

Totals : 0.00000

Uncalibrated Peaks : compound name not specified

aw
3/11/19

Sample Name: GSL_190239-003

```

=====
Acq. Operator   : Emily Decker
Sample Operator : Emily Decker
Acq. Instrument : GC8                               Location : Vial 1
Injection Date  : 3/7/2019 3:23:37 PM
                                                    Inj Volume : Manually
Acq. Method     : C:\CHEM32\1\METHODS\REAR_BTEX_ACETALD_M18_030619.M
Last changed    : 3/7/2019 12:32:44 PM by Emily Decker
Analysis Method : C:\CHEM32\1\METHODS\REAR_BTEX_ACETALD_M18_030619.M
Last changed    : 3/11/2019 1:58:08 PM by Emily Decker
                  (modified after loading)
Sample Info     : GSL_190239-003
                  Method:M18
=====

```

2 Warnings or Errors :

Warning : Calibration warnings (see calibration table listing)
Warning : Calibrated compound(s) not found

```

=====
                          Area Percent Report
=====

```

```

Sorted By           : Signal
Calib. Data Modified : 3/7/2019 1:36:23 PM
Multiplier          : 1.0000
Dilution            : 1.0000
Do not use Multiplier & Dilution Factor with ISTDs

```

Signal 1: FID2 B, Back Signal

Peak #	RetTime [min]	Type	Width [min]	Area [pA*s]	Area %	Name
1	1.278		0.0000	0.00000	0.00000	Benzene
2	1.866		0.0000	0.00000	0.00000	Toluene
3	2.006		0.0000	0.00000	0.00000	Acetaldehyde
4	2.810		0.0000	0.00000	0.00000	Ethylbenzene
5	2.910		0.0000	0.00000	0.00000	m,p-Xylenes
6	3.222		0.0000	0.00000	0.00000	o-Xylene

```

Totals :                               0.00000  0.0000
Uncalibrated Peaks: n.a.

```

2 Warnings or Errors :

Warning : Calibration warnings (see calibration table listing)
Warning : Calibrated compound(s) not found

```

=====
*** End of Report ***

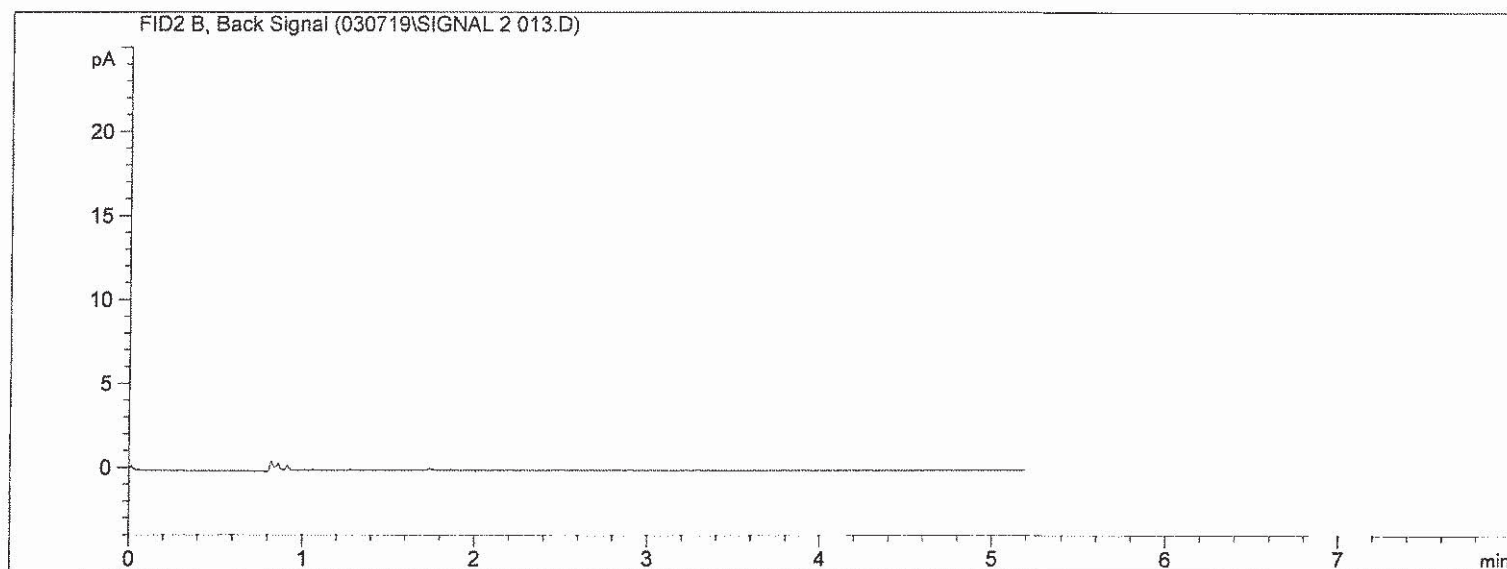
```


Sample Name: GSL_190239-003

```

=====
Acq. Operator   : Emily Decker
Sample Operator : Emily Decker
Acq. Instrument : GC8                      Location : Vial 1
Injection Date  : 3/7/2019 3:40:38 PM
                                           Inj Volume : Manually
Acq. Method     : C:\CHEM32\1\METHODS\REAR_BTEX_ACETALD_M18_030619.M
Last changed    : 3/7/2019 12:32:44 PM by Emily Decker
Analysis Method : C:\CHEM32\1\METHODS\REAR_BTEX_ACETALD_M18_030619.M
Last changed    : 3/11/2019 1:58:08 PM by Emily Decker
                 (modified after loading)
Sample Info     : GSL_190239-003
                 Method:M18
=====

```



```

=====
External Standard Report
=====

```

```

Sorted By           : Signal
Calib. Data Modified : 3/7/2019 1:36:23 PM
Multiplier          : 1.0000
Dilution            : 1.0000
Do not use Multiplier & Dilution Factor with ISTDs

```

Signal 1: FID2 B, Back Signal

RetTime [min]	Type	Area [pA*s]	Amt/Area	Amount [ppmv]	Grp	Name
1.278	-	-	-	-	-	Benzene
1.866	-	-	-	-	-	Toluene
2.006	-	-	-	-	-	Acetaldehyde
2.810	-	-	-	-	-	Ethylbenzene
2.910	-	-	-	-	-	m,p-Xylenes
3.222	-	-	-	-	-	o-Xylene

```
Totals : 0.00000
```

```
Uncalibrated Peaks : compound name not specified
```

aw
3/11/19

Sample Name: GSL_190239-003

```
=====
Acq. Operator   : Emily Decker
Sample Operator : Emily Decker
Acq. Instrument : GC8                      Location : Vial 1
Injection Date  : 3/7/2019 3:40:38 PM
                                           Inj Volume : Manually
Acq. Method     : C:\CHEM32\1\METHODS\REAR_BTEX_ACETALD_M18_030619.M
Last changed    : 3/7/2019 12:32:44 PM by Emily Decker
Analysis Method : C:\CHEM32\1\METHODS\REAR_BTEX_ACETALD_M18_030619.M
Last changed    : 3/11/2019 1:58:08 PM by Emily Decker
                 (modified after loading)
Sample Info     : GSL_190239-003
                 Method:M18
=====
```

2 Warnings or Errors :

Warning : Calibration warnings (see calibration table listing)
Warning : Calibrated compound(s) not found

```
=====
                          Area Percent Report
=====
```

Sorted By : Signal
Calib. Data Modified : 3/7/2019 1:36:23 PM
Multiplier : 1.0000
Dilution : 1.0000
Do not use Multiplier & Dilution Factor with ISTDs

Signal 1: FID2 B, Back Signal

Peak #	RetTime [min]	Type	Width [min]	Area [pA*s]	Area %	Name
1	1.278		0.0000	0.00000	0.00000	Benzene
2	1.866		0.0000	0.00000	0.00000	Toluene
3	2.006		0.0000	0.00000	0.00000	Acetaldehyde
4	2.810		0.0000	0.00000	0.00000	Ethylbenzene
5	2.910		0.0000	0.00000	0.00000	m,p-Xylenes
6	3.222		0.0000	0.00000	0.00000	o-Xylene

Totals : 0.00000 0.0000
Uncalibrated Peaks: n.a.

2 Warnings or Errors :

Warning : Calibration warnings (see calibration table listing)
Warning : Calibrated compound(s) not found

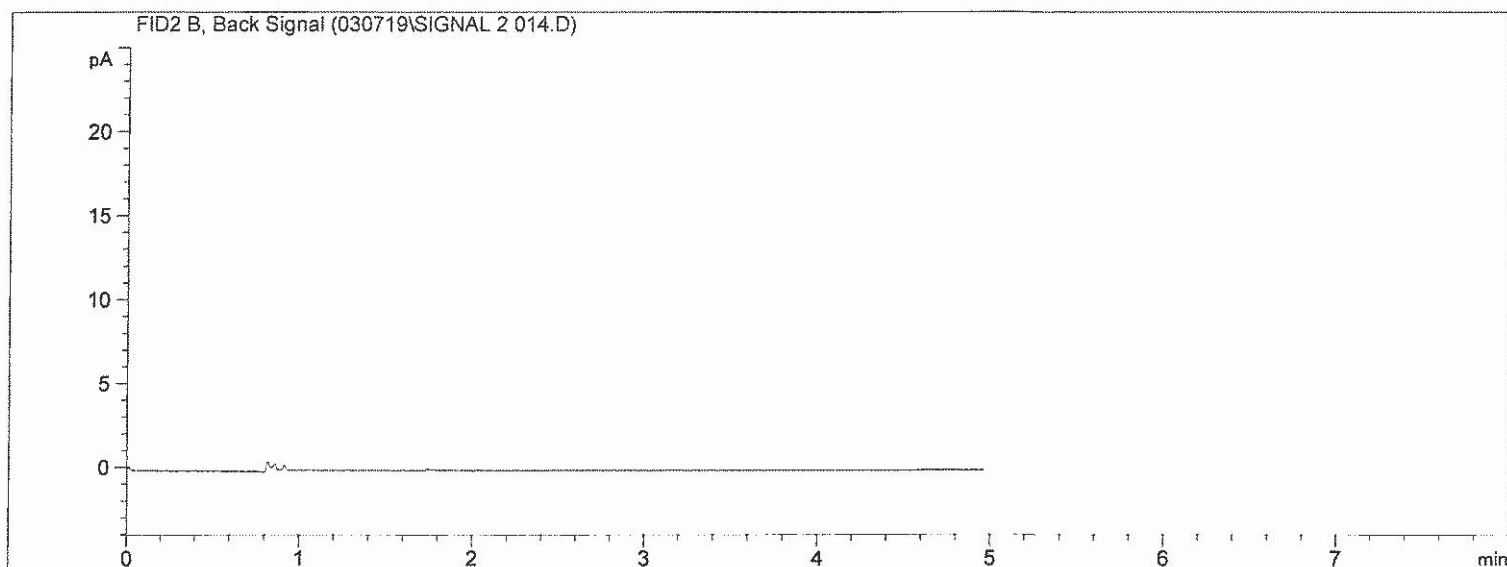
```
=====
*** End of Report ***
=====
```

Sample Name: GSL_190239-003

```

=====
Acq. Operator   : Emily Decker
Sample Operator : Emily Decker
Acq. Instrument : GC8                      Location : Vial 1
Injection Date  : 3/7/2019 3:53:52 PM
                                           Inj Volume : Manually
Acq. Method     : C:\CHEM32\1\METHODS\REAR_BTEX_ACETALD_M18_030619.M
Last changed    : 3/7/2019 12:32:44 PM by Emily Decker
Analysis Method : C:\CHEM32\1\METHODS\REAR_BTEX_ACETALD_M18_030619.M
Last changed    : 3/11/2019 1:58:08 PM by Emily Decker
                 (modified after loading)
Sample Info     : GSL_190239-003
                 Method:M18
=====

```



```

=====
External Standard Report
=====

```

```

Sorted By           : Signal
Calib. Data Modified : 3/7/2019 1:36:23 PM
Multiplier          : 1.0000
Dilution            : 1.0000
Do not use Multiplier & Dilution Factor with ISTDs

```

Signal 1: FID2 B, Back Signal

RetTime [min]	Type	Area [pA*s]	Amt/Area	Amount [ppmv]	Grp	Name
1.278	-	-	-	-	-	Benzene
1.866	-	-	-	-	-	Toluene
2.006	-	-	-	-	-	Acetaldehyde
2.810	-	-	-	-	-	Ethylbenzene
2.910	-	-	-	-	-	m,p-Xylenes
3.222	-	-	-	-	-	o-Xylene

```
Totals :                               0.00000
```

```
Uncalibrated Peaks : compound name not specified
```

EW
3/11/19

Sample Name: GSL_190239-003

```

=====
Acq. Operator   : Emily Decker
Sample Operator : Emily Decker
Acq. Instrument : GC8                      Location : Vial 1
Injection Date  : 3/7/2019 3:53:52 PM
                                           Inj Volume : Manually
Acq. Method     : C:\CHEM32\1\METHODS\REAR_BTEX_ACETALD_M18_030619.M
Last changed    : 3/7/2019 12:32:44 PM by Emily Decker
Analysis Method : C:\CHEM32\1\METHODS\REAR_BTEX_ACETALD_M18_030619.M
Last changed    : 3/11/2019 1:58:08 PM by Emily Decker
                 (modified after loading)
Sample Info     : GSL_190239-003
                 Method:M18
=====

```

2 Warnings or Errors :

Warning : Calibration warnings (see calibration table listing)
Warning : Calibrated compound(s) not found

```

=====
                          Area Percent Report
=====

```

```

Sorted By           :      Signal
Calib. Data Modified :      3/7/2019 1:36:23 PM
Multiplier          :      1.0000
Dilution            :      1.0000
Do not use Multiplier & Dilution Factor with ISTDs

```

Signal 1: FID2 B, Back Signal

Peak #	RetTime [min]	Type	Width [min]	Area [pA*s]	Area %	Name
1	1.278		0.0000	0.00000	0.00000	Benzene
2	1.866		0.0000	0.00000	0.00000	Toluene
3	2.006		0.0000	0.00000	0.00000	Acetaldehyde
4	2.810		0.0000	0.00000	0.00000	Ethylbenzene
5	2.910		0.0000	0.00000	0.00000	m,p-Xylenes
6	3.222		0.0000	0.00000	0.00000	o-Xylene

Totals : 0.00000 0.0000
Uncalibrated Peaks: n.a.

2 Warnings or Errors :

Warning : Calibration warnings (see calibration table listing)
Warning : Calibrated compound(s) not found

```

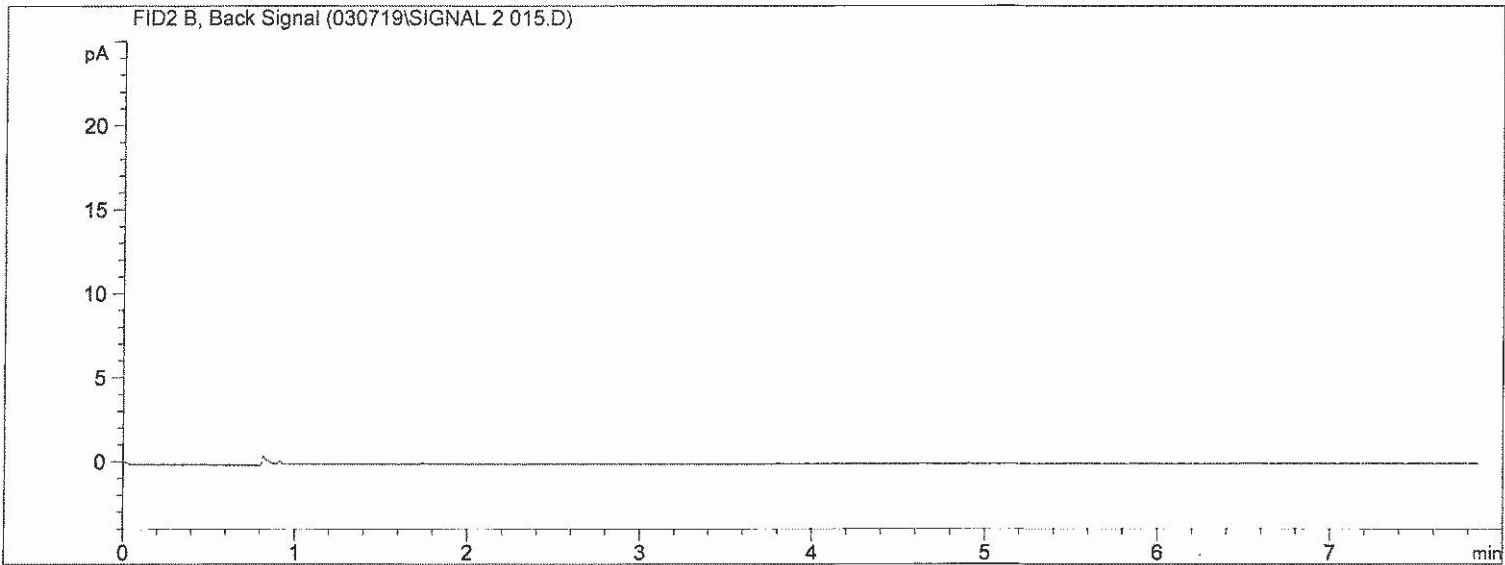
=====
*** End of Report ***

```

Sample Name: GSL_190244-001

```

=====
Acq. Operator   : Emily Decker
Sample Operator : Emily Decker
Acq. Instrument : GC8                      Location : Vial 1
Injection Date  : 3/7/2019 4:08:58 PM
                                           Inj Volume : Manually
Acq. Method     : C:\CHEM32\1\METHODS\REAR_BTEX_ACETALD_M18_030619.M
Last changed    : 3/7/2019 12:32:44 PM by Emily Decker
Analysis Method : C:\CHEM32\1\METHODS\REAR_BTEX_ACETALD_M18_030619.M
Last changed    : 3/11/2019 1:58:08 PM by Emily Decker
                 (modified after loading)
Sample Info     : GSL_190244-001
                 Method:M18
=====
    
```



External Standard Report

```

Sorted By           : Signal
Calib. Data Modified : 3/7/2019 1:36:23 PM
Multiplier          : 1.0000
Dilution            : 1.0000
Do not use Multiplier & Dilution Factor with ISTDs
    
```

Signal 1: FID2 B, Back Signal

RetTime [min]	Type	Area [pA*s]	Amt/Area	Amount [ppmv]	Grp	Name
1.278	-	-	-	-		Benzene
1.866	-	-	-	-		Toluene
2.006	-	-	-	-		Acetaldehyde
2.810	-	-	-	-		Ethylbenzene
2.910	-	-	-	-		m,p-Xylenes
3.222	-	-	-	-		o-Xylene

Totals : 0.00000

Uncalibrated Peaks : compound name not specified

aw
3/11/19

Sample Name: GSL_190244-001

```

=====
Acq. Operator   : Emily Decker
Sample Operator : Emily Decker
Acq. Instrument : GC8
Injection Date  : 3/7/2019 4:08:58 PM
Location       : Vial 1
Inj Volume     : Manually
Acq. Method    : C:\CHEM32\1\METHODS\REAR_BTEX_ACETALD_M18_030619.M
Last changed   : 3/7/2019 12:32:44 PM by Emily Decker
Analysis Method : C:\CHEM32\1\METHODS\REAR_BTEX_ACETALD_M18_030619.M
Last changed   : 3/11/2019 1:58:08 PM by Emily Decker
                (modified after loading)
Sample Info    : GSL_190244-001
                Method:M18
=====

```

2 Warnings or Errors :

Warning : Calibration warnings (see calibration table listing)
Warning : Calibrated compound(s) not found

```

=====
                          Area Percent Report
=====

```

```

Sorted By           : Signal
Calib. Data Modified : 3/7/2019 1:36:23 PM
Multiplier          : 1.0000
Dilution            : 1.0000
Do not use Multiplier & Dilution Factor with ISTDs

```

Signal 1: FID2 B, Back Signal

Peak #	RetTime [min]	Type	Width [min]	Area [pA*s]	Area %	Name
1	1.278		0.0000	0.00000	0.00000	Benzene
2	1.866		0.0000	0.00000	0.00000	Toluene
3	2.006		0.0000	0.00000	0.00000	Acetaldehyde
4	2.810		0.0000	0.00000	0.00000	Ethylbenzene
5	2.910		0.0000	0.00000	0.00000	m,p-Xylenes
6	3.222		0.0000	0.00000	0.00000	o-Xylene

```

Totals :
Uncalibrated Peaks: n.a.

```

2 Warnings or Errors :

Warning : Calibration warnings (see calibration table listing)
Warning : Calibrated compound(s) not found

```

=====
*** End of Report ***

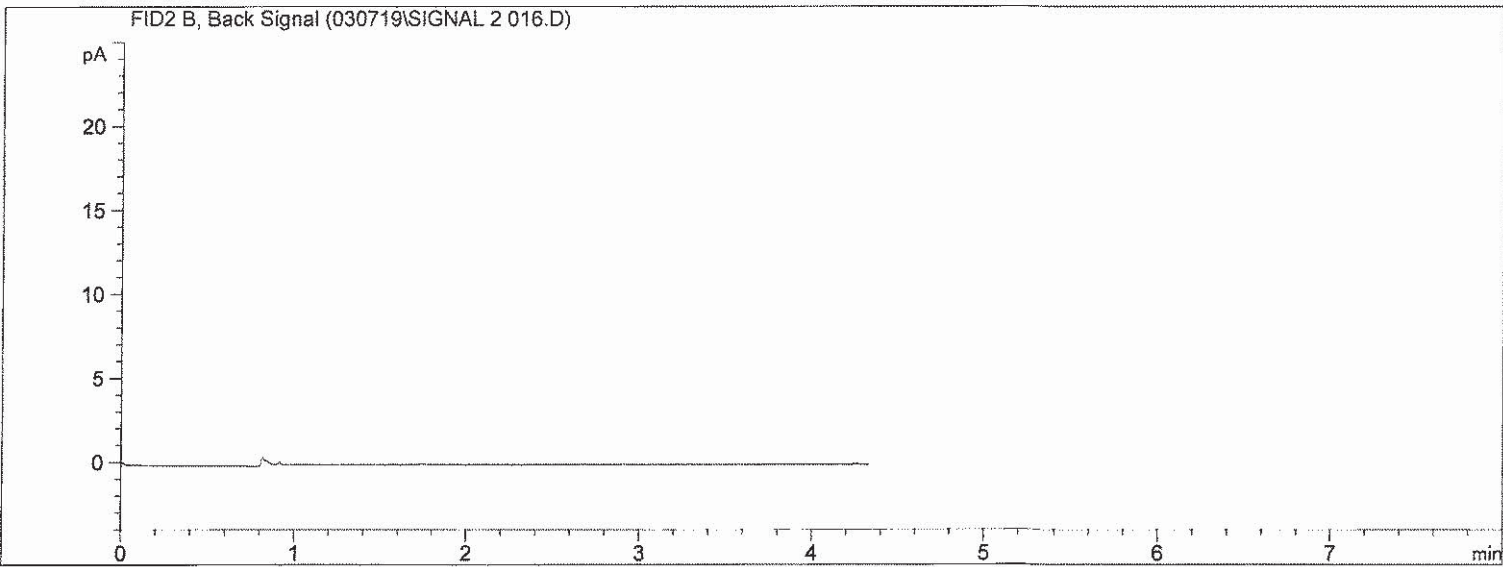
```

Sample Name: GSL_190244-001

```

=====
Acq. Operator   : Emily Decker
Sample Operator : Emily Decker
Acq. Instrument : GC8                      Location : Vial 1
Injection Date  : 3/7/2019 4:25:12 PM
                                           Inj Volume : Manually
Acq. Method     : C:\CHEM32\1\METHODS\REAR_BTEX_ACETALD_M18_030619.M
Last changed    : 3/7/2019 12:32:44 PM by Emily Decker
Analysis Method : C:\CHEM32\1\METHODS\REAR_BTEX_ACETALD_M18_030619.M
Last changed    : 3/11/2019 1:58:08 PM by Emily Decker
                  (modified after loading)
Sample Info     : GSL_190244-001
                  Method:M18
=====

```



```

=====
External Standard Report
=====

```

```

Sorted By           : Signal
Calib. Data Modified : 3/7/2019 1:36:23 PM
Multiplier          : 1.0000
Dilution            : 1.0000
Do not use Multiplier & Dilution Factor with ISTDs

```

Signal 1: FID2 B, Back Signal

RetTime [min]	Type	Area [pA*s]	Amt/Area	Amount [ppmv]	Grp	Name
1.278	-	-	-	-		Benzene
1.866	-	-	-	-		Toluene
2.006	-	-	-	-		Acetaldehyde
2.810	-	-	-	-		Ethylbenzene
2.910	-	-	-	-		m,p-Xylenes
3.222	-	-	-	-		o-Xylene

Totals : 0.00000

aw
3/11/19

Uncalibrated Peaks : compound name not specified

Sample Name: GSL_190244-001

```

=====
Acq. Operator   : Emily Decker
Sample Operator : Emily Decker
Acq. Instrument : GC8                      Location : Vial 1
Injection Date  : 3/7/2019 4:25:12 PM
                                           Inj Volume : Manually
Acq. Method     : C:\CHEM32\1\METHODS\REAR_BTEX_ACETALD_M18_030619.M
Last changed    : 3/7/2019 12:32:44 PM by Emily Decker
Analysis Method : C:\CHEM32\1\METHODS\REAR_BTEX_ACETALD_M18_030619.M
Last changed    : 3/11/2019 1:58:08 PM by Emily Decker
                 (modified after loading)
Sample Info     : GSL_190244-001
                 Method:M18
=====

```

2 Warnings or Errors :

Warning : Calibration warnings (see calibration table listing)
Warning : Calibrated compound(s) not found

```

=====
                          Area Percent Report
=====

```

```

Sorted By           :      Signal
Calib. Data Modified :      3/7/2019 1:36:23 PM
Multiplier          :      1.0000
Dilution            :      1.0000
Do not use Multiplier & Dilution Factor with ISTDs

```

Signal 1: FID2 B, Back Signal

Peak #	RetTime [min]	Type	Width [min]	Area [pA*s]	Area %	Name
1	1.278		0.0000	0.00000	0.00000	Benzene
2	1.866		0.0000	0.00000	0.00000	Toluene
3	2.006		0.0000	0.00000	0.00000	Acetaldehyde
4	2.810		0.0000	0.00000	0.00000	Ethylbenzene
5	2.910		0.0000	0.00000	0.00000	m,p-Xylenes
6	3.222		0.0000	0.00000	0.00000	o-Xylene

Totals : 0.00000 0.0000
Uncalibrated Peaks: n.a.

2 Warnings or Errors :

Warning : Calibration warnings (see calibration table listing)
Warning : Calibrated compound(s) not found

```

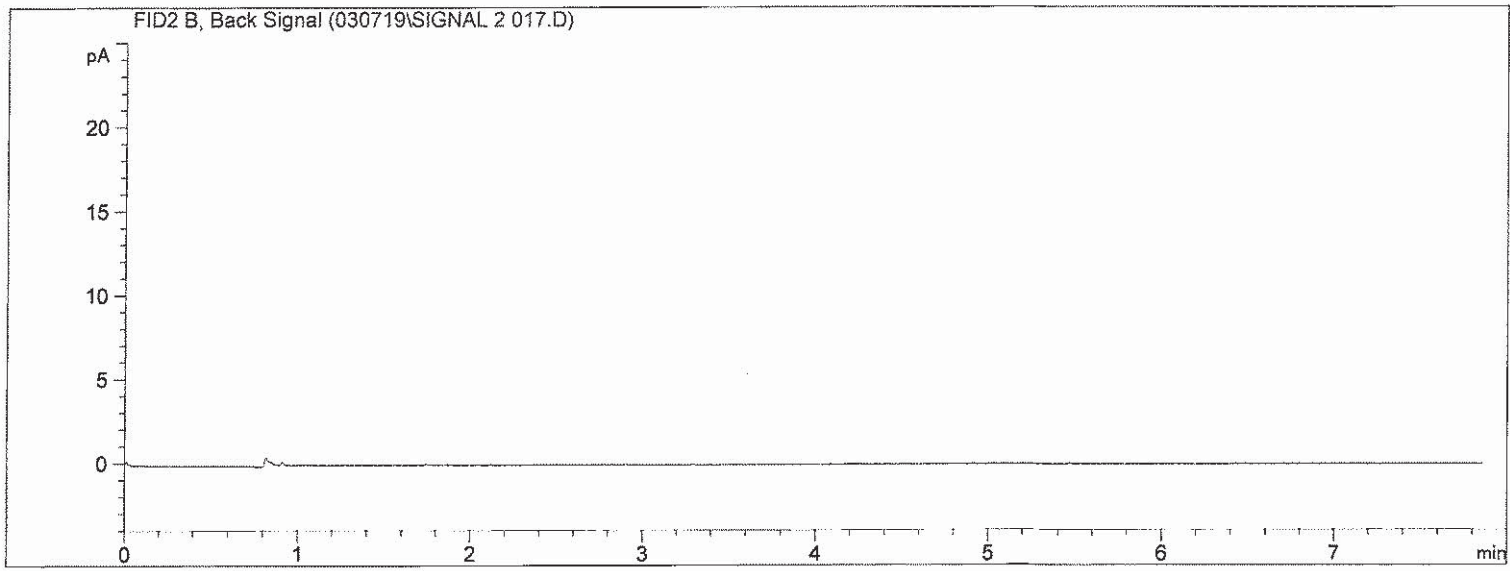
=====
*** End of Report ***

```


Sample Name: GSL_190244-001

```

=====
Acq. Operator   : Emily Decker
Sample Operator : Emily Decker
Acq. Instrument : GC8                      Location : Vial 1
Injection Date  : 3/7/2019 4:37:36 PM
                                           Inj Volume : Manually
Acq. Method     : C:\CHEM32\1\METHODS\REAR_BTEX_ACETALD_M18_030619.M
Last changed    : 3/7/2019 12:32:44 PM by Emily Decker
Analysis Method : C:\CHEM32\1\METHODS\REAR_BTEX_ACETALD_M18_030619.M
Last changed    : 3/11/2019 1:58:08 PM by Emily Decker
                 (modified after loading)
Sample Info     : GSL_190244-001
                 Method:M18
=====
    
```



External Standard Report

```

Sorted By           : Signal
Calib. Data Modified : 3/7/2019 1:36:23 PM
Multiplier          : 1.0000
Dilution            : 1.0000
Do not use Multiplier & Dilution Factor with ISTDs
    
```

Signal 1: FID2 B, Back Signal

RetTime [min]	Type	Area [pA*s]	Amt/Area	Amount [ppmv]	Grp	Name
1.278	-	-	-	-	-	Benzene
1.866	-	-	-	-	-	Toluene
2.006	-	-	-	-	-	Acetaldehyde
2.810	-	-	-	-	-	Ethylbenzene
2.910	-	-	-	-	-	m,p-Xylenes
3.222	-	-	-	-	-	o-Xylene

Totals : 0.00000

Uncalibrated Peaks : compound name not specified

aw
3/11/19

Sample Name: GSL_190244-001

```

=====
Acq. Operator   : Emily Decker
Sample Operator : Emily Decker
Acq. Instrument : GC8                      Location : Vial 1
Injection Date  : 3/7/2019 4:37:36 PM
                                           Inj Volume : Manually
Acq. Method     : C:\CHEM32\1\METHODS\REAR_BTEX_ACETALD_M18_030619.M
Last changed    : 3/7/2019 12:32:44 PM by Emily Decker
Analysis Method : C:\CHEM32\1\METHODS\REAR_BTEX_ACETALD_M18_030619.M
Last changed    : 3/11/2019 1:58:08 PM by Emily Decker
                 (modified after loading)
Sample Info     : GSL_190244-001
                 Method:M18
=====

```

2 Warnings or Errors :

Warning : Calibration warnings (see calibration table listing)
Warning : Calibrated compound(s) not found

```

=====
                          Area Percent Report
=====

```

```

Sorted By           :      Signal
Calib. Data Modified :      3/7/2019 1:36:23 PM
Multiplier          :      1.0000
Dilution            :      1.0000
Do not use Multiplier & Dilution Factor with ISTDs

```

Signal 1: FID2 B, Back Signal

Peak #	RetTime [min]	Type	Width [min]	Area [pA*s]	Area %	Name
1	1.278		0.0000	0.00000	0.00000	Benzene
2	1.866		0.0000	0.00000	0.00000	Toluene
3	2.006		0.0000	0.00000	0.00000	Acetaldehyde
4	2.810		0.0000	0.00000	0.00000	Ethylbenzene
5	2.910		0.0000	0.00000	0.00000	m,p-Xylenes
6	3.222		0.0000	0.00000	0.00000	o-Xylene

Totals : 0.00000 0.0000
Uncalibrated Peaks: n.a.

2 Warnings or Errors :

Warning : Calibration warnings (see calibration table listing)
Warning : Calibrated compound(s) not found

```

=====
*** End of Report ***

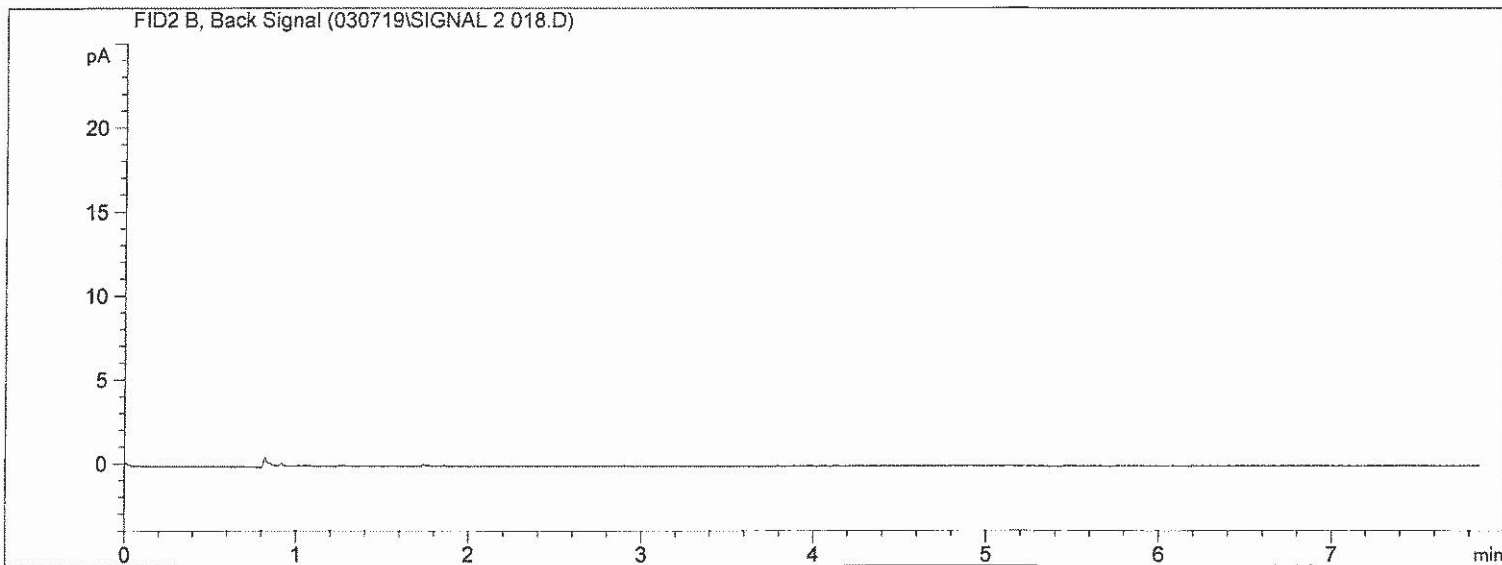
```

Sample Name: GSL_190244-002

```

=====
Acq. Operator   : Emily Decker
Sample Operator : Emily Decker
Acq. Instrument : GC8                      Location : Vial 1
Injection Date  : 3/7/2019 4:54:15 PM
                                           Inj Volume : Manually
Acq. Method     : C:\CHEM32\1\METHODS\REAR_BTEX_ACETALD_M18_030619.M
Last changed    : 3/7/2019 12:32:44 PM by Emily Decker
Analysis Method : C:\CHEM32\1\METHODS\REAR_BTEX_ACETALD_M18_030619.M
Last changed    : 3/11/2019 1:59:00 PM by Emily Decker
                 (modified after loading)
Sample Info     : GSL_190244-002
                 Method:M18
=====

```



```

=====
External Standard Report
=====

```

```

Sorted By           : Signal
Calib. Data Modified : 3/7/2019 1:36:23 PM
Multiplier          : 1.0000
Dilution            : 1.0000
Do not use Multiplier & Dilution Factor with ISTDs

```

Signal 1: FID2 B, Back Signal

RetTime [min]	Type	Area [pA*s]	Amt/Area	Amount [ppmv]	Grp	Name
1.278	-	-	-	-	-	Benzene
1.866	-	-	-	-	-	Toluene
2.006	-	-	-	-	-	Acetaldehyde
2.810	-	-	-	-	-	Ethylbenzene
2.910	-	-	-	-	-	m,p-Xylenes
3.222	-	-	-	-	-	o-Xylene

Totals : 0.00000

Uncalibrated Peaks : compound name not specified

aw
3/11/19

Sample Name: GSL_190244-002

```

=====
Acq. Operator   : Emily Decker
Sample Operator : Emily Decker
Acq. Instrument : GC8                      Location : Vial 1
Injection Date  : 3/7/2019 4:54:15 PM
                                           Inj Volume : Manually
Acq. Method     : C:\CHEM32\1\METHODS\REAR_BTEX_ACETALD_M18_030619.M
Last changed    : 3/7/2019 12:32:44 PM by Emily Decker
Analysis Method : C:\CHEM32\1\METHODS\REAR_BTEX_ACETALD_M18_030619.M
Last changed    : 3/11/2019 1:59:00 PM by Emily Decker
                 (modified after loading)
Sample Info     : GSL_190244-002
                 Method:M18
=====

```

2 Warnings or Errors :

```

Warning : Calibration warnings (see calibration table listing)
Warning : Calibrated compound(s) not found
=====
=====

```

```

=====
                          Area Percent Report
=====

```

```

Sorted By           : Signal
Calib. Data Modified : 3/7/2019 1:36:23 PM
Multiplier          : 1.0000
Dilution            : 1.0000
Do not use Multiplier & Dilution Factor with ISTDs

```

Signal 1: FID2 B, Back Signal

Peak #	RetTime [min]	Type	Width [min]	Area [pA*s]	Area %	Name
1	1.278		0.0000	0.00000	0.00000	Benzene
2	1.866		0.0000	0.00000	0.00000	Toluene
3	2.006		0.0000	0.00000	0.00000	Acetaldehyde
4	2.810		0.0000	0.00000	0.00000	Ethylbenzene
5	2.910		0.0000	0.00000	0.00000	m,p-Xylenes
6	3.222		0.0000	0.00000	0.00000	o-Xylene

Totals : 0.00000 0.0000

Uncalibrated Peaks: n.a.

2 Warnings or Errors :

```

Warning : Calibration warnings (see calibration table listing)
Warning : Calibrated compound(s) not found
=====

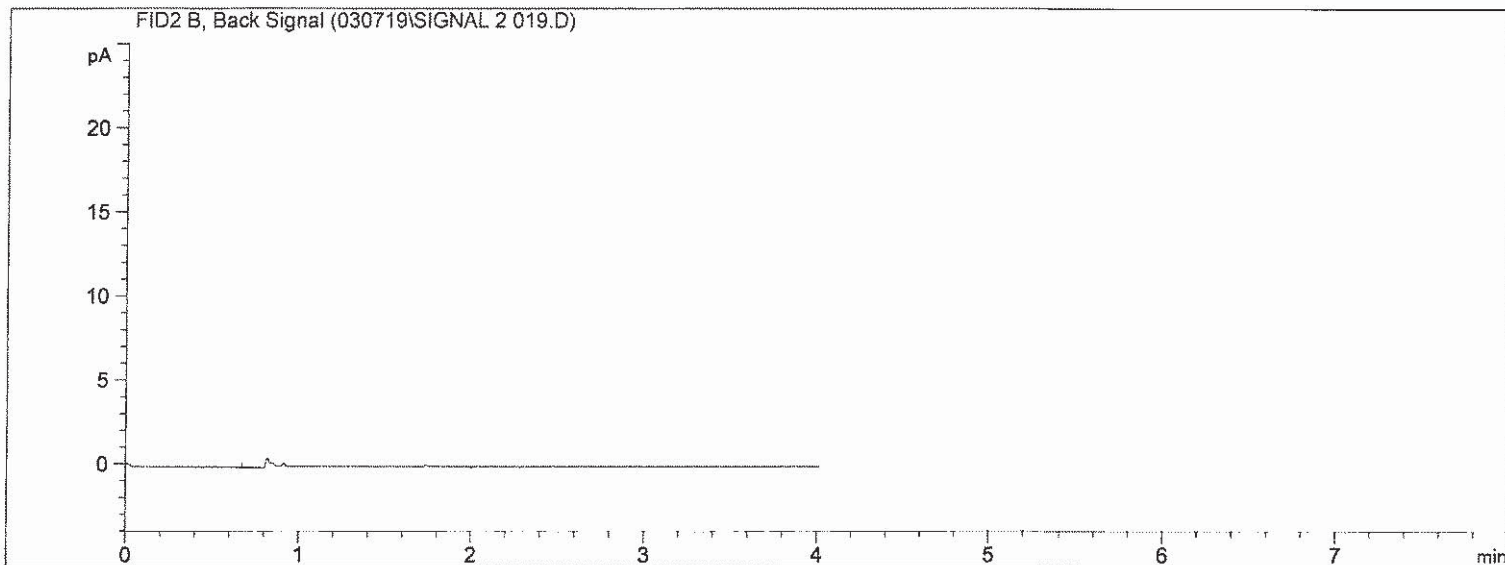
```

*** End of Report ***

Sample Name: GSL_190244-002

```

=====
Acq. Operator   : Emily Decker
Sample Operator : Emily Decker
Acq. Instrument : GC8                      Location : Vial 1
Injection Date  : 3/7/2019 5:12:09 PM
                                           Inj Volume : Manually
Acq. Method     : C:\CHEM32\1\METHODS\REAR_BTEX_ACETALD_M18_030619.M
Last changed    : 3/7/2019 12:32:44 PM by Emily Decker
Analysis Method : C:\CHEM32\1\METHODS\REAR_BTEX_ACETALD_M18_030619.M
Last changed    : 3/11/2019 1:59:00 PM by Emily Decker
                 (modified after loading)
Sample Info     : GSL_190244-002
                 Method:M18
=====
    
```



External Standard Report

```

=====
Sorted By      : Signal
Calib. Data Modified : 3/7/2019 1:36:23 PM
Multiplier     : 1.0000
Dilution       : 1.0000
Do not use Multiplier & Dilution Factor with ISTDs
    
```

Signal 1: FID2 B, Back Signal

RetTime [min]	Type	Area [pA*s]	Amt/Area	Amount [ppmv]	Grp	Name
1.278	-	-	-	-	-	Benzene
1.866	-	-	-	-	-	Toluene
2.006	-	-	-	-	-	Acetaldehyde
2.810	-	-	-	-	-	Ethylbenzene
2.910	-	-	-	-	-	m,p-Xylenes
3.222	-	-	-	-	-	o-Xylene

Totals : 0.00000

Uncalibrated Peaks : compound name not specified

as
3/11/19

Sample Name: GSL_190244-002

=====

Acq. Operator : Emily Decker
Sample Operator : Emily Decker
Acq. Instrument : GC8 Location : Vial 1
Injection Date : 3/7/2019 5:12:09 PM
Inj Volume : Manually

Acq. Method : C:\CHEM32\1\METHODS\REAR_BTEX_ACETALD_M18_030619.M
Last changed : 3/7/2019 12:32:44 PM by Emily Decker
Analysis Method : C:\CHEM32\1\METHODS\REAR_BTEX_ACETALD_M18_030619.M
Last changed : 3/11/2019 1:59:00 PM by Emily Decker
(modified after loading)

Sample Info : GSL_190244-002
Method:M18

=====

2 Warnings or Errors :

Warning : Calibration warnings (see calibration table listing)

Warning : Calibrated compound(s) not found

=====

=====

Area Percent Report

=====

=====

Sorted By : Signal
Calib. Data Modified : 3/7/2019 1:36:23 PM
Multiplier : 1.0000
Dilution : 1.0000
Do not use Multiplier & Dilution Factor with ISTDs

Signal 1: FID2 B, Back Signal

Peak #	RetTime [min]	Type	Width [min]	Area [pA*s]	Area %	Name
1	1.278		0.0000	0.00000	0.00000	Benzene
2	1.866		0.0000	0.00000	0.00000	Toluene
3	2.006		0.0000	0.00000	0.00000	Acetaldehyde
4	2.810		0.0000	0.00000	0.00000	Ethylbenzene
5	2.910		0.0000	0.00000	0.00000	m,p-Xylenes
6	3.222		0.0000	0.00000	0.00000	o-Xylene

Totals : 0.00000 0.0000

Uncalibrated Peaks: n.a.

2 Warnings or Errors :

Warning : Calibration warnings (see calibration table listing)

Warning : Calibrated compound(s) not found

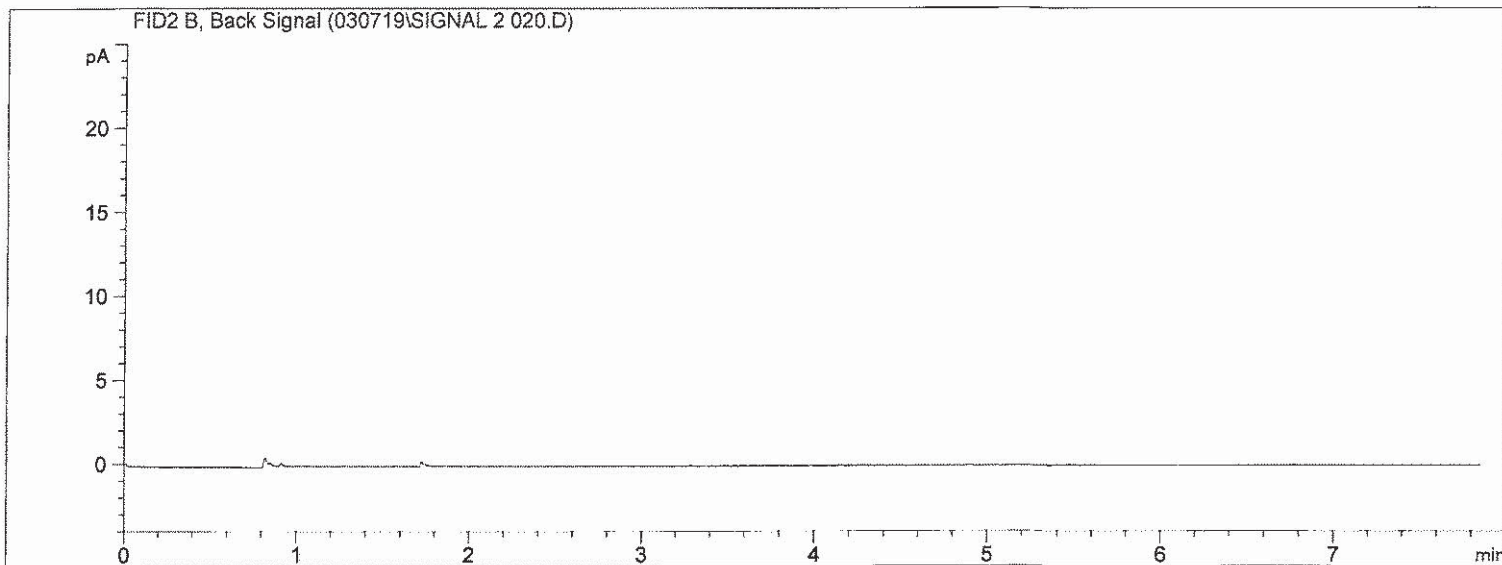
=====

*** End of Report ***

Sample Name: GSL_190244-002

```

=====
Acq. Operator   : Emily Decker
Sample Operator : Emily Decker
Acq. Instrument : GC8                      Location : Vial 1
Injection Date  : 3/7/2019 5:32:59 PM
                                           Inj Volume : Manually
Acq. Method     : C:\CHEM32\1\METHODS\REAR_BTEX_ACETALD_M18_030619.M
Last changed    : 3/7/2019 12:32:44 PM by Emily Decker
Analysis Method : C:\CHEM32\1\METHODS\REAR_BTEX_ACETALD_M18_030619.M
Last changed    : 3/11/2019 1:59:00 PM by Emily Decker
                 (modified after loading)
Sample Info     : GSL_190244-002
                 Method:M18
=====
    
```



External Standard Report

```

Sorted By           : Signal
Calib. Data Modified : 3/7/2019 1:36:23 PM
Multiplier          : 1.0000
Dilution            : 1.0000
Do not use Multiplier & Dilution Factor with ISTDs
    
```

Signal 1: FID2 B, Back Signal

RetTime [min]	Type	Area [pA*s]	Amt/Area	Amount [ppmv]	Grp	Name
1.278	-	-	-	-	-	Benzene
1.866	-	-	-	-	-	Toluene
2.006	-	-	-	-	-	Acetaldehyde
2.810	-	-	-	-	-	Ethylbenzene
2.910	-	-	-	-	-	m,p-Xylenes
3.222	-	-	-	-	-	o-Xylene

Totals : 0.00000

Uncalibrated Peaks : compound name not specified

aw
3/11/19

Sample Name: GSL_190244-002

```
=====
Acq. Operator   : Emily Decker
Sample Operator : Emily Decker
Acq. Instrument : GC8                      Location : Vial 1
Injection Date  : 3/7/2019 5:32:59 PM
                                           Inj Volume : Manually
Acq. Method     : C:\CHEM32\1\METHODS\REAR_BTEX_ACETALD_M18_030619.M
Last changed    : 3/7/2019 12:32:44 PM by Emily Decker
Analysis Method : C:\CHEM32\1\METHODS\REAR_BTEX_ACETALD_M18_030619.M
Last changed    : 3/11/2019 1:59:00 PM by Emily Decker
                 (modified after loading)
Sample Info     : GSL_190244-002
                 Method:M18
=====
```

2 Warnings or Errors :

Warning : Calibration warnings (see calibration table listing)

Warning : Calibrated compound(s) not found

```
=====
Area Percent Report
=====
```

```
Sorted By           : Signal
Calib. Data Modified : 3/7/2019 1:36:23 PM
Multiplier          : 1.0000
Dilution            : 1.0000
Do not use Multiplier & Dilution Factor with ISTDs
```

Signal 1: FID2 B, Back Signal

Peak #	RetTime [min]	Type	Width [min]	Area [pA*s]	Area %	Name
1	1.278		0.0000	0.00000	0.00000	Benzene
2	1.866		0.0000	0.00000	0.00000	Toluene
3	2.006		0.0000	0.00000	0.00000	Acetaldehyde
4	2.810		0.0000	0.00000	0.00000	Ethylbenzene
5	2.910		0.0000	0.00000	0.00000	m,p-Xylenes
6	3.222		0.0000	0.00000	0.00000	o-Xylene

Totals : 0.00000 0.0000

Uncalibrated Peaks: n.a.

2 Warnings or Errors :

Warning : Calibration warnings (see calibration table listing)

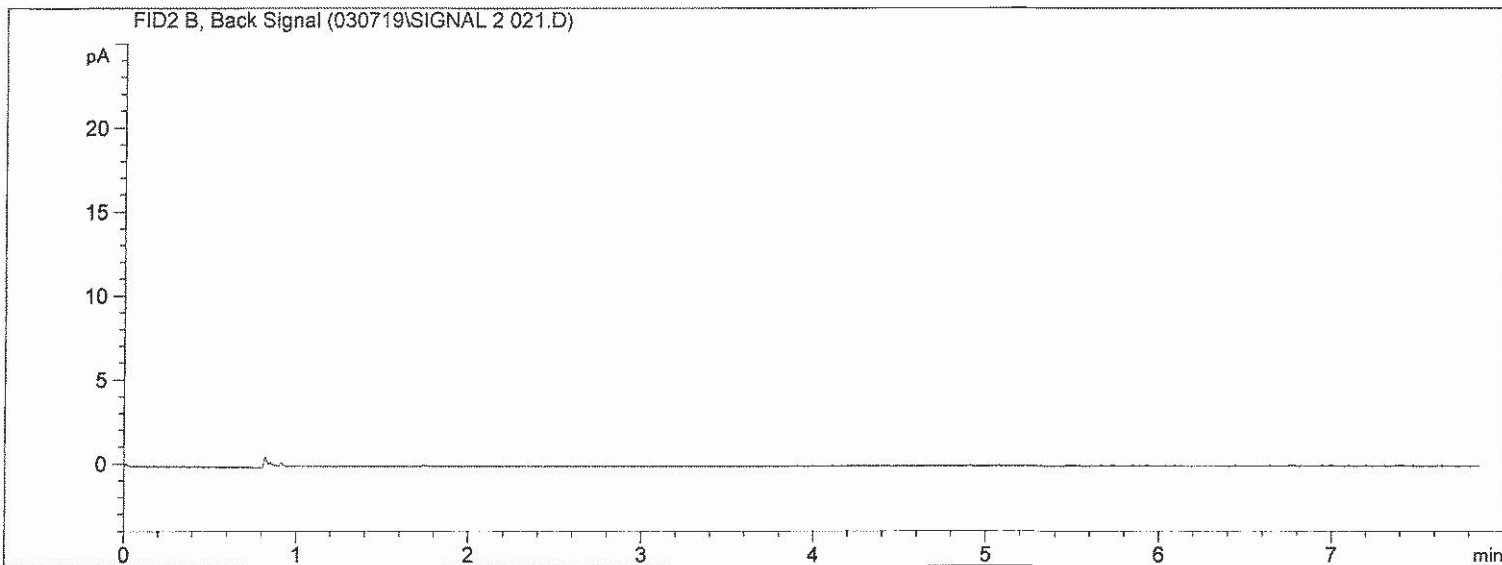
Warning : Calibrated compound(s) not found

```
=====
*** End of Report ***
=====
```


Sample Name: GSL_190244-003

```

=====
Acq. Operator   : Emily Decker
Sample Operator : Emily Decker
Acq. Instrument : GC8                      Location : Vial 1
Injection Date  : 3/7/2019 5:47:08 PM
                                           Inj Volume : Manually
Acq. Method     : C:\CHEM32\1\METHODS\REAR_BTEX_ACETALD_M18_030619.M
Last changed    : 3/7/2019 12:32:44 PM by Emily Decker
Analysis Method : C:\CHEM32\1\METHODS\REAR_BTEX_ACETALD_M18_030619.M
Last changed    : 3/11/2019 2:00:08 PM by Emily Decker
                  (modified after loading)
Sample Info     : GSL_190244-003
                  Method:M18
=====
    
```



External Standard Report

```

Sorted By           : Signal
Calib. Data Modified : 3/7/2019 1:36:23 PM
Multiplier          : 1.0000
Dilution            : 1.0000
Do not use Multiplier & Dilution Factor with ISTDs
    
```

Signal 1: FID2 B, Back Signal

RetTime [min]	Type	Area [pA*s]	Amt/Area	Amount [ppmv]	Grp	Name
1.278	-	-	-	-	-	Benzene
1.866	-	-	-	-	-	Toluene
2.006	-	-	-	-	-	Acetaldehyde
2.810	-	-	-	-	-	Ethylbenzene
2.910	-	-	-	-	-	m,p-Xylenes
3.222	-	-	-	-	-	o-Xylene

Totals : 0.00000

Uncalibrated Peaks : compound name not specified

no
3/11/19

Sample Name: GSL_190244-003

```

=====
Acq. Operator   : Emily Decker
Sample Operator : Emily Decker
Acq. Instrument : GC8                      Location : Vial 1
Injection Date  : 3/7/2019 5:47:08 PM
                                           Inj Volume : Manually
Acq. Method     : C:\CHEM32\1\METHODS\REAR_BTEX_ACETALD_M18_030619.M
Last changed    : 3/7/2019 12:32:44 PM by Emily Decker
Analysis Method : C:\CHEM32\1\METHODS\REAR_BTEX_ACETALD_M18_030619.M
Last changed    : 3/11/2019 2:00:08 PM by Emily Decker
                 (modified after loading)
Sample Info     : GSL_190244-003
                 Method:M18
=====

```

2 Warnings or Errors :

Warning : Calibration warnings (see calibration table listing)
Warning : Calibrated compound(s) not found

```

=====
                          Area Percent Report
=====

```

```

Sorted By           :      Signal
Calib. Data Modified :      3/7/2019 1:36:23 PM
Multiplier          :      1.0000
Dilution            :      1.0000
Do not use Multiplier & Dilution Factor with ISTDs

```

Signal 1: FID2 B, Back Signal

Peak #	RetTime [min]	Type	Width [min]	Area [pA*s]	Area %	Name
1	1.278		0.0000	0.00000	0.00000	Benzene
2	1.866		0.0000	0.00000	0.00000	Toluene
3	2.006		0.0000	0.00000	0.00000	Acetaldehyde
4	2.810		0.0000	0.00000	0.00000	Ethylbenzene
5	2.910		0.0000	0.00000	0.00000	m,p-Xylenes
6	3.222		0.0000	0.00000	0.00000	o-Xylene

```

Totals :                      0.00000  0.0000
Uncalibrated Peaks: n.a.

```

2 Warnings or Errors :

Warning : Calibration warnings (see calibration table listing)
Warning : Calibrated compound(s) not found

```

=====
*** End of Report ***

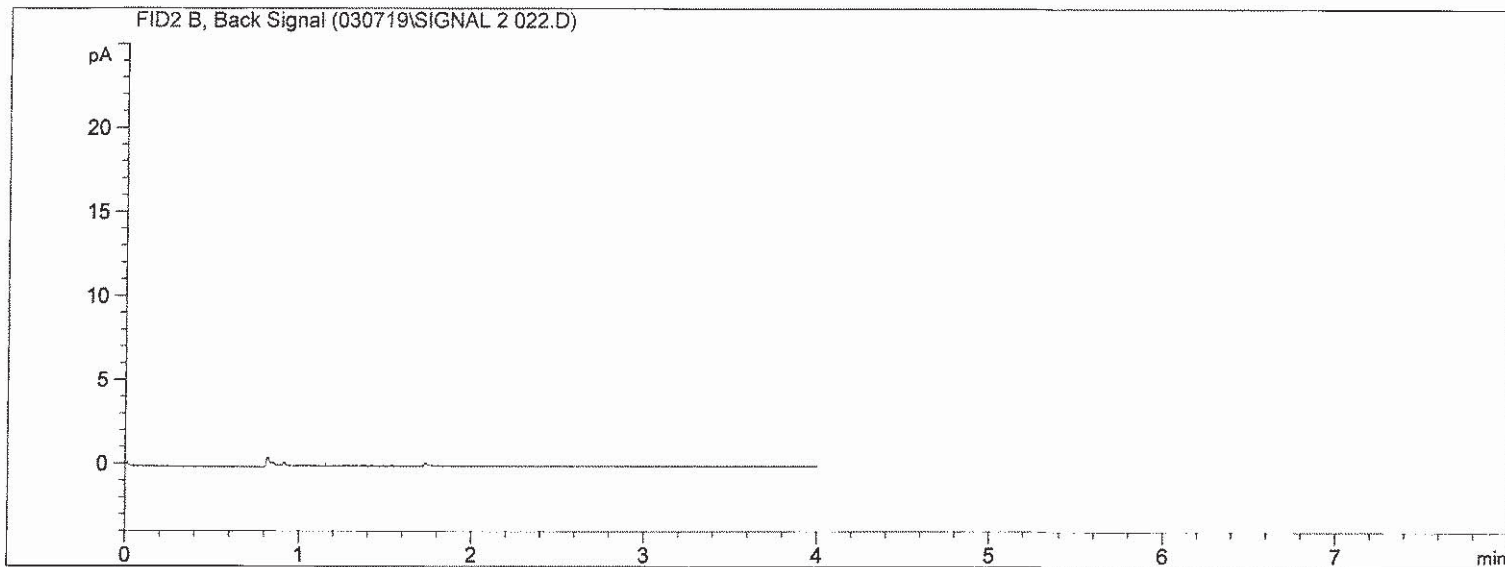
```

Sample Name: GSL_190244-003

```

=====
Acq. Operator   : Emily Decker
Sample Operator : Emily Decker
Acq. Instrument : GC8                      Location : Vial 1
Injection Date  : 3/7/2019 6:05:07 PM
                                           Inj Volume : Manually
Acq. Method     : C:\CHEM32\1\METHODS\REAR_BTEX_ACETALD_M18_030619.M
Last changed    : 3/7/2019 12:32:44 PM by Emily Decker
Analysis Method : C:\CHEM32\1\METHODS\REAR_BTEX_ACETALD_M18_030619.M
Last changed    : 3/11/2019 2:00:08 PM by Emily Decker
                 (modified after loading)
Sample Info     : GSL_190244-003
                 Method:M18
=====

```



```

=====
External Standard Report
=====

```

```

Sorted By      : Signal
Calib. Data Modified : 3/7/2019 1:36:23 PM
Multiplier     : 1.0000
Dilution       : 1.0000
Do not use Multiplier & Dilution Factor with ISTDs

```

Signal 1: FID2 B, Back Signal

RetTime [min]	Type	Area [pA*s]	Amt/Area	Amount [ppmv]	Grp	Name
1.278	-	-	-	-	-	Benzene
1.866	-	-	-	-	-	Toluene
2.006	-	-	-	-	-	Acetaldehyde
2.810	-	-	-	-	-	Ethylbenzene
2.910	-	-	-	-	-	m,p-Xylenes
3.222	-	-	-	-	-	o-Xylene

Totals : 0.00000

Uncalibrated Peaks : compound name not specified

Handwritten: 3/11/19

Sample Name: GSL_190244-003

```
=====
Acq. Operator   : Emily Decker
Sample Operator : Emily Decker
Acq. Instrument : GC8                      Location : Vial 1
Injection Date  : 3/7/2019 6:05:07 PM
                                           Inj Volume : Manually
Acq. Method     : C:\CHEM32\1\METHODS\REAR_BTEX_ACETALD_M18_030619.M
Last changed    : 3/7/2019 12:32:44 PM by Emily Decker
Analysis Method : C:\CHEM32\1\METHODS\REAR_BTEX_ACETALD_M18_030619.M
Last changed    : 3/11/2019 2:00:08 PM by Emily Decker
                 (modified after loading)
Sample Info     : GSL_190244-003
                 Method:M18
=====
```

2 Warnings or Errors :

Warning : Calibration warnings (see calibration table listing)

Warning : Calibrated compound(s) not found

```
=====
Area Percent Report
=====
```

```
Sorted By      : Signal
Calib. Data Modified : 3/7/2019 1:36:23 PM
Multiplier     : 1.0000
Dilution       : 1.0000
Do not use Multiplier & Dilution Factor with ISTDs
```

Signal 1: FID2 B, Back Signal

Peak #	RetTime [min]	Type	Width [min]	Area [pA*s]	Area %	Name
1	1.278		0.0000	0.00000	0.00000	Benzene
2	1.866		0.0000	0.00000	0.00000	Toluene
3	2.006		0.0000	0.00000	0.00000	Acetaldehyde
4	2.810		0.0000	0.00000	0.00000	Ethylbenzene
5	2.910		0.0000	0.00000	0.00000	m,p-Xylenes
6	3.222		0.0000	0.00000	0.00000	o-Xylene

Totals : 0.00000 0.0000

Uncalibrated Peaks: n.a.

2 Warnings or Errors :

Warning : Calibration warnings (see calibration table listing)

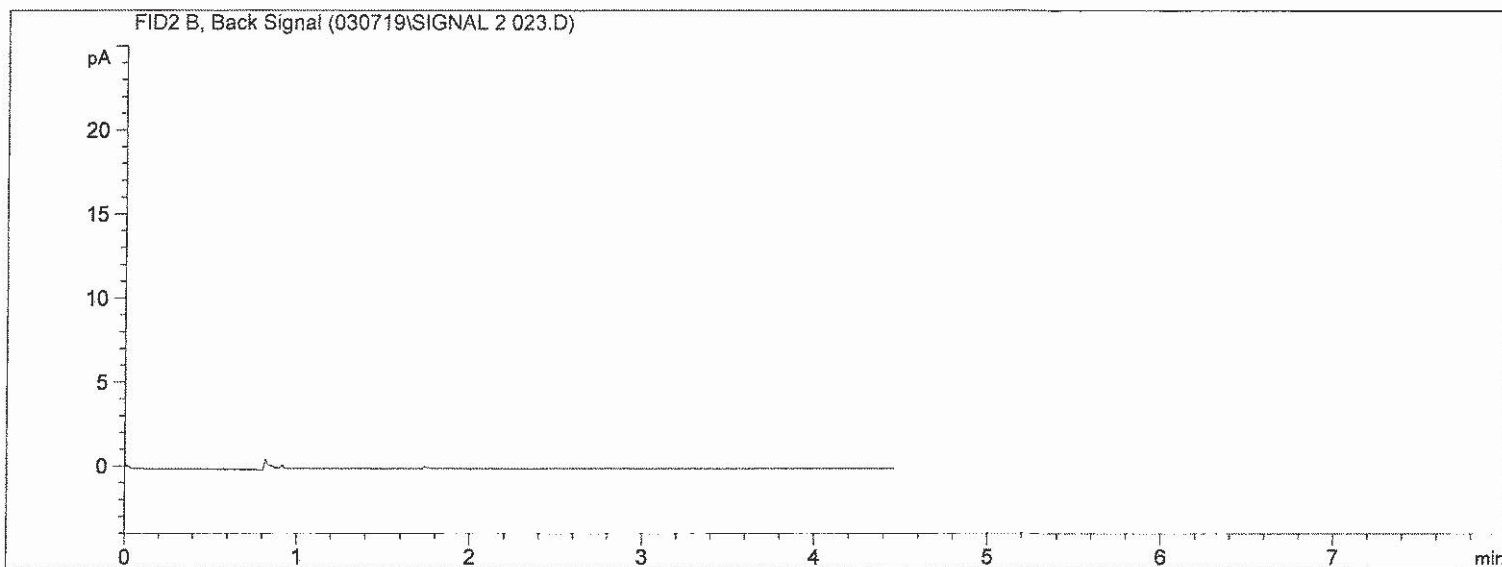
Warning : Calibrated compound(s) not found

```
=====
*** End of Report ***
```

Sample Name: GSL_190244-003

```

=====
Acq. Operator   : Emily Decker
Sample Operator : Emily Decker
Acq. Instrument : GC8                      Location : Vial 1
Injection Date  : 3/7/2019 6:17:06 PM
                                           Inj Volume : Manually
Acq. Method     : C:\CHEM32\1\METHODS\REAR_BTEX_ACETALD_M18_030619.M
Last changed    : 3/7/2019 12:32:44 PM by Emily Decker
Analysis Method : C:\CHEM32\1\METHODS\REAR_BTEX_ACETALD_M18_030619.M
Last changed    : 3/11/2019 2:00:08 PM by Emily Decker
                 (modified after loading)
Sample Info     : GSL_190244-003
                 Method:M18
=====
    
```



External Standard Report

```

=====
Sorted By      : Signal
Calib. Data Modified : 3/7/2019 1:36:23 PM
Multiplier     : 1.0000
Dilution       : 1.0000
Do not use Multiplier & Dilution Factor with ISTDs
    
```

Signal 1: FID2 B, Back Signal

RetTime [min]	Type	Area [pA*s]	Amt/Area	Amount [ppmv]	Grp	Name
1.278	-	-	-	-	-	Benzene
1.866	-	-	-	-	-	Toluene
2.006	-	-	-	-	-	Acetaldehyde
2.810	-	-	-	-	-	Ethylbenzene
2.910	-	-	-	-	-	m,p-Xylenes
3.222	-	-	-	-	-	o-Xylene

Totals : 0.00000

Uncalibrated Peaks : compound name not specified

EW
3/11/19

Sample Name: GSL_190244-003

```

=====
Acq. Operator   : Emily Decker
Sample Operator : Emily Decker
Acq. Instrument : GC8                      Location : Vial 1
Injection Date  : 3/7/2019 6:17:06 PM
                                           Inj Volume : Manually
Acq. Method     : C:\CHEM32\1\METHODS\REAR_BTEX_ACETALD_M18_030619.M
Last changed    : 3/7/2019 12:32:44 PM by Emily Decker
Analysis Method : C:\CHEM32\1\METHODS\REAR_BTEX_ACETALD_M18_030619.M
Last changed    : 3/11/2019 2:00:08 PM by Emily Decker
                 (modified after loading)
Sample Info     : GSL_190244-003
                 Method:M18
=====

```

2 Warnings or Errors :

Warning : Calibration warnings (see calibration table listing)

Warning : Calibrated compound(s) not found

```

=====
                          Area Percent Report
=====

```

```

Sorted By           :      Signal
Calib. Data Modified :      3/7/2019 1:36:23 PM
Multiplier          :      1.0000
Dilution            :      1.0000
Do not use Multiplier & Dilution Factor with ISTDs

```

Signal 1: FID2 B, Back Signal

Peak #	RetTime [min]	Type	Width [min]	Area [pA*s]	Area %	Name
1	1.278		0.0000	0.00000	0.00000	Benzene
2	1.866		0.0000	0.00000	0.00000	Toluene
3	2.006		0.0000	0.00000	0.00000	Acetaldehyde
4	2.810		0.0000	0.00000	0.00000	Ethylbenzene
5	2.910		0.0000	0.00000	0.00000	m,p-Xylenes
6	3.222		0.0000	0.00000	0.00000	o-Xylene

Totals : 0.00000 0.0000

Uncalibrated Peaks: n.a.

2 Warnings or Errors :

Warning : Calibration warnings (see calibration table listing)

Warning : Calibrated compound(s) not found

```

=====
*** End of Report ***

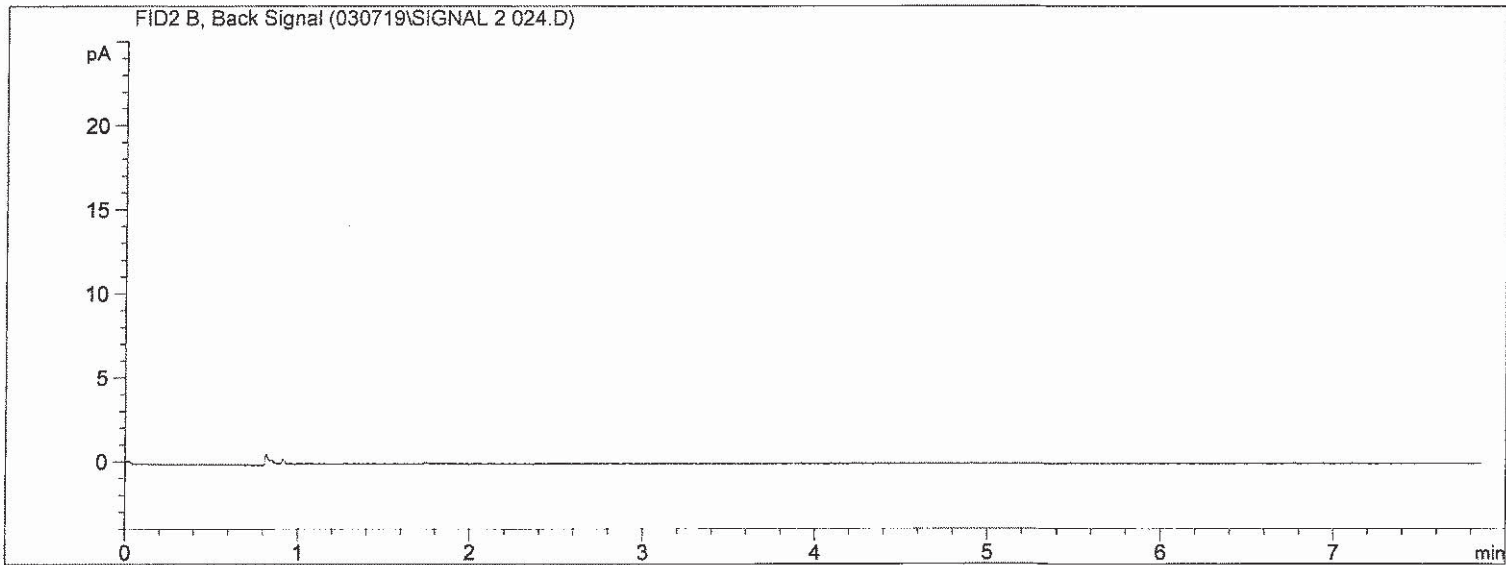
```

Sample Name: GSL_190244-004

```

=====
Acq. Operator   : Emily Decker
Sample Operator : Emily Decker
Acq. Instrument : GC8                      Location : Vial 1
Injection Date  : 3/7/2019 6:29:43 PM
                                           Inj Volume : Manually
Acq. Method     : C:\CHEM32\1\METHODS\REAR_BTEX_ACETALD_M18_030619.M
Last changed    : 3/7/2019 12:32:44 PM by Emily Decker
Analysis Method : C:\CHEM32\1\METHODS\REAR_BTEX_ACETALD_M18_030619.M
Last changed    : 3/11/2019 2:00:38 PM by Emily Decker
                 (modified after loading)
Sample Info     : GSL_190244-004
                 Method:M18
=====

```



```

=====
External Standard Report
=====

```

```

Sorted By      : Signal
Calib. Data Modified : 3/7/2019 1:36:23 PM
Multiplier     : 1.0000
Dilution       : 1.0000
Do not use Multiplier & Dilution Factor with ISTDs

```

Signal 1: FID2 B, Back Signal

RetTime [min]	Type	Area [pA*s]	Amt/Area	Amount [ppmv]	Grp	Name
1.278	-	-	-	-	-	Benzene
1.866	-	-	-	-	-	Toluene
2.006	-	-	-	-	-	Acetaldehyde
2.810	-	-	-	-	-	Ethylbenzene
2.910	-	-	-	-	-	m,p-Xylenes
3.222	-	-	-	-	-	o-Xylene

Totals : 0.00000

Uncalibrated Peaks : compound name not specified

60
3/11/19

Sample Name: GSL_190244-004

```

=====
Acq. Operator   : Emily Decker
Sample Operator : Emily Decker
Acq. Instrument : GC8                      Location : Vial 1
Injection Date  : 3/7/2019 6:29:43 PM
                                           Inj Volume : Manually
Acq. Method     : C:\CHEM32\1\METHODS\REAR_BTEX_ACETALD_M18_030619.M
Last changed    : 3/7/2019 12:32:44 PM by Emily Decker
Analysis Method : C:\CHEM32\1\METHODS\REAR_BTEX_ACETALD_M18_030619.M
Last changed    : 3/11/2019 2:00:38 PM by Emily Decker
                 (modified after loading)
Sample Info     : GSL_190244-004
                 Method:M18
=====

```

2 Warnings or Errors :

Warning : Calibration warnings (see calibration table listing)
Warning : Calibrated compound(s) not found

```

=====
                          Area Percent Report
=====

```

```

Sorted By           : Signal
Calib. Data Modified : 3/7/2019 1:36:23 PM
Multiplier          : 1.0000
Dilution            : 1.0000
Do not use Multiplier & Dilution Factor with ISTDs

```

Signal 1: FID2 B, Back Signal

Peak #	RetTime [min]	Type	Width [min]	Area [pA*s]	Area %	Name
1	1.278		0.0000	0.00000	0.00000	Benzene
2	1.866		0.0000	0.00000	0.00000	Toluene
3	2.006		0.0000	0.00000	0.00000	Acetaldehyde
4	2.810		0.0000	0.00000	0.00000	Ethylbenzene
5	2.910		0.0000	0.00000	0.00000	m,p-Xylenes
6	3.222		0.0000	0.00000	0.00000	o-Xylene

Totals : 0.00000 0.0000
Uncalibrated Peaks: n.a.

2 Warnings or Errors :

Warning : Calibration warnings (see calibration table listing)
Warning : Calibrated compound(s) not found

```

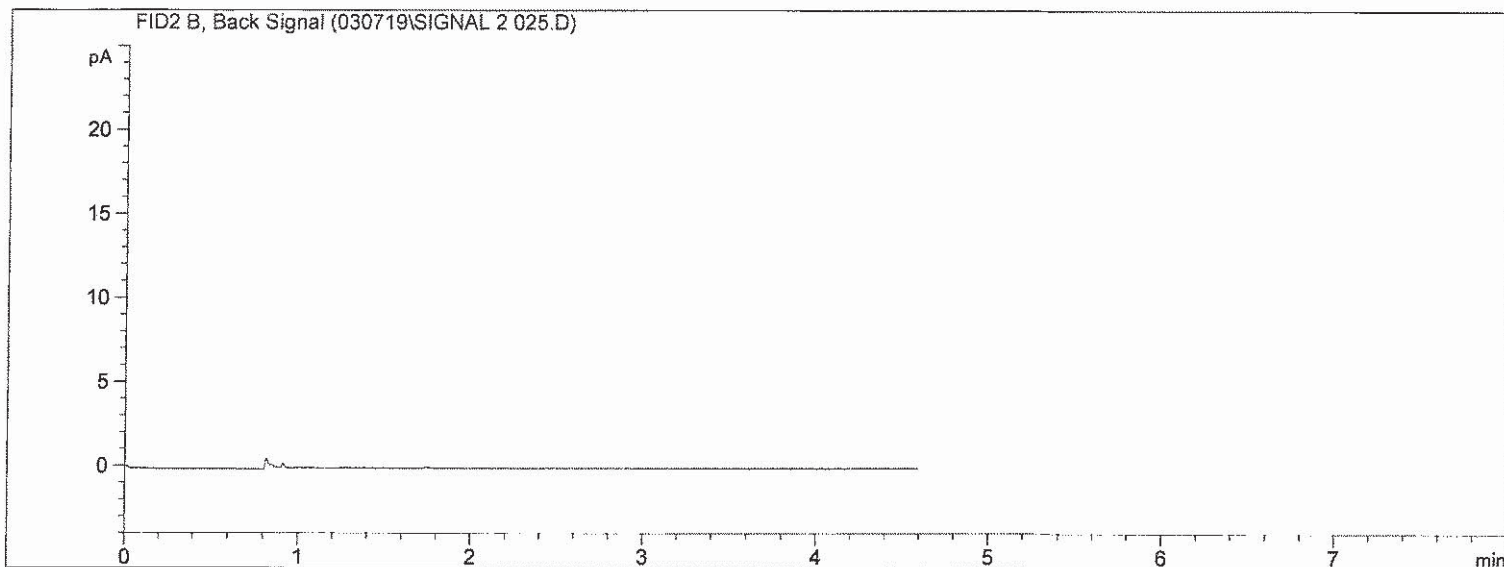
=====
*** End of Report ***

```


Sample Name: GSL_190244-004

```

=====
Acq. Operator   : Emily Decker
Sample Operator : Emily Decker
Acq. Instrument : GC8                      Location : Vial 1
Injection Date  : 3/7/2019 6:47:48 PM
                                           Inj Volume : Manually
Acq. Method     : C:\CHEM32\1\METHODS\REAR_BTEX_ACETALD_M18_030619.M
Last changed    : 3/7/2019 12:32:44 PM by Emily Decker
Analysis Method : C:\CHEM32\1\METHODS\REAR_BTEX_ACETALD_M18_030619.M
Last changed    : 3/11/2019 2:00:38 PM by Emily Decker
                 (modified after loading)
Sample Info     : GSL_190244-004
                 Method:M18
=====
    
```



External Standard Report

```

Sorted By      : Signal
Calib. Data Modified : 3/7/2019 1:36:23 PM
Multiplier     : 1.0000
Dilution       : 1.0000
Do not use Multiplier & Dilution Factor with ISTDs
    
```

Signal 1: FID2 B, Back Signal

RetTime [min]	Type	Area [pA*s]	Amt/Area	Amount [ppmv]	Grp	Name
1.278	-	-	-	-	-	Benzene
1.866	-	-	-	-	-	Toluene
2.006	-	-	-	-	-	Acetaldehyde
2.810	-	-	-	-	-	Ethylbenzene
2.910	-	-	-	-	-	m,p-Xylenes
3.222	-	-	-	-	-	o-Xylene

Totals : 0.00000

Uncalibrated Peaks : compound name not specified

EW
3/11/19

Sample Name: GSL_190244-004

```

=====
Acq. Operator   : Emily Decker
Sample Operator : Emily Decker
Acq. Instrument : GC8                      Location : Vial 1
Injection Date  : 3/7/2019 6:47:48 PM
                                           Inj Volume : Manually
Acq. Method     : C:\CHEM32\1\METHODS\REAR_BTEX_ACETALD_M18_030619.M
Last changed    : 3/7/2019 12:32:44 PM by Emily Decker
Analysis Method : C:\CHEM32\1\METHODS\REAR_BTEX_ACETALD_M18_030619.M
Last changed    : 3/11/2019 2:00:38 PM by Emily Decker
                 (modified after loading)
Sample Info     : GSL_190244-004
                 Method:M18
=====

```

2 Warnings or Errors :

Warning : Calibration warnings (see calibration table listing)

Warning : Calibrated compound(s) not found

```

=====
                          Area Percent Report
=====

```

```

Sorted By           :      Signal
Calib. Data Modified :      3/7/2019 1:36:23 PM
Multiplier          :      1.0000
Dilution            :      1.0000
Do not use Multiplier & Dilution Factor with ISTDs

```

Signal 1: FID2 B, Back Signal

Peak #	RetTime [min]	Type	Width [min]	Area [pA*s]	Area %	Name
1	1.278		0.0000	0.00000	0.00000	Benzene
2	1.866		0.0000	0.00000	0.00000	Toluene
3	2.006		0.0000	0.00000	0.00000	Acetaldehyde
4	2.810		0.0000	0.00000	0.00000	Ethylbenzene
5	2.910		0.0000	0.00000	0.00000	m,p-Xylenes
6	3.222		0.0000	0.00000	0.00000	o-Xylene

Totals : 0.00000 0.0000

Uncalibrated Peaks: n.a.

2 Warnings or Errors :

Warning : Calibration warnings (see calibration table listing)

Warning : Calibrated compound(s) not found

```

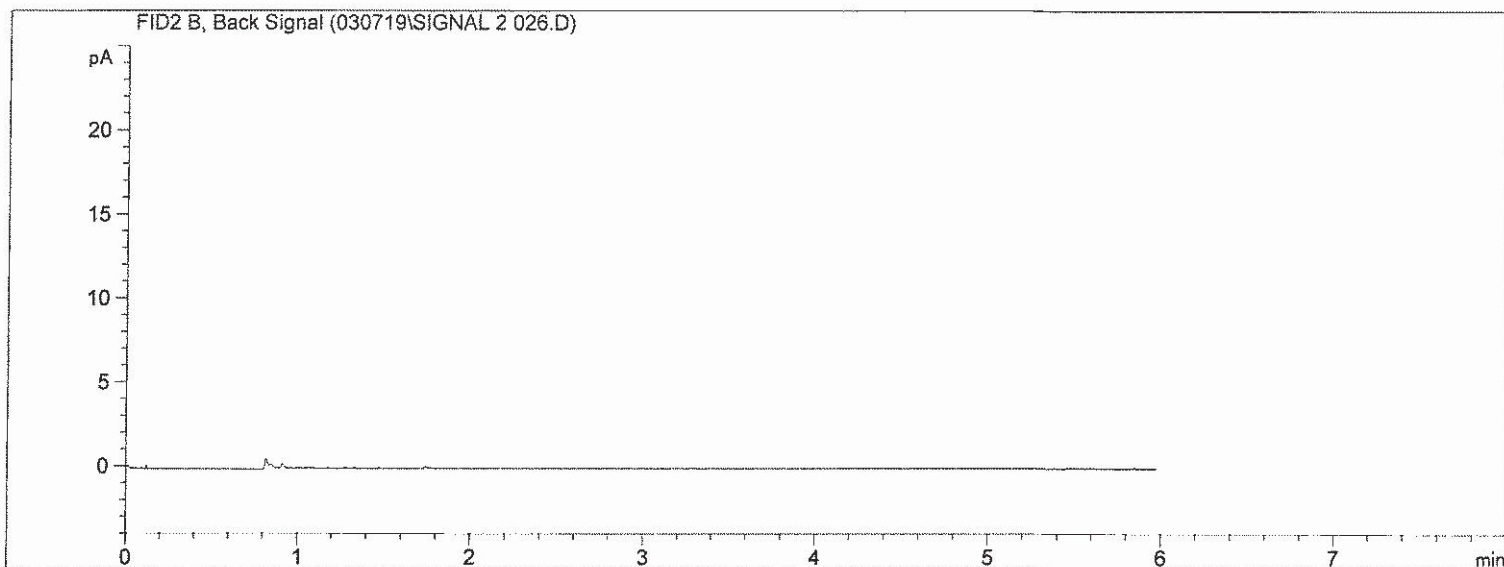
=====
*** End of Report ***

```

Sample Name: GSL_190244-004

```

=====
Acq. Operator   : Emily Decker
Sample Operator : Emily Decker
Acq. Instrument : GC8                      Location : Vial 1
Injection Date  : 3/7/2019 7:01:43 PM
                                           Inj Volume : Manually
Acq. Method     : C:\CHEM32\1\METHODS\REAR_BTEX_ACETALD_M18_030619.M
Last changed    : 3/7/2019 12:32:44 PM by Emily Decker
Analysis Method : C:\CHEM32\1\METHODS\REAR_BTEX_ACETALD_M18_030619.M
Last changed    : 3/11/2019 2:00:38 PM by Emily Decker
                 (modified after loading)
Sample Info     : GSL_190244-004
                 Method:M18
=====
    
```



External Standard Report

```

Sorted By           : Signal
Calib. Data Modified : 3/7/2019 1:36:23 PM
Multiplier          : 1.0000
Dilution            : 1.0000
Do not use Multiplier & Dilution Factor with ISTDs
    
```

Signal 1: FID2 B, Back Signal

RetTime [min]	Type	Area [pA*s]	Amt/Area	Amount [ppmv]	Grp	Name
1.278	-	-	-	-	-	Benzene
1.866	-	-	-	-	-	Toluene
2.006	-	-	-	-	-	Acetaldehyde
2.810	-	-	-	-	-	Ethylbenzene
2.910	-	-	-	-	-	m,p-Xylenes
3.222	-	-	-	-	-	o-Xylene

Totals : 0.00000

Uncalibrated Peaks : compound name not specified

EW
3/11/19

Sample Name: GSL_190244-004

```

=====
Acq. Operator   : Emily Decker
Sample Operator : Emily Decker
Acq. Instrument : GC8                      Location : Vial 1
Injection Date  : 3/7/2019 7:01:43 PM
                                           Inj Volume : Manually
Acq. Method     : C:\CHEM32\1\METHODS\REAR_BTEX_ACETALD_M18_030619.M
Last changed    : 3/7/2019 12:32:44 PM by Emily Decker
Analysis Method : C:\CHEM32\1\METHODS\REAR_BTEX_ACETALD_M18_030619.M
Last changed    : 3/11/2019 2:00:38 PM by Emily Decker
                 (modified after loading)
Sample Info     : GSL_190244-004
                 Method:M18
=====

```

2 Warnings or Errors :

Warning : Calibration warnings (see calibration table listing)

Warning : Calibrated compound(s) not found

```

=====
                          Area Percent Report
=====

```

```

Sorted By           :      Signal
Calib. Data Modified :      3/7/2019 1:36:23 PM
Multiplier          :      1.0000
Dilution            :      1.0000
Do not use Multiplier & Dilution Factor with ISTDs

```

Signal 1: FID2 B, Back Signal

Peak #	RetTime [min]	Type	Width [min]	Area [pA*s]	Area %	Name
1	1.278		0.0000	0.00000	0.00000	Benzene
2	1.866		0.0000	0.00000	0.00000	Toluene
3	2.006		0.0000	0.00000	0.00000	Acetaldehyde
4	2.810		0.0000	0.00000	0.00000	Ethylbenzene
5	2.910		0.0000	0.00000	0.00000	m,p-Xylenes
6	3.222		0.0000	0.00000	0.00000	o-Xylene

Totals : 0.00000 0.0000

Uncalibrated Peaks: n.a.

2 Warnings or Errors :

Warning : Calibration warnings (see calibration table listing)

Warning : Calibrated compound(s) not found

```

=====
*** End of Report ***

```

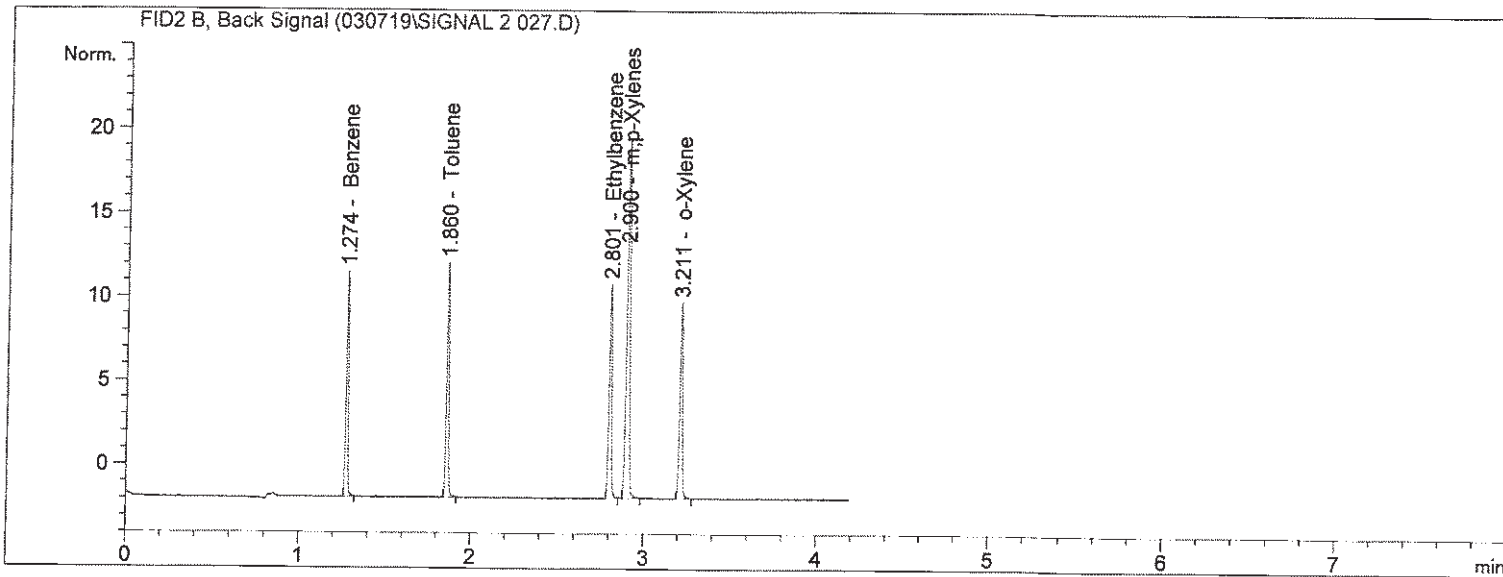
Sample Name: POSTCCV

```

=====
Acq. Operator   : Emily Decker
Sample Operator : Emily Decker
Acq. Instrument : GC8
Injection Date  : 3/7/2019 8:14:38 PM
Location       : Vial 1
Inj Volume     : Manually

Acq. Method    : C:\CHEM32\1\METHODS\REAR_BTEX_ACETALD_M18_030619.M
Last changed   : 3/7/2019 12:32:44 PM by Emily Decker
Analysis Method : C:\CHEM32\1\METHODS\REAR_BTEX_ACETALD_M18_030619.M
Last changed   : 3/7/2019 1:36:36 PM by Emily Decker
                (modified after loading)
Sample Info    : POSTCCV(10ppmv BTEX)
                Method:M18
=====

```



```

=====
External Standard Report
=====

```

```

Sorted By           : Signal
Calib. Data Modified : 3/7/2019 1:36:23 PM
Multiplier          : 1.0000
Dilution            : 1.0000
Do not use Multiplier & Dilution Factor with ISTDs

```

Signal 1: FID2 B, Back Signal

RetTime [min]	Type	Area [pA*s]	Amt/Area	Amount [ppmv]	Grp	Name
1.274	BB	8.96526	1.11651	10.00983		Benzene
1.860	BB	9.98124	1.02218	10.20259		Toluene
2.006		-	-	-		Acetaldehyde
2.801	BB	10.75550	9.81706e-1	10.55873		Ethylbenzene
2.900	BB	20.93426	1.02577	21.47373		m,p-Xylenes
3.211	BB	10.43347	1.04696	10.92345		o-Xylene

Totals : 63.16833

Uncalibrated Peaks : compound name not specified

ES
3/11/19

Sample Name: POSTCCV

```
=====
Acq. Operator   : Emily Decker
Sample Operator : Emily Decker
Acq. Instrument : GC8                               Location : Vial 1
Injection Date  : 3/7/2019 8:14:38 PM
                                                    Inj Volume : Manually
Acq. Method     : C:\CHEM32\1\METHODS\REAR_BTEX_ACETALD_M18_030619.M
Last changed    : 3/7/2019 12:32:44 PM by Emily Decker
Analysis Method : C:\CHEM32\1\METHODS\REAR_BTEX_ACETALD_M18_030619.M
Last changed    : 3/7/2019 1:36:36 PM by Emily Decker
                (modified after loading)
Sample Info     : POSTCCV(10ppmv BTEX)
                Method:M18
=====
```

2 Warnings or Errors :

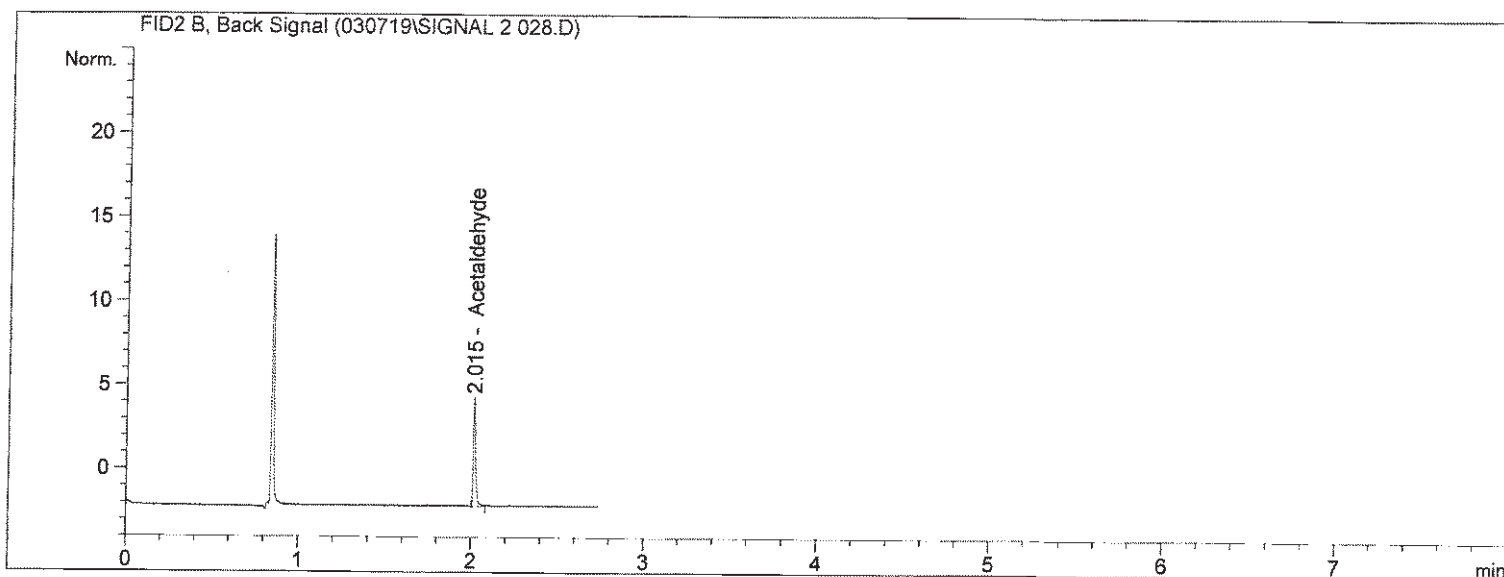
Warning : Calibration warnings (see calibration table listing)
Warning : Calibrated compound(s) not found

```
=====
*** End of Report ***
```

Sample Name: POSTCCV

```

=====
Acq. Operator   : Emily Decker
Sample Operator : Emily Decker
Acq. Instrument : GC8
Injection Date  : 3/7/2019 8:56:40 PM
Location       : Vial 1
Inj Volume     : Manually
Acq. Method    : C:\CHEM32\1\METHODS\REAR_BTEX_ACETALD_M18_030619.M
Last changed   : 3/7/2019 12:32:44 PM by Emily Decker
Analysis Method : C:\CHEM32\1\METHODS\REAR_BTEX_ACETALD_M18_030619.M
Last changed   : 3/7/2019 8:59:50 PM by Emily Decker
                (modified after loading)
Sample Info    : POSTCCV(100ppmv Acetaldehyde)
                Method:M18
=====
    
```



External Standard Report

```

Sorted By      : Signal
Calib. Data Modified : 3/7/2019 1:36:23 PM
Multiplier     : 1.0000
Dilution       : 1.0000
Do not use Multiplier & Dilution Factor with ISTDs
    
```

Signal 1: FID2 B, Back Signal

RetTime [min]	Type	Area [pA*s]	Amt/Area	Amount [ppmv]	Grp	Name
1.278	-	-	-	-	-	Benzene
1.866	-	-	-	-	-	Toluene
2.015	BBA	4.59173	21.61679	99.25848	-	Acetaldehyde
2.810	-	-	-	-	-	Ethylbenzene
2.910	-	-	-	-	-	m,p-Xylenes
3.222	-	-	-	-	-	o-Xylene

Totals : 99.25848

Uncalibrated Peaks : compound name not specified

EW
3/11/19

Sample Name: POSTCCV

```
=====
Acq. Operator   : Emily Decker
Sample Operator : Emily Decker
Acq. Instrument : GC8                      Location : Vial 1
Injection Date  : 3/7/2019 8:56:40 PM
                                           Inj Volume : Manually
Acq. Method     : C:\CHEM32\1\METHODS\REAR_BTEX_ACETALD_M18_030619.M
Last changed    : 3/7/2019 12:32:44 PM by Emily Decker
Analysis Method : C:\CHEM32\1\METHODS\REAR_BTEX_ACETALD_M18_030619.M
Last changed    : 3/7/2019 8:59:50 PM by Emily Decker
                 (modified after loading)
Sample Info     : POSTCCV(100ppmv Acetaldehyde)
                 Method:M18
=====
```

2 Warnings or Errors :

Warning : Calibration warnings (see calibration table listing)
Warning : Calibrated compound(s) not found

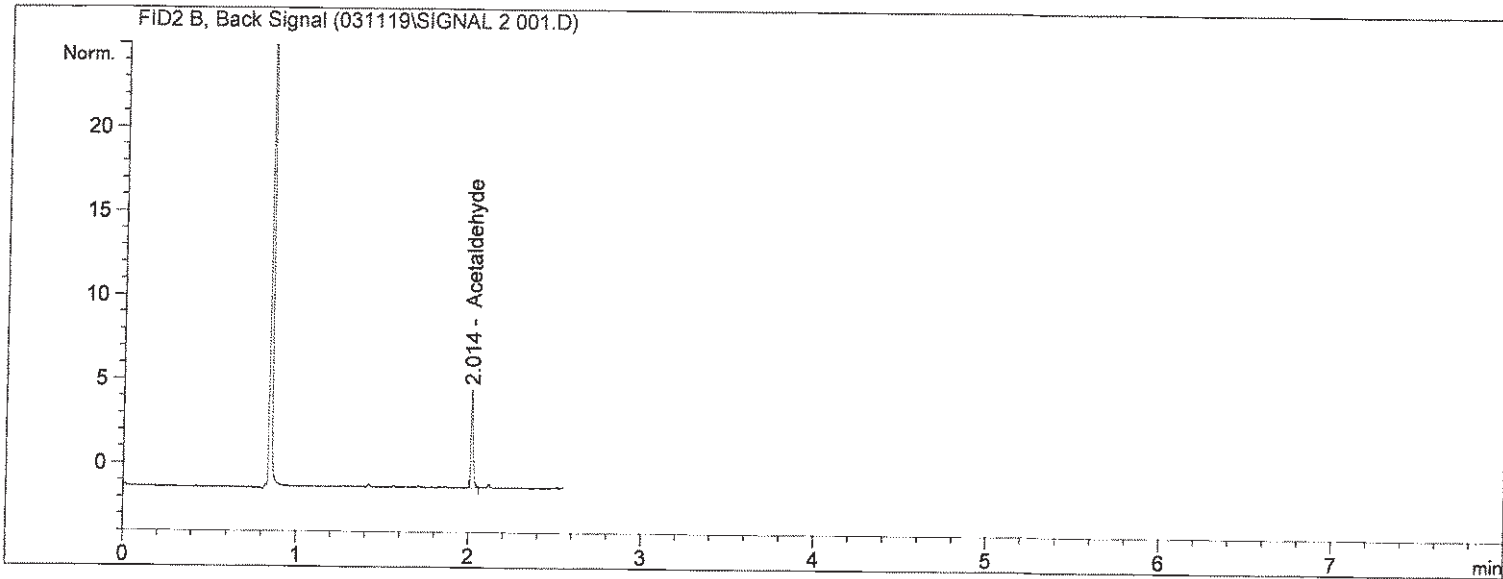
```
=====
*** End of Report ***
```


Sample Name: CCV

```

=====
Acq. Operator   : Emily Decker
Sample Operator : Emily Decker
Acq. Instrument : GC8
Injection Date  : 3/11/2019 10:24:45 AM
Location        : Vial 1
Inj Volume     : Manually

Acq. Method    : C:\CHEM32\1\METHODS\REAR_BTEX_ACETALD_M18_030619.M
Last changed   : 3/8/2019 10:17:23 AM by Emily Decker
Analysis Method : C:\CHEM32\1\METHODS\REAR_BTEX_ACETALD_M18_030619.M
Last changed   : 3/11/2019 10:28:24 AM by Emily Decker
                (modified after loading)
Sample Info    : CCV(100ppmv Acetaldehyde)
                Method:M18
=====
    
```



External Standard Report

```

Sorted By      : Signal
Calib. Data Modified : 3/7/2019 1:36:23 PM
Multiplier     : 1.0000
Dilution       : 1.0000
Do not use Multiplier & Dilution Factor with ISTDs
    
```

Signal 1: FID2 B, Back Signal

RetTime [min]	Type	Area [pA*s]	Amt/Area	Amount [ppmv]	Grp	Name
1.278	-	-	-	-	-	Benzene
1.866	-	-	-	-	-	Toluene
2.014	BB	4.72654	21.61679	102.17253	-	Acetaldehyde
2.810	-	-	-	-	-	Ethylbenzene
2.910	-	-	-	-	-	m,p-Xylenes
3.222	-	-	-	-	-	o-Xylene

Totals : 102.17253

Uncalibrated Peaks : compound name not specified

aw
3/12/19

Sample Name: CCV

```
=====
Acq. Operator   : Emily Decker
Sample Operator : Emily Decker
Acq. Instrument : GC8                      Location : Vial 1
Injection Date  : 3/11/2019 10:24:45 AM
                                           Inj Volume : Manually
Acq. Method     : C:\CHEM32\1\METHODS\REAR_BTEX_ACETALD_M18_030619.M
Last changed    : 3/8/2019 10:17:23 AM by Emily Decker
Analysis Method : C:\CHEM32\1\METHODS\REAR_BTEX_ACETALD_M18_030619.M
Last changed    : 3/11/2019 10:28:24 AM by Emily Decker
                 (modified after loading)
Sample Info     : CCV(100ppmv Acetaldehyde)
                 Method:M18
=====
```

2 Warnings or Errors :

Warning : Calibration warnings (see calibration table listing)

Warning : Calibrated compound(s) not found

```
=====
*** End of Report ***
```

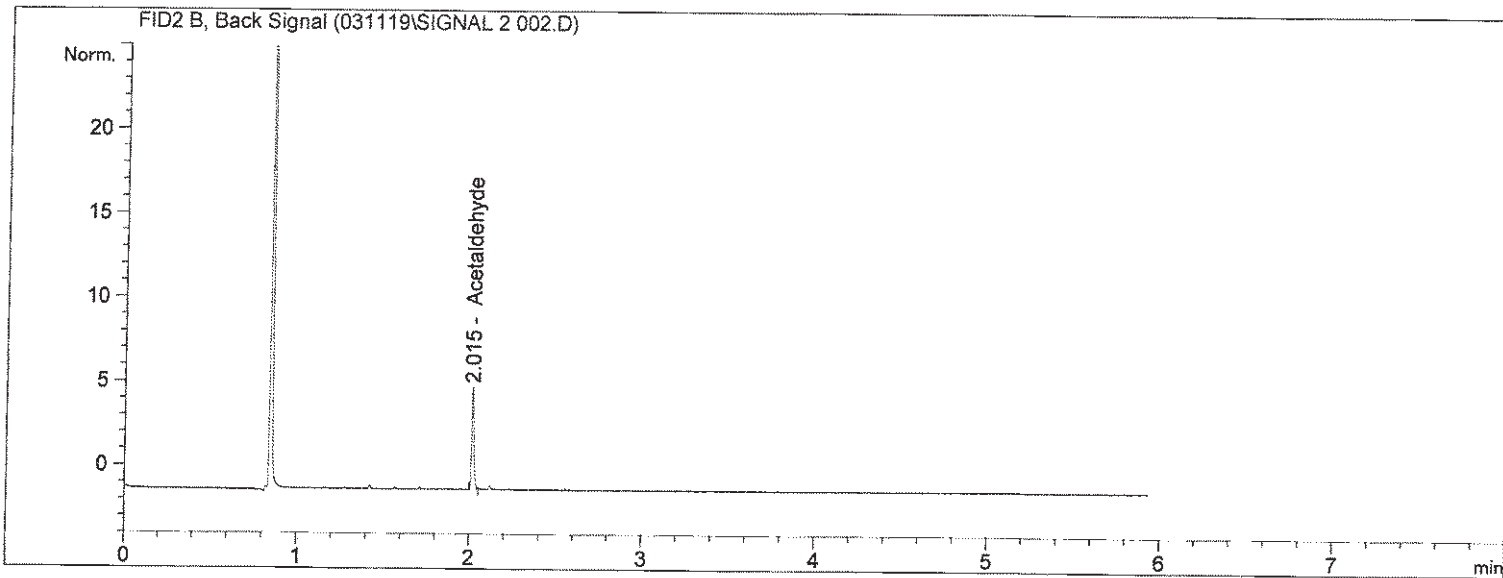
Sample Name: LCS

```

=====
Acq. Operator   : Emily Decker
Sample Operator : Emily Decker
Acq. Instrument : GC8
Injection Date  : 3/11/2019 10:31:47 AM
Location       : Vial 1
Inj Volume     : Manually

Acq. Method    : C:\CHEM32\1\METHODS\REAR_BTEX_ACETALD_M18_030619.M
Last changed   : 3/8/2019 10:17:23 AM by Emily Decker
Analysis Method : C:\CHEM32\1\METHODS\REAR_BTEX_ACETALD_M18_030619.M
Last changed   : 3/11/2019 10:38:10 AM by Emily Decker
                (modified after loading)
Sample Info    : LCS(100ppmv Acetaldehyde)
                Method:M18
=====

```



```

=====
External Standard Report
=====

```

```

Sorted By      : Signal
Calib. Data Modified : 3/7/2019 1:36:23 PM
Multiplier     : 1.0000
Dilution       : 1.0000
Do not use Multiplier & Dilution Factor with ISTDs

```

Signal 1: FID2 B, Back Signal

RetTime [min]	Type	Area [pA*s]	Amt/Area	Amount [ppmv]	Grp	Name
1.278	-	-	-	-	-	Benzene
1.866	-	-	-	-	-	Toluene
2.015	BB	4.92628	21.61679	106.49040	-	Acetaldehyde
2.810	-	-	-	-	-	Ethylbenzene
2.910	-	-	-	-	-	m,p-Xylenes
3.222	-	-	-	-	-	o-Xylene

Totals : 106.49040

Uncalibrated Peaks : compound name not specified

aw
3/12/19

Sample Name: LCS

```
=====
Acq. Operator   : Emily Decker
Sample Operator : Emily Decker
Acq. Instrument : GC8                      Location : Vial 1
Injection Date  : 3/11/2019 10:31:47 AM
                                           Inj Volume : Manually
Acq. Method     : C:\CHEM32\1\METHODS\REAR_BTEX_ACETALD_M18_030619.M
Last changed    : 3/8/2019 10:17:23 AM by Emily Decker
Analysis Method : C:\CHEM32\1\METHODS\REAR_BTEX_ACETALD_M18_030619.M
Last changed    : 3/11/2019 10:38:10 AM by Emily Decker
                 (modified after loading)
Sample Info     : LCS(100ppmv Acetaldehyde)
                 Method:M18
=====
```

2 Warnings or Errors :

Warning : Calibration warnings (see calibration table listing)
Warning : Calibrated compound(s) not found

```
=====
*** End of Report ***
```

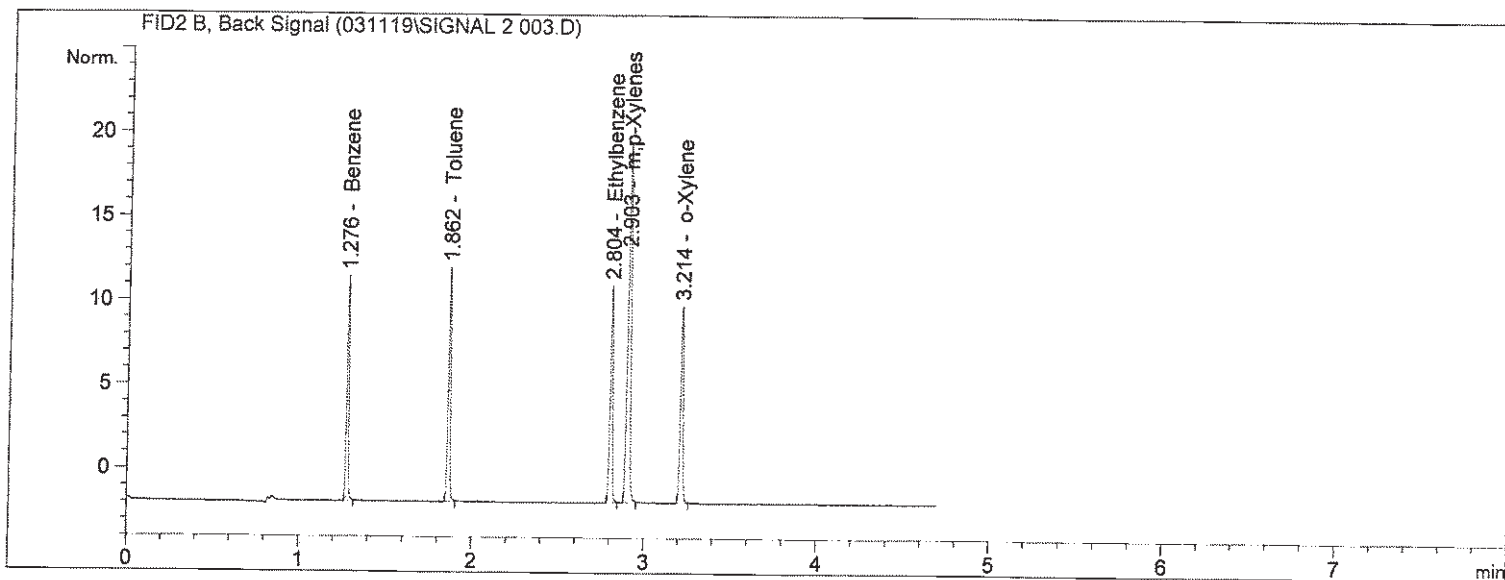
Sample Name: CCV

```

=====
Acq. Operator   : Emily Decker
Sample Operator : Emily Decker
Acq. Instrument : GC8
Injection Date  : 3/11/2019 11:00:52 AM
Location        : Vial 1
Inj Volume     : Manually

Acq. Method    : C:\CHEM32\1\METHODS\REAR_BTEX_ACETALD_M18_030619.M
Last changed   : 3/8/2019 10:17:23 AM by Emily Decker
Analysis Method : C:\CHEM32\1\METHODS\REAR_BTEX_ACETALD_M18_030619.M
Last changed   : 3/11/2019 11:06:31 AM by Emily Decker
                (modified after loading)

Sample Info    : CCV(10ppmv BTEX)
                Method:M18
=====
    
```



External Standard Report

```

Sorted By           : Signal
Calib. Data Modified : 3/7/2019 1:36:23 PM
Multiplier          : 1.0000
Dilution            : 1.0000
Do not use Multiplier & Dilution Factor with ISTDs
    
```

Signal 1: FID2 B, Back Signal

RetTime [min]	Type	Area [pA*s]	Amt/Area	Amount [ppmv]	Grp	Name
1.276	BB	8.90471	1.11651	9.94222		Benzene
1.862	BB	9.96515	1.02218	10.18614		Toluene
2.006		-	-	-		Acetaldehyde
2.804	BB	10.81676	9.81706e-1	10.61887		Ethylbenzene
2.903	BB	21.07440	1.02577	21.61748		m,p-Xylenes
3.214	BB	10.59319	1.04696	11.09066		o-Xylene

Totals : 63.45537

Uncalibrated Peaks : compound name not specified

ew
3/12/19

Sample Name: CCV

```
=====
Acq. Operator   : Emily Decker
Sample Operator : Emily Decker
Acq. Instrument : GC8                      Location : Vial 1
Injection Date  : 3/11/2019 11:00:52 AM
                                           Inj Volume : Manually
Acq. Method     : C:\CHEM32\1\METHODS\REAR_BTEX_ACETALD_M18_030619.M
Last changed    : 3/8/2019 10:17:23 AM by Emily Decker
Analysis Method : C:\CHEM32\1\METHODS\REAR_BTEX_ACETALD_M18_030619.M
Last changed    : 3/11/2019 11:06:31 AM by Emily Decker
                 (modified after loading)
Sample Info     : CCV(10ppmv BTEX)
                 Method:M18
=====
```

2 Warnings or Errors :

Warning : Calibration warnings (see calibration table listing)
Warning : Calibrated compound(s) not found

```
=====
*** End of Report ***
```

Sample Name: LCS

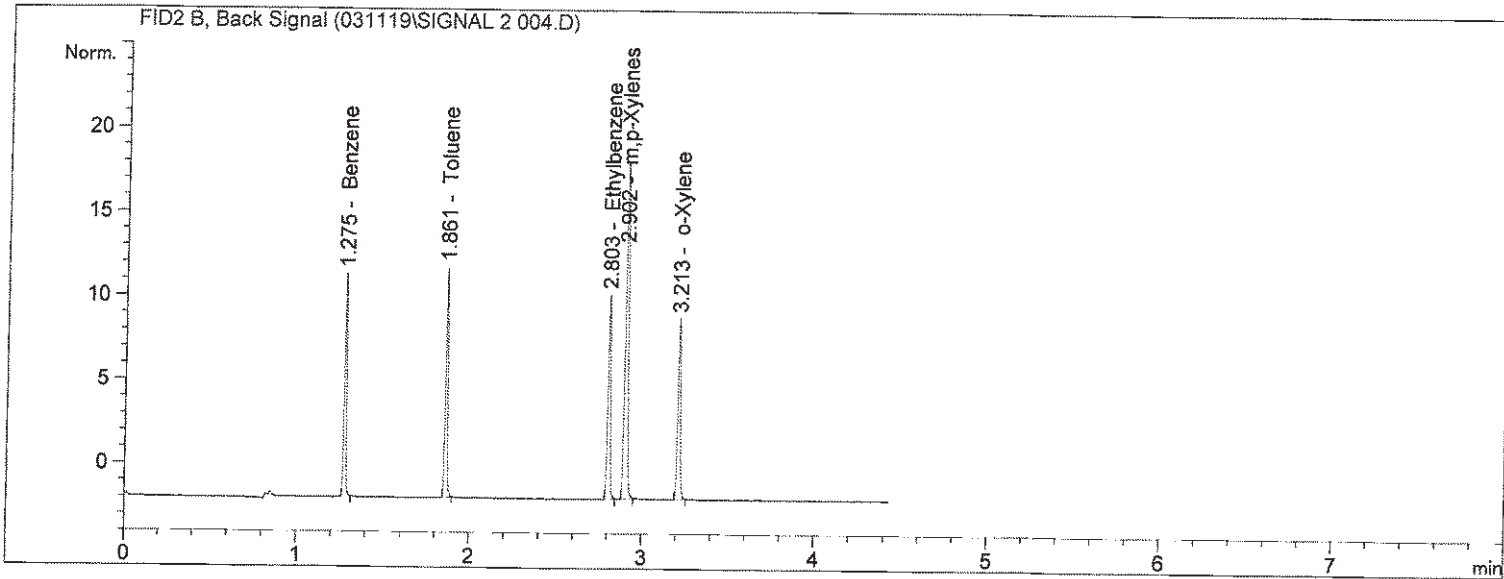
```

=====
Acq. Operator   : Emily Decker
Sample Operator : Emily Decker
Acq. Instrument : GC8
Injection Date  : 3/11/2019 11:09:26 AM
Location       : Vial 1
Inj Volume     : Manually

Acq. Method    : C:\CHEM32\1\METHODS\REAR_BTEX_ACETALD_M18_030619.M
Last changed   : 3/8/2019 10:17:23 AM by Emily Decker
Analysis Method : C:\CHEM32\1\METHODS\REAR_BTEX_ACETALD_M18_030619.M
Last changed   : 3/11/2019 11:06:40 AM by Emily Decker
                (modified after loading)

Sample Info    : LCS(10ppmv BTEX)
                Method:M18
=====

```



```

=====
External Standard Report
=====

```

```

Sorted By      : Signal
Calib. Data Modified : 3/7/2019 1:36:23 PM
Multiplier     : 1.0000
Dilution      : 1.0000
Do not use Multiplier & Dilution Factor with ISTDs

```

Signal 1: FID2 B, Back Signal

RetTime [min]	Type	Area [pA*s]	Amt/Area	Amount [ppmv]	Grp	Name
1.275	BB	8.69288	1.11651	9.70572		Benzene
1.861	BB	9.50383	1.02218	9.71460		Toluene
2.006		-	-	-		Acetaldehyde
2.803	BB	9.99047	9.81706e-1	9.80770		Ethylbenzene
2.902	BB	19.17288	1.02577	19.66696		m,p-Xylenes
3.213	BB	9.50381	1.04696	9.95012		o-Xylene

Totals : 58.84510

Uncalibrated Peaks : compound name not specified

aw
3/12/19

Sample Name: LCS

```
=====
Acq. Operator   : Emily Decker
Sample Operator : Emily Decker
Acq. Instrument : GC8                      Location : Vial 1
Injection Date  : 3/11/2019 11:09:26 AM
                                           Inj Volume : Manually
Acq. Method     : C:\CHEM32\1\METHODS\REAR_BTEX_ACETALD_M18_030619.M
Last changed    : 3/8/2019 10:17:23 AM by Emily Decker
Analysis Method : C:\CHEM32\1\METHODS\REAR_BTEX_ACETALD_M18_030619.M
Last changed    : 3/11/2019 11:06:40 AM by Emily Decker
                 (modified after loading)
Sample Info     : LCS(10ppmv BTEX)
                 Method:M18
=====
```

2 Warnings or Errors :

Warning : Calibration warnings (see calibration table listing)
Warning : Calibrated compound(s) not found

```
=====
*** End of Report ***
```

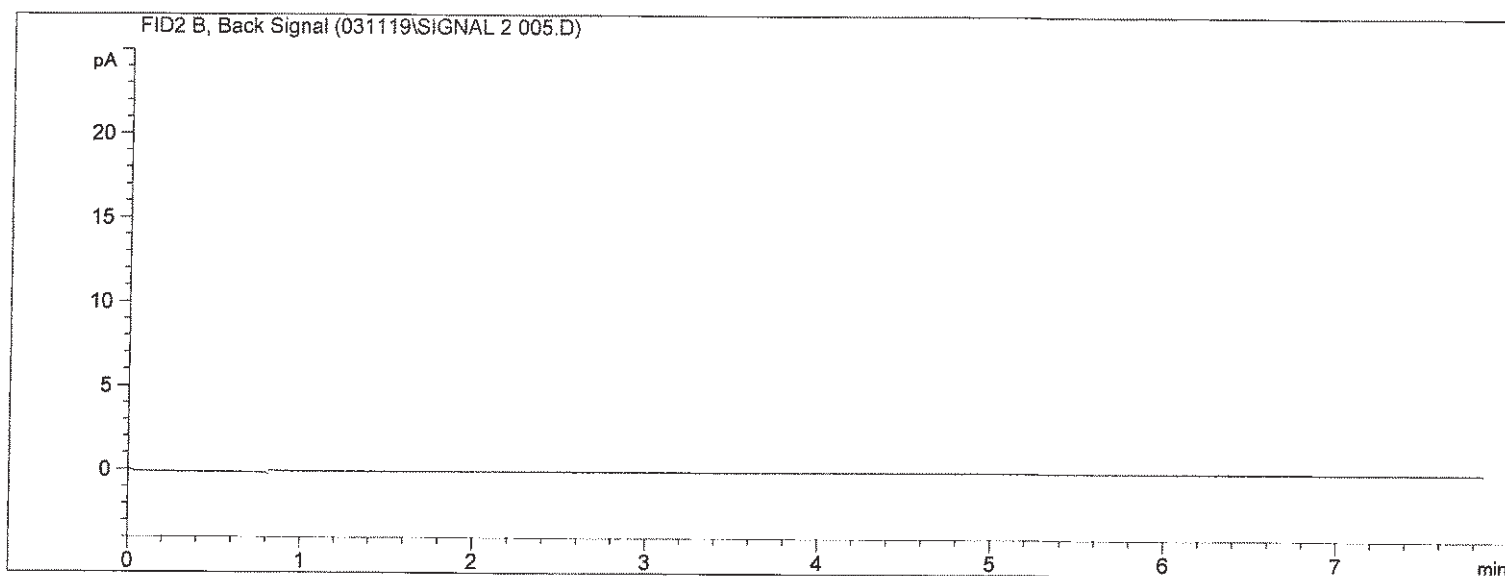

Sample Name: BLANK

```

=====
Acq. Operator   : Emily Decker
Sample Operator : Emily Decker
Acq. Instrument : GC8
Injection Date  : 3/11/2019 11:16:22 AM
Location       : Vial 1
Inj Volume     : Manually

Acq. Method    : C:\CHEM32\1\METHODS\REAR_BTEX_ACETALD_M18_030619.M
Last changed   : 3/8/2019 10:17:23 AM by Emily Decker
Analysis Method : C:\CHEM32\1\METHODS\REAR_BTEX_ACETALD_M18_030619.M
Last changed   : 3/11/2019 11:06:40 AM by Emily Decker
                (modified after loading)

Sample Info    : BLANK
                Method:M18
=====
    
```



External Standard Report

```

=====
Sorted By      : Signal
Calib. Data Modified : 3/7/2019 1:36:23 PM
Multiplier     : 1.0000
Dilution       : 1.0000
Do not use Multiplier & Dilution Factor with ISTDs
    
```

Signal 1: FID2 B, Back Signal

RetTime [min]	Type	Area [pA*s]	Amt/Area	Amount [ppmv]	Grp	Name
1.278	-	-	-	-	-	Benzene
1.866	-	-	-	-	-	Toluene
2.006	-	-	-	-	-	Acetaldehyde
2.810	-	-	-	-	-	Ethylbenzene
2.910	-	-	-	-	-	m,p-Xylenes
3.222	-	-	-	-	-	o-Xylene

Totals : 0.00000

AW
3/12/19

Uncalibrated Peaks : compound name not specified

Sample Name: BLANK

```

=====
Acq. Operator   : Emily Decker
Sample Operator : Emily Decker
Acq. Instrument : GC8                      Location : Vial 1
Injection Date  : 3/11/2019 11:16:22 AM
                                           Inj Volume : Manually
Acq. Method     : C:\CHEM32\1\METHODS\REAR_BTEX_ACETALD_M18_030619.M
Last changed    : 3/8/2019 10:17:23 AM by Emily Decker
Analysis Method : C:\CHEM32\1\METHODS\REAR_BTEX_ACETALD_M18_030619.M
Last changed    : 3/11/2019 11:06:40 AM by Emily Decker
                                           (modified after loading)
Sample Info     : BLANK
                                           Method:M18
=====

```

2 Warnings or Errors :

Warning : Calibration warnings (see calibration table listing)

Warning : Calibrated compound(s) not found

```

=====
                          Area Percent Report
=====

```

```

Sorted By           :      Signal
Calib. Data Modified :      3/7/2019 1:36:23 PM
Multiplier          :      1.0000
Dilution            :      1.0000
Do not use Multiplier & Dilution Factor with ISTDs

```

Signal 1: FID2 B, Back Signal

Peak #	RetTime [min]	Type	Width [min]	Area [pA*s]	Area %	Name
1	1.278		0.0000	0.00000	0.00000	Benzene
2	1.866		0.0000	0.00000	0.00000	Toluene
3	2.006		0.0000	0.00000	0.00000	Acetaldehyde
4	2.810		0.0000	0.00000	0.00000	Ethylbenzene
5	2.910		0.0000	0.00000	0.00000	m,p-Xylenes
6	3.222		0.0000	0.00000	0.00000	o-Xylene

Totals : 0.00000 0.0000

Uncalibrated Peaks: n.a.

2 Warnings or Errors :

Warning : Calibration warnings (see calibration table listing)

Warning : Calibrated compound(s) not found

```

=====
*** End of Report ***

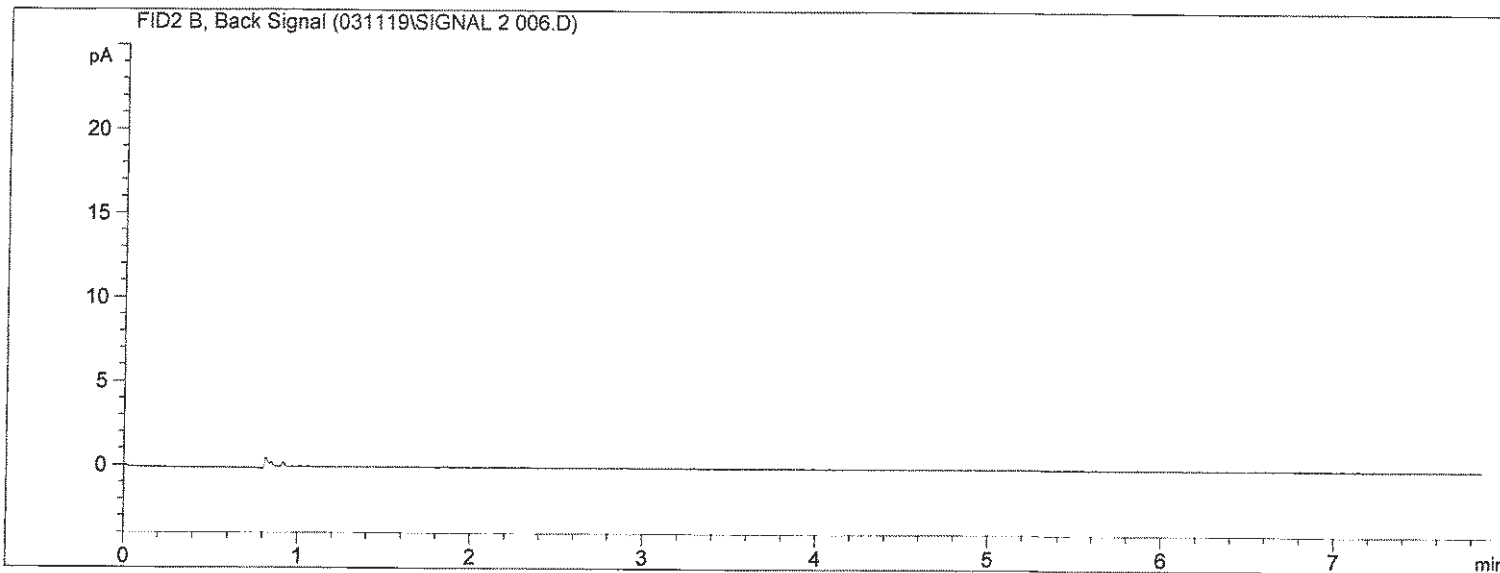
```

Sample Name: GSL_190247-001

```

=====
Acq. Operator   : Emily Decker
Sample Operator : Emily Decker
Acq. Instrument : GC8
Injection Date  : 3/11/2019 11:29:49 AM
Location        : Vial 1
Inj Volume      : Manually
Acq. Method     : C:\CHEM32\1\METHODS\REAR_BTEX_ACETALD_M18_030619.M
Last changed    : 3/8/2019 10:17:23 AM by Emily Decker
Analysis Method : C:\CHEM32\1\METHODS\REAR_BTEX_ACETALD_M18_030619.M
Last changed    : 3/11/2019 11:06:40 AM by Emily Decker
                  (modified after loading)
Sample Info     : GSL_190247-001
                  Method:M18
=====

```



```

=====
External Standard Report
=====

```

```

Sorted By      : Signal
Calib. Data Modified : 3/7/2019 1:36:23 PM
Multiplier     : 1.0000
Dilution       : 1.0000
Do not use Multiplier & Dilution Factor with ISTDs

```

Signal 1: FID2 B, Back Signal

RetTime [min]	Type	Area [pA*s]	Amt/Area	Amount [ppmv]	Grp	Name
1.278	-	-	-	-	-	Benzene
1.866	-	-	-	-	-	Toluene
2.006	-	-	-	-	-	Acetaldehyde
2.810	-	-	-	-	-	Ethylbenzene
2.910	-	-	-	-	-	m,p-Xylenes
3.222	-	-	-	-	-	o-Xylene

Totals : 0.00000

Uncalibrated Peaks : compound name not specified

aw
3/12/19

Sample Name: GSL_190247-001

```

=====
Acq. Operator   : Emily Decker
Sample Operator : Emily Decker
Acq. Instrument : GC8                               Location : Vial 1
Injection Date  : 3/11/2019 11:29:49 AM
                                                    Inj Volume : Manually
Acq. Method     : C:\CHEM32\1\METHODS\REAR_BTEX_ACETALD_M18_030619.M
Last changed    : 3/8/2019 10:17:23 AM by Emily Decker
Analysis Method : C:\CHEM32\1\METHODS\REAR_BTEX_ACETALD_M18_030619.M
Last changed    : 3/11/2019 11:06:40 AM by Emily Decker
                (modified after loading)
Sample Info     : GSL_190247-001
                Method:M18
=====

```

2 Warnings or Errors :

Warning : Calibration warnings (see calibration table listing)

Warning : Calibrated compound(s) not found

```

=====
                          Area Percent Report
=====

```

```

Sorted By           :      Signal
Calib. Data Modified :      3/7/2019 1:36:23 PM
Multiplier          :      1.0000
Dilution            :      1.0000
Do not use Multiplier & Dilution Factor with ISTDs

```

Signal 1: FID2 B, Back Signal

Peak #	RetTime [min]	Type	Width [min]	Area [pA*s]	Area %	Name
1	1.278		0.0000	0.00000	0.00000	Benzene
2	1.866		0.0000	0.00000	0.00000	Toluene
3	2.006		0.0000	0.00000	0.00000	Acetaldehyde
4	2.810		0.0000	0.00000	0.00000	Ethylbenzene
5	2.910		0.0000	0.00000	0.00000	m,p-Xylenes
6	3.222		0.0000	0.00000	0.00000	o-Xylene

Totals : 0.00000 0.0000

Uncalibrated Peaks: n.a.

2 Warnings or Errors :

Warning : Calibration warnings (see calibration table listing)

Warning : Calibrated compound(s) not found

```

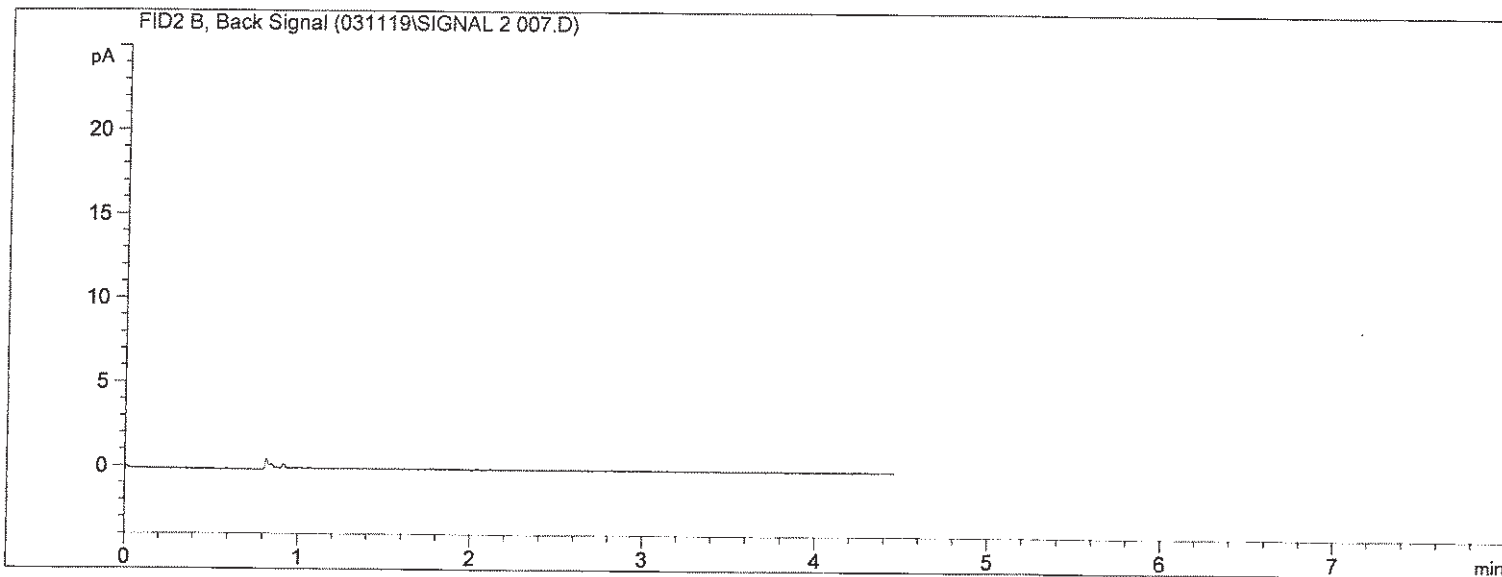
=====
*** End of Report ***

```

Sample Name: GSL_190247-001

```

=====
Acq. Operator   : Emily Decker
Sample Operator : Emily Decker
Acq. Instrument : GC8
Injection Date  : 3/11/2019 11:45:51 AM
Location       : Vial 1
Inj Volume     : Manually
Acq. Method    : C:\CHEM32\1\METHODS\REAR_BTEX_ACETALD_M18_030619.M
Last changed   : 3/8/2019 10:17:23 AM by Emily Decker
Analysis Method : C:\CHEM32\1\METHODS\REAR_BTEX_ACETALD_M18_030619.M
Last changed   : 3/11/2019 11:06:40 AM by Emily Decker
                (modified after loading)
Sample Info    : GSL_190247-001
                Method:M18
=====
    
```



External Standard Report

```

Sorted By      : Signal
Calib. Data Modified : 3/7/2019 1:36:23 PM
Multiplier     : 1.0000
Dilution       : 1.0000
Do not use Multiplier & Dilution Factor with ISTDs
    
```

Signal 1: FID2 B, Back Signal

RetTime [min]	Type	Area [pA*s]	Amt/Area	Amount [ppmv]	Grp	Name
1.278	-	-	-	-	-	Benzene
1.866	-	-	-	-	-	Toluene
2.006	-	-	-	-	-	Acetaldehyde
2.810	-	-	-	-	-	Ethylbenzene
2.910	-	-	-	-	-	m,p-Xylenes
3.222	-	-	-	-	-	o-Xylene

Totals : 0.00000

END
3/12/19

Uncalibrated Peaks : compound name not specified

Sample Name: GSL_190247-001

```

=====
Acq. Operator   : Emily Decker
Sample Operator : Emily Decker
Acq. Instrument : GC8                      Location : Vial 1
Injection Date  : 3/11/2019 11:45:51 AM
                                           Inj Volume : Manually
Acq. Method     : C:\CHEM32\1\METHODS\REAR_BTEX_ACETALD_M18_030619.M
Last changed    : 3/8/2019 10:17:23 AM by Emily Decker
Analysis Method : C:\CHEM32\1\METHODS\REAR_BTEX_ACETALD_M18_030619.M
Last changed    : 3/11/2019 11:06:40 AM by Emily Decker
                 (modified after loading)
Sample Info     : GSL_190247-001
                 Method:M18
=====

```

2 Warnings or Errors :

Warning : Calibration warnings (see calibration table listing)

Warning : Calibrated compound(s) not found

```

=====
                          Area Percent Report
=====

```

```

Sorted By           :      Signal
Calib. Data Modified :      3/7/2019 1:36:23 PM
Multiplier          :      1.0000
Dilution            :      1.0000
Do not use Multiplier & Dilution Factor with ISTDs

```

Signal 1: FID2 B, Back Signal

Peak #	RetTime [min]	Type	Width [min]	Area [pA*s]	Area %	Name
1	1.278		0.0000	0.00000	0.00000	Benzene
2	1.866		0.0000	0.00000	0.00000	Toluene
3	2.006		0.0000	0.00000	0.00000	Acetaldehyde
4	2.810		0.0000	0.00000	0.00000	Ethylbenzene
5	2.910		0.0000	0.00000	0.00000	m,p-Xylenes
6	3.222		0.0000	0.00000	0.00000	o-Xylene

Totals : 0.00000 0.0000

Uncalibrated Peaks: n.a.

2 Warnings or Errors :

Warning : Calibration warnings (see calibration table listing)

Warning : Calibrated compound(s) not found

```

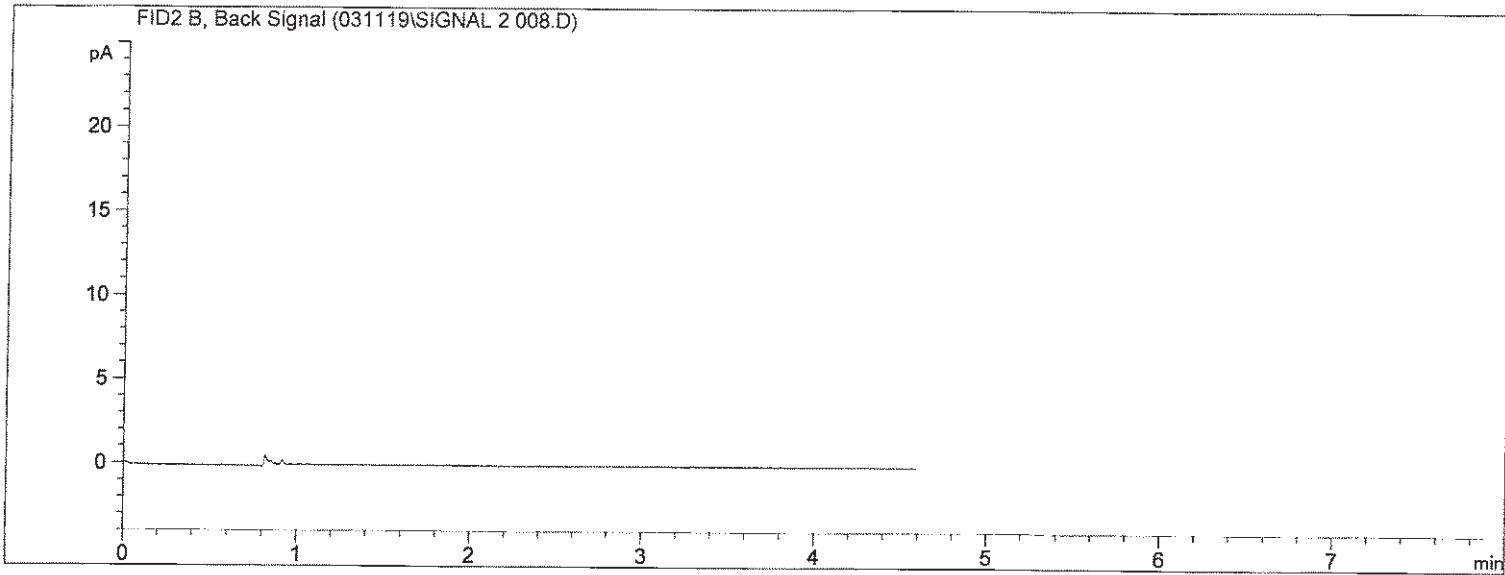
=====
*** End of Report ***

```

Sample Name: GSL_190247-001

```

=====
Acq. Operator   : Emily Decker
Sample Operator : Emily Decker
Acq. Instrument : GC8                      Location : Vial 1
Injection Date  : 3/11/2019 11:53:06 AM
                                           Inj Volume : Manually
Acq. Method     : C:\CHEM32\1\METHODS\REAR_BTEX_ACETALD_M18_030619.M
Last changed    : 3/8/2019 10:17:23 AM by Emily Decker
Analysis Method : C:\CHEM32\1\METHODS\REAR_BTEX_ACETALD_M18_030619.M
Last changed    : 3/11/2019 11:06:40 AM by Emily Decker
                 (modified after loading)
Sample Info     : GSL_190247-001
                 Method:M18
=====
    
```



External Standard Report

```

Sorted By           : Signal
Calib. Data Modified : 3/7/2019 1:36:23 PM
Multiplier          : 1.0000
Dilution            : 1.0000
Do not use Multiplier & Dilution Factor with ISTDs
    
```

Signal 1: FID2 B, Back Signal

RetTime [min]	Type	Area [pA*s]	Amt/Area	Amount [ppmv]	Grp	Name
1.278	-	-	-	-		Benzene
1.866	-	-	-	-		Toluene
2.006	-	-	-	-		Acetaldehyde
2.810	-	-	-	-		Ethylbenzene
2.910	-	-	-	-		m,p-Xylenes
3.222	-	-	-	-		o-Xylene

Totals : 0.00000

Uncalibrated Peaks : compound name not specified

aw
3/12/19

Sample Name: GSL_190247-001

```

=====
Acq. Operator   : Emily Decker
Sample Operator : Emily Decker
Acq. Instrument : GC8                      Location : Vial 1
Injection Date  : 3/11/2019 11:53:06 AM
                                           Inj Volume : Manually
Acq. Method     : C:\CHEM32\1\METHODS\REAR_BTEX_ACETALD_M18_030619.M
Last changed    : 3/8/2019 10:17:23 AM by Emily Decker
Analysis Method : C:\CHEM32\1\METHODS\REAR_BTEX_ACETALD_M18_030619.M
Last changed    : 3/11/2019 11:06:40 AM by Emily Decker
                                           (modified after loading)
Sample Info     : GSL_190247-001
                                           Method:M18
=====

```

2 Warnings or Errors :

Warning : Calibration warnings (see calibration table listing)
Warning : Calibrated compound(s) not found

```

=====
                          Area Percent Report
=====

```

```

Sorted By           :      Signal
Calib. Data Modified :      3/7/2019 1:36:23 PM
Multiplier          :      1.0000
Dilution            :      1.0000
Do not use Multiplier & Dilution Factor with ISTDs

```

Signal 1: FID2 B, Back Signal

Peak #	RetTime [min]	Type	Width [min]	Area [pA*s]	Area %	Name
1	1.278		0.0000	0.00000	0.00000	Benzene
2	1.866		0.0000	0.00000	0.00000	Toluene
3	2.006		0.0000	0.00000	0.00000	Acetaldehyde
4	2.810		0.0000	0.00000	0.00000	Ethylbenzene
5	2.910		0.0000	0.00000	0.00000	m,p-Xylenes
6	3.222		0.0000	0.00000	0.00000	o-Xylene

Totals : 0.00000 0.0000
Uncalibrated Peaks: n.a.

2 Warnings or Errors :

Warning : Calibration warnings (see calibration table listing)
Warning : Calibrated compound(s) not found

```

=====
*** End of Report ***

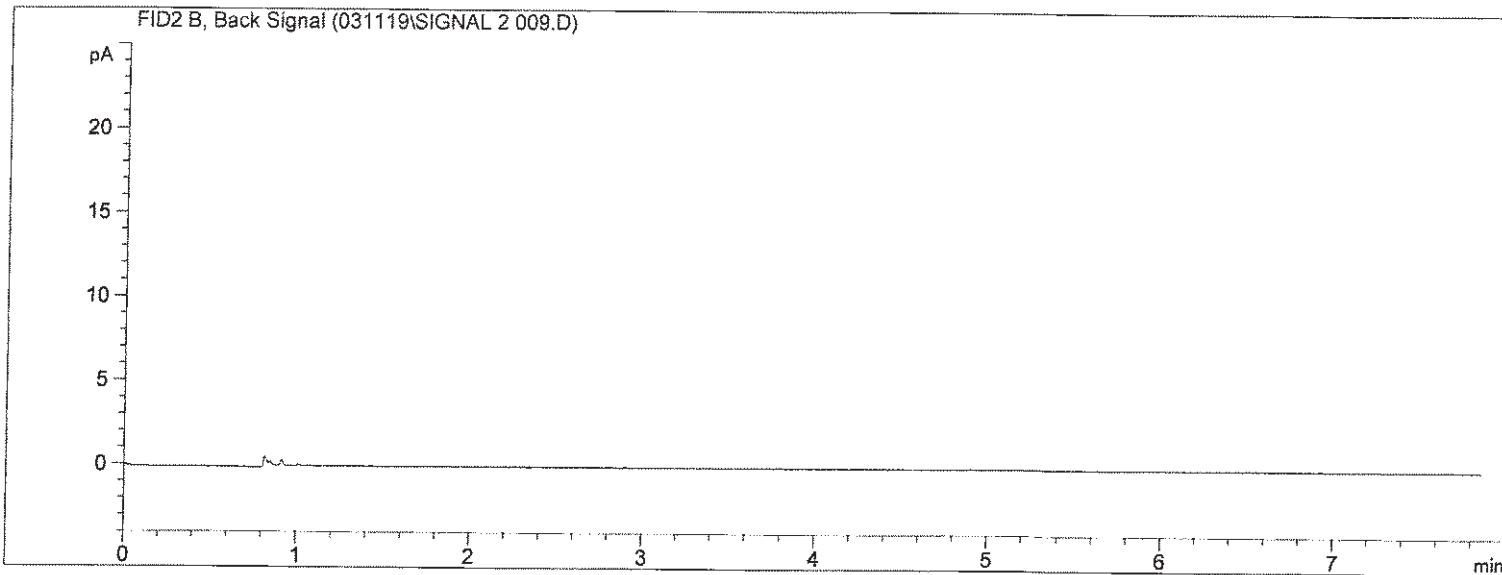
```


Sample Name: GSL_190247-002

```

=====
Acq. Operator   : Emily Decker
Sample Operator : Emily Decker
Acq. Instrument : GC8
Injection Date  : 3/11/2019 12:00:42 PM
Location        : Vial 1
Inj Volume      : Manually

Acq. Method     : C:\CHEM32\1\METHODS\REAR_BTEX_ACETALD_M18_030619.M
Last changed    : 3/8/2019 10:17:23 AM by Emily Decker
Analysis Method : C:\CHEM32\1\METHODS\REAR_BTEX_ACETALD_M18_030619.M
Last changed    : 3/11/2019 11:06:40 AM by Emily Decker
                  (modified after loading)
Sample Info     : GSL_190247-002
                  Method:M18
=====
    
```



External Standard Report

```

Sorted By      : Signal
Calib. Data Modified : 3/7/2019 1:36:23 PM
Multiplier     : 1.0000
Dilution       : 1.0000
Do not use Multiplier & Dilution Factor with ISTDs
    
```

Signal 1: FID2 B, Back Signal

RetTime [min]	Type	Area [pA*s]	Amt/Area	Amount [ppmv]	Grp	Name
1.278	-	-	-	-		Benzene
1.866	-	-	-	-		Toluene
2.006	-	-	-	-		Acetaldehyde
2.810	-	-	-	-		Ethylbenzene
2.910	-	-	-	-		m,p-Xylenes
3.222	-	-	-	-		o-Xylene

Totals : 0.00000

Uncalibrated Peaks : compound name not specified

aw
3/17/19

Sample Name: GSL_190247-002

```

=====
Acq. Operator   : Emily Decker
Sample Operator : Emily Decker
Acq. Instrument : GC8                      Location : Vial 1
Injection Date  : 3/11/2019 12:00:42 PM
                                           Inj Volume : Manually
Acq. Method     : C:\CHEM32\1\METHODS\REAR_BTEX_ACETALD_M18_030619.M
Last changed    : 3/8/2019 10:17:23 AM by Emily Decker
Analysis Method : C:\CHEM32\1\METHODS\REAR_BTEX_ACETALD_M18_030619.M
Last changed    : 3/11/2019 11:06:40 AM by Emily Decker
                                           (modified after loading)
Sample Info     : GSL_190247-002
                                           Method:M18
=====

```

2 Warnings or Errors :

Warning : Calibration warnings (see calibration table listing)
Warning : Calibrated compound(s) not found

```

=====
                          Area Percent Report
=====

```

```

Sorted By           : Signal
Calib. Data Modified : 3/7/2019 1:36:23 PM
Multiplier          : 1.0000
Dilution            : 1.0000
Do not use Multiplier & Dilution Factor with ISTDs

```

Signal 1: FID2 B, Back Signal

Peak #	RetTime [min]	Type	Width [min]	Area [pA*s]	Area %	Name
1	1.278		0.0000	0.00000	0.00000	Benzene
2	1.866		0.0000	0.00000	0.00000	Toluene
3	2.006		0.0000	0.00000	0.00000	Acetaldehyde
4	2.810		0.0000	0.00000	0.00000	Ethylbenzene
5	2.910		0.0000	0.00000	0.00000	m,p-Xylenes
6	3.222		0.0000	0.00000	0.00000	o-Xylene

Totals : 0.00000 0.0000
Uncalibrated Peaks: n.a.

2 Warnings or Errors :

Warning : Calibration warnings (see calibration table listing)
Warning : Calibrated compound(s) not found

```

=====
*** End of Report ***

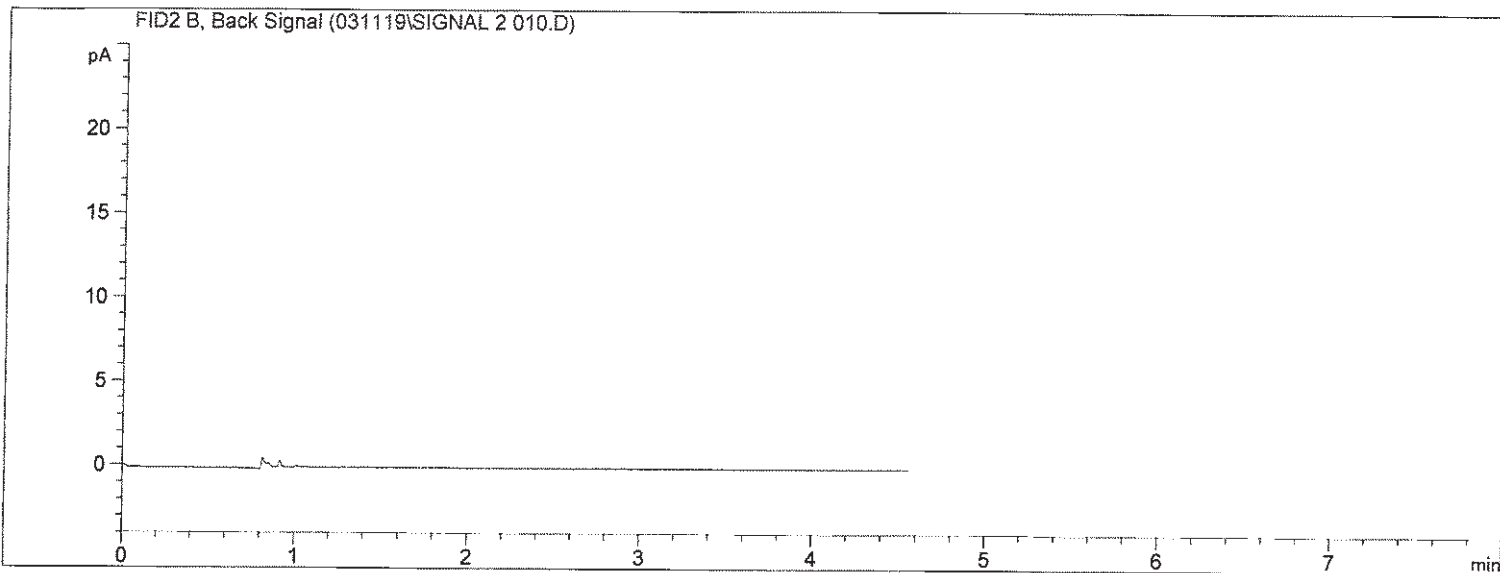
```

Sample Name: GSL_190247-002

```

=====
Acq. Operator   : Emily Decker
Sample Operator : Emily Decker
Acq. Instrument : GC8
Injection Date  : 3/11/2019 12:16:32 PM
Location       : Vial 1
Inj Volume     : Manually
Acq. Method    : C:\CHEM32\1\METHODS\REAR_BTEX_ACETALD_M18_030619.M
Last changed   : 3/8/2019 10:17:23 AM by Emily Decker
Analysis Method: C:\CHEM32\1\METHODS\REAR_BTEX_ACETALD_M18_030619.M
Last changed   : 3/11/2019 11:06:40 AM by Emily Decker
                (modified after loading)
Sample Info    : GSL_190247-002
                Method:M18
=====

```



```

=====
External Standard Report
=====

```

```

Sorted By      : Signal
Calib. Data Modified : 3/7/2019 1:36:23 PM
Multiplier     : 1.0000
Dilution       : 1.0000
Do not use Multiplier & Dilution Factor with ISTDs

```

Signal 1: FID2 B, Back Signal

RetTime [min]	Type	Area [pA*s]	Amt/Area	Amount [ppmv]	Grp	Name
1.278	-	-	-	-	-	Benzene
1.866	-	-	-	-	-	Toluene
2.006	-	-	-	-	-	Acetaldehyde
2.810	-	-	-	-	-	Ethylbenzene
2.910	-	-	-	-	-	m,p-Xylenes
3.222	-	-	-	-	-	o-Xylene

Totals : 0.00000

Uncalibrated Peaks : compound name not specified

aw
3/12/19

Sample Name: GSL_190247-002

```

=====
Acq. Operator   : Emily Decker
Sample Operator : Emily Decker
Acq. Instrument : GC8                      Location : Vial 1
Injection Date  : 3/11/2019 12:16:32 PM
                                           Inj Volume : Manually
Acq. Method     : C:\CHEM32\1\METHODS\REAR_BTEX_ACETALD_M18_030619.M
Last changed    : 3/8/2019 10:17:23 AM by Emily Decker
Analysis Method : C:\CHEM32\1\METHODS\REAR_BTEX_ACETALD_M18_030619.M
Last changed    : 3/11/2019 11:06:40 AM by Emily Decker
                 (modified after loading)
Sample Info     : GSL_190247-002
                 Method:M18
=====

```

2 Warnings or Errors :

Warning : Calibration warnings (see calibration table listing)

Warning : Calibrated compound(s) not found

```

=====
                          Area Percent Report
=====

```

```

Sorted By           : Signal
Calib. Data Modified : 3/7/2019 1:36:23 PM
Multiplier          : 1.0000
Dilution            : 1.0000
Do not use Multiplier & Dilution Factor with ISTDs

```

Signal 1: FID2 B, Back Signal

Peak #	RetTime [min]	Type	Width [min]	Area [pA*s]	Area %	Name
1	1.278		0.0000	0.00000	0.00000	Benzene
2	1.866		0.0000	0.00000	0.00000	Toluene
3	2.006		0.0000	0.00000	0.00000	Acetaldehyde
4	2.810		0.0000	0.00000	0.00000	Ethylbenzene
5	2.910		0.0000	0.00000	0.00000	m,p-Xylenes
6	3.222		0.0000	0.00000	0.00000	o-Xylene

Totals : 0.00000 0.0000

Uncalibrated Peaks: n.a.

2 Warnings or Errors :

Warning : Calibration warnings (see calibration table listing)

Warning : Calibrated compound(s) not found

```

=====
*** End of Report ***

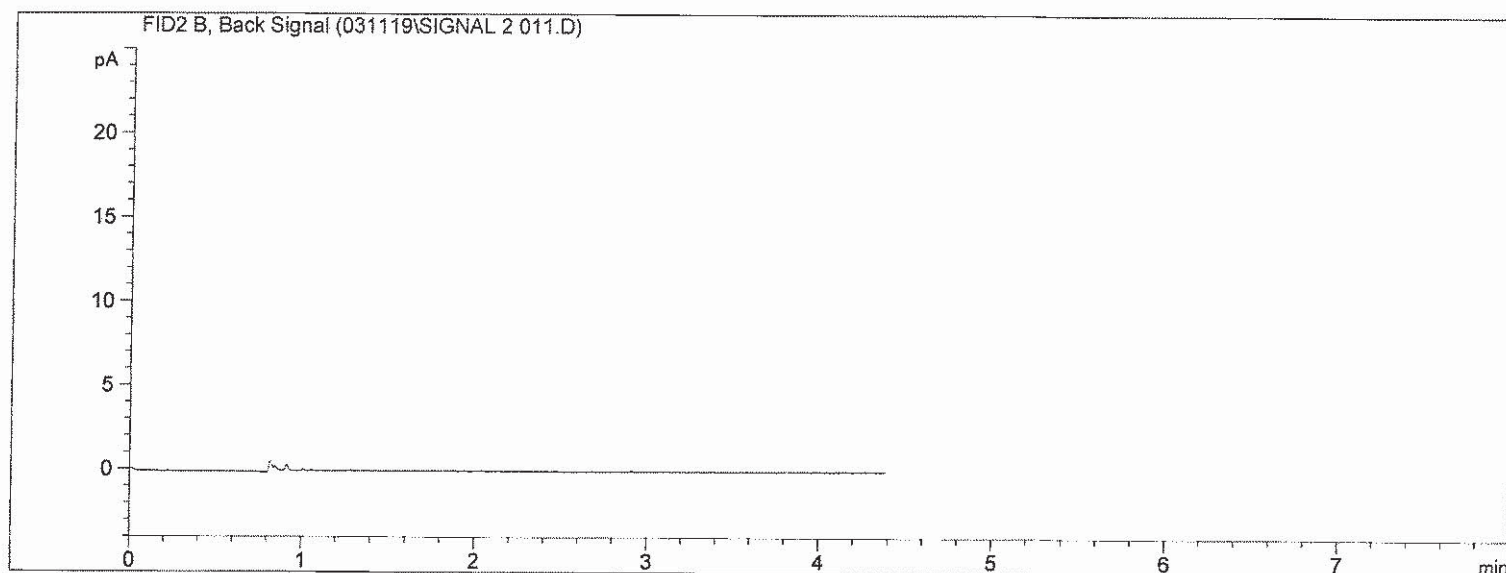
```

Sample Name: GSL_190247-002

```

=====
Acq. Operator   : Emily Decker
Sample Operator : Emily Decker
Acq. Instrument : GC8                      Location : Vial 1
Injection Date  : 3/11/2019 12:23:51 PM
                                           Inj Volume : Manually
Acq. Method     : C:\CHEM32\1\METHODS\REAR_BTEX_ACETALD_M18_030619.M
Last changed    : 3/8/2019 10:17:23 AM by Emily Decker
Analysis Method : C:\CHEM32\1\METHODS\REAR_BTEX_ACETALD_M18_030619.M
Last changed    : 3/11/2019 11:06:40 AM by Emily Decker
                                           (modified after loading)
Sample Info     : GSL_190247-002
                                           Method:M18
=====

```



```

=====
External Standard Report
=====

```

```

Sorted By           : Signal
Calib. Data Modified : 3/7/2019 1:36:23 PM
Multiplier          : 1.0000
Dilution            : 1.0000
Do not use Multiplier & Dilution Factor with ISTDs

```

Signal 1: FID2 B, Back Signal

RetTime [min]	Type	Area [pA*s]	Amt/Area	Amount [ppmv]	Grp	Name
1.278	-	-	-	-	-	Benzene
1.866	-	-	-	-	-	Toluene
2.006	-	-	-	-	-	Acetaldehyde
2.810	-	-	-	-	-	Ethylbenzene
2.910	-	-	-	-	-	m,p-Xylenes
3.222	-	-	-	-	-	o-Xylene

Totals : 0.00000

Uncalibrated Peaks : compound name not specified

ES
3/12/19

=====
Acq. Operator : Emily Decker
Sample Operator : Emily Decker
Acq. Instrument : GC8 Location : Vial 1
Injection Date : 3/11/2019 12:23:51 PM
Inj Volume : Manually
Acq. Method : C:\CHEM32\1\METHODS\REAR_BTEX_ACETALD_M18_030619.M
Last changed : 3/8/2019 10:17:23 AM by Emily Decker
Analysis Method : C:\CHEM32\1\METHODS\REAR_BTEX_ACETALD_M18_030619.M
Last changed : 3/11/2019 11:06:40 AM by Emily Decker
(modified after loading)
Sample Info : GSL_190247-002
Method:M18
=====

2 Warnings or Errors :

Warning : Calibration warnings (see calibration table listing)
Warning : Calibrated compound(s) not found

=====
=====
Area Percent Report
=====

Sorted By : Signal
Calib. Data Modified : 3/7/2019 1:36:23 PM
Multiplier : 1.0000
Dilution : 1.0000
Do not use Multiplier & Dilution Factor with ISTDs

Signal 1: FID2 B, Back Signal

Peak #	RetTime [min]	Type	Width [min]	Area [pA*s]	Area %	Name
1	1.278		0.0000	0.00000	0.00000	Benzene
2	1.866		0.0000	0.00000	0.00000	Toluene
3	2.006		0.0000	0.00000	0.00000	Acetaldehyde
4	2.810		0.0000	0.00000	0.00000	Ethylbenzene
5	2.910		0.0000	0.00000	0.00000	m,p-Xylenes
6	3.222		0.0000	0.00000	0.00000	o-Xylene

Totals : 0.00000 0.0000
Uncalibrated Peaks: n.a.

2 Warnings or Errors :

Warning : Calibration warnings (see calibration table listing)
Warning : Calibrated compound(s) not found

=====
*** End of Report ***

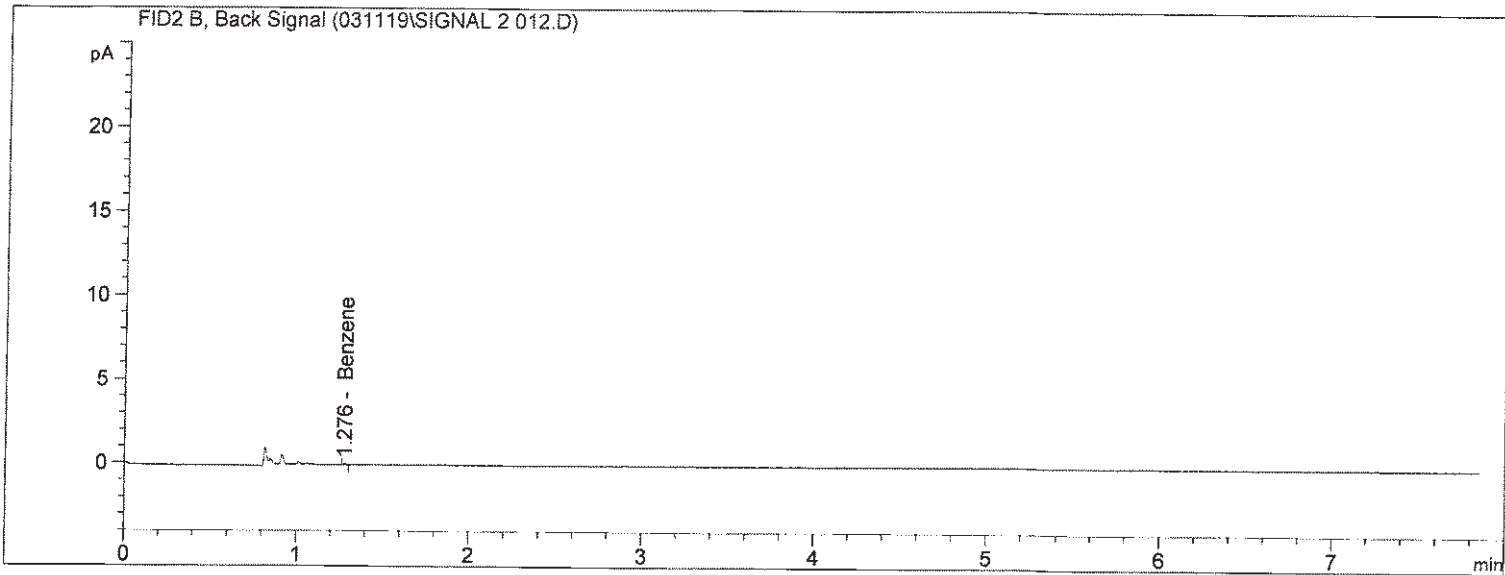
Sample Name: GSL_190247-003

```

=====
Acq. Operator   : Emily Decker
Sample Operator : Emily Decker
Acq. Instrument : GC8
Injection Date  : 3/11/2019 12:31:12 PM
Location       : Vial 1
Inj Volume     : Manually

Acq. Method    : C:\CHEM32\1\METHODS\REAR_BTEX_ACETALD_M18_030619.M
Last changed   : 3/8/2019 10:17:23 AM by Emily Decker
Analysis Method : C:\CHEM32\1\METHODS\REAR_BTEX_ACETALD_M18_030619.M
Last changed   : 3/12/2019 11:22:46 AM by Emily Decker
                (modified after loading)

Sample Info    : GSL_190247-003
                Method:M18
=====
    
```



External Standard Report

```

Sorted By      : Signal
Calib. Data Modified : 3/7/2019 1:36:23 PM
Multiplier    : 1.0000
Dilution      : 1.0000
Do not use Multiplier & Dilution Factor with ISTDs
    
```

Signal 1: FID2 B, Back Signal

RetTime [min]	Type	Area [pA*s]	Amt/Area	Amount [ppmv]	Grp	Name
1.276	BBA	8.00391e-2	1.11651	8.93646e-2		Benzene
1.866	-	-	-	-		Toluene
2.006	-	-	-	-		Acetaldehyde
2.810	-	-	-	-		Ethylbenzene
2.910	-	-	-	-		m,p-Xylenes
3.222	-	-	-	-		o-Xylene

Totals : 8.93646e-2

Uncalibrated Peaks : compound name not specified

aw
3/12/19

Sample Name: GSL_190247-003

```
=====
Acq. Operator   : Emily Decker
Sample Operator : Emily Decker
Acq. Instrument : GC8                               Location : Vial 1
Injection Date  : 3/11/2019 12:31:12 PM
                                                    Inj Volume : Manually
Acq. Method     : C:\CHEM32\1\METHODS\REAR_BTEX_ACETALD_M18_030619.M
Last changed    : 3/8/2019 10:17:23 AM by Emily Decker
Analysis Method : C:\CHEM32\1\METHODS\REAR_BTEX_ACETALD_M18_030619.M
Last changed    : 3/12/2019 11:22:46 AM by Emily Decker
                (modified after loading)
Sample Info     : GSL_190247-003
                Method:M18
=====
```

2 Warnings or Errors :

Warning : Calibration warnings (see calibration table listing)

Warning : Calibrated compound(s) not found

```
=====
*** End of Report ***
```

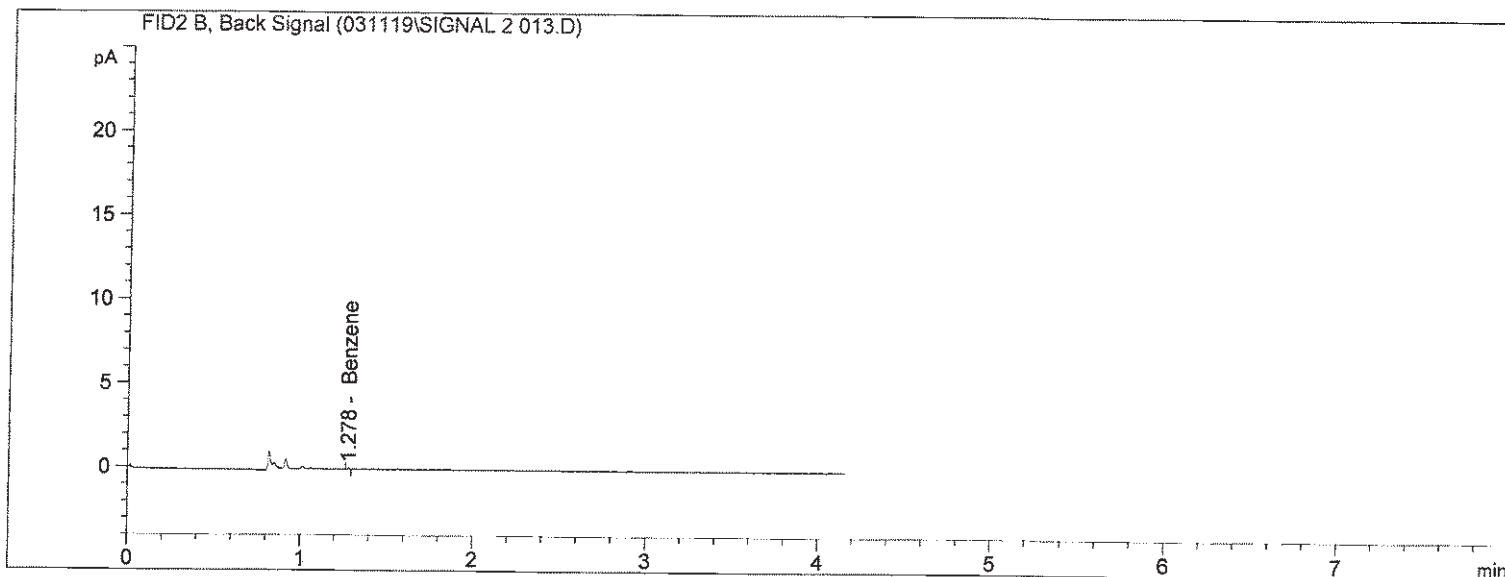

Sample Name: GSL_190247-003

```

=====
Acq. Operator   : Emily Decker
Sample Operator : Emily Decker
Acq. Instrument : GC8
Injection Date  : 3/11/2019 12:46:59 PM
Location       : Vial 1
Inj Volume     : Manually

Acq. Method    : C:\CHEM32\1\METHODS\REAR_BTEX_ACETALD_M18_030619.M
Last changed   : 3/8/2019 10:17:23 AM by Emily Decker
Analysis Method : C:\CHEM32\1\METHODS\REAR_BTEX_ACETALD_M18_030619.M
Last changed   : 3/12/2019 11:17:36 AM by Emily Decker
                (modified after loading)

Sample Info    : GSL_190247-003
                Method:M18
=====
    
```



External Standard Report

```

Sorted By      : Signal
Calib. Data Modified : 3/7/2019 1:36:23 PM
Multiplier     : 1.0000
Dilution       : 1.0000
Do not use Multiplier & Dilution Factor with ISTDs
    
```

Signal 1: FID2 B, Back Signal

RetTime [min]	Type	Area [pA*s]	Amt/Area	Amount [ppmv]	Grp	Name
1.278	BBA	8.23594e-2	1.11651	9.19553e-2		Benzene
1.866	-	-	-	-		Toluene
2.006	-	-	-	-		Acetaldehyde
2.810	-	-	-	-		Ethylbenzene
2.910	-	-	-	-		m,p-Xylenes
3.222	-	-	-	-		o-Xylene

Totals : 9.19553e-2

Uncalibrated Peaks : compound name not specified

EDS
3/12/19

Sample Name: GSL_190247-003

```
=====
Acq. Operator   : Emily Decker
Sample Operator : Emily Decker
Acq. Instrument : GC8                      Location : Vial 1
Injection Date  : 3/11/2019 12:46:59 PM
                                           Inj Volume : Manually
Acq. Method     : C:\CHEM32\1\METHODS\REAR_BTEX_ACETALD_M18_030619.M
Last changed    : 3/8/2019 10:17:23 AM by Emily Decker
Analysis Method : C:\CHEM32\1\METHODS\REAR_BTEX_ACETALD_M18_030619.M
Last changed    : 3/12/2019 11:17:36 AM by Emily Decker
                 (modified after loading)
Sample Info     : GSL_190247-003
                 Method:M18
=====
```

2 Warnings or Errors :

Warning : Calibration warnings (see calibration table listing)

Warning : Calibrated compound(s) not found

```
=====
*** End of Report ***
```

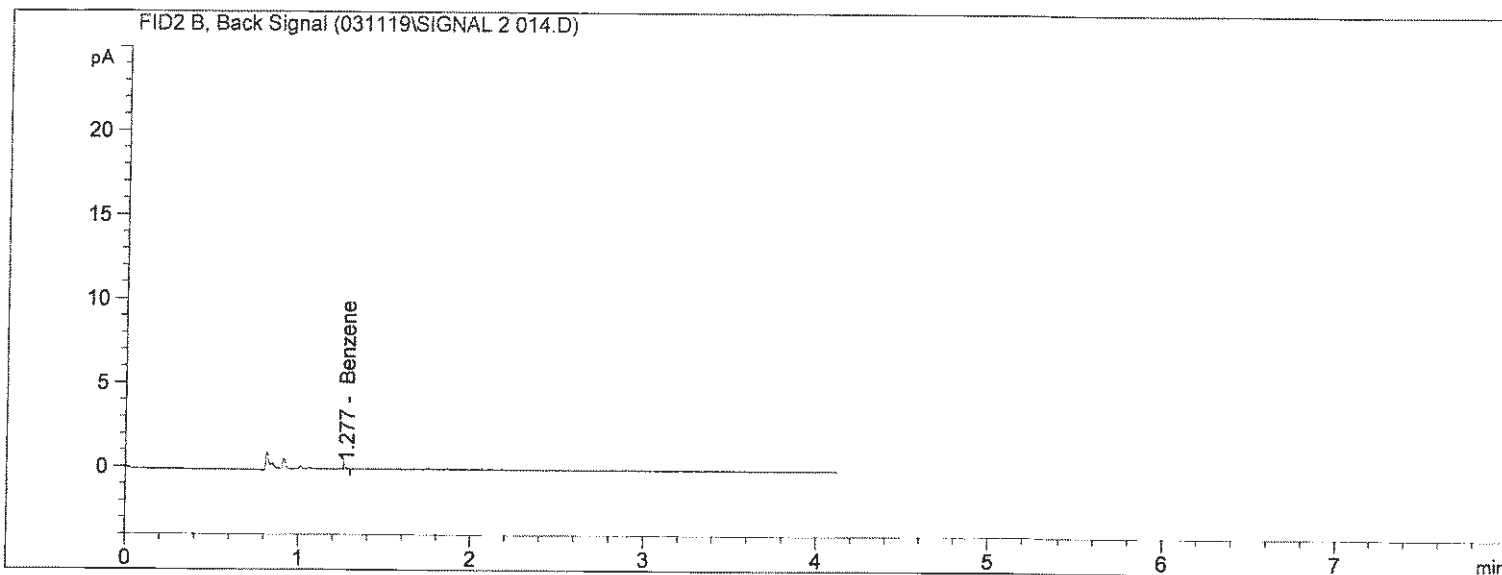
Sample Name: GSL_190247-003

```

=====
Acq. Operator   : Emily Decker
Sample Operator : Emily Decker
Acq. Instrument : GC8
Injection Date  : 3/11/2019 12:54:02 PM
Location       : Vial 1
Inj Volume     : Manually

Acq. Method    : C:\CHEM32\1\METHODS\REAR_BTEX_ACETALD_M18_030619.M
Last changed   : 3/8/2019 10:17:23 AM by Emily Decker
Analysis Method : C:\CHEM32\1\METHODS\REAR_BTEX_ACETALD_M18_030619.M
Last changed   : 3/12/2019 11:22:46 AM by Emily Decker
                (modified after loading)

Sample Info    : GSL_190247-003
                Method:M18
=====
    
```



External Standard Report

```

Sorted By      : Signal
Calib. Data Modified : 3/7/2019 1:36:23 PM
Multiplier     : 1.0000
Dilution       : 1.0000
Do not use Multiplier & Dilution Factor with ISTDs
    
```

Signal 1: FID2 B, Back Signal

RetTime [min]	Type	Area [pA*s]	Amt/Area	Amount [ppmv]	Grp	Name
1.277	BBA	8.11865e-2	1.11651	9.06457e-2		Benzene
1.866	-	-	-	-		Toluene
2.006	-	-	-	-		Acetaldehyde
2.810	-	-	-	-		Ethylbenzene
2.910	-	-	-	-		m,p-Xylenes
3.222	-	-	-	-		o-Xylene

Totals : 9.06457e-2

Uncalibrated Peaks : compound name not specified

aw
3/12/19

Sample Name: GSL_190247-003

```
=====
Acq. Operator   : Emily Decker
Sample Operator : Emily Decker
Acq. Instrument : GC8                      Location : Vial 1
Injection Date  : 3/11/2019 12:54:02 PM
                                           Inj Volume : Manually
Acq. Method     : C:\CHEM32\1\METHODS\REAR_BTEX_ACETALD_M18_030619.M
Last changed    : 3/8/2019 10:17:23 AM by Emily Decker
Analysis Method : C:\CHEM32\1\METHODS\REAR_BTEX_ACETALD_M18_030619.M
Last changed    : 3/12/2019 11:22:46 AM by Emily Decker
                 (modified after loading)
Sample Info     : GSL_190247-003
                 Method:M18
=====
```

2 Warnings or Errors :

Warning : Calibration warnings (see calibration table listing)

Warning : Calibrated compound(s) not found

```
=====
*** End of Report ***
```

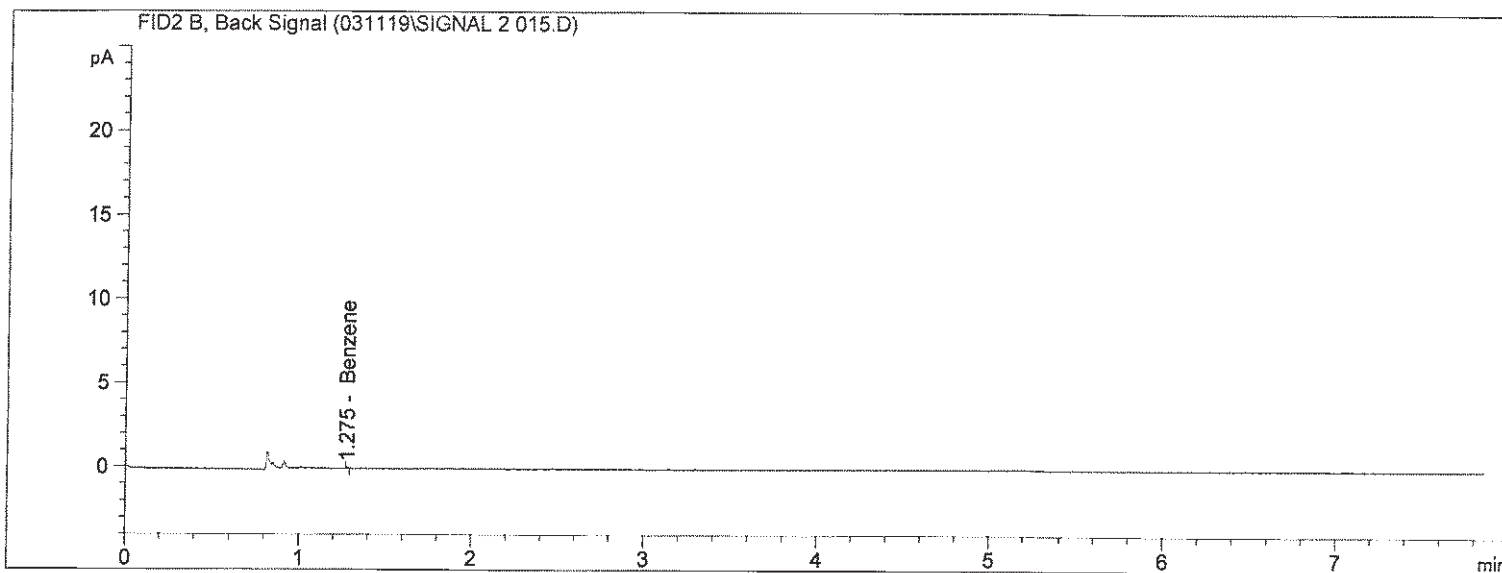
Sample Name: GSL_190247-004

```

=====
Acq. Operator   : Emily Decker
Sample Operator : Emily Decker
Acq. Instrument : GC8
Injection Date  : 3/11/2019 1:01:24 PM
Location       : Vial 1
Inj Volume     : Manually

Acq. Method    : C:\CHEM32\1\METHODS\REAR_BTEX_ACETALD_M18_030619.M
Last changed   : 3/8/2019 10:17:23 AM by Emily Decker
Analysis Method : C:\CHEM32\1\METHODS\REAR_BTEX_ACETALD_M18_030619.M
Last changed   : 3/12/2019 11:36:39 AM by Emily Decker
                (modified after loading)

Sample Info    : GSL_190247-004
                Method:M18
=====
    
```



External Standard Report

```

Sorted By      : Signal
Calib. Data Modified : 3/7/2019 1:36:23 PM
Multiplier     : 1.0000
Dilution      : 1.0000
Do not use Multiplier & Dilution Factor with ISTDs
    
```

Signal 1: FID2 B, Back Signal

RetTime [min]	Type	Area [pA*s]	Amt/Area	Amount [ppmv]	Grp	Name
1.275	BBA	4.98802e-2	1.11651	5.56919e-2		Benzene
1.866	-	-	-	-		Toluene
2.006	-	-	-	-		Acetaldehyde
2.810	-	-	-	-		Ethylbenzene
2.910	-	-	-	-		m,p-Xylenes
3.222	-	-	-	-		o-Xylene

Totals : 5.56919e-2

Uncalibrated Peaks : compound name not specified

aw
3/12/19

Sample Name: GSL_190247-004

```
=====
Acq. Operator   : Emily Decker
Sample Operator : Emily Decker
Acq. Instrument : GC8                      Location : Vial 1
Injection Date  : 3/11/2019 1:01:24 PM
                                           Inj Volume : Manually
Acq. Method     : C:\CHEM32\1\METHODS\REAR_BTEX_ACETALD_M18_030619.M
Last changed    : 3/8/2019 10:17:23 AM by Emily Decker
Analysis Method : C:\CHEM32\1\METHODS\REAR_BTEX_ACETALD_M18_030619.M
Last changed    : 3/12/2019 11:36:39 AM by Emily Decker
                 (modified after loading)
Sample Info     : GSL_190247-004
                 Method:M18
=====
```

2 Warnings or Errors :

Warning : Calibration warnings (see calibration table listing)

Warning : Calibrated compound(s) not found

```
=====
*** End of Report ***
```

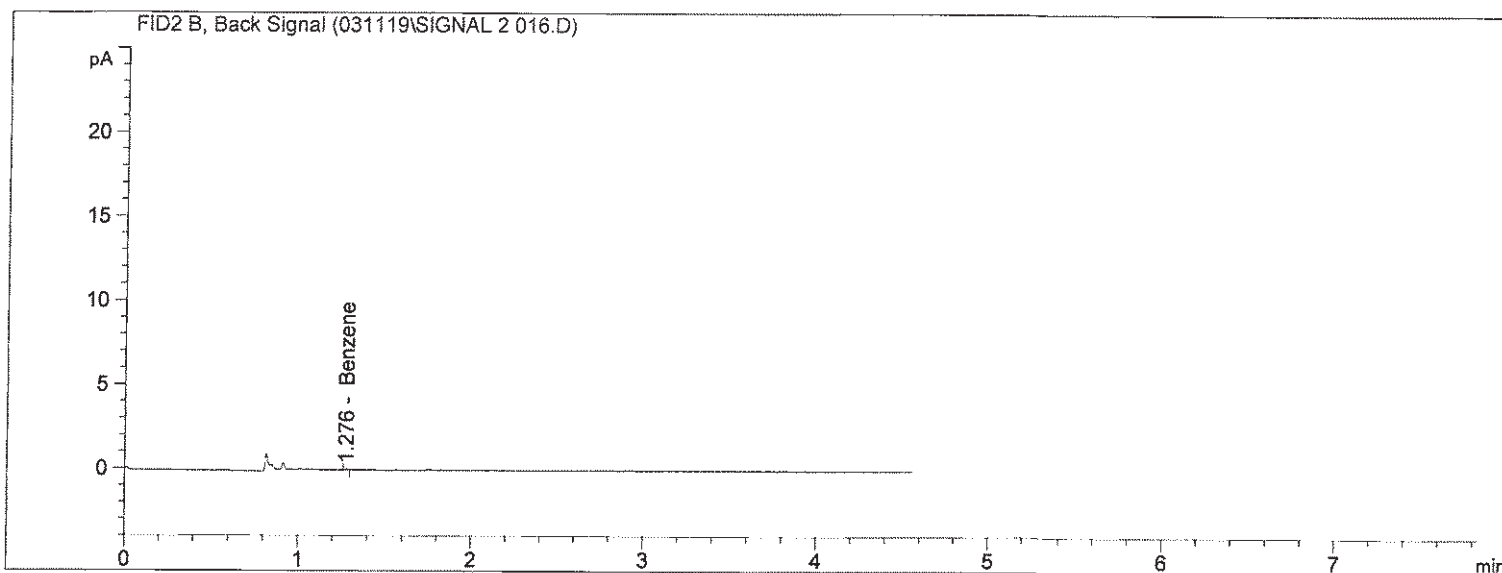
Sample Name: GSL_190247-004

```

=====
Acq. Operator   : Emily Decker
Sample Operator : Emily Decker
Acq. Instrument : GC8
Injection Date  : 3/11/2019 1:19:23 PM
Location        : Vial 1
Inj Volume     : Manually

Acq. Method    : C:\CHEM32\1\METHODS\REAR_BTEX_ACETALD_M18_030619.M
Last changed   : 3/8/2019 10:17:23 AM by Emily Decker
Analysis Method : C:\CHEM32\1\METHODS\REAR_BTEX_ACETALD_M18_030619.M
Last changed   : 3/12/2019 11:24:55 AM by Emily Decker
                (modified after loading)

Sample Info    : GSL_190247-004
                Method:M18
=====
    
```



External Standard Report

```

Sorted By      : Signal
Calib. Data Modified : 3/7/2019 1:36:23 PM
Multiplier     : 1.0000
Dilution       : 1.0000
Do not use Multiplier & Dilution Factor with ISTDs
    
```

Signal 1: FID2 B, Back Signal

RetTime [min]	Type	Area [pA*s]	Amt/Area	Amount [ppmv]	Grp	Name
1.276	BB	5.13579e-2	1.11651	5.73418e-2		Benzene
1.866	-	-	-	-		Toluene
2.006	-	-	-	-		Acetaldehyde
2.810	-	-	-	-		Ethylbenzene
2.910	-	-	-	-		m,p-Xylenes
3.222	-	-	-	-		o-Xylene

Totals : 5.73418e-2

Uncalibrated Peaks : compound name not specified

EW
3/12/19

Sample Name: GSL_190247-004

```
=====
Acq. Operator   : Emily Decker
Sample Operator : Emily Decker
Acq. Instrument : GC8                      Location : Vial 1
Injection Date  : 3/11/2019 1:19:23 PM      Inj Volume : Manually
Acq. Method     : C:\CHEM32\1\METHODS\REAR_BTEX_ACETALD_M18_030619.M
Last changed    : 3/8/2019 10:17:23 AM by Emily Decker
Analysis Method : C:\CHEM32\1\METHODS\REAR_BTEX_ACETALD_M18_030619.M
Last changed    : 3/12/2019 11:24:55 AM by Emily Decker
                  (modified after loading)
Sample Info     : GSL_190247-004
                  Method:M18
=====
```

2 Warnings or Errors :

Warning : Calibration warnings (see calibration table listing)

Warning : Calibrated compound(s) not found

```
=====
*** End of Report ***
```

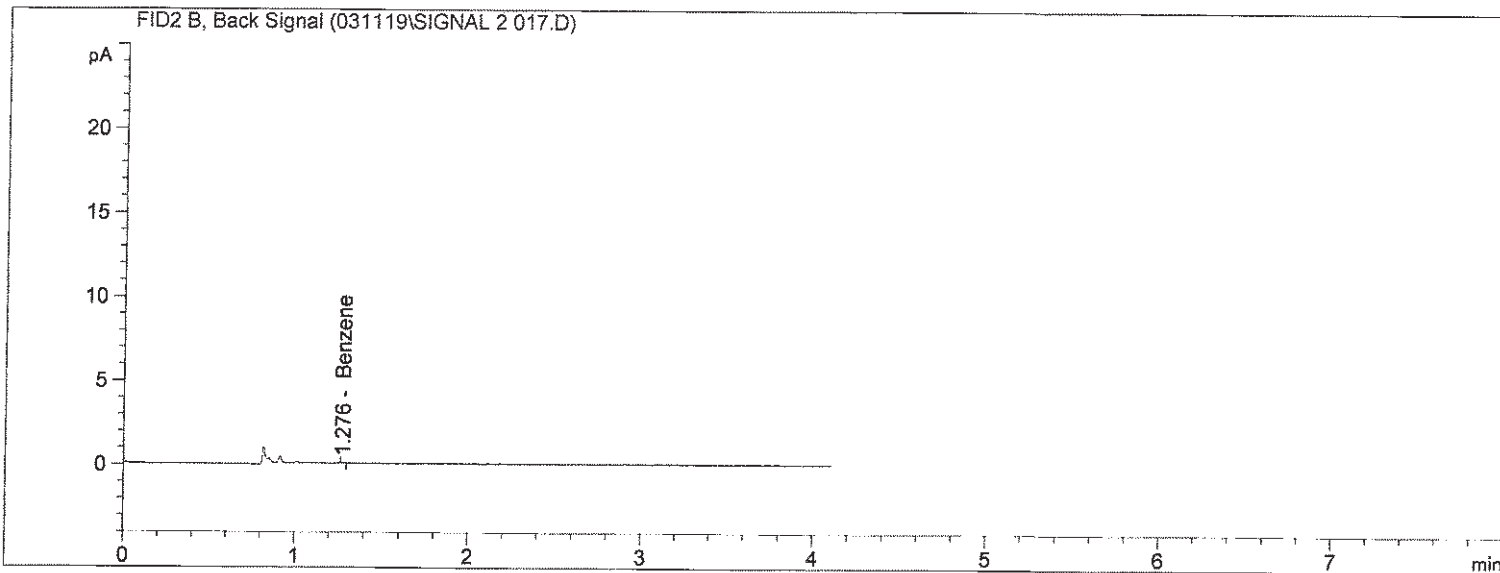

Sample Name: GSL_190247-004

```

=====
Acq. Operator   : Emily Decker
Sample Operator : Emily Decker
Acq. Instrument : GC8
Injection Date  : 3/11/2019 1:26:49 PM
Location       : Vial 1
Inj Volume     : Manually

Acq. Method    : C:\CHEM32\1\METHODS\REAR_BTEX_ACETALD_M18_030619.M
Last changed   : 3/8/2019 10:17:23 AM by Emily Decker
Analysis Method : C:\CHEM32\1\METHODS\REAR_BTEX_ACETALD_M18_030619.M
Last changed   : 3/12/2019 11:24:55 AM by Emily Decker
                (modified after loading)

Sample Info    : GSL_190247-004
                Method:M18
=====
    
```



External Standard Report

```

Sorted By      : Signal
Calib. Data Modified : 3/7/2019 1:36:23 PM
Multiplier     : 1.0000
Dilution       : 1.0000
Do not use Multiplier & Dilution Factor with ISTDs
    
```

Signal 1: FID2 B, Back Signal

RetTime [min]	Type	Area [pA*s]	Amt/Area	Amount [ppmv]	Grp	Name
1.276	BB	5.17407e-2	1.11651	5.77691e-2		Benzene
1.866	-	-	-	-		Toluene
2.006	-	-	-	-		Acetaldehyde
2.810	-	-	-	-		Ethylbenzene
2.910	-	-	-	-		m,p-Xylenes
3.222	-	-	-	-		o-Xylene

Totals : 5.77691e-2

Uncalibrated Peaks : compound name not specified

aw
3/12/19

Sample Name: GSL_190247-004

```
=====
Acq. Operator   : Emily Decker
Sample Operator : Emily Decker
Acq. Instrument : GC8                      Location : Vial 1
Injection Date  : 3/11/2019 1:26:49 PM
                                           Inj Volume : Manually
Acq. Method     : C:\CHEM32\1\METHODS\REAR_BTEX_ACETALD_M18_030619.M
Last changed    : 3/8/2019 10:17:23 AM by Emily Decker
Analysis Method : C:\CHEM32\1\METHODS\REAR_BTEX_ACETALD_M18_030619.M
Last changed    : 3/12/2019 11:24:55 AM by Emily Decker
                 (modified after loading)
Sample Info     : GSL_190247-004
                 Method:M18
=====
```

2 Warnings or Errors :

Warning : Calibration warnings (see calibration table listing)

Warning : Calibrated compound(s) not found

```
=====
*** End of Report ***
```

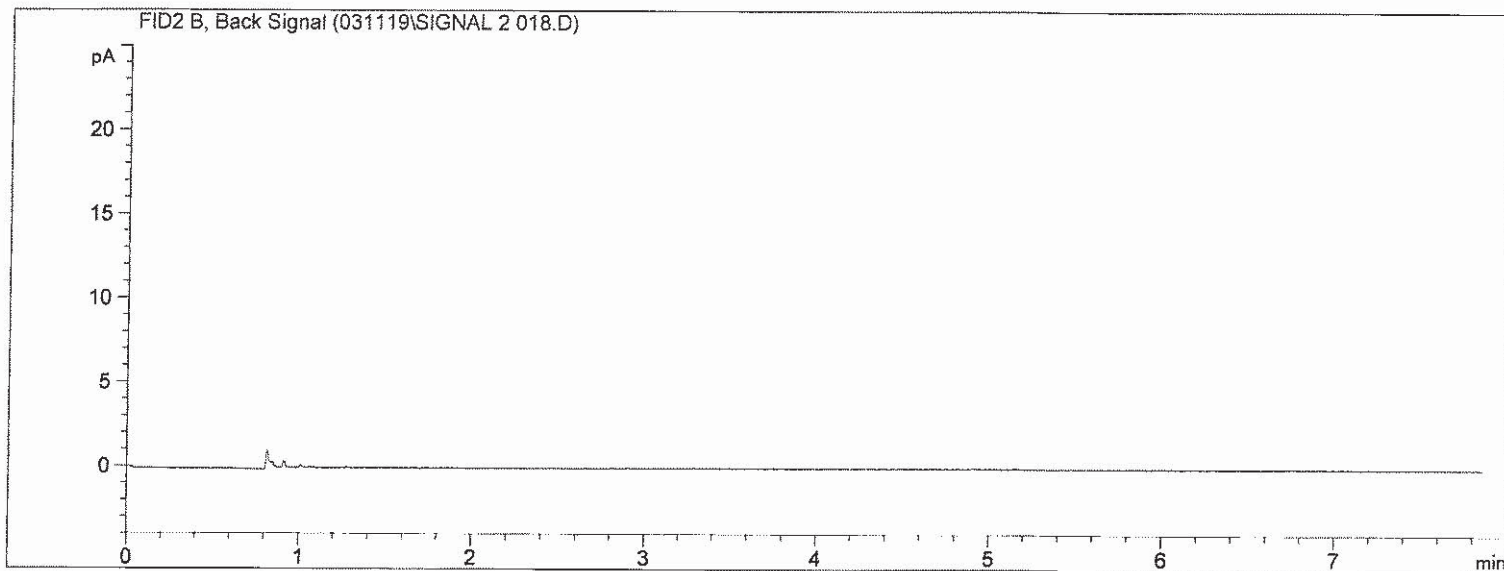
Sample Name: GSL_190247-005

```

=====
Acq. Operator   : Emily Decker
Sample Operator : Emily Decker
Acq. Instrument : GC8
Injection Date  : 3/11/2019 1:33:48 PM
Location       : Vial 1
Inj Volume     : Manually

Acq. Method    : C:\CHEM32\1\METHODS\REAR_BTEX_ACETALD_M18_030619.M
Last changed   : 3/8/2019 10:17:23 AM by Emily Decker
Analysis Method : C:\CHEM32\1\METHODS\REAR_BTEX_ACETALD_M18_030619.M
Last changed   : 3/12/2019 11:37:34 AM by Emily Decker
                (modified after loading)

Sample Info    : GSL_190247-005
                Method:M18
=====
    
```



External Standard Report

```

Sorted By      : Signal
Calib. Data Modified : 3/7/2019 1:36:23 PM
Multiplier     : 1.0000
Dilution       : 1.0000
Do not use Multiplier & Dilution Factor with ISTDs
    
```

Signal 1: FID2 B, Back Signal

RetTime [min]	Type	Area [pA*s]	Amt/Area	Amount [ppmv]	Grp	Name
1.278	-	-	-	-	-	Benzene
1.866	-	-	-	-	-	Toluene
2.006	-	-	-	-	-	Acetaldehyde
2.810	-	-	-	-	-	Ethylbenzene
2.910	-	-	-	-	-	m,p-Xylenes
3.222	-	-	-	-	-	o-Xylene

Totals : 0.00000

Uncalibrated Peaks : compound name not specified

aw
3/12/19

Sample Name: GSL_190247-005

```

=====
Acq. Operator   : Emily Decker
Sample Operator : Emily Decker
Acq. Instrument : GC8
Injection Date  : 3/11/2019 1:33:48 PM
Location       : Vial 1
Inj Volume     : Manually

Acq. Method    : C:\CHEM32\1\METHODS\REAR_BTEX_ACETALD_M18_030619.M
Last changed   : 3/8/2019 10:17:23 AM by Emily Decker
Analysis Method : C:\CHEM32\1\METHODS\REAR_BTEX_ACETALD_M18_030619.M
Last changed   : 3/12/2019 11:37:34 AM by Emily Decker
                (modified after loading)
Sample Info    : GSL_190247-005
                Method:M18
=====

```

2 Warnings or Errors :

Warning : Calibration warnings (see calibration table listing)
Warning : Calibrated compound(s) not found

```

=====
                          Area Percent Report
=====

```

```

Sorted By      : Signal
Calib. Data Modified : 3/7/2019 1:36:23 PM
Multiplier     : 1.0000
Dilution       : 1.0000
Do not use Multiplier & Dilution Factor with ISTDs

```

Signal 1: FID2 B, Back Signal

Peak #	RetTime [min]	Type	Width [min]	Area [pA*s]	Area %	Name
1	1.278		0.0000	0.00000	0.00000	Benzene
2	1.866		0.0000	0.00000	0.00000	Toluene
3	2.006		0.0000	0.00000	0.00000	Acetaldehyde
4	2.810		0.0000	0.00000	0.00000	Ethylbenzene
5	2.910		0.0000	0.00000	0.00000	m,p-Xylenes
6	3.222		0.0000	0.00000	0.00000	o-Xylene

Totals : 0.00000 0.0000
Uncalibrated Peaks: n.a.

2 Warnings or Errors :

Warning : Calibration warnings (see calibration table listing)
Warning : Calibrated compound(s) not found

```

=====
*** End of Report ***

```

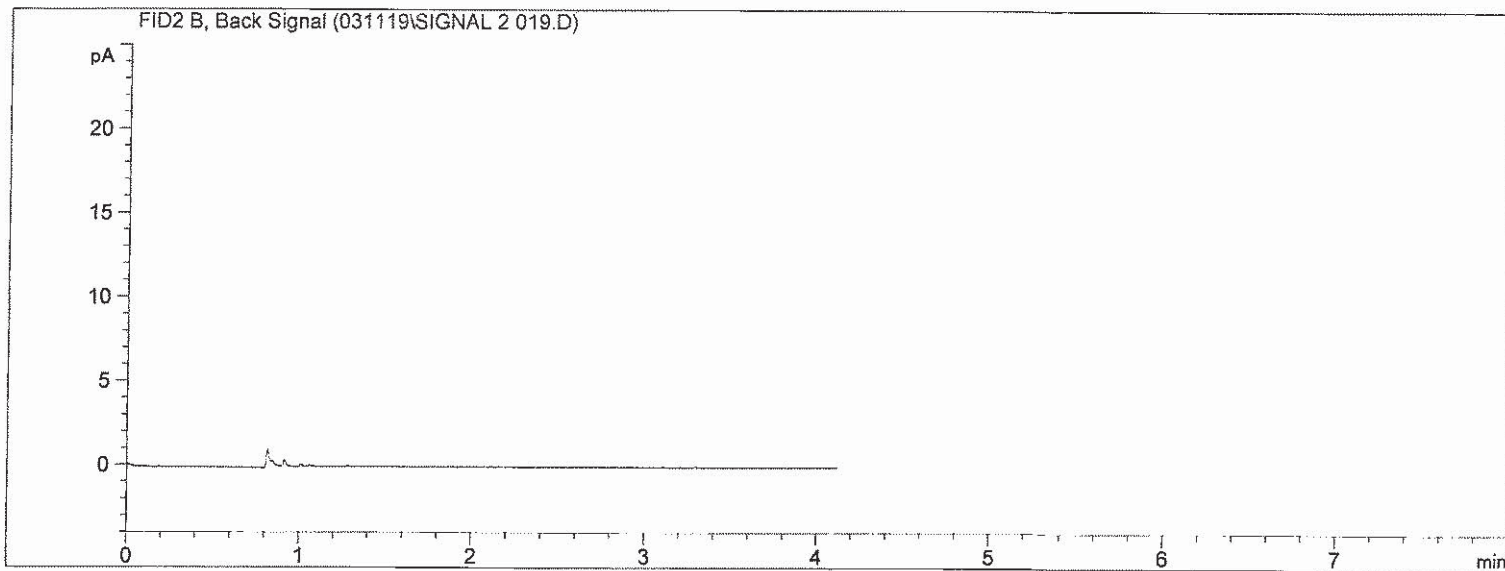
Sample Name: GSL_190247-005

```

=====
Acq. Operator   : Emily Decker
Sample Operator : Emily Decker
Acq. Instrument : GC8
Injection Date  : 3/11/2019 1:49:36 PM
Location       : Vial 1
Inj Volume     : Manually

Acq. Method    : C:\CHEM32\1\METHODS\REAR_BTEX_ACETALD_M18_030619.M
Last changed   : 3/8/2019 10:17:23 AM by Emily Decker
Analysis Method : C:\CHEM32\1\METHODS\REAR_BTEX_ACETALD_M18_030619.M
Last changed   : 3/12/2019 11:37:34 AM by Emily Decker
                (modified after loading)

Sample Info    : GSL_190247-005
                Method:M18
=====
    
```



External Standard Report

```

Sorted By      : Signal
Calib. Data Modified : 3/7/2019 1:36:23 PM
Multiplier     : 1.0000
Dilution       : 1.0000
Do not use Multiplier & Dilution Factor with ISTDs
    
```

Signal 1: FID2 B, Back Signal

RetTime [min]	Type	Area [pA*s]	Amt/Area	Amount [ppmv]	Grp	Name
1.278	-	-	-	-	-	Benzene
1.866	-	-	-	-	-	Toluene
2.006	-	-	-	-	-	Acetaldehyde
2.810	-	-	-	-	-	Ethylbenzene
2.910	-	-	-	-	-	m,p-Xylenes
3.222	-	-	-	-	-	o-Xylene

Totals : 0.00000

Uncalibrated Peaks : compound name not specified

aw
3/12/19

Sample Name: GSL_190247-005

```
=====
Acq. Operator   : Emily Decker
Sample Operator : Emily Decker
Acq. Instrument : GC8                      Location : Vial 1
Injection Date  : 3/11/2019 1:49:36 PM
                                           Inj Volume : Manually
Acq. Method     : C:\CHEM32\1\METHODS\REAR_BTEX_ACETALD_M18_030619.M
Last changed    : 3/8/2019 10:17:23 AM by Emily Decker
Analysis Method : C:\CHEM32\1\METHODS\REAR_BTEX_ACETALD_M18_030619.M
Last changed    : 3/12/2019 11:37:34 AM by Emily Decker
                 (modified after loading)
Sample Info     : GSL_190247-005
                 Method:M18
=====
```

2 Warnings or Errors :

Warning : Calibration warnings (see calibration table listing)

Warning : Calibrated compound(s) not found

```
=====
Area Percent Report
=====
```

```
Sorted By      : Signal
Calib. Data Modified : 3/7/2019 1:36:23 PM
Multiplier     : 1.0000
Dilution       : 1.0000
Do not use Multiplier & Dilution Factor with ISTDs
```

Signal 1: FID2 B, Back Signal

Peak #	RetTime [min]	Type	Width [min]	Area [pA*s]	Area %	Name
1	1.278		0.0000	0.00000	0.00000	Benzene
2	1.866		0.0000	0.00000	0.00000	Toluene
3	2.006		0.0000	0.00000	0.00000	Acetaldehyde
4	2.810		0.0000	0.00000	0.00000	Ethylbenzene
5	2.910		0.0000	0.00000	0.00000	m,p-Xylenes
6	3.222		0.0000	0.00000	0.00000	o-Xylene

Totals : 0.00000 0.0000

Uncalibrated Peaks: n.a.

2 Warnings or Errors :

Warning : Calibration warnings (see calibration table listing)

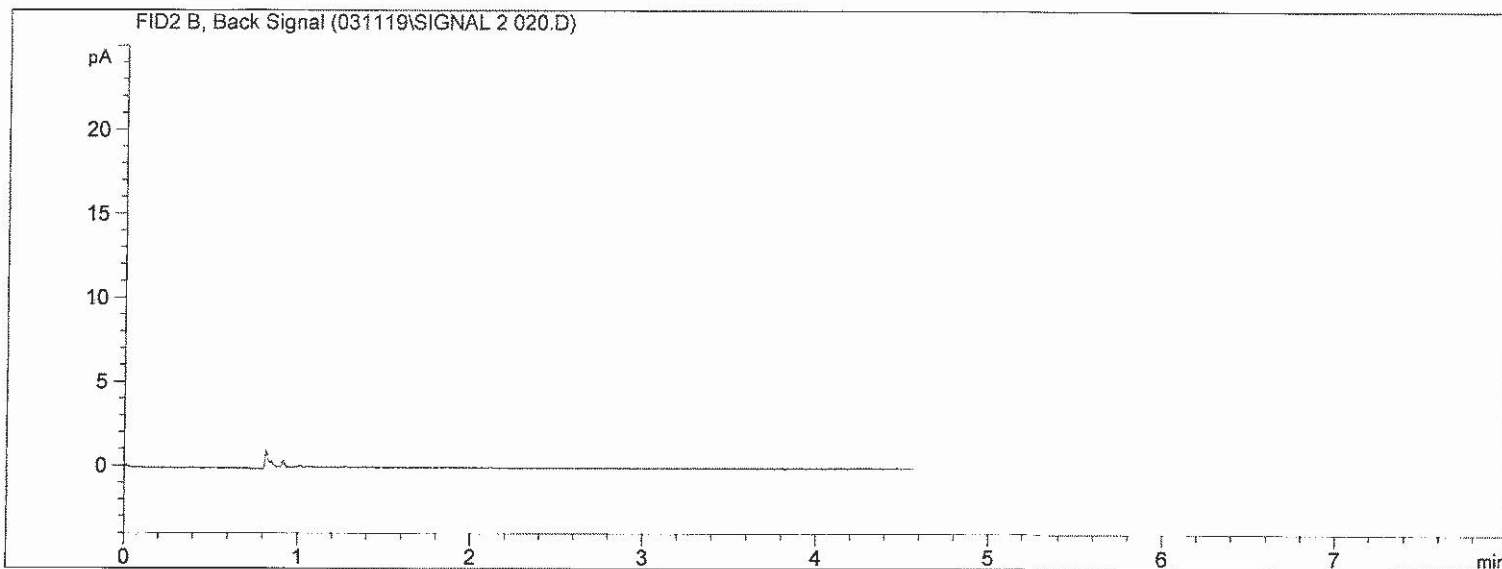
Warning : Calibrated compound(s) not found

```
=====
*** End of Report ***
=====
```

Sample Name: GSL_190247-005

```

=====
Acq. Operator   : Emily Decker
Sample Operator : Emily Decker
Acq. Instrument : GC8                      Location : Vial 1
Injection Date  : 3/11/2019 1:57:30 PM
                                           Inj Volume : Manually
Acq. Method     : C:\CHEM32\1\METHODS\REAR_BTEX_ACETALD_M18_030619.M
Last changed    : 3/8/2019 10:17:23 AM by Emily Decker
Analysis Method : C:\CHEM32\1\METHODS\REAR_BTEX_ACETALD_M18_030619.M
Last changed    : 3/12/2019 11:37:34 AM by Emily Decker
                 (modified after loading)
Sample Info     : GSL_190247-005
                 Method:M18
=====
    
```



External Standard Report

```

=====
Sorted By      : Signal
Calib. Data Modified : 3/7/2019 1:36:23 PM
Multiplier     : 1.0000
Dilution       : 1.0000
Do not use Multiplier & Dilution Factor with ISTDs
    
```

Signal 1: FID2 B, Back Signal

RetTime [min]	Type	Area [pA*s]	Amt/Area	Amount [ppmv]	Grp	Name
1.278	-	-	-	-	-	Benzene
1.866	-	-	-	-	-	Toluene
2.006	-	-	-	-	-	Acetaldehyde
2.810	-	-	-	-	-	Ethylbenzene
2.910	-	-	-	-	-	m,p-Xylenes
3.222	-	-	-	-	-	o-Xylene

Totals : 0.00000

Uncalibrated Peaks : compound name not specified

aw
3/12/19

Sample Name: GSL_190247-005

```

=====
Acq. Operator   : Emily Decker
Sample Operator : Emily Decker
Acq. Instrument : GC8                      Location : Vial 1
Injection Date  : 3/11/2019 1:57:30 PM
                                           Inj Volume : Manually
Acq. Method     : C:\CHEM32\1\METHODS\REAR_BTEX_ACETALD_M18_030619.M
Last changed    : 3/8/2019 10:17:23 AM by Emily Decker
Analysis Method : C:\CHEM32\1\METHODS\REAR_BTEX_ACETALD_M18_030619.M
Last changed    : 3/12/2019 11:37:34 AM by Emily Decker
                 (modified after loading)
Sample Info     : GSL_190247-005
                 Method:M18
=====

```

2 Warnings or Errors :

Warning : Calibration warnings (see calibration table listing)

Warning : Calibrated compound(s) not found

```

=====
                          Area Percent Report
=====

```

```

Sorted By           : Signal
Calib. Data Modified : 3/7/2019 1:36:23 PM
Multiplier          : 1.0000
Dilution            : 1.0000
Do not use Multiplier & Dilution Factor with ISTDs

```

Signal 1: FID2 B, Back Signal

Peak #	RetTime [min]	Type	Width [min]	Area [pA*s]	Area %	Name
1	1.278		0.0000	0.00000	0.00000	Benzene
2	1.866		0.0000	0.00000	0.00000	Toluene
3	2.006		0.0000	0.00000	0.00000	Acetaldehyde
4	2.810		0.0000	0.00000	0.00000	Ethylbenzene
5	2.910		0.0000	0.00000	0.00000	m,p-Xylenes
6	3.222		0.0000	0.00000	0.00000	o-Xylene

Totals : 0.00000 0.0000

Uncalibrated Peaks: n.a.

2 Warnings or Errors :

Warning : Calibration warnings (see calibration table listing)

Warning : Calibrated compound(s) not found

```

=====
*** End of Report ***

```

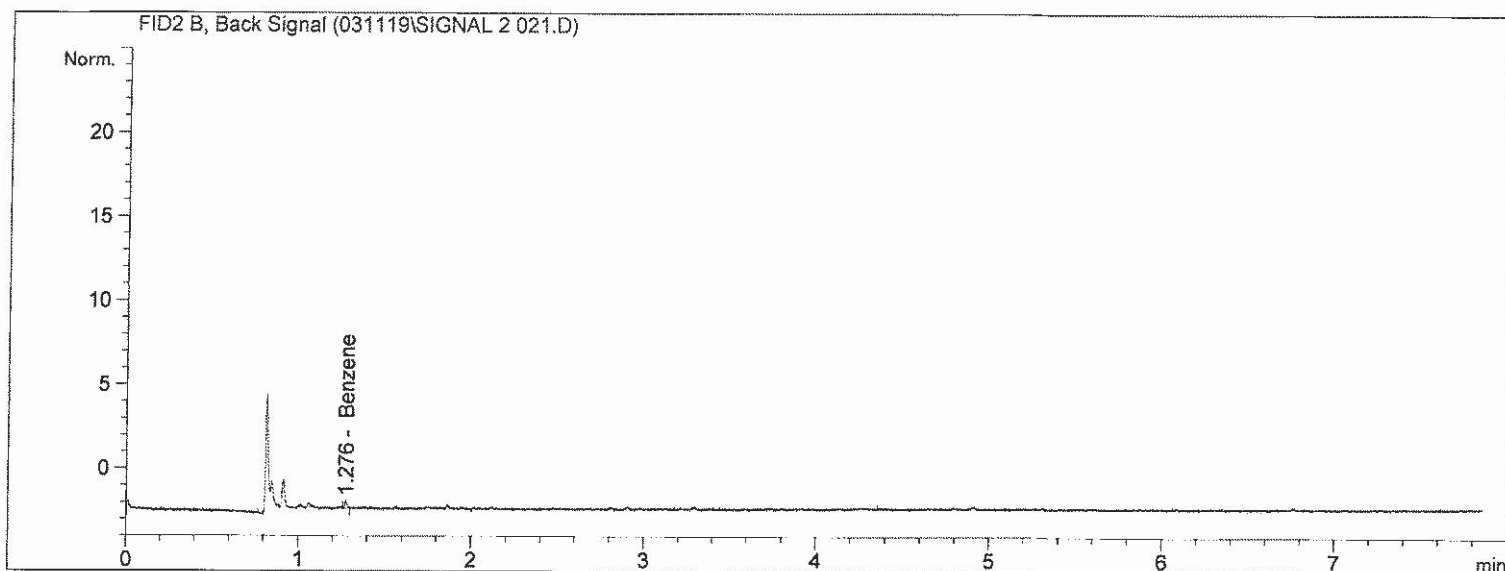

Sample Name: GSL_190249-001

```

=====
Acq. Operator   : Emily Decker
Sample Operator : Emily Decker
Acq. Instrument : GC8
Injection Date  : 3/11/2019 2:06:19 PM
Location       : Vial 1
Inj Volume     : Manually

Acq. Method    : C:\CHEM32\1\METHODS\REAR_BTEX_ACETALD_M18_030619.M
Last changed   : 3/8/2019 10:17:23 AM by Emily Decker
Analysis Method : C:\CHEM32\1\METHODS\REAR_BTEX_ACETALD_M18_030619.M
Last changed   : 3/12/2019 11:44:36 AM by Emily Decker
                (modified after loading)

Sample Info    : GSL_190249-001
                Method:M18
=====
    
```



External Standard Report

```

Sorted By      : Signal
Calib. Data Modified : 3/7/2019 1:36:23 PM
Multiplier    : 1.0000
Dilution      : 1.0000
Do not use Multiplier & Dilution Factor with ISTDs
    
```

Signal 1: FID2 B, Back Signal

RetTime [min]	Type	Area [pA*s]	Amt/Area	Amount [ppmv]	Grp	Name
1.276	BBA	1.15452e-1	1.11651	1.28903e-1		Benzene
1.866	-	-	-	-		Toluene
2.006	-	-	-	-		Acetaldehyde
2.810	-	-	-	-		Ethylbenzene
2.910	-	-	-	-		m,p-Xylenes
3.222	-	-	-	-		o-Xylene

Totals : 1.28903e-1

Uncalibrated Peaks : compound name not specified

aw
3/12/19

Sample Name: GSL_190249-001

```
=====
Acq. Operator   : Emily Decker
Sample Operator : Emily Decker
Acq. Instrument : GC8                      Location : Vial 1
Injection Date  : 3/11/2019 2:06:19 PM
                                           Inj Volume : Manually
Acq. Method     : C:\CHEM32\1\METHODS\REAR_BTEX_ACETALD_M18_030619.M
Last changed    : 3/8/2019 10:17:23 AM by Emily Decker
Analysis Method : C:\CHEM32\1\METHODS\REAR_BTEX_ACETALD_M18_030619.M
Last changed    : 3/12/2019 11:44:36 AM by Emily Decker
                 (modified after loading)
Sample Info     : GSL_190249-001
                 Method:M18
=====
```

2 Warnings or Errors :

- Warning : Calibration warnings (see calibration table listing)
- Warning : Calibrated compound(s) not found

```
=====
*** End of Report ***
=====
```

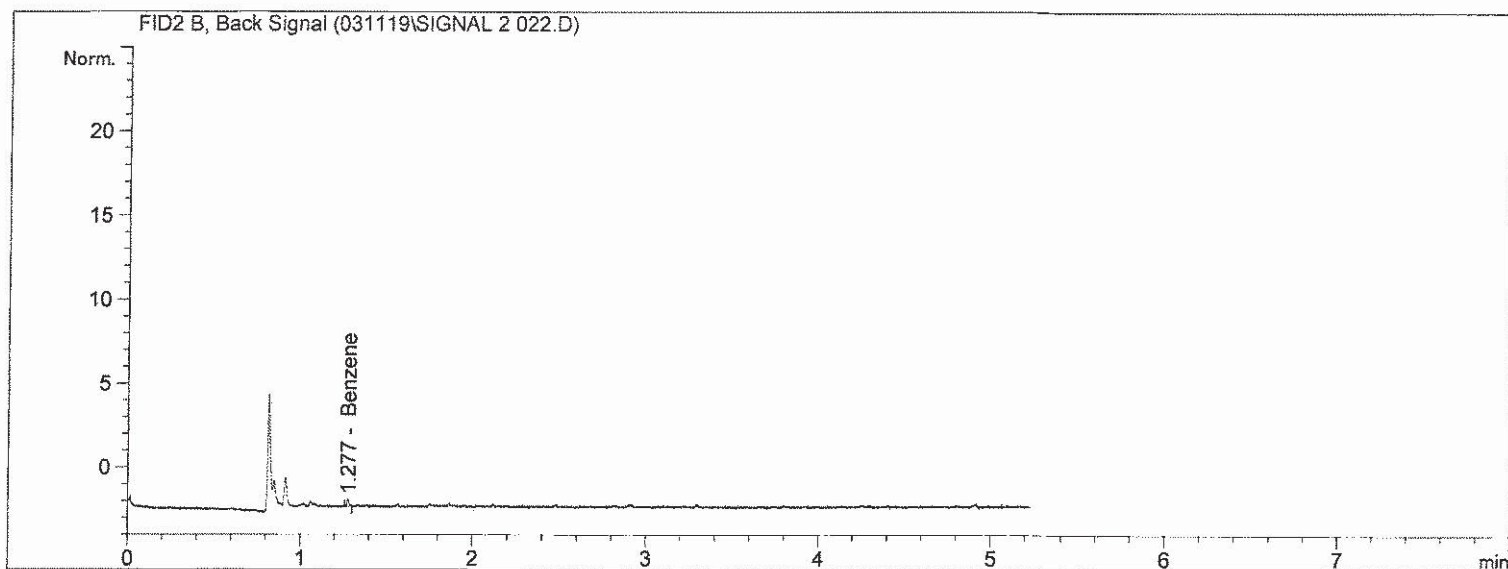
Sample Name: GSL_190249-001

```

=====
Acq. Operator   : Emily Decker
Sample Operator : Emily Decker
Acq. Instrument : GC8
Injection Date  : 3/11/2019 2:22:21 PM
Location       : Vial 1
Inj Volume     : Manually

Acq. Method    : C:\CHEM32\1\METHODS\REAR_BTEX_ACETALD_M18_030619.M
Last changed   : 3/8/2019 10:17:23 AM by Emily Decker
Analysis Method : C:\CHEM32\1\METHODS\REAR_BTEX_ACETALD_M18_030619.M
Last changed   : 3/12/2019 11:44:58 AM by Emily Decker
                (modified after loading)

Sample Info    : GSL_190249-001
                Method:M18
=====
    
```



External Standard Report

```

Sorted By      : Signal
Calib. Data Modified : 3/7/2019 1:36:23 PM
Multiplier     : 1.0000
Dilution       : 1.0000
Do not use Multiplier & Dilution Factor with ISTDs
    
```

Signal 1: FID2 B, Back Signal

RetTime [min]	Type	Area [pA*s]	Amt/Area	Amount [ppmv]	Grp	Name
1.277	BBA	1.16855e-1	1.11651	1.30471e-1		Benzene
1.866		-	-	-		Toluene
2.006		-	-	-		Acetaldehyde
2.810		-	-	-		Ethylbenzene
2.910		-	-	-		m,p-Xylenes
3.222		-	-	-		o-Xylene

Totals : 1.30471e-1

Uncalibrated Peaks : compound name not specified

aw
3/12/19

Sample Name: GSL_190249-001

```
=====
Acq. Operator   : Emily Decker
Sample Operator : Emily Decker
Acq. Instrument : GC8                      Location : Vial 1
Injection Date  : 3/11/2019 2:22:21 PM
                                           Inj Volume : Manually
Acq. Method     : C:\CHEM32\1\METHODS\REAR_BTEX_ACETALD_M18_030619.M
Last changed    : 3/8/2019 10:17:23 AM by Emily Decker
Analysis Method : C:\CHEM32\1\METHODS\REAR_BTEX_ACETALD_M18_030619.M
Last changed    : 3/12/2019 11:44:58 AM by Emily Decker
                 (modified after loading)
Sample Info     : GSL_190249-001
                 Method:M18
=====
```

2 Warnings or Errors :

Warning : Calibration warnings (see calibration table listing)

Warning : Calibrated compound(s) not found

```
=====
*** End of Report ***
```

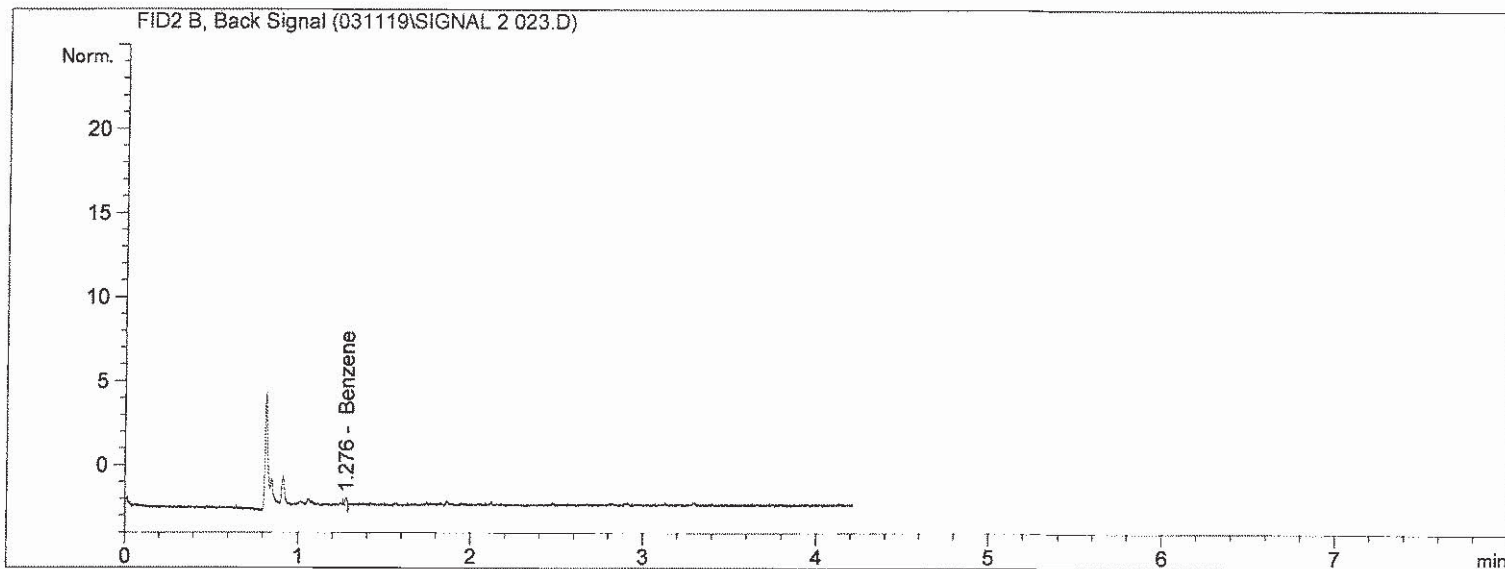
Sample Name: GSL_190249-001

```

=====
Acq. Operator   : Emily Decker
Sample Operator : Emily Decker
Acq. Instrument : GC8
Injection Date  : 3/11/2019 2:30:48 PM
Location       : Vial 1
Inj Volume     : Manually

Acq. Method    : C:\CHEM32\1\METHODS\REAR_BTEX_ACETALD_M18_030619.M
Last changed   : 3/8/2019 10:17:23 AM by Emily Decker
Analysis Method : C:\CHEM32\1\METHODS\REAR_BTEX_ACETALD_M18_030619.M
Last changed   : 3/12/2019 11:44:36 AM by Emily Decker
                (modified after loading)

Sample Info    : GSL_190249-001
                Method:M18
=====
    
```



External Standard Report

```

Sorted By      : Signal
Calib. Data Modified : 3/7/2019 1:36:23 PM
Multiplier     : 1.0000
Dilution       : 1.0000
Do not use Multiplier & Dilution Factor with ISTDs
    
```

Signal 1: FID2 B, Back Signal

RetTime [min]	Type	Area [pA*s]	Amt/Area	Amount [ppmv]	Grp	Name
1.276	BBA	1.20052e-1	1.11651	1.34040e-1		Benzene
1.866	-	-	-	-		Toluene
2.006	-	-	-	-		Acetaldehyde
2.810	-	-	-	-		Ethylbenzene
2.910	-	-	-	-		m,p-Xylenes
3.222	-	-	-	-		o-Xylene

Totals : 1.34040e-1

Uncalibrated Peaks : compound name not specified

aw
3/12/19

Sample Name: GSL_190249-001

```
=====
Acq. Operator   : Emily Decker
Sample Operator : Emily Decker
Acq. Instrument : GC8                      Location : Vial 1
Injection Date  : 3/11/2019 2:30:48 PM
                                           Inj Volume : Manually
Acq. Method     : C:\CHEM32\1\METHODS\REAR_BTEX_ACETALD_M18_030619.M
Last changed    : 3/8/2019 10:17:23 AM by Emily Decker
Analysis Method : C:\CHEM32\1\METHODS\REAR_BTEX_ACETALD_M18_030619.M
Last changed    : 3/12/2019 11:44:36 AM by Emily Decker
                 (modified after loading)
Sample Info     : GSL_190249-001
                 Method:M18
=====
```

2 Warnings or Errors :

Warning : Calibration warnings (see calibration table listing)

Warning : Calibrated compound(s) not found

```
=====
*** End of Report ***
```

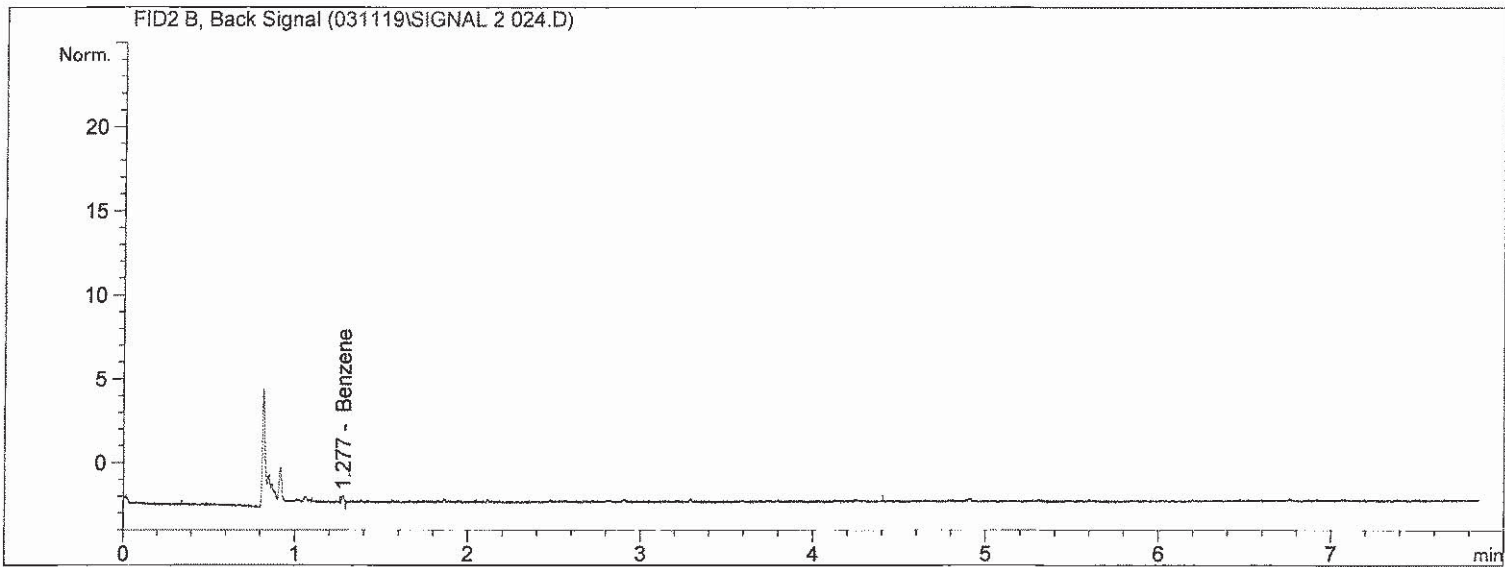
Sample Name: GSL_190249-002

```

=====
Acq. Operator   : Emily Decker
Sample Operator : Emily Decker
Acq. Instrument : GC8                      Location : Vial 1
Injection Date  : 3/11/2019 2:38:43 PM
                                           Inj Volume : Manually

Acq. Method     : C:\CHEM32\1\METHODS\REAR_BTEX_ACETALD_M18_030619.M
Last changed    : 3/8/2019 10:17:23 AM by Emily Decker
Analysis Method : C:\CHEM32\1\METHODS\REAR_BTEX_ACETALD_M18_030619.M
Last changed    : 3/12/2019 11:49:50 AM by Emily Decker
                 (modified after loading)

Sample Info     : GSL_190249-002
                 Method:M18
=====
    
```



External Standard Report

```

Sorted By      : Signal
Calib. Data Modified : 3/7/2019 1:36:23 PM
Multiplier     : 1.0000
Dilution       : 1.0000
Do not use Multiplier & Dilution Factor with ISTDs
    
```

Signal 1: FID2 B, Back Signal

RetTime [min]	Type	Area [pA*s]	Amt/Area	Amount [ppmv]	Grp	Name
1.277	BBA	1.15738e-1	1.11651	1.29223e-1		Benzene
1.866		-	-	-		Toluene
2.006		-	-	-		Acetaldehyde
2.810		-	-	-		Ethylbenzene
2.910		-	-	-		m,p-Xylenes
3.222		-	-	-		o-Xylene

Totals : 1.29223e-1

Uncalibrated Peaks : compound name not specified

CS
3/12/19

Sample Name: GSL_190249-002

```
=====
Acq. Operator   : Emily Decker
Sample Operator : Emily Decker
Acq. Instrument : GC8                      Location : Vial 1
Injection Date  : 3/11/2019 2:38:43 PM
                                           Inj Volume : Manually
Acq. Method     : C:\CHEM32\1\METHODS\REAR_BTEX_ACETALD_M18_030619.M
Last changed    : 3/8/2019 10:17:23 AM by Emily Decker
Analysis Method : C:\CHEM32\1\METHODS\REAR_BTEX_ACETALD_M18_030619.M
Last changed    : 3/12/2019 11:49:50 AM by Emily Decker
                 (modified after loading)
Sample Info     : GSL_190249-002
                 Method:M18
=====
```

2 Warnings or Errors :

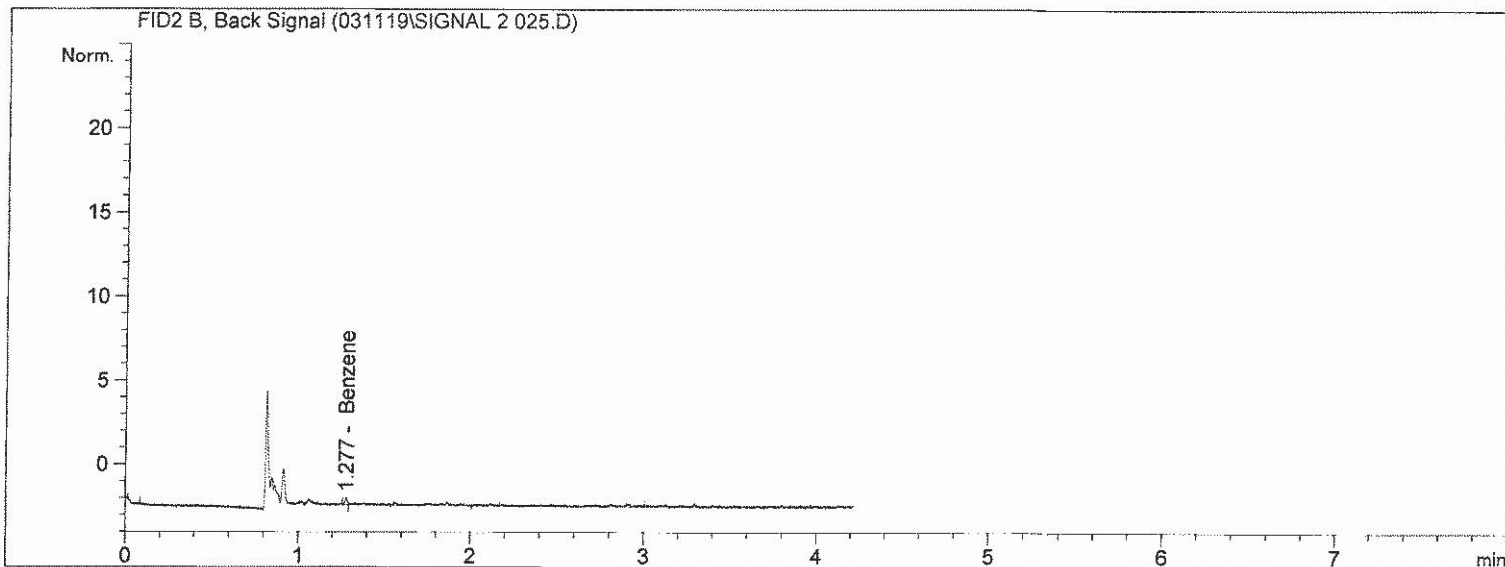
- Warning : Calibration warnings (see calibration table listing)
- Warning : Calibrated compound(s) not found

```
=====
*** End of Report ***
```


Sample Name: GSL_190249-002

```

=====
Acq. Operator   : Emily Decker
Sample Operator : Emily Decker
Acq. Instrument : GC8                      Location : Vial 1
Injection Date  : 3/11/2019 2:55:18 PM
                                           Inj Volume : Manually
Acq. Method     : C:\CHEM32\1\METHODS\REAR_BTEX_ACETALD_M18_030619.M
Last changed    : 3/8/2019 10:17:23 AM by Emily Decker
Analysis Method : C:\CHEM32\1\METHODS\REAR_BTEX_ACETALD_M18_030619.M
Last changed    : 3/12/2019 11:49:10 AM by Emily Decker
                                           (modified after loading)
Sample Info     : GSL_190249-002
                                           Method:M18
=====
    
```



External Standard Report

```

Sorted By      : Signal
Calib. Data Modified : 3/7/2019 1:36:23 PM
Multiplier     : 1.0000
Dilution       : 1.0000
Do not use Multiplier & Dilution Factor with ISTDs
    
```

Signal 1: FID2 B, Back Signal

RetTime [min]	Type	Area [pA*s]	Amt/Area	Amount [ppmv]	Grp	Name
1.277	BBA	1.17260e-1	1.11651	1.30923e-1		Benzene
1.866	-	-	-	-		Toluene
2.006	-	-	-	-		Acetaldehyde
2.810	-	-	-	-		Ethylbenzene
2.910	-	-	-	-		m,p-Xylenes
3.222	-	-	-	-		o-Xylene

Totals : 1.30923e-1

Uncalibrated Peaks : compound name not specified

EW
3/12/19

Sample Name: GSL_190249-002

```
=====
Acq. Operator   : Emily Decker
Sample Operator : Emily Decker
Acq. Instrument : GC8                      Location : Vial 1
Injection Date  : 3/11/2019 2:55:18 PM
                                           Inj Volume : Manually
Acq. Method     : C:\CHEM32\1\METHODS\REAR_BTEX_ACETALD_M18_030619.M
Last changed    : 3/8/2019 10:17:23 AM by Emily Decker
Analysis Method : C:\CHEM32\1\METHODS\REAR_BTEX_ACETALD_M18_030619.M
Last changed    : 3/12/2019 11:49:10 AM by Emily Decker
                 (modified after loading)
Sample Info     : GSL_190249-002
                 Method:M18
=====
```

2 Warnings or Errors :

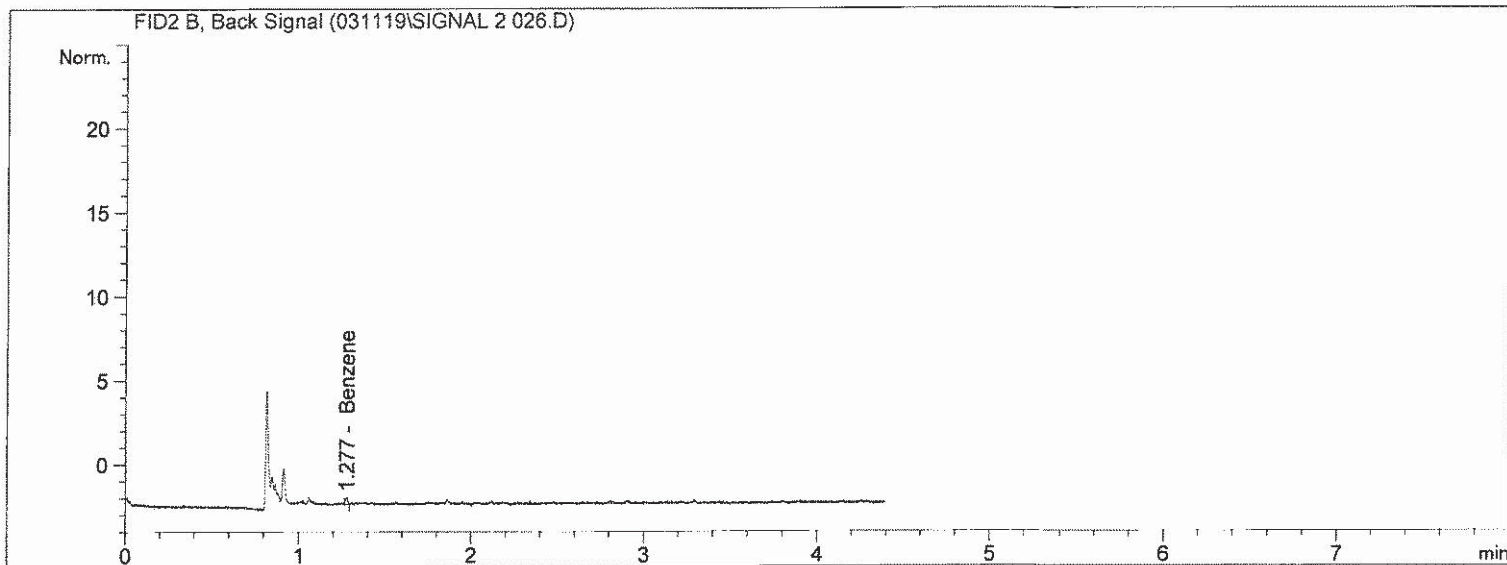
Warning : Calibration warnings (see calibration table listing)
Warning : Calibrated compound(s) not found

```
=====
*** End of Report ***
```

Sample Name: GSL_190249-002

```

=====
Acq. Operator   : Emily Decker
Sample Operator : Emily Decker
Acq. Instrument : GC8                      Location : Vial 1
Injection Date  : 3/11/2019 3:02:22 PM
                                           Inj Volume : Manually
Acq. Method    : C:\CHEM32\1\METHODS\REAR_BTEX_ACETALD_M18_030619.M
Last changed   : 3/8/2019 10:17:23 AM by Emily Decker
Analysis Method : C:\CHEM32\1\METHODS\REAR_BTEX_ACETALD_M18_030619.M
Last changed   : 3/12/2019 11:50:54 AM by Emily Decker
                 (modified after loading)
Sample Info    : GSL_190249-002
                 Method:M18
=====
    
```



External Standard Report

```

Sorted By      : Signal
Calib. Data Modified : 3/7/2019 1:36:23 PM
Multiplier     : 1.0000
Dilution       : 1.0000
Do not use Multiplier & Dilution Factor with ISTDs
    
```

Signal 1: FID2 B, Back Signal

RetTime [min]	Type	Area [pA*s]	Amt/Area	Amount [ppmv]	Grp	Name
1.277	BBA	1.15841e-1	1.11651	1.29338e-1		Benzene
1.866	-	-	-	-		Toluene
2.006	-	-	-	-		Acetaldehyde
2.810	-	-	-	-		Ethylbenzene
2.910	-	-	-	-		m,p-Xylenes
3.222	-	-	-	-		o-Xylene

Totals : 1.29338e-1

Uncalibrated Peaks : compound name not specified

aw
3/12/19

Sample Name: GSL_190249-002

```
=====
Acq. Operator   : Emily Decker
Sample Operator : Emily Decker
Acq. Instrument : GC8                      Location : Vial 1
Injection Date  : 3/11/2019 3:02:22 PM
                                           Inj Volume : Manually
Acq. Method     : C:\CHEM32\1\METHODS\REAR_BTEX_ACETALD_M18_030619.M
Last changed    : 3/8/2019 10:17:23 AM by Emily Decker
Analysis Method : C:\CHEM32\1\METHODS\REAR_BTEX_ACETALD_M18_030619.M
Last changed    : 3/12/2019 11:50:54 AM by Emily Decker
                 (modified after loading)
Sample Info     : GSL_190249-002
                 Method:M18
=====
```

2 Warnings or Errors :

Warning : Calibration warnings (see calibration table listing)

Warning : Calibrated compound(s) not found

```
=====
*** End of Report ***
```

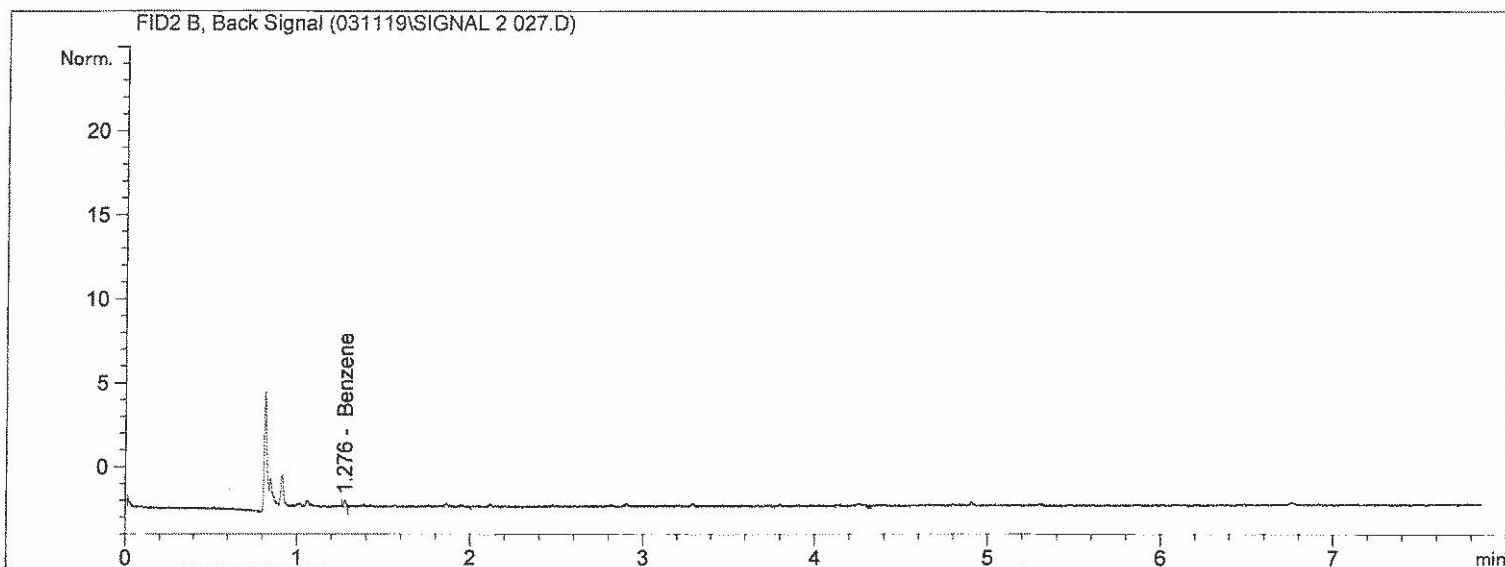
Sample Name: GSL_190249-003

```

=====
Acq. Operator   : Emily Decker
Sample Operator : Emily Decker
Acq. Instrument : GC8                      Location : Vial 1
Injection Date  : 3/11/2019 3:13:20 PM
                                           Inj Volume : Manually

Acq. Method    : C:\CHEM32\1\METHODS\REAR_BTEX_ACETALD_M18_030619.M
Last changed   : 3/8/2019 10:17:23 AM by Emily Decker
Analysis Method : C:\CHEM32\1\METHODS\REAR_BTEX_ACETALD_M18_030619.M
Last changed   : 3/12/2019 11:56:06 AM by Emily Decker
                (modified after loading)

Sample Info    : GSL_190249-003
                Method:M18
=====
    
```



External Standard Report

```

Sorted By      : Signal
Calib. Data Modified : 3/7/2019 1:36:23 PM
Multiplier     : 1.0000
Dilution       : 1.0000
Do not use Multiplier & Dilution Factor with ISTDs
    
```

Signal 1: FID2 B, Back Signal

RetTime [min]	Type	Area [pA*s]	Amt/Area	Amount [ppmv]	Grp	Name
1.276	BBA	1.22392e-1	1.11651	1.36652e-1		Benzene
1.866	-	-	-	-		Toluene
2.006	-	-	-	-		Acetaldehyde
2.810	-	-	-	-		Ethylbenzene
2.910	-	-	-	-		m,p-Xylenes
3.222	-	-	-	-		o-Xylene

Totals : 1.36652e-1

Uncalibrated Peaks : compound name not specified

aw
3/12/19

Sample Name: GSL_190249-003

```
=====
Acq. Operator   : Emily Decker
Sample Operator : Emily Decker
Acq. Instrument : GC8                      Location : Vial 1
Injection Date  : 3/11/2019 3:13:20 PM
                                           Inj Volume : Manually
Acq. Method     : C:\CHEM32\1\METHODS\REAR_BTEX_ACETALD_M18_030619.M
Last changed    : 3/8/2019 10:17:23 AM by Emily Decker
Analysis Method : C:\CHEM32\1\METHODS\REAR_BTEX_ACETALD_M18_030619.M
Last changed    : 3/12/2019 11:56:06 AM by Emily Decker
                 (modified after loading)
Sample Info     : GSL_190249-003
                 Method:M18
=====
```

2 Warnings or Errors :

- Warning : Calibration warnings (see calibration table listing)
- Warning : Calibrated compound(s) not found

```
=====
*** End of Report ***
```

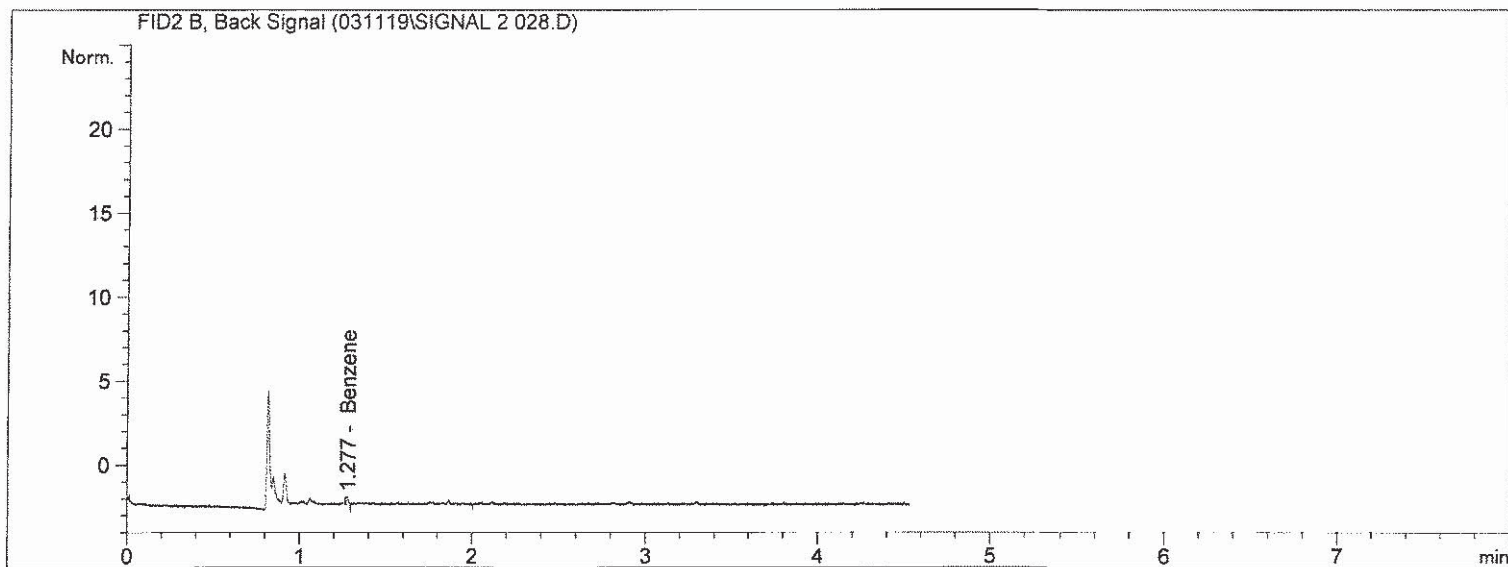
Sample Name: GSL_190249-003

```

=====
Acq. Operator   : Emily Decker
Sample Operator : Emily Decker
Acq. Instrument : GC8
Injection Date  : 3/11/2019 3:29:24 PM
Location       : Vial 1
Inj Volume     : Manually

Acq. Method    : C:\CHEM32\1\METHODS\REAR_BTEX_ACETALD_M18_030619.M
Last changed   : 3/8/2019 10:17:23 AM by Emily Decker
Analysis Method : C:\CHEM32\1\METHODS\REAR_BTEX_ACETALD_M18_030619.M
Last changed   : 3/12/2019 11:56:47 AM by Emily Decker
                (modified after loading)

Sample Info    : GSL_190249-003
                Method:M18
=====
    
```



External Standard Report

```

Sorted By      : Signal
Calib. Data Modified : 3/7/2019 1:36:23 PM
Multiplier     : 1.0000
Dilution       : 1.0000
Do not use Multiplier & Dilution Factor with ISTDs
    
```

Signal 1: FID2 B, Back Signal

RetTime [min]	Type	Area [pA*s]	Amt/Area	Amount [ppmv]	Grp	Name
1.277	BBA	1.16771e-1	1.11651	1.30376e-1		Benzene
1.866	-	-	-	-		Toluene
2.006	-	-	-	-		Acetaldehyde
2.810	-	-	-	-		Ethylbenzene
2.910	-	-	-	-		m,p-Xylenes
3.222	-	-	-	-		o-Xylene

Totals : 1.30376e-1

Uncalibrated Peaks : compound name not specified

no
3/12/19

Sample Name: GSL_190249-003

```
=====
Acq. Operator   : Emily Decker
Sample Operator : Emily Decker
Acq. Instrument : GC8                      Location : Vial 1
Injection Date  : 3/11/2019 3:29:24 PM
                                           Inj Volume : Manually
Acq. Method     : C:\CHEM32\1\METHODS\REAR_BTEX_ACETALD_M18_030619.M
Last changed    : 3/8/2019 10:17:23 AM by Emily Decker
Analysis Method : C:\CHEM32\1\METHODS\REAR_BTEX_ACETALD_M18_030619.M
Last changed    : 3/12/2019 11:56:47 AM by Emily Decker
                 (modified after loading)
Sample Info     : GSL_190249-003
                 Method:M18
=====
```

2 Warnings or Errors :

Warning : Calibration warnings (see calibration table listing)

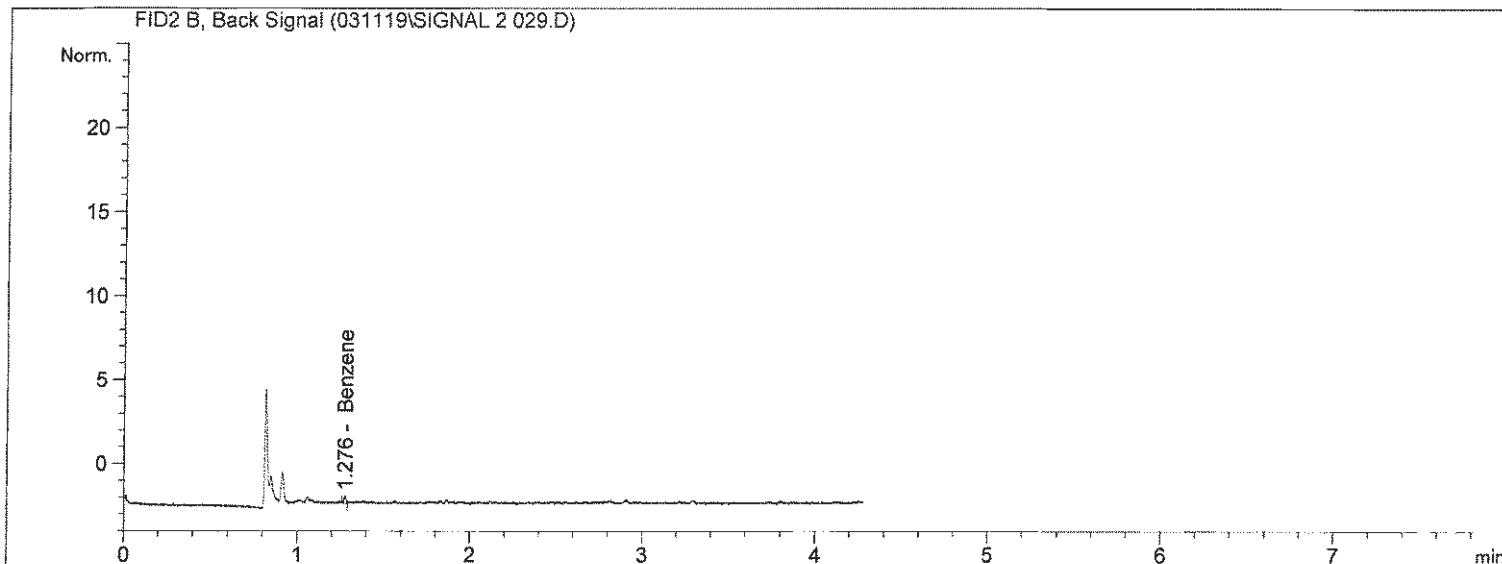
Warning : Calibrated compound(s) not found

```
=====
*** End of Report ***
```


Sample Name: GSL_190249-003

```

=====
Acq. Operator   : Emily Decker
Sample Operator : Emily Decker
Acq. Instrument : GC8                      Location : Vial 1
Injection Date  : 3/11/2019 3:37:04 PM
                                           Inj Volume : Manually
Acq. Method     : C:\CHEM32\1\METHODS\REAR_BTEX_ACETALD_M18_030619.M
Last changed    : 3/8/2019 10:17:23 AM by Emily Decker
Analysis Method : C:\CHEM32\1\METHODS\REAR_BTEX_ACETALD_M18_030619.M
Last changed    : 3/12/2019 11:56:06 AM by Emily Decker
                                           (modified after loading)
Sample Info     : GSL_190249-003
                                           Method:M18
=====
    
```



External Standard Report

```

Sorted By      : Signal
Calib. Data Modified : 3/7/2019 1:36:23 PM
Multiplier     : 1.0000
Dilution       : 1.0000
Do not use Multiplier & Dilution Factor with ISTDs
    
```

Signal 1: FID2 B, Back Signal

RetTime [min]	Type	Area [pA*s]	Amt/Area	Amount [ppmv]	Grp	Name
1.276	BBA	1.21146e-1	1.11651	1.35261e-1		Benzene
1.866	-	-	-	-		Toluene
2.006	-	-	-	-		Acetaldehyde
2.810	-	-	-	-		Ethylbenzene
2.910	-	-	-	-		m,p-Xylenes
3.222	-	-	-	-		o-Xylene

Totals : 1.35261e-1

Uncalibrated Peaks : compound name not specified

ans
3/12/19

Sample Name: GSL_190249-003

```
=====
Acq. Operator   : Emily Decker
Sample Operator : Emily Decker
Acq. Instrument : GC8                      Location : Vial 1
Injection Date  : 3/11/2019 3:37:04 PM
                                           Inj Volume : Manually
Acq. Method     : C:\CHEM32\1\METHODS\REAR_BTEX_ACETALD_M18_030619.M
Last changed    : 3/8/2019 10:17:23 AM by Emily Decker
Analysis Method : C:\CHEM32\1\METHODS\REAR_BTEX_ACETALD_M18_030619.M
Last changed    : 3/12/2019 11:56:06 AM by Emily Decker
                 (modified after loading)
Sample Info     : GSL_190249-003
                 Method:M18
=====
```

2 Warnings or Errors :

Warning : Calibration warnings (see calibration table listing)

Warning : Calibrated compound(s) not found

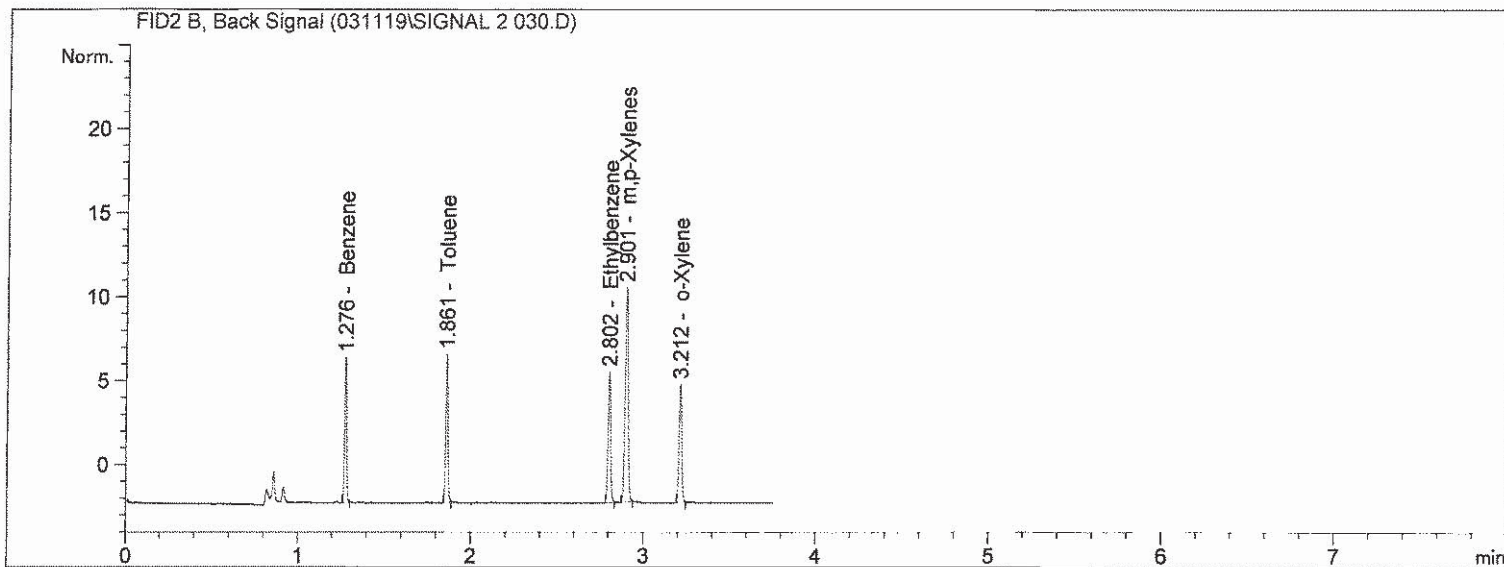
```
=====
*** End of Report ***
```

Sample Name: MS

```

=====
Acq. Operator   : Emily Decker
Sample Operator : Emily Decker
Acq. Instrument : GC8
Injection Date  : 3/11/2019 4:11:28 PM
Location       : Vial 1
Inj Volume     : Manually

Acq. Method    : C:\CHEM32\1\METHODS\REAR_BTEX_ACETALD_M18_030619.M
Last changed   : 3/8/2019 10:17:23 AM by Emily Decker
Analysis Method : C:\CHEM32\1\METHODS\REAR_BTEX_ACETALD_M18_030619.M
Last changed   : 3/12/2019 11:59:53 AM by Emily Decker
                (modified after loading)
Sample Info    : GSL_190239-001MS(5ppmv BTEX)
                Method:M18
=====
    
```



External Standard Report

```

Sorted By           : Signal
Calib. Data Modified : 3/7/2019 1:36:23 PM
Multiplier          : 1.0000
Dilution            : 1.0000
Do not use Multiplier & Dilution Factor with ISTDs
    
```

Signal 1: FID2 B, Back Signal

RetTime [min]	Type	Area [pA*s]	Amt/Area	Amount [ppmv]	Grp	Name
1.276	BB	4.54364	1.11651	5.07303		Benzene
1.861	BB	4.93278	1.02218	5.04217		Toluene
2.006		-	-	-		Acetaldehyde
2.802	BB	5.20260	9.81706e-1	5.10743		Ethylbenzene
2.901	BB	10.04569	1.02577	10.30457		m,p-Xylenes
3.212	BB	4.99991	1.04696	5.23472		o-Xylene

Totals : 30.76191

Uncalibrated Peaks : compound name not specified

aw
3/12/19

Sample Name: MS

```
=====
Acq. Operator   : Emily Decker
Sample Operator : Emily Decker
Acq. Instrument : GC8                      Location : Vial 1
Injection Date  : 3/11/2019 4:11:28 PM
                                           Inj Volume : Manually
Acq. Method     : C:\CHEM32\1\METHODS\REAR_BTEX_ACETALD_M18_030619.M
Last changed    : 3/8/2019 10:17:23 AM by Emily Decker
Analysis Method : C:\CHEM32\1\METHODS\REAR_BTEX_ACETALD_M18_030619.M
Last changed    : 3/12/2019 11:59:53 AM by Emily Decker
                 (modified after loading)
Sample Info     : GSL_190239-001MS(5ppmv BTEX)
                 Method:M18
=====
```

2 Warnings or Errors :

Warning : Calibration warnings (see calibration table listing)

Warning : Calibrated compound(s) not found

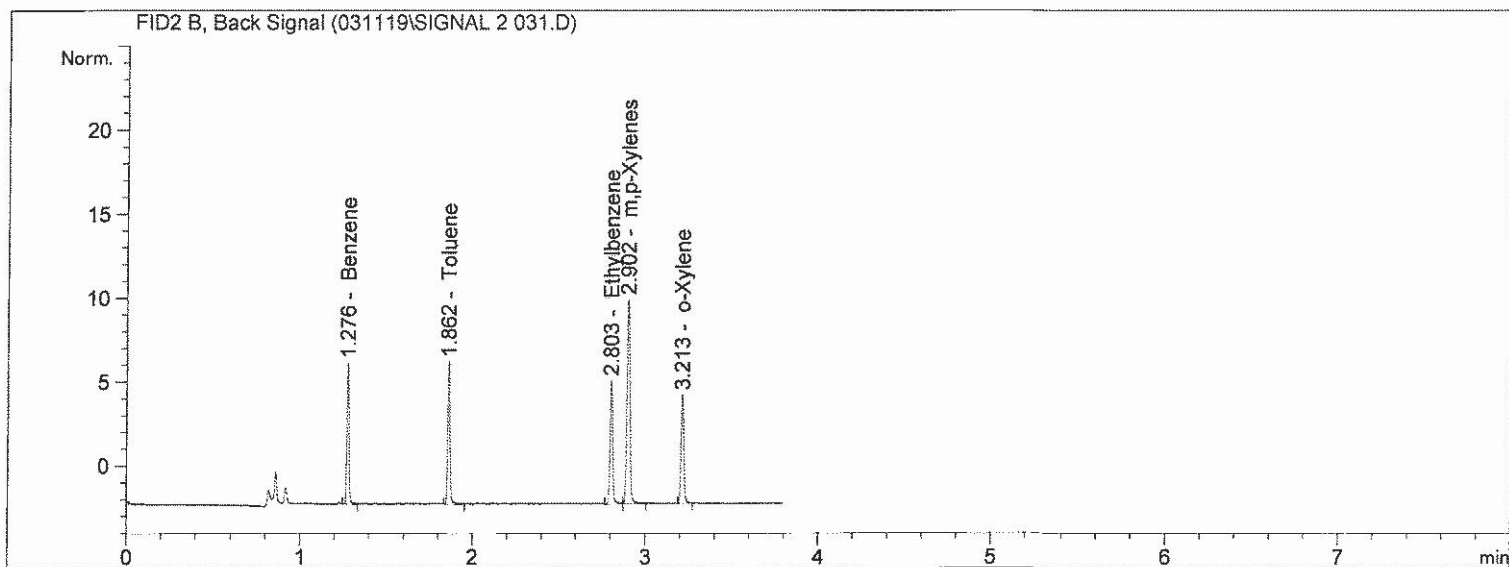
```
=====
*** End of Report ***
```

Sample Name: MS

```

=====
Acq. Operator   : Emily Decker
Sample Operator : Emily Decker
Acq. Instrument : GC8                      Location : Vial 1
Injection Date  : 3/11/2019 4:17:38 PM
                                           Inj Volume : Manually
Acq. Method     : C:\CHEM32\1\METHODS\REAR_BTEX_ACETALD_M18_030619.M
Last changed    : 3/8/2019 10:17:23 AM by Emily Decker
Analysis Method : C:\CHEM32\1\METHODS\REAR_BTEX_ACETALD_M18_030619.M
Last changed    : 3/12/2019 12:07:12 PM by Emily Decker
                                           (modified after loading)
Sample Info     : GSL_190239-001MS (5ppmv BTEX)
                                           Method:M18
=====

```



```

=====
External Standard Report
=====

```

```

Sorted By      : Signal
Calib. Data Modified : 3/7/2019 1:36:23 PM
Multiplier     : 1.0000
Dilution       : 1.0000
Do not use Multiplier & Dilution Factor with ISTDs

```

Signal 1: FID2 B, Back Signal

RetTime [min]	Type	Area [pA*s]	Amt/Area	Amount [ppmv]	Grp	Name
1.276	BB	4.43361	1.11651	4.95018		Benzene
1.862	BBA	4.86591	1.02218	4.97382		Toluene
2.006		-	-	-		Acetaldehyde
2.803	BB	4.92571	9.81706e-1	4.83560		Ethylbenzene
2.902	BB	9.32859	1.02577	9.56898		m,p-Xylenes
3.213	BB	4.58774	1.04696	4.80319		o-Xylene

Totals : 29.13176

Uncalibrated Peaks : compound name not specified

and
3/12/19

Sample Name: MS

```
=====
Acq. Operator   : Emily Decker
Sample Operator : Emily Decker
Acq. Instrument : GC8                      Location : Vial 1
Injection Date  : 3/11/2019 4:17:38 PM
                                           Inj Volume : Manually
Acq. Method     : C:\CHEM32\1\METHODS\REAR_BTEX_ACETALD_M18_030619.M
Last changed    : 3/8/2019 10:17:23 AM by Emily Decker
Analysis Method : C:\CHEM32\1\METHODS\REAR_BTEX_ACETALD_M18_030619.M
Last changed    : 3/12/2019 12:07:12 PM by Emily Decker
                 (modified after loading)
Sample Info     : GSL_190239-001MS(5ppmv BTEX)
                 Method:M18
=====
```

2 Warnings or Errors :

Warning : Calibration warnings (see calibration table listing)

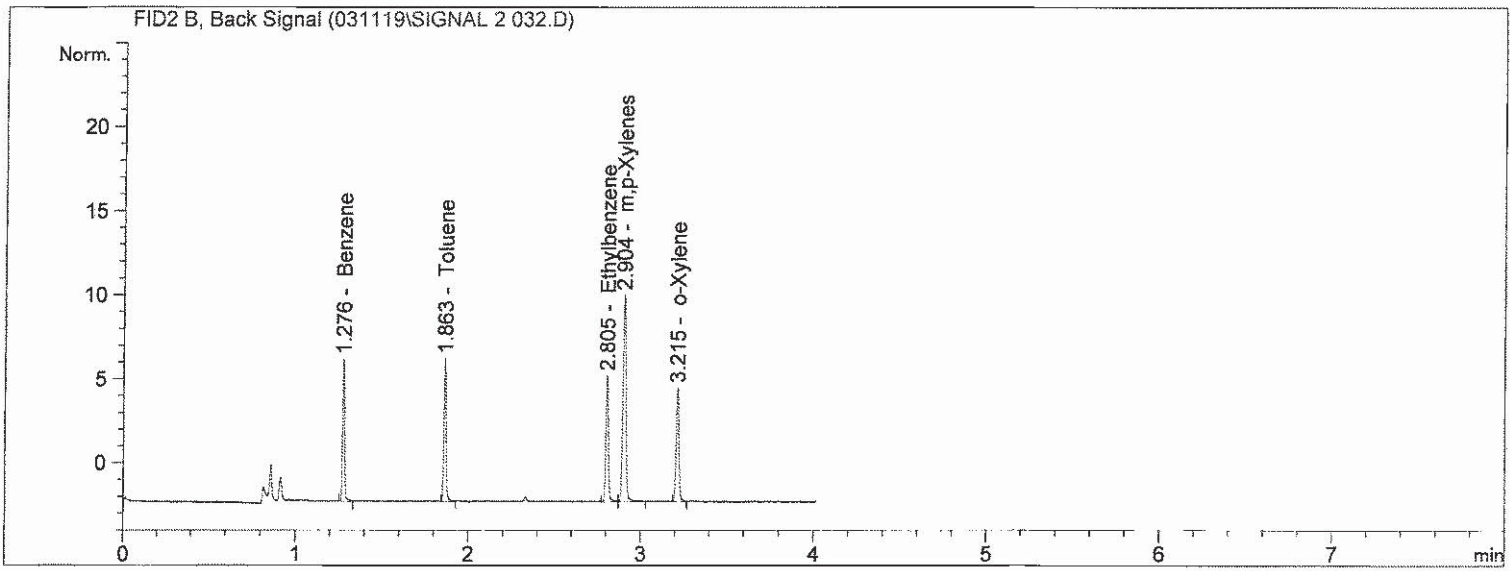
Warning : Calibrated compound(s) not found

```
=====
*** End of Report ***
```

Sample Name: MS

```

=====
Acq. Operator   : Emily Decker
Sample Operator : Emily Decker
Acq. Instrument : GC8                      Location : Vial 1
Injection Date  : 3/11/2019 4:50:51 PM
                                           Inj Volume : Manually
Acq. Method    : C:\CHEM32\1\METHODS\REAR_BTEX_ACETALD_M18_030619.M
Last changed   : 3/8/2019 10:17:23 AM by Emily Decker
Analysis Method : C:\CHEM32\1\METHODS\REAR_BTEX_ACETALD_M18_030619.M
Last changed   : 3/12/2019 12:07:12 PM by Emily Decker
                (modified after loading)
Sample Info    : GSL_190239-001MS(5ppmv BTEX)
                Method:M18
=====
    
```



External Standard Report

```

Sorted By      : Signal
Calib. Data Modified : 3/7/2019 1:36:23 PM
Multiplier    : 1.0000
Dilution      : 1.0000
Do not use Multiplier & Dilution Factor with ISTDs
    
```

Signal 1: FID2 B, Back Signal

RetTime [min]	Type	Area [pA*s]	Amt/Area	Amount [ppmv]	Grp	Name
1.276	BB	4.48020	1.11651	5.00219		Benzene
1.863	BV	4.85235	1.02218	4.95996		Toluene
2.006		-	-	-		Acetaldehyde
2.805	BB	5.00292	9.81706e-1	4.91139		Ethylbenzene
2.904	BBA	9.64811	1.02577	9.89674		m,p-Xylenes
3.215	BB	4.77359	1.04696	4.99777		o-Xylene

Totals : 29.76805

Uncalibrated Peaks : compound name not specified

EW
3/12/19

Sample Name: MS

```
=====
Acq. Operator   : Emily Decker
Sample Operator : Emily Decker
Acq. Instrument : GC8                      Location : Vial 1
Injection Date  : 3/11/2019 4:50:51 PM
                                           Inj Volume : Manually
Acq. Method     : C:\CHEM32\1\METHODS\REAR_BTEX_ACETALD_M18_030619.M
Last changed    : 3/8/2019 10:17:23 AM by Emily Decker
Analysis Method : C:\CHEM32\1\METHODS\REAR_BTEX_ACETALD_M18_030619.M
Last changed    : 3/12/2019 12:07:12 PM by Emily Decker
                 (modified after loading)
Sample Info     : GSL_190239-001MS(5ppmv BTEX)
                 Method:M18
=====
```

2 Warnings or Errors :

Warning : Calibration warnings (see calibration table listing)

Warning : Calibrated compound(s) not found

```
=====
*** End of Report ***
```

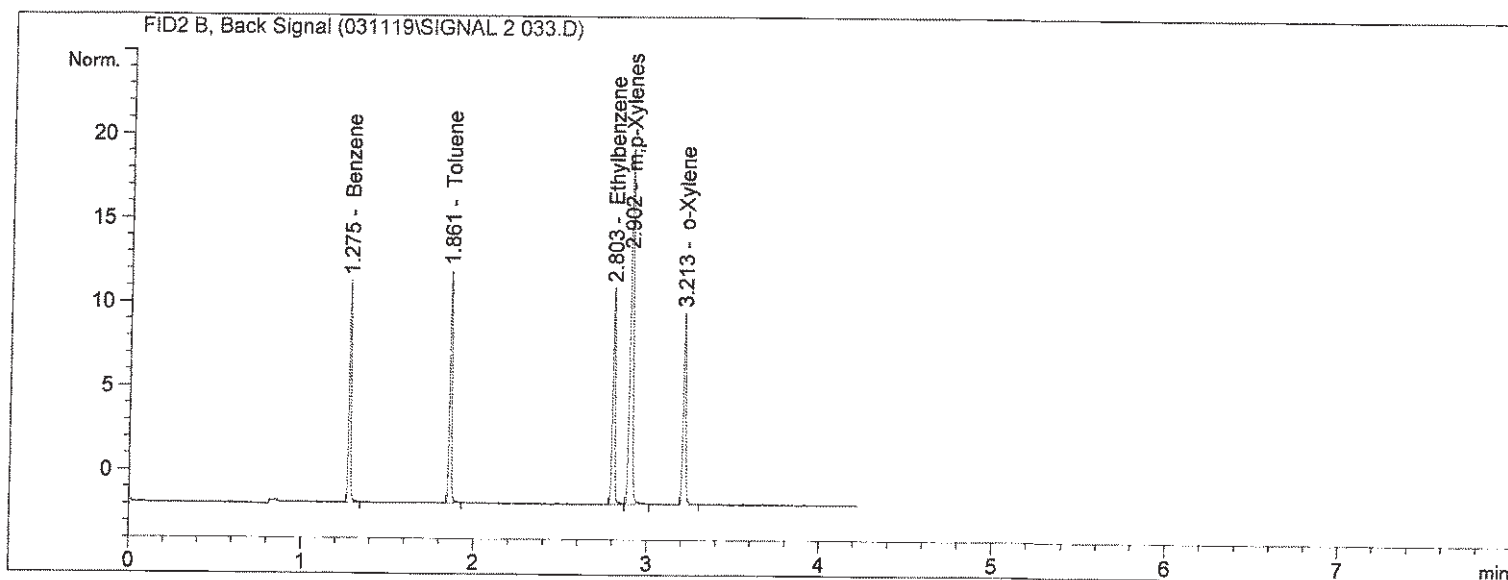

Sample Name: POSTCCV

```

=====
Acq. Operator   : Emily Decker
Sample Operator : Emily Decker
Acq. Instrument : GC8
Injection Date  : 3/11/2019 5:09:16 PM
Location        : Vial 1
Inj Volume     : Manually

Acq. Method    : C:\CHEM32\1\METHODS\REAR_BTEX_ACETALD_M18_030619.M
Last changed   : 3/8/2019 10:17:23 AM by Emily Decker
Analysis Method: C:\CHEM32\1\METHODS\REAR_BTEX_ACETALD_M18_030619.M
Last changed   : 3/11/2019 2:01:14 PM by Emily Decker
                (modified after loading)
Sample Info    : POSTCCV(10ppmv BTEX)
                Method:M18
=====

```



```

=====
External Standard Report
=====

```

```

Sorted By           : Signal
Calib. Data Modified : 3/7/2019 1:36:23 PM
Multiplier          : 1.0000
Dilution            : 1.0000
Do not use Multiplier & Dilution Factor with ISTDs

```

Signal 1: FID2 B, Back Signal

RetTime [min]	Type	Area [pA*s]	Amt/Area	Amount [ppmv]	Grp	Name
1.275	BB	8.85809	1.11651	9.89017		Benzene
1.861	BB	9.90995	1.02218	10.12972		Toluene
2.006	-	-	-	-		Acetaldehyde
2.803	BV	10.74281	9.81706e-1	10.54628		Ethylbenzene
2.902	VB	20.89593	1.02577	21.43441		m,p-Xylenes
3.213	BB	10.38798	1.04696	10.87582		o-Xylene

Totals : 62.87641

Uncalibrated Peaks : compound name not specified

sw
3/11/2019

Sample Name: POSTCCV

```
=====
Acq. Operator   : Emily Decker
Sample Operator : Emily Decker
Acq. Instrument : GC8                               Location : Vial 1
Injection Date  : 3/11/2019 5:09:16 PM
                                                    Inj Volume : Manually
Acq. Method     : C:\CHEM32\1\METHODS\REAR_BTEX_ACETALD_M18_030619.M
Last changed    : 3/8/2019 10:17:23 AM by Emily Decker
Analysis Method : C:\CHEM32\1\METHODS\REAR_BTEX_ACETALD_M18_030619.M
Last changed    : 3/11/2019 2:01:14 PM by Emily Decker
                  (modified after loading)
Sample Info     : POSTCCV(10ppmv BTEX)
                  Method:M18
=====
```

2 Warnings or Errors :

Warning : Calibration warnings (see calibration table listing)

Warning : Calibrated compound(s) not found

```
=====
*** End of Report ***
```

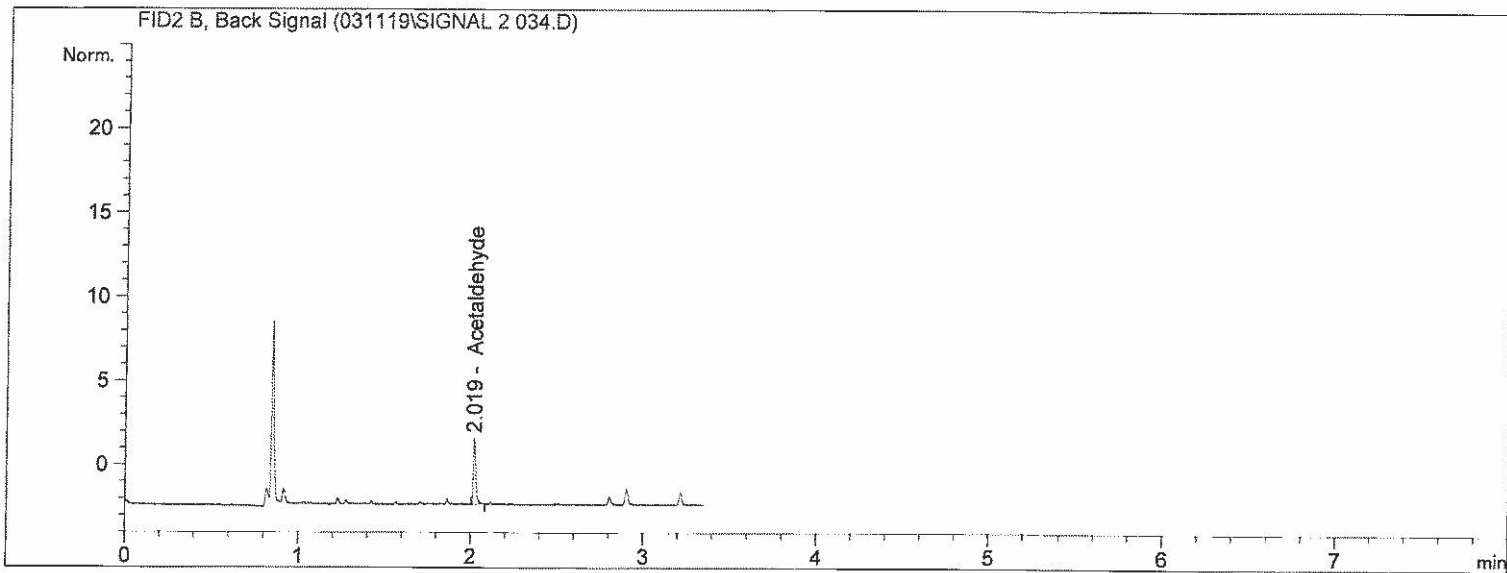
Sample Name: MS

```

=====
Acq. Operator   : Emily Decker
Sample Operator : Emily Decker
Acq. Instrument : GC8
Injection Date  : 3/11/2019 5:17:09 PM
Location        : Vial 1
Inj Volume     : Manually

Acq. Method    : C:\CHEM32\1\METHODS\REAR_BTEX_ACETALD_M18_030619.M
Last changed   : 3/8/2019 10:17:23 AM by Emily Decker
Analysis Method : C:\CHEM32\1\METHODS\REAR_BTEX_ACETALD_M18_030619.M
Last changed   : 3/11/2019 5:21:21 PM by Emily Decker
                (modified after loading)

Sample Info    : GSL_190239-001MS(50ppmv Acetaldehyde)
                Method:M18
=====
    
```



External Standard Report

```

Sorted By      : Signal
Calib. Data Modified : 3/7/2019 1:36:23 PM
Multiplier    : 1.0000
Dilution      : 1.0000
Do not use Multiplier & Dilution Factor with ISTDs
    
```

Signal 1: FID2 B, Back Signal

RetTime [min]	Type	Area [pA*s]	Amt/Area	Amount [ppmv]	Grp	Name
1.278	-	-	-	-	-	Benzene
1.866	-	-	-	-	-	Toluene
2.019	BB	2.23403	21.61679	48.29245	-	Acetaldehyde
2.810	-	-	-	-	-	Ethylbenzene
2.910	-	-	-	-	-	m,p-Xylenes
3.222	-	-	-	-	-	o-Xylene

Totals : 48.29245

aw
3/12/19

Uncalibrated Peaks : compound name not specified

Sample Name: MS

```
=====
Acq. Operator   : Emily Decker
Sample Operator : Emily Decker
Acq. Instrument : GC8                      Location : Vial 1
Injection Date  : 3/11/2019 5:17:09 PM      Inj Volume : Manually
Acq. Method     : C:\CHEM32\1\METHODS\REAR_BTEX_ACETALD_M18_030619.M
Last changed    : 3/8/2019 10:17:23 AM by Emily Decker
Analysis Method : C:\CHEM32\1\METHODS\REAR_BTEX_ACETALD_M18_030619.M
Last changed    : 3/11/2019 5:21:21 PM by Emily Decker
                  (modified after loading)
Sample Info     : GSL_190239-001MS(50ppmv Acetaldehyde)
                  Method:M18
=====
```

2 Warnings or Errors :

Warning : Calibration warnings (see calibration table listing)

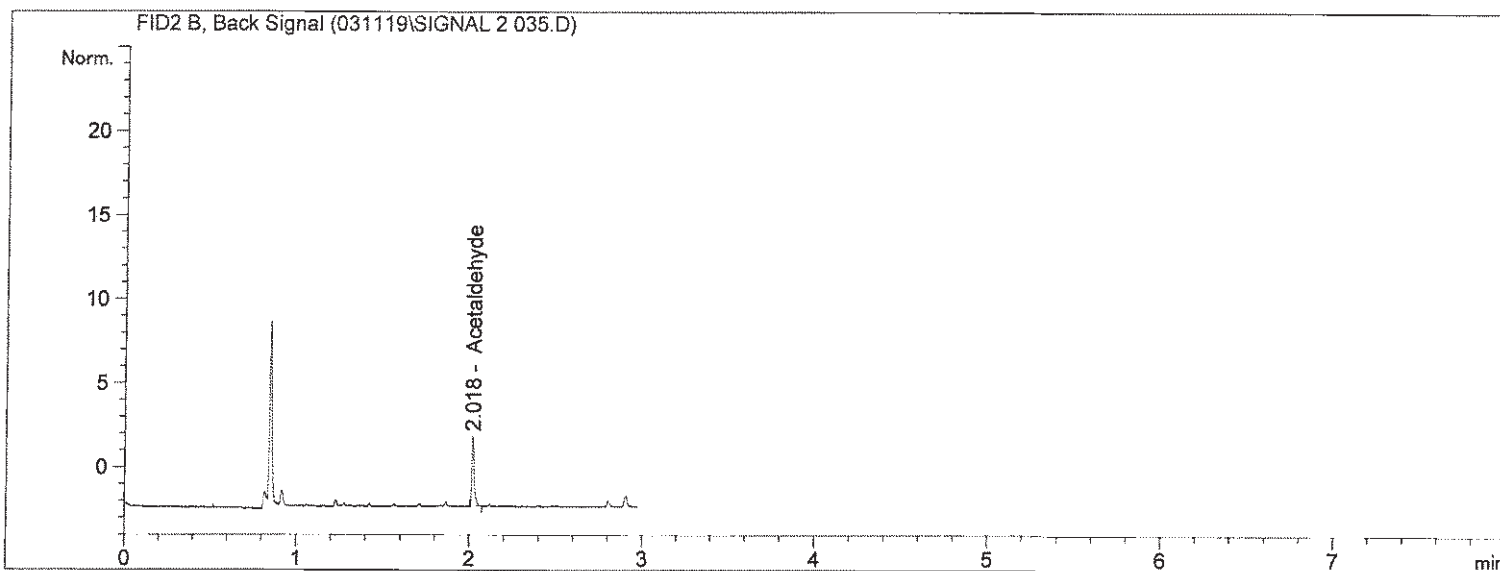
Warning : Calibrated compound(s) not found

```
=====
*** End of Report ***
```

Sample Name: MS

```

=====
Acq. Operator   : Emily Decker
Sample Operator : Emily Decker
Acq. Instrument : GC8                      Location : Vial 1
Injection Date  : 3/11/2019 5:23:37 PM
                                           Inj Volume : Manually
Acq. Method     : C:\CHEM32\1\METHODS\REAR_BTEX_ACETALD_M18_030619.M
Last changed    : 3/8/2019 10:17:23 AM by Emily Decker
Analysis Method : C:\CHEM32\1\METHODS\REAR_BTEX_ACETALD_M18_030619.M
Last changed    : 3/11/2019 5:32:39 PM by Emily Decker
                 (modified after loading)
Sample Info     : GSL_190239-001MS(50ppmv Acetaldehyde)
                 Method:M18
=====
    
```



External Standard Report

```

Sorted By      : Signal
Calib. Data Modified : 3/7/2019 1:36:23 PM
Multiplier     : 1.0000
Dilution       : 1.0000
Do not use Multiplier & Dilution Factor with ISTDs
    
```

Signal 1: FID2 B, Back Signal

RetTime [min]	Type	Area [pA*s]	Amt/Area	Amount [ppmv]	Grp	Name
1.278	-	-	-	-	-	Benzene
1.866	-	-	-	-	-	Toluene
2.018	BB	2.33410	21.61679	50.45577	-	Acetaldehyde
2.810	-	-	-	-	-	Ethylbenzene
2.910	-	-	-	-	-	m,p-Xylenes
3.222	-	-	-	-	-	o-Xylene

Totals : 50.45577

Uncalibrated Peaks : compound name not specified

MS
3/11/19

Sample Name: MS

```
=====
Acq. Operator   : Emily Decker
Sample Operator : Emily Decker
Acq. Instrument : GC8                      Location : Vial 1
Injection Date  : 3/11/2019 5:23:37 PM
                                           Inj Volume : Manually
Acq. Method     : C:\CHEM32\1\METHODS\REAR_BTEX_ACETALD_M18_030619.M
Last changed    : 3/8/2019 10:17:23 AM by Emily Decker
Analysis Method : C:\CHEM32\1\METHODS\REAR_BTEX_ACETALD_M18_030619.M
Last changed    : 3/11/2019 5:32:39 PM by Emily Decker
                 (modified after loading)
Sample Info     : GSL_190239-001MS(50ppmv Acetaldehyde)
                 Method:M18
=====
```

2 Warnings or Errors :

Warning : Calibration warnings (see calibration table listing)

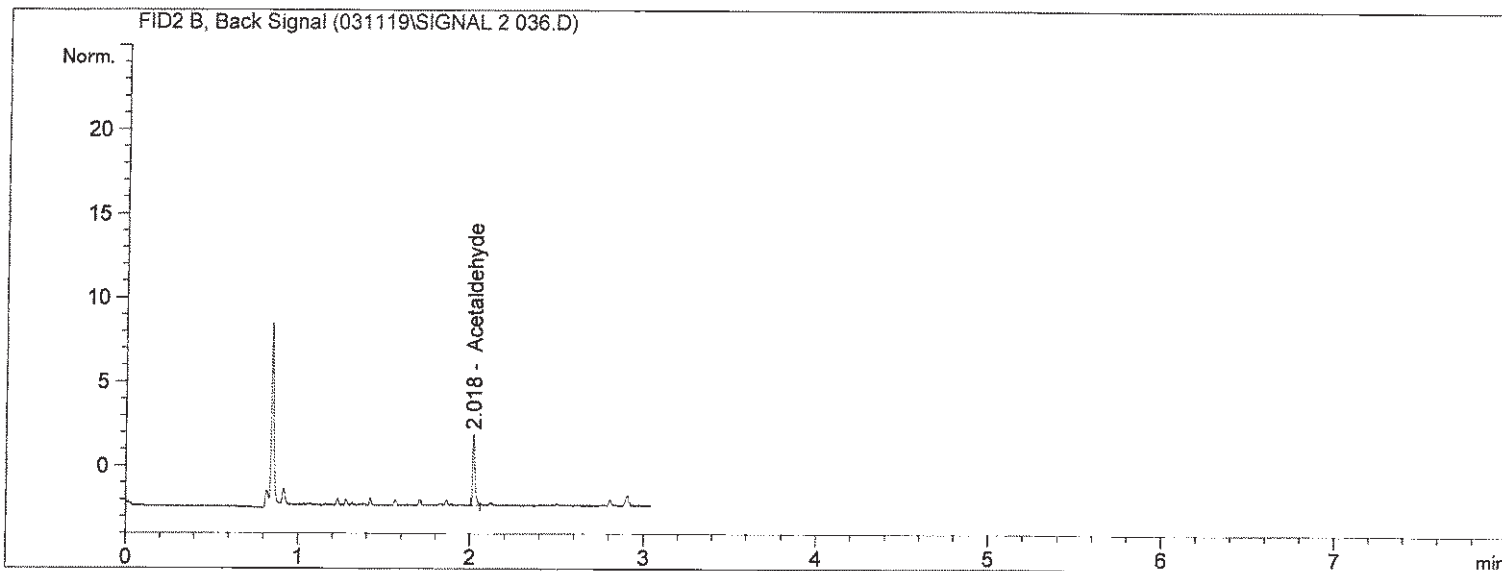
Warning : Calibrated compound(s) not found

```
=====
*** End of Report ***
```

Sample Name: MS

```

=====
Acq. Operator   : Emily Decker
Sample Operator : Emily Decker
Acq. Instrument : GC8
Injection Date  : 3/11/2019 5:29:08 PM
Location        : Vial 1
Inj Volume     : Manually
Acq. Method    : C:\CHEM32\1\METHODS\REAR_BTEX_ACETALD_M18_030619.M
Last changed   : 3/8/2019 10:17:23 AM by Emily Decker
Analysis Method : C:\CHEM32\1\METHODS\REAR_BTEX_ACETALD_M18_030619.M
Last changed   : 3/11/2019 5:33:49 PM by Emily Decker
                (modified after loading)
Sample Info    : GSL_190239-001MS(50ppmv Acetaldehyde)
                Method:M18
=====
    
```



External Standard Report

```

Sorted By      : Signal
Calib. Data Modified : 3/7/2019 1:36:23 PM
Multiplier     : 1.0000
Dilution       : 1.0000
Do not use Multiplier & Dilution Factor with ISTDs
    
```

Signal 1: FID2 B, Back Signal

RetTime [min]	Type	Area [pA*s]	Amt/Area	Amount [ppmv]	Grp	Name
1.278	-	-	-	-	-	Benzene
1.866	-	-	-	-	-	Toluene
2.018	BB	2.30335	21.61679	49.79094	-	Acetaldehyde
2.810	-	-	-	-	-	Ethylbenzene
2.910	-	-	-	-	-	m,p-Xylenes
3.222	-	-	-	-	-	o-Xylene

Totals : 49.79094

Uncalibrated Peaks : compound name not specified

EW
3/11/19

Sample Name: MS

```
=====
Acq. Operator   : Emily Decker
Sample Operator : Emily Decker
Acq. Instrument : GC8                      Location : Vial 1
Injection Date  : 3/11/2019 5:29:08 PM
                                           Inj Volume : Manually
Acq. Method     : C:\CHEM32\1\METHODS\REAR_BTEX_ACETALD_M18_030619.M
Last changed    : 3/8/2019 10:17:23 AM by Emily Decker
Analysis Method : C:\CHEM32\1\METHODS\REAR_BTEX_ACETALD_M18_030619.M
Last changed    : 3/11/2019 5:33:49 PM by Emily Decker
                 (modified after loading)
Sample Info     : GSL_190239-001MS(50ppmv Acetaldehyde)
                 Method:M18
=====
```

2 Warnings or Errors :

Warning : Calibration warnings (see calibration table listing)

Warning : Calibrated compound(s) not found

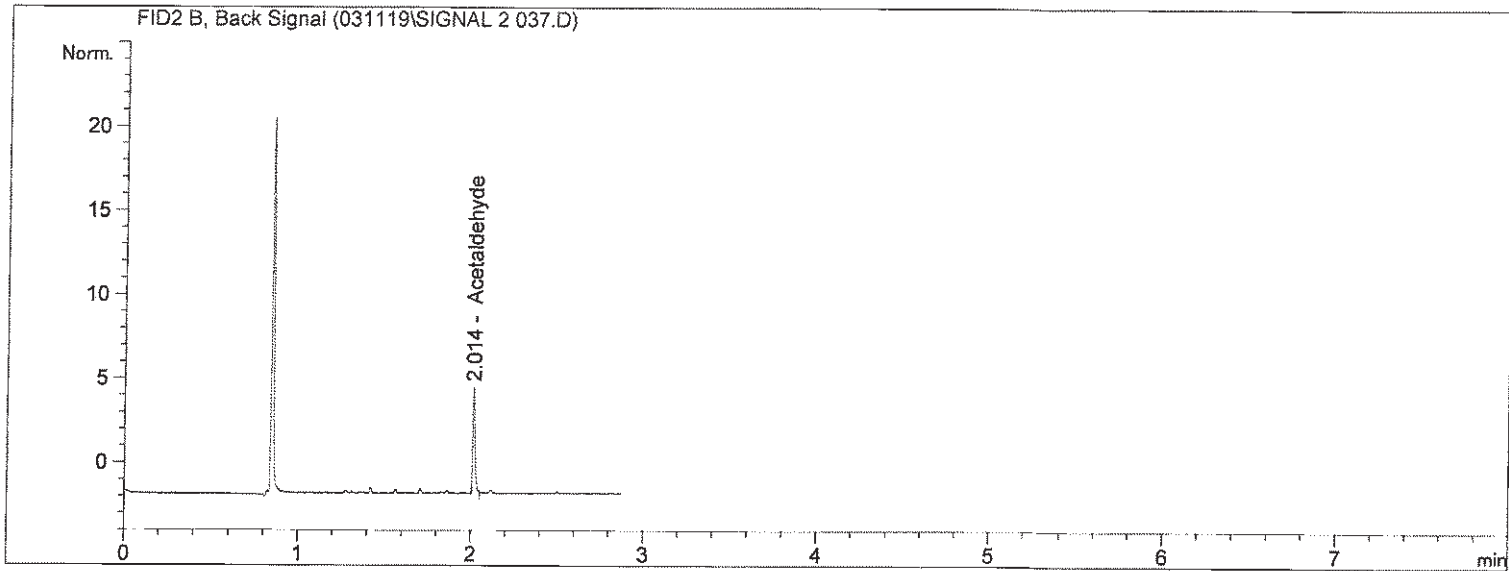
```
=====
*** End of Report ***
```


Sample Name: POSTCCV

```

=====
Acq. Operator   : Emily Decker
Sample Operator : Emily Decker
Acq. Instrument : GC8
Injection Date  : 3/11/2019 5:53:38 PM
Location       : Vial 1
Inj Volume     : Manually

Acq. Method    : C:\CHEM32\1\METHODS\REAR_BTEX_ACETALD_M18_030619.M
Last changed   : 3/8/2019 10:17:23 AM by Emily Decker
Analysis Method : C:\CHEM32\1\METHODS\REAR_BTEX_ACETALD_M18_030619.M
Last changed   : 3/11/2019 5:57:13 PM by Emily Decker
                (modified after loading)
Sample Info    : POSTCCV(100ppmv Acetaldehyde)
                Method:M18
=====
    
```



External Standard Report

```

Sorted By      : Signal
Calib. Data Modified : 3/7/2019 1:36:23 PM
Multiplier     : 1.0000
Dilution       : 1.0000
Do not use Multiplier & Dilution Factor with ISTDs
    
```

Signal 1: FID2 B, Back Signal

RetTime [min]	Type	Area [pA*s]	Amt/Area	Amount [ppmv]	Grp	Name
1.278	-	-	-	-	-	Benzene
1.866	-	-	-	-	-	Toluene
2.014	BB	4.80852	21.61679	103.94476	-	Acetaldehyde
2.810	-	-	-	-	-	Ethylbenzene
2.910	-	-	-	-	-	m,p-Xylenes
3.222	-	-	-	-	-	o-Xylene

Totals : 103.94476

Uncalibrated Peaks : compound name not specified

gd
3/12/19

Sample Name: POSTCCV

```
=====
Acq. Operator   : Emily Decker
Sample Operator : Emily Decker
Acq. Instrument : GC8                      Location : Vial 1
Injection Date  : 3/11/2019 5:53:38 PM
                                           Inj Volume : Manually
Acq. Method     : C:\CHEM32\1\METHODS\REAR_BTEX_ACETALD_M18_030619.M
Last changed    : 3/8/2019 10:17:23 AM by Emily Decker
Analysis Method : C:\CHEM32\1\METHODS\REAR_BTEX_ACETALD_M18_030619.M
Last changed    : 3/11/2019 5:57:13 PM by Emily Decker
                 (modified after loading)
Sample Info     : POSTCCV(100ppmv Acetaldehyde)
                 Method:M18
=====
```

2 Warnings or Errors :

Warning : Calibration warnings (see calibration table listing)
Warning : Calibrated compound(s) not found

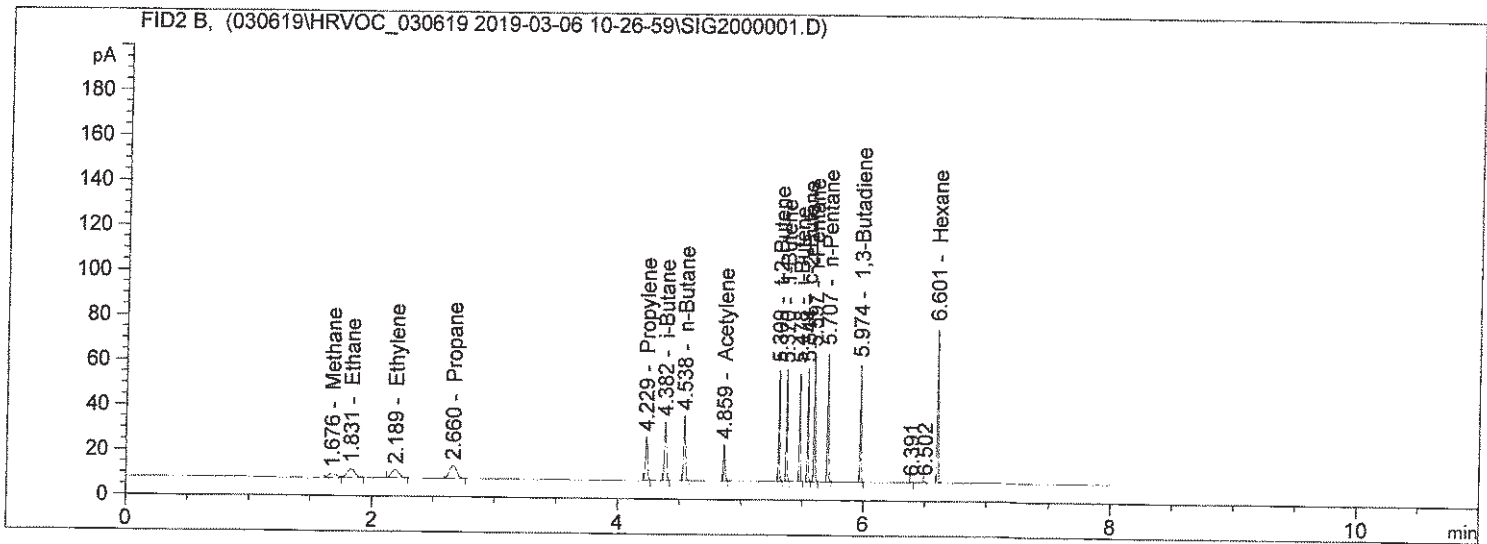
```
=====
*** End of Report ***
```

```

=====
Acq. Operator   : dyeddula                      Seq. Line :    1
Acq. Instrument : GC#1                          Location  : Vial 1
Injection Date  : 3/6/2019 10:29:43 AM          Inj       :    1
                                           Inj Volume: Manually

Acq. Method     : C:\CHEM32\1\DATA\030619\HRVOC_030619 2019-03-06 10-26-59\ALKANES_HRVOC_
                  M18_091117.M
Last changed    : 3/6/2019 9:23:33 AM by dyeddula
Analysis Method : C:\CHEM32\1\METHODS\ALKANES_HRVOC_M18_091117.M
Last changed    : 3/6/2019 11:03:09 AM by dyeddula
                  (modified after loading)
Method Info     : HRVOC

Sample Info     : CCV(10ppmv HRVOC+ALKANES)
                  Method:18
=====
  
```



External Standard Report

```

Sorted By           :      Signal
Calib. Data Modified :      3/6/2019 11:02:06 AM
Multiplier:         :      1.0000
Dilution:           :      1.0000
Use Multiplier & Dilution Factor with ISTDs
  
```

Signal 1: FID2 B,

RetTime [min]	Type	Area [pA*s]	Amt/Area	Amount [ppmv]	Grp	Name
1.676	BV	8.43599	1.12222	9.46707		Methane
1.831	VB	16.52282	5.89609e-1	9.74200		Ethane
2.189	BB	14.89825	6.45663e-1	9.61925		Ethylene
2.660	BB	22.57837	4.34024e-1	9.79954		Propane
4.229	BB	22.66287	4.30557e-1	9.75765		Propylene
4.382	BB	29.96479	3.29374e-1	9.86962		i-Butane
4.538	BB	30.01554	3.26258e-1	9.79282		n-Butane
4.859	BB	14.24042	6.47127e-1	9.21536		Acetylene

237419

Sample Name: CCV

```

=====
Acq. Operator   : dyeddula                      Seq. Line :    1
Acq. Instrument : GC#1                          Location  : Vial 1
Injection Date  : 3/6/2019 10:29:43 AM          Inj       :    1
                                                Inj Volume: Manually

Acq. Method     : C:\CHEM32\1\DATA\030619\HRVOC_030619 2019-03-06 10-26-59\ALKANES_HRVOC_
                M18_091117.M
Last changed    : 3/6/2019 9:23:33 AM by dyeddula
Analysis Method : C:\CHEM32\1\METHODS\ALKANES_HRVOC_M18_091117.M
Last changed    : 3/6/2019 11:03:09 AM by dyeddula
                (modified after loading)
Method Info     : HRVOC

Sample Info     : CCV(10ppmv HRVOC+ALKANES)
                Method:18
=====
    
```

RetTime [min]	Type	Area [pA*s]	Amt/Area	Amount [ppmv]	Grp	Name
5.309	BB	29.76043	3.29413e-1	9.80347		t-2-Butene
5.370	BB	30.30604	3.26200e-1	9.88582		1-Butene
5.478	BB	29.94850	3.31334e-1	9.92295		i-Butene
5.544	BB	29.94385	3.40178e-1	10.18624		c-2-Butene
5.597	BB	37.78078	2.52648e-1	9.54524		i-Pentane
5.707	BB	37.69852	2.58175e-1	9.73280		n-Pentane
5.974	BB	30.11754	3.37185e-1	10.15518		1,3-Butadiene
6.601	BB	42.90352	2.30048e-1	9.86988		Hexane

Totals : 156.36489

Uncalibrated Peaks : using compound Propane

RetTime [min]	Type	Area [pA*s]	Amt/Area	Amount [ppmv]	Grp	Name
6.391	BB	1.65654e-1	4.34024e-1	7.18977e-2		?
6.502	BB	3.61162e-1	4.34024e-1	1.56753e-1		?

Uncalib. totals : 2.28651e-1

1 Warnings or Errors :

Warning : Calibration warnings (see calibration table listing)

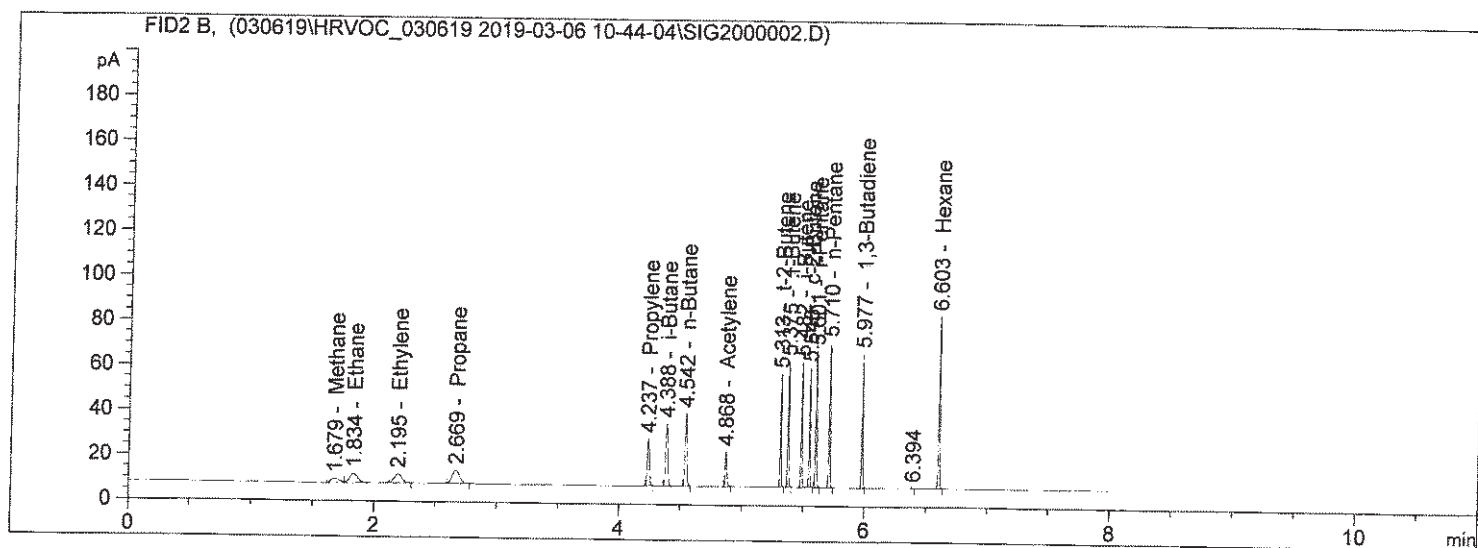
*** End of Report ***

```

=====
Acq. Operator   : dyeddula                      Seq. Line :    1
Acq. Instrument : GC#1                          Location  : Vial 2
Injection Date  : 3/6/2019 10:47:42 AM          Inj       :    1
                                                    Inj Volume: Manually

Acq. Method     : C:\CHEM32\1\DATA\030619\HRVOC_030619 2019-03-06 10-44-04\ALKANES_HRVOC_
                  M18_091117.M
Last changed    : 3/6/2019 9:23:33 AM by dyeddula
Analysis Method : C:\CHEM32\1\METHODS\ALKANES_HRVOC_M18_091117.M
Last changed    : 3/6/2019 11:02:22 AM by dyeddula
                  (modified after loading)
Method Info     : HRVOC

Sample Info     : LCS(10ppmv HRVOC+ALKANES)
                  Method:18
=====
  
```



External Standard Report

```

Sorted By           :      Signal
Calib. Data Modified :      3/6/2019 11:02:06 AM
Multiplier:         :      1.0000
Dilution:           :      1.0000
Use Multiplier & Dilution Factor with ISTDs
  
```

Signal 1: FID2 B,

RetTime [min]	Type	Area [pA*s]	Amt/Area	Amount [ppmv]	Grp	Name
1.679	BV	9.14192	1.12222	10.25928		Methane
1.834	VB	17.77159	5.89609e-1	10.47828		Ethane
2.195	BB	16.56464	6.45663e-1	10.69518		Ethylene
2.669	BB	24.54080	4.34024e-1	10.65128		Propane
4.237	BB	24.61722	4.30557e-1	10.59911		Propylene
4.388	BB	33.24407	3.29374e-1	10.94973		i-Butane
4.542	BB	33.94547	3.26258e-1	11.07500		n-Butane
4.868	BB	14.12624	6.47127e-1	9.14146		Acetylene

Handwritten signature/initials

Sample Name: LCS

```

=====
Acq. Operator   : dyeddula                      Seq. Line :    1
Acq. Instrument : GC#1                          Location  : Vial 2
Injection Date  : 3/6/2019 10:47:42 AM          Inj       :    1
                                                Inj Volume: Manually

Acq. Method     : C:\CHEM32\1\DATA\030619\HRVOC_030619 2019-03-06 10-44-04\ALKANES_HRVOC_
                  M18_091117.M
Last changed    : 3/6/2019 9:23:33 AM by dyeddula
Analysis Method : C:\CHEM32\1\METHODS\ALKANES_HRVOC_M18_091117.M
Last changed    : 3/6/2019 11:02:22 AM by dyeddula
                  (modified after loading)
Method Info     : HRVOC

Sample Info     : LCS(10ppmv HRVOC+ALKANES)
                  Method:18
=====
    
```

RetTime [min]	Type	Area [pA*s]	Amt/Area	Amount [ppmv]	Grp	Name
5.313	BB	30.12437	3.29413e-1	9.92336		t-2-Butene
5.375	BB	34.04353	3.26200e-1	11.10499		1-Butene
5.482	BB	34.16533	3.31334e-1	11.32012		i-Butene
5.548	BB	30.62214	3.40178e-1	10.41698		c-2-Butene
5.601	BB	40.79350	2.52648e-1	10.30640		i-Pentane
5.710	BB	41.56649	2.58175e-1	10.73141		n-Pentane
5.977	BB	34.12960	3.37185e-1	11.50798		1,3-Butadiene
6.603	BB	48.81984	2.30048e-1	11.23092		Hexane

Totals : 170.39149

Uncalibrated Peaks : using compound Propane

RetTime [min]	Type	Area [pA*s]	Amt/Area	Amount [ppmv]	Grp	Name
6.394	BB	2.29388e-1	4.34024e-1	9.95596e-2		?

Uncalib. totals : 9.95596e-2

1 Warnings or Errors :

Warning : Calibration warnings (see calibration table listing)

*** End of Report ***

Sample Name: BLANK

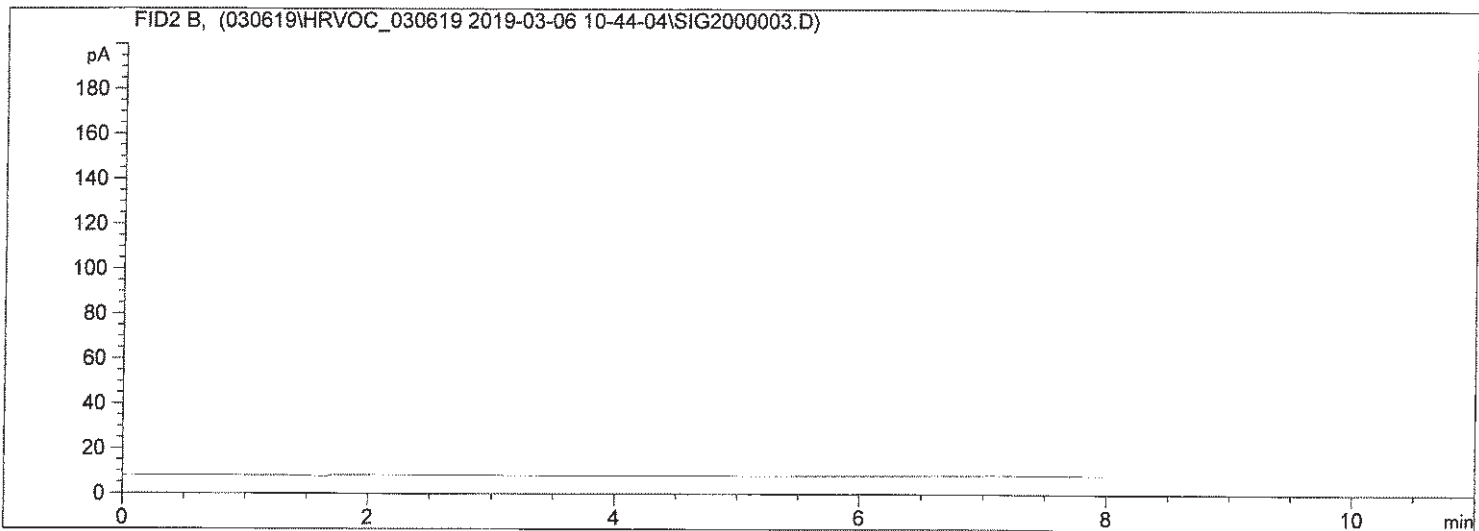
```

=====
Acq. Operator   : dyeddula                      Seq. Line :    2
Acq. Instrument : GC#1                          Location  : Vial 3
Injection Date  : 3/6/2019 11:04:41 AM          Inj       :    1
                                                    Inj Volume: Manually

Acq. Method     : C:\CHEM32\1\DATA\030619\HRVOC_030619 2019-03-06 10-44-04\ALKANES_HRVOC_
                  M18_091117.M
Last changed    : 3/6/2019 9:23:33 AM by dyeddula
Analysis Method : C:\CHEM32\1\METHODS\ALKANES_HRVOC_M18_091117.M
Last changed    : 3/6/2019 11:03:09 AM by dyeddula
                  (modified after loading)

Method Info     : HRVOC

Sample Info     : BLANK
                  Method:18
=====
    
```



External Standard Report

```

Sorted By      : Signal
Calib. Data Modified : 3/6/2019 11:02:06 AM
Multiplier:    : 1.0000
Dilution:     : 1.0000
Use Multiplier & Dilution Factor with ISTDs
    
```

Signal 1: FID2 B,

RetTime [min]	Type	Area [pA*s]	Amt/Area	Amount [ppmv]	Grp	Name
1.689	-	-	-	-	-	Methane
1.842	-	-	-	-	-	Ethane
2.192	-	-	-	-	-	Ethylene
2.664	-	-	-	-	-	Propane
4.147	-	-	-	-	-	Propylene
4.315	-	-	-	-	-	i-Butane
4.475	-	-	-	-	-	n-Butane
4.802	-	-	-	-	-	Acetylene

2/27/19

=====

Acq. Operator	: dyeddula	Seq. Line	: 2
Acq. Instrument	: GC#1	Location	: Vial 3
Injection Date	: 3/6/2019 11:04:41 AM	Inj	: 1
		Inj Volume	: Manually
Acq. Method	: C:\CHEM32\1\DATA\030619\HRVOC_030619 2019-03-06 10-44-04\ALKANES_HRVOC_M18_091117.M		
Last changed	: 3/6/2019 9:23:33 AM by dyeddula		
Analysis Method	: C:\CHEM32\1\METHODS\ALKANES_HRVOC_M18_091117.M		
Last changed	: 3/6/2019 11:03:09 AM by dyeddula (modified after loading)		
Method Info	: HRVOC		
Sample Info	: BLANK Method:18		

=====

RetTime [min]	Type	Area [pA*s]	Amt/Area	Amount [ppmv]	Grp	Name
5.310	-	-	-	-	-	t-2-Butene
5.371	-	-	-	-	-	1-Butene
5.478	-	-	-	-	-	i-Butene
5.548	-	-	-	-	-	c-2-Butene
5.600	-	-	-	-	-	i-Pentane
5.658	-	-	-	-	-	n-Pentane
5.942	-	-	-	-	-	1,3-Butadiene
6.553	-	-	-	-	-	Hexane

Totals : 0.00000

Uncalibrated Peaks : using compound Propane

2 Warnings or Errors :

Warning : Calibration warnings (see calibration table listing)
Warning : Calibrated compound(s) not found

=====
Area Percent Report
=====

Sorted By : Signal
Calib. Data Modified : 3/6/2019 11:02:06 AM
Multiplier: : 1.0000
Dilution: : 1.0000
Use Multiplier & Dilution Factor with ISTDs

Signal 1: FID2 B,

Peak #	RetTime [min]	Type	Width [min]	Area [pA*s]	Area %	Name
1	1.689		0.0000	0.00000	0.00000	Methane
2	1.842		0.0000	0.00000	0.00000	Ethane

Sample Name: BLANK

```

=====
Acq. Operator   : dyeddula                      Seq. Line :    2
Acq. Instrument : GC#1                          Location  : Vial 3
Injection Date  : 3/6/2019 11:04:41 AM          Inj       :    1
                                                    Inj Volume: Manually

Acq. Method     : C:\CHEM32\1\DATA\030619\HRVOC_030619 2019-03-06 10-44-04\ALKANES_HRVOC_
                M18_091117.M
Last changed    : 3/6/2019 9:23:33 AM by dyeddula
Analysis Method : C:\CHEM32\1\METHODS\ALKANES_HRVOC_M18_091117.M
Last changed    : 3/6/2019 11:03:09 AM by dyeddula
                (modified after loading)
Method Info     : HRVOC

Sample Info     : BLANK
                Method:18
=====

```

```

=====
Peak RetTime  Type  Width  Area  Area  Name
#    [min]    [min] [pA*s] %
-----|-----|-----|-----|-----|-----
  3    2.192      0.0000  0.00000  0.00000 Ethylene
  4    2.664      0.0000  0.00000  0.00000 Propane
  5    4.147      0.0000  0.00000  0.00000 Propylene
  6    4.315      0.0000  0.00000  0.00000 i-Butane
  7    4.475      0.0000  0.00000  0.00000 n-Butane
  8    4.802      0.0000  0.00000  0.00000 Acetylene
  9    5.310      0.0000  0.00000  0.00000 t-2-Butene
 10    5.371      0.0000  0.00000  0.00000 1-Butene
 11    5.478      0.0000  0.00000  0.00000 i-Butene
 12    5.548      0.0000  0.00000  0.00000 c-2-Butene
 13    5.600      0.0000  0.00000  0.00000 i-Pentane
 14    5.658      0.0000  0.00000  0.00000 n-Pentane
 15    5.942      0.0000  0.00000  0.00000 1,3-Butadiene
 16    6.553      0.0000  0.00000  0.00000 Hexane

Totals :                      0.00000  0.0000
=====

```

2 Warnings or Errors :

Warning : Calibration warnings (see calibration table listing)

Warning : Calibrated compound(s) not found

```

=====
*** End of Report ***
=====

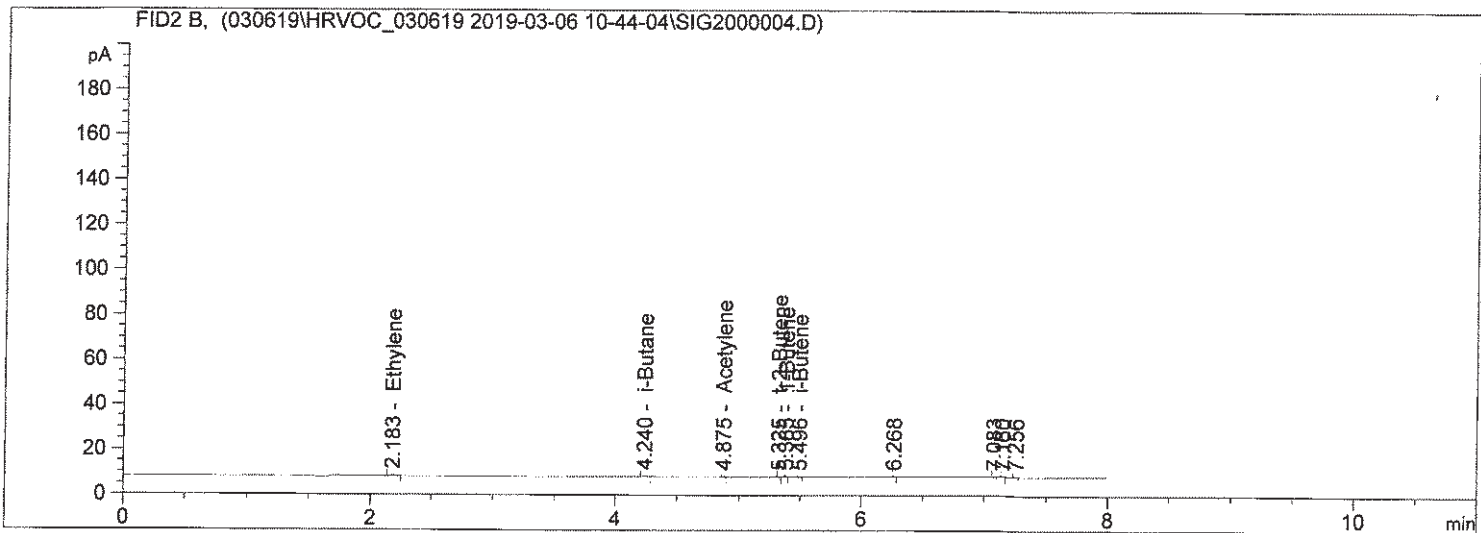
```

```

=====
Acq. Operator   : dyeddula                      Seq. Line :    3
Acq. Instrument : GC#1                          Location  : Vial 4
Injection Date  : 3/6/2019 11:21:47 AM          Inj       :    1
                                                Inj Volume: Manually

Acq. Method     : C:\CHEM32\1\DATA\030619\HRVOC_030619 2019-03-06 10-44-04\ALKANES_HRVOC_
                  M18_091117.M
Last changed    : 3/6/2019 9:23:33 AM by dyeddula
Analysis Method : C:\CHEM32\1\METHODS\ALKANES_HRVOC_M18_091117.M
Last changed    : 3/6/2019 11:59:01 AM by dyeddula
                  (modified after loading)
Method Info     : HRVOC

Sample Info     : GSL_190239-001
                  Method:18
=====
  
```



External Standard Report

```

Sorted By      : Signal
Calib. Data Modified : 3/6/2019 11:02:06 AM
Multiplier:    : 1.0000
Dilution:     : 1.0000
Use Multiplier & Dilution Factor with ISTDs
  
```

Signal 1: FID2 B,

RetTime [min]	Type	Area [pA*s]	Amt/Area	Amount [ppmv]	Grp	Name
1.689		-	-	-		Methane
1.842		-	-	-		Ethane
2.183	BB	1.14983	6.45663e-1	7.42404e-1		Ethylene
2.664		-	-	-		Propane
4.147		-	-	-		Propylene
4.240	BB	6.84893e-1	3.29374e-1	2.25586e-1		i-Butane
4.475		-	-	-		n-Butane
4.875	BB	1.30237e-1	6.47127e-1	8.42795e-2		Acetylene

Handwritten signature

=====

Acq. Operator	: dyeddula	Seq. Line	: 3
Acq. Instrument	: GC#1	Location	: Vial 4
Injection Date	: 3/6/2019 11:21:47 AM	Inj	: 1
		Inj Volume	: Manually
Acq. Method	: C:\CHEM32\1\DATA\030619\HRVOC_030619 2019-03-06 10-44-04\ALKANES_HRVOC_M18_091117.M		
Last changed	: 3/6/2019 9:23:33 AM by dyeddula		
Analysis Method	: C:\CHEM32\1\METHODS\ALKANES_HRVOC_M18_091117.M		
Last changed	: 3/6/2019 11:59:01 AM by dyeddula (modified after loading)		
Method Info	: HRVOC		
Sample Info	: GSL_190239-001 Method:18		

=====

RetTime [min]	Type	Area [pA*s]	Amt/Area	Amount [ppmv]	Grp	Name
5.325	BB	5.03445e-2	3.29413e-1	1.65841e-2		t-2-Butene
5.385	BB	2.42741e-1	3.26200e-1	7.91819e-2		1-Butene
5.496	BB	1.29312e-1	3.31334e-1	4.28455e-2		i-Butene
5.548		-	-	-		c-2-Butene
5.600		-	-	-		i-Pentane
5.658		-	-	-		n-Pentane
5.942		-	-	-		1,3-Butadiene
6.553		-	-	-		Hexane

Totals : 1.19088

Uncalibrated Peaks : using compound Propane

RetTime [min]	Type	Area [pA*s]	Amt/Area	Amount [ppmv]	Grp	Name
6.268	BB	1.37012e-1	4.34024e-1	5.94664e-2	?	
7.083	BB	1.27454e-1	4.34024e-1	5.53179e-2	?	
7.160	BB	6.74440e-2	4.34024e-1	2.92723e-2	?	
7.256	BB	7.89418e-2	4.34024e-1	3.42626e-2	?	

Uncalib. totals : 1.78319e-1

2 Warnings or Errors :

Warning : Calibration warnings (see calibration table listing)
Warning : Calibrated compound(s) not found

=====
*** End of Report ***

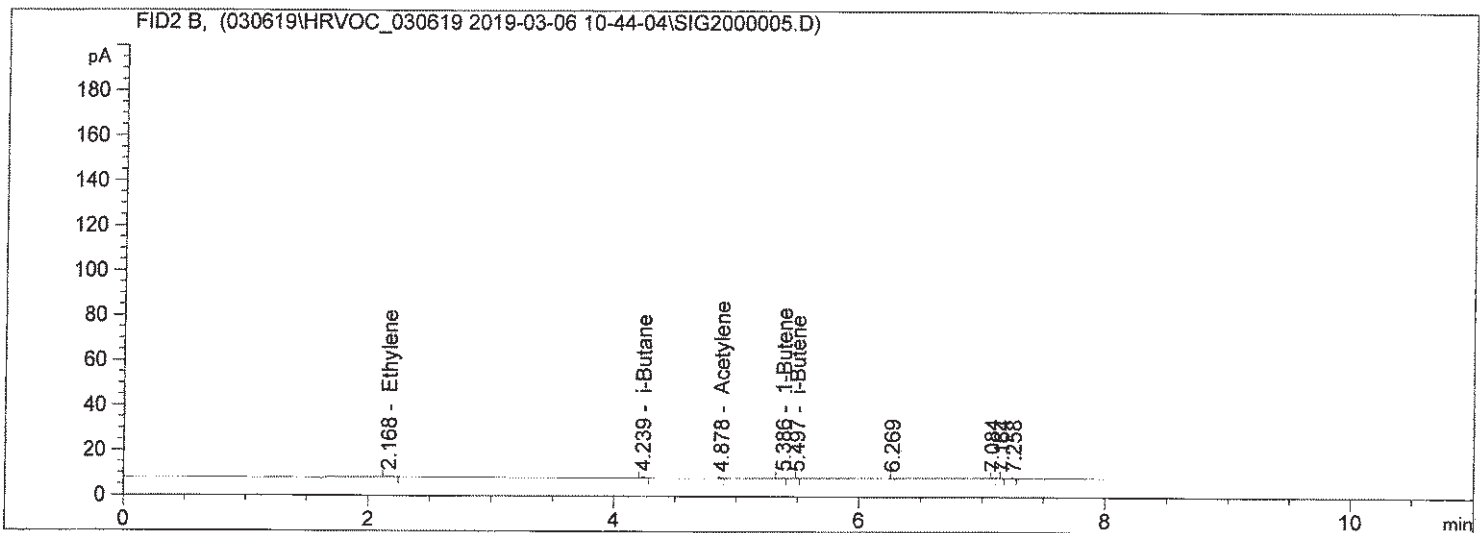
```

=====
Acq. Operator   : dyeddula                      Seq. Line :    3
Acq. Instrument : GC#1                          Location  : Vial 4
Injection Date  : 3/6/2019 11:38:52 AM          Inj       :    2
                                                Inj Volume: Manually

Acq. Method     : C:\CHEM32\1\DATA\030619\HRVOC_030619 2019-03-06 10-44-04\ALKANES_HRVOC_
M18_091117.M
Last changed    : 3/6/2019 9:23:33 AM by dyeddula
Analysis Method : C:\CHEM32\1\METHODS\ALKANES_HRVOC_M18_091117.M
Last changed    : 3/6/2019 11:59:01 AM by dyeddula
                (modified after loading)

Method Info     : HRVOC

Sample Info     : GSL_190239-001
                Method:18
=====
  
```



External Standard Report

```

Sorted By      : Signal
Calib. Data Modified : 3/6/2019 11:02:06 AM
Multiplier:    : 1.0000
Dilution:     : 1.0000
Use Multiplier & Dilution Factor with ISTDs
  
```

Signal 1: FID2 B,

RetTime [min]	Type	Area [pA*s]	Amt/Area	Amount [ppmv]	Grp	Name
1.689		-	-	-		Methane
1.842		-	-	-		Ethane
2.168	BB	1.19412	6.45663e-1	7.70996e-1		Ethylene
2.664		-	-	-		Propane
4.147		-	-	-		Propylene
4.239	BB	6.93099e-1	3.29374e-1	2.28289e-1		i-Butane
4.475		-	-	-		n-Butane
4.878	BB	1.32861e-1	6.47127e-1	8.59776e-2		Acetylene

Handwritten signature/initials

```

=====
Acq. Operator   : dyeddula                               Seq. Line :    3
Acq. Instrument : GC#1                                   Location  : Vial 4
Injection Date  : 3/6/2019 11:38:52 AM                 Inj       :    2
                                                    Inj Volume: Manually
Acq. Method     : C:\CHEM32\1\DATA\030619\HRVOC_030619 2019-03-06 10-44-04\ALKANES_HRVOC_
                  M18_091117.M
Last changed    : 3/6/2019 9:23:33 AM by dyeddula
Analysis Method : C:\CHEM32\1\METHODS\ALKANES_HRVOC_M18_091117.M
Last changed    : 3/6/2019 11:59:01 AM by dyeddula
                  (modified after loading)
Method Info     : HRVOC

Sample Info     : GSL_190239-001
                  Method:18
=====
  
```

```

=====
RetTime  Type      Area      Amt/Area   Amount   Grp   Name
 [min]                [pA*s]                    [ppmv]
-----|-----|-----|-----|-----|---|-----
5.310    -             -           -           -           -   t-2-Butene
5.386 BB   2.70388e-1 3.26200e-1 8.82005e-2 1-Butene
5.497 BB   1.42489e-1 3.31334e-1 4.72113e-2 i-Butene
5.548    -             -           -           -           -   c-2-Butene
5.600    -             -           -           -           -   i-Pentane
5.658    -             -           -           -           -   n-Pentane
5.942    -             -           -           -           -   1,3-Butadiene
6.553    -             -           -           -           -   Hexane
  
```

Totals : 1.22067

Uncalibrated Peaks : using compound Propane

```

RetTime  Type      Area      Amt/Area   Amount   Grp   Name
 [min]                [pA*s]                    [ppmv]
-----|-----|-----|-----|-----|---|-----
6.269 BB   1.28631e-1 4.34024e-1 5.58290e-2 ?
7.084 BB   1.30933e-1 4.34024e-1 5.68282e-2 ?
7.164 BB   5.43489e-2 4.34024e-1 2.35887e-2 ?
7.258 BB   7.28617e-2 4.34024e-1 3.16237e-2 ?
  
```

Uncalib. totals : 1.67870e-1

2 Warnings or Errors :

Warning : Calibration warnings (see calibration table listing)
 Warning : Calibrated compound(s) not found

*** End of Report ***

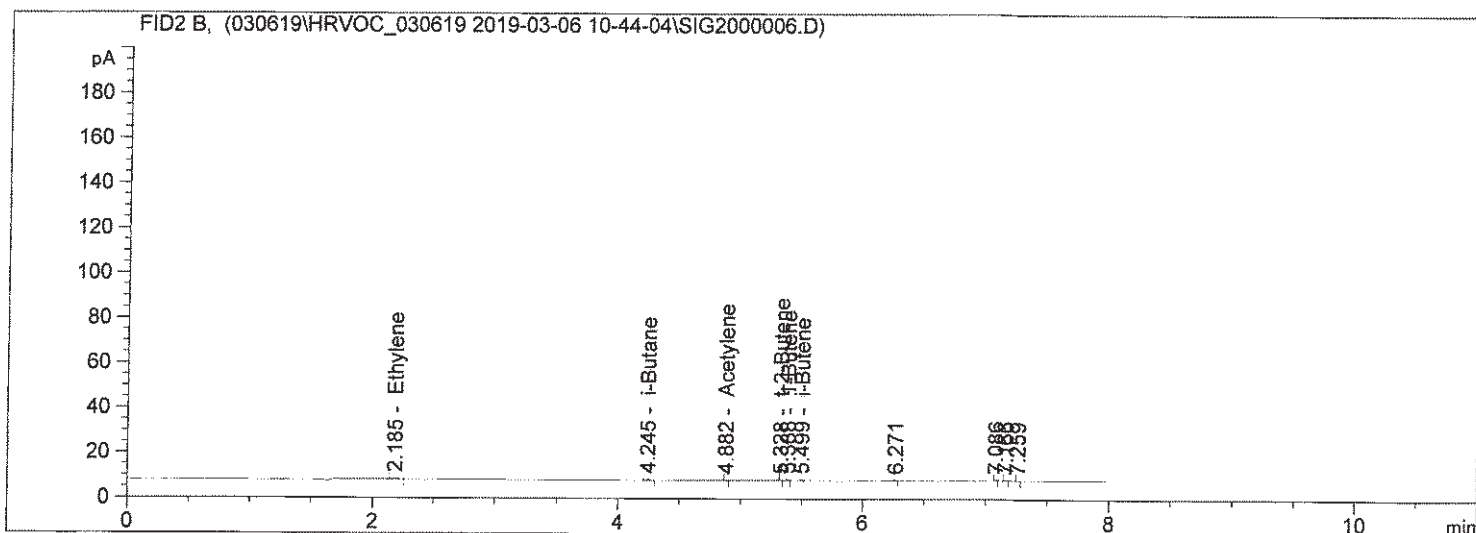
```

=====
Acq. Operator   : dyeddula                      Seq. Line :    3
Acq. Instrument : GC#1                          Location  : Vial 4
Injection Date  : 3/6/2019 11:55:46 AM          Inj       :    3
                                                    Inj Volume: Manually

Acq. Method     : C:\CHEM32\1\DATA\030619\HRVOC_030619 2019-03-06 10-44-04\ALKANES_HRVOC_
                M18_091117.M
Last changed    : 3/6/2019 9:23:33 AM by dyeddula
Analysis Method : C:\CHEM32\1\METHODS\ALKANES_HRVOC_M18_091117.M
Last changed    : 3/6/2019 11:59:01 AM by dyeddula
                (modified after loading)

Method Info     : HRVOC

Sample Info     : GSL_190239-001
                Method:18
=====
  
```



External Standard Report

```

Sorted By      : Signal
Calib. Data Modified : 3/6/2019 11:02:06 AM
Multiplier:    : 1.0000
Dilution:     : 1.0000
Use Multiplier & Dilution Factor with ISTDs
  
```

Signal 1: FID2 B,

RetTime [min]	Type	Area [pA*s]	Amt/Area	Amount [ppmv]	Grp	Name
1.689		-	-	-		Methane
1.842		-	-	-		Ethane
2.185	BB	1.20035	6.45663e-1	7.75025e-1		Ethylene
2.664		-	-	-		Propane
4.147		-	-	-		Propylene
4.245	BB	7.10049e-1	3.29374e-1	2.33872e-1		i-Butane
4.475		-	-	-		n-Butane
4.882	BB	1.27865e-1	6.47127e-1	8.27451e-2		Acetylene

Handwritten signature: 2371419

Sample Name: GSL_190239-001

```

=====
Acq. Operator   : dyeddula                      Seq. Line :    3
Acq. Instrument : GC#1                          Location  : Vial 4
Injection Date  : 3/6/2019 11:55:46 AM          Inj       :    3
                                                    Inj Volume: Manually

Acq. Method     : C:\CHEM32\1\DATA\030619\HRVOC_030619 2019-03-06 10-44-04\ALKANES_HRVOC_
                M18_091117.M
Last changed    : 3/6/2019 9:23:33 AM by dyeddula
Analysis Method : C:\CHEM32\1\METHODS\ALKANES_HRVOC_M18_091117.M
Last changed    : 3/6/2019 11:59:01 AM by dyeddula
                (modified after loading)
Method Info     : HRVOC

Sample Info     : GSL_190239-001
                Method:18
=====
    
```

RetTime [min]	Type	Area [pA*s]	Amt/Area	Amount [ppmv]	Grp	Name
5.328	BB	3.84896e-2	3.29413e-1	1.26790e-2		t-2-Butene
5.388	BB	2.42647e-1	3.26200e-1	7.91514e-2		1-Butene
5.499	BB	1.53358e-1	3.31334e-1	5.08126e-2		i-Butene
5.548		-	-	-		c-2-Butene
5.600		-	-	-		i-Pentane
5.658		-	-	-		n-Pentane
5.942		-	-	-		1,3-Butadiene
6.553		-	-	-		Hexane

Totals : 1.23428

Uncalibrated Peaks : using compound Propane

RetTime [min]	Type	Area [pA*s]	Amt/Area	Amount [ppmv]	Grp	Name
6.271	BB	1.46072e-1	4.34024e-1	6.33985e-2	?	
7.086	BB	1.47578e-1	4.34024e-1	6.40523e-2	?	
7.166	BB	7.26435e-2	4.34024e-1	3.15290e-2	?	
7.259	BB	6.84432e-2	4.34024e-1	2.97060e-2	?	

Uncalib. totals : 1.88686e-1

2 Warnings or Errors :

Warning : Calibration warnings (see calibration table listing)
 Warning : Calibrated compound(s) not found

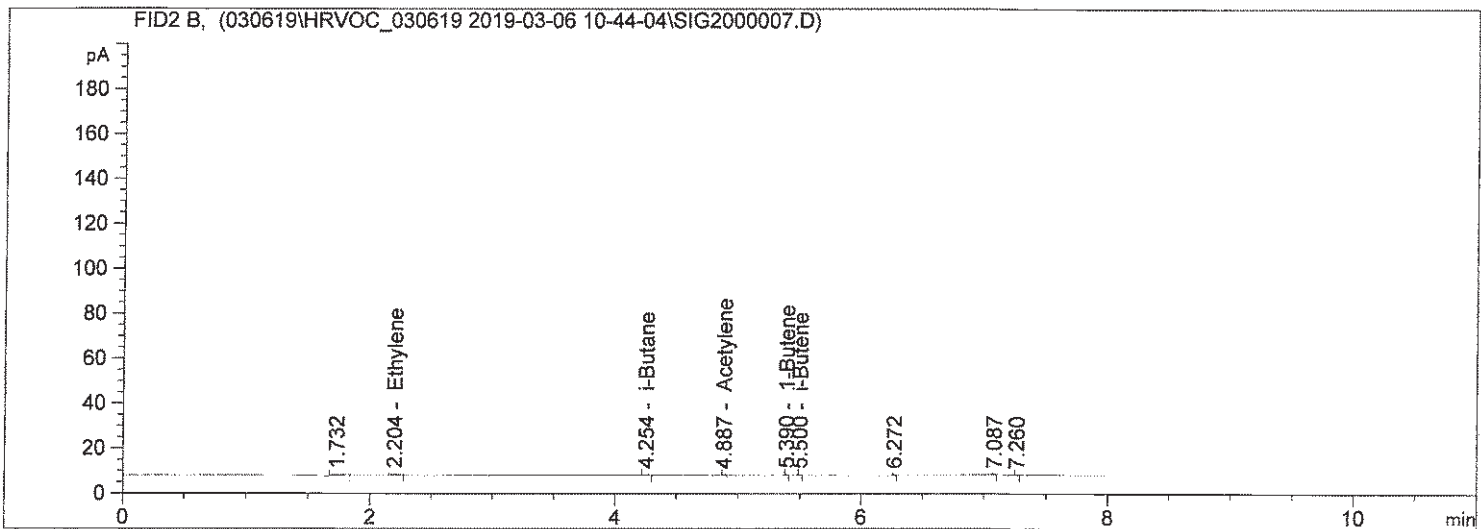
*** End of Report ***

```

=====
Acq. Operator   : dyeddula                      Seq. Line :    4
Acq. Instrument : GC#1                          Location  : Vial 5
Injection Date  : 3/6/2019 12:12:45 PM          Inj       :    1
                                                    Inj Volume: Manually

Acq. Method     : C:\CHEM32\1\DATA\030619\HRVOC_030619 2019-03-06 10-44-04\ALKANES_HRVOC_
M18_091117.M
Last changed    : 3/6/2019 9:23:33 AM by dyeddula
Analysis Method : C:\CHEM32\1\METHODS\ALKANES_HRVOC_M18_091117.M
Last changed    : 3/6/2019 11:59:01 AM by dyeddula
                 (modified after loading)
Method Info     : HRVOC

Sample Info     : GSL_190239-002
                 Method:18
=====
  
```



External Standard Report

```

Sorted By      : Signal
Calib. Data Modified : 3/6/2019 11:02:06 AM
Multiplier:    : 1.0000
Dilution:      : 1.0000
Use Multiplier & Dilution Factor with ISTDs
  
```

Signal 1: FID2 B,

RetTime [min]	Type	Area [pA*s]	Amt/Area	Amount [ppmv]	Grp	Name
1.689		-	-	-		Methane
1.842		-	-	-		Ethane
2.204	BB	1.02305	6.45663e-1	6.60543e-1		Ethylene
2.664		-	-	-		Propane
4.147		-	-	-		Propylene
4.254	BB	6.06163e-1	3.29374e-1	1.99654e-1		i-Butane
4.475		-	-	-		n-Butane
4.887	BB	1.21569e-1	6.47127e-1	7.86705e-2		Acetylene

2737149

=====

Acq. Operator	: dyeddula	Seq. Line	: 4
Acq. Instrument	: GC#1	Location	: Vial 5
Injection Date	: 3/6/2019 12:12:45 PM	Inj	: 1
		Inj Volume	: Manually
Acq. Method	: C:\CHEM32\1\DATA\030619\HRVOC_030619 2019-03-06 10-44-04\ALKANES_HRVOC_M18_091117.M		
Last changed	: 3/6/2019 9:23:33 AM by dyeddula		
Analysis Method	: C:\CHEM32\1\METHODS\ALKANES_HRVOC_M18_091117.M		
Last changed	: 3/6/2019 11:59:01 AM by dyeddula (modified after loading)		
Method Info	: HRVOC		
Sample Info	: GSL_190239-002 Method:18		

=====

RetTime [min]	Type	Area [pA*s]	Amt/Area	Amount [ppmv]	Grp	Name
5.310		-	-	-		t-2-Butene
5.390	BB	2.10428e-1	3.26200e-1	6.86414e-2		1-Butene
5.500	BB	1.33201e-1	3.31334e-1	4.41339e-2		i-Butene
5.548		-	-	-		c-2-Butene
5.600		-	-	-		i-Pentane
5.658		-	-	-		n-Pentane
5.942		-	-	-		1,3-Butadiene
6.553		-	-	-		Hexane

Totals : 1.05164

Uncalibrated Peaks : using compound Propane

RetTime [min]	Type	Area [pA*s]	Amt/Area	Amount [ppmv]	Grp	Name
1.732	BB	2.12383	4.34024e-1	9.21793e-1	?	
6.272	BB	1.46724e-1	4.34024e-1	6.36818e-2	?	
7.087	BB	1.24593e-1	4.34024e-1	5.40764e-2	?	
7.260	BB	6.29709e-2	4.34024e-1	2.73308e-2	?	

Uncalib. totals : 1.06688

2 Warnings or Errors :

Warning : Calibration warnings (see calibration table listing)
Warning : Calibrated compound(s) not found

=====

*** End of Report ***

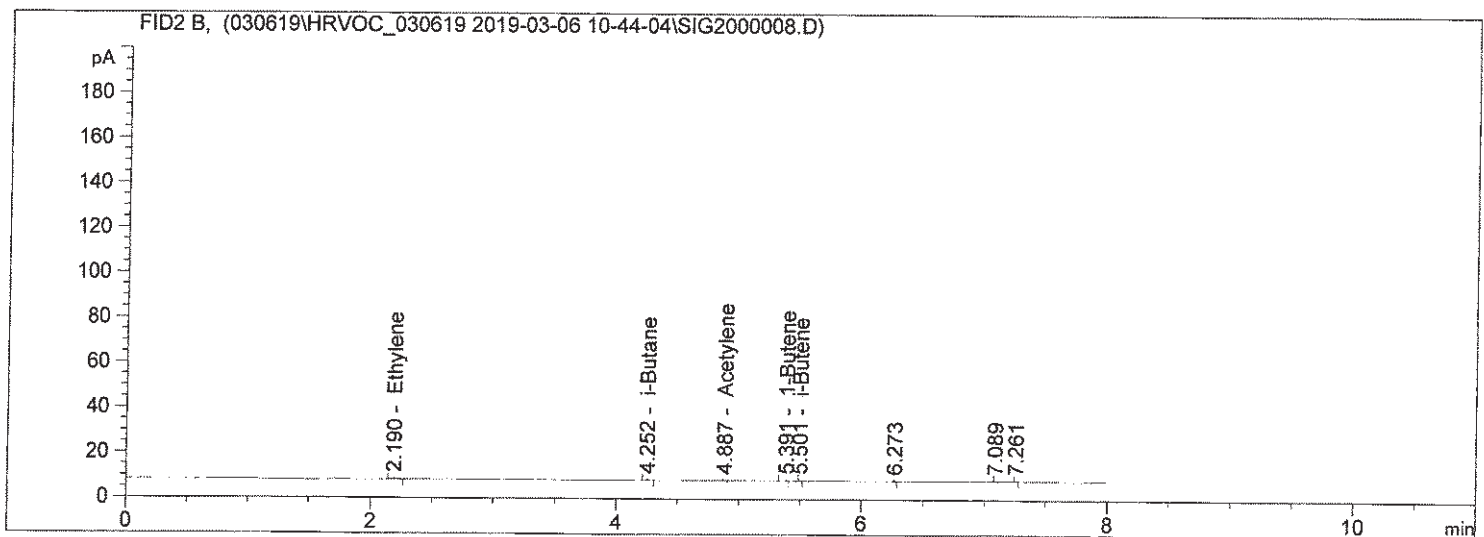
Sample Name: GSL_190239-002

```

=====
Acq. Operator   : dyeddula                      Seq. Line :    4
Acq. Instrument : GC#1                          Location  : Vial 5
Injection Date  : 3/6/2019 12:29:46 PM          Inj       :    2
                                                Inj Volume: Manually

Acq. Method     : C:\CHEM32\1\DATA\030619\HRVOC_030619 2019-03-06 10-44-04\ALKANES_HRVOC_
                : M18_091117.M
Last changed    : 3/6/2019 9:23:33 AM by dyeddula
Analysis Method : C:\CHEM32\1\METHODS\ALKANES_HRVOC_M18_091117.M
Last changed    : 3/6/2019 11:59:01 AM by dyeddula
                : (modified after loading)
Method Info     : HRVOC

Sample Info     : GSL_190239-002
                : Method:18
=====
    
```



External Standard Report

```

Sorted By           : Signal
Calib. Data Modified : 3/6/2019 11:02:06 AM
Multiplier          : 1.0000
Dilution            : 1.0000
Use Multiplier & Dilution Factor with ISTDs
    
```

Signal 1: FID2 B,

RetTime [min]	Type	Area [pA*s]	Amt/Area	Amount [ppmv]	Grp	Name
1.689		-	-	-		Methane
1.842		-	-	-		Ethane
2.190	BB	1.03469	6.45663e-1	6.68064e-1		Ethylene
2.664		-	-	-		Propane
4.147		-	-	-		Propylene
4.252	BB	6.31033e-1	3.29374e-1	2.07846e-1		i-Butane
4.475		-	-	-		n-Butane
4.887	BB	1.07212e-1	6.47127e-1	6.93798e-2		Acetylene

Handwritten signature/initials

```
=====
Acq. Operator   : dyeddula                      Seq. Line :    4
Acq. Instrument : GC#1                          Location  : Vial 5
Injection Date  : 3/6/2019 12:29:46 PM          Inj       :    2
                                                    Inj Volume: Manually

Acq. Method     : C:\CHEM32\1\DATA\030619\HRVOC_030619 2019-03-06 10-44-04\ALKANES_HRVOC_
M18_091117.M
Last changed    : 3/6/2019 9:23:33 AM by dyeddula
Analysis Method : C:\CHEM32\1\METHODS\ALKANES_HRVOC_M18_091117.M
Last changed    : 3/6/2019 11:59:01 AM by dyeddula
                 (modified after loading)
Method Info     : HRVOC

Sample Info     : GSL_190239-002
                 Method:18
=====
```

RetTime [min]	Type	Area [pA*s]	Amt/Area	Amount [ppmv]	Grp	Name
5.310		-	-	-		t-2-Butene
5.391	BB	2.63636e-1	3.26200e-1	8.59979e-2		1-Butene
5.501	BB	1.47143e-1	3.31334e-1	4.87535e-2		i-Butene
5.548		-	-	-		c-2-Butene
5.600		-	-	-		i-Pentane
5.658		-	-	-		n-Pentane
5.942		-	-	-		1,3-Butadiene
6.553		-	-	-		Hexane

Totals : 1.08004

Uncalibrated Peaks : using compound Propane

RetTime [min]	Type	Area [pA*s]	Amt/Area	Amount [ppmv]	Grp	Name
6.273	BB	1.32448e-1	4.34024e-1	5.74857e-2		?
7.089	BB	1.34109e-1	4.34024e-1	5.82063e-2		?
7.261	BB	5.64872e-2	4.34024e-1	2.45168e-2		?

Uncalib. totals : 1.40209e-1

2 Warnings or Errors :

Warning : Calibration warnings (see calibration table listing)
 Warning : Calibrated compound(s) not found

*** End of Report ***

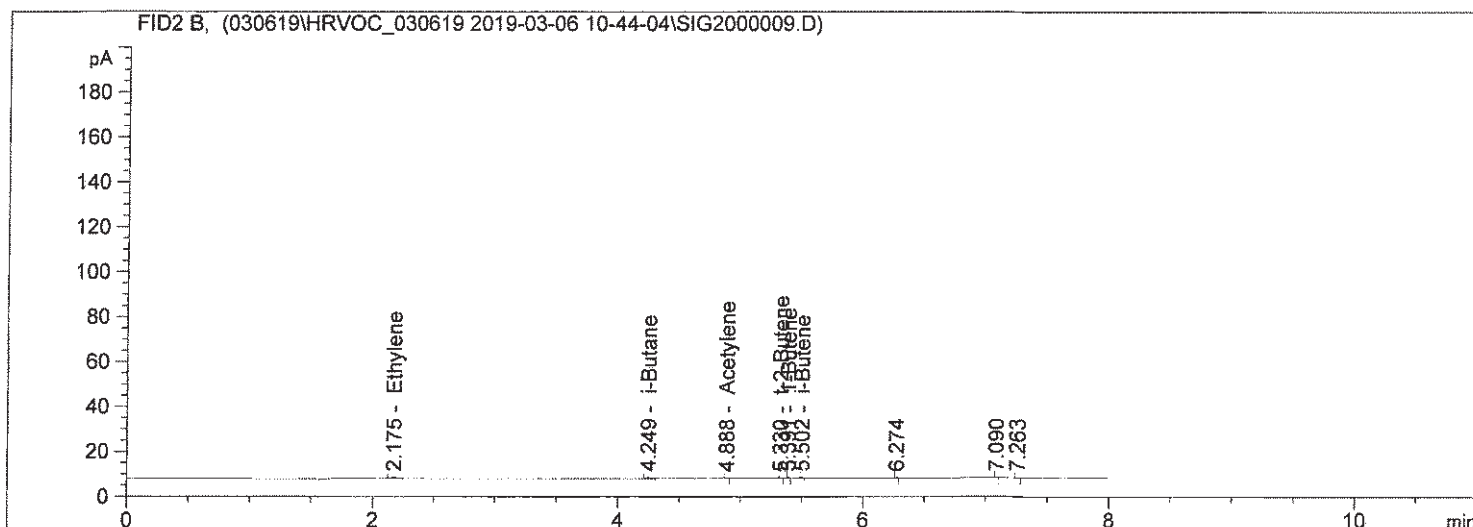
Sample Name: GSL_190239-002

```

=====
Acq. Operator   : dyeddula                      Seq. Line :    4
Acq. Instrument : GC#1                          Location  : Vial 5
Injection Date  : 3/6/2019 12:46:46 PM          Inj       :    3
                                                Inj Volume: Manually

Acq. Method     : C:\CHEM32\1\DATA\030619\HRVOC_030619 2019-03-06 10-44-04\ALKANES_HRVOC_
                  M18_091117.M
Last changed    : 3/6/2019 9:23:33 AM by dyeddula
Analysis Method : C:\CHEM32\1\METHODS\ALKANES_HRVOC_M18_091117.M
Last changed    : 3/6/2019 11:59:01 AM by dyeddula
                  (modified after loading)
Method Info     : HRVOC

Sample Info     : GSL_190239-002
                  Method:18
=====
    
```



External Standard Report

```

Sorted By      :      Signal
Calib. Data Modified :      3/6/2019 11:02:06 AM
Multiplier:    :      1.0000
Dilution:     :      1.0000
Use Multiplier & Dilution Factor with ISTDs
    
```

Signal 1: FID2 B,

RetTime [min]	Type	Area [pA*s]	Amt/Area	Amount [ppmv]	Grp	Name
1.689	-	-	-	-		Methane
1.842	-	-	-	-		Ethane
2.175	BB	1.06206	6.45663e-1	6.85734e-1		Ethylene
2.664	-	-	-	-		Propane
4.147	-	-	-	-		Propylene
4.249	BB	6.57570e-1	3.29374e-1	2.16586e-1		i-Butane
4.475	-	-	-	-		n-Butane
4.888	BB	1.11976e-1	6.47127e-1	7.24623e-2		Acetylene

Handwritten signature/initials

Sample Name: GSL_190239-002

```
=====
Acq. Operator   : dyeddula                      Seq. Line :    4
Acq. Instrument : GC#1                          Location  : Vial 5
Injection Date  : 3/6/2019 12:46:46 PM          Inj       :    3
                                                Inj Volume: Manually
Acq. Method     : C:\CHEM32\1\DATA\030619\HRVOC_030619 2019-03-06 10-44-04\ALKANES_HRVOC_
                M18_091117.M
Last changed    : 3/6/2019 9:23:33 AM by dyeddula
Analysis Method : C:\CHEM32\1\METHODS\ALKANES_HRVOC_M18_091117.M
Last changed    : 3/6/2019 11:59:01 AM by dyeddula
                (modified after loading)
Method Info     : HRVOC

Sample Info     : GSL_190239-002
                Method:18
=====
```

RetTime [min]	Type	Area [pA*s]	Amt/Area	Amount [ppmv]	Grp	Name
5.330	BB	4.30591e-2	3.29413e-1	1.41842e-2		t-2-Butene
5.391	BB	2.32109e-1	3.26200e-1	7.57140e-2		1-Butene
5.502	BB	1.50915e-1	3.31334e-1	5.00031e-2		i-Butene
5.548		-	-	-		c-2-Butene
5.600		-	-	-		i-Pentane
5.658		-	-	-		n-Pentane
5.942		-	-	-		1,3-Butadiene
6.553		-	-	-		Hexane

Totals : 1.11468

Uncalibrated Peaks : using compound Propane

RetTime [min]	Type	Area [pA*s]	Amt/Area	Amount [ppmv]	Grp	Name
6.274	BB	1.64286e-1	4.34024e-1	7.13041e-2		?
7.090	BB	1.31707e-1	4.34024e-1	5.71638e-2		?
7.263	BB	7.89526e-2	4.34024e-1	3.42673e-2		?

Uncalib. totals : 1.62735e-1

2 Warnings or Errors :

Warning : Calibration warnings (see calibration table listing)
 Warning : Calibrated compound(s) not found

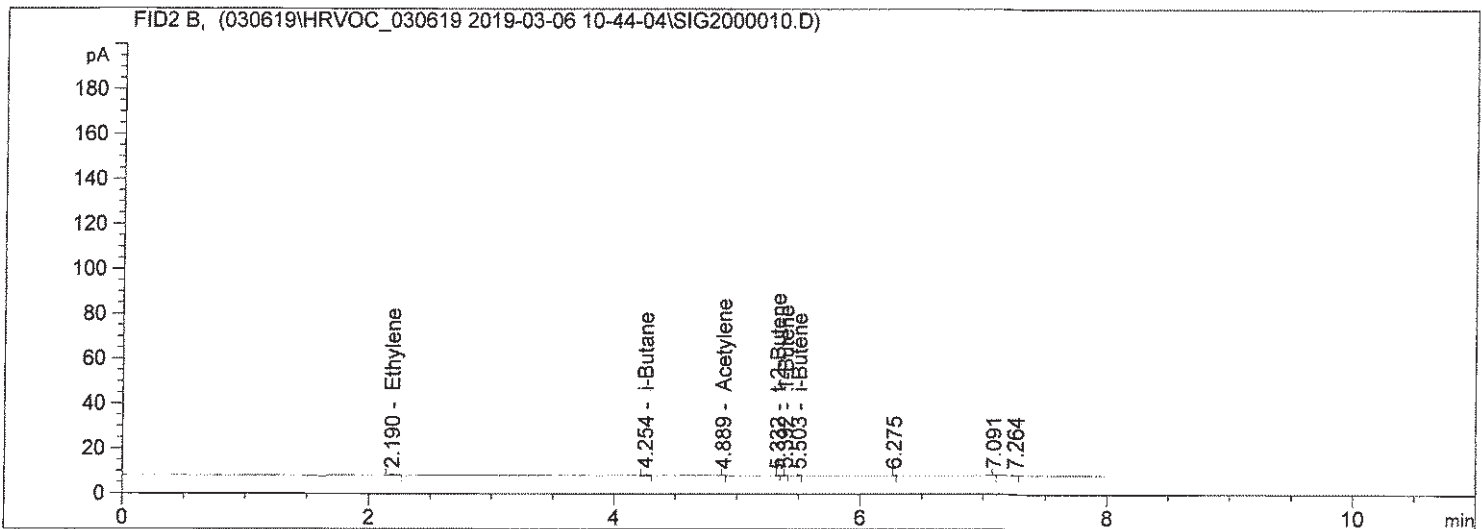
*** End of Report ***

```

=====
Acq. Operator   : dyeddula                      Seq. Line :    5
Acq. Instrument : GC#1                          Location  : Vial 6
Injection Date  : 3/6/2019 1:03:47 PM          Inj       :    1
                                                Inj Volume: Manually

Acq. Method     : C:\CHEM32\1\DATA\030619\HRVOC_030619 2019-03-06 10-44-04\ALKANES_HRVOC_
                  M18_091117.M
Last changed    : 3/6/2019 9:23:33 AM by dyeddula
Analysis Method : C:\CHEM32\1\METHODS\ALKANES_HRVOC_M18_091117.M
Last changed    : 3/6/2019 11:59:01 AM by dyeddula
                  (modified after loading)
Method Info     : HRVOC

Sample Info     : GSL_190239-003
                  Method:18
=====
  
```



External Standard Report

```

Sorted By           : Signal
Calib. Data Modified : 3/6/2019 11:02:06 AM
Multiplier          : 1.0000
Dilution            : 1.0000
Use Multiplier & Dilution Factor with ISTDs
  
```

Signal 1: FID2 B,

RetTime [min]	Type	Area [pA*s]	Amt/Area	Amount [ppmv]	Grp	Name
1.689	-	-	-	-	-	Methane
1.842	-	-	-	-	-	Ethane
2.190	BB	1.24285	6.45663e-1	8.02465e-1	-	Ethylene
2.664	-	-	-	-	-	Propane
4.147	-	-	-	-	-	Propylene
4.254	BB	7.48370e-1	3.29374e-1	2.46494e-1	-	i-Butane
4.475	-	-	-	-	-	n-Butane
4.889	BB	1.17725e-1	6.47127e-1	7.61833e-2	-	Acetylene

Handwritten signature: 2/3/14/19

Sample Name: GSL_190239-003

```

=====
Acq. Operator   : dyeddula                      Seq. Line :    5
Acq. Instrument : GC#1                          Location  : Vial 6
Injection Date  : 3/6/2019 1:03:47 PM           Inj       :    1
                                                Inj Volume: Manually
Acq. Method     : C:\CHEM32\1\DATA\030619\HRVOC_030619 2019-03-06 10-44-04\ALKANES_HRVOC_
                  M18_091117.M
Last changed    : 3/6/2019 9:23:33 AM by dyeddula
Analysis Method : C:\CHEM32\1\METHODS\ALKANES_HRVOC_M18_091117.M
Last changed    : 3/6/2019 11:59:01 AM by dyeddula
                  (modified after loading)
Method Info     : HRVOC

Sample Info     : GSL_190239-003
                  Method:18
=====

```

```

=====
RetTime  Type      Area      Amt/Area  Amount  Grp  Name
 [min]   |-----| [pA*s]   |-----| [ppmv]  |---|-----|
-----|-----|-----|-----|-----|---|-----|
 5.332 BB      4.02528e-2 3.29413e-1 1.32598e-2 t-2-Butene
 5.392 BB      2.61389e-1 3.26200e-1 8.52652e-2 1-Butene
 5.503 BB      1.67245e-1 3.31334e-1 5.54138e-2 i-Butene
 5.548         -          -          -          c-2-Butene
 5.600         -          -          -          i-Pentane
 5.658         -          -          -          n-Pentane
 5.942         -          -          -          1,3-Butadiene
 6.553         -          -          -          Hexane
=====

```

Totals : 1.27908

Uncalibrated Peaks : using compound Propane

```

RetTime  Type      Area      Amt/Area  Amount  Grp  Name
 [min]   |-----| [pA*s]   |-----| [ppmv]  |---|-----|
-----|-----|-----|-----|-----|---|-----|
 6.275 BB      1.56965e-1 4.34024e-1 6.81266e-2 ?
 7.091 BB      1.52197e-1 4.34024e-1 6.60571e-2 ?
 7.264 BB      7.23652e-2 4.34024e-1 3.14082e-2 ?
=====

```

Uncalib. totals : 1.65592e-1

2 Warnings or Errors :

Warning : Calibration warnings (see calibration table listing)
Warning : Calibrated compound(s) not found

```

=====
*** End of Report ***
=====

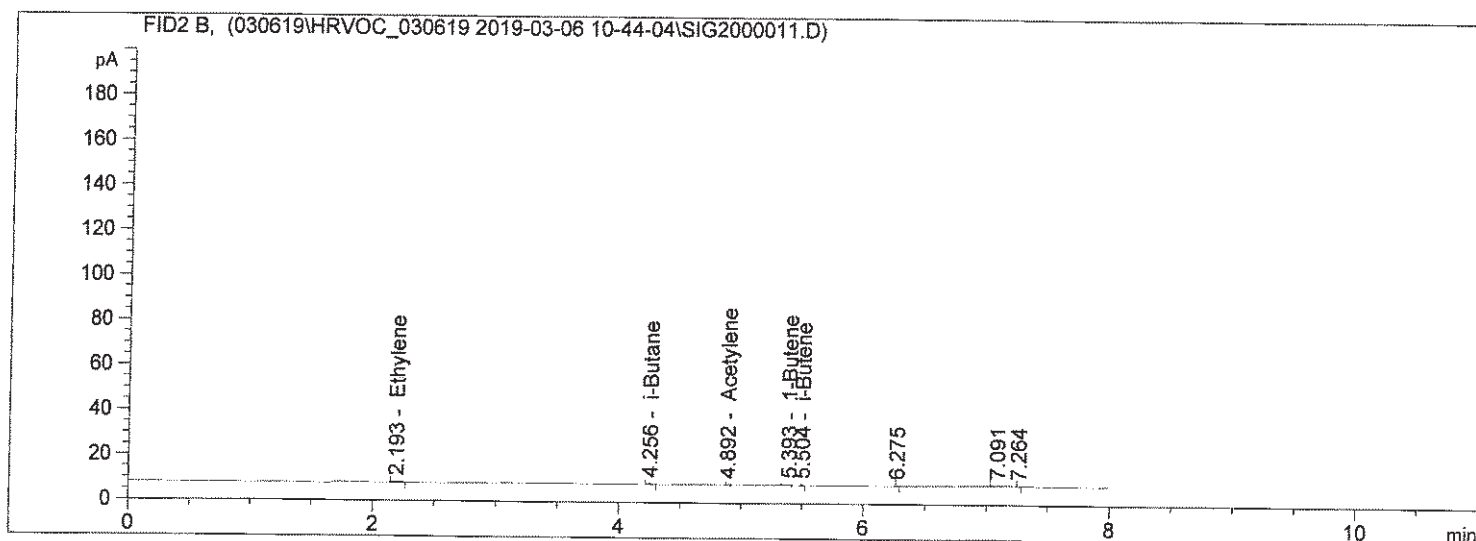
```

```

=====
Acq. Operator   : dyeddula                      Seq. Line :    5
Acq. Instrument : GC#1                          Location  : Vial 6
Injection Date  : 3/6/2019 1:20:48 PM           Inj       :    2
                                                Inj Volume: Manually

Acq. Method     : C:\CHEM32\1\DATA\030619\HRVOC_030619 2019-03-06 10-44-04\ALKANES_HRVOC_
                  M18_091117.M
Last changed    : 3/6/2019 9:23:33 AM by dyeddula
Analysis Method : C:\CHEM32\1\METHODS\ALKANES_HRVOC_M18_091117.M
Last changed    : 3/6/2019 11:59:01 AM by dyeddula
                  (modified after loading)
Method Info     : HRVOC

Sample Info     : GSL_190239-003
                  Method:18
=====
  
```



External Standard Report

```

Sorted By           : Signal
Calib. Data Modified : 3/6/2019 11:02:06 AM
Multiplier          : 1.0000
Dilution            : 1.0000
Use Multiplier & Dilution Factor with ISTDs
  
```

Signal 1: FID2 B,

RetTime [min]	Type	Area [pA*s]	Amt/Area	Amount [ppmv]	Grp	Name
1.689		-	-	-		Methane
1.842		-	-	-		Ethane
2.193	BB	1.05271	6.45663e-1	6.79699e-1		Ethylene
2.664		-	-	-		Propane
4.147		-	-	-		Propylene
4.256	BB	6.33582e-1	3.29374e-1	2.08685e-1		i-Butane
4.475		-	-	-		n-Butane
4.892	BB	1.12045e-1	6.47127e-1	7.25075e-2		Acetylene

Handwritten signature/initials


```
=====
Acq. Operator   : dyeddula                      Seq. Line :    5
Acq. Instrument : GC#1                          Location  : Vial 6
Injection Date  : 3/6/2019 1:20:48 PM           Inj       :    2
                                                Inj Volume: Manually
Acq. Method     : C:\CHEM32\1\DATA\030619\HRVOC_030619 2019-03-06 10-44-04\ALKANES_HRVOC_
                  M18_091117.M
Last changed    : 3/6/2019 9:23:33 AM by dyeddula
Analysis Method : C:\CHEM32\1\METHODS\ALKANES_HRVOC_M18_091117.M
Last changed    : 3/6/2019 11:59:01 AM by dyeddula
                  (modified after loading)
Method Info     : HRVOC

Sample Info     : GSL_190239-003
                  Method:18
=====
```

RetTime [min]	Type	Area [pA*s]	Amt/Area	Amount [ppmv]	Grp	Name
5.310		-	-	-		t-2-Butene
5.393	BB	2.68726e-1	3.26200e-1	8.76582e-2		1-Butene
5.504	BB	1.54717e-1	3.31334e-1	5.12630e-2		i-Butene
5.548		-	-	-		c-2-Butene
5.600		-	-	-		i-Pentane
5.658		-	-	-		n-Pentane
5.942		-	-	-		1,3-Butadiene
6.553		-	-	-		Hexane

Totals : 1.09981

Uncalibrated Peaks : using compound Propane

RetTime [min]	Type	Area [pA*s]	Amt/Area	Amount [ppmv]	Grp	Name
6.275	BB	1.44503e-1	4.34024e-1	6.27177e-2	?	
7.091	BB	5.07737e-1	4.34024e-1	2.20370e-1	?	
7.264	BB	3.83876e-2	4.34024e-1	1.66611e-2	?	

Uncalib. totals : 2.99749e-1

2 Warnings or Errors :

Warning : Calibration warnings (see calibration table listing)
Warning : Calibrated compound(s) not found

*** End of Report ***

```

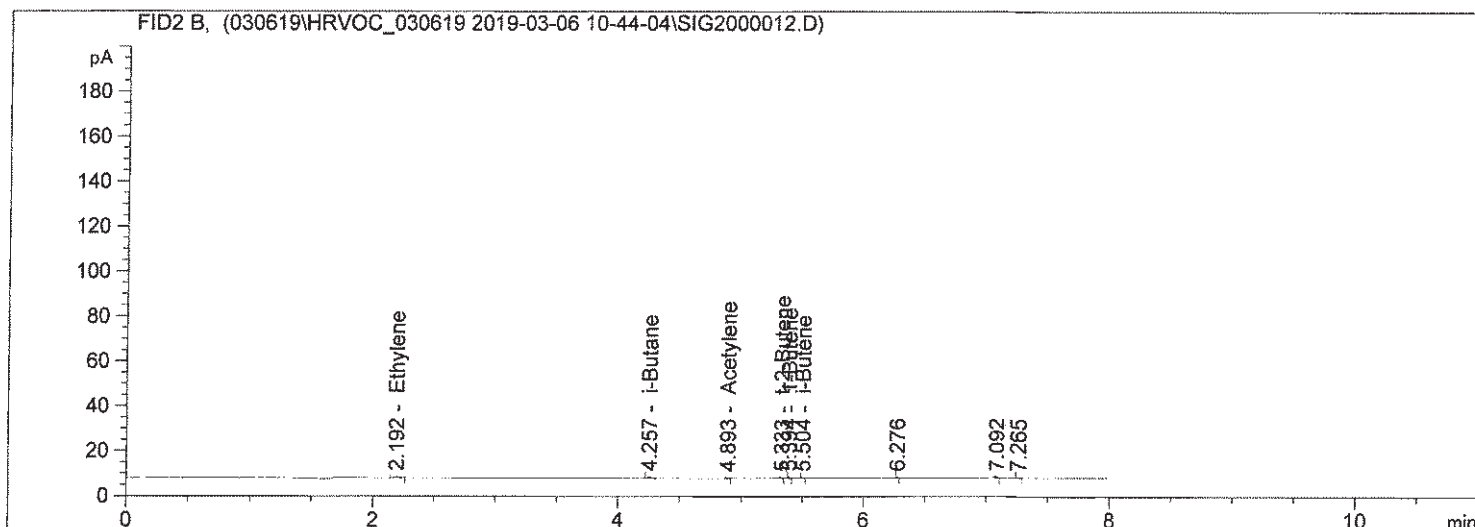
=====
Acq. Operator   : dyeddula                      Seq. Line :    5
Acq. Instrument : GC#1                          Location  : Vial 6
Injection Date  : 3/6/2019 1:37:46 PM          Inj       :    3
                                                Inj Volume: Manually

Acq. Method     : C:\CHEM32\1\DATA\030619\HRVOC_030619 2019-03-06 10-44-04\ALKANES_HRVOC_
M18_091117.M

Last changed    : 3/6/2019 9:23:33 AM by dyeddula
Analysis Method : C:\CHEM32\1\METHODS\ALKANES_HRVOC_M18_091117.M
Last changed    : 3/6/2019 11:59:01 AM by dyeddula
                  (modified after loading)

Method Info     : HRVOC

Sample Info     : GSL_190239-003
                  Method:18
=====
  
```



External Standard Report

```

Sorted By      : Signal
Calib. Data Modified : 3/6/2019 11:02:06 AM
Multiplier:    : 1.0000
Dilution:     : 1.0000
Use Multiplier & Dilution Factor with ISTDs
  
```

Signal 1: FID2 B,

RetTime [min]	Type	Area [pA*s]	Amt/Area	Amount [ppmv]	Grp	Name
1.689		-	-	-		Methane
1.842		-	-	-		Ethane
2.192	BB	1.09633	6.45663e-1	7.07863e-1		Ethylene
2.664		-	-	-		Propane
4.147		-	-	-		Propylene
4.257	BB	6.49037e-1	3.29374e-1	2.13776e-1		i-Butane
4.475		-	-	-		n-Butane
4.893	BB	1.02085e-1	6.47127e-1	6.60622e-2		Acetylene

Handwritten signature: 23749

Sample Name: GSL_190239-003

```

=====
Acq. Operator   : dyeddula                      Seq. Line :    5
Acq. Instrument : GC#1                          Location  : Vial 6
Injection Date  : 3/6/2019 1:37:46 PM          Inj       :    3
                                                Inj Volume: Manually

Acq. Method     : C:\CHEM32\1\DATA\030619\HRVOC_030619 2019-03-06 10-44-04\ALKANES_HRVOC_
M18_091117.M
Last changed    : 3/6/2019 9:23:33 AM by dyeddula
Analysis Method : C:\CHEM32\1\METHODS\ALKANES_HRVOC_M18_091117.M
Last changed    : 3/6/2019 11:59:01 AM by dyeddula
                 (modified after loading)
Method Info     : HRVOC

Sample Info     : GSL_190239-003
                 Method:18
=====

```

```

=====
RetTime  Type      Area      Amt/Area  Amount  Grp  Name
 [min]   |-----| [pA*s]   |-----| [ppmv]  |---|-----|
-----|-----|-----|-----|-----|---|-----|
 5.333 BB      3.60751e-2 3.29413e-1 1.18836e-2 t-2-Butene
 5.394 BB      2.27315e-1 3.26200e-1 7.41501e-2 1-Butene
 5.504 BB      1.51504e-1 3.31334e-1 5.01984e-2 i-Butene
 5.548         -          -          -          c-2-Butene
 5.600         -          -          -          i-Pentane
 5.658         -          -          -          n-Pentane
 5.942         -          -          -          1,3-Butadiene
 6.553         -          -          -          Hexane

```

Totals : 1.12393

Uncalibrated Peaks : using compound Propane

```

RetTime  Type      Area      Amt/Area  Amount  Grp  Name
 [min]   |-----| [pA*s]   |-----| [ppmv]  |---|-----|
-----|-----|-----|-----|-----|---|-----|
 6.276 BB      1.45028e-1 4.34024e-1 6.29454e-2 ?
 7.092 BB      1.35239e-1 4.34024e-1 5.86969e-2 ?
 7.265 BB      5.92259e-2 4.34024e-1 2.57055e-2 ?

```

Uncalib. totals : 1.47348e-1

2 Warnings or Errors :

Warning : Calibration warnings (see calibration table listing)
Warning : Calibrated compound(s) not found

```

=====
*** End of Report ***
=====

```

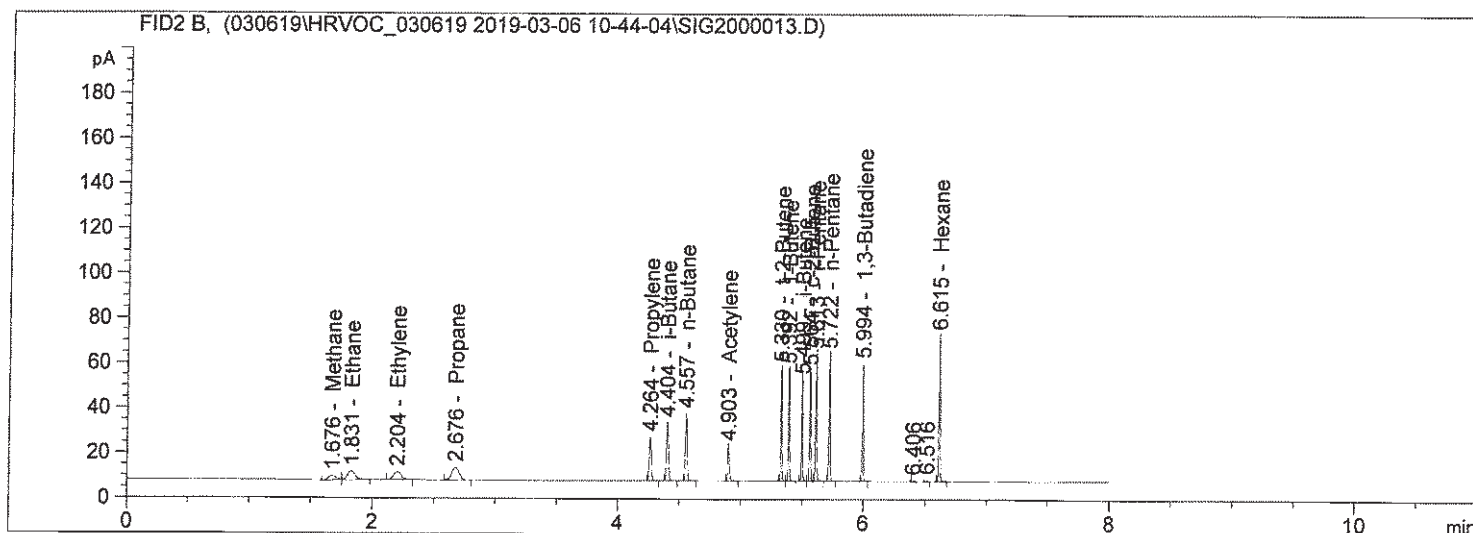
Sample Name: POST CCV

```

=====
Acq. Operator   : dyeddula                      Seq. Line :    6
Acq. Instrument : GC#1                          Location  : Vial 7
Injection Date  : 3/6/2019 1:54:43 PM           Inj       :    1
                                           Inj Volume: Manually

Acq. Method    : C:\CHEM32\1\DATA\030619\HRVOC_030619 2019-03-06 10-44-04\ALKANES_HRVOC_
M18_091117.M
Last changed   : 3/6/2019 9:23:33 AM by dyeddula
Analysis Method : C:\CHEM32\1\METHODS\ALKANES_HRVOC_M18_091117.M
Last changed   : 3/6/2019 2:23:17 PM by dyeddula
                (modified after loading)
Method Info    : HRVOC

Sample Info    : POST CCV(10ppmv HRVOC+ALKANES)
                Method:18
=====
    
```



External Standard Report

```

Sorted By      :      Signal
Calib. Data Modified :      3/6/2019 2:22:51 PM
Multiplier:    :      1.0000
Dilution:      :      1.0000
Use Multiplier & Dilution Factor with ISTDs
    
```

Signal 1: FID2 B,

RetTime [min]	Type	Area [pA*s]	Amt/Area	Amount [ppmv]	Grp	Name
1.676	BV	8.76894	1.12222	9.84072		Methane
1.831	VB	17.40279	5.89609e-1	10.26084		Ethane
2.204	BB	15.10629	6.45663e-1	9.75358		Ethylene
2.676	BB	22.71687	4.34024e-1	9.85966		Propane
4.264	BB	22.92953	4.30557e-1	9.87246		Propylene
4.404	BB	30.28004	3.29374e-1	9.97346		i-Butane
4.557	BB	30.15769	3.26258e-1	9.83920		n-Butane
4.903	BB	15.20792	6.47127e-1	9.84145		Acetylene

27371419

Sample Name: POST CCV

```

=====
Acq. Operator   : dyeddula                      Seq. Line :    6
Acq. Instrument : GC#1                          Location  : Vial 7
Injection Date  : 3/6/2019 1:54:43 PM           Inj       :    1
                                                Inj Volume: Manually
Acq. Method     : C:\CHEM32\1\DATA\030619\HRVOC_030619 2019-03-06 10-44-04\ALKANES_HRVOC_
M18_091117.M
Last changed    : 3/6/2019 9:23:33 AM by dyeddula
Analysis Method : C:\CHEM32\1\METHODS\ALKANES_HRVOC_M18_091117.M
Last changed    : 3/6/2019 2:23:17 PM by dyeddula
                 (modified after loading)
Method Info     : HRVOC

Sample Info     : POST CCV(10ppmv HRVOC+ALKANES)
                 Method:18
=====

```

RetTime [min]	Type	Area [pA*s]	Amt/Area	Amount [ppmv]	Grp	Name
5.330	BV	29.63066	3.29413e-1	9.76072		t-2-Butene
5.392	VB	30.61152	3.26200e-1	9.98547		1-Butene
5.499	BV	29.80332	3.31334e-1	9.87485		i-Butene
5.564	VV	29.81900	3.40178e-1	10.14377		c-2-Butene
5.613	VB	37.79074	2.52648e-1	9.54776		i-Pentane
5.722	BB	37.41454	2.58175e-1	9.65948		n-Pentane
5.994	BB	29.68624	3.37185e-1	10.00975		1,3-Butadiene
6.615	BB	42.33761	2.30048e-1	9.73970		Hexane

Totals : 157.96285

Uncalibrated Peaks : using compound Propane

RetTime [min]	Type	Area [pA*s]	Amt/Area	Amount [ppmv]	Grp	Name
6.406	BB	1.62992e-1	4.34024e-1	7.07425e-2		?
6.516	BB	3.75150e-1	4.34024e-1	1.62824e-1		?

Uncalib. totals : 2.33567e-1

1 Warnings or Errors :

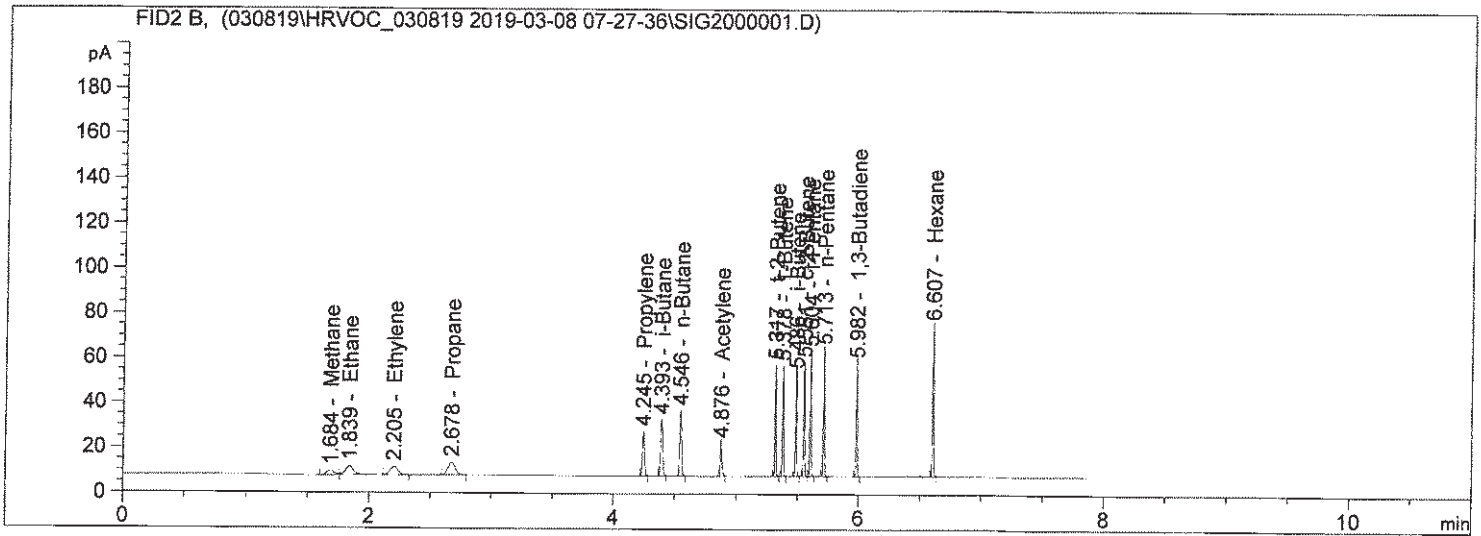
Warning : Calibration warnings (see calibration table listing)

*** End of Report ***

```
=====
Acq. Operator   : dyeddula                      Seq. Line :    1
Acq. Instrument : GC#1                          Location  : Vial 1
Injection Date  : 3/8/2019 7:33:46 AM           Inj       :    1
                                                    Inj Volume: Manually

Acq. Method    : C:\CHEM32\1\DATA\030819\HRVOC_030819 2019-03-08 07-27-36\ALKANES_HRVOC_
                M18_091117.M
Last changed   : 3/8/2019 7:11:23 AM by dyeddula
Analysis Method : C:\CHEM32\1\METHODS\ALKANES_HRVOC_M18_091117.M
Last changed   : 3/7/2019 1:49:38 PM by dyeddula
                (modified after loading)
Method Info    : HRVOC

Sample Info    : CCV(10ppmv HRVOC+ALKANES)
                Method:18
=====
```



External Standard Report

```
Sorted By           : Signal
Calib. Data Modified : 3/7/2019 1:49:13 PM
Multiplier:         : 1.0000
Dilution:           : 1.0000
Use Multiplier & Dilution Factor with ISTDs
```

Signal 1: FID2 B,

RetTime [min]	Type	Area [pA*s]	Amt/Area	Amount [ppmv]	Grp	Name
1.684	BV	8.76680	1.12222	9.83831		Methane
1.839	VB	17.25198	5.89609e-1	10.17192		Ethane
2.205	BB	15.20439	6.45663e-1	9.81692		Ethylene
2.678	BB	22.74714	4.34024e-1	9.87279		Propane
4.245	BB	22.78110	4.30557e-1	9.80855		Propylene
4.393	BB	29.96136	3.29374e-1	9.86849		i-Butane
4.546	BB	30.01163	3.26258e-1	9.79155		n-Butane
4.876	BB	14.07870	6.47127e-1	9.11071		Acetylene

2/27/19

Sample Name: CCV

```

=====
Acq. Operator   : dyeddula                      Seq. Line :    1
Acq. Instrument : GC#1                          Location  : Vial 1
Injection Date  : 3/8/2019 7:33:46 AM           Inj       :    1
                                                    Inj Volume: Manually
Acq. Method     : C:\CHEM32\1\DATA\030819\HRVOC_030819 2019-03-08 07-27-36\ALKANES_HRVOC_
                : M18_091117.M
Last changed    : 3/8/2019 7:11:23 AM by dyeddula
Analysis Method : C:\CHEM32\1\METHODS\ALKANES_HRVOC_M18_091117.M
Last changed    : 3/7/2019 1:49:38 PM by dyeddula
                : (modified after loading)
Method Info     : HRVOC

Sample Info     : CCV(10ppmv HRVOC+ALKANES)
                : Method:18
=====

```

```

=====
RetTime  Type      Area      Amt/Area   Amount   Grp   Name
 [min]   [pA*s]
-----|-----|-----|-----|-----|-----|-----
5.317 BB      29.74337 3.29413e-1  9.79785   t-2-Butene
5.378 BB      30.43749 3.26200e-1  9.92870   l-Butene
5.486 BB      29.91574 3.31334e-1  9.91210   i-Butene
5.551 BB      29.98714 3.40178e-1 10.20096   c-2-Butene
5.604 BB      37.80416 2.52648e-1  9.55115   i-Pentane
5.713 BB      37.64018 2.58175e-1  9.71774   n-Pentane
5.982 BB      29.92797 3.37185e-1 10.09126   1,3-Butadiene
6.607 BB      42.80475 2.30048e-1  9.84716   Hexane
=====

```

Totals : 157.32616

Uncalibrated Peaks : using compound Propane

1 Warnings or Errors :

Warning : Calibration warnings (see calibration table listing)

```

=====
*** End of Report ***
=====

```

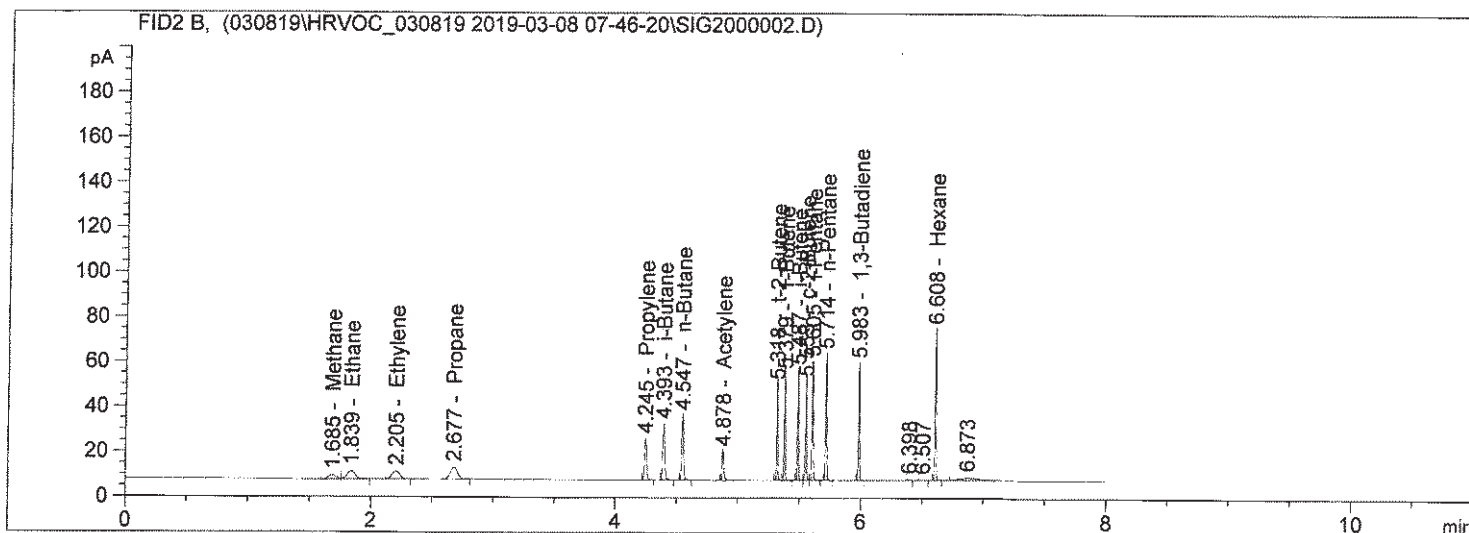
Sample Name: LCS

```

=====
Acq. Operator   : dyeddula                      Seq. Line :    1
Acq. Instrument : GC#1                          Location  : Vial 2
Injection Date  : 3/8/2019 7:50:21 AM           Inj       :    1
                                                    Inj Volume: Manually

Acq. Method     : C:\CHEM32\1\DATA\030819\HRVOC_030819 2019-03-08 07-46-20\ALKANES_HRVOC_
M18_091117.M
Last changed    : 3/8/2019 7:11:23 AM by dyeddula
Analysis Method : C:\CHEM32\1\METHODS\ALKANES_HRVOC_M18_091117.M
Last changed    : 3/8/2019 8:01:18 AM by dyeddula
                (modified after loading)
Method Info     : HRVOC

Sample Info     : LCS(10ppmv HRVOC+ALKANES)
                Method:18
=====
    
```



External Standard Report

```

Sorted By           :      Signal
Calib. Data Modified :      3/7/2019 1:49:13 PM
Multiplier:         :      1.0000
Dilution:           :      1.0000
Use Multiplier & Dilution Factor with ISTDs
    
```

Signal 1: FID2 B,

RetTime [min]	Type	Area [pA*s]	Amt/Area	Amount [ppmv]	Grp	Name
1.685	BV	8.67186	1.12222	9.73177		Methane
1.839	VB	16.62284	5.89609e-1	9.80097		Ethane
2.205	BB	14.63681	6.45663e-1	9.45045		Ethylene
2.677	BB	21.68333	4.34024e-1	9.41108		Propane
4.245	BB	21.87533	4.30557e-1	9.41857		Propylene
4.393	BB	29.37021	3.29374e-1	9.67378		i-Butane
4.547	BB	30.01476	3.26258e-1	9.79257		n-Butane
4.878	BB	12.66614	6.47127e-1	8.19659		Acetylene

237/14/19

Sample Name: LCS

```

=====
Acq. Operator   : dyeddula                      Seq. Line :    1
Acq. Instrument : GC#1                          Location  : Vial 2
Injection Date  : 3/8/2019 7:50:21 AM           Inj       :    1
                                                    Inj Volume: Manually
Acq. Method     : C:\CHEM32\1\DATA\030819\HRVOC_030819 2019-03-08 07-46-20\ALKANES_HRVOC_
                  M18_091117.M
Last changed    : 3/8/2019 7:11:23 AM by dyeddula
Analysis Method : C:\CHEM32\1\METHODS\ALKANES_HRVOC_M18_091117.M
Last changed    : 3/8/2019 8:01:18 AM by dyeddula
                  (modified after loading)
Method Info     : HRVOC

Sample Info     : LCS(10ppmv HRVOC+ALKANES)
                  Method:18
=====
    
```

RetTime [min]	Type	Area [pA*s]	Amt/Area	Amount [ppmv]	Grp	Name
5.318	BV	26.53936	3.29413e-1	8.74241		t-2-Butene
5.379	VB	30.43156	3.26200e-1	9.92676		1-Butene
5.487	BV	30.12053	3.31334e-1	9.97995		i-Butene
5.553	VV	27.15812	3.40178e-1	9.23860		c-2-Butene
5.605	VB	36.13133	2.52648e-1	9.12851		i-Pentane
5.714	BB	36.78979	2.58175e-1	9.49819		n-Pentane
5.983	BB	29.95873	3.37185e-1	10.10163		1,3-Butadiene
6.608	BB	43.78390	2.30048e-1	10.07241		Hexane

Totals : 152.16425

Uncalibrated Peaks : using compound Propane

RetTime [min]	Type	Area [pA*s]	Amt/Area	Amount [ppmv]	Grp	Name
6.398	BB	2.10138e-1	4.34024e-1	9.12047e-2		?
6.507	BB	9.12240e-2	4.34024e-1	3.95934e-2		?
6.873	BB	10.02280	4.34024e-1	4.35013		?

Uncalib. totals : 4.48093

1 Warnings or Errors :

Warning : Calibration warnings (see calibration table listing)

*** End of Report ***

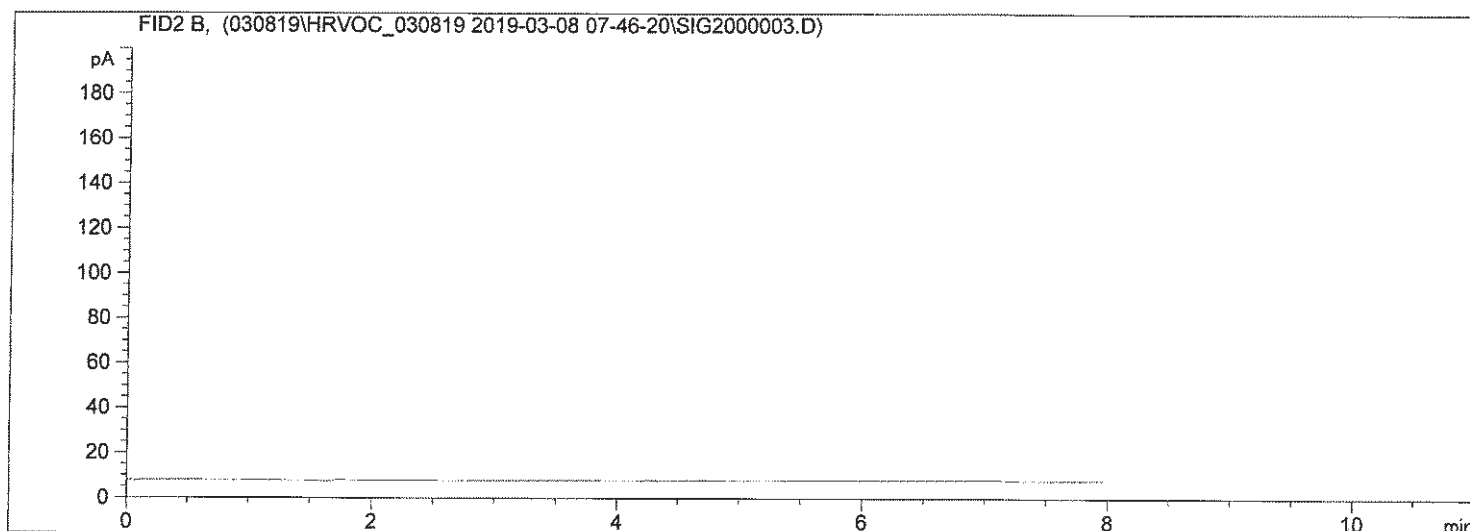
Sample Name: BLANK

```

=====
Acq. Operator   : dyeddula                      Seq. Line :    2
Acq. Instrument : GC#1                          Location  : Vial 3
Injection Date  : 3/8/2019 8:07:21 AM           Inj       :    1
                                                Inj Volume: Manually

Acq. Method    : C:\CHEM32\1\DATA\030819\HRVOC_030819 2019-03-08 07-46-20\ALKANES_HRVOC_
                M18_091117.M
Last changed   : 3/8/2019 7:11:23 AM by dyeddula
Analysis Method : C:\CHEM32\1\METHODS\ALKANES_HRVOC_M18_091117.M
Last changed   : 3/8/2019 8:34:36 AM by dyeddula
                (modified after loading)
Method Info    : HRVOC

Sample Info    : BLANK
                Method:18
=====
    
```



External Standard Report

```

Sorted By      : Signal
Calib. Data Modified : 3/7/2019 1:49:13 PM
Multiplier:    : 1.0000
Dilution:      : 1.0000
Use Multiplier & Dilution Factor with ISTDs
    
```

Signal 1: FID2 B,

RetTime [min]	Type	Area [pA*s]	Amt/Area	Amount [ppmv]	Grp	Name
1.689	-	-	-	-		Methane
1.842	-	-	-	-		Ethane
2.192	-	-	-	-		Ethylene
2.664	-	-	-	-		Propane
4.264	-	-	-	-		Propylene
4.400	-	-	-	-		i-Butane
4.550	-	-	-	-		n-Butane
4.802	-	-	-	-		Acetylene

3/31/19

Sample Name: BLANK

```

=====
Acq. Operator   : dyeddula                      Seq. Line :    2
Acq. Instrument : GC#1                          Location  : Vial 3
Injection Date  : 3/8/2019 8:07:21 AM           Inj       :    1
                                                Inj Volume: Manually
Acq. Method     : C:\CHEM32\1\DATA\030819\HRVOC_030819 2019-03-08 07-46-20\ALKANES_HRVOC_
M18_091117.M
Last changed    : 3/8/2019 7:11:23 AM by dyeddula
Analysis Method : C:\CHEM32\1\METHODS\ALKANES_HRVOC_M18_091117.M
Last changed    : 3/8/2019 8:34:36 AM by dyeddula
                (modified after loading)
Method Info     : HRVOC
Sample Info     : BLANK
                Method:18
=====

```

```

=====
RetTime  Type      Area      Amt/Area  Amount  Grp  Name
 [min]   [pA*s]          [ppmv]
-----|-----|-----|-----|-----|-----|-----
5.310    -            -          -          -        -    t-2-Butene
5.371    -            -          -          -        -    1-Butene
5.478    -            -          -          -        -    i-Butene
5.548    -            -          -          -        -    c-2-Butene
5.600    -            -          -          -        -    i-Pentane
5.658    -            -          -          -        -    n-Pentane
5.942    -            -          -          -        -    1,3-Butadiene
6.610    -            -          -          -        -    Hexane
=====

```

Totals : 0.00000

Uncalibrated Peaks : using compound Propane

2 Warnings or Errors :

Warning : Calibration warnings (see calibration table listing)

Warning : Calibrated compound(s) not found

```

=====
                          Area Percent Report
=====

```

```

Sorted By      : Signal
Calib. Data Modified : 3/7/2019 1:49:13 PM
Multiplier:    : 1.0000
Dilution:      : 1.0000
Use Multiplier & Dilution Factor with ISTDs

```

Signal 1: FID2 B,

```

Peak RetTime  Type  Width  Area  Area  Name
 #   [min]    [min] [pA*s] [%]
-----|-----|-----|-----|-----|-----
1   1.689    0.0000 0.00000 0.00000 Methane
2   1.842    0.0000 0.00000 0.00000 Ethane

```

Sample Name: BLANK

```

=====
Acq. Operator   : dyeddula                      Seq. Line :    2
Acq. Instrument : GC#1                          Location  : Vial 3
Injection Date  : 3/8/2019 8:07:21 AM           Inj       :    1
                                                    Inj Volume: Manually
Acq. Method     : C:\CHEM32\1\DATA\030819\HRVOC_030819 2019-03-08 07-46-20\ALKANES_HRVOC_
                M18_091117.M
Last changed    : 3/8/2019 7:11:23 AM by dyeddula
Analysis Method : C:\CHEM32\1\METHODS\ALKANES_HRVOC_M18_091117.M
Last changed    : 3/8/2019 8:34:36 AM by dyeddula
                (modified after loading)
Method Info     : HRVOC

Sample Info     : BLANK
                Method:18
=====

```

```

=====
Peak RetTime  Type  Width  Area  Area  Name
#    [min]    Type  [min] [pA*s] %
-----|-----|-----|-----|-----|-----
  3   2.192    0.0000 0.00000 0.00000 Ethylene
  4   2.664    0.0000 0.00000 0.00000 Propane
  5   4.264    0.0000 0.00000 0.00000 Propylene
  6   4.400    0.0000 0.00000 0.00000 i-Butane
  7   4.550    0.0000 0.00000 0.00000 n-Butane
  8   4.802    0.0000 0.00000 0.00000 Acetylene
  9   5.310    0.0000 0.00000 0.00000 t-2-Butene
 10   5.371    0.0000 0.00000 0.00000 l-Butene
 11   5.478    0.0000 0.00000 0.00000 i-Butene
 12   5.548    0.0000 0.00000 0.00000 c-2-Butene
 13   5.600    0.0000 0.00000 0.00000 i-Pentane
 14   5.658    0.0000 0.00000 0.00000 n-Pentane
 15   5.942    0.0000 0.00000 0.00000 1,3-Butadiene
 16   6.610    0.0000 0.00000 0.00000 Hexane

```

Totals : 0.00000 0.0000

2 Warnings or Errors :

Warning : Calibration warnings (see calibration table listing)

Warning : Calibrated compound(s) not found

```

=====
*** End of Report ***
=====

```

```

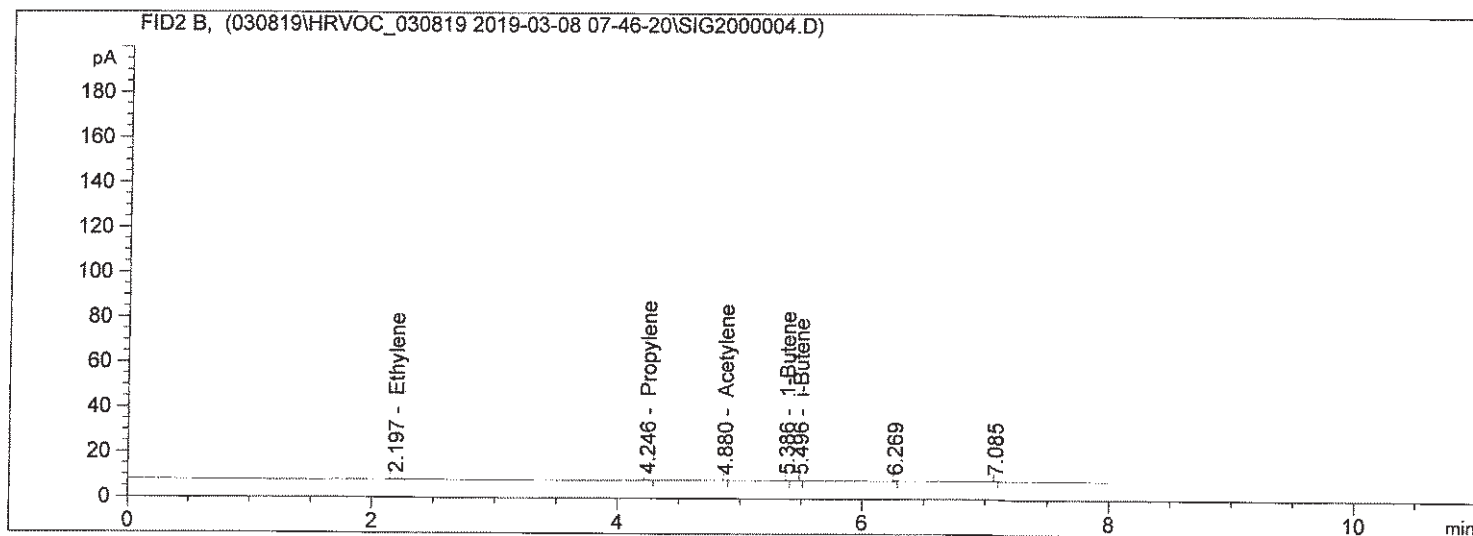
=====
Acq. Operator   : dyeddula                      Seq. Line :    3
Acq. Instrument : GC#1                          Location  : Vial 4
Injection Date  : 3/8/2019 8:23:54 AM           Inj       :    1
                                                Inj Volume: Manually

Acq. Method     : C:\CHEM32\1\DATA\030819\HRVOC_030819 2019-03-08 07-46-20\ALKANES_HRVOC_
M18_091117.M

Last changed    : 3/8/2019 7:11:23 AM by dyeddula
Analysis Method : C:\CHEM32\1\METHODS\ALKANES_HRVOC_M18_091117.M
Last changed    : 3/8/2019 8:36:00 AM by dyeddula
                 (modified after loading)

Method Info     : HRVOC

Sample Info     : GSL_190244-001
                 Method:18
=====
  
```



External Standard Report

```

Sorted By      : Signal
Calib. Data Modified : 3/7/2019 1:49:13 PM
Multiplier:    : 1.0000
Dilution:      : 1.0000
Use Multiplier & Dilution Factor with ISTDs
  
```

Signal 1: FID2 B,

RetTime [min]	Type	Area [pA*s]	Amt/Area	Amount [ppmv]	Grp	Name
1.689		-	-	-		Methane
1.842		-	-	-		Ethane
2.197	BB	7.50664e-1	6.45663e-1	4.84676e-1		Ethylene
2.664		-	-	-		Propane
4.246	BB	4.26550e-1	4.30557e-1	1.83654e-1		Propylene
4.400		-	-	-		i-Butane
4.550		-	-	-		n-Butane
4.880	BB	9.30297e-2	6.47127e-1	6.02020e-2		Acetylene

Handwritten signature/initials

Sample Name: GSL_190244-001

```
=====
Acq. Operator   : dyeddula                Seq. Line :    3
Acq. Instrument : GC#1                    Location  : Vial 4
Injection Date  : 3/8/2019 8:23:54 AM      Inj       :    1
                                           Inj Volume: Manually

Acq. Method     : C:\CHEM32\1\DATA\030819\HRVOC_030819 2019-03-08 07-46-20\ALKANES_HRVOC_
M18_091117.M
Last changed    : 3/8/2019 7:11:23 AM by dyeddula
Analysis Method : C:\CHEM32\1\METHODS\ALKANES_HRVOC_M18_091117.M
Last changed    : 3/8/2019 8:36:00 AM by dyeddula
                 (modified after loading)

Method Info     : HRVOC

Sample Info     : GSL_190244-001
                 Method:18
=====
```

```
=====
```

RetTime [min]	Type	Area [pA*s]	Amt/Area	Amount [ppmv]	Grp	Name
5.310		-	-	-		t-2-Butene
5.386	BB	1.29432e-1	3.26200e-1	4.22207e-2		1-Butene
5.496	BB	1.05737e-1	3.31334e-1	3.50341e-2		i-Butene
5.548		-	-	-		c-2-Butene
5.600		-	-	-		i-Pentane
5.658		-	-	-		n-Pentane
5.942		-	-	-		1,3-Butadiene
6.610		-	-	-		Hexane

Totals : 8.05787e-1

Uncalibrated Peaks : using compound Propane

RetTime [min]	Type	Area [pA*s]	Amt/Area	Amount [ppmv]	Grp	Name
6.269	BB	8.59197e-2	4.34024e-1	3.72912e-2		?
7.085	BB	5.45349e-2	4.34024e-1	2.36694e-2		?

Uncalib. totals : 6.09606e-2

2 Warnings or Errors :

Warning : Calibration warnings (see calibration table listing)
Warning : Calibrated compound(s) not found

*** End of Report ***

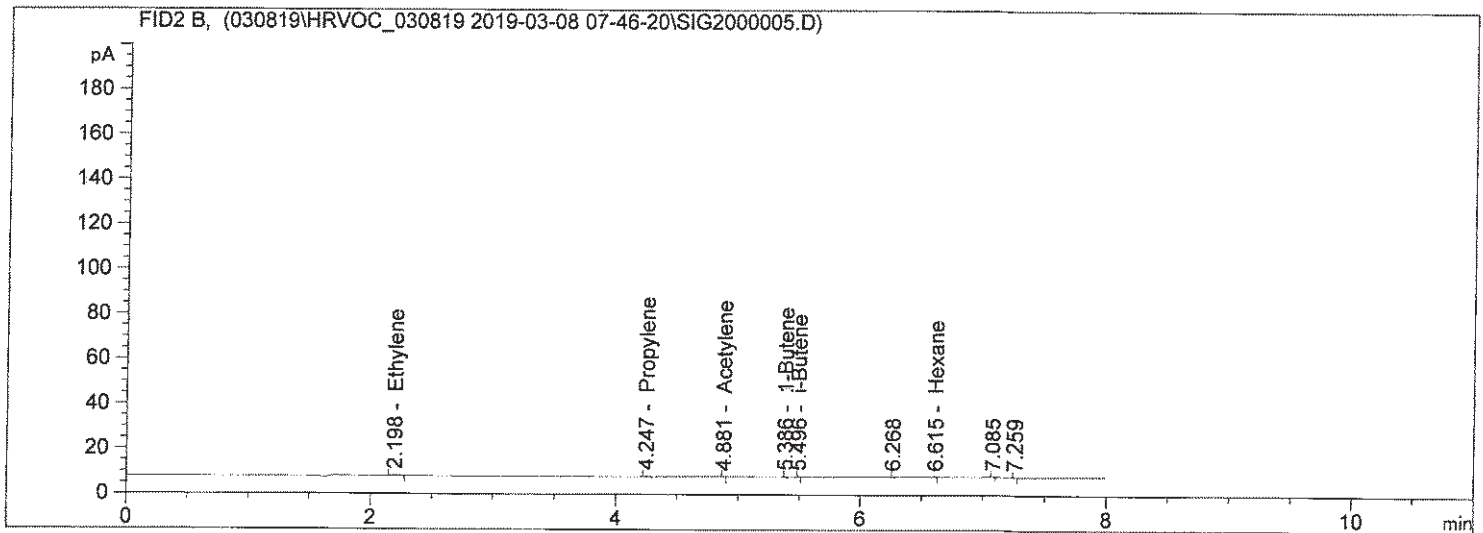
Sample Name: GSL_190244-001

```

=====
Acq. Operator   : dyeddula                      Seq. Line :    3
Acq. Instrument : GC#1                          Location  : Vial 4
Injection Date  : 3/8/2019 8:40:42 AM           Inj       :    2
                                                    Inj Volume: Manually

Acq. Method     : C:\CHEM32\1\DATA\030819\HRVOC_030819 2019-03-08 07-46-20\ALKANES_HRVOC_
                M18_091117.M
Last changed    : 3/8/2019 7:11:23 AM by dyeddula
Analysis Method : C:\CHEM32\1\METHODS\ALKANES_HRVOC_M18_091117.M
Last changed    : 3/8/2019 10:09:59 AM by dyeddula
                (modified after loading)
Method Info     : HRVOC

Sample Info     : GSL_190244-001
                Method:18
=====
    
```



External Standard Report

```

Sorted By           : Signal
Calib. Data Modified : 3/7/2019 1:49:13 PM
Multiplier          : 1.0000
Dilution            : 1.0000
Use Multiplier & Dilution Factor with ISTDs
    
```

Signal 1: FID2 B,

RetTime [min]	Type	Area [pA*s]	Amt/Area	Amount [ppmv]	Grp	Name
1.689		-	-	-		Methane
1.842		-	-	-		Ethane
2.198	BB	6.12676e-1	6.45663e-1	3.95582e-1		Ethylene
2.664		-	-	-		Propane
4.247	BB	4.20417e-1	4.30557e-1	1.81014e-1		Propylene
4.400		-	-	-		i-Butane
4.550		-	-	-		n-Butane
4.881	BB	8.42636e-2	6.47127e-1	5.45292e-2		Acetylene

Handwritten signature/initials

Sample Name: GSL_190244-001

```

=====
Acq. Operator   : dyeddula                      Seq. Line :    3
Acq. Instrument : GC#1                          Location  : Vial 4
Injection Date  : 3/8/2019 8:40:42 AM           Inj       :    2
                                                Inj Volume: Manually

Acq. Method     : C:\CHEM32\1\DATA\030819\HRVOC_030819 2019-03-08 07-46-20\ALKANES_HRVOC_
                  M18_091117.M
Last changed    : 3/8/2019 7:11:23 AM by dyeddula
Analysis Method : C:\CHEM32\1\METHODS\ALKANES_HRVOC_M18_091117.M
Last changed    : 3/8/2019 10:09:59 AM by dyeddula
                  (modified after loading)
Method Info     : HRVOC

Sample Info     : GSL_190244-001
                  Method:18
=====
    
```

RetTime [min]	Type	Area [pA*s]	Amt/Area	Amount [ppmv]	Grp	Name
5.310		-	-	-		t-2-Butene
5.386	BB	9.85155e-2	3.26200e-1	3.21357e-2		1-Butene
5.496	BB	8.49044e-2	3.31334e-1	2.81317e-2		i-Butene
5.548		-	-	-		c-2-Butene
5.600		-	-	-		i-Pentane
5.658		-	-	-		n-Pentane
5.942		-	-	-		1,3-Butadiene
6.615	BB	3.27910e-2	2.30048e-1	7.54352e-3		Hexane

Totals : 6.98936e-1

Uncalibrated Peaks : using compound Propane

RetTime [min]	Type	Area [pA*s]	Amt/Area	Amount [ppmv]	Grp	Name
6.268	BB	5.47729e-2	4.34024e-1	2.37727e-2		?
7.085	BB	3.36384e-2	4.34024e-1	1.45999e-2		?
7.259	BB	4.72694e-2	4.34024e-1	2.05160e-2		?

Uncalib. totals : 5.88886e-2

2 Warnings or Errors :

Warning : Calibration warnings (see calibration table listing)

Warning : Calibrated compound(s) not found

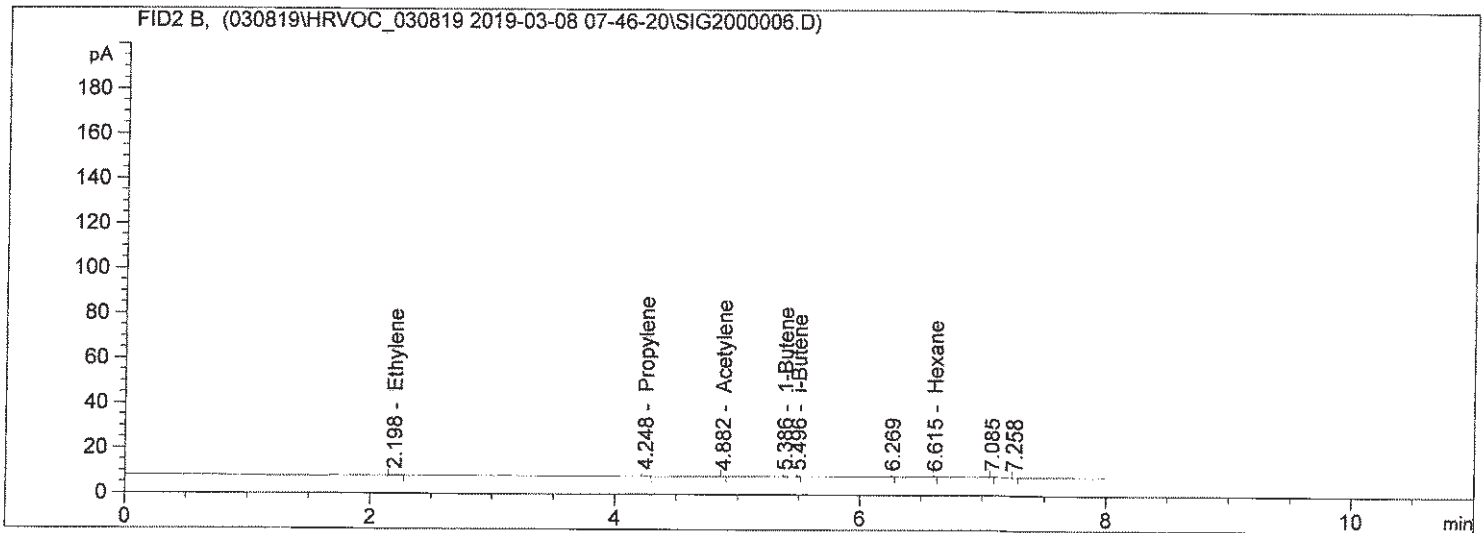
*** End of Report ***


```

=====
Acq. Operator   : dyeddula                      Seq. Line :    3
Acq. Instrument : GC#1                          Location  : Vial 4
Injection Date  : 3/8/2019 8:57:15 AM           Inj       :    3
                                                    Inj Volume: Manually

Acq. Method     : C:\CHEM32\1\DATA\030819\HRVOC_030819 2019-03-08 07-46-20\ALKANES_HRVOC_
                M18_091117.M
Last changed    : 3/8/2019 7:11:23 AM by dyeddula
Analysis Method : C:\CHEM32\1\METHODS\ALKANES_HRVOC_M18_091117.M
Last changed    : 3/8/2019 10:09:59 AM by dyeddula
                (modified after loading)
Method Info     : HRVOC

Sample Info     : GSL_190244-001
                Method:18
=====
  
```



External Standard Report

```

Sorted By           : Signal
Calib. Data Modified : 3/7/2019 1:49:13 PM
Multiplier:         : 1.0000
Dilution:           : 1.0000
Use Multiplier & Dilution Factor with ISTDs
  
```

Signal 1: FID2 B,

RetTime [min]	Type	Area [pA*s]	Amt/Area	Amount [ppmv]	Grp	Name
1.689		-	-	-		Methane
1.842		-	-	-		Ethane
2.198	BB	5.88934e-1	6.45663e-1	3.80253e-1		Ethylene
2.664		-	-	-		Propane
4.248	BB	4.21742e-1	4.30557e-1	1.81584e-1		Propylene
4.400		-	-	-		i-Butane
4.550		-	-	-		n-Butane
4.882	BB	7.82269e-2	6.47127e-1	5.06227e-2		Acetylene

Handwritten signature/initials

Sample Name: GSL_190244-001

```

=====
Acq. Operator   : dyeddula                      Seq. Line :    3
Acq. Instrument : GC#1                          Location  : Vial 4
Injection Date  : 3/8/2019 8:57:15 AM          Inj       :    3
                                                Inj Volume: Manually
Acq. Method     : C:\CHEM32\1\DATA\030819\HRVOC_030819 2019-03-08 07-46-20\ALKANES_HRVOC_
                  M18_091117.M
Last changed    : 3/8/2019 7:11:23 AM by dyeddula
Analysis Method : C:\CHEM32\1\METHODS\ALKANES_HRVOC_M18_091117.M
Last changed    : 3/8/2019 10:09:59 AM by dyeddula
                  (modified after loading)
Method Info     : HRVOC

Sample Info     : GSL_190244-001
                  Method:18
=====

```

```

=====
RetTime  Type      Area      Amt/Area   Amount   Grp   Name
 [min]   [pA*s]          [ppmv]
-----|-----|-----|-----|-----|---|-----
 5.310           -          -          -          -          t-2-Butene
 5.386 BB      1.16287e-1 3.26200e-1 3.79329e-2          1-Butene
 5.496 BB      8.09781e-2 3.31334e-1 2.68308e-2          i-Butene
 5.548           -          -          -          -          c-2-Butene
 5.600           -          -          -          -          i-Pentane
 5.658           -          -          -          -          n-Pentane
 5.942           -          -          -          -          1,3-Butadiene
 6.615 BB      3.06673e-2 2.30048e-1 7.05496e-3          Hexane
=====

```

Totals : 6.84278e-1

Uncalibrated Peaks : using compound Propane

```

RetTime  Type      Area      Amt/Area   Amount   Grp   Name
 [min]   [pA*s]          [ppmv]
-----|-----|-----|-----|-----|---|-----
 6.269 BB      4.61785e-2 4.34024e-1 2.00425e-2          ?
 7.085 BB      5.39747e-2 4.34024e-1 2.34263e-2          ?
 7.258 BB      5.57489e-2 4.34024e-1 2.41963e-2          ?
=====

```

Uncalib. totals : 6.76651e-2

2 Warnings or Errors :

Warning : Calibration warnings (see calibration table listing)

Warning : Calibrated compound(s) not found

```

=====
*** End of Report ***
=====

```

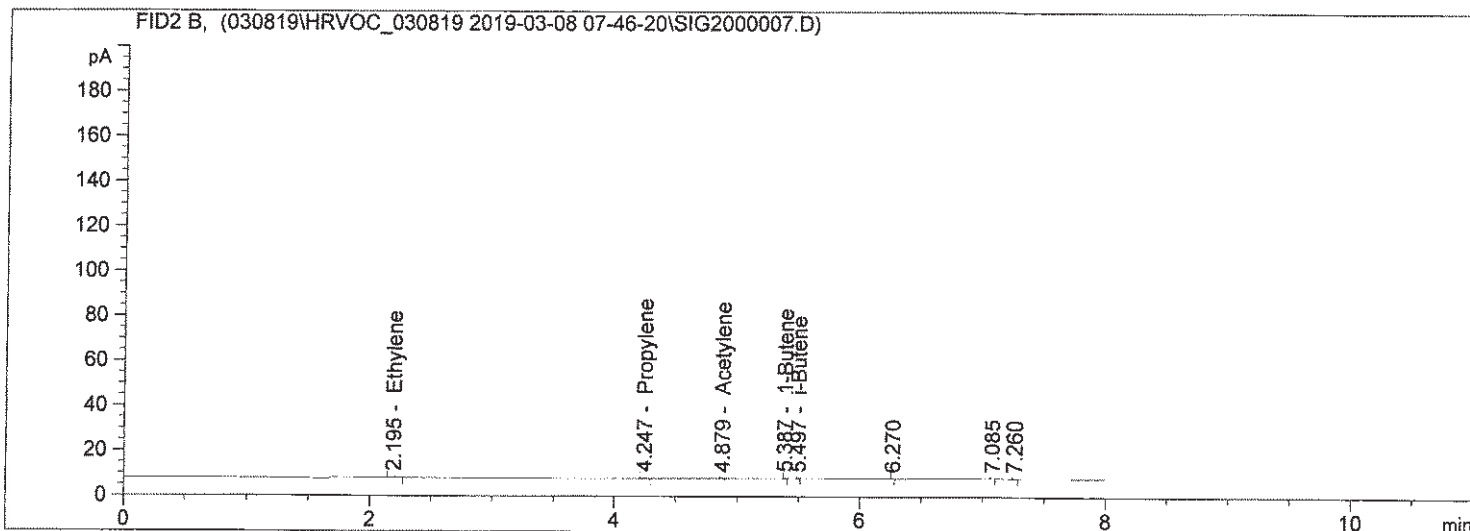
```

=====
Acq. Operator   : dyeddula                      Seq. Line :    4
Acq. Instrument : GC#1                          Location  : Vial 5
Injection Date  : 3/8/2019 9:13:50 AM           Inj       :    1
                                                Inj Volume: Manually

Acq. Method     : C:\CHEM32\1\DATA\030819\HRVOC_030819 2019-03-08 07-46-20\ALKANES_HRVOC_
M18_091117.M
Last changed    : 3/8/2019 7:11:23 AM by dyeddula
Analysis Method : C:\CHEM32\1\METHODS\ALKANES_HRVOC_M18_091117.M
Last changed    : 3/8/2019 10:09:59 AM by dyeddula
                 (modified after loading)

Method Info     : HRVOC

Sample Info     : GSL_190244-002
                 Method:18
=====
  
```



External Standard Report

```

Sorted By      : Signal
Calib. Data Modified : 3/7/2019 1:49:13 PM
Multiplier:    : 1.0000
Dilution:     : 1.0000
Use Multiplier & Dilution Factor with ISTDs
  
```

Signal 1: FID2 B,

RetTime [min]	Type	Area [pA*s]	Amt/Area	Amount [ppmv]	Grp	Name
1.689		-	-	-		Methane
1.842		-	-	-		Ethane
2.195	BB	8.77688e-1	6.45663e-1	5.66691e-1		Ethylene
2.664		-	-	-		Propane
4.247	BB	4.73207e-1	4.30557e-1	2.03743e-1		Propylene
4.400		-	-	-		i-Butane
4.550		-	-	-		n-Butane
4.879	BB	1.18068e-1	6.47127e-1	7.64047e-2		Acetylene

Handwritten signature/initials

Sample Name: GSL_190244-002

```

=====
Acq. Operator   : dyeddula                      Seq. Line :    4
Acq. Instrument : GC#1                          Location  : Vial 5
Injection Date  : 3/8/2019 9:13:50 AM          Inj       :    1
                                                Inj Volume: Manually

Acq. Method     : C:\CHEM32\1\DATA\030819\HRVOC_030819 2019-03-08 07-46-20\ALKANES_HRVOC_
                M18_091117.M
Last changed    : 3/8/2019 7:11:23 AM by dyeddula
Analysis Method : C:\CHEM32\1\METHODS\ALKANES_HRVOC_M18_091117.M
Last changed    : 3/8/2019 10:09:59 AM by dyeddula
                (modified after loading)
Method Info     : HRVOC

Sample Info     : GSL_190244-002
                Method:18
=====

```

```

=====
RetTime  Type      Area      Amt/Area   Amount   Grp   Name
 [min]   [pA*s]          [ppmv]
-----|-----|-----|-----|-----|-----|-----
5.310    -            -            -            -        -        t-2-Butene
5.387 BB   1.60604e-1  3.26200e-1  5.23890e-2  -        -        1-Butene
5.497 BB   1.15273e-1  3.31334e-1  3.81939e-2  -        -        i-Butene
5.548    -            -            -            -        -        c-2-Butene
5.600    -            -            -            -        -        i-Pentane
5.658    -            -            -            -        -        n-Pentane
5.942    -            -            -            -        -        1,3-Butadiene
6.610    -            -            -            -        -        Hexane
=====

```

Totals : 9.37421e-1

Uncalibrated Peaks : using compound Propane

```

RetTime  Type      Area      Amt/Area   Amount   Grp   Name
 [min]   [pA*s]          [ppmv]
-----|-----|-----|-----|-----|-----|-----
6.270 BB   8.68791e-2  4.34024e-1  3.77076e-2  -        -        ?
7.085 BB   9.03851e-2  4.34024e-1  3.92293e-2  -        -        ?
7.260 BB   6.94705e-2  4.34024e-1  3.01518e-2  -        -        ?
=====

```

Uncalib. totals : 1.07089e-1

2 Warnings or Errors :

Warning : Calibration warnings (see calibration table listing)
Warning : Calibrated compound(s) not found

```

=====
*** End of Report ***
=====

```

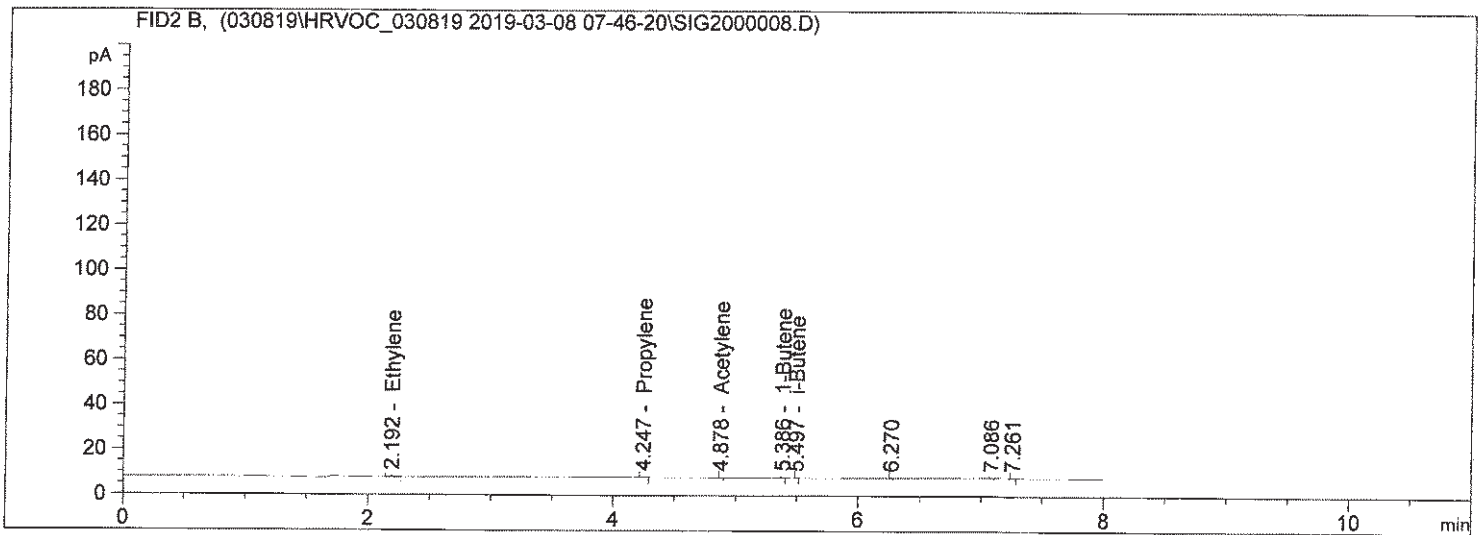
Sample Name: GSL_190244-002

```

=====
Acq. Operator   : dyeddula                      Seq. Line :    4
Acq. Instrument : GC#1                          Location  : Vial 5
Injection Date  : 3/8/2019 9:30:45 AM           Inj       :    2
                                                    Inj Volume: Manually

Acq. Method     : C:\CHEM32\1\DATA\030819\HRVOC_030819 2019-03-08 07-46-20\ALKANES_HRVOC_
                  M18_091117.M
Last changed    : 3/8/2019 7:11:23 AM by dyeddula
Analysis Method : C:\CHEM32\1\METHODS\ALKANES_HRVOC_M18_091117.M
Last changed    : 3/8/2019 10:09:59 AM by dyeddula
                  (modified after loading)
Method Info     : HRVOC

Sample Info     : GSL_190244-002
                  Method:18
=====
    
```



External Standard Report

```

Sorted By           : Signal
Calib. Data Modified : 3/7/2019 1:49:13 PM
Multiplier          : 1.0000
Dilution            : 1.0000
Use Multiplier & Dilution Factor with ISTDs
    
```

Signal 1: FID2 B,

RetTime [min]	Type	Area [pA*s]	Amt/Area	Amount [ppmv]	Grp	Name
1.689		-	-	-		Methane
1.842		-	-	-		Ethane
2.192	BB	9.21268e-1	6.45663e-1	5.94829e-1		Ethylene
2.664		-	-	-		Propane
4.247	BB	4.85633e-1	4.30557e-1	2.09092e-1		Propylene
4.400		-	-	-		i-Butane
4.550		-	-	-		n-Butane
4.878	BB	1.23309e-1	6.47127e-1	7.97966e-2		Acetylene

Handwritten signature

```
=====
Acq. Operator   : dyeddula                      Seq. Line :    4
Acq. Instrument : GC#1                          Location  : Vial 5
Injection Date  : 3/8/2019 9:30:45 AM           Inj       :    2
                                                Inj Volume: Manually

Acq. Method     : C:\CHEM32\1\DATA\030819\HRVOC_030819 2019-03-08 07-46-20\ALKANES_HRVOC_
                M18_091117.M
Last changed    : 3/8/2019 7:11:23 AM by dyeddula
Analysis Method : C:\CHEM32\1\METHODS\ALKANES_HRVOC_M18_091117.M
Last changed    : 3/8/2019 10:09:59 AM by dyeddula
                (modified after loading)
Method Info     : HRVOC

Sample Info     : GSL_190244-002
                Method:18
=====
```

RetTime [min]	Type	Area [pA*s]	Amt/Area	Amount [ppmv]	Grp	Name
5.310		-	-	-		t-2-Butene
5.386	BB	1.49614e-1	3.26200e-1	4.88039e-2		1-Butene
5.497	BB	1.28075e-1	3.31334e-1	4.24355e-2		i-Butene
5.548		-	-	-		c-2-Butene
5.600		-	-	-		i-Pentane
5.658		-	-	-		n-Pentane
5.942		-	-	-		1,3-Butadiene
6.610		-	-	-		Hexane

Totals : 9.74958e-1

Uncalibrated Peaks : using compound Propane

RetTime [min]	Type	Area [pA*s]	Amt/Area	Amount [ppmv]	Grp	Name
6.270	BB	8.33632e-2	4.34024e-1	3.61816e-2		?
7.086	BB	7.51245e-2	4.34024e-1	3.26058e-2		?
7.261	BB	7.45070e-2	4.34024e-1	3.23378e-2		?

Uncalib. totals : 1.01125e-1

2 Warnings or Errors :

Warning : Calibration warnings (see calibration table listing)
 Warning : Calibrated compound(s) not found

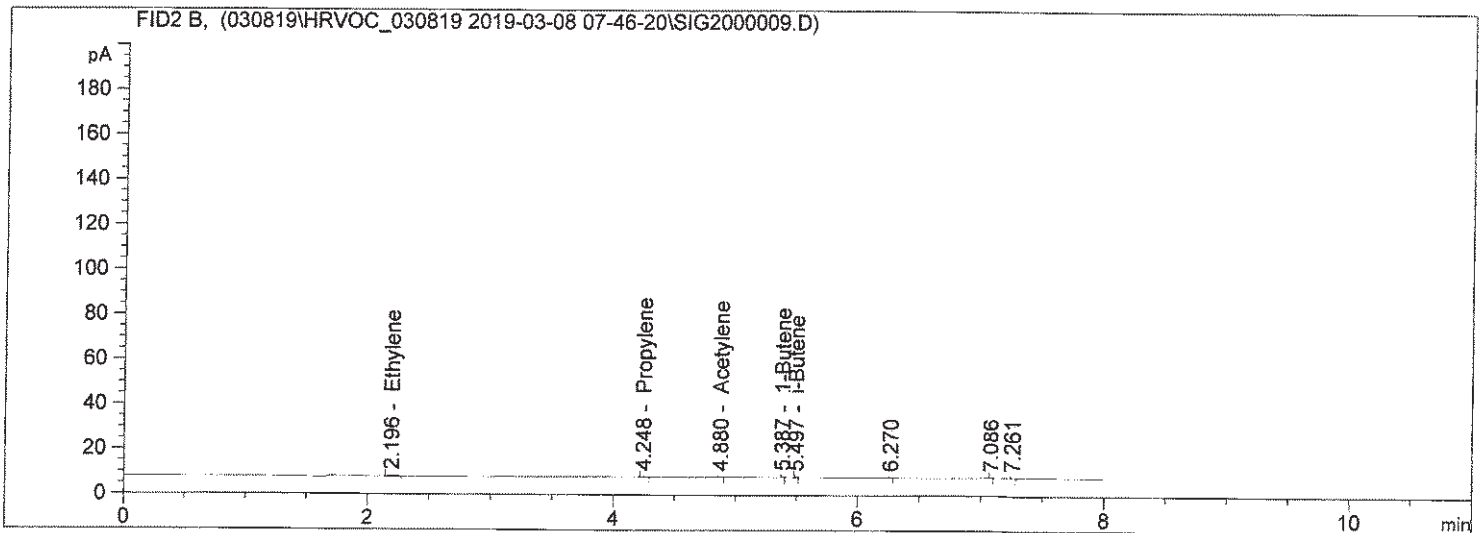
*** End of Report ***

```

=====
Acq. Operator   : dyeddula                      Seq. Line :    4
Acq. Instrument : GC#1                          Location  : Vial 5
Injection Date  : 3/8/2019 9:47:26 AM           Inj       :    3
                                                    Inj Volume: Manually

Acq. Method     : C:\CHEM32\1\DATA\030819\HRVOC_030819 2019-03-08 07-46-20\ALKANES_HRVOC_
                  M18_091117.M
Last changed    : 3/8/2019 7:11:23 AM by dyeddula
Analysis Method : C:\CHEM32\1\METHODS\ALKANES_HRVOC_M18_091117.M
Last changed    : 3/8/2019 10:09:59 AM by dyeddula
                  (modified after loading)
Method Info     : HRVOC

Sample Info     : GSL_190244-002
                  Method:18
=====
  
```



External Standard Report

```

Sorted By      : Signal
Calib. Data Modified : 3/7/2019 1:49:13 PM
Multiplier:    : 1.0000
Dilution:      : 1.0000
Use Multiplier & Dilution Factor with ISTDs
  
```

Signal 1: FID2 B,

RetTime [min]	Type	Area [pA*s]	Amt/Area	Amount [ppmv]	Grp	Name
1.689		-	-	-		Methane
1.842		-	-	-		Ethane
2.196	BB	8.93420e-1	6.45663e-1	5.76849e-1		Ethylene
2.664		-	-	-		Propane
4.248	BB	5.01719e-1	4.30557e-1	2.16019e-1		Propylene
4.400		-	-	-		i-Butane
4.550		-	-	-		n-Butane
4.880	BB	1.04319e-1	6.47127e-1	6.75073e-2		Acetylene

Handwritten signature/initials

```

=====
Acq. Operator   : dyeddula                      Seq. Line :    4
Acq. Instrument : GC#1                          Location  : Vial 5
Injection Date  : 3/8/2019 9:47:26 AM           Inj       :    3
                                                Inj Volume: Manually
Acq. Method     : C:\CHEM32\1\DATA\030819\HRVOC_030819 2019-03-08 07-46-20\ALKANES_HRVOC_
M18_091117.M
Last changed    : 3/8/2019 7:11:23 AM by dyeddula
Analysis Method : C:\CHEM32\1\METHODS\ALKANES_HRVOC_M18_091117.M
Last changed    : 3/8/2019 10:09:59 AM by dyeddula
                 (modified after loading)
Method Info     : HRVOC

Sample Info     : GSL_190244-002
                 Method:18
=====
  
```

RetTime [min]	Type	Area [pA*s]	Amt/Area	Amount [ppmv]	Grp	Name
5.310		-	-	-		t-2-Butene
5.387	BB	1.46714e-1	3.26200e-1	4.78581e-2		1-Butene
5.497	BB	1.19885e-1	3.31334e-1	3.97218e-2		i-Butene
5.548		-	-	-		c-2-Butene
5.600		-	-	-		i-Pentane
5.658		-	-	-		n-Pentane
5.942		-	-	-		1,3-Butadiene
6.610		-	-	-		Hexane

Totals : 9.47954e-1

Uncalibrated Peaks : using compound Propane

RetTime [min]	Type	Area [pA*s]	Amt/Area	Amount [ppmv]	Grp	Name
6.270	BB	9.93451e-2	4.34024e-1	4.31181e-2	?	
7.086	BB	8.71602e-2	4.34024e-1	3.78296e-2	?	
7.261	BB	8.61380e-2	4.34024e-1	3.73859e-2	?	

Uncalib. totals : 1.18334e-1

2 Warnings or Errors :

Warning : Calibration warnings (see calibration table listing)
 Warning : Calibrated compound(s) not found

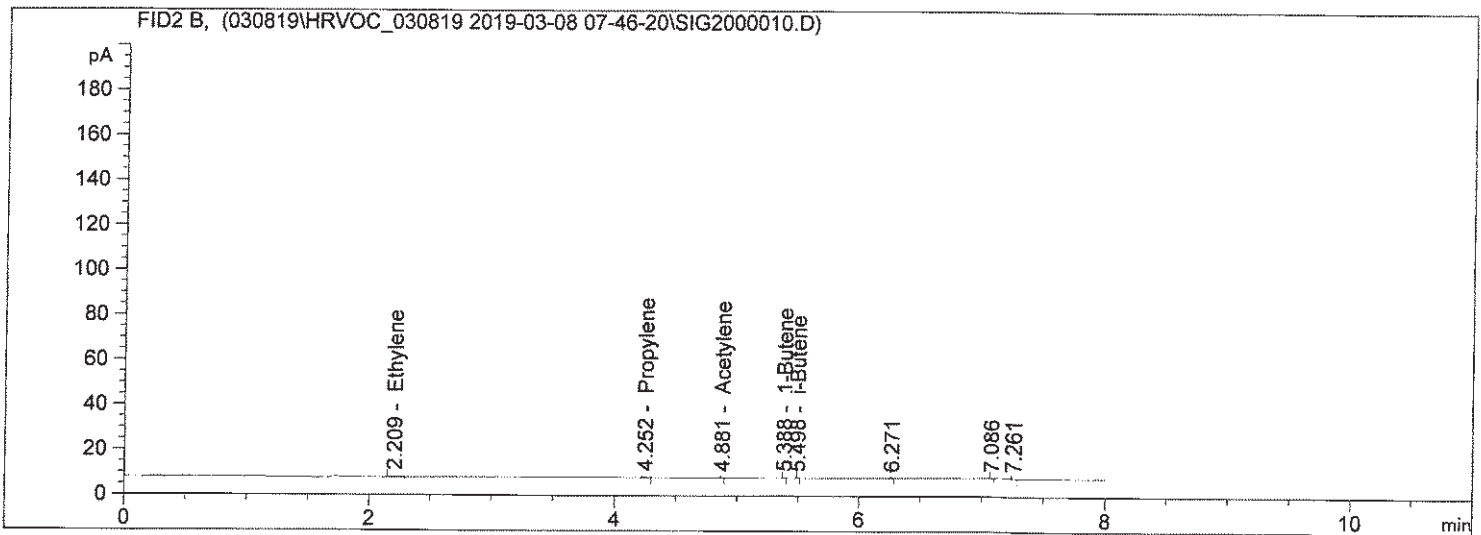
*** End of Report ***


```

=====
Acq. Operator   : dyeddula                      Seq. Line :    5
Acq. Instrument : GC#1                          Location  : Vial 6
Injection Date  : 3/8/2019 10:04:01 AM          Inj       :    1
                                                Inj Volume: Manually

Acq. Method     : C:\CHEM32\1\DATA\030819\HRVOC_030819 2019-03-08 07-46-20\ALKANES_HRVOC_
                  M18_091117.M
Last changed    : 3/8/2019 7:11:23 AM by dyeddula
Analysis Method : C:\CHEM32\1\METHODS\ALKANES_HRVOC_M18_091117.M
Last changed    : 3/8/2019 10:09:59 AM by dyeddula
                  (modified after loading)
Method Info     : HRVOC

Sample Info     : GSL_190244-003
                  Method:18
=====
  
```



External Standard Report

```

Sorted By      : Signal
Calib. Data Modified : 3/7/2019 1:49:13 PM
Multiplier:    : 1.0000
Dilution:      : 1.0000
Use Multiplier & Dilution Factor with ISTDs
  
```

Signal 1: FID2 B,

RetTime [min]	Type	Area [pA*s]	Amt/Area	Amount [ppmv]	Grp	Name
1.689		-	-	-		Methane
1.842		-	-	-		Ethane
2.209	BB	9.29423e-1	6.45663e-1	6.00094e-1		Ethylene
2.664		-	-	-		Propane
4.252	BB	5.16407e-1	4.30557e-1	2.22342e-1		Propylene
4.400		-	-	-		i-Butane
4.550		-	-	-		n-Butane
4.881	BB	1.06906e-1	6.47127e-1	6.91819e-2		Acetylene

Handwritten signature/initials

Sample Name: GSL_190244-003

```

=====
Acq. Operator   : dyeddula                      Seq. Line :    5
Acq. Instrument : GC#1                          Location  : Vial 6
Injection Date  : 3/8/2019 10:04:01 AM          Inj       :    1
                                                Inj Volume: Manually

Acq. Method     : C:\CHEM32\1\DATA\030819\HRVOC_030819 2019-03-08 07-46-20\ALKANES_HRVOC_
                  M18_091117.M
Last changed    : 3/8/2019 7:11:23 AM by dyeddula
Analysis Method : C:\CHEM32\1\METHODS\ALKANES_HRVOC_M18_091117.M
Last changed    : 3/8/2019 10:09:59 AM by dyeddula
                  (modified after loading)
Method Info     : HRVOC

Sample Info     : GSL_190244-003
                  Method:18
=====
    
```

RetTime [min]	Type	Area [pA*s]	Amt/Area	Amount [ppmv]	Grp	Name
5.310		-	-	-		t-2-Butene
5.388	BB	1.61806e-1	3.26200e-1	5.27810e-2		1-Butene
5.498	BB	1.19355e-1	3.31334e-1	3.95462e-2		i-Butene
5.548		-	-	-		c-2-Butene
5.600		-	-	-		i-Pentane
5.658		-	-	-		n-Pentane
5.942		-	-	-		1,3-Butadiene
6.610		-	-	-		Hexane

Totals : 9.83946e-1

Uncalibrated Peaks : using compound Propane

RetTime [min]	Type	Area [pA*s]	Amt/Area	Amount [ppmv]	Grp	Name
6.271	BB	9.18005e-2	4.34024e-1	3.98436e-2		?
7.086	BB	8.02730e-2	4.34024e-1	3.48404e-2		?
7.261	BB	8.20168e-2	4.34024e-1	3.55972e-2		?

Uncalib. totals : 1.10281e-1

2 Warnings or Errors :

Warning : Calibration warnings (see calibration table listing)
 Warning : Calibrated compound(s) not found

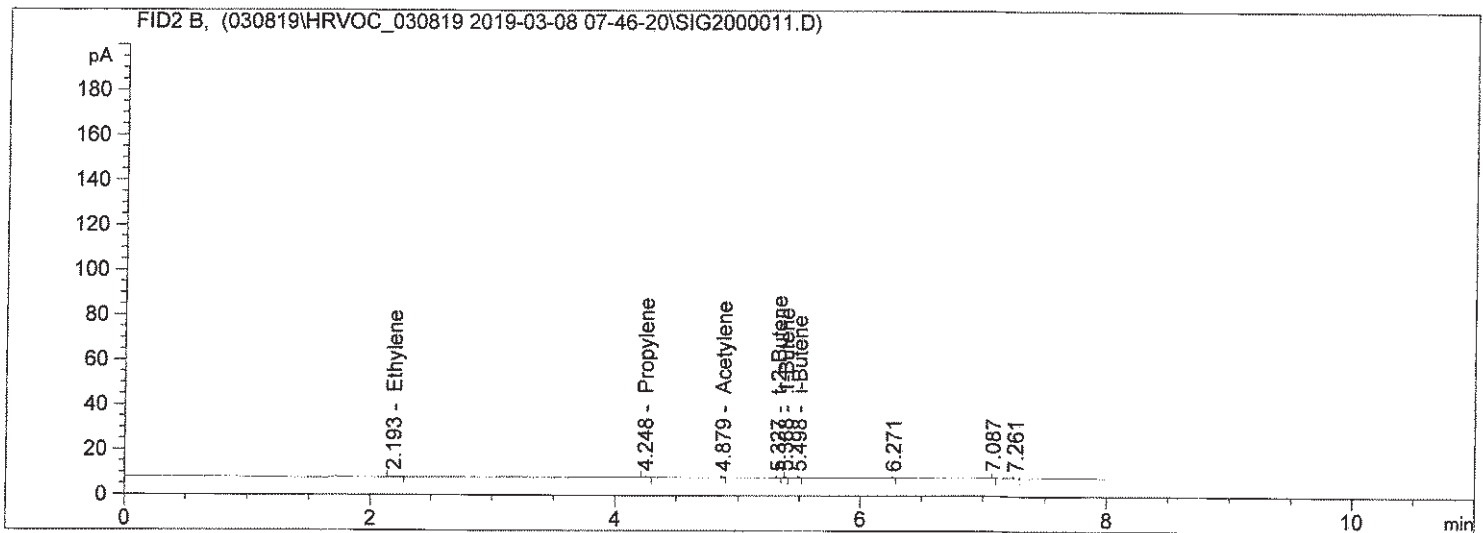
*** End of Report ***

```

=====
Acq. Operator   : dyeddula                      Seq. Line :    5
Acq. Instrument : GC#1                          Location  : Vial 6
Injection Date  : 3/8/2019 10:20:40 AM          Inj       :    2
                                                    Inj Volume: Manually

Acq. Method     : C:\CHEM32\1\DATA\030819\HRVOC_030819 2019-03-08 07-46-20\ALKANES_HRVOC_
                  M18_091117.M
Last changed    : 3/8/2019 7:11:23 AM by dyeddula
Analysis Method : C:\CHEM32\1\METHODS\ALKANES_HRVOC_M18_091117.M
Last changed    : 3/8/2019 10:09:59 AM by dyeddula
                  (modified after loading)
Method Info     : HRVOC

Sample Info     : GSL_190244-003
                  Method:18
=====
  
```



External Standard Report

```

Sorted By           : Signal
Calib. Data Modified : 3/7/2019 1:49:13 PM
Multiplier:         : 1.0000
Dilution:           : 1.0000
Use Multiplier & Dilution Factor with ISTDs
  
```

Signal 1: FID2 B,

RetTime [min]	Type	Area [pA*s]	Amt/Area	Amount [ppmv]	Grp	Name
1.689		-	-	-		Methane
1.842		-	-	-		Ethane
2.193	BB	1.03737	6.45663e-1	6.69794e-1		Ethylene
2.664		-	-	-		Propane
4.248	BB	5.71797e-1	4.30557e-1	2.46191e-1		Propylene
4.400		-	-	-		i-Butane
4.550		-	-	-		n-Butane
4.879	BB	1.36723e-1	6.47127e-1	8.84773e-2		Acetylene

Handwritten signature: 3/8/2019

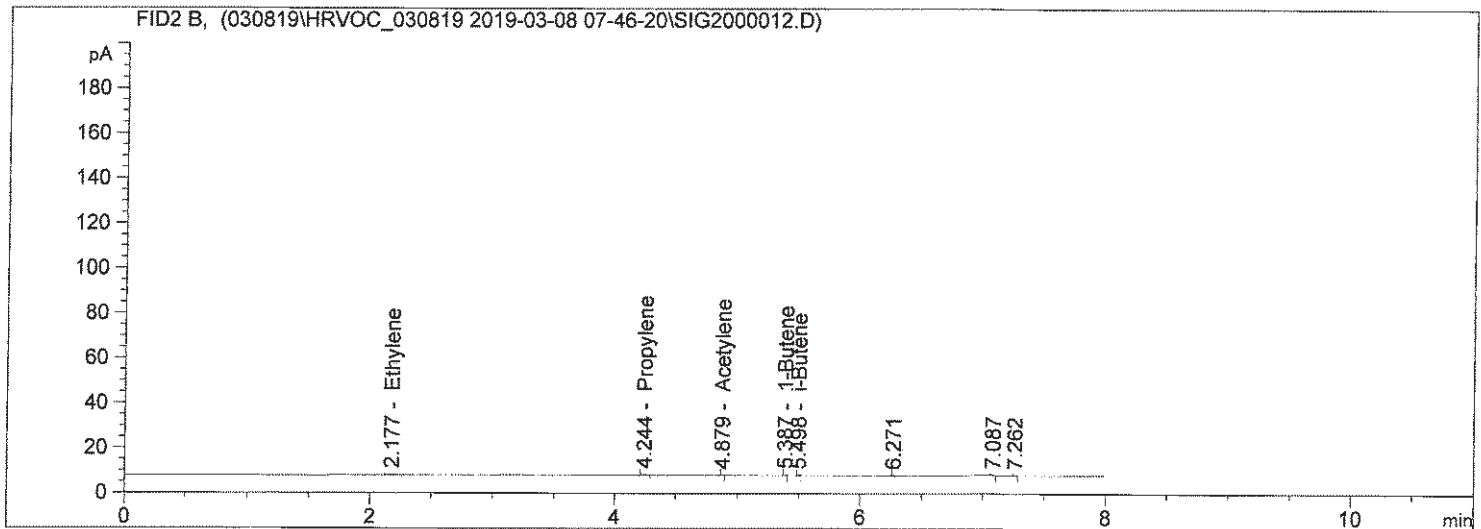
Sample Name: GSL_190244-003

```

=====
Acq. Operator   : dyeddula                      Seq. Line :    5
Acq. Instrument : GC#1                          Location  : Vial 6
Injection Date  : 3/8/2019 10:37:29 AM          Inj       :    3
                                                    Inj Volume: Manually

Acq. Method     : C:\CHEM32\1\DATA\030819\HRVOC_030819 2019-03-08 07-46-20\ALKANES_HRVOC_
M18_091117.M
Last changed    : 3/8/2019 7:11:23 AM by dyeddula
Analysis Method : C:\CHEM32\1\METHODS\ALKANES_HRVOC_M18_091117.M
Last changed    : 3/8/2019 10:09:59 AM by dyeddula
                (modified after loading)
Method Info     : HRVOC

Sample Info     : GSL_190244-003
                Method:18
=====
    
```



External Standard Report

```

Sorted By           : Signal
Calib. Data Modified : 3/7/2019 1:49:13 PM
Multiplier:         : 1.0000
Dilution:           : 1.0000
Use Multiplier & Dilution Factor with ISTDs
    
```

Signal 1: FID2 B,

RetTime [min]	Type	Area [pA*s]	Amt/Area	Amount [ppmv]	Grp	Name
1.689		-	-	-		Methane
1.842		-	-	-		Ethane
2.177	BB	9.63394e-1	6.45663e-1	6.22028e-1		Ethylene
2.664		-	-	-		Propane
4.244	BB	5.36432e-1	4.30557e-1	2.30964e-1		Propylene
4.400		-	-	-		i-Butane
4.550		-	-	-		n-Butane
4.879	BB	1.05357e-1	6.47127e-1	6.81793e-2		Acetylene

Handwritten signature/initials

Sample Name: GSL_190244-004

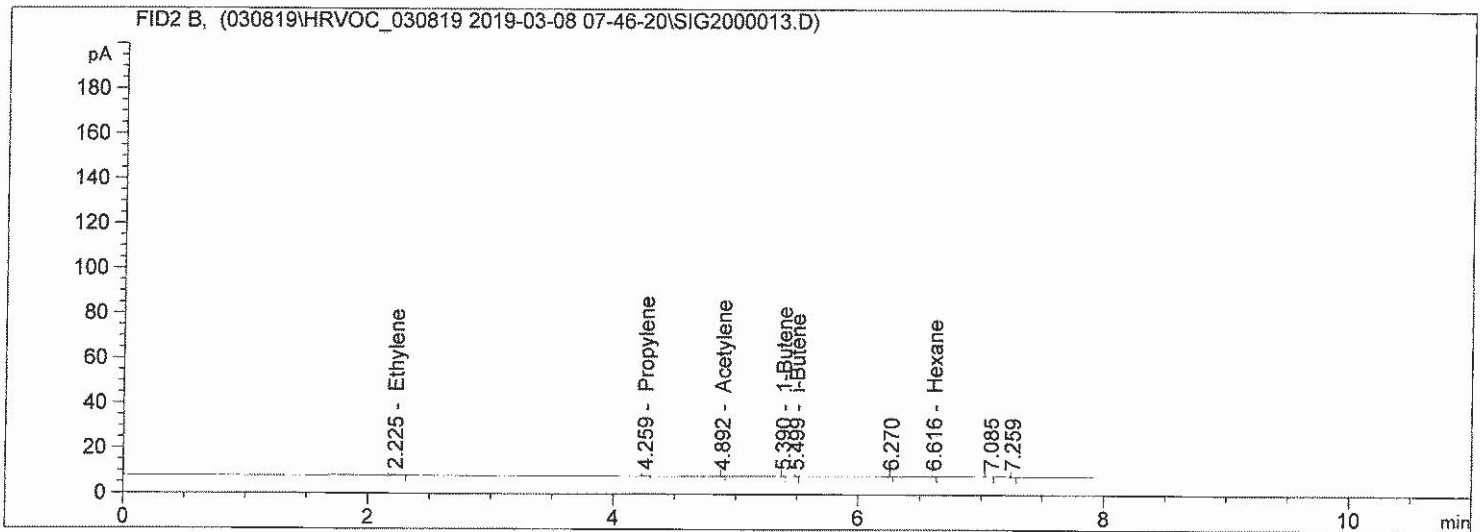
```

=====
Acq. Operator   : dyeddula                      Seq. Line :    6
Acq. Instrument : GC#1                          Location  : Vial 7
Injection Date  : 3/8/2019 10:54:05 AM          Inj       :    1
                                                Inj Volume: Manually

Acq. Method     : C:\CHEM32\1\DATA\030819\HRVOC_030819 2019-03-08 07-46-20\ALKANES_HRVOC_
M18_091117.M
Last changed    : 3/8/2019 7:11:23 AM by dyeddula
Analysis Method : C:\CHEM32\1\METHODS\ALKANES_HRVOC_M18_091117.M
Last changed    : 3/8/2019 12:31:43 PM by dyeddula
                 (modified after loading)

Method Info     : HRVOC

Sample Info     : GSL_190244-004
                 Method:18
=====
    
```



External Standard Report

```

Sorted By      : Signal
Calib. Data Modified : 3/7/2019 1:49:13 PM
Multiplier:    : 1.0000
Dilution:      : 1.0000
Use Multiplier & Dilution Factor with ISTDs
    
```

Signal 1: FID2 B,

RetTime [min]	Type	Area [pA*s]	Amt/Area	Amount [ppmv]	Grp	Name
1.689		-	-	-		Methane
1.842		-	-	-		Ethane
2.225	BB	4.18141e-1	6.45663e-1	2.69978e-1		Ethylene
2.664		-	-	-		Propane
4.259	BB	4.96732e-1	4.30557e-1	2.13871e-1		Propylene
4.400		-	-	-		i-Butane
4.550		-	-	-		n-Butane
4.892	BB	5.50622e-2	6.47127e-1	3.56322e-2		Acetylene

Handwritten signature/initials

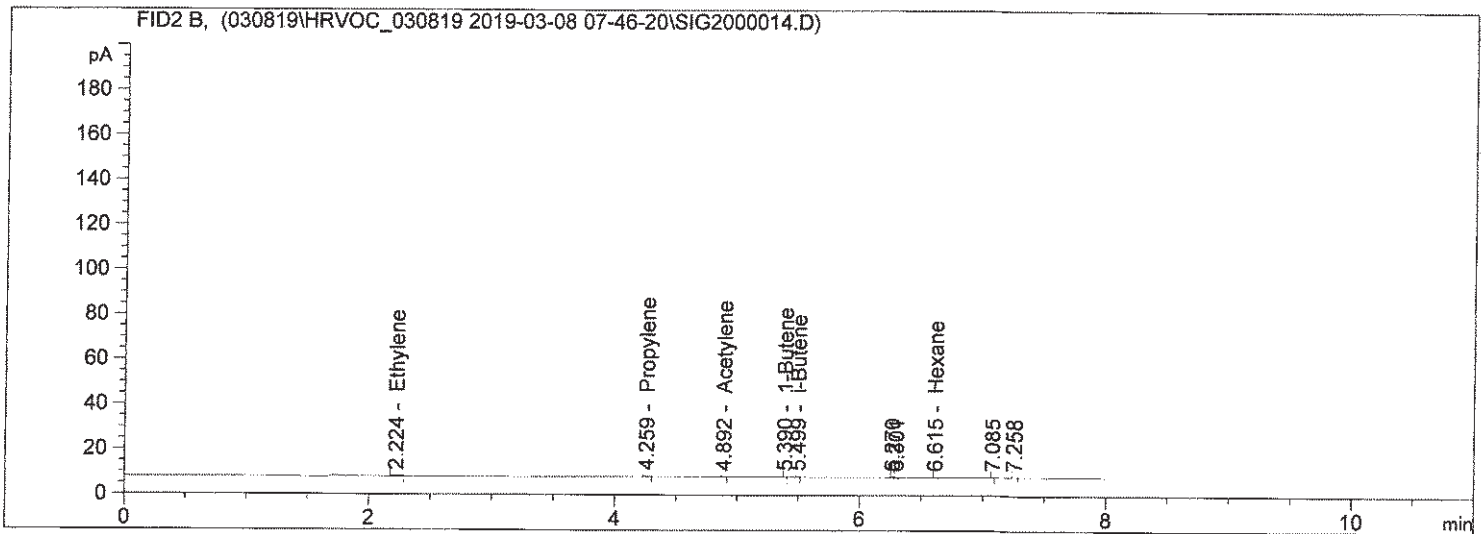

```

=====
Acq. Operator   : dyeddula                      Seq. Line :    6
Acq. Instrument : GC#1                          Location  : Vial 7
Injection Date  : 3/8/2019 11:11:00 AM          Inj       :    2
                                                Inj Volume: Manually

Acq. Method     : C:\CHEM32\1\DATA\030819\HRVOC_030819 2019-03-08 07-46-20\ALKANES_HRVOC_
M18_091117.M
Last changed    : 3/8/2019 7:11:23 AM by dyeddula
Analysis Method : C:\CHEM32\1\METHODS\ALKANES_HRVOC_M18_091117.M
Last changed    : 3/8/2019 12:31:43 PM by dyeddula
                 (modified after loading)

Method Info     : HRVOC

Sample Info     : GSL_190244-004
                 Method:18
=====
  
```



External Standard Report

```

Sorted By      : Signal
Calib. Data Modified : 3/7/2019 1:49:13 PM
Multiplier:    : 1.0000
Dilution:      : 1.0000
Use Multiplier & Dilution Factor with ISTDs
  
```

Signal 1: FID2 B,

RetTime [min]	Type	Area [pA*s]	Amt/Area	Amount [ppmv]	Grp	Name
1.689	-	-	-	-	-	Methane
1.842	-	-	-	-	-	Ethane
2.224	BB	3.89418e-1	6.45663e-1	2.51433e-1	-	Ethylene
2.664	-	-	-	-	-	Propane
4.259	BB	5.00393e-1	4.30557e-1	2.15448e-1	-	Propylene
4.400	-	-	-	-	-	i-Butane
4.550	-	-	-	-	-	n-Butane
4.892	BB	6.46557e-2	6.47127e-1	4.18404e-2	-	Acetylene

Handwritten signature/initials

Sample Name: GSL_190244-004

```

=====
Acq. Operator   : dyeddula                      Seq. Line :    6
Acq. Instrument : GC#1                          Location  : Vial 7
Injection Date  : 3/8/2019 11:11:00 AM          Inj       :    2
                                                Inj Volume: Manually
Acq. Method     : C:\CHEM32\1\DATA\030819\HRVOC_030819 2019-03-08 07-46-20\ALKANES_HRVOC_
M18_091117.M
Last changed    : 3/8/2019 7:11:23 AM by dyeddula
Analysis Method : C:\CHEM32\1\METHODS\ALKANES_HRVOC_M18_091117.M
Last changed    : 3/8/2019 12:31:43 PM by dyeddula
                (modified after loading)
Method Info     : HRVOC

Sample Info     : GSL_190244-004
                Method:18
=====

```

```

=====
RetTime  Type      Area      Amt/Area   Amount   Grp   Name
 [min]   |-----| [pA*s]   |-----| [ppmv]   |-----|
-----|-----|-----|-----|-----|-----|
5.310    |         |         |         |         |         | t-2-Butene
5.390 BB |         | 8.63841e-2 | 3.26200e-1 | 2.81785e-2 |         | 1-Butene
5.499 BB |         | 7.57431e-2 | 3.31334e-1 | 2.50962e-2 |         | i-Butene
5.548    |         |         |         |         |         | c-2-Butene
5.600    |         |         |         |         |         | i-Pentane
5.658    |         |         |         |         |         | n-Pentane
5.942    |         |         |         |         |         | 1,3-Butadiene
6.615 BB |         | 3.29181e-2 | 2.30048e-1 | 7.57275e-3 |         | Hexane
=====

```

Totals : 5.69569e-1

Uncalibrated Peaks : using compound Propane

```

RetTime  Type      Area      Amt/Area   Amount   Grp   Name
 [min]   |-----| [pA*s]   |-----| [ppmv]   |-----|
-----|-----|-----|-----|-----|-----|
6.270 BV |         | 5.23625e-2 | 4.34024e-1 | 2.27266e-2 |         | ?
6.301 VB |         | 3.86994e-2 | 4.34024e-1 | 1.67964e-2 |         | ?
7.085 BB |         | 3.56091e-2 | 4.34024e-1 | 1.54552e-2 |         | ?
7.258 BB |         | 4.24006e-2 | 4.34024e-1 | 1.84029e-2 |         | ?
=====

```

Uncalib. totals : 7.33810e-2

2 Warnings or Errors :

Warning : Calibration warnings (see calibration table listing)

Warning : Calibrated compound(s) not found

```

=====
*** End of Report ***
=====

```

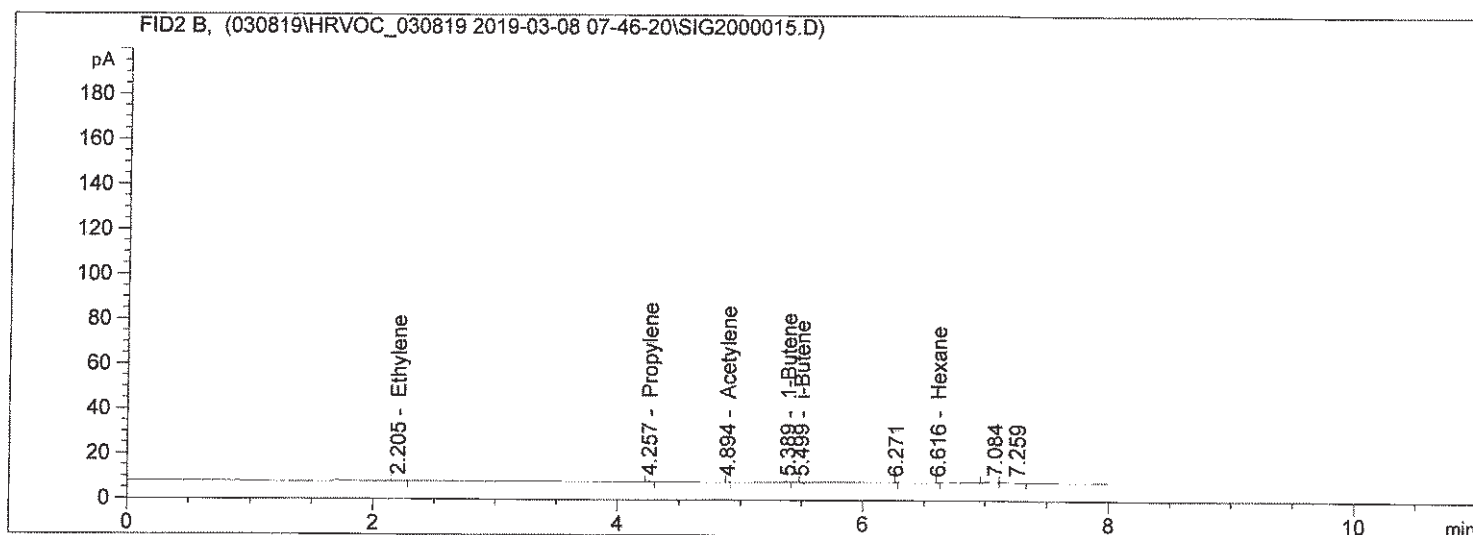
```

=====
Acq. Operator   : dyeddula                      Seq. Line :    6
Acq. Instrument : GC#1                          Location  : Vial 7
Injection Date  : 3/8/2019 11:27:31 AM          Inj       :    3
                                                Inj Volume: Manually

Acq. Method     : C:\CHEM32\1\DATA\030819\HRVOC_030819 2019-03-08 07-46-20\ALKANES_HRVOC_
M18_091117.M
Last changed    : 3/8/2019 7:11:23 AM by dyeddula
Analysis Method : C:\CHEM32\1\METHODS\ALKANES_HRVOC_M18_091117.M
Last changed    : 3/8/2019 12:32:22 PM by dyeddula
                 (modified after loading)

Method Info     : HRVOC

Sample Info     : GSL_190244-004
                 Method:18
=====
  
```



External Standard Report

```

Sorted By      : Signal
Calib. Data Modified : 3/7/2019 1:49:13 PM
Multiplier:    : 1.0000
Dilution:      : 1.0000
Use Multiplier & Dilution Factor with ISTDs
  
```

Signal 1: FID2 B,

RetTime [min]	Type	Area [pA*s]	Amt/Area	Amount [ppmv]	Grp	Name
1.689		-	-	-		Methane
1.842		-	-	-		Ethane
2.205	BB	2.34359e-1	6.45663e-1	1.51317e-1		Ethylene
2.664		-	-	-		Propane
4.257	BB	4.27544e-1	4.30557e-1	1.84082e-1		Propylene
4.400		-	-	-		i-Butane
4.550		-	-	-		n-Butane
4.894	BB	3.59252e-2	6.47127e-1	2.32481e-2		Acetylene

257149

```

=====
Acq. Operator   : dyeddula                      Seq. Line :    6
Acq. Instrument : GC#1                          Location  : Vial 7
Injection Date  : 3/8/2019 11:27:31 AM          Inj       :    3
                                                Inj Volume: Manually
Acq. Method     : C:\CHEM32\1\DATA\030819\HRVOC_030819 2019-03-08 07-46-20\ALKANES_HRVOC_
                  M18_091117.M
Last changed    : 3/8/2019 7:11:23 AM by dyeddula
Analysis Method : C:\CHEM32\1\METHODS\ALKANES_HRVOC_M18_091117.M
Last changed    : 3/8/2019 12:32:22 PM by dyeddula
                  (modified after loading)
Method Info     : HRVOC

Sample Info     : GSL_190244-004
                  Method:18
=====
  
```

RetTime [min]	Type	Area [pA*s]	Amt/Area	Amount [ppmv]	Grp	Name
5.310		-	-	-		t-2-Butene
5.389	BB	5.76434e-2	3.26200e-1	1.88033e-2		1-Butene
5.499	BB	4.99210e-2	3.31334e-1	1.65405e-2		i-Butene
5.548		-	-	-		c-2-Butene
5.600		-	-	-		i-Pentane
5.658		-	-	-		n-Pentane
5.942		-	-	-		1,3-Butadiene
6.616	BB	3.39763e-2	2.30048e-1	7.81620e-3		Hexane

Totals : 4.01807e-1

Uncalibrated Peaks : using compound Propane

RetTime [min]	Type	Area [pA*s]	Amt/Area	Amount [ppmv]	Grp	Name
6.271	BB	3.13238e-2	4.34024e-1	1.35953e-2	?	
7.084	BV	2.03423e-1	4.34024e-1	8.82905e-2	?	
7.259	VB	1.50366e-1	4.34024e-1	6.52622e-2	?	

Uncalib. totals : 1.67148e-1

2 Warnings or Errors :

Warning : Calibration warnings (see calibration table listing)
 Warning : Calibrated compound(s) not found

*** End of Report ***

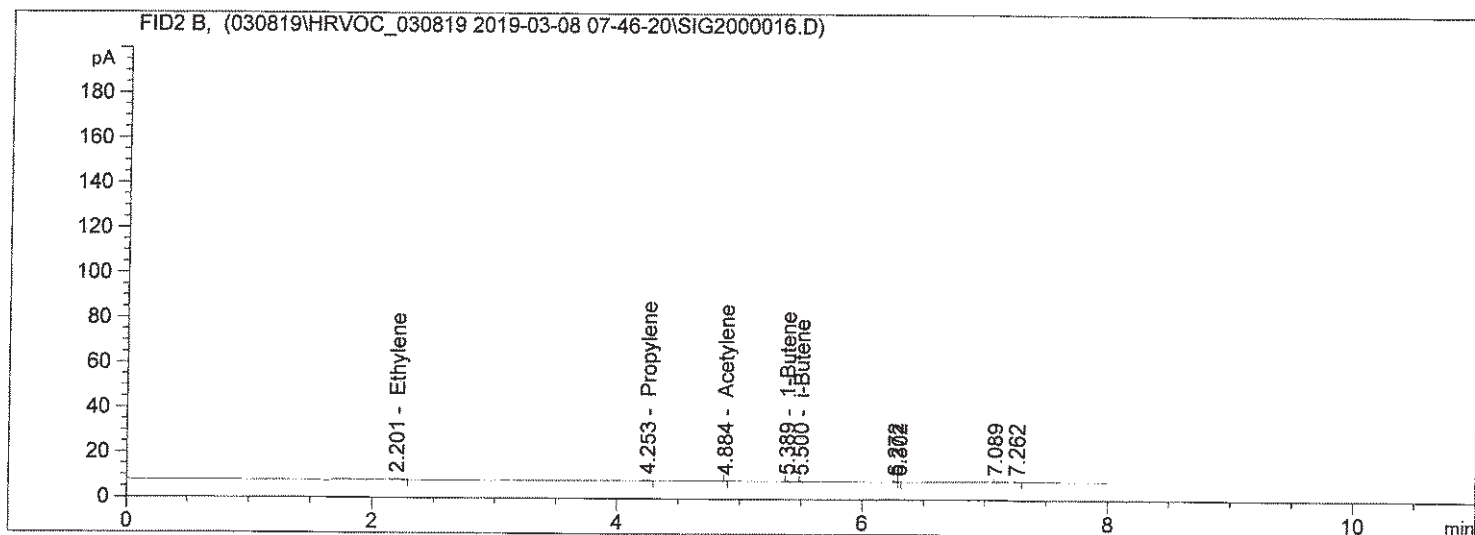
```

=====
Acq. Operator   : dyeddula                      Seq. Line :    7
Acq. Instrument : GC#1                          Location  : Vial 8
Injection Date  : 3/8/2019 11:44:17 AM          Inj       :    1
                                                Inj Volume: Manually

Acq. Method     : C:\CHEM32\1\DATA\030819\HRVOC_030819 2019-03-08 07-46-20\ALKANES_HRVOC_
M18_091117.M
Last changed    : 3/8/2019 7:11:23 AM by dyeddula
Analysis Method : C:\CHEM32\1\METHODS\ALKANES_HRVOC_M18_091117.M
Last changed    : 3/8/2019 12:32:43 PM by dyeddula
                 (modified after loading)

Method Info     : HRVOC

Sample Info     : GSL_190247-001
                 Method:18
=====
  
```



External Standard Report

```

Sorted By      : Signal
Calib. Data Modified : 3/7/2019 1:49:13 PM
Multiplier:    : 1.0000
Dilution:     : 1.0000
Use Multiplier & Dilution Factor with ISTDs
  
```

Signal 1: FID2 B,

RetTime [min]	Type	Area [pA*s]	Amt/Area	Amount [ppmv]	Grp	Name
1.689		-	-	-		Methane
1.842		-	-	-		Ethane
2.201	BB	1.05492	6.45663e-1	6.81120e-1		Ethylene
2.664		-	-	-		Propane
4.253	BB	4.89260e-1	4.30557e-1	2.10654e-1		Propylene
4.400		-	-	-		i-Butane
4.550		-	-	-		n-Butane
4.884	BB	1.50667e-1	6.47127e-1	9.75009e-2		Acetylene

Handwritten signature/initials

Sample Name: GSL_190247-001

```

=====
Acq. Operator   : dyeddula                      Seq. Line :    7
Acq. Instrument : GC#1                          Location  : Vial 8
Injection Date  : 3/8/2019 11:44:17 AM          Inj       :    1
                                                Inj Volume: Manually
Acq. Method     : C:\CHEM32\1\DATA\030819\HRVOC_030819 2019-03-08 07-46-20\ALKANES_HRVOC_
                M18_091117.M
Last changed    : 3/8/2019 7:11:23 AM by dyeddula
Analysis Method : C:\CHEM32\1\METHODS\ALKANES_HRVOC_M18_091117.M
Last changed    : 3/8/2019 12:32:43 PM by dyeddula
                (modified after loading)
Method Info     : HRVOC

Sample Info     : GSL_190247-001
                Method:18
=====

```

```

=====
RetTime  Type      Area      Amt/Area   Amount   Grp   Name
 [min]   [pA*s]         [ppmv]
-----|-----|-----|-----|-----|---|-----
 5.310   -            -          -          -          -    t-2-Butene
 5.389 BB    1.57885e-1  3.26200e-1  5.15019e-2  1-Butene
 5.500 BB    1.22085e-1  3.31334e-1  4.04509e-2  i-Butene
 5.548   -            -          -          -          -    c-2-Butene
 5.600   -            -          -          -          -    i-Pentane
 5.658   -            -          -          -          -    n-Pentane
 5.942   -            -          -          -          -    1,3-Butadiene
 6.610   -            -          -          -          -    Hexane

```

Totals : 1.08123

Uncalibrated Peaks : using compound Propane

```

RetTime  Type      Area      Amt/Area   Amount   Grp   Name
 [min]   [pA*s]         [ppmv]
-----|-----|-----|-----|-----|---|-----
 6.272 BV    1.02798e-1  4.34024e-1  4.46166e-2  ?
 6.302 VB    3.06082e-2  4.34024e-1  1.32847e-2  ?
 7.089 BB    7.30264e-2  4.34024e-1  3.16952e-2  ?
 7.262 BB    7.52568e-2  4.34024e-1  3.26632e-2  ?

```

Uncalib. totals : 1.22260e-1

2 Warnings or Errors :

Warning : Calibration warnings (see calibration table listing)
Warning : Calibrated compound(s) not found

```

=====
*** End of Report ***
=====

```

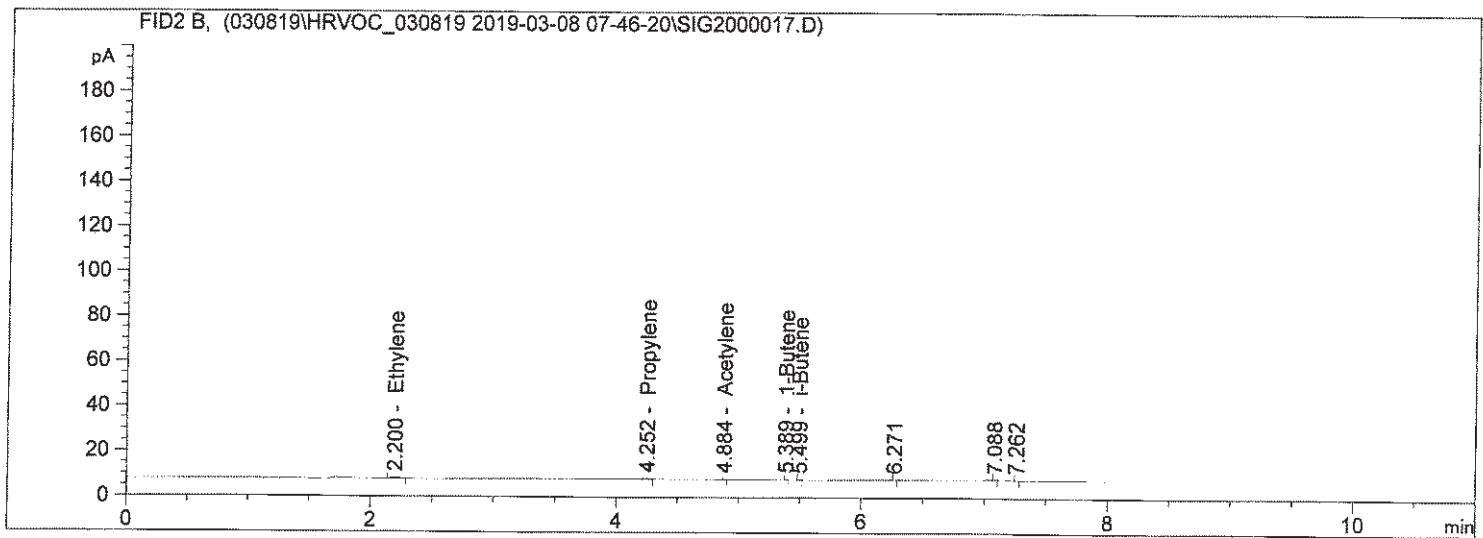
```

=====
Acq. Operator   : dyeddula                      Seq. Line :    7
Acq. Instrument : GC#1                          Location  : Vial 8
Injection Date  : 3/8/2019 12:00:57 PM          Inj       :    2
                                           Inj Volume: Manually

Acq. Method     : C:\CHEM32\1\DATA\030819\HRVOC_030819 2019-03-08 07-46-20\ALKANES_HRVOC_
                  M18_091117.M
Last changed    : 3/8/2019 7:11:23 AM by dyeddula
Analysis Method : C:\CHEM32\1\METHODS\ALKANES_HRVOC_M18_091117.M
Last changed    : 3/8/2019 12:32:43 PM by dyeddula
                  (modified after loading)

Method Info     : HRVOC

Sample Info     : GSL_190247-001
                  Method:18
=====
  
```



External Standard Report

```

Sorted By      : Signal
Calib. Data Modified : 3/7/2019 1:49:13 PM
Multiplier:    : 1.0000
Dilution:      : 1.0000
Use Multiplier & Dilution Factor with ISTDs
  
```

Signal 1: FID2 B,

RetTime [min]	Type	Area [pA*s]	Amt/Area	Amount [ppmv]	Grp	Name
1.689		-	-	-		Methane
1.842		-	-	-		Ethane
2.200	BB	1.01152	6.45663e-1	6.53103e-1		Ethylene
2.664		-	-	-		Propane
4.252	BB	4.73838e-1	4.30557e-1	2.04014e-1		Propylene
4.400		-	-	-		i-Butane
4.550		-	-	-		n-Butane
4.884	BB	1.56969e-1	6.47127e-1	1.01579e-1		Acetylene

Handwritten signature/initials

=====

Acq. Operator	: dyeddula	Seq. Line	: 7
Acq. Instrument	: GC#1	Location	: Vial 8
Injection Date	: 3/8/2019 12:00:57 PM	Inj	: 2
		Inj Volume	: Manually
Acq. Method	: C:\CHEM32\1\DATA\030819\HRVOC_030819 2019-03-08 07-46-20\ALKANES_HRVOC_M18_091117.M		
Last changed	: 3/8/2019 7:11:23 AM by dyeddula		
Analysis Method	: C:\CHEM32\1\METHODS\ALKANES_HRVOC_M18_091117.M		
Last changed	: 3/8/2019 12:32:43 PM by dyeddula (modified after loading)		
Method Info	: HRVOC		
Sample Info	: GSL_190247-001 Method:18		

=====

RetTime [min]	Type	Area [pA*s]	Amt/Area	Amount [ppmv]	Grp	Name
5.310		-	-	-		t-2-Butene
5.389	BB	1.50430e-1	3.26200e-1	4.90702e-2		1-Butene
5.499	BB	1.36711e-1	3.31334e-1	4.52971e-2		i-Butene
5.548		-	-	-		c-2-Butene
5.600		-	-	-		i-Pentane
5.658		-	-	-		n-Pentane
5.942		-	-	-		1,3-Butadiene
6.610		-	-	-		Hexane

Totals : 1.05306

Uncalibrated Peaks : using compound Propane

RetTime [min]	Type	Area [pA*s]	Amt/Area	Amount [ppmv]	Grp	Name
6.271	BB	8.02275e-2	4.34024e-1	3.48206e-2	?	
7.088	BB	1.02448e-1	4.34024e-1	4.44648e-2	?	
7.262	BB	7.37924e-2	4.34024e-1	3.20277e-2	?	

Uncalib. totals : 1.11313e-1

2 Warnings or Errors :

Warning : Calibration warnings (see calibration table listing)
Warning : Calibrated compound(s) not found

=====

*** End of Report ***

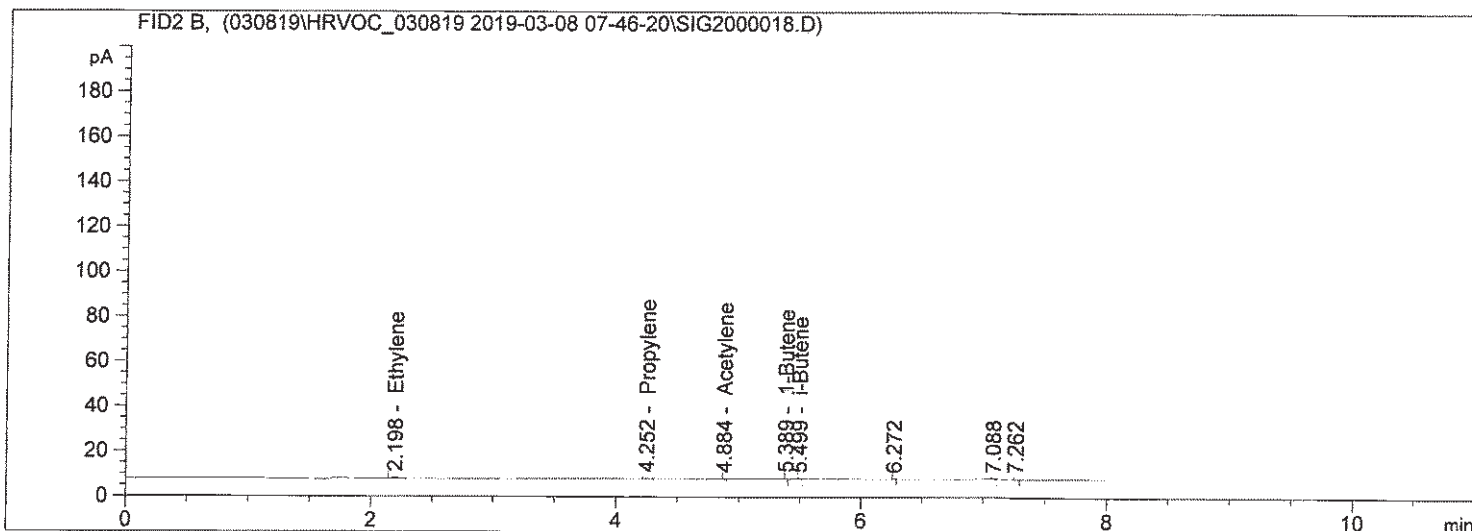

```

=====
Acq. Operator   : dyeddula                      Seq. Line :    7
Acq. Instrument : GC#1                          Location  : Vial 8
Injection Date  : 3/8/2019 12:17:28 PM          Inj       :    3
                                                Inj Volume: Manually

Acq. Method     : C:\CHEM32\1\DATA\030819\HRVOC_030819 2019-03-08 07-46-20\ALKANES_HRVOC_
M18_091117.M
Last changed    : 3/8/2019 7:11:23 AM by dyeddula
Analysis Method : C:\CHEM32\1\METHODS\ALKANES_HRVOC_M18_091117.M
Last changed    : 3/8/2019 12:32:43 PM by dyeddula
                 (modified after loading)

Method Info     : HRVOC

Sample Info     : GSL_190247-001
                 Method:18
=====
  
```



External Standard Report

```

Sorted By           : Signal
Calib. Data Modified : 3/7/2019 1:49:13 PM
Multiplier          : 1.0000
Dilution            : 1.0000
Use Multiplier & Dilution Factor with ISTDs
  
```

Signal 1: FID2 B,

RetTime [min]	Type	Area [pA*s]	Amt/Area	Amount [ppmv]	Grp	Name
1.689		-	-	-		Methane
1.842		-	-	-		Ethane
2.198	BB	9.91004e-1	6.45663e-1	6.39855e-1		Ethylene
2.664		-	-	-		Propane
4.252	BB	4.82309e-1	4.30557e-1	2.07661e-1		Propylene
4.400		-	-	-		i-Butane
4.550		-	-	-		n-Butane
4.884	BB	1.42636e-1	6.47127e-1	9.23037e-2		Acetylene

2/8/19/19

=====

Acq. Operator	: dyeddula	Seq. Line	: 7
Acq. Instrument	: GC#1	Location	: Vial 8
Injection Date	: 3/8/2019 12:17:28 PM	Inj	: 3
		Inj Volume	: Manually
Acq. Method	: C:\CHEM32\1\DATA\030819\HRVOC_030819 2019-03-08 07-46-20\ALKANES_HRVOC_M18_091117.M		
Last changed	: 3/8/2019 7:11:23 AM by dyeddula		
Analysis Method	: C:\CHEM32\1\METHODS\ALKANES_HRVOC_M18_091117.M		
Last changed	: 3/8/2019 12:32:43 PM by dyeddula (modified after loading)		
Method Info	: HRVOC		
Sample Info	: GSL_190247-001 Method:18		

=====

RetTime [min]	Type	Area [pA*s]	Amt/Area	Amount [ppmv]	Grp	Name
5.310		-	-	-		t-2-Butene
5.389	BB	1.48783e-1	3.26200e-1	4.85330e-2		1-Butene
5.499	BB	1.33519e-1	3.31334e-1	4.42394e-2		i-Butene
5.548		-	-	-		c-2-Butene
5.600		-	-	-		i-Pentane
5.658		-	-	-		n-Pentane
5.942		-	-	-		1,3-Butadiene
6.610		-	-	-		Hexane

Totals : 1.03259

Uncalibrated Peaks : using compound Propane

RetTime [min]	Type	Area [pA*s]	Amt/Area	Amount [ppmv]	Grp	Name
6.272	BB	7.26871e-2	4.34024e-1	3.15479e-2	?	
7.088	BB	7.53481e-2	4.34024e-1	3.27028e-2	?	
7.262	BB	6.83556e-2	4.34024e-1	2.96679e-2	?	

Uncalib. totals : 9.39187e-2

2 Warnings or Errors :

Warning : Calibration warnings (see calibration table listing)
Warning : Calibrated compound(s) not found

=====

*** End of Report ***

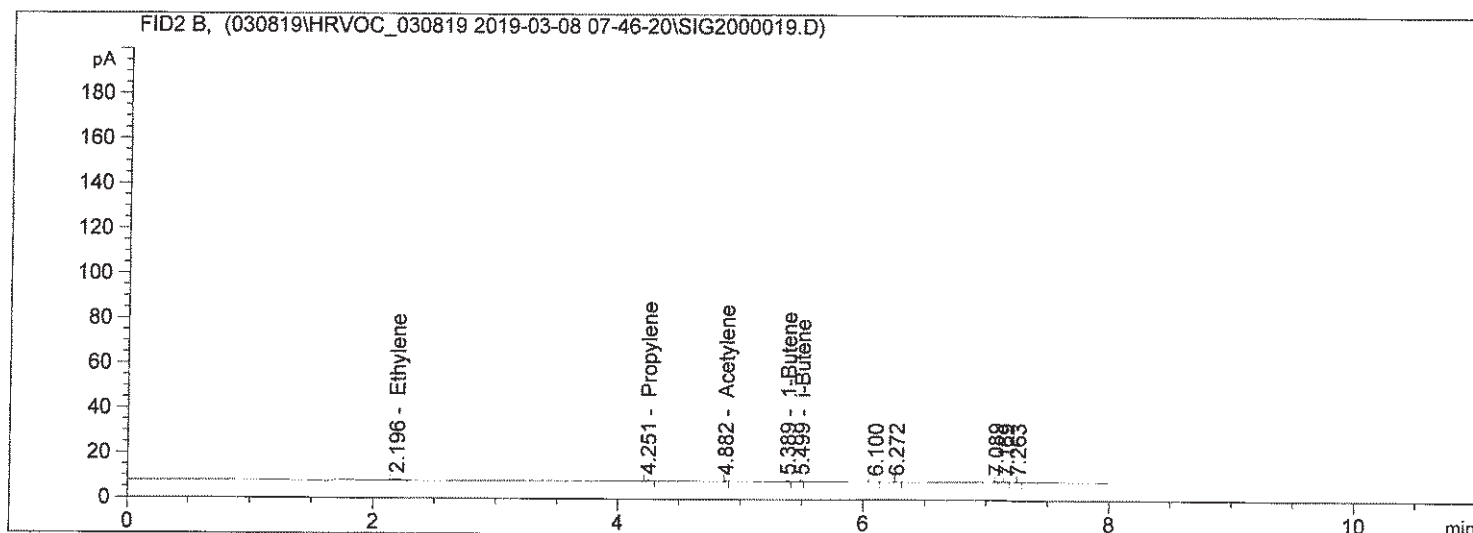
```

=====
Acq. Operator   : dyeddula                      Seq. Line :    8
Acq. Instrument : GC#1                          Location  : Vial 9
Injection Date  : 3/8/2019 12:34:18 PM          Inj       :    1
                                                Inj Volume: Manually

Acq. Method     : C:\CHEM32\1\DATA\030819\HRVOC_030819 2019-03-08 07-46-20\ALKANES_HRVOC_
                  M18_091117.M
Last changed    : 3/8/2019 7:11:23 AM by dyeddula
Analysis Method : C:\CHEM32\1\METHODS\ALKANES_HRVOC_M18_091117.M
Last changed    : 3/8/2019 12:32:43 PM by dyeddula
                  (modified after loading)

Method Info     : HRVOC

Sample Info     : GSL_190247-002
                  Method:18
=====
  
```



External Standard Report

```

Sorted By      : Signal
Calib. Data Modified : 3/7/2019 1:49:13 PM
Multiplier:    : 1.0000
Dilution:      : 1.0000
Use Multiplier & Dilution Factor with ISTDs
  
```

Signal 1: FID2 B,

RetTime [min]	Type	Area [pA*s]	Amt/Area	Amount [ppmv]	Grp	Name
1.689		-	-	-		Methane
1.842		-	-	-		Ethane
2.196	BB	1.28076	6.45663e-1	8.26938e-1		Ethylene
2.664		-	-	-		Propane
4.251	BB	6.25033e-1	4.30557e-1	2.69112e-1		Propylene
4.400		-	-	-		i-Butane
4.550		-	-	-		n-Butane
4.882	BB	1.83935e-1	6.47127e-1	1.19029e-1		Acetylene

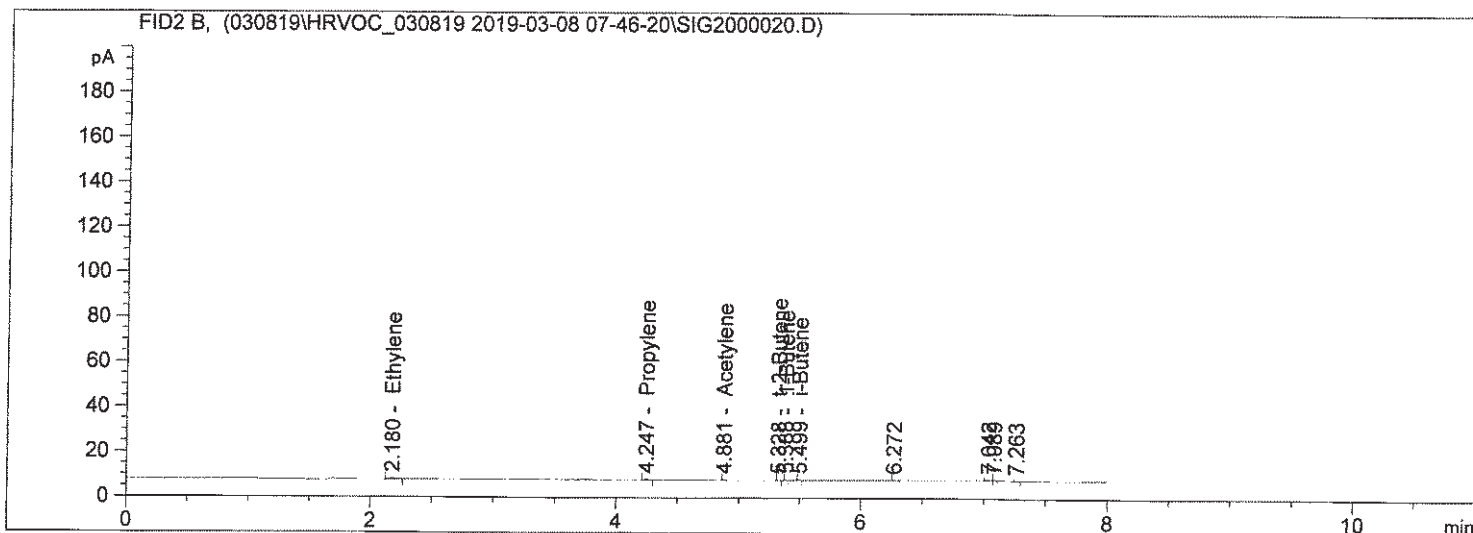
Handwritten signature/initials


```

=====
Acq. Operator   : dyeddula                      Seq. Line :    8
Acq. Instrument : GC#1                          Location  : Vial 9
Injection Date  : 3/8/2019 12:51:11 PM          Inj       :    2
                                           Inj Volume: Manually

Acq. Method     : C:\CHEM32\1\DATA\030819\HRVOC_030819 2019-03-08 07-46-20\ALKANES_HRVOC_
                  M18_091117.M
Last changed    : 3/8/2019 7:11:23 AM by dyeddula
Analysis Method : C:\CHEM32\1\METHODS\ALKANES_HRVOC_M18_091117.M
Last changed    : 3/8/2019 12:32:43 PM by dyeddula
                  (modified after loading)
Method Info     : HRVOC

Sample Info     : GSL_190247-002
                  Method:18
=====
  
```



External Standard Report

```

Sorted By           : Signal
Calib. Data Modified : 3/7/2019 1:49:13 PM
Multiplier          : 1.0000
Dilution            : 1.0000
Use Multiplier & Dilution Factor with ISTDs
  
```

Signal 1: FID2 B,

RetTime [min]	Type	Area [pA*s]	Amt/Area	Amount [ppmv]	Grp	Name
1.689		-	-	-		Methane
1.842		-	-	-		Ethane
2.180	BB	1.26727	6.45663e-1	8.18233e-1		Ethylene
2.664		-	-	-		Propane
4.247	BB	6.20325e-1	4.30557e-1	2.67085e-1		Propylene
4.400		-	-	-		i-Butane
4.550		-	-	-		n-Butane
4.881	BB	1.72800e-1	6.47127e-1	1.11824e-1		Acetylene

Handwritten signature: 2/3/19/19

```
=====
Acq. Operator   : dyeddula                      Seq. Line :    8
Acq. Instrument : GC#1                          Location  : Vial 9
Injection Date  : 3/8/2019 12:51:11 PM           Inj       :    2
                                                    Inj Volume: Manually

Acq. Method     : C:\CHEM32\1\DATA\030819\HRVOC_030819 2019-03-08 07-46-20\ALKANES_HRVOC_
                M18_091117.M
Last changed    : 3/8/2019 7:11:23 AM by dyeddula
Analysis Method : C:\CHEM32\1\METHODS\ALKANES_HRVOC_M18_091117.M
Last changed    : 3/8/2019 12:32:43 PM by dyeddula
                (modified after loading)
Method Info     : HRVOC

Sample Info     : GSL_190247-002
                Method:18
=====
```

RetTime [min]	Type	Area [pA*s]	Amt/Area	Amount [ppmv]	Grp	Name
5.328	BB	3.14009e-2	3.29413e-1	1.03439e-2		t-2-Butene
5.388	BB	1.96439e-1	3.26200e-1	6.40785e-2		1-Butene
5.499	BB	1.82673e-1	3.31334e-1	6.05257e-2		i-Butene
5.548		-	-	-		c-2-Butene
5.600		-	-	-		i-Pentane
5.658		-	-	-		n-Pentane
5.942		-	-	-		1,3-Butadiene
6.610		-	-	-		Hexane

Totals : 1.33209

Uncalibrated Peaks : using compound Propane

RetTime [min]	Type	Area [pA*s]	Amt/Area	Amount [ppmv]	Grp	Name
6.272	BB	1.59988e-1	4.34024e-1	6.94387e-2	?	
7.042	BV	2.20333e-1	4.34024e-1	9.56296e-2	?	
7.089	VB	1.18257e-1	4.34024e-1	5.13265e-2	?	
7.263	BB	9.07864e-2	4.34024e-1	3.94034e-2	?	

Uncalib. totals : 2.55798e-1

2 Warnings or Errors :

Warning : Calibration warnings (see calibration table listing)
Warning : Calibrated compound(s) not found

*** End of Report ***

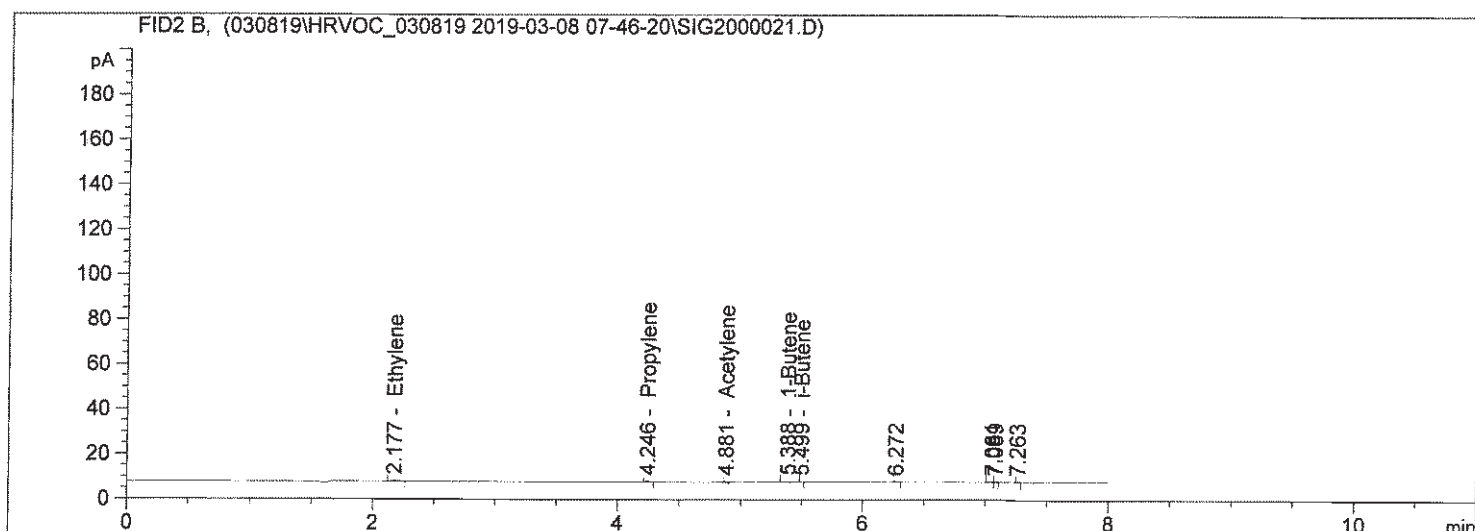
```

=====
Acq. Operator   : dyeddula                      Seq. Line :    8
Acq. Instrument : GC#1                          Location  : Vial 9
Injection Date  : 3/8/2019 1:07:49 PM           Inj       :    3
                                                Inj Volume: Manually

Acq. Method     : C:\CHEM32\1\DATA\030819\HRVOC_030819 2019-03-08 07-46-20\ALKANES_HRVOC_
                  M18_091117.M
Last changed    : 3/8/2019 7:11:23 AM by dyeddula
Analysis Method : C:\CHEM32\1\METHODS\ALKANES_HRVOC_M18_091117.M
Last changed    : 3/8/2019 12:32:43 PM by dyeddula
                  (modified after loading)

Method Info     : HRVOC

Sample Info     : GSL_190247-002
                  Method:18
=====
  
```



External Standard Report

```

Sorted By      : Signal
Calib. Data Modified : 3/7/2019 1:49:13 PM
Multiplier:    : 1.0000
Dilution:      : 1.0000
Use Multiplier & Dilution Factor with ISTDs
  
```

Signal 1: FID2 B,

RetTime [min]	Type	Area [pA*s]	Amt/Area	Amount [ppmv]	Grp	Name
1.689		-	-	-		Methane
1.842		-	-	-		Ethane
2.177	BB	1.26643	6.45663e-1	8.17685e-1		Ethylene
2.664		-	-	-		Propane
4.246	BB	6.13006e-1	4.30557e-1	2.63934e-1		Propylene
4.400		-	-	-		i-Butane
4.550		-	-	-		n-Butane
4.881	BB	1.79194e-1	6.47127e-1	1.15961e-1		Acetylene

Handwritten signature/initials

=====

Acq. Operator	: dyeddula	Seq. Line	: 8
Acq. Instrument	: GC#1	Location	: Vial 9
Injection Date	: 3/8/2019 1:07:49 PM	Inj	: 3
		Inj Volume	: Manually
Acq. Method	: C:\CHEM32\1\DATA\030819\HRVOC_030819 2019-03-08 07-46-20\ALKANES_HRVOC_M18_091117.M		
Last changed	: 3/8/2019 7:11:23 AM by dyeddula		
Analysis Method	: C:\CHEM32\1\METHODS\ALKANES_HRVOC_M18_091117.M		
Last changed	: 3/8/2019 12:32:43 PM by dyeddula (modified after loading)		
Method Info	: HRVOC		
Sample Info	: GSL_190247-002 Method:18		

=====

RetTime [min]	Type	Area [pA*s]	Amt/Area	Amount [ppmv]	Grp	Name
5.310		-	-	-		t-2-Butene
5.388	BB	2.33150e-1	3.26200e-1	7.60535e-2		1-Butene
5.499	BB	1.61715e-1	3.31334e-1	5.35815e-2		i-Butene
5.548		-	-	-		c-2-Butene
5.600		-	-	-		i-Pentane
5.658		-	-	-		n-Pentane
5.942		-	-	-		1,3-Butadiene
6.610		-	-	-		Hexane

Totals : 1.32722

Uncalibrated Peaks : using compound Propane

RetTime [min]	Type	Area [pA*s]	Amt/Area	Amount [ppmv]	Grp	Name
6.272	BB	1.39431e-1	4.34024e-1	6.05163e-2	?	
7.061	BV	1.61653e-1	4.34024e-1	7.01613e-2	?	
7.089	VB	1.12028e-1	4.34024e-1	4.86226e-2	?	
7.263	BB	1.07496e-1	4.34024e-1	4.66559e-2	?	

Uncalib. totals : 2.25956e-1

2 Warnings or Errors :

Warning : Calibration warnings (see calibration table listing)
Warning : Calibrated compound(s) not found

=====

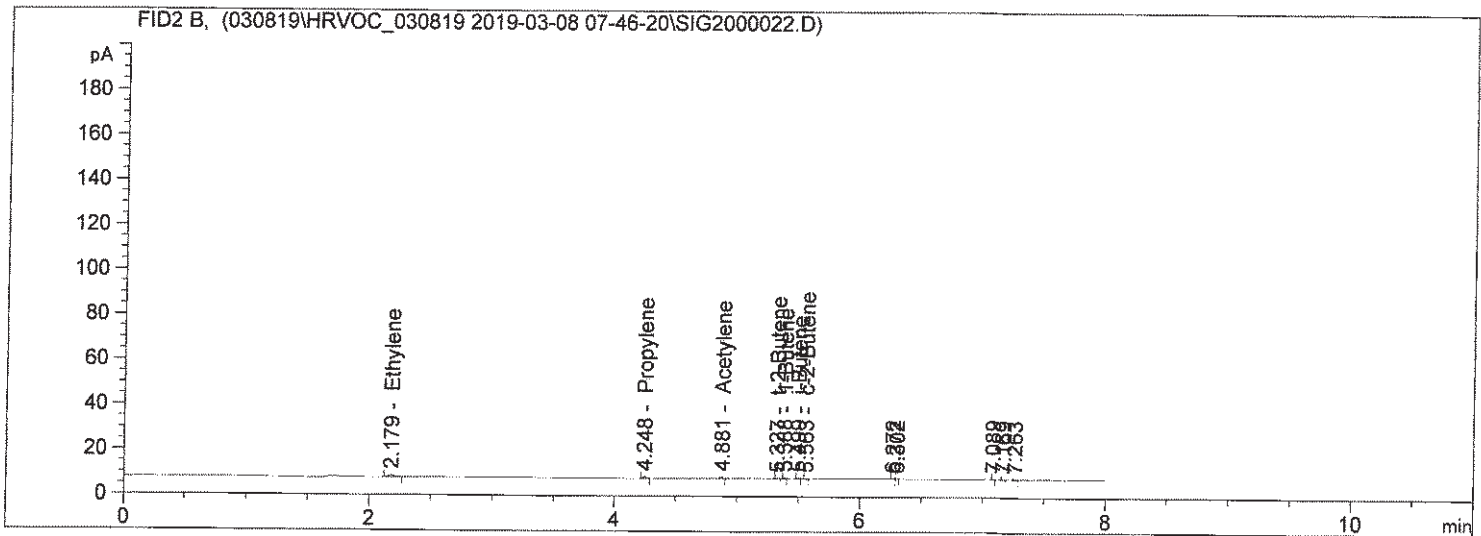
*** End of Report ***


```

=====
Acq. Operator   : dyeddula                      Seq. Line :    9
Acq. Instrument : GC#1                          Location  : Vial 10
Injection Date  : 3/8/2019 1:24:37 PM           Inj       :    1
                                                Inj Volume: Manually

Acq. Method    : C:\CHEM32\1\DATA\030819\HRVOC_030819 2019-03-08 07-46-20\ALKANES_HRVOC_
                M18_091117.M
Last changed   : 3/8/2019 7:11:23 AM by dyeddula
Analysis Method : C:\CHEM32\1\METHODS\ALKANES_HRVOC_M18_091117.M
Last changed   : 3/8/2019 12:32:43 PM by dyeddula
                (modified after loading)
Method Info    : HRVOC

Sample Info    : GSL_190247-003
                Method:18
=====
  
```



External Standard Report

```

Sorted By      : Signal
Calib. Data Modified : 3/7/2019 1:49:13 PM
Multiplier:    : 1.0000
Dilution:      : 1.0000
Use Multiplier & Dilution Factor with ISTDs
  
```

Signal 1: FID2 B,

RetTime [min]	Type	Area [pA*s]	Amt/Area	Amount [ppmv]	Grp	Name
1.689		-	-	-		Methane
1.842		-	-	-		Ethane
2.179	BB	2.64675	6.45663e-1	1.70891		Ethylene
2.664		-	-	-		Propane
4.248	BB	9.63895e-1	4.30557e-1	4.15011e-1		Propylene
4.400		-	-	-		i-Butane
4.550		-	-	-		n-Butane
4.881	BB	4.90835e-1	6.47127e-1	3.17633e-1		Acetylene

257141 19

Sample Name: GSL_190247-003

```

=====
Acq. Operator   : dyeddula                      Seq. Line :    9
Acq. Instrument : GC#1                          Location  : Vial 10
Injection Date  : 3/8/2019 1:24:37 PM          Inj       :    1
                                                Inj Volume: Manually

Acq. Method     : C:\CHEM32\1\DATA\030819\HRVOC_030819 2019-03-08 07-46-20\ALKANES_HRVOC_
M18_091117.M
Last changed    : 3/8/2019 7:11:23 AM by dyeddula
Analysis Method : C:\CHEM32\1\METHODS\ALKANES_HRVOC_M18_091117.M
Last changed    : 3/8/2019 12:32:43 PM by dyeddula
                 (modified after loading)
Method Info     : HRVOC

Sample Info     : GSL_190247-003
                 Method:18
=====

```

```

=====
RetTime  Type      Area      Amt/Area   Amount     Grp   Name
 [min]   [pA*s]         [ppmv]
-----|-----|-----|-----|-----|-----|-----
 5.327 BB      5.58964e-2 3.29413e-1 1.84130e-2 t-2-Butene
 5.388 BB      2.87834e-1 3.26200e-1 9.38914e-2 1-Butene
 5.499 BB      2.03664e-1 3.31334e-1 6.74808e-2 i-Butene
 5.563 BB      4.18734e-2 3.40178e-1 1.42444e-2 c-2-Butene
 5.600         -           -           -           i-Pentane
 5.658         -           -           -           n-Pentane
 5.942         -           -           -           1,3-Butadiene
 6.610         -           -           -           Hexane
=====

```

Totals : 2.63558

Uncalibrated Peaks : using compound Propane

```

RetTime  Type      Area      Amt/Area   Amount     Grp   Name
 [min]   [pA*s]         [ppmv]
-----|-----|-----|-----|-----|-----|-----
 6.272 BV      1.44914e-1 4.34024e-1 6.28962e-2 ?
 6.302 VB      3.75842e-2 4.34024e-1 1.63124e-2 ?
 7.089 BB      1.17913e-1 4.34024e-1 5.11771e-2 ?
 7.169 BB      3.91636e-2 4.34024e-1 1.69979e-2 ?
 7.263 BB      1.02695e-1 4.34024e-1 4.45721e-2 ?
=====

```

Uncalib. totals : 1.91956e-1

2 Warnings or Errors :

Warning : Calibration warnings (see calibration table listing)

Warning : Calibrated compound(s) not found

```

=====
*** End of Report ***
=====

```

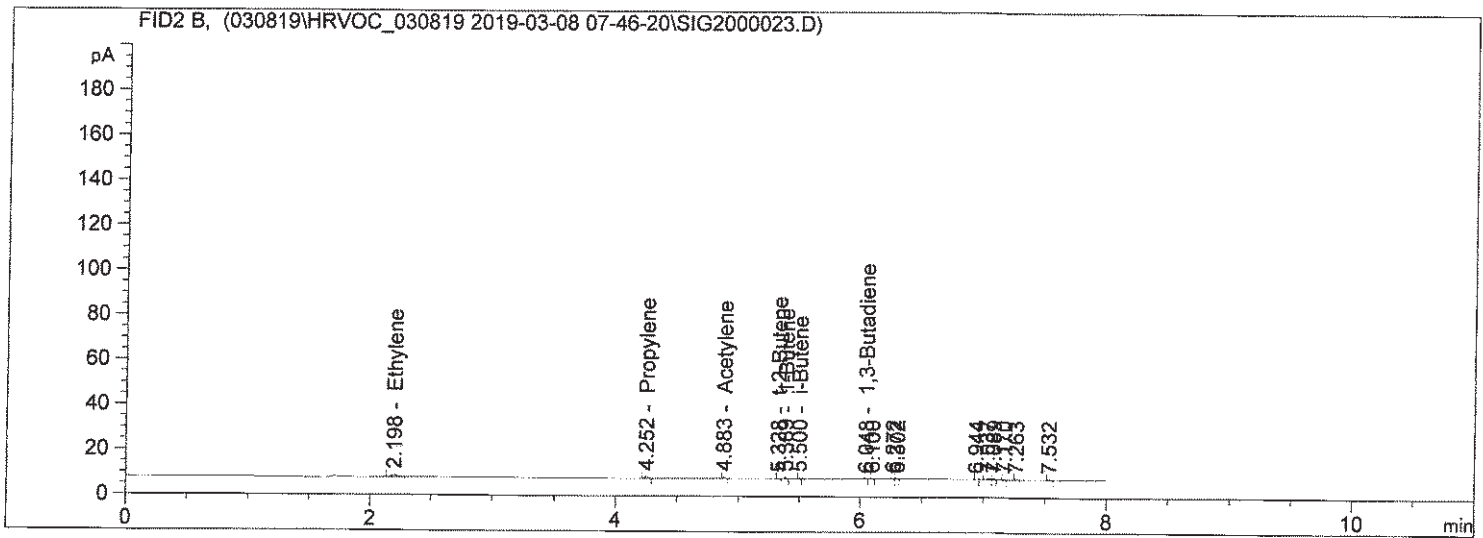
```

=====
Acq. Operator   : dyeddula                      Seq. Line :    9
Acq. Instrument : GC#1                          Location  : Vial 10
Injection Date  : 3/8/2019 1:41:15 PM           Inj       :    2
                                           Inj Volume: Manually

Acq. Method     : C:\CHEM32\1\DATA\030819\HRVOC_030819 2019-03-08 07-46-20\ALKANES_HRVOC_
                  M18_091117.M
Last changed    : 3/8/2019 7:11:23 AM by dyeddula
Analysis Method : C:\CHEM32\1\METHODS\ALKANES_HRVOC_M18_091117.M
Last changed    : 3/8/2019 12:32:43 PM by dyeddula
                  (modified after loading)

Method Info     : HRVOC

Sample Info     : GSL_190247-003
                  Method:18
=====
  
```



External Standard Report

```

Sorted By           : Signal
Calib. Data Modified : 3/7/2019 1:49:13 PM
Multiplier:         : 1.0000
Dilution:           : 1.0000
Use Multiplier & Dilution Factor with ISTDs
  
```

Signal 1: FID2 B,

RetTime [min]	Type	Area [pA*s]	Amt/Area	Amount [ppmv]	Grp	Name
1.689		-	-	-		Methane
1.842		-	-	-		Ethane
2.198	BB	2.63307	6.45663e-1	1.70008		Ethylene
2.664		-	-	-		Propane
4.252	BB	9.81215e-1	4.30557e-1	4.22469e-1		Propylene
4.400		-	-	-		i-Butane
4.550		-	-	-		n-Butane
4.883	BB	4.82277e-1	6.47127e-1	3.12094e-1		Acetylene

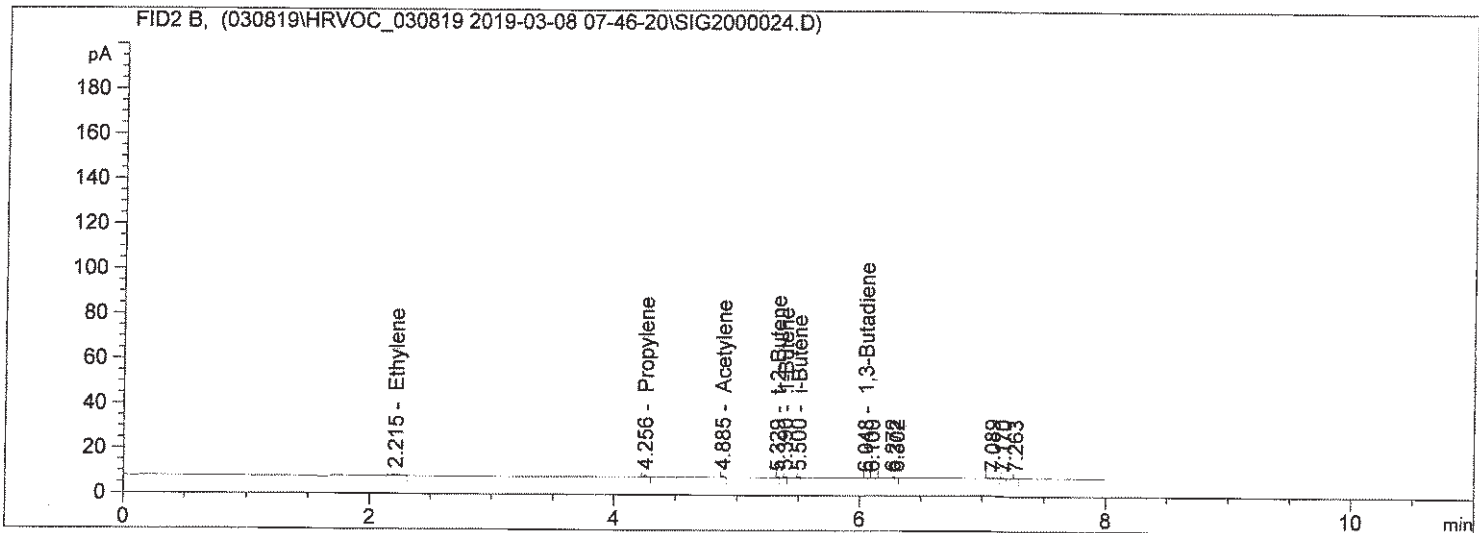
Handwritten signature: 2/25/19


```

=====
Acq. Operator   : dyeddula                      Seq. Line :    9
Acq. Instrument : GC#1                          Location  : Vial 10
Injection Date  : 3/8/2019 1:57:56 PM           Inj       :    3
                                                Inj Volume: Manually

Acq. Method     : C:\CHEM32\1\DATA\030819\HRVOC_030819 2019-03-08 07-46-20\ALKANES_HRVOC_
                  M18_091117.M
Last changed    : 3/8/2019 7:11:23 AM by dyeddula
Analysis Method : C:\CHEM32\1\METHODS\ALKANES_HRVOC_M18_091117.M
Last changed    : 3/8/2019 12:32:43 PM by dyeddula
                  (modified after loading)
Method Info     : HRVOC

Sample Info     : GSL_190247-003
                  Method:18
=====
  
```



External Standard Report

```

Sorted By           : Signal
Calib. Data Modified : 3/7/2019 1:49:13 PM
Multiplier          : 1.0000
Dilution            : 1.0000
Use Multiplier & Dilution Factor with ISTDs
  
```

Signal 1: FID2 B,

RetTime [min]	Type	Area [pA*s]	Amt/Area	Amount [ppmv]	Grp	Name
1.689		-	-	-		Methane
1.842		-	-	-		Ethane
2.215	BB	2.61512	6.45663e-1	1.68849		Ethylene
2.664		-	-	-		Propane
4.256	BB	9.58685e-1	4.30557e-1	4.12768e-1		Propylene
4.400		-	-	-		i-Butane
4.550		-	-	-		n-Butane
4.885	BB	4.61944e-1	6.47127e-1	2.98936e-1		Acetylene

Handwritten signature/initials

```

=====
Acq. Operator   : dyeddula                      Seq. Line :    9
Acq. Instrument : GC#1                          Location  : Vial 10
Injection Date  : 3/8/2019 1:57:56 PM           Inj       :    3
                                                    Inj Volume: Manually

Acq. Method     : C:\CHEM32\1\DATA\030819\HRVOC_030819 2019-03-08 07-46-20\ALKANES_HRVOC_
M18_091117.M
Last changed    : 3/8/2019 7:11:23 AM by dyeddula
Analysis Method : C:\CHEM32\1\METHODS\ALKANES_HRVOC_M18_091117.M
Last changed    : 3/8/2019 12:32:43 PM by dyeddula
                 (modified after loading)
Method Info     : HRVOC

Sample Info     : GSL_190247-003
                 Method:18
=====
  
```

RetTime [min]	Type	Area [pA*s]	Amt/Area	Amount [ppmv]	Grp	Name
5.329	BB	5.16666e-2	3.29413e-1	1.70197e-2		t-2-Butene
5.390	BB	2.84467e-1	3.26200e-1	9.27931e-2		l-Butene
5.500	BB	2.03888e-1	3.31334e-1	6.75549e-2		i-Butene
5.548		-	-	-		c-2-Butene
5.600		-	-	-		i-Pentane
5.658		-	-	-		n-Pentane
6.048	BB	4.76987e-2	3.37185e-1	1.60833e-2		1,3-Butadiene
6.610		-	-	-		Hexane

Totals : 2.59365

Uncalibrated Peaks : using compound Propane

RetTime [min]	Type	Area [pA*s]	Amt/Area	Amount [ppmv]	Grp	Name
6.100	BB	6.28165e-2	4.34024e-1	2.72638e-2		?
6.272	BV	2.14432e-1	4.34024e-1	9.30687e-2		?
6.302	VB	5.54177e-2	4.34024e-1	2.40526e-2		?
7.089	BB	2.94818e-1	4.34024e-1	1.27958e-1		?
7.170	BB	5.62439e-2	4.34024e-1	2.44112e-2		?
7.263	BB	1.17606e-1	4.34024e-1	5.10436e-2		?

Uncalib. totals : 3.47798e-1

2 Warnings or Errors :

Warning : Calibration warnings (see calibration table listing)
 Warning : Calibrated compound(s) not found

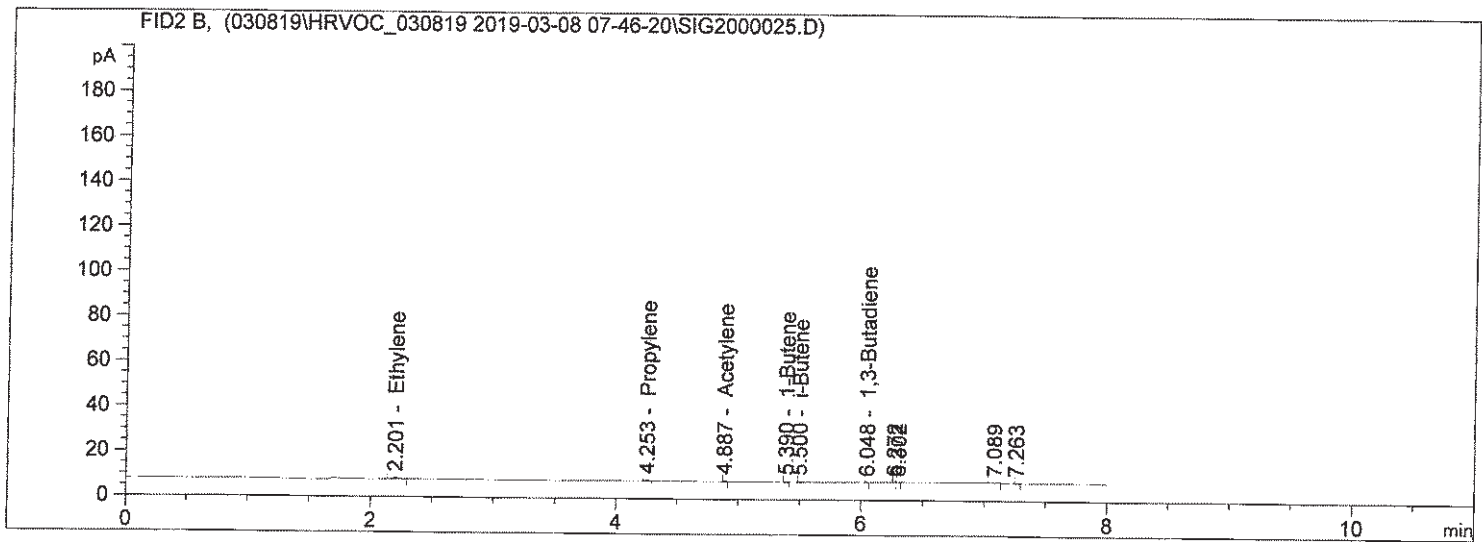
*** End of Report ***

```

=====
Acq. Operator   : dyeddula                      Seq. Line :   10
Acq. Instrument : GC#1                          Location  : Vial 11
Injection Date  : 3/8/2019 2:14:31 PM           Inj       :    1
                                                Inj Volume: Manually

Acq. Method     : C:\CHEM32\1\DATA\030819\HRVOC_030819 2019-03-08 07-46-20\ALKANES_HRVOC_
                  M18_091117.M
Last changed    : 3/8/2019 7:11:23 AM by dyeddula
Analysis Method : C:\CHEM32\1\METHODS\ALKANES_HRVOC_M18_091117.M
Last changed    : 3/8/2019 12:32:43 PM by dyeddula
                  (modified after loading)
Method Info     : HRVOC

Sample Info     : GSL_190247-004
                  Method:18
=====
  
```



External Standard Report

```

Sorted By           : Signal
Calib. Data Modified : 3/7/2019 1:49:13 PM
Multiplier          : 1.0000
Dilution            : 1.0000
Use Multiplier & Dilution Factor with ISTDs
  
```

Signal 1: FID2 B,

RetTime [min]	Type	Area [pA*s]	Amt/Area	Amount [ppmv]	Grp	Name
1.689		-	-	-		Methane
1.842		-	-	-		Ethane
2.201	BB	1.87153	6.45663e-1	1.20838		Ethylene
2.664		-	-	-		Propane
4.253	BB	7.64020e-1	4.30557e-1	3.28954e-1		Propylene
4.400		-	-	-		i-Butane
4.550		-	-	-		n-Butane
4.887	BB	3.37986e-1	6.47127e-1	2.18720e-1		Acetylene

Handwritten signature/initials: 2/23/14/19

=====

Acq. Operator	: dyeddula	Seq. Line	: 10
Acq. Instrument	: GC#1	Location	: Vial 11
Injection Date	: 3/8/2019 2:14:31 PM	Inj	: 1
		Inj Volume	: Manually
Acq. Method	: C:\CHEM32\1\DATA\030819\HRVOC_030819 2019-03-08 07-46-20\ALKANES_HRVOC_M18_091117.M		
Last changed	: 3/8/2019 7:11:23 AM by dyeddula		
Analysis Method	: C:\CHEM32\1\METHODS\ALKANES_HRVOC_M18_091117.M		
Last changed	: 3/8/2019 12:32:43 PM by dyeddula (modified after loading)		
Method Info	: HRVOC		
Sample Info	: GSL_190247-004 Method:18		

=====

RetTime [min]	Type	Area [pA*s]	Amt/Area	Amount [ppmv]	Grp	Name
5.310		-	-	-		t-2-Butene
5.390	BB	2.03731e-1	3.26200e-1	6.64568e-2		1-Butene
5.500	BB	1.48122e-1	3.31334e-1	4.90779e-2		i-Butene
5.548		-	-	-		c-2-Butene
5.600		-	-	-		i-Pentane
5.658		-	-	-		n-Pentane
6.048	BB	3.33737e-2	3.37185e-1	1.12531e-2		1,3-Butadiene
6.610		-	-	-		Hexane

Totals : 1.88284

Uncalibrated Peaks : using compound Propane

RetTime [min]	Type	Area [pA*s]	Amt/Area	Amount [ppmv]	Grp	Name
6.272	BV	1.06826e-1	4.34024e-1	4.63651e-2	?	
6.302	VB	4.12504e-2	4.34024e-1	1.79036e-2	?	
7.089	BB	2.37530e-1	4.34024e-1	1.03093e-1	?	
7.263	BB	7.35115e-2	4.34024e-1	3.19057e-2	?	

Uncalib. totals : 1.99268e-1

2 Warnings or Errors :

Warning : Calibration warnings (see calibration table listing)
Warning : Calibrated compound(s) not found

=====

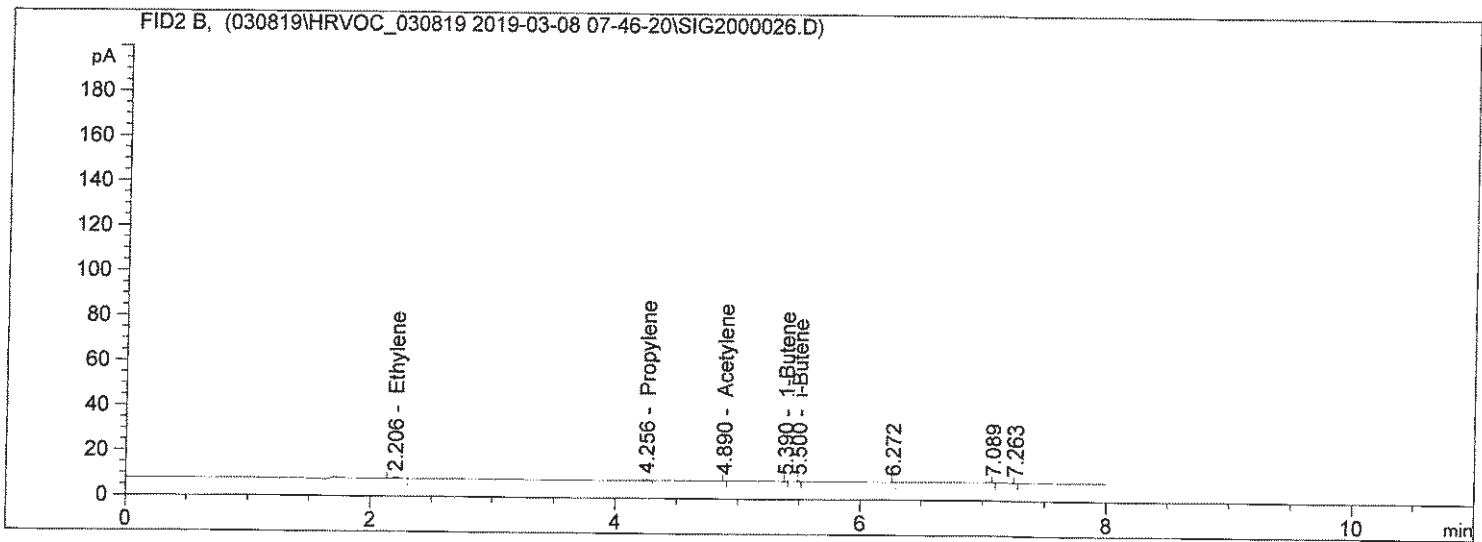
*** End of Report ***


```

=====
Acq. Operator   : dyeddula                      Seq. Line :   10
Acq. Instrument : GC#1                          Location  : Vial 11
Injection Date  : 3/8/2019 2:31:15 PM           Inj       :    2
                                                Inj Volume: Manually

Acq. Method     : C:\CHEM32\1\DATA\030819\HRVOC_030819 2019-03-08 07-46-20\ALKANES_HRVOC_
                M18_091117.M
Last changed    : 3/8/2019 7:11:23 AM by dyeddula
Analysis Method : C:\CHEM32\1\METHODS\ALKANES_HRVOC_M18_091117.M
Last changed    : 3/8/2019 12:32:43 PM by dyeddula
                (modified after loading)
Method Info     : HRVOC

Sample Info     : GSL_190247-004
                Method:18
=====
  
```



External Standard Report

```

Sorted By           : Signal
Calib. Data Modified : 3/7/2019 1:49:13 PM
Multiplier          : 1.0000
Dilution            : 1.0000
Use Multiplier & Dilution Factor with ISTDs
  
```

Signal 1: FID2 B,

RetTime [min]	Type	Area [pA*s]	Amt/Area	Amount [ppmv]	Grp	Name
1.689		-	-	-		Methane
1.842		-	-	-		Ethane
2.206	BB	1.41086	6.45663e-1	9.10939e-1		Ethylene
2.664		-	-	-		Propane
4.256	BB	6.49176e-1	4.30557e-1	2.79507e-1		Propylene
4.400		-	-	-		i-Butane
4.550		-	-	-		n-Butane
4.890	BB	2.46024e-1	6.47127e-1	1.59209e-1		Acetylene

Handwritten signature/initials

Sample Name: GSL_190247-004

```

=====
Acq. Operator   : dyeddula                      Seq. Line :   10
Acq. Instrument : GC#1                          Location  : Vial 11
Injection Date  : 3/8/2019 2:31:15 PM           Inj       :    2
                                                Inj Volume: Manually

Acq. Method     : C:\CHEM32\1\DATA\030819\HRVOC_030819 2019-03-08 07-46-20\ALKANES_HRVOC_
                M18_091117.M
Last changed    : 3/8/2019 7:11:23 AM by dyeddula
Analysis Method : C:\CHEM32\1\METHODS\ALKANES_HRVOC_M18_091117.M
Last changed    : 3/8/2019 12:32:43 PM by dyeddula
                (modified after loading)
Method Info     : HRVOC

Sample Info     : GSL_190247-004
                Method:18
=====
    
```

RetTime [min]	Type	Area [pA*s]	Amt/Area	Amount [ppmv]	Grp	Name
5.310		-	-	-		t-2-Butene
5.390	BB	1.47075e-1	3.26200e-1	4.79759e-2		1-Butene
5.500	BB	1.12786e-1	3.31334e-1	3.73696e-2		i-Butene
5.548		-	-	-		c-2-Butene
5.600		-	-	-		i-Pentane
5.658		-	-	-		n-Pentane
5.942		-	-	-		1,3-Butadiene
6.610		-	-	-		Hexane

Totals : 1.43500

Uncalibrated Peaks : using compound Propane

RetTime [min]	Type	Area [pA*s]	Amt/Area	Amount [ppmv]	Grp	Name
6.272	BB	7.71429e-2	4.34024e-1	3.34818e-2		?
7.089	BB	6.59295e-2	4.34024e-1	2.86150e-2		?
7.263	BB	5.35607e-2	4.34024e-1	2.32466e-2		?

Uncalib. totals : 8.53434e-2

2 Warnings or Errors :

Warning : Calibration warnings (see calibration table listing)
 Warning : Calibrated compound(s) not found

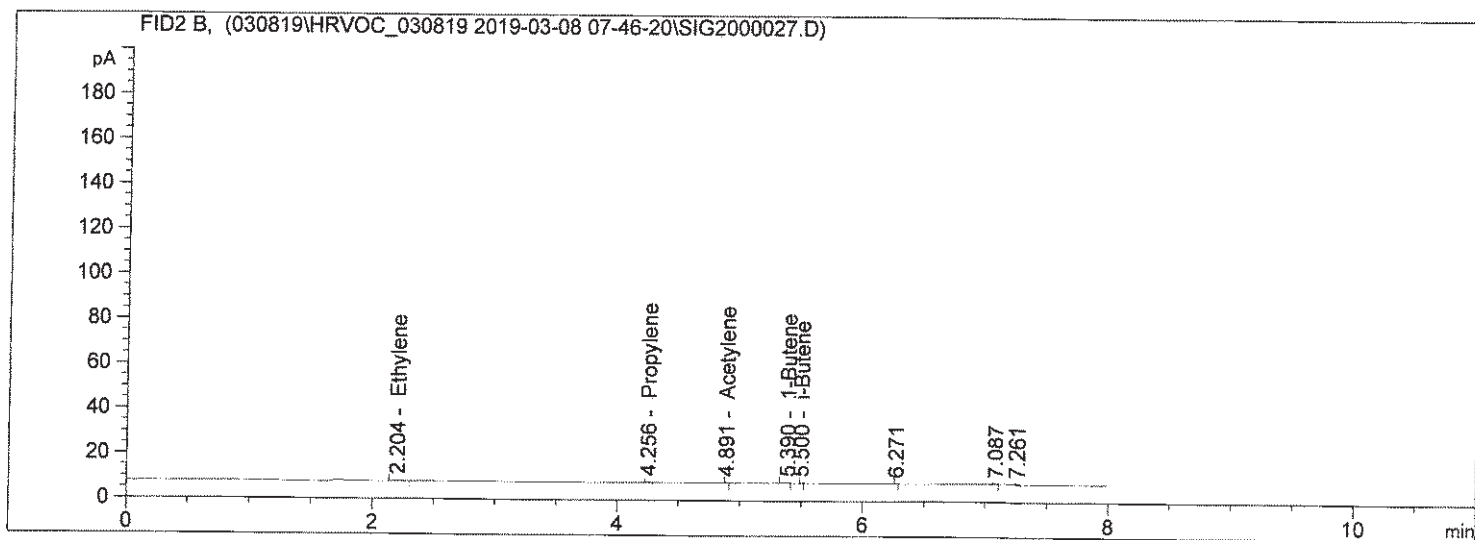
*** End of Report ***

```

=====
Acq. Operator   : dyeddula                      Seq. Line :   10
Acq. Instrument : GC#1                          Location  : Vial 11
Injection Date  : 3/8/2019 2:47:50 PM           Inj       :    3
                                                    Inj Volume: Manually

Acq. Method     : C:\CHEM32\1\DATA\030819\HRVOC_030819 2019-03-08 07-46-20\ALKANES_HRVOC_
                  M18_091117.M
Last changed    : 3/8/2019 7:11:23 AM by dyeddula
Analysis Method : C:\CHEM32\1\METHODS\ALKANES_HRVOC_M18_091117.M
Last changed    : 3/8/2019 12:32:43 PM by dyeddula
                  (modified after loading)
Method Info     : HRVOC

Sample Info     : GSL_190247-004
                  Method:18
=====
  
```



External Standard Report

```

Sorted By           : Signal
Calib. Data Modified : 3/7/2019 1:49:13 PM
Multiplier:         : 1.0000
Dilution:           : 1.0000
Use Multiplier & Dilution Factor with ISTDs
  
```

Signal 1: FID2 B,

RetTime [min]	Type	Area [pA*s]	Amt/Area	Amount [ppmv]	Grp	Name
1.689		-	-	-		Methane
1.842		-	-	-		Ethane
2.204	BB	1.10218	6.45663e-1	7.11634e-1		Ethylene
2.664		-	-	-		Propane
4.256	BB	5.84007e-1	4.30557e-1	2.51448e-1		Propylene
4.400		-	-	-		i-Butane
4.550		-	-	-		n-Butane
4.891	BB	1.92602e-1	6.47127e-1	1.24638e-1		Acetylene

Handwritten signature: 3/27/19
 316 of 460
 Page 1 of 2

```
=====
Acq. Operator   : dyeddula                               Seq. Line :   10
Acq. Instrument : GC#1                                   Location  : Vial 11
Injection Date  : 3/8/2019 2:47:50 PM                    Inj       :    3
                                                    Inj Volume: Manually

Acq. Method     : C:\CHEM32\1\DATA\030819\HRVOC_030819 2019-03-08 07-46-20\ALKANES_HRVOC_
                  M18_091117.M
Last changed    : 3/8/2019 7:11:23 AM by dyeddula
Analysis Method : C:\CHEM32\1\METHODS\ALKANES_HRVOC_M18_091117.M
Last changed    : 3/8/2019 12:32:43 PM by dyeddula
                  (modified after loading)
Method Info     : HRVOC

Sample Info     : GSL_190247-004
                  Method:18
=====
```

RetTime [min]	Type	Area [pA*s]	Amt/Area	Amount [ppmv]	Grp	Name
5.310		-	-	-		t-2-Butene
5.390	BB	1.45593e-1	3.26200e-1	4.74924e-2		1-Butene
5.500	BB	9.16399e-2	3.31334e-1	3.03634e-2		i-Butene
5.548		-	-	-		c-2-Butene
5.600		-	-	-		i-Pentane
5.658		-	-	-		n-Pentane
5.942		-	-	-		1,3-Butadiene
6.610		-	-	-		Hexane

Totals : 1.16558

Uncalibrated Peaks : using compound Propane

RetTime [min]	Type	Area [pA*s]	Amt/Area	Amount [ppmv]	Grp	Name
6.271	BB	5.88817e-2	4.34024e-1	2.55560e-2	?	
7.087	BB	7.11462e-2	4.34024e-1	3.08791e-2	?	
7.261	BB	4.87377e-2	4.34024e-1	2.11533e-2	?	

Uncalib. totals : 7.75885e-2

2 Warnings or Errors :

Warning : Calibration warnings (see calibration table listing)
Warning : Calibrated compound(s) not found

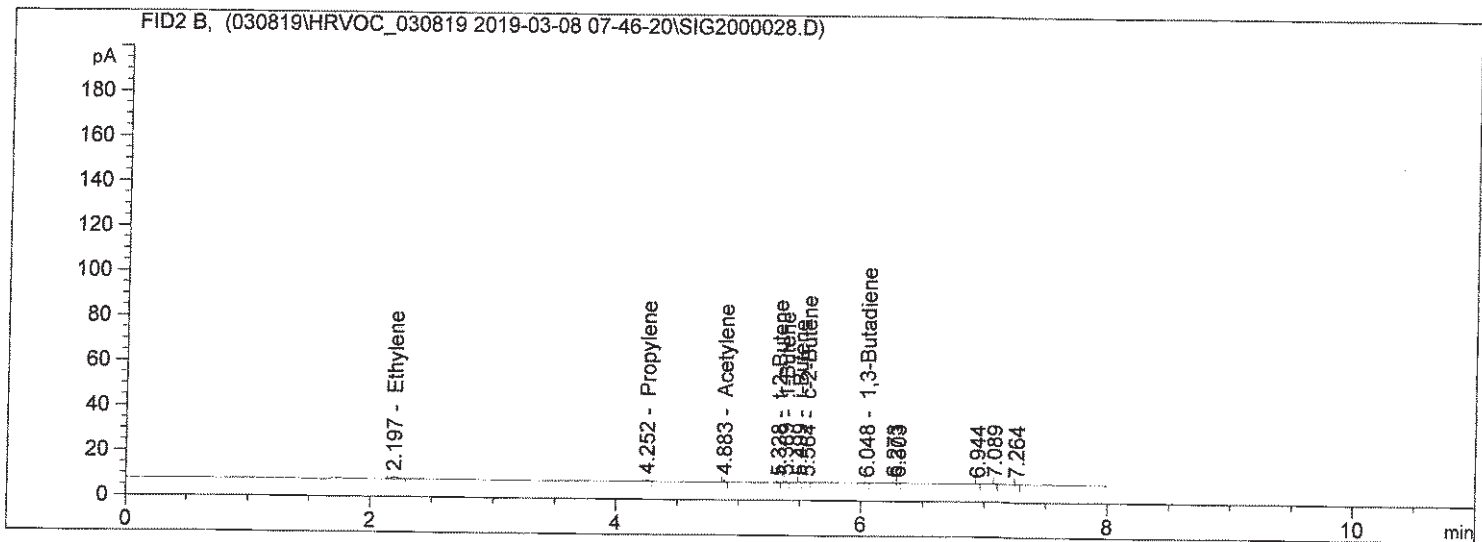
*** End of Report ***

```

=====
Acq. Operator   : dyeddula                      Seq. Line :   11
Acq. Instrument : GC#1                          Location  : Vial 12
Injection Date  : 3/8/2019 3:04:28 PM           Inj       :    1
                                                Inj Volume: Manually

Acq. Method     : C:\CHEM32\1\DATA\030819\HRVOC_030819 2019-03-08 07-46-20\ALKANES_HRVOC_
                  M18_091117.M
Last changed    : 3/8/2019 7:11:23 AM by dyeddula
Analysis Method : C:\CHEM32\1\METHODS\ALKANES_HRVOC_M18_091117.M
Last changed    : 3/8/2019 12:32:43 PM by dyeddula
                  (modified after loading)
Method Info     : HRVOC

Sample Info     : GSL_190247-005
                  Method:18
=====
  
```



External Standard Report

```

Sorted By           : Signal
Calib. Data Modified : 3/7/2019 1:49:13 PM
Multiplier          : 1.0000
Dilution            : 1.0000
Use Multiplier & Dilution Factor with ISTDs
  
```

Signal 1: FID2 B,

RetTime [min]	Type	Area [pA*s]	Amt/Area	Amount [ppmv]	Grp	Name
1.689		-	-	-		Methane
1.842		-	-	-		Ethane
2.197	BB	2.66205	6.45663e-1	1.71879		Ethylene
2.664		-	-	-		Propane
4.252	BB	9.91377e-1	4.30557e-1	4.26844e-1		Propylene
4.400		-	-	-		i-Butane
4.550		-	-	-		n-Butane
4.883	BB	4.89162e-1	6.47127e-1	3.16550e-1		Acetylene

Handwritten signature: 2/27/19

=====

Acq. Operator	: dyeddula	Seq. Line	: 11
Acq. Instrument	: GC#1	Location	: Vial 12
Injection Date	: 3/8/2019 3:04:28 PM	Inj	: 1
		Inj Volume	: Manually
Acq. Method	: C:\CHEM32\1\DATA\030819\HRVOC_030819 2019-03-08 07-46-20\ALKANES_HRVOC_M18_091117.M		
Last changed	: 3/8/2019 7:11:23 AM by dyeddula		
Analysis Method	: C:\CHEM32\1\METHODS\ALKANES_HRVOC_M18_091117.M		
Last changed	: 3/8/2019 12:32:43 PM by dyeddula (modified after loading)		
Method Info	: HRVOC		
Sample Info	: GSL_190247-005 Method:18		

=====

RetTime [min]	Type	Area [pA*s]	Amt/Area	Amount [ppmv]	Grp	Name
5.328	BB	5.18461e-2	3.29413e-1	1.70788e-2		t-2-Butene
5.389	BB	3.01949e-1	3.26200e-1	9.84955e-2		1-Butene
5.499	BB	2.06637e-1	3.31334e-1	6.84657e-2		i-Butene
5.564	BB	5.06352e-2	3.40178e-1	1.72250e-2		c-2-Butene
5.600		-	-	-		i-Pentane
5.658		-	-	-		n-Pentane
6.048	BB	4.82736e-2	3.37185e-1	1.62771e-2		1,3-Butadiene
6.610		-	-	-		Hexane

Totals : 2.67972

Uncalibrated Peaks : using compound Propane

RetTime [min]	Type	Area [pA*s]	Amt/Area	Amount [ppmv]	Grp	Name
6.273	BB	1.37786e-1	4.34024e-1	5.98024e-2	?	
6.303	BB	4.52537e-2	4.34024e-1	1.96412e-2	?	
6.944	BB	3.08165e-2	4.34024e-1	1.33751e-2	?	
7.089	BB	1.33851e-1	4.34024e-1	5.80945e-2	?	
7.264	BB	1.06023e-1	4.34024e-1	4.60163e-2	?	

Uncalib. totals : 1.96929e-1

2 Warnings or Errors :

Warning : Calibration warnings (see calibration table listing)
Warning : Calibrated compound(s) not found

=====

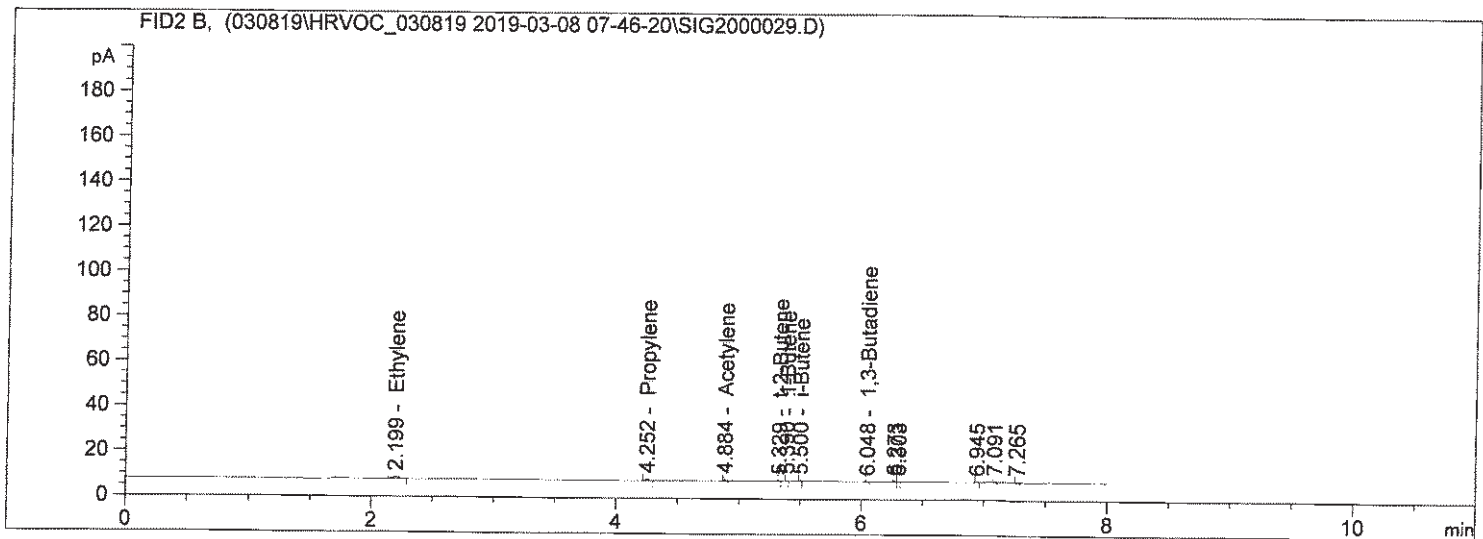
*** End of Report ***

```

=====
Acq. Operator   : dyeddula                      Seq. Line :   11
Acq. Instrument : GC#1                          Location  : Vial 12
Injection Date  : 3/8/2019 3:21:28 PM           Inj       :    2
                                                Inj Volume: Manually

Acq. Method     : C:\CHEM32\1\DATA\030819\HRVOC_030819 2019-03-08 07-46-20\ALKANES_HRVOC_
                  M18_091117.M
Last changed    : 3/8/2019 7:11:23 AM by dyeddula
Analysis Method : C:\CHEM32\1\METHODS\ALKANES_HRVOC_M18_091117.M
Last changed    : 3/8/2019 12:32:43 PM by dyeddula
                  (modified after loading)
Method Info     : HRVOC

Sample Info     : GSL_190247-005
                  Method:18
=====
  
```



External Standard Report

```

Sorted By           :      Signal
Calib. Data Modified :      3/7/2019 1:49:13 PM
Multiplier:         :      1.0000
Dilution:           :      1.0000
Use Multiplier & Dilution Factor with ISTDs
  
```

Signal 1: FID2 B,

RetTime [min]	Type	Area [pA*s]	Amt/Area	Amount [ppmv]	Grp	Name
1.689		-	-	-		Methane
1.842		-	-	-		Ethane
2.199	BB	2.52850	6.45663e-1	1.63256		Ethylene
2.664		-	-	-		Propane
4.252	BB	9.62974e-1	4.30557e-1	4.14615e-1		Propylene
4.400		-	-	-		i-Butane
4.550		-	-	-		n-Butane
4.884	BB	4.76071e-1	6.47127e-1	3.08078e-1		Acetylene

Handwritten signature/initials

=====

Acq. Operator	: dyeddula	Seq. Line	: 11
Acq. Instrument	: GC#1	Location	: Vial 12
Injection Date	: 3/8/2019 3:21:28 PM	Inj	: 2
		Inj Volume	: Manually
Acq. Method	: C:\CHEM32\1\DATA\030819\HRVOC_030819 2019-03-08 07-46-20\ALKANES_HRVOC_M18_091117.M		
Last changed	: 3/8/2019 7:11:23 AM by dyeddula		
Analysis Method	: C:\CHEM32\1\METHODS\ALKANES_HRVOC_M18_091117.M		
Last changed	: 3/8/2019 12:32:43 PM by dyeddula (modified after loading)		
Method Info	: HRVOC		
Sample Info	: GSL_190247-005 Method:18		

=====

RetTime [min]	Type	Area [pA*s]	Amt/Area	Amount [ppmv]	Grp	Name
5.329	BB	4.63903e-2	3.29413e-1	1.52816e-2		t-2-Butene
5.390	BB	2.78064e-1	3.26200e-1	9.07045e-2		1-Butene
5.500	BB	1.92713e-1	3.31334e-1	6.38525e-2		i-Butene
5.548		-	-	-		c-2-Butene
5.600		-	-	-		i-Pentane
5.658		-	-	-		n-Pentane
6.048	BB	4.83358e-2	3.37185e-1	1.62981e-2		1,3-Butadiene
6.610		-	-	-		Hexane

Totals : 2.54139

Uncalibrated Peaks : using compound Propane

RetTime [min]	Type	Area [pA*s]	Amt/Area	Amount [ppmv]	Grp	Name
6.273	BB	1.36035e-1	4.34024e-1	5.90426e-2	?	
6.303	BB	5.52740e-2	4.34024e-1	2.39902e-2	?	
6.945	BB	6.58079e-2	4.34024e-1	2.85622e-2	?	
7.091	BB	1.02456e-1	4.34024e-1	4.44682e-2	?	
7.265	BB	8.79340e-2	4.34024e-1	3.81654e-2	?	

Uncalib. totals : 1.94229e-1

2 Warnings or Errors :

Warning : Calibration warnings (see calibration table listing)
Warning : Calibrated compound(s) not found

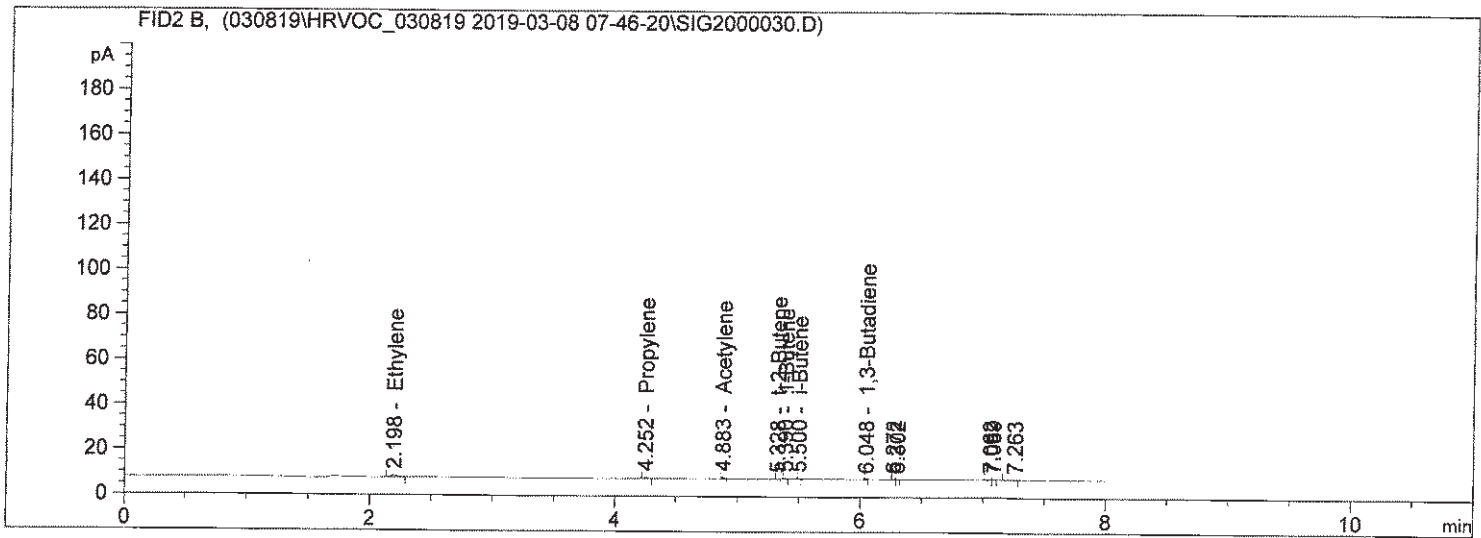
*** End of Report ***


```

=====
Acq. Operator   : dyeddula                      Seq. Line :   11
Acq. Instrument : GC#1                          Location  : Vial 12
Injection Date  : 3/8/2019 3:37:58 PM           Inj       :    3
                                                Inj Volume: Manually

Acq. Method     : C:\CHEM32\1\DATA\030819\HRVOC_030819 2019-03-08 07-46-20\ALKANES_HRVOC_
                  M18_091117.M
Last changed    : 3/8/2019 7:11:23 AM by dyeddula
Analysis Method : C:\CHEM32\1\METHODS\ALKANES_HRVOC_M18_091117.M
Last changed    : 3/8/2019 12:32:43 PM by dyeddula
                  (modified after loading)
Method Info     : HRVOC

Sample Info     : GSL_190247-005
                  Method:18
=====
  
```



External Standard Report

```

Sorted By      :      Signal
Calib. Data Modified : 3/7/2019 1:49:13 PM
Multiplier:    :      1.0000
Dilution:     :      1.0000
Use Multiplier & Dilution Factor with ISTDs
  
```

Signal 1: FID2 B,

RetTime [min]	Type	Area [pA*s]	Amt/Area	Amount [ppmv]	Grp	Name
1.689		-	-	-		Methane
1.842		-	-	-		Ethane
2.198	BB	2.67148	6.45663e-1	1.72487		Ethylene
2.664		-	-	-		Propane
4.252	BB	1.02720	4.30557e-1	4.42267e-1		Propylene
4.400		-	-	-		i-Butane
4.550		-	-	-		n-Butane
4.883	BB	4.89619e-1	6.47127e-1	3.16845e-1		Acetylene

Handwritten signature/initials

=====

Acq. Operator	: dyeddula	Seq. Line	: 11
Acq. Instrument	: GC#1	Location	: Vial 12
Injection Date	: 3/8/2019 3:37:58 PM	Inj	: 3
		Inj Volume	: Manually
Acq. Method	: C:\CHEM32\1\DATA\030819\HRVOC_030819 2019-03-08 07-46-20\ALKANES_HRVOC_M18_091117.M		
Last changed	: 3/8/2019 7:11:23 AM by dyeddula		
Analysis Method	: C:\CHEM32\1\METHODS\ALKANES_HRVOC_M18_091117.M		
Last changed	: 3/8/2019 12:32:43 PM by dyeddula (modified after loading)		
Method Info	: HRVOC		
Sample Info	: GSL_190247-005 Method:18		

=====

RetTime [min]	Type	Area [pA*s]	Amt/Area	Amount [ppmv]	Grp	Name
5.328	BB	4.63694e-2	3.29413e-1	1.52747e-2		t-2-Butene
5.390	BB	3.04456e-1	3.26200e-1	9.93135e-2		1-Butene
5.500	BB	2.16395e-1	3.31334e-1	7.16989e-2		i-Butene
5.548		-	-	-		c-2-Butene
5.600		-	-	-		i-Pentane
5.658		-	-	-		n-Pentane
6.048	BB	5.26834e-2	3.37185e-1	1.77640e-2		1,3-Butadiene
6.610		-	-	-		Hexane

Totals : 2.68804

Uncalibrated Peaks : using compound Propane

RetTime [min]	Type	Area [pA*s]	Amt/Area	Amount [ppmv]	Grp	Name
6.272	BV	1.50324e-1	4.34024e-1	6.52442e-2	?	
6.302	VB	3.85535e-2	4.34024e-1	1.67331e-2	?	
7.062	BV	1.76839e-1	4.34024e-1	7.67522e-2	?	
7.089	VB	1.46718e-1	4.34024e-1	6.36790e-2	?	
7.263	BB	1.06329e-1	4.34024e-1	4.61491e-2	?	

Uncalib. totals : 2.68558e-1

2 Warnings or Errors :

Warning : Calibration warnings (see calibration table listing)
Warning : Calibrated compound(s) not found

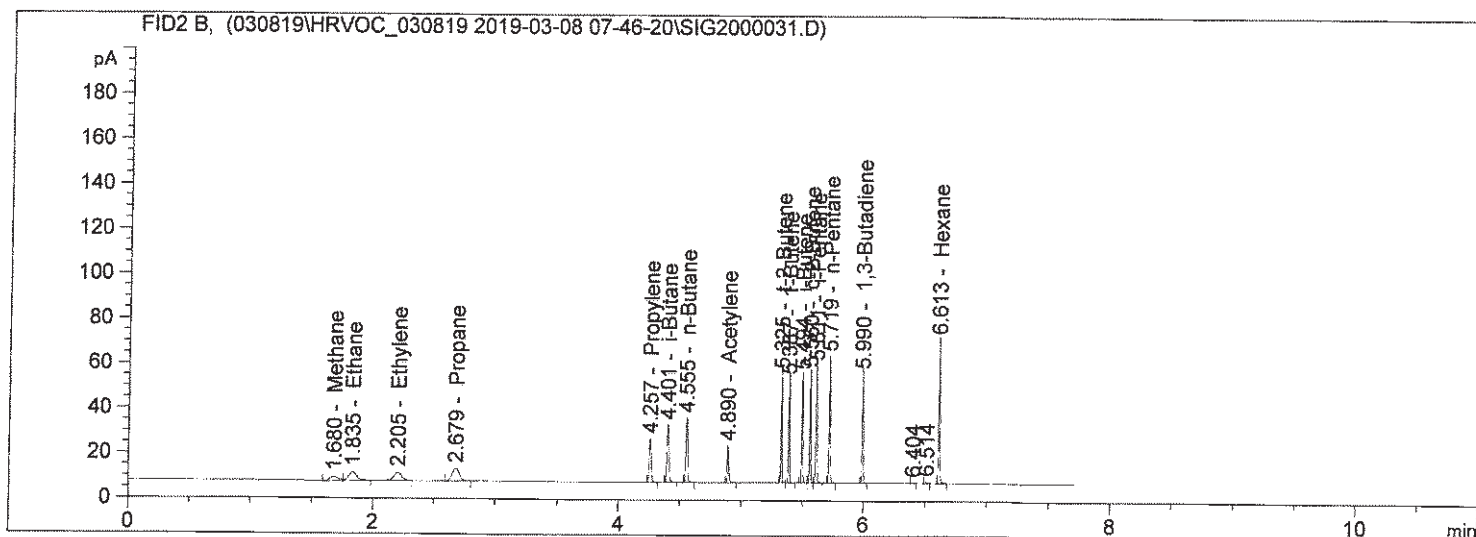
=====
*** End of Report ***

```

=====
Acq. Operator   : dyeddula                      Seq. Line :   12
Acq. Instrument : GC#1                          Location  : Vial 12
Injection Date  : 3/8/2019 3:54:44 PM           Inj       :    1
                                           Inj Volume: Manually

Acq. Method    : C:\CHEM32\1\DATA\030819\HRVOC_030819 2019-03-08 07-46-20\ALKANES_HRVOC_
                M18_091117.M
Last changed   : 3/8/2019 7:11:23 AM by dyeddula
Analysis Method : C:\CHEM32\1\METHODS\ALKANES_HRVOC_M18_091117.M
Last changed   : 3/8/2019 4:05:24 PM by dyeddula
                (modified after loading)
Method Info    : HRVOC

Sample Info    : POST CCV(10ppmv HRVOC+ALKANES)
                Method:18
=====
  
```



External Standard Report

```

Sorted By           :      Signal
Calib. Data Modified :      3/7/2019 1:49:13 PM
Multiplier:         :      1.0000
Dilution:           :      1.0000
Use Multiplier & Dilution Factor with ISTDs
  
```

Signal 1: FID2 B,

RetTime [min]	Type	Area [pA*s]	Amt/Area	Amount [ppmv]	Grp	Name
1.680	BV	8.59016	1.12222	9.64009		Methane
1.835	VB	16.98835	5.89609e-1	10.01648		Ethane
2.205	BB	14.79374	6.45663e-1	9.55177		Ethylene
2.679	BB	22.25752	4.34024e-1	9.66029		Propane
4.257	BB	22.39714	4.30557e-1	9.64324		Propylene
4.401	BB	29.50278	3.29374e-1	9.71745		i-Butane
4.555	BB	29.47403	3.26258e-1	9.61615		n-Butane
4.890	BB	14.25300	6.47127e-1	9.22350		Acetylene

207149

Sample Name: POST CCV

```

=====
Acq. Operator   : dyeddula                      Seq. Line :   12
Acq. Instrument : GC#1                          Location  : Vial 12
Injection Date  : 3/8/2019 3:54:44 PM           Inj       :    1
                                           Inj Volume : Manually
Acq. Method     : C:\CHEM32\1\DATA\030819\HRVOC_030819 2019-03-08 07-46-20\ALKANES_HRVOC_
                  M18_091117.M
Last changed    : 3/8/2019 7:11:23 AM by dyeddula
Analysis Method : C:\CHEM32\1\METHODS\ALKANES_HRVOC_M18_091117.M
Last changed    : 3/8/2019 4:05:24 PM by dyeddula
                  (modified after loading)
Method Info     : HRVOC

Sample Info     : POST CCV(10ppmv HRVOC+ALKANES)
                  Method:18
=====

```

```

=====
RetTime  Type      Area      Amt/Area   Amount    Grp   Name
 [min]   [pA*s]          [ppmv]
-----|-----|-----|-----|-----|-----|-----
 5.325  BV          28.97248  3.29413e-1  9.54391   t-2-Butene
 5.387  VB          29.96472  3.26200e-1  9.77448   1-Butene
 5.494  BV          29.18171  3.31334e-1  9.66888   i-Butene
 5.560  VV          29.16629  3.40178e-1  9.92173   c-2-Butene
 5.611  VB          36.92987  2.52648e-1  9.33026   i-Pentane
 5.719  BB          36.54632  2.58175e-1  9.43533   n-Pentane
 5.990  BB          29.02400  3.37185e-1  9.78645   1,3-Butadiene
 6.613  BB          41.24366  2.30048e-1  9.48804   Hexane
=====

```

Totals : 154.01805

Uncalibrated Peaks : using compound Propane

```

RetTime  Type      Area      Amt/Area   Amount    Grp   Name
 [min]   [pA*s]          [ppmv]
-----|-----|-----|-----|-----|-----|-----
 6.404  BB          1.44104e-1  4.34024e-1  6.25443e-2  ?
 6.514  BB          3.49544e-1  4.34024e-1  1.51710e-1  ?
=====

```

Uncalib. totals : 2.14255e-1

1 Warnings or Errors :

Warning : Calibration warnings (see calibration table listing)

```

=====
*** End of Report ***
=====

```

Sample Name: CCV

```

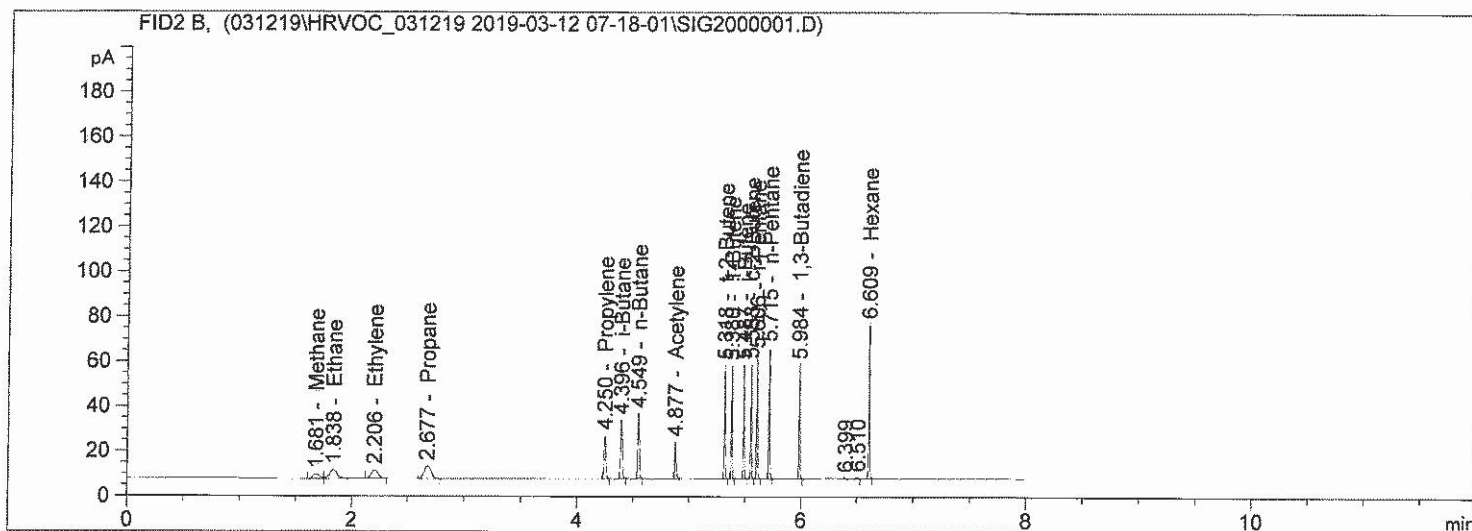
=====
Acq. Operator   : dyeddula                      Seq. Line :    1
Acq. Instrument : GC#1                          Location  : Vial 1
Injection Date  : 3/12/2019 7:24:33 AM          Inj       :    1
                                                Inj Volume: Manually

Acq. Method     : C:\CHEM32\1\DATA\031219\HRVOC_031219 2019-03-12 07-18-01\ALKANES_HRVOC_
                  M18_091117.M

Last changed    : 3/12/2019 7:18:00 AM by dyeddula
Analysis Method : C:\CHEM32\1\METHODS\ALKANES_HRVOC_M18_091117.M
Last changed    : 3/12/2019 7:39:40 AM by dyeddula
                  (modified after loading)

Method Info     : HRVOC

Sample Info     : CCV(10ppmv HRVOC+ALKANES)
                  Method:18
=====
    
```



External Standard Report

```

Sorted By      : Signal
Calib. Data Modified : 3/11/2019 2:57:14 PM
Multiplier:    : 1.0000
Dilution:      : 1.0000
Use Multiplier & Dilution Factor with ISTDs
    
```

Signal 1: FID2 B,

RetTime [min]	Type	Area [pA*s]	Amt/Area	Amount [ppmv]	Grp	Name
1.681	BV	8.56178	1.12222	9.60824		Methane
1.838	VB	17.02062	5.89609e-1	10.03551		Ethane
2.206	BB	15.01513	6.45663e-1	9.69472		Ethylene
2.677	BB	22.59308	4.34024e-1	9.80593		Propane
4.250	BB	22.70829	4.30557e-1	9.77720		Propylene
4.396	BB	29.85678	3.29374e-1	9.83405		i-Butane
4.549	BB	29.93185	3.26258e-1	9.76552		n-Butane
4.877	BB	13.98584	6.47127e-1	9.05061		Acetylene

Handwritten signature/initials

Sample Name: CCV

```

=====
Acq. Operator   : dyeddula                      Seq. Line :    1
Acq. Instrument : GC#1                          Location  : Vial 1
Injection Date  : 3/12/2019 7:24:33 AM          Inj       :    1
                                                Inj Volume: Manually
Acq. Method     : C:\CHEM32\1\DATA\031219\HRVOC_031219 2019-03-12 07-18-01\ALKANES_HRVOC_
                  M18_091117.M
Last changed    : 3/12/2019 7:18:00 AM by dyeddula
Analysis Method : C:\CHEM32\1\METHODS\ALKANES_HRVOC_M18_091117.M
Last changed    : 3/12/2019 7:39:40 AM by dyeddula
                  (modified after loading)
Method Info     : HRVOC

Sample Info     : CCV(10ppmv HRVOC+ALKANES)
                  Method:18
=====
    
```

RetTime [min]	Type	Area [pA*s]	Amt/Area	Amount [ppmv]	Grp	Name
5.318	BB	29.67489	3.29413e-1	9.77530		t-2-Butene
5.380	BB	30.24816	3.26200e-1	9.86694		1-Butene
5.487	BB	29.82188	3.31334e-1	9.88099		i-Butene
5.553	BB	29.86663	3.40178e-1	10.15997		c-2-Butene
5.606	BB	37.66014	2.52648e-1	9.51476		i-Pentane
5.715	BB	37.52074	2.58175e-1	9.68690		n-Pentane
5.984	BB	29.71518	3.37185e-1	10.01951		1,3-Butadiene
6.609	BB	42.71241	2.30048e-1	9.82592		Hexane

Totals : 156.30206

Uncalibrated Peaks : using compound Propane

RetTime [min]	Type	Area [pA*s]	Amt/Area	Amount [ppmv]	Grp	Name
6.399	BB	1.46598e-1	4.34024e-1	6.36271e-2		?
6.510	BB	3.47984e-1	4.34024e-1	1.51033e-1		?

Uncalib. totals : 2.14660e-1

1 Warnings or Errors :

Warning : Calibration warnings (see calibration table listing)

*** End of Report ***

Sample Name: LCS

```

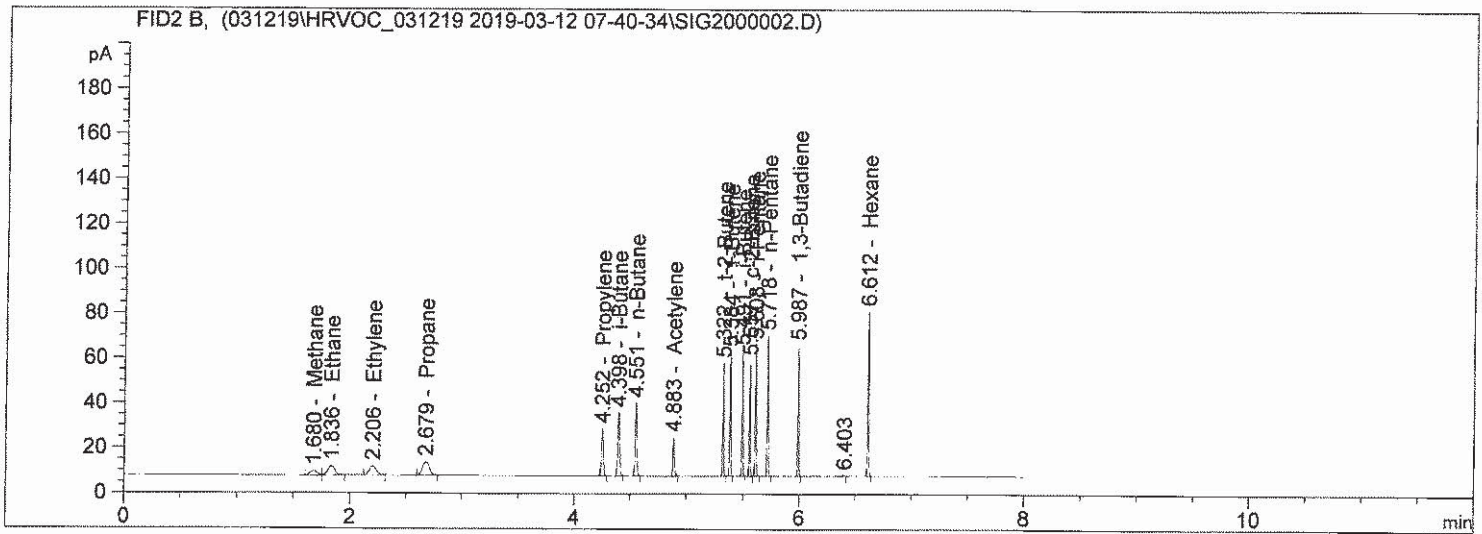
=====
Acq. Operator   : dyeddula                      Seq. Line :    1
Acq. Instrument : GC#1                          Location  : Vial 2
Injection Date  : 3/12/2019 7:44:54 AM          Inj       :    1
                                                Inj Volume: Manually

Acq. Method     : C:\CHEM32\1\DATA\031219\HRVOC_031219 2019-03-12 07-40-34\ALKANES_HRVOC_
M18_091117.M

Last changed    : 3/12/2019 7:18:00 AM by dyeddula
Analysis Method : C:\CHEM32\1\METHODS\ALKANES_HRVOC_M18_091117.M
Last changed    : 3/12/2019 7:39:40 AM by dyeddula
                 (modified after loading)

Method Info     : HRVOC

Sample Info     : LCS(10ppmv HRVOC+ALKANES)
                 Method:18
=====
    
```



External Standard Report

```

Sorted By      : Signal
Calib. Data Modified : 3/11/2019 2:57:14 PM
Multiplier:    : 1.0000
Dilution:      : 1.0000
Use Multiplier & Dilution Factor with ISTDs
    
```

Signal 1: FID2 B,

RetTime [min]	Type	Area [pA*s]	Amt/Area	Amount [ppmv]	Grp	Name
1.680	BV	9.16270	1.12222	10.28260		Methane
1.836	VB	17.93584	5.89609e-1	10.57513		Ethane
2.206	BB	16.64917	6.45663e-1	10.74976		Ethylene
2.679	BB	24.37570	4.34024e-1	10.57963		Propane
4.252	BB	24.45498	4.30557e-1	10.52925		Propylene
4.398	BB	32.59991	3.29374e-1	10.73756		i-Butane
4.551	BB	33.28112	3.26258e-1	10.85825		n-Butane
4.883	BB	14.62574	6.47127e-1	9.46471		Acetylene

3/12/2019

Sample Name: LCS

```

=====
Acq. Operator   : dyeddula                      Seq. Line :    1
Acq. Instrument : GC#1                          Location  : Vial 2
Injection Date  : 3/12/2019 7:44:54 AM          Inj       :    1
                                                Inj Volume: Manually
Acq. Method     : C:\CHEM32\1\DATA\031219\HRVOC_031219 2019-03-12 07-40-34\ALKANES_HRVOC_
M18_091117.M
Last changed    : 3/12/2019 7:18:00 AM by dyeddula
Analysis Method : C:\CHEM32\1\METHODS\ALKANES_HRVOC_M18_091117.M
Last changed    : 3/12/2019 7:39:40 AM by dyeddula
                 (modified after loading)
Method Info     : HRVOC

Sample Info     : LCS(10ppmv HRVOC+ALKANES)
                 Method:18
=====

```

```

=====
RetTime  Type      Area      Amt/Area   Amount   Grp   Name
 [min]                [pA*s]                [ppmv]
-----|-----|-----|-----|-----|---|-----
 5.322 BB      29.49520 3.29413e-1  9.71610   t-2-Butene
 5.384 BB      33.53899 3.26200e-1 10.94041   1-Butene
 5.491 BB      33.43354 3.31334e-1 11.07766   i-Butene
 5.557 BB      30.22267 3.40178e-1 10.28109   c-2-Butene
 5.608 BB      39.87177 2.52648e-1 10.07352   i-Pentane
 5.718 BB      40.41762 2.58175e-1 10.43480   n-Pentane
 5.987 BB      33.44274 3.37185e-1 11.27638   1,3-Butadiene
 6.612 BB      47.19776 2.30048e-1 10.85777   Hexane
=====

```

Totals : 168.43462

Uncalibrated Peaks : using compound Propane

```

RetTime  Type      Area      Amt/Area   Amount   Grp   Name
 [min]                [pA*s]                [ppmv]
-----|-----|-----|-----|-----|---|-----
 6.403 BB      2.16998e-1 4.34024e-1 9.41821e-2  ?
=====

```

Uncalib. totals : 9.41821e-2

1 Warnings or Errors :

Warning : Calibration warnings (see calibration table listing)

```

=====
*** End of Report ***
=====

```


Sample Name: BLANK

```

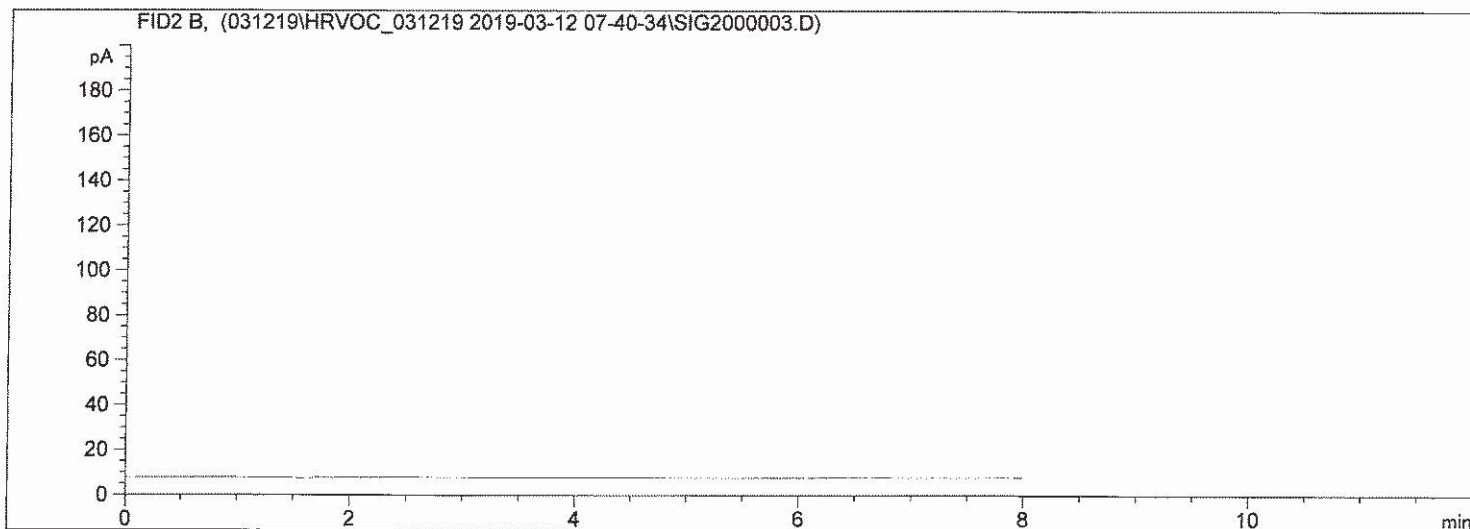
=====
Acq. Operator   : dyeddula                      Seq. Line :    2
Acq. Instrument : GC#1                          Location  : Vial 3
Injection Date  : 3/12/2019 8:01:52 AM          Inj       :    1
                                                Inj Volume: Manually

Acq. Method     : C:\CHEM32\1\DATA\031219\HRVOC_031219 2019-03-12 07-40-34\ALKANES_HRVOC_
                M18_091117.M

Last changed    : 3/12/2019 7:18:00 AM by dyeddula
Analysis Method : C:\CHEM32\1\METHODS\ALKANES_HRVOC_M18_091117.M
Last changed    : 3/12/2019 7:39:40 AM by dyeddula
                (modified after loading)

Method Info     : HRVOC

Sample Info     : BLANK
                Method:18
=====
    
```



External Standard Report

```

Sorted By      : Signal
Calib. Data Modified : 3/11/2019 2:57:14 PM
Multiplier:    : 1.0000
Dilution:      : 1.0000
Use Multiplier & Dilution Factor with ISTDs
    
```

Signal 1: FID2 B,

RetTime [min]	Type	Area [pA*s]	Amt/Area	Amount [ppmv]	Grp	Name
1.689	-	-	-	-	-	Methane
1.842	-	-	-	-	-	Ethane
2.192	-	-	-	-	-	Ethylene
2.664	-	-	-	-	-	Propane
4.264	-	-	-	-	-	Propylene
4.400	-	-	-	-	-	i-Butane
4.550	-	-	-	-	-	n-Butane
4.802	-	-	-	-	-	Acetylene

3/15/19

Sample Name: BLANK

```

=====
Acq. Operator   : dyeddula                      Seq. Line :    2
Acq. Instrument : GC#1                          Location  : Vial 3
Injection Date  : 3/12/2019 8:01:52 AM          Inj       :    1
                                                Inj Volume: Manually

Acq. Method     : C:\CHEM32\1\DATA\031219\HRVOC_031219 2019-03-12 07-40-34\ALKANES_HRVOC_
                  M18_091117.M
Last changed    : 3/12/2019 7:18:00 AM by dyeddula
Analysis Method : C:\CHEM32\1\METHODS\ALKANES_HRVOC_M18_091117.M
Last changed    : 3/12/2019 7:39:40 AM by dyeddula
                  (modified after loading)

Method Info     : HRVOC

Sample Info     : BLANK
                  Method:18
=====
    
```

RetTime [min]	Type	Area [pA*s]	Amt/Area	Amount [ppmv]	Grp	Name
5.310	-	-	-	-		t-2-Butene
5.371	-	-	-	-		1-Butene
5.478	-	-	-	-		i-Butene
5.548	-	-	-	-		c-2-Butene
5.600	-	-	-	-		i-Pentane
5.658	-	-	-	-		n-Pentane
5.942	-	-	-	-		1,3-Butadiene
6.606	-	-	-	-		Hexane

Totals : 0.00000

Uncalibrated Peaks : using compound Propane

2 Warnings or Errors :

Warning : Calibration warnings (see calibration table listing)
 Warning : Calibrated compound(s) not found

Area Percent Report

```

Sorted By      : Signal
Calib. Data Modified : 3/11/2019 2:57:14 PM
Multiplier:    : 1.0000
Dilution:      : 1.0000
Use Multiplier & Dilution Factor with ISTDs
    
```

Signal 1: FID2 B,

Peak #	RetTime [min]	Type	Width [min]	Area [pA*s]	Area %	Name
1	1.689		0.0000	0.00000	0.00000	Methane
2	1.842		0.0000	0.00000	0.00000	Ethane

Sample Name: BLANK

```

=====
Acq. Operator   : dyeddula                      Seq. Line :    2
Acq. Instrument : GC#1                          Location  : Vial 3
Injection Date  : 3/12/2019 8:01:52 AM          Inj       :    1
                                                Inj Volume: Manually
Acq. Method     : C:\CHEM32\1\DATA\031219\HRVOC_031219 2019-03-12 07-40-34\ALKANES_HRVOC_
M18_091117.M
Last changed    : 3/12/2019 7:18:00 AM by dyeddula
Analysis Method : C:\CHEM32\1\METHODS\ALKANES_HRVOC_M18_091117.M
Last changed    : 3/12/2019 7:39:40 AM by dyeddula
                (modified after loading)
Method Info     : HRVOC
Sample Info     : BLANK
                Method:18
=====

```

```

=====
Peak RetTime  Type  Width  Area  Area  Name
#    [min]    [min] [pA*s] %
-----|-----|-----|-----|-----|-----
  3   2.192      0.0000  0.00000  0.00000 Ethylene
  4   2.664      0.0000  0.00000  0.00000 Propane
  5   4.264      0.0000  0.00000  0.00000 Propylene
  6   4.400      0.0000  0.00000  0.00000 i-Butane
  7   4.550      0.0000  0.00000  0.00000 n-Butane
  8   4.802      0.0000  0.00000  0.00000 Acetylene
  9   5.310      0.0000  0.00000  0.00000 t-2-Butene
 10   5.371      0.0000  0.00000  0.00000 l-Butene
 11   5.478      0.0000  0.00000  0.00000 i-Butene
 12   5.548      0.0000  0.00000  0.00000 c-2-Butene
 13   5.600      0.0000  0.00000  0.00000 i-Pentane
 14   5.658      0.0000  0.00000  0.00000 n-Pentane
 15   5.942      0.0000  0.00000  0.00000 1,3-Butadiene
 16   6.606      0.0000  0.00000  0.00000 Hexane

```

```
Totals :                      0.00000  0.0000
```

```
2 Warnings or Errors :
```

```
Warning : Calibration warnings (see calibration table listing)
```

```
Warning : Calibrated compound(s) not found
```

```
=====
*** End of Report ***
```

```

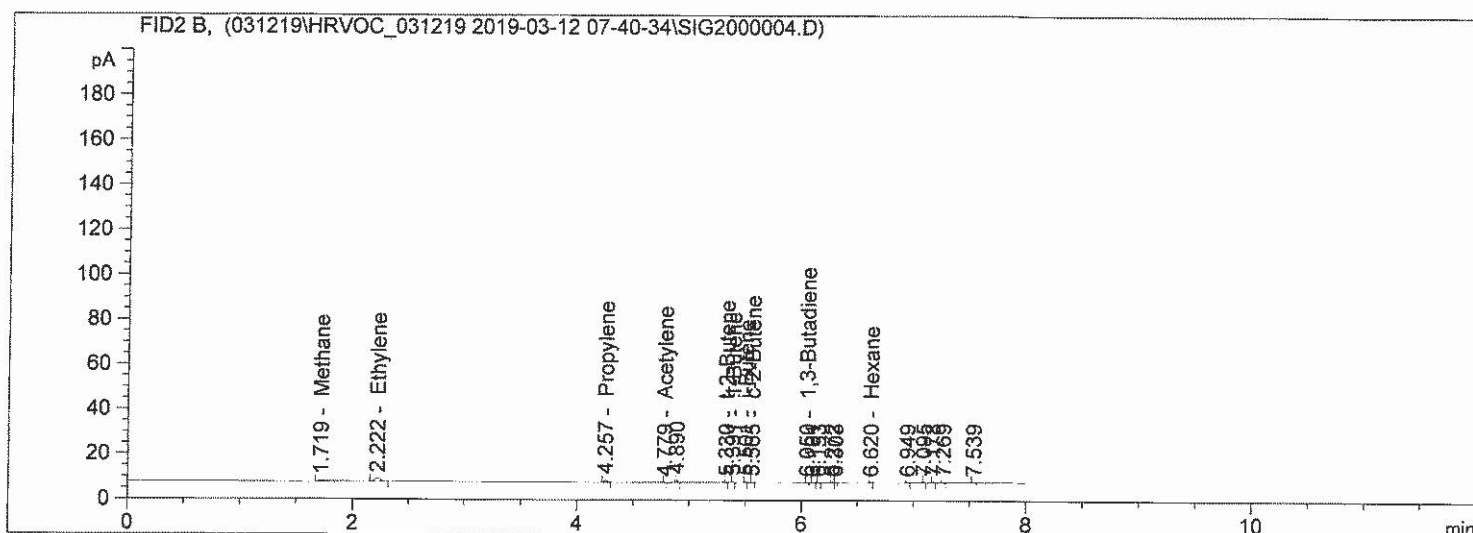
=====
Acq. Operator   : dyeddula                      Seq. Line :    3
Acq. Instrument : GC#1                          Location  : Vial 4
Injection Date  : 3/12/2019 9:41:08 AM          Inj       :    1
                                                Inj Volume: Manually

Acq. Method     : C:\CHEM32\1\DATA\031219\HRVOC_031219 2019-03-12 07-40-34\ALKANES_HRVOC_
                  M18_091117.M

Last changed    : 3/12/2019 7:18:00 AM by dyeddula
Analysis Method : C:\CHEM32\1\METHODS\ALKANES_HRVOC_M18_091117.M
Last changed    : 3/12/2019 10:36:40 AM by dyeddula
                  (modified after loading)

Method Info     : HRVOC

Sample Info     : GSL_190249-001
                  Method:18
=====
  
```



External Standard Report

```

Sorted By      : Signal
Calib. Data Modified : 3/12/2019 10:36:22 AM
Multiplier:    : 1.0000
Dilution:      : 1.0000
Use Multiplier & Dilution Factor with ISTDs
  
```

Signal 1: FID2 B,

RetTime [min]	Type	Area [pA*s]	Amt/Area	Amount [ppmv]	Grp	Name
1.719	BB	2.15699	1.12222	2.42062		Methane
1.838		-	-	-		Ethane
2.222	BB	4.77525	6.45663e-1	3.08320		Ethylene
2.664		-	-	-		Propane
4.257	BB	1.44348	4.30557e-1	6.21501e-1		Propylene
4.400		-	-	-		i-Butane
4.550		-	-	-		n-Butane
4.779	BB	3.85938e-2	6.47127e-1	2.49751e-2		Acetylene

Handwritten signature/initials

Sample Name: GSL_190249-001

```

=====
Acq. Operator   : dyeddula                      Seq. Line :    3
Acq. Instrument : GC#1                          Location  : Vial 4
Injection Date  : 3/12/2019 9:41:08 AM          Inj       :    1
                                                Inj Volume: Manually
Acq. Method     : C:\CHEM32\1\DATA\031219\HRVOC_031219 2019-03-12 07-40-34\ALKANES_HRVOC_
                  M18_091117.M
Last changed    : 3/12/2019 7:18:00 AM by dyeddula
Analysis Method : C:\CHEM32\1\METHODS\ALKANES_HRVOC_M18_091117.M
Last changed    : 3/12/2019 10:36:40 AM by dyeddula
                  (modified after loading)
Method Info     : HRVOC

Sample Info     : GSL_190249-001
                  Method:18
=====
    
```

RetTime [min]	Type	Area [pA*s]	Amt/Area	Amount [ppmv]	Grp	Name
5.330	BB	6.31448e-2	3.29413e-1	2.08007e-2		t-2-Butene
5.391	BB	3.66358e-1	3.26200e-1	1.19506e-1		1-Butene
5.501	BB	2.05379e-1	3.31334e-1	6.80490e-2		i-Butene
5.565	BB	5.14871e-2	3.40178e-1	1.75148e-2		c-2-Butene
5.600		-	-	-		i-Pentane
5.658		-	-	-		n-Pentane
6.050	BB	9.45671e-2	3.37185e-1	3.18866e-2		1,3-Butadiene
6.620	BB	4.65409e-2	2.30048e-1	1.07067e-2		Hexane

Totals : 6.41876

Uncalibrated Peaks : using compound Propane

RetTime [min]	Type	Area [pA*s]	Amt/Area	Amount [ppmv]	Grp	Name
4.890	BB	8.88454e-1	4.34024e-1	3.85610e-1	?	
6.101	BB	1.07941e-1	4.34024e-1	4.68488e-2	?	
6.153	BB	5.32444e-2	4.34024e-1	2.31093e-2	?	
6.272	BB	1.45362e-1	4.34024e-1	6.30904e-2	?	
6.303	BB	5.71200e-2	4.34024e-1	2.47914e-2	?	
6.949	BB	3.29002e-2	4.34024e-1	1.42795e-2	?	
7.095	BB	1.01403e-1	4.34024e-1	4.40115e-2	?	
7.178	BB	7.44294e-2	4.34024e-1	3.23041e-2	?	
7.269	BB	1.16119e-1	4.34024e-1	5.03984e-2	?	
7.539	BB	5.14262e-2	4.34024e-1	2.23202e-2	?	

Uncalib. totals : 7.06764e-1

2 Warnings or Errors :

Warning : Calibration warnings (see calibration table listing)

Warning : Calibrated compound(s) not found

*** End of Report ***

Sample Name: GSL_190249-001

```

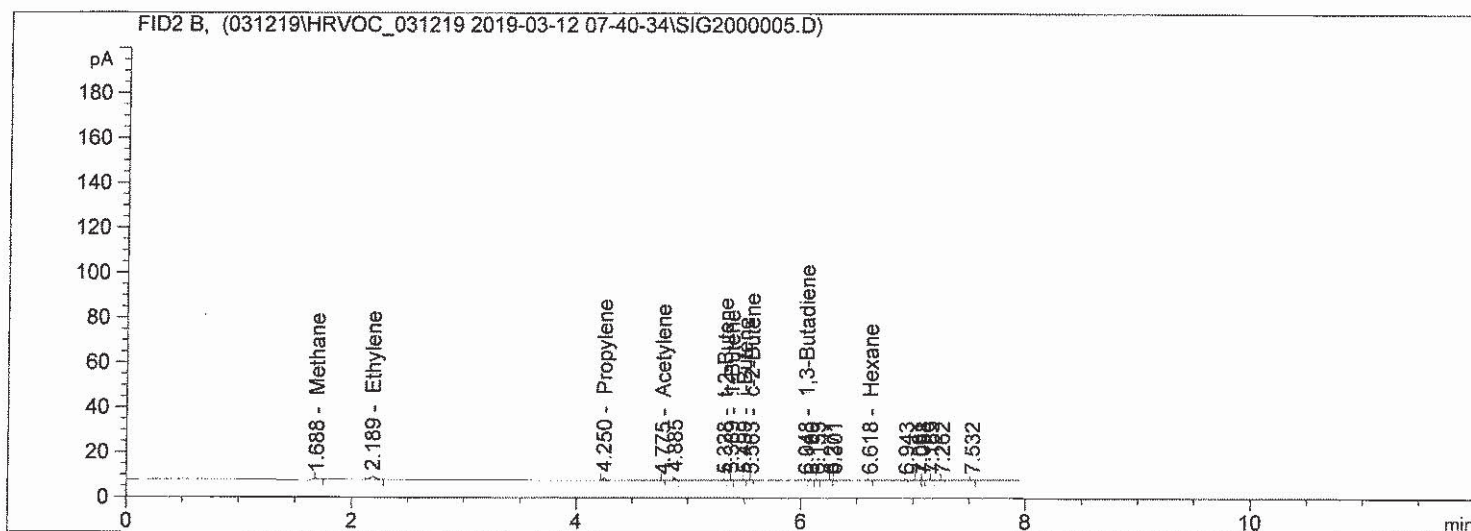
=====
Acq. Operator   : dyeddula                      Seq. Line :    3
Acq. Instrument : GC#1                          Location  : Vial 4
Injection Date  : 3/12/2019 9:57:54 AM          Inj       :    2
                                                Inj Volume: Manually

Acq. Method     : C:\CHEM32\1\DATA\031219\HRVOC_031219 2019-03-12 07-40-34\ALKANES_HRVOC_
                  M18_091117.M

Last changed    : 3/12/2019 7:18:00 AM by dyeddula
Analysis Method : C:\CHEM32\1\METHODS\ALKANES_HRVOC_M18_091117.M
Last changed    : 3/12/2019 10:36:40 AM by dyeddula
                  (modified after loading)

Method Info     : HRVOC

Sample Info     : GSL_190249-001
                  Method:18
=====
    
```



External Standard Report

```

Sorted By      : Signal
Calib. Data Modified : 3/12/2019 10:36:22 AM
Multiplier:    : 1.0000
Dilution:      : 1.0000
Use Multiplier & Dilution Factor with ISTDs
    
```

Signal 1: FID2 B,

RetTime [min]	Type	Area [pA*s]	Amt/Area	Amount [ppmv]	Grp	Name
1.688	BB	1.68384e-1	1.12222	1.88964e-1		Methane
1.838		-	-	-		Ethane
2.189	BB	4.53029	6.45663e-1	2.92504		Ethylene
2.664		-	-	-		Propane
4.250	BB	1.37945	4.30557e-1	5.93930e-1		Propylene
4.400		-	-	-		i-Butane
4.550		-	-	-		n-Butane
4.775	BB	4.59546e-2	6.47127e-1	2.97385e-2		Acetylene

Handwritten signature: 3/12/2019

Sample Name: GSL_190249-001

```

=====
Acq. Operator   : dyeddula                      Seq. Line :    3
Acq. Instrument : GC#1                          Location  : Vial 4
Injection Date  : 3/12/2019 9:57:54 AM          Inj       :    2
                                                Inj Volume: Manually

Acq. Method     : C:\CHEM32\1\DATA\031219\HRVOC_031219 2019-03-12 07-40-34\ALKANES_HRVOC_
                  M18_091117.M

Last changed    : 3/12/2019 7:18:00 AM by dyeddula
Analysis Method : C:\CHEM32\1\METHODS\ALKANES_HRVOC_M18_091117.M
Last changed    : 3/12/2019 10:36:40 AM by dyeddula
                  (modified after loading)

Method Info     : HRVOC

Sample Info     : GSL_190249-001
                  Method:18
=====

```

```

=====
RetTime  Type      Area      Amt/Area   Amount     Grp   Name
 [min]                [pA*s]                [ppmv]
-----|-----|-----|-----|-----|---|-----
 5.328 BB      6.67826e-2 3.29413e-1 2.19991e-2 t-2-Butene
 5.389 BB      3.41247e-1 3.26200e-1 1.11314e-1 1-Butene
 5.499 BB      2.08270e-1 3.31334e-1 6.90067e-2 i-Butene
 5.563 BB      4.72641e-2 3.40178e-1 1.60782e-2 c-2-Butene
 5.600          -           -           -           i-Pentane
 5.658          -           -           -           n-Pentane
 6.048 BB      7.87023e-2 3.37185e-1 2.65372e-2 1,3-Butadiene
 6.618 BB      4.61924e-2 2.30048e-1 1.06265e-2 Hexane

```

Totals : 3.99323

Uncalibrated Peaks : using compound Propane

```

RetTime  Type      Area      Amt/Area   Amount     Grp   Name
 [min]                [pA*s]                [ppmv]
-----|-----|-----|-----|-----|---|-----
 4.885 BB      8.01437e-1 4.34024e-1 3.47842e-1 ?
 6.100 BB      6.81932e-2 4.34024e-1 2.95975e-2 ?
 6.153 BB      3.00004e-2 4.34024e-1 1.30209e-2 ?
 6.271 BB      1.39438e-1 4.34024e-1 6.05194e-2 ?
 6.301 BB      5.54091e-2 4.34024e-1 2.40488e-2 ?
 6.943 BB      3.59441e-2 4.34024e-1 1.56006e-2 ?
 7.061 BV      1.85619e-1 4.34024e-1 8.05630e-2 ?
 7.088 VB      1.37515e-1 4.34024e-1 5.96847e-2 ?
 7.169 BB      5.71830e-2 4.34024e-1 2.48188e-2 ?
 7.262 BB      1.01613e-1 4.34024e-1 4.41025e-2 ?
 7.532 BB      6.14722e-2 4.34024e-1 2.66804e-2 ?

```

Uncalib. totals : 7.26479e-1

2 Warnings or Errors :

Warning : Calibration warnings (see calibration table listing)

Warning : Calibrated compound(s) not found

*** End of Report ***

336 of 460

Sample Name: GSL_190249-001

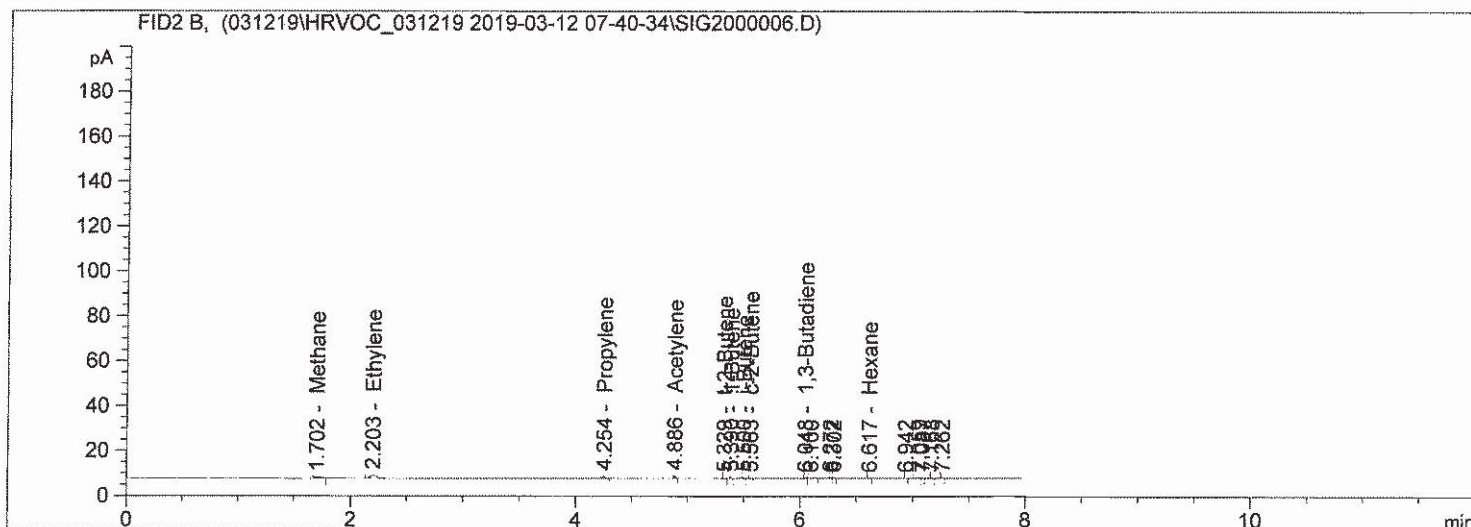
```

=====
Acq. Operator   : dyeddula                      Seq. Line :    3
Acq. Instrument : GC#1                          Location  : Vial 4
Injection Date  : 3/12/2019 10:14:53 AM         Inj       :    3
                                                    Inj Volume: Manually

Acq. Method     : C:\CHEM32\1\DATA\031219\HRVOC_031219 2019-03-12 07-40-34\ALKANES_HRVOC_
                  M18_091117.M
Last changed    : 3/12/2019 7:18:00 AM by dyeddula
Analysis Method : C:\CHEM32\1\METHODS\ALKANES_HRVOC_M18_091117.M
Last changed    : 3/12/2019 10:36:40 AM by dyeddula
                  (modified after loading)

Method Info     : HRVOC

Sample Info     : GSL_190249-001
                  Method:18
=====
    
```



External Standard Report

```

Sorted By           : Signal
Calib. Data Modified : 3/12/2019 10:36:22 AM
Multiplier          : 1.0000
Dilution            : 1.0000
Use Multiplier & Dilution Factor with ISTDs
    
```

Signal 1: FID2 B,

RetTime [min]	Type	Area [pA*s]	Amt/Area	Amount [ppmv]	Grp	Name
1.702	BB	8.49871e-1	1.12222	9.53745e-1		Methane
1.838		-	-	-		Ethane
2.203	BB	4.46677	6.45663e-1	2.88403		Ethylene
2.664		-	-	-		Propane
4.254	BB	1.39016	4.30557e-1	5.98543e-1		Propylene
4.400		-	-	-		i-Butane
4.550		-	-	-		n-Butane
4.886	BB	8.02669e-1	6.47127e-1	5.19429e-1		Acetylene

Handwritten signature/initials

Sample Name: GSL_190249-001

```

=====
Acq. Operator   : dyeddula                      Seq. Line :    3
Acq. Instrument : GC#1                          Location  : Vial 4
Injection Date  : 3/12/2019 10:14:53 AM         Inj       :    3
                                                Inj Volume: Manually
Acq. Method     : C:\CHEM32\1\DATA\031219\HRVOC_031219 2019-03-12 07-40-34\ALKANES_HRVOC_
                  M18_091117.M
Last changed    : 3/12/2019 7:18:00 AM by dyeddula
Analysis Method : C:\CHEM32\1\METHODS\ALKANES_HRVOC_M18_091117.M
Last changed    : 3/12/2019 10:36:40 AM by dyeddula
                  (modified after loading)
Method Info     : HRVOC

Sample Info     : GSL_190249-001
                  Method:18
=====

```

```

=====
RetTime  Type      Area      Amt/Area  Amount  Grp  Name
 [min]                [pA*s]                [ppmv]
-----|-----|-----|-----|-----|---|-----
 5.329 BB      5.82599e-2 3.29413e-1 1.91916e-2 t-2-Butene
 5.390 BB      3.43709e-1 3.26200e-1 1.12118e-1 1-Butene
 5.500 BB      1.89987e-1 3.31334e-1 6.29492e-2 i-Butene
 5.563 BB      4.97248e-2 3.40178e-1 1.69153e-2 c-2-Butene
 5.600          -          -          -          i-Pentane
 5.658          -          -          -          n-Pentane
 6.048 BB      8.46016e-2 3.37185e-1 2.85264e-2 1,3-Butadiene
 6.617 BB      4.61721e-2 2.30048e-1 1.06218e-2 Hexane
=====

```

Totals : 5.20607

Uncalibrated Peaks : using compound Propane

```

RetTime  Type      Area      Amt/Area  Amount  Grp  Name
 [min]                [pA*s]                [ppmv]
-----|-----|-----|-----|-----|---|-----
 6.100 BB      8.25313e-2 4.34024e-1 3.58205e-2 ?
 6.272 BB      1.33445e-1 4.34024e-1 5.79184e-2 ?
 6.302 BB      4.16441e-2 4.34024e-1 1.80745e-2 ?
 6.942 BB      3.07846e-2 4.34024e-1 1.33613e-2 ?
 7.059 BV      2.15287e-1 4.34024e-1 9.34398e-2 ?
 7.087 VB      1.02265e-1 4.34024e-1 4.43854e-2 ?
 7.168 BB      4.45924e-2 4.34024e-1 1.93542e-2 ?
 7.262 BB      1.18777e-1 4.34024e-1 5.15521e-2 ?
=====

```

Uncalib. totals : 3.33906e-1

2 Warnings or Errors :

Warning : Calibration warnings (see calibration table listing)
Warning : Calibrated compound(s) not found

*** End of Report ***

Sample Name: GSL_190249-002

```

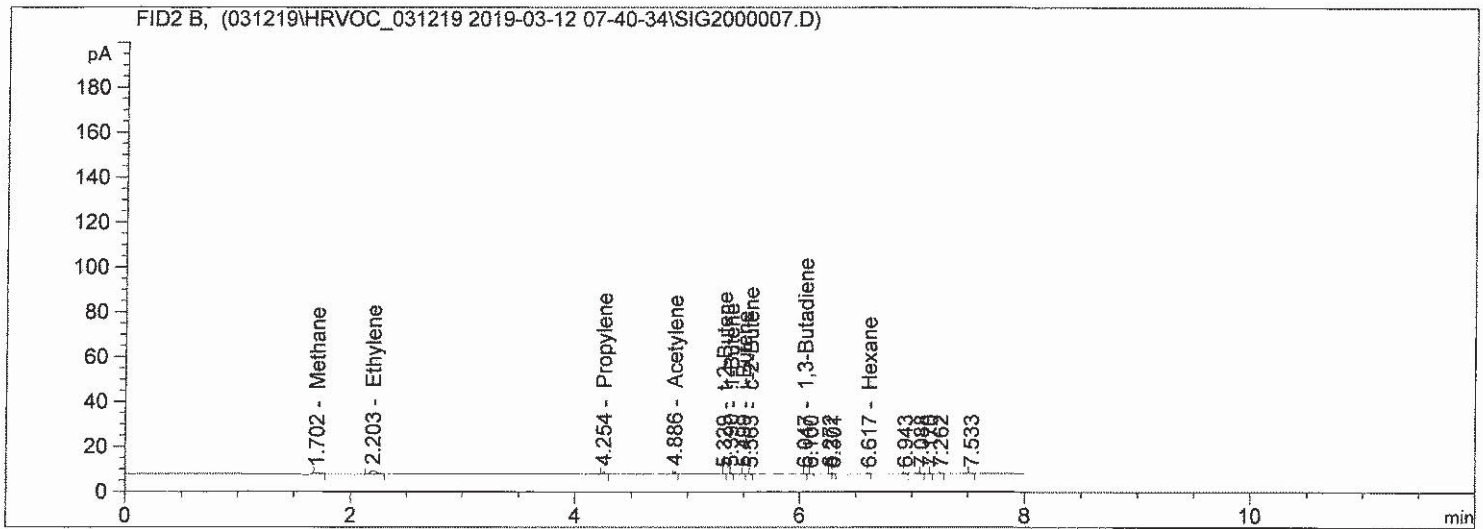
=====
Acq. Operator   : dyeddula                      Seq. Line :    4
Acq. Instrument : GC#1                          Location  : Vial 5
Injection Date  : 3/12/2019 10:31:57 AM         Inj       :    1
                                                Inj Volume: Manually

Acq. Method     : C:\CHEM32\1\DATA\031219\HRVOC_031219 2019-03-12 07-40-34\ALKANES_HRVOC_
                  M18_091117.M

Last changed    : 3/12/2019 7:18:00 AM by dyeddula
Analysis Method : C:\CHEM32\1\METHODS\ALKANES_HRVOC_M18_091117.M
Last changed    : 3/12/2019 10:36:40 AM by dyeddula
                  (modified after loading)

Method Info     : HRVOC

Sample Info     : GSL_190249-002
                  Method:18
=====
    
```



External Standard Report

```

Sorted By      : Signal
Calib. Data Modified : 3/12/2019 11:30:45 AM
Multiplier:    : 1.0000
Dilution:      : 1.0000
Use Multiplier & Dilution Factor with ISTDs
    
```

Signal 1: FID2 B,

RetTime [min]	Type	Area [pA*s]	Amt/Area	Amount [ppmv]	Grp	Name
1.702	BB	7.00104e-1	1.12222	7.85674e-1		Methane
1.838		-	-	-		Ethane
2.203	BB	4.84439	6.45663e-1	3.12785		Ethylene
2.664		-	-	-		Propane
4.254	BB	1.46876	4.30557e-1	6.32386e-1		Propylene
4.400		-	-	-		i-Butane
4.550		-	-	-		n-Butane
4.886	BB	8.61168e-1	6.47127e-1	5.57285e-1		Acetylene

Handwritten signature: 2/3/17/19

Sample Name: GSL_190249-002

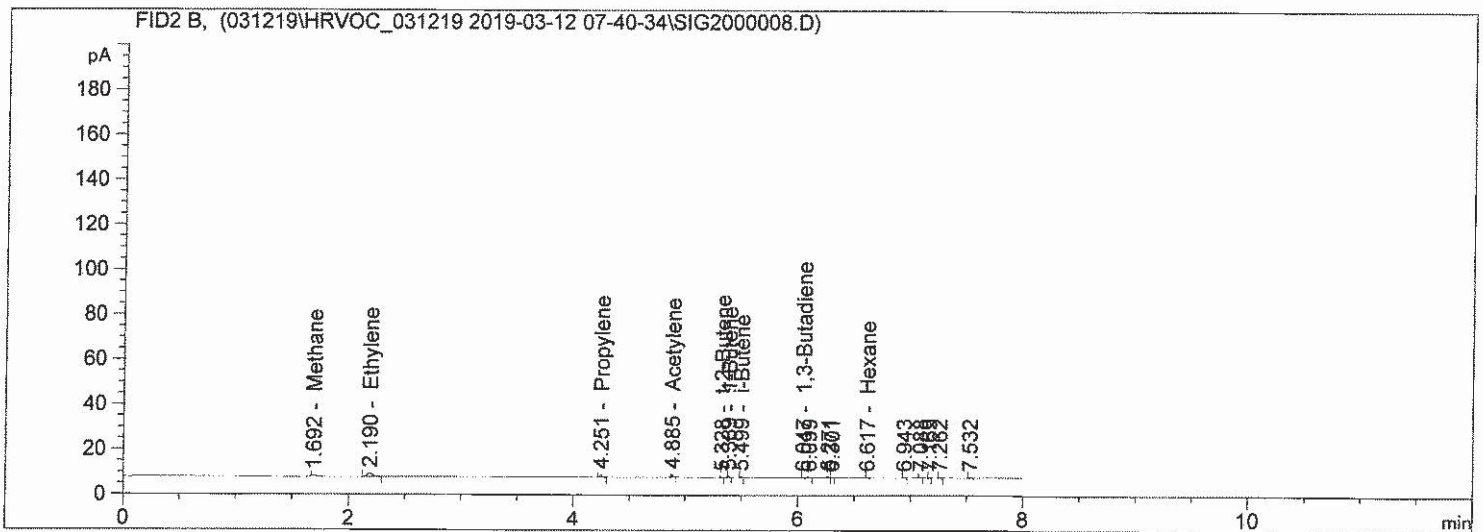
```

=====
Acq. Operator   : dyeddula                      Seq. Line :    4
Acq. Instrument : GC#1                          Location  : Vial 5
Injection Date  : 3/12/2019 10:49:01 AM         Inj       :    2
                                                Inj Volume: Manually

Acq. Method     : C:\CHEM32\1\DATA\031219\HRVOC_031219 2019-03-12 07-40-34\ALKANES_HRVOC_
                  M18_091117.M
Last changed    : 3/12/2019 7:18:00 AM by dyeddula
Analysis Method : C:\CHEM32\1\METHODS\ALKANES_HRVOC_M18_091117.M
Last changed    : 3/12/2019 10:36:40 AM by dyeddula
                  (modified after loading)

Method Info     : HRVOC

Sample Info     : GSL_190249-002
                  Method:18
=====
    
```



External Standard Report

```

Sorted By      : Signal
Calib. Data Modified : 3/12/2019 11:30:45 AM
Multiplier:    : 1.0000
Dilution:     : 1.0000
Use Multiplier & Dilution Factor with ISTDs
    
```

Signal 1: FID2 B,

RetTime [min]	Type	Area [pA*s]	Amt/Area	Amount [ppmv]	Grp	Name
1.692	BB	2.65969e-1	1.12222	2.98477e-1		Methane
1.838		-	-	-		Ethane
2.190	BB	4.96431	6.45663e-1	3.20527		Ethylene
2.664		-	-	-		Propane
4.251	BB	1.48306	4.30557e-1	6.38540e-1		Propylene
4.400		-	-	-		i-Butane
4.550		-	-	-		n-Butane
4.885	BB	8.70859e-1	6.47127e-1	5.63556e-1		Acetylene

Handwritten signature/initials

Sample Name: GSL_190249-002

```

=====
Acq. Operator   : dyeddula                      Seq. Line :    4
Acq. Instrument : GC#1                          Location  : Vial 5
Injection Date  : 3/12/2019 10:49:01 AM         Inj       :    2
                                                Inj Volume: Manually
Acq. Method     : C:\CHEM32\1\DATA\031219\HRVOC_031219 2019-03-12 07-40-34\ALKANES_HRVOC_
                  M18_091117.M
Last changed    : 3/12/2019 7:18:00 AM by dyeddula
Analysis Method : C:\CHEM32\1\METHODS\ALKANES_HRVOC_M18_091117.M
Last changed    : 3/12/2019 10:36:40 AM by dyeddula
                  (modified after loading)
Method Info     : HRVOC

Sample Info     : GSL_190249-002
                  Method:18
=====
    
```

RetTime [min]	Type	Area [pA*s]	Amt/Area	Amount [ppmv]	Grp	Name
5.328	BB	6.70050e-2	3.29413e-1	2.20723e-2		t-2-Butene
5.389	BB	3.77416e-1	3.26200e-1	1.23113e-1		1-Butene
5.499	BB	2.30029e-1	3.31334e-1	7.62164e-2		i-Butene
5.548		-	-	-		c-2-Butene
5.600		-	-	-		i-Pentane
5.658		-	-	-		n-Pentane
6.047	BB	8.19577e-2	3.37185e-1	2.76349e-2		1,3-Butadiene
6.617	BB	6.78175e-2	2.30048e-1	1.56013e-2		Hexane

Totals : 4.97048

Uncalibrated Peaks : using compound Propane

RetTime [min]	Type	Area [pA*s]	Amt/Area	Amount [ppmv]	Grp	Name
6.099	BB	5.60973e-2	4.34024e-1	2.43476e-2	?	
6.271	BB	1.56367e-1	4.34024e-1	6.78669e-2	?	
6.301	BB	5.33952e-2	4.34024e-1	2.31748e-2	?	
6.943	BB	4.47183e-2	4.34024e-1	1.94088e-2	?	
7.088	BB	9.91393e-2	4.34024e-1	4.30288e-2	?	
7.169	BB	5.25112e-2	4.34024e-1	2.27911e-2	?	
7.262	BB	1.21070e-1	4.34024e-1	5.25473e-2	?	
7.532	BB	7.70565e-2	4.34024e-1	3.34444e-2	?	

Uncalib. totals : 2.86610e-1

2 Warnings or Errors :

Warning : Calibration warnings (see calibration table listing)

Warning : Calibrated compound(s) not found

*** End of Report ***

Sample Name: GSL_190249-002

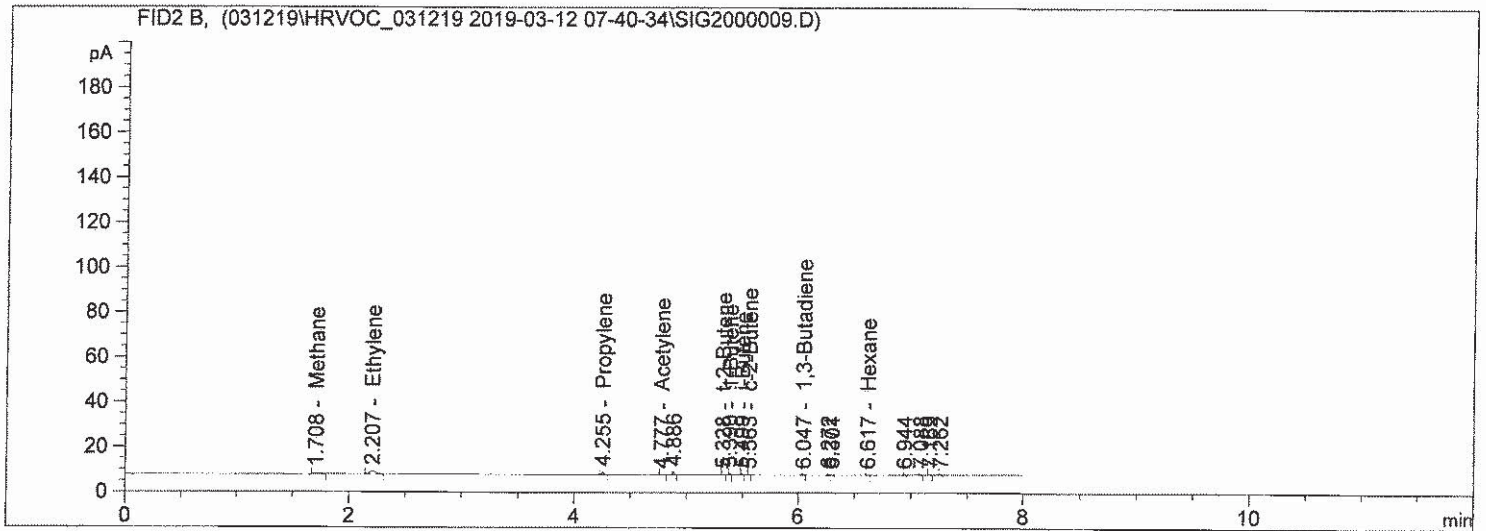
```

=====
Acq. Operator   : dyeddula                      Seq. Line :    4
Acq. Instrument : GC#1                          Location  : Vial 5
Injection Date  : 3/12/2019 11:06:03 AM         Inj       :    3
                                                Inj Volume: Manually

Acq. Method     : C:\CHEM32\1\DATA\031219\HRVOC_031219 2019-03-12 07-40-34\ALKANES_HRVOC_
                  M18_091117.M
Last changed    : 3/12/2019 7:18:00 AM by dyeddula
Analysis Method : C:\CHEM32\1\METHODS\ALKANES_HRVOC_M18_091117.M
Last changed    : 3/12/2019 10:36:40 AM by dyeddula
                  (modified after loading)

Method Info     : HRVOC

Sample Info     : GSL_190249-002
                  Method:18
=====
    
```



External Standard Report

```

Sorted By      : Signal
Calib. Data Modified : 3/12/2019 11:30:45 AM
Multiplier:    : 1.0000
Dilution:      : 1.0000
Use Multiplier & Dilution Factor with ISTDs
    
```

Signal 1: FID2 B,

RetTime [min]	Type	Area [pA*s]	Amt/Area	Amount [ppmv]	Grp	Name
1.708	BB	1.12382	1.12222	1.26117		Methane
1.838		-	-	-		Ethane
2.207	BB	5.05895	6.45663e-1	3.26638		Ethylene
2.664		-	-	-		Propane
4.255	BB	1.55634	4.30557e-1	6.70091e-1		Propylene
4.400		-	-	-		i-Butane
4.550		-	-	-		n-Butane
4.777	BB	5.30619e-2	6.47127e-1	3.43377e-2		Acetylene

Handwritten signature: 2/27/19

Sample Name: GSL_190249-002

```

=====
Acq. Operator   : dyeddula                      Seq. Line :    4
Acq. Instrument : GC#1                          Location  : Vial 5
Injection Date  : 3/12/2019 11:06:03 AM         Inj       :    3
                                                Inj Volume: Manually

Acq. Method     : C:\CHEM32\1\DATA\031219\HRVOC_031219 2019-03-12 07-40-34\ALKANES_HRVOC_
M18_091117.M
Last changed    : 3/12/2019 7:18:00 AM by dyeddula
Analysis Method : C:\CHEM32\1\METHODS\ALKANES_HRVOC_M18_091117.M
Last changed    : 3/12/2019 10:36:40 AM by dyeddula
                 (modified after loading)

Method Info     : HRVOC

Sample Info     : GSL_190249-002
                 Method:18
=====
    
```

RetTime [min]	Type	Area [pA*s]	Amt/Area	Amount [ppmv]	Grp	Name
5.328	BB	7.54189e-2	3.29413e-1	2.48440e-2		t-2-Butene
5.390	BB	3.92018e-1	3.26200e-1	1.27876e-1		1-Butene
5.499	BB	2.33444e-1	3.31334e-1	7.73477e-2		i-Butene
5.563	BB	5.20185e-2	3.40178e-1	1.76956e-2		c-2-Butene
5.600		-	-	-		i-Pentane
5.658		-	-	-		n-Pentane
6.047	BB	8.32360e-2	3.37185e-1	2.80659e-2		1,3-Butadiene
6.617	BB	7.08077e-2	2.30048e-1	1.62892e-2		Hexane

Totals : 5.52410

Uncalibrated Peaks : using compound Propane

RetTime [min]	Type	Area [pA*s]	Amt/Area	Amount [ppmv]	Grp	Name
4.886	BB	9.04099e-1	4.34024e-1	3.92400e-1	?	
6.272	BB	1.45764e-1	4.34024e-1	6.32651e-2	?	
6.301	BB	4.81720e-2	4.34024e-1	2.09078e-2	?	
6.944	BB	3.16366e-2	4.34024e-1	1.37310e-2	?	
7.088	BB	1.00879e-1	4.34024e-1	4.37841e-2	?	
7.169	BB	5.73858e-2	4.34024e-1	2.49068e-2	?	
7.262	BB	1.24405e-1	4.34024e-1	5.39949e-2	?	

Uncalib. totals : 6.12990e-1

2 Warnings or Errors :

Warning : Calibration warnings (see calibration table listing)
 Warning : Calibrated compound(s) not found

*** End of Report ***

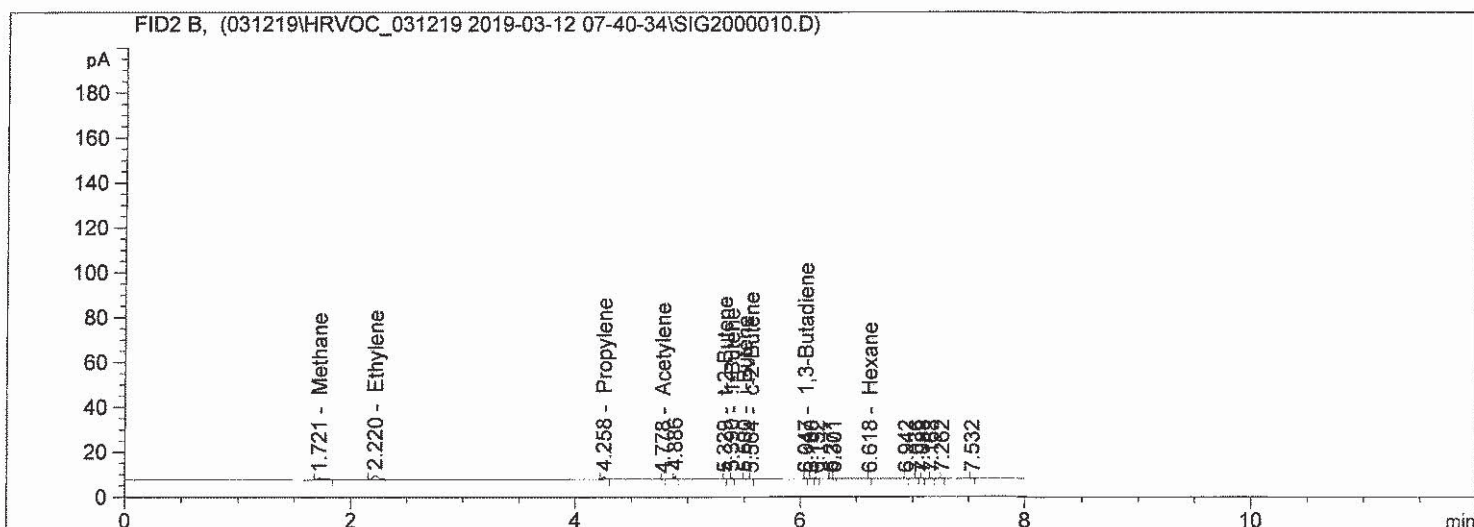
```

=====
Acq. Operator   : dyeddula                      Seq. Line :    5
Acq. Instrument : GC#1                          Location  : Vial 6
Injection Date  : 3/12/2019 11:23:05 AM         Inj       :    1
                                                Inj Volume: Manually

Acq. Method     : C:\CHEM32\1\DATA\031219\HRVOC_031219 2019-03-12 07-40-34\ALKANES_HRVOC_
                  M18_091117.M
Last changed    : 3/12/2019 7:18:00 AM by dyeddula
Analysis Method : C:\CHEM32\1\METHODS\ALKANES_HRVOC_M18_091117.M
Last changed    : 3/12/2019 11:32:32 AM by dyeddula
                  (modified after loading)

Method Info     : HRVOC

Sample Info     : GSL_190249-003
                  Method:18
=====
  
```



External Standard Report

```

Sorted By           : Signal
Calib. Data Modified : 3/12/2019 11:30:45 AM
Multiplier          : 1.0000
Dilution            : 1.0000
Use Multiplier & Dilution Factor with ISTDs
  
```

Signal 1: FID2 B,

RetTime [min]	Type	Area [pA*s]	Amt/Area	Amount [ppmv]	Grp	Name
1.721	BB	2.00886	1.12222	2.25439		Methane
1.838		-	-	-		Ethane
2.220	BB	5.35017	6.45663e-1	3.45441		Ethylene
2.664		-	-	-		Propane
4.258	BB	1.59438	4.30557e-1	6.86470e-1		Propylene
4.400		-	-	-		i-Butane
4.550		-	-	-		n-Butane
4.778	BB	5.31237e-2	6.47127e-1	3.43777e-2		Acetylene

Handwritten signature: 2/27/19


```
=====
Acq. Operator   : dyeddula                      Seq. Line :    5
Acq. Instrument : GC#1                          Location  : Vial 6
Injection Date  : 3/12/2019 11:23:05 AM         Inj       :    1
                                                Inj Volume: Manually
Acq. Method     : C:\CHEM32\1\DATA\031219\HRVOC_031219 2019-03-12 07-40-34\ALKANES_HRVOC_
                  M18_091117.M
Last changed    : 3/12/2019 7:18:00 AM by dyeddula
Analysis Method : C:\CHEM32\1\METHODS\ALKANES_HRVOC_M18_091117.M
Last changed    : 3/12/2019 11:32:32 AM by dyeddula
                  (modified after loading)
Method Info     : HRVOC
Sample Info     : GSL_190249-003
                  Method:18
=====
```

RetTime [min]	Type	Area [pA*s]	Amt/Area	Amount [ppmv]	Grp	Name
5.329	BB	6.78416e-2	3.29413e-1	2.23479e-2		t-2-Butene
5.390	BB	4.10018e-1	3.26200e-1	1.33748e-1		1-Butene
5.500	BB	2.39763e-1	3.31334e-1	7.94415e-2		i-Butene
5.564	BB	5.34009e-2	3.40178e-1	1.81658e-2		c-2-Butene
5.600		-	-	-		i-Pentane
5.658		-	-	-		n-Pentane
6.047	BB	9.57571e-2	3.37185e-1	3.22879e-2		1,3-Butadiene
6.618	BB	4.05727e-2	2.30048e-1	9.33368e-3		Hexane

Totals : 6.72497

Uncalibrated Peaks : using compound Hexane

RetTime [min]	Type	Area [pA*s]	Amt/Area	Amount [ppmv]	Grp	Name
4.886	BB	9.78710e-1	2.30048e-1	2.25151e-1	?	
6.100	BB	7.94810e-2	2.30048e-1	1.82845e-2	?	
6.152	BB	3.36173e-2	2.30048e-1	7.73361e-3	?	
6.271	BV	1.71838e-1	2.30048e-1	3.95311e-2	?	
6.301	VB	7.61913e-2	2.30048e-1	1.75277e-2	?	
6.942	BB	3.74868e-2	2.30048e-1	8.62378e-3	?	
7.036	BB	1.19980e-1	2.30048e-1	2.76012e-2	?	
7.088	BB	1.05211e-1	2.30048e-1	2.42035e-2	?	
7.168	BB	8.37759e-2	2.30048e-1	1.92725e-2	?	
7.262	BB	1.39831e-1	2.30048e-1	3.21680e-2	?	
7.532	BB	6.08562e-2	2.30048e-1	1.39999e-2	?	

Uncalib. totals : 4.34096e-1

2 Warnings or Errors :

Warning : Calibration warnings (see calibration table listing)

Warning : Calibrated compound(s) not found

*** End of Report ***

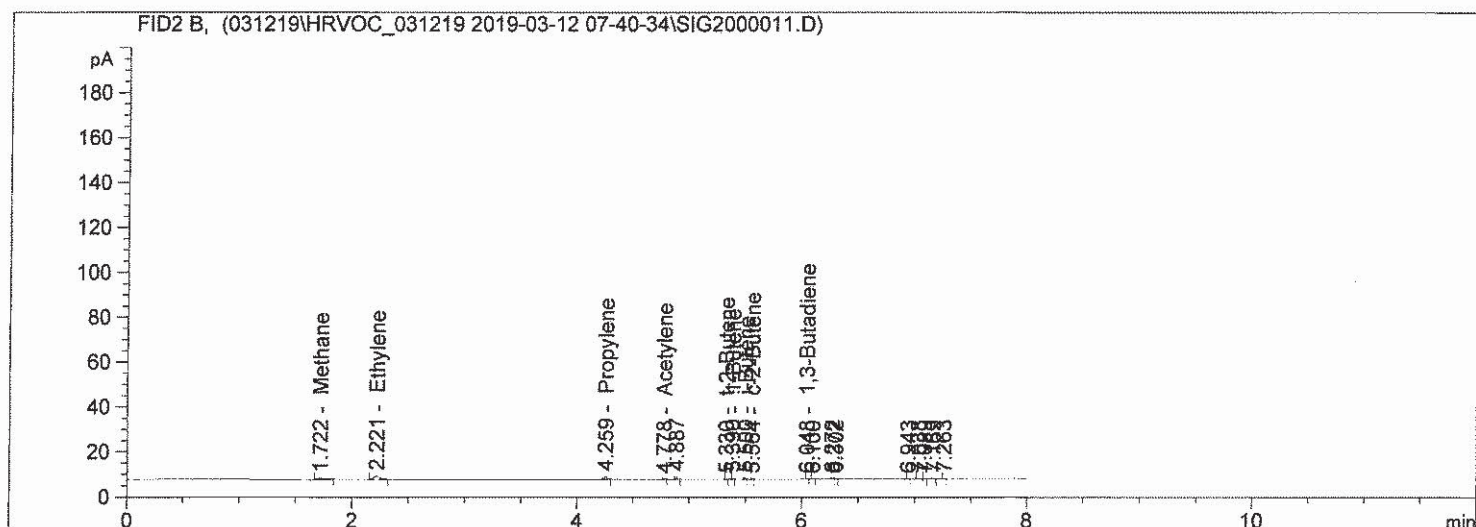
```

=====
Acq. Operator   : dyeddula                      Seq. Line :    5
Acq. Instrument : GC#1                          Location  : Vial 6
Injection Date  : 3/12/2019 11:40:12 AM         Inj       :    2
                                           Inj Volume: Manually

Acq. Method     : C:\CHEM32\1\DATA\031219\HRVOC_031219 2019-03-12 07-40-34\ALKANES_HRVOC_
                  M18_091117.M
Last changed    : 3/12/2019 7:18:00 AM by dyeddula
Analysis Method : C:\CHEM32\1\METHODS\ALKANES_HRVOC_M18_091117.M
Last changed    : 3/12/2019 11:32:32 AM by dyeddula
                  (modified after loading)

Method Info     : HRVOC

Sample Info     : GSL_190249-003
                  Method:18
=====
  
```



External Standard Report

```

Sorted By      : Signal
Calib. Data Modified : 3/12/2019 11:30:45 AM
Multiplier:    : 1.0000
Dilution:     : 1.0000
Use Multiplier & Dilution Factor with ISTDs
  
```

Signal 1: FID2 B,

RetTime [min]	Type	Area [pA*s]	Amt/Area	Amount [ppmv]	Grp	Name
1.722	BB	2.04768	1.12222	2.29796		Methane
1.838		-	-	-		Ethane
2.221	BB	4.91382	6.45663e-1	3.17267		Ethylene
2.664		-	-	-		Propane
4.259	BB	1.47607	4.30557e-1	6.35530e-1		Propylene
4.400		-	-	-		i-Butane
4.550		-	-	-		n-Butane
4.778	BB	5.76004e-2	6.47127e-1	3.72747e-2		Acetylene

Handwritten signature: 2/27/19

Sample Name: GSL_190249-003

```

=====
Acq. Operator   : dyeddula                      Seq. Line :    5
Acq. Instrument : GC#1                          Location  : Vial 6
Injection Date  : 3/12/2019 11:40:12 AM         Inj       :    2
                                           Inj Volume: Manually
Acq. Method     : C:\CHEM32\1\DATA\031219\HRVOC_031219 2019-03-12 07-40-34\ALKANES_HRVOC_
                  M18_091117.M
Last changed    : 3/12/2019 7:18:00 AM by dyeddula
Analysis Method : C:\CHEM32\1\METHODS\ALKANES_HRVOC_M18_091117.M
Last changed    : 3/12/2019 11:32:32 AM by dyeddula
                  (modified after loading)
Method Info     : HRVOC

Sample Info     : GSL_190249-003
                  Method:18
=====
    
```

RetTime [min]	Type	Area [pA*s]	Amt/Area	Amount [ppmv]	Grp	Name
5.330	BB	5.62432e-2	3.29413e-1	1.85273e-2		t-2-Butene
5.390	BB	3.72141e-1	3.26200e-1	1.21392e-1		1-Butene
5.500	BB	2.17191e-1	3.31334e-1	7.19628e-2		i-Butene
5.564	BB	3.53569e-2	3.40178e-1	1.20276e-2		c-2-Butene
5.600		-	-	-		i-Pentane
5.658		-	-	-		n-Pentane
6.048	BB	9.72426e-2	3.37185e-1	3.27887e-2		1,3-Butadiene
6.606		-	-	-		Hexane

Totals : 6.40013

Uncalibrated Peaks : using compound Hexane

RetTime [min]	Type	Area [pA*s]	Amt/Area	Amount [ppmv]	Grp	Name
4.887	BB	9.06975e-1	2.30048e-1	2.08648e-1	?	
6.100	BB	8.52012e-2	2.30048e-1	1.96004e-2	?	
6.272	BV	1.72691e-1	2.30048e-1	3.97273e-2	?	
6.302	VB	6.96737e-2	2.30048e-1	1.60283e-2	?	
6.943	BB	3.07554e-2	2.30048e-1	7.07524e-3	?	
7.038	BV	2.10152e-1	2.30048e-1	4.83450e-2	?	
7.089	VB	1.13148e-1	2.30048e-1	2.60295e-2	?	
7.169	BB	6.72661e-2	2.30048e-1	1.54745e-2	?	
7.263	BB	1.22745e-1	2.30048e-1	2.82373e-2	?	

Uncalib. totals : 4.09166e-1

2 Warnings or Errors :

Warning : Calibration warnings (see calibration table listing)

Warning : Calibrated compound(s) not found

*** End of Report ***

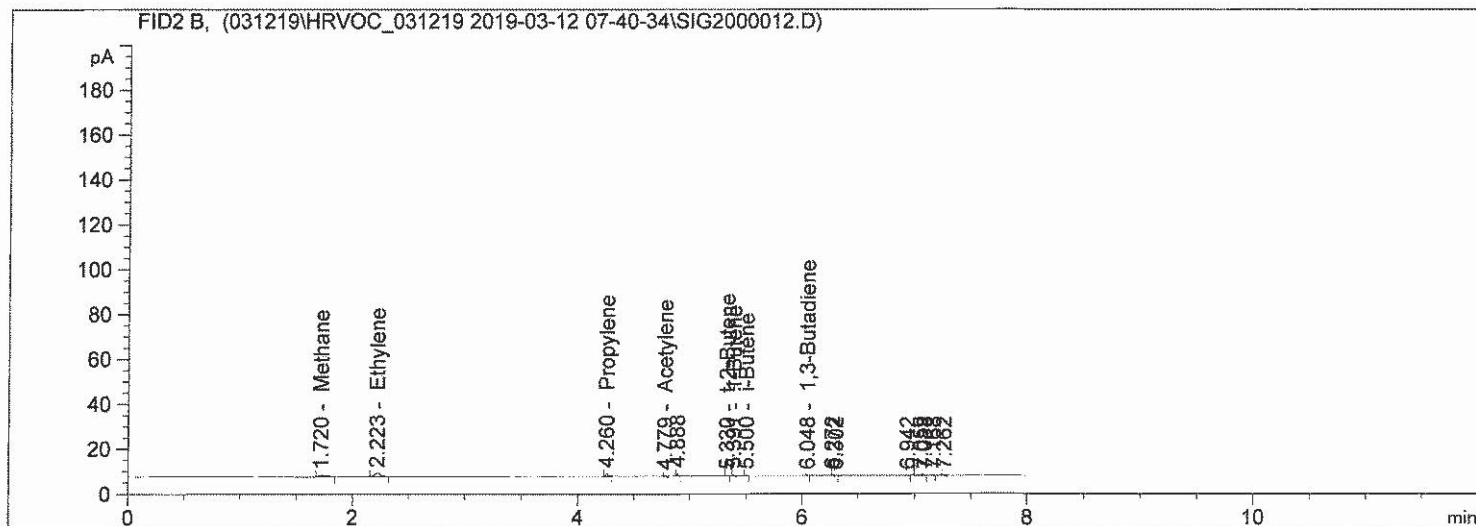
```

=====
Acq. Operator   : dyeddula                      Seq. Line :    5
Acq. Instrument : GC#1                          Location  : Vial 6
Injection Date  : 3/12/2019 11:57:11 AM         Inj       :    3
                                           Inj Volume: Manually

Acq. Method    : C:\CHEM32\1\DATA\031219\HRVOC_031219 2019-03-12 07-40-34\ALKANES_HRVOC_
                M18_091117.M
Last changed   : 3/12/2019 7:18:00 AM by dyeddula
Analysis Method : C:\CHEM32\1\METHODS\ALKANES_HRVOC_M18_091117.M
Last changed   : 3/12/2019 11:32:32 AM by dyeddula
                (modified after loading)

Method Info    : HRVOC

Sample Info    : GSL_190249-003
                Method:18
=====
  
```



External Standard Report

```

=====
Sorted By      : Signal
Calib. Data Modified : 3/12/2019 11:30:45 AM
Multiplier:    : 1.0000
Dilution:     : 1.0000
Use Multiplier & Dilution Factor with ISTDs
  
```

Signal 1: FID2 B,

RetTime [min]	Type	Area [pA*s]	Amt/Area	Amount [ppmv]	Grp	Name
1.720	BB	2.07969	1.12222	2.33388		Methane
1.838		-	-	-		Ethane
2.223	BB	4.69746	6.45663e-1	3.03298		Ethylene
2.664		-	-	-		Propane
4.260	BB	1.43468	4.30557e-1	6.17712e-1		Propylene
4.400		-	-	-		i-Butane
4.550		-	-	-		n-Butane
4.779	BB	4.34902e-2	6.47127e-1	2.81437e-2		Acetylene

Handwritten signature: 257119

```
=====
Acq. Operator   : dyeddula                      Seq. Line :    5
Acq. Instrument : GC#1                          Location  : Vial 6
Injection Date  : 3/12/2019 11:57:11 AM         Inj       :    3
                                                Inj Volume: Manually
Acq. Method     : C:\CHEM32\1\DATA\031219\HRVOC_031219 2019-03-12 07-40-34\ALKANES_HRVOC_
                  M18_091117.M
Last changed    : 3/12/2019 7:18:00 AM by dyeddula
Analysis Method : C:\CHEM32\1\METHODS\ALKANES_HRVOC_M18_091117.M
Last changed    : 3/12/2019 11:32:32 AM by dyeddula
                  (modified after loading)
Method Info     : HRVOC

Sample Info     : GSL_190249-003
                  Method:18
=====
```

RetTime [min]	Type	Area [pA*s]	Amt/Area	Amount [ppmv]	Grp	Name
5.330	BB	7.87532e-2	3.29413e-1	2.59423e-2		t-2-Butene
5.391	BB	3.67020e-1	3.26200e-1	1.19722e-1		1-Butene
5.500	BB	2.12061e-1	3.31334e-1	7.02629e-2		i-Butene
5.548		-	-	-		c-2-Butene
5.600		-	-	-		i-Pentane
5.658		-	-	-		n-Pentane
6.048	BB	8.34756e-2	3.37185e-1	2.81467e-2		1,3-Butadiene
6.606		-	-	-		Hexane

Totals : 6.25678

Uncalibrated Peaks : using compound Hexane

RetTime [min]	Type	Area [pA*s]	Amt/Area	Amount [ppmv]	Grp	Name
4.888	BB	8.31008e-1	2.30048e-1	1.91172e-1	?	
6.272	BB	1.45495e-1	2.30048e-1	3.34709e-2	?	
6.302	BB	5.19102e-2	2.30048e-1	1.19419e-2	?	
6.942	BB	3.44221e-2	2.30048e-1	7.91874e-3	?	
7.059	BV	2.05082e-1	2.30048e-1	4.71787e-2	?	
7.088	VB	1.07136e-1	2.30048e-1	2.46464e-2	?	
7.168	BB	5.64619e-2	2.30048e-1	1.29890e-2	?	
7.262	BB	1.08142e-1	2.30048e-1	2.48779e-2	?	

Uncalib. totals : 3.54195e-1

2 Warnings or Errors :

Warning : Calibration warnings (see calibration table listing)
 Warning : Calibrated compound(s) not found

*** End of Report ***

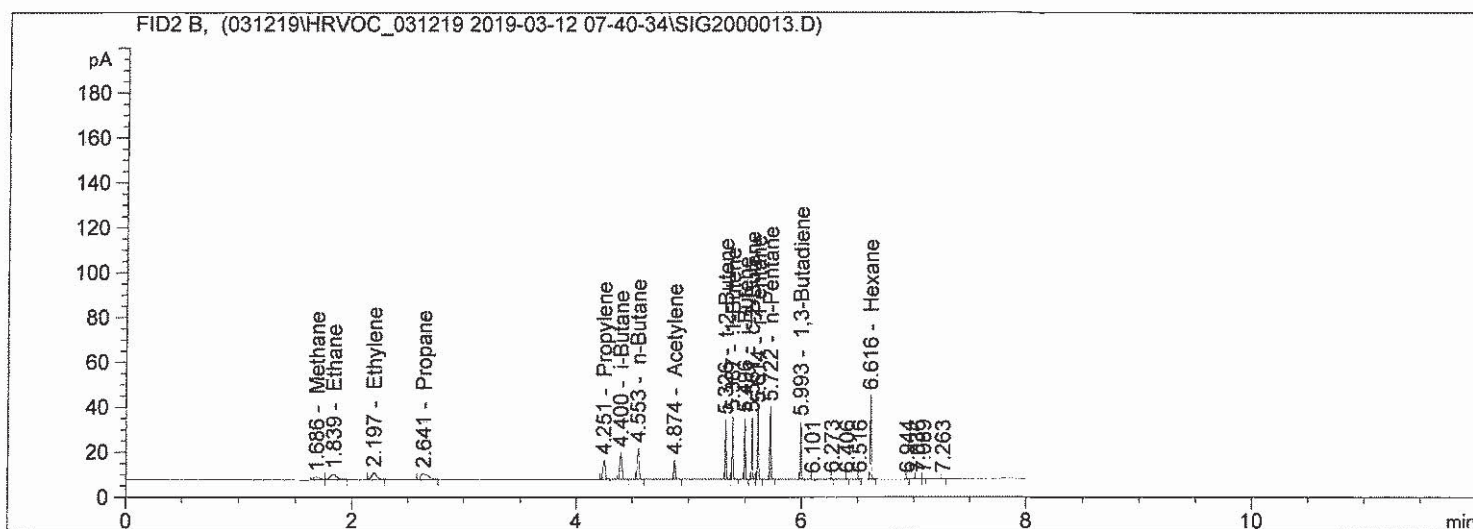
Sample Name: GSL_190239-003MS

```

=====
Acq. Operator   : dyeddula                      Seq. Line :    6
Acq. Instrument : GC#1                          Location  : Vial 7
Injection Date  : 3/12/2019 12:14:16 PM          Inj       :    1
                                           Inj Volume: Manually
Acq. Method     : C:\CHEM32\1\DATA\031219\HRVOC_031219 2019-03-12 07-40-34\ALKANES_HRVOC_
M18_091117.M
Last changed    : 3/12/2019 7:18:00 AM by dyeddula
Analysis Method : C:\CHEM32\1\METHODS\ALKANES_HRVOC_M18_091117.M
Last changed    : 3/12/2019 12:46:28 PM by dyeddula
                 (modified after loading)
Method Info     : HRVOC

Sample Info     : GSL_190239-003MS
                 Method:18
=====

```



```

=====
External Standard Report
=====

```

```

Sorted By           :      Signal
Calib. Data Modified :      3/12/2019 11:30:45 AM
Multiplier:         :      1.0000
Dilution:           :      1.0000
Use Multiplier & Dilution Factor with ISTDs

```

Signal 1: FID2 B,

RetTime [min]	Type	Area [pA*s]	Amt/Area	Amount [ppmv]	Grp	Name
1.686	BV	4.86228	1.12222	5.45657		Methane
1.839	VB	9.02925	5.89609e-1	5.32372		Ethane
2.197	BB	9.06005	6.45663e-1	5.84974		Ethylene
2.641	BB	12.06345	4.34024e-1	5.23582		Propane
4.251	BB	12.70356	4.30557e-1	5.46960		Propylene
4.400	BB	16.03646	3.29374e-1	5.28199		i-Butane
4.553	BB	16.02906	3.26258e-1	5.22962		n-Butane
4.874	BB	7.34374	6.47127e-1	4.75233		Acetylene

351 of 460

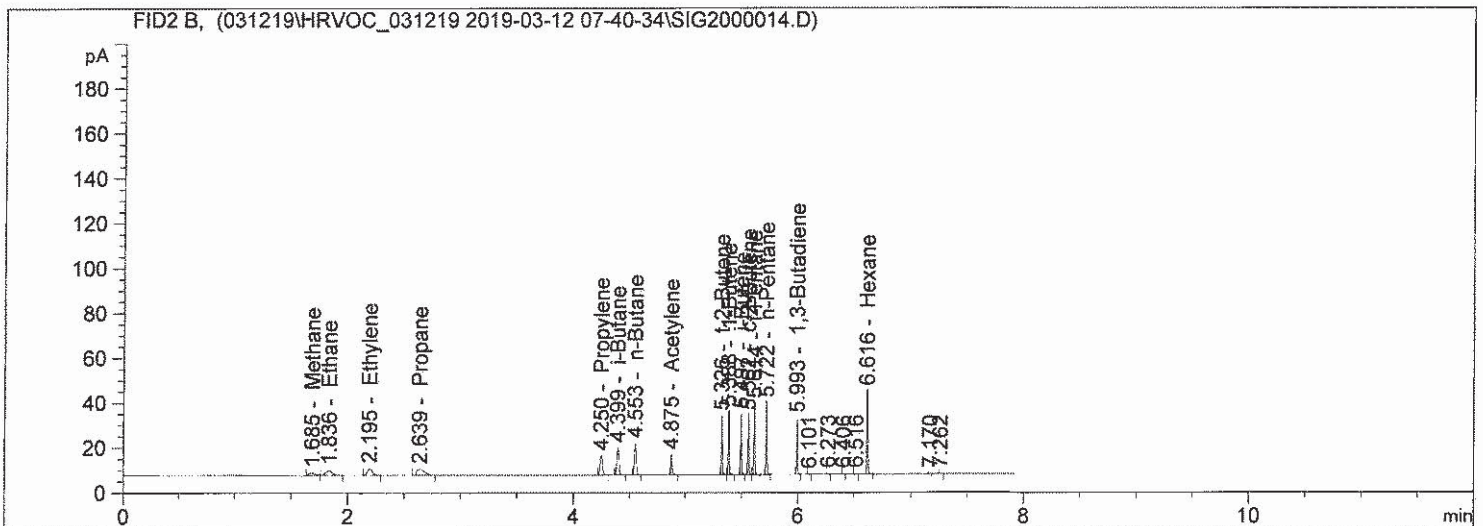

```

=====
Acq. Operator   : dyeddula                      Seq. Line :    6
Acq. Instrument : GC#1                          Location  : Vial 7
Injection Date  : 3/12/2019 12:31:28 PM         Inj       :    2
                                                Inj Volume: Manually

Acq. Method     : C:\CHEM32\1\DATA\031219\HRVOC_031219 2019-03-12 07-40-34\ALKANES_HRVOC_
                  M18_091117.M
Last changed    : 3/12/2019 7:18:00 AM by dyeddula
Analysis Method : C:\CHEM32\1\METHODS\ALKANES_HRVOC_M18_091117.M
Last changed    : 3/12/2019 12:46:28 PM by dyeddula
                  (modified after loading)

Method Info     : HRVOC

Sample Info     : GSL_190239-003MS
                  Method:18
=====
  
```



External Standard Report

```

Sorted By      : Signal
Calib. Data Modified : 3/12/2019 11:30:45 AM
Multiplier:    : 1.0000
Dilution:      : 1.0000
Use Multiplier & Dilution Factor with ISTDs
  
```

Signal 1: FID2 B,

RetTime [min]	Type	Area [pA*s]	Amt/Area	Amount [ppmv]	Grp	Name
1.685	BV	4.75412	1.12222	5.33518		Methane
1.836	VB	9.01729	5.89609e-1	5.31667		Ethane
2.195	BB	9.14316	6.45663e-1	5.90340		Ethylene
2.639	BB	12.21677	4.34024e-1	5.30237		Propane
4.250	BB	12.88109	4.30557e-1	5.54604		Propylene
4.399	BB	16.29600	3.29374e-1	5.36748		i-Butane
4.553	BB	16.27089	3.26258e-1	5.30851		n-Butane
4.875	BB	7.38255	6.47127e-1	4.77744		Acetylene

Handwritten signature/initials

Sample Name: GSL_190239-003MS

```

=====
Acq. Operator   : dyeddula                      Seq. Line :    6
Acq. Instrument : GC#1                          Location  : Vial 7
Injection Date  : 3/12/2019 12:31:28 PM        Inj       :    2
                                           Inj Volume: Manually

Acq. Method     : C:\CHEM32\1\DATA\031219\HRVOC_031219 2019-03-12 07-40-34\ALKANES_HRVOC_
                  M18_091117.M
Last changed    : 3/12/2019 7:18:00 AM by dyeddula
Analysis Method : C:\CHEM32\1\METHODS\ALKANES_HRVOC_M18_091117.M
Last changed    : 3/12/2019 12:46:28 PM by dyeddula
                  (modified after loading)

Method Info     : HRVOC

Sample Info     : GSL_190239-003MS
                  Method:18
=====
    
```

RetTime [min]	Type	Area [pA*s]	Amt/Area	Amount [ppmv]	Grp	Name
5.326	BV	15.69834	3.29413e-1	5.17124		t-2-Butene
5.388	VB	16.64467	3.26200e-1	5.42948		1-Butene
5.497	BB	15.88054	3.31334e-1	5.26176		i-Butene
5.562	BV	15.68148	3.40178e-1	5.33449		c-2-Butene
5.614	VB	20.46510	2.52648e-1	5.17047		i-Pentane
5.722	BB	20.33597	2.58175e-1	5.25023		n-Pentane
5.993	BB	13.57775	3.37185e-1	4.57821		1,3-Butadiene
6.616	BB	23.26331	2.30048e-1	5.35168		Hexane

Totals : 84.40467

Uncalibrated Peaks : using compound Hexane

RetTime [min]	Type	Area [pA*s]	Amt/Area	Amount [ppmv]	Grp	Name
6.101	BB	6.83165e-2	2.30048e-1	1.57161e-2	?	
6.273	BB	1.36937e-1	2.30048e-1	3.15022e-2	?	
6.406	BB	9.97212e-2	2.30048e-1	2.29407e-2	?	
6.516	BB	1.99079e-1	2.30048e-1	4.57977e-2	?	
7.170	BB	3.10315e-2	2.30048e-1	7.13873e-3	?	
7.262	BB	5.07007e-2	2.30048e-1	1.16636e-2	?	

Uncalib. totals : 1.34759e-1

1 Warnings or Errors :

Warning : Calibration warnings (see calibration table listing)

*** End of Report ***

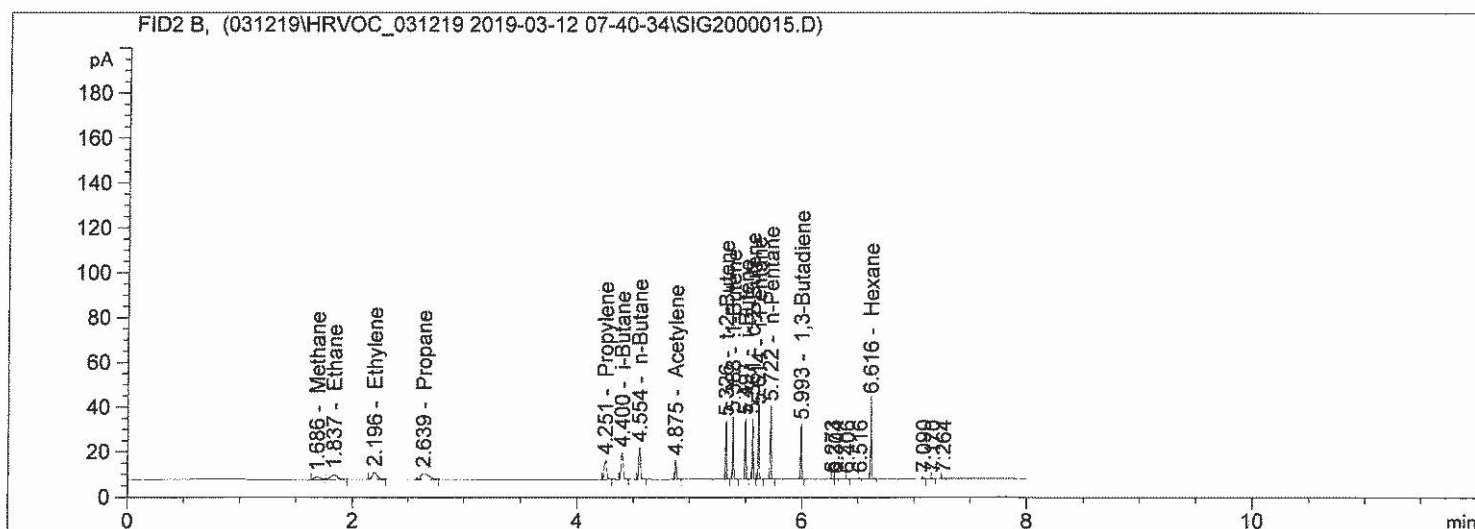
```

=====
Acq. Operator   : dyeddula                      Seq. Line :    6
Acq. Instrument : GC#1                          Location  : Vial 7
Injection Date  : 3/12/2019 12:48:46 PM         Inj       :    3
                                                Inj Volume: Manually

Acq. Method    : C:\CHEM32\1\DATA\031219\HRVOC_031219 2019-03-12 07-40-34\ALKANES_HRVOC_
                M18_091117.M
Last changed   : 3/12/2019 7:18:00 AM by dyeddula
Analysis Method: C:\CHEM32\1\METHODS\ALKANES_HRVOC_M18_091117.M
Last changed   : 3/12/2019 12:46:28 PM by dyeddula
                (modified after loading)

Method Info    : HRVOC

Sample Info    : GSL_190239-003MS
                Method:18
=====
  
```



External Standard Report

```

Sorted By      : Signal
Calib. Data Modified : 3/12/2019 11:30:45 AM
Multiplier:    : 1.0000
Dilution:     : 1.0000
Use Multiplier & Dilution Factor with ISTDs
  
```

Signal 1: FID2 B,

RetTime [min]	Type	Area [pA*s]	Amt/Area	Amount [ppmv]	Grp	Name
1.686	BV	4.78437	1.12222	5.36914		Methane
1.837	VB	9.04857	5.89609e-1	5.33512		Ethane
2.196	BB	9.05464	6.45663e-1	5.84625		Ethylene
2.639	BB	12.16977	4.34024e-1	5.28196		Propane
4.251	BB	12.76854	4.30557e-1	5.49758		Propylene
4.400	BB	16.13157	3.29374e-1	5.31332		i-Butane
4.554	BB	16.16561	3.26258e-1	5.27417		n-Butane
4.875	BB	7.30385	6.47127e-1	4.72651		Acetylene

dyeddula
355 of 460

Sample Name: GSL_190239-003MS

```

=====
Acq. Operator   : dyeddula                      Seq. Line :    6
Acq. Instrument : GC#1                          Location  : Vial 7
Injection Date  : 3/12/2019 12:48:46 PM         Inj       :    3
                                                Inj Volume: Manually
Acq. Method     : C:\CHEM32\1\DATA\031219\HRVOC_031219 2019-03-12 07-40-34\ALKANES_HRVOC_
                  M18_091117.M
Last changed    : 3/12/2019 7:18:00 AM by dyeddula
Analysis Method : C:\CHEM32\1\METHODS\ALKANES_HRVOC_M18_091117.M
Last changed    : 3/12/2019 12:46:28 PM by dyeddula
                  (modified after loading)
Method Info     : HRVOC

Sample Info     : GSL_190239-003MS
                  Method:18
=====
    
```

RetTime [min]	Type	Area [pA*s]	Amt/Area	Amount [ppmv]	Grp	Name
5.326	BB	15.48237	3.29413e-1	5.10009		t-2-Butene
5.388	BB	16.47429	3.26200e-1	5.37391		1-Butene
5.497	BB	15.70245	3.31334e-1	5.20275		i-Butene
5.561	BV	15.49315	3.40178e-1	5.27043		c-2-Butene
5.614	VB	20.27412	2.52648e-1	5.12222		i-Pentane
5.722	BB	20.14795	2.58175e-1	5.20169		n-Pentane
5.993	BB	13.19206	3.37185e-1	4.44816		1,3-Butadiene
6.616	BB	23.06480	2.30048e-1	5.30602		Hexane

Totals : 83.66932

Uncalibrated Peaks : using compound Hexane

RetTime [min]	Type	Area [pA*s]	Amt/Area	Amount [ppmv]	Grp	Name
6.273	BB	1.46633e-1	2.30048e-1	3.37327e-2	?	
6.304	BB	3.38740e-2	2.30048e-1	7.79267e-3	?	
6.406	BB	1.01068e-1	2.30048e-1	2.32505e-2	?	
6.516	BB	1.93301e-1	2.30048e-1	4.44686e-2	?	
7.090	BB	1.18330e-1	2.30048e-1	2.72216e-2	?	
7.170	BB	5.24684e-2	2.30048e-1	1.20703e-2	?	
7.264	BB	5.24782e-2	2.30048e-1	1.20725e-2	?	

Uncalib. totals : 1.60609e-1

1 Warnings or Errors :

Warning : Calibration warnings (see calibration table listing)

*** End of Report ***

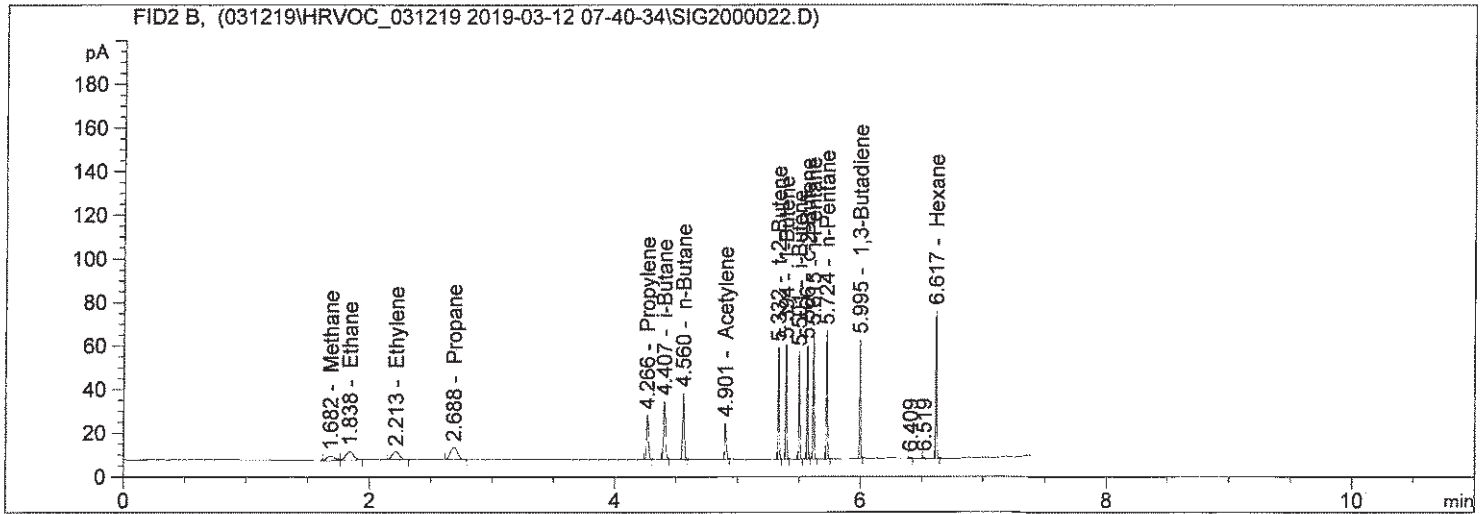
Sample Name: POST CCV

```

=====
Acq. Operator   : dyeddula                      Seq. Line :    9
Acq. Instrument : GC#1                          Location  : Vial 10
Injection Date  : 3/12/2019 3:09:55 PM          Inj       :    1
                                                Inj Volume: Manually

Acq. Method     : C:\CHEM32\1\DATA\031219\HRVOC_031219 2019-03-12 07-40-34\ALKANES_HRVOC_
                  M18_091117.M
Last changed    : 3/12/2019 3:05:32 PM by dyeddula
                  (modified after loading)
Analysis Method : C:\CHEM32\1\METHODS\ALKANES_HRVOC_M18_091117.M
Last changed    : 3/12/2019 3:22:42 PM by dyeddula
                  (modified after loading)
Method Info     : HRVOC

Sample Info     : POST CCV(10ppmv HRVOC+ALKANES)
                  Method:18
=====
    
```



External Standard Report

```

Sorted By           :      Signal
Calib. Data Modified :      3/12/2019 11:30:45 AM
Multiplier:         :      1.0000
Dilution:           :      1.0000
Use Multiplier & Dilution Factor with ISTDs
    
```

Signal 1: FID2 B,

RetTime [min]	Type	Area [pA*s]	Amt/Area	Amount [ppmv]	Grp	Name
1.682	BV	8.56926	1.12222	9.61663		Methane
1.838	VB	16.66031	5.89609e-1	9.82306		Ethane
2.213	BB	15.14878	6.45663e-1	9.78101		Ethylene
2.688	BB	22.90869	4.34024e-1	9.94291		Propane
4.266	BB	23.08290	4.30557e-1	9.93849		Propylene
4.407	BB	30.44740	3.29374e-1	10.02858		i-Butane
4.560	BB	30.49234	3.26258e-1	9.94838		n-Butane

Handwritten signature/initials

Sample Name: POST CCV

```

=====
Acq. Operator   : dyeddula                      Seq. Line :    9
Acq. Instrument : GC#1                          Location  : Vial 10
Injection Date  : 3/12/2019 3:09:55 PM          Inj       :    1
                                           Inj Volume: Manually

Acq. Method     : C:\CHEM32\1\DATA\031219\HRVOC_031219 2019-03-12 07-40-34\ALKANES_HRVOC_
M18_091117.M
Last changed    : 3/12/2019 3:05:32 PM by dyeddula
                  (modified after loading)
Analysis Method : C:\CHEM32\1\METHODS\ALKANES_HRVOC_M18_091117.M
Last changed    : 3/12/2019 3:22:42 PM by dyeddula
                  (modified after loading)
Method Info     : HRVOC

Sample Info     : POST CCV(10ppmv HRVOC+ALKANES)
                  Method:18
=====
    
```

RetTime [min]	Type	Area [pA*s]	Amt/Area	Amount [ppmv]	Grp	Name
4.901	BB	14.51253	6.47127e-1	9.39144		Acetylene
5.332	BB	30.10460	3.29413e-1	9.91685		t-2-Butene
5.394	BB	30.64589	3.26200e-1	9.99668		1-Butene
5.501	BB	30.34422	3.31334e-1	10.05406		i-Butene
5.566	BB	30.31125	3.40178e-1	10.31122		c-2-Butene
5.615	BB	38.19451	2.52648e-1	9.64977		i-Pentane
5.724	BB	38.06134	2.58175e-1	9.82647		n-Pentane
5.995	BB	30.33952	3.37185e-1	10.23003		1,3-Butadiene
6.617	BB	42.79411	2.30048e-1	9.84471		Hexane

Totals : 158.30031

Uncalibrated Peaks : using compound Hexane

RetTime [min]	Type	Area [pA*s]	Amt/Area	Amount [ppmv]	Grp	Name
6.409	BB	2.59633e-1	2.30048e-1	5.97282e-2		?
6.519	BB	4.11245e-1	2.30048e-1	9.46063e-2		?

Uncalib. totals : 1.54335e-1

1 Warnings or Errors :

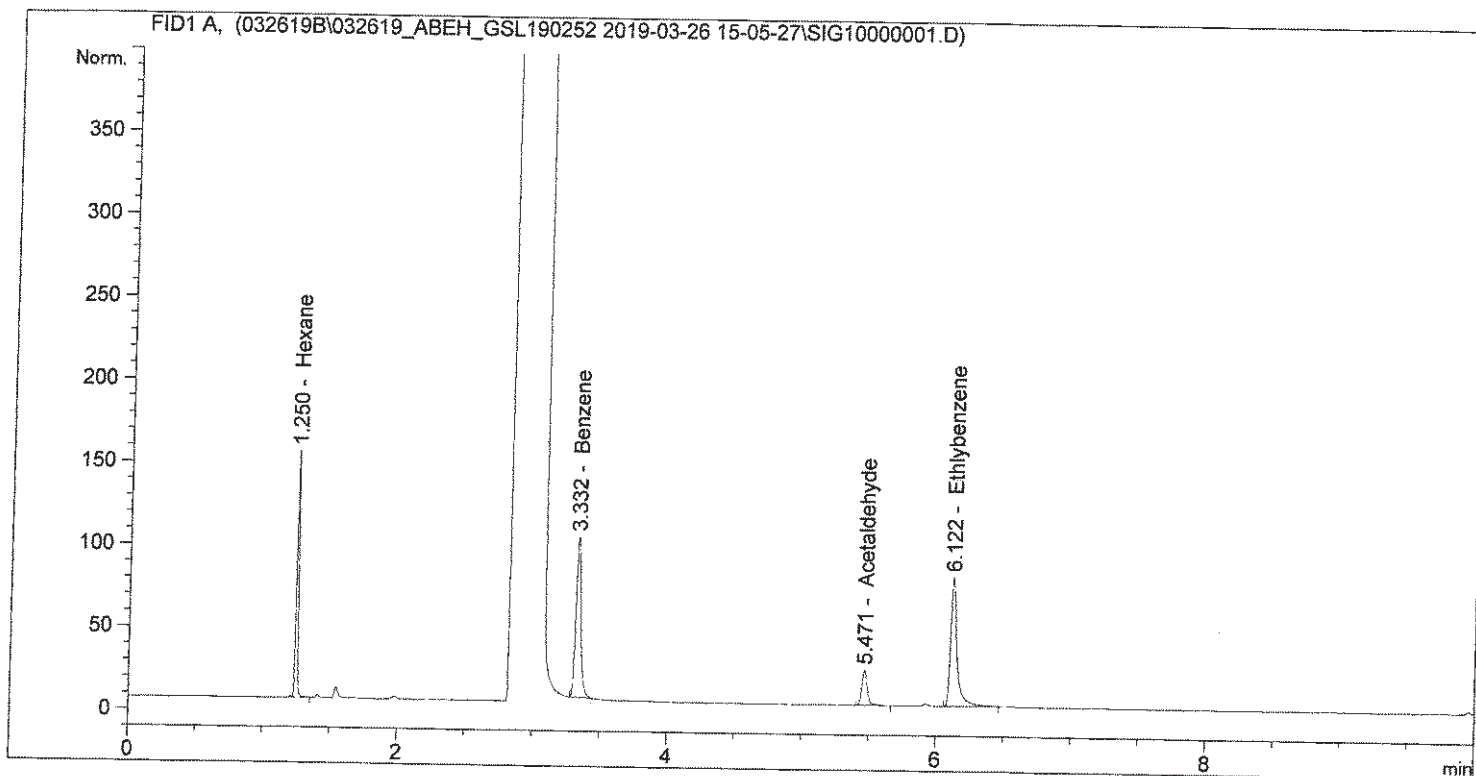
Warning : Calibration warnings (see calibration table listing)

*** End of Report ***

```

=====
Acq. Operator   : edecker                               Seq. Line :    1
Acq. Instrument : GC#10                               Location  : Vial 1
Injection Date  : 3/26/2019 3:07:50 PM                Inj       :    1
                                                    Inj Volume: 1 µl

Acq. Method     : C:\CHEM32\1\DATA\032619B\032619_ABEH_GSL190252 2019-03-26 15-05-27\
                  FRONT_M18_ABEH_IN_MEOH_032519.M
Last changed    : 3/26/2019 1:55:14 PM by edecker
Analysis Method : C:\CHEM32\1\METHODS\FRONT_M18_ABEH_IN_MEOH_032519.M
Last changed    : 3/26/2019 3:23:48 PM by dyeddula
                  (modified after loading)
Sample Info     : CCV - 8X of ABEH Stock Standard
                  Method:M18
  
```



External Standard Report

```

Sorted By           :      Signal
Calib. Data Modified :      Tuesday, March 26, 2019 12:02:38 PM
Multiplier:         :      1.0000
Dilution:           :      1.0000
Use Multiplier & Dilution Factor with ISTDs
  
```

Signal 1: FID1 A,

RetTime [min]	Type	Area [pA*s]	Amt/Area	Amount [ppm]	Grp	Name
1.250	BBA	150.05835	1.92661	289.10467		Hexane
3.332	BBA	251.90709	1.58343	398.87614		Benzene
5.471	BBA	59.49291	6.04944	359.89860		Acetaldehyde
6.122	BBA	263.09509	1.49414	393.10140		Ethylbenzene

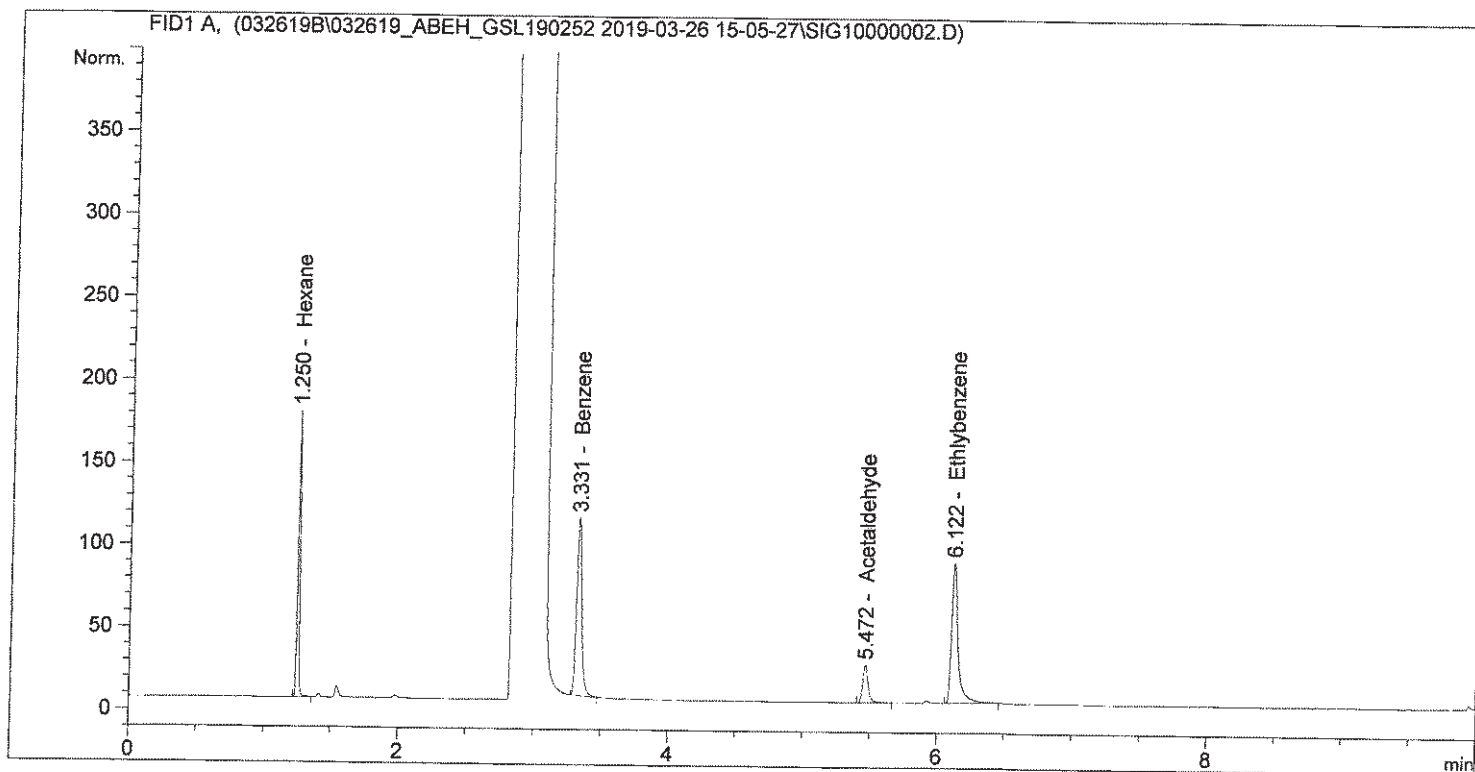
ew
3/27/19

RetTime [min]	Type	Area [pA*s]	Amt/Area	Amount [ppm]	Grp	Name
----- ----- ----- ----- ----- ----- -----						
Totals :				1440.98081		

=====
*** End of Report ***

```

=====
Acq. Operator   : edecker                               Seq. Line :    2
Acq. Instrument : GC#10                               Location  : Vial 2
Injection Date  : 3/26/2019 3:30:49 PM                Inj       :    1
                                                    Inj Volume: 1 µl
Acq. Method    : C:\CHEM32\1\DATA\032619B\032619_ABEH_GSL190252 2019-03-26 15-05-27\
                FRONT_M18_ABEH_IN_MEOH_032519.M
Last changed   : 3/26/2019 1:55:14 PM by edecker
Analysis Method : C:\CHEM32\1\METHODS\FRONT_M18_ABEH_IN_MEOH_032519.M
Last changed   : 3/26/2019 3:44:39 PM by dyeddula
                (modified after loading)
Sample Info    : LCS - 8X
                Method:M18
=====
  
```



External Standard Report

```

Sorted By           :      Signal
Calib. Data Modified :      Tuesday, March 26, 2019 12:02:38 PM
Multiplier:         :      1.0000
Dilution:           :      1.0000
Use Multiplier & Dilution Factor with ISTDs
  
```

Signal 1: FID1 A,

RetTime [min]	Type	Area [pA*s]	Amt/Area	Amount [ppm]	Grp	Name
1.250	BBA	171.94249	1.91231	328.80785		Hexane
3.331	BBA	283.30673	1.57218	445.41050		Benzene
5.472	BBA	64.21095	6.03346	387.41411		Acetaldehyde
6.122	BBA	285.38068	1.48888	424.89652		Ethylbenzene

aw
3/27/19

RetTime [min]	Type	Area [pA*s]	Amt/Area	Amount [ppm]	Grp	Name
Totals :				1586.52899		

=====
*** End of Report ***

RetTime [min]	Type	Area [pA*s]	Amt/Area	Amount [ppm]	Grp	Name
Totals :				0.00000		

1 Warnings or Errors :

Warning : Calibrated compound(s) not found

=====
=====
Area Percent Report
=====

Sorted By : Signal
Calib. Data Modified : Tuesday, March 26, 2019 12:02:38 PM
Multiplier: : 1.0000
Dilution: : 1.0000
Use Multiplier & Dilution Factor with ISTDs

Signal 1: FID1 A,

Peak #	RetTime [min]	Type	Width [min]	Area [pA*s]	Area %	Name
1	1.250		0.0000	0.00000	0.00000	Hexane
2	3.335		0.0000	0.00000	0.00000	Benzene
3	5.471		0.0000	0.00000	0.00000	Acetaldehyde
4	6.150		0.0000	0.00000	0.00000	Ethlybenzene

Totals : 0.00000 0.0000
Uncalibrated Peaks: n.a.

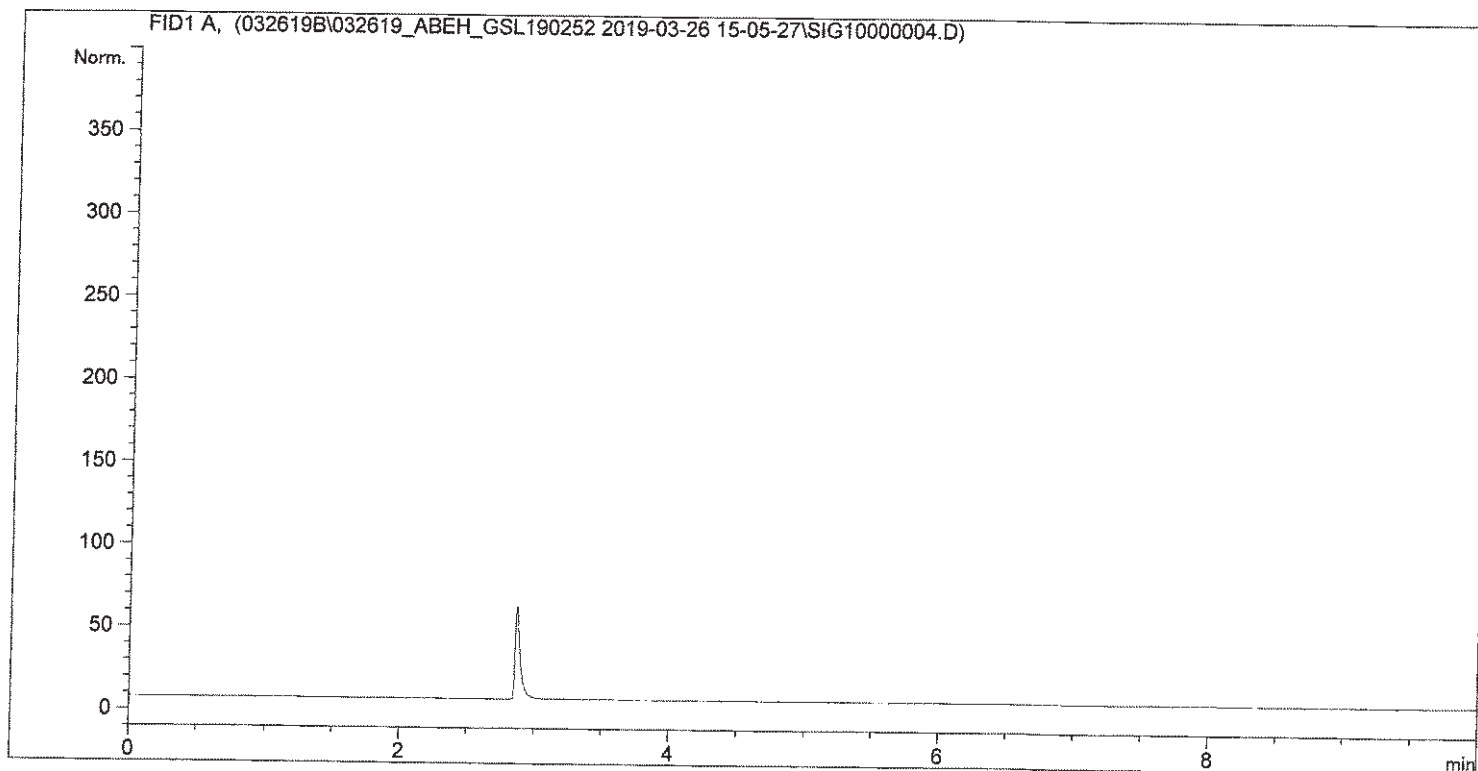
1 Warnings or Errors :

Warning : Calibrated compound(s) not found

=====
*** End of Report ***

```

=====
Acq. Operator   : edecker                               Seq. Line :    4
Acq. Instrument : GC#10                               Location  : Vial 4
Injection Date  : 3/26/2019 4:15:02 PM                Inj       :    1
                                                    Inj Volume: 1 µl
Acq. Method     : C:\CHEM32\1\DATA\032619B\032619_ABEH_GSL190252 2019-03-26 15-05-27\
                  FRONT_M18_ABEH_IN_MEOH_032519.M
Last changed    : 3/26/2019 1:55:14 PM by edecker
Analysis Method : C:\CHEM32\1\METHODS\FRONT_M18_ABEH_IN_MEOH_032519.M
Last changed    : 3/26/2019 4:28:15 PM by dyeddula
                  (modified after loading)
Sample Info     : Blank - DI H2O
                  Method:M18
=====
  
```



External Standard Report

```

Sorted By           :      Signal
Calib. Data Modified :      Tuesday, March 26, 2019 12:02:38 PM
Multiplier:         :      1.0000
Dilution:           :      1.0000
Use Multiplier & Dilution Factor with ISTDs
  
```

Signal 1: FID1 A,

RetTime [min]	Type	Area [pA*s]	Amt/Area	Amount [ppm]	Grp	Name
1.250	-	-	-	-	-	Hexane
3.335	-	-	-	-	-	Benzene
5.471	-	-	-	-	-	Acetaldehyde
6.150	-	-	-	-	-	Ethlybenzene

20
3/27/19

RetTime [min]	Type	Area [pA*s]	Amt/Area	Amount [ppm]	Grp	Name
Totals :				0.00000		

1 Warnings or Errors :

Warning : Calibrated compound(s) not found

=====
=====
Area Percent Report
=====

Sorted By : Signal
Calib. Data Modified : Tuesday, March 26, 2019 12:02:38 PM
Multiplier: : 1.0000
Dilution: : 1.0000
Use Multiplier & Dilution Factor with ISTDs

Signal 1: FID1 A,

Peak #	RetTime [min]	Type	Width [min]	Area [pA*s]	Area %	Name
1	1.250		0.0000	0.00000	0.00000	Hexane
2	3.335		0.0000	0.00000	0.00000	Benzene
3	5.471		0.0000	0.00000	0.00000	Acetaldehyde
4	6.150		0.0000	0.00000	0.00000	Ethlybenzene

Totals : 0.00000 0.0000
Uncalibrated Peaks: n.a.

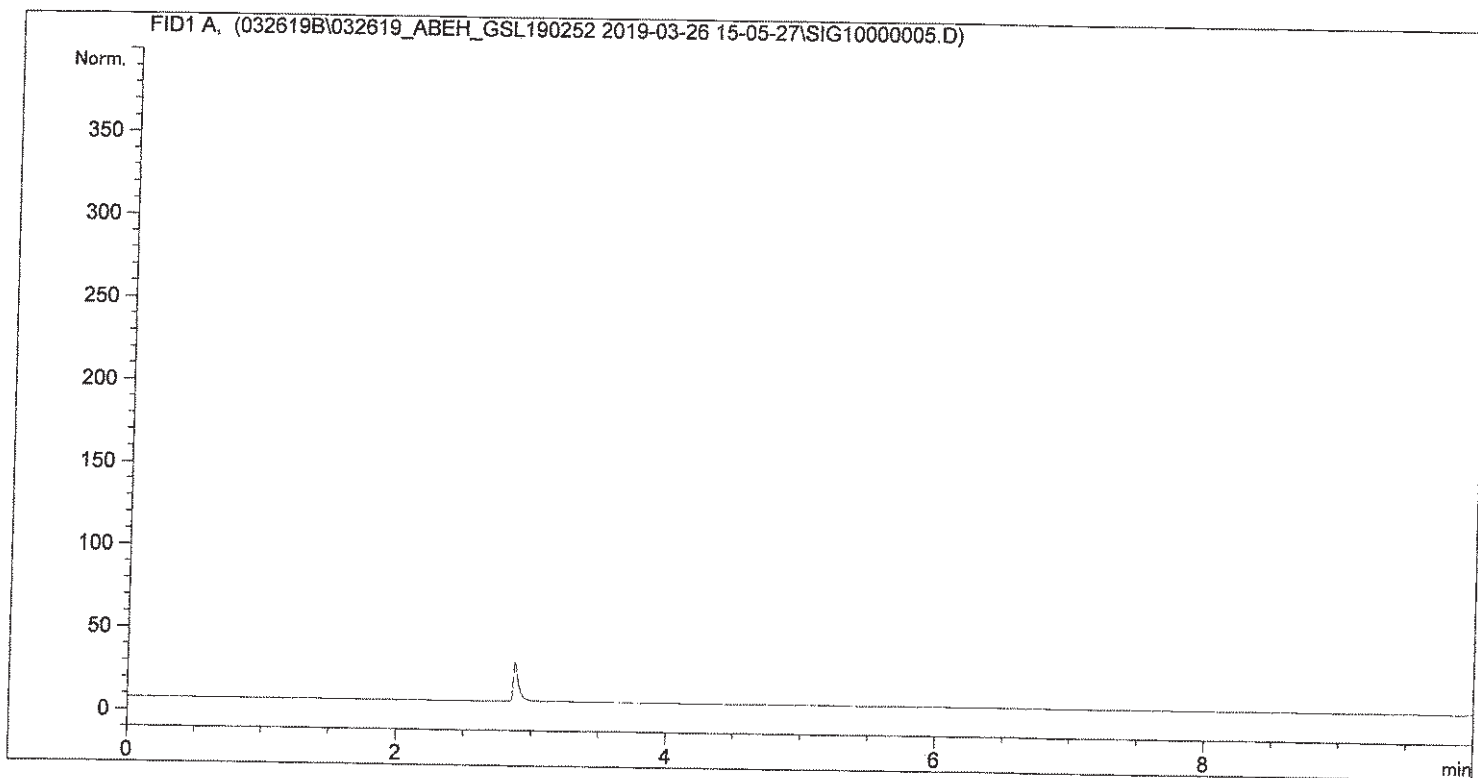
1 Warnings or Errors :

Warning : Calibrated compound(s) not found

=====
*** End of Report ***

```

=====
Acq. Operator   : edecker                               Seq. Line :    5
Acq. Instrument : GC#10                                 Location  : Vial 5
Injection Date  : 3/26/2019 4:37:50 PM                 Inj       :    1
                                                    Inj Volume: 1 µl
Acq. Method     : C:\CHEM32\1\DATA\032619B\032619_ABEH_GSL190252 2019-03-26 15-05-27\
                  FRONT_M18_ABEH_IN_MEOH_032519.M
Last changed    : 3/26/2019 1:55:14 PM by edecker
Analysis Method : C:\CHEM32\1\METHODS\FRONT_M18_ABEH_IN_MEOH_032519.M
Last changed    : 3/27/2019 10:01:36 AM by dyeddula
                  (modified after loading)
Sample Info     : GSL_190252-001
                  Method:M18
=====
  
```



External Standard Report

```

=====
Sorted By       : Signal
Calib. Data Modified : Tuesday, March 26, 2019 12:02:38 PM
Multiplier:     : 1.0000
Dilution:       : 1.0000
Use Multiplier & Dilution Factor with ISTDs
=====
  
```

Signal 1: FID1 A,

RetTime [min]	Type	Area [pA*s]	Amt/Area	Amount [ppm]	Grp	Name
1.250	-	-	-	-	-	Hexane
3.335	-	-	-	-	-	Benzene
5.471	-	-	-	-	-	Acetaldehyde
6.150	-	-	-	-	-	Ethylbenzene

dy
3/27/19

RetTime [min]	Type	Area [pA*s]	Amt/Area	Amount [ppm]	Grp	Name
Totals :				0.00000		

1 Warnings or Errors :

Warning : Calibrated compound(s) not found

=====
=====
Area Percent Report
=====

Sorted By : Signal
Calib. Data Modified : Tuesday, March 26, 2019 12:02:38 PM
Multiplier: : 1.0000
Dilution: : 1.0000
Use Multiplier & Dilution Factor with ISTDs

Signal 1: FID1 A,

Peak #	RetTime [min]	Type	Width [min]	Area [pA*s]	Area %	Name
1	1.250		0.0000	0.00000	0.00000	Hexane
2	3.335		0.0000	0.00000	0.00000	Benzene
3	5.471		0.0000	0.00000	0.00000	Acetaldehyde
4	6.150		0.0000	0.00000	0.00000	Ethlybenzene

Totals : 0.00000 0.0000
Uncalibrated Peaks: n.a.

1 Warnings or Errors :

Warning : Calibrated compound(s) not found

=====
=====
*** End of Report ***

RetTime [min]	Type	Area [pA*s]	Amt/Area	Amount [ppm]	Grp	Name
Totals :				0.00000		

1 Warnings or Errors :

Warning : Calibrated compound(s) not found

=====
=====
Area Percent Report
=====

Sorted By : Signal
Calib. Data Modified : Tuesday, March 26, 2019 12:02:38 PM
Multiplier: : 1.0000
Dilution: : 1.0000
Use Multiplier & Dilution Factor with ISTDs

Signal 1: FID1 A,

Peak #	RetTime [min]	Type	Width [min]	Area [pA*s]	Area %	Name
1	1.250		0.0000	0.00000	0.00000	Hexane
2	3.335		0.0000	0.00000	0.00000	Benzene
3	5.471		0.0000	0.00000	0.00000	Acetaldehyde
4	6.150		0.0000	0.00000	0.00000	Ethlybenzene

Totals : 0.00000 0.0000
Uncalibrated Peaks: n.a.

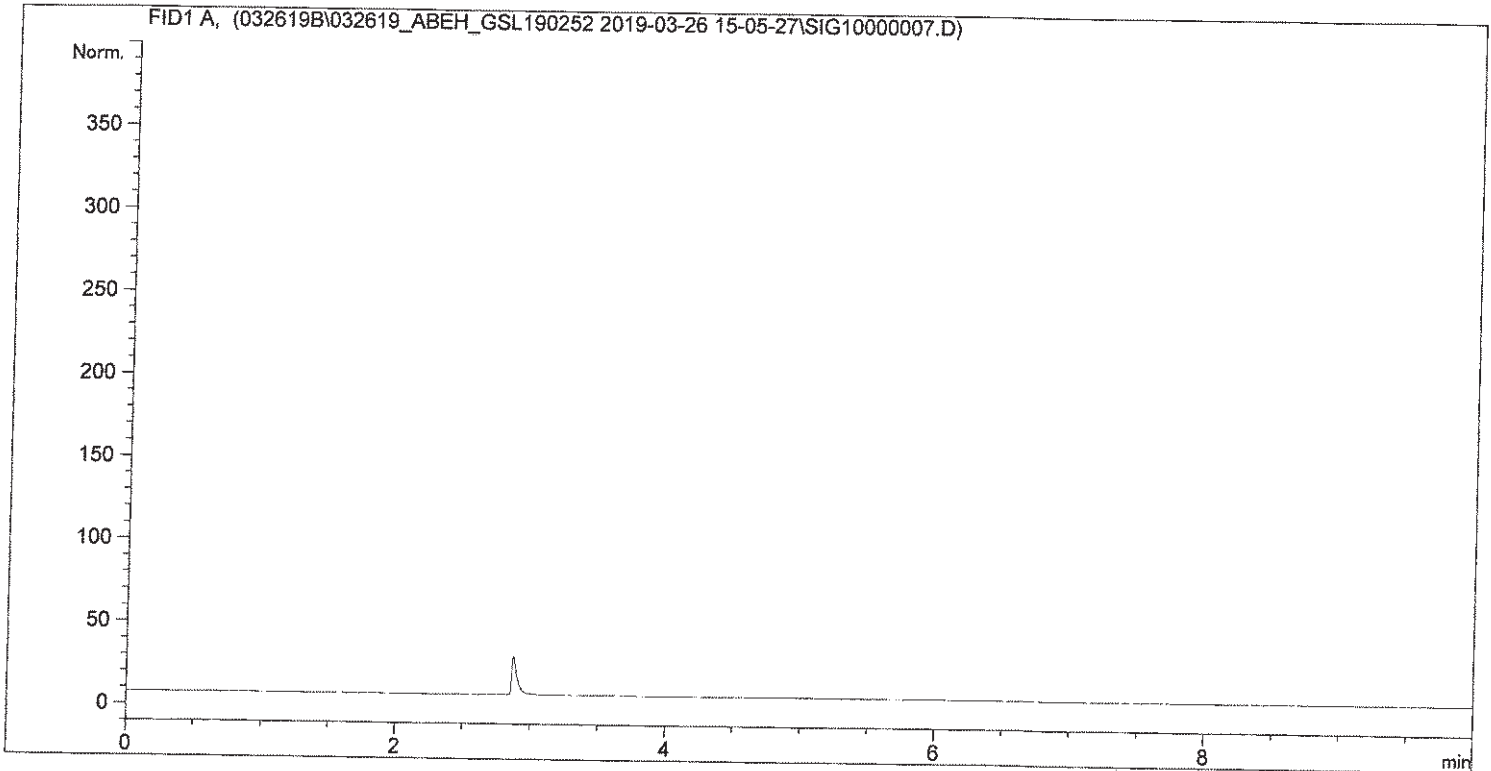
1 Warnings or Errors :

Warning : Calibrated compound(s) not found

=====
*** End of Report ***

```

=====
Acq. Operator   : edecker                               Seq. Line :    5
Acq. Instrument : GC#10                               Location  : Vial 5
Injection Date  : 3/26/2019 5:21:59 PM                Inj       :    3
                                                    Inj Volume: 1 µl
Acq. Method     : C:\CHEM32\1\DATA\032619B\032619_ABEH_GSL190252 2019-03-26 15-05-27\
                  FRONT_M18_ABEH_IN_MEOH_032519.M
Last changed    : 3/26/2019 1:55:14 PM by edecker
Analysis Method : C:\CHEM32\1\METHODS\FRONT_M18_ABEH_IN_MEOH_032519.M
Last changed    : 3/27/2019 10:01:36 AM by dyeddula
                  (modified after loading)
Sample Info     : GSL_190252-001
                  Method:M18
=====
  
```



External Standard Report

```

Sorted By           : Signal
Calib. Data Modified : Tuesday, March 26, 2019 12:02:38 PM
Multiplier:         : 1.0000
Dilution:           : 1.0000
Use Multiplier & Dilution Factor with ISTDs
  
```

Signal 1: FID1 A,

RetTime [min]	Type	Area [pA*s]	Amt/Area	Amount [ppm]	Grp	Name
1.250	-	-	-	-	-	Hexane
3.335	-	-	-	-	-	Benzene
5.471	-	-	-	-	-	Acetaldehyde
6.150	-	-	-	-	-	Ethylbenzene

dy
3/27/19

RetTime [min]	Type	Area [pA*s]	Amt/Area	Amount [ppm]	Grp	Name
Totals :				0.00000		

1 Warnings or Errors :

Warning : Calibrated compound(s) not found

=====
=====
Area Percent Report
=====

Sorted By : Signal
Calib. Data Modified : Tuesday, March 26, 2019 12:02:38 PM
Multiplier: : 1.0000
Dilution: : 1.0000
Use Multiplier & Dilution Factor with ISTDs

Signal 1: FID1 A,

Peak #	RetTime [min]	Type	Width [min]	Area [pA*s]	Area %	Name
1	1.250		0.0000	0.00000	0.00000	Hexane
2	3.335		0.0000	0.00000	0.00000	Benzene
3	5.471		0.0000	0.00000	0.00000	Acetaldehyde
4	6.150		0.0000	0.00000	0.00000	Ethlybenzene

Totals : 0.00000 0.0000

Uncalibrated Peaks: n.a.

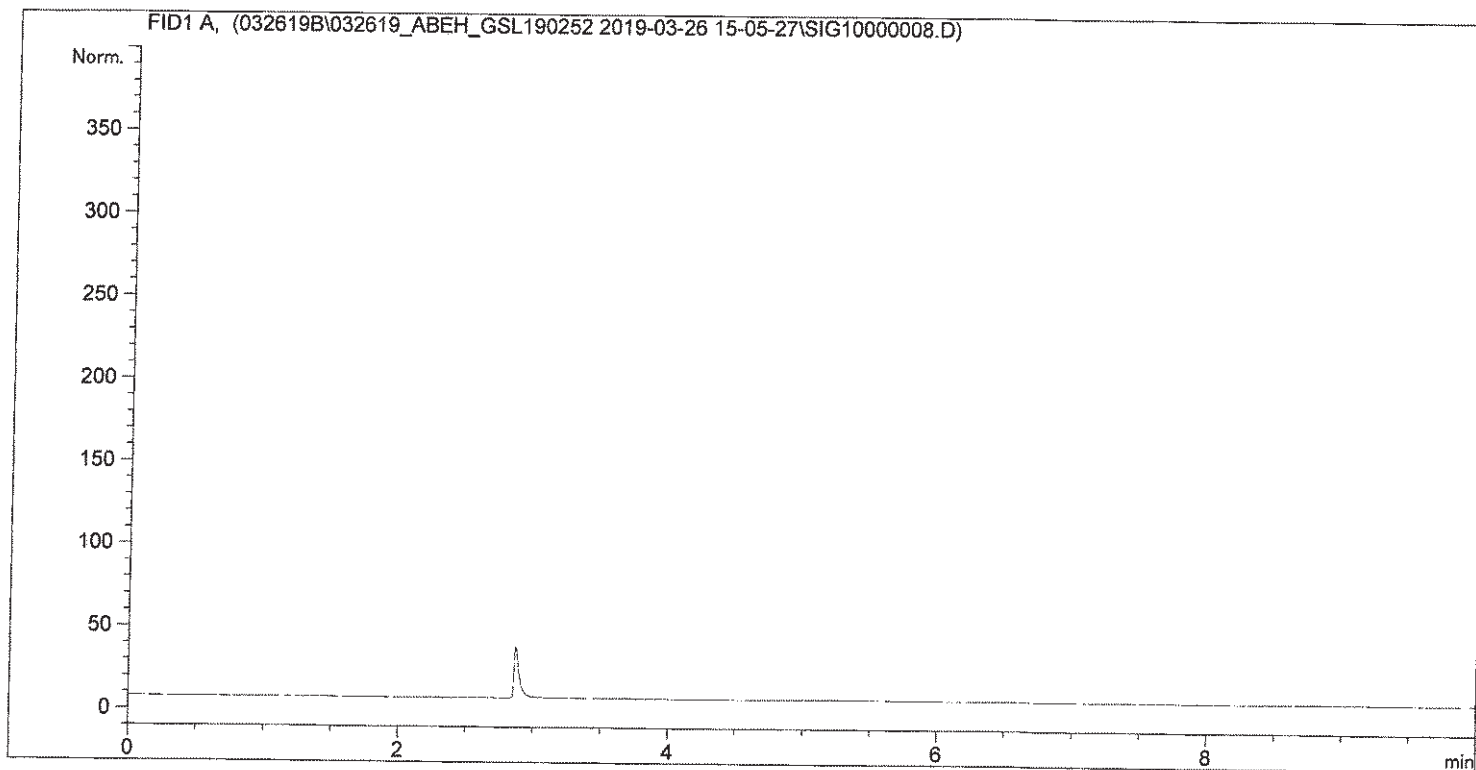
1 Warnings or Errors :

Warning : Calibrated compound(s) not found

=====
*** End of Report ***

```

=====
Acq. Operator   : edecker                               Seq. Line :    6
Acq. Instrument : GC#10                               Location  : Vial 6
Injection Date  : 3/26/2019 5:43:34 PM                Inj       :    1
                                                    Inj Volume: 1 µl
Acq. Method     : C:\CHEM32\1\DATA\032619B\032619_ABEH_GSL190252 2019-03-26 15-05-27\
                  FRONT_M18_ABEH_IN_MEOH_032519.M
Last changed    : 3/26/2019 1:55:14 PM by edecker
Analysis Method : C:\CHEM32\1\METHODS\FRONT_M18_ABEH_IN_MEOH_032519.M
Last changed    : 3/27/2019 10:01:36 AM by dyeddula
                  (modified after loading)
Sample Info     : GSL_190252-002
                  Method:M18
=====
  
```



External Standard Report

```

=====
Sorted By      : Signal
Calib. Data Modified : Tuesday, March 26, 2019 12:02:38 PM
Multiplier:    : 1.0000
Dilution:      : 1.0000
Use Multiplier & Dilution Factor with ISTDs
=====
  
```

Signal 1: FID1 A,

RetTime [min]	Type	Area [pA*s]	Amt/Area	Amount [ppm]	Grp	Name
1.250	-	-	-	-	-	Hexane
3.335	-	-	-	-	-	Benzene
5.471	-	-	-	-	-	Acetaldehyde
6.150	-	-	-	-	-	Ethlybenzene

W
3/27/19

RetTime [min]	Type	Area [pA*s]	Amt/Area	Amount [ppm]	Grp	Name
Totals :				0.00000		

1 Warnings or Errors :

Warning : Calibrated compound(s) not found

=====
=====
Area Percent Report
=====

Sorted By : Signal
Calib. Data Modified : Tuesday, March 26, 2019 12:02:38 PM
Multiplier: : 1.0000
Dilution: : 1.0000
Use Multiplier & Dilution Factor with ISTDs

Signal 1: FID1 A,

Peak #	RetTime [min]	Type	Width [min]	Area [pA*s]	Area %	Name
1	1.250		0.0000	0.00000	0.00000	Hexane
2	3.335		0.0000	0.00000	0.00000	Benzene
3	5.471		0.0000	0.00000	0.00000	Acetaldehyde
4	6.150		0.0000	0.00000	0.00000	Ethlybenzene

Totals : 0.00000 0.0000
Uncalibrated Peaks: n.a.

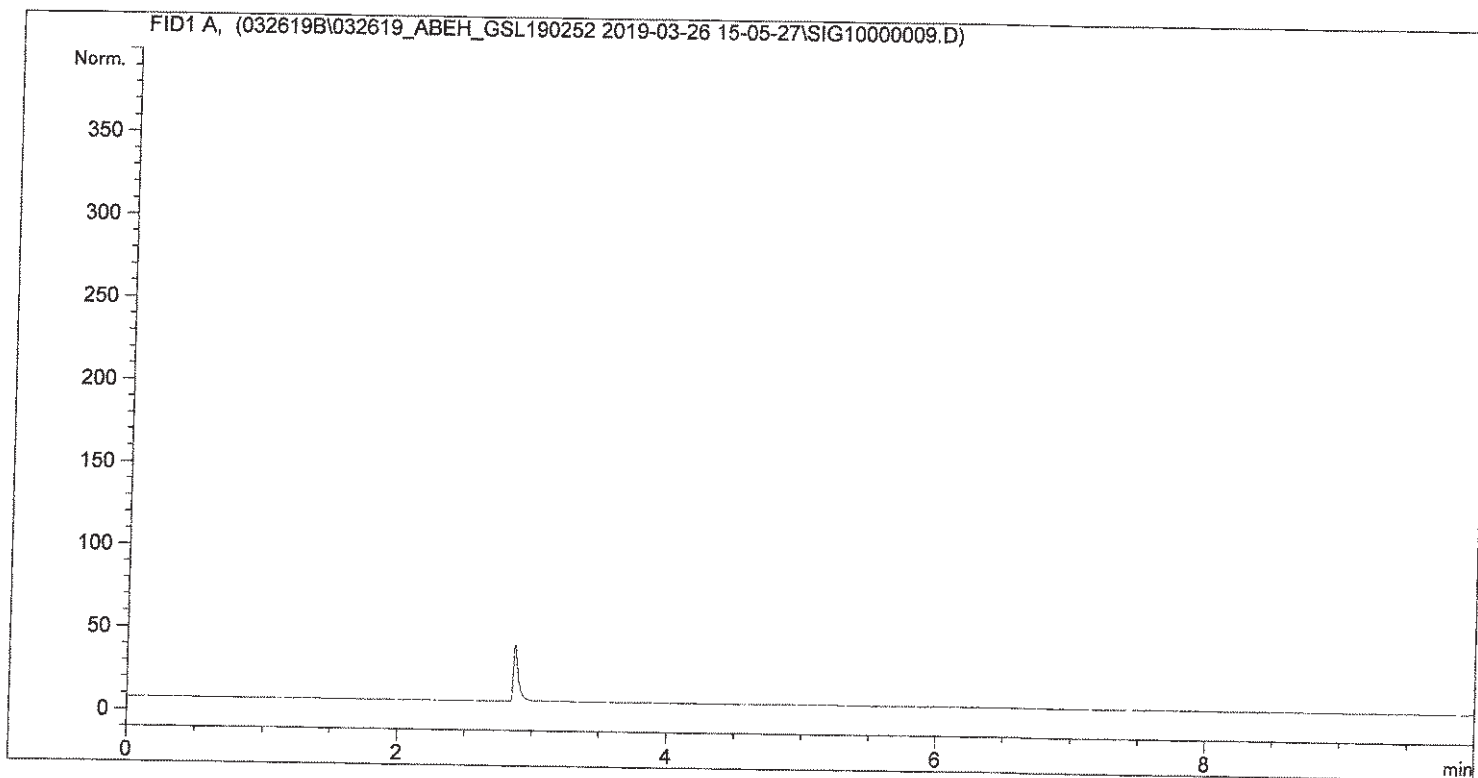
1 Warnings or Errors :

Warning : Calibrated compound(s) not found

=====
*** End of Report ***

```

=====
Acq. Operator   : edecker                               Seq. Line :    6
Acq. Instrument : GC#10                               Location  : Vial 6
Injection Date  : 3/26/2019 6:05:16 PM                Inj       :    2
                                                    Inj Volume: 1 µl
Acq. Method     : C:\CHEM32\1\DATA\032619B\032619_ABEH_GSL190252 2019-03-26 15-05-27\
                  FRONT_M18_ABEH_IN_MEOH_032519.M
Last changed    : 3/26/2019 1:55:14 PM by edecker
Analysis Method : C:\CHEM32\1\METHODS\FRONT_M18_ABEH_IN_MEOH_032519.M
Last changed    : 3/27/2019 10:02:06 AM by dyeddula
                  (modified after loading)
Sample Info     : GSL_190252-002
                  Method:M18
=====
  
```



External Standard Report

```

=====
Sorted By           :      Signal
Calib. Data Modified :      Tuesday, March 26, 2019 12:02:38 PM
Multiplier:         :      1.0000
Dilution:           :      1.0000
Use Multiplier & Dilution Factor with ISTDs
=====
  
```

Signal 1: FID1 A,

RetTime [min]	Type	Area [pA*s]	Amt/Area	Amount [ppm]	Grp	Name
1.250	-	-	-	-	-	Hexane
3.335	-	-	-	-	-	Benzene
5.471	-	-	-	-	-	Acetaldehyde
6.150	-	-	-	-	-	Ethlybenzene

dy
3/27/19

RetTime [min]	Type	Area [pA*s]	Amt/Area	Amount [ppm]	Grp	Name
Totals :				0.00000		

1 Warnings or Errors :

Warning : Calibrated compound(s) not found

=====
=====
Area Percent Report
=====

Sorted By : Signal
Calib. Data Modified : Tuesday, March 26, 2019 12:02:38 PM
Multiplier: : 1.0000
Dilution: : 1.0000
Use Multiplier & Dilution Factor with ISTDs

Signal 1: FID1 A,

Peak #	RetTime [min]	Type	Width [min]	Area [pA*s]	Area %	Name
1	1.250		0.0000	0.00000	0.00000	Hexane
2	3.335		0.0000	0.00000	0.00000	Benzene
3	5.471		0.0000	0.00000	0.00000	Acetaldehyde
4	6.150		0.0000	0.00000	0.00000	Ethlybenzene

Totals : 0.00000 0.0000
Uncalibrated Peaks: n.a.

1 Warnings or Errors :

Warning : Calibrated compound(s) not found

=====
*** End of Report ***

RetTime [min]	Type	Area [pA*s]	Amt/Area	Amount [ppm]	Grp	Name
Totals :				0.00000		

1 Warnings or Errors :

Warning : Calibrated compound(s) not found

=====
=====
Area Percent Report
=====

Sorted By : Signal
Calib. Data Modified : Tuesday, March 26, 2019 12:02:38 PM
Multiplier: : 1.0000
Dilution: : 1.0000
Use Multiplier & Dilution Factor with ISTDs

Signal 1: FID1 A,

Peak #	RetTime [min]	Type	Width [min]	Area [pA*s]	Area %	Name
1	1.250		0.0000	0.00000	0.00000	Hexane
2	3.335		0.0000	0.00000	0.00000	Benzene
3	5.471		0.0000	0.00000	0.00000	Acetaldehyde
4	6.150		0.0000	0.00000	0.00000	Ethlybenzene

Totals : 0.00000 0.0000
Uncalibrated Peaks: n.a.

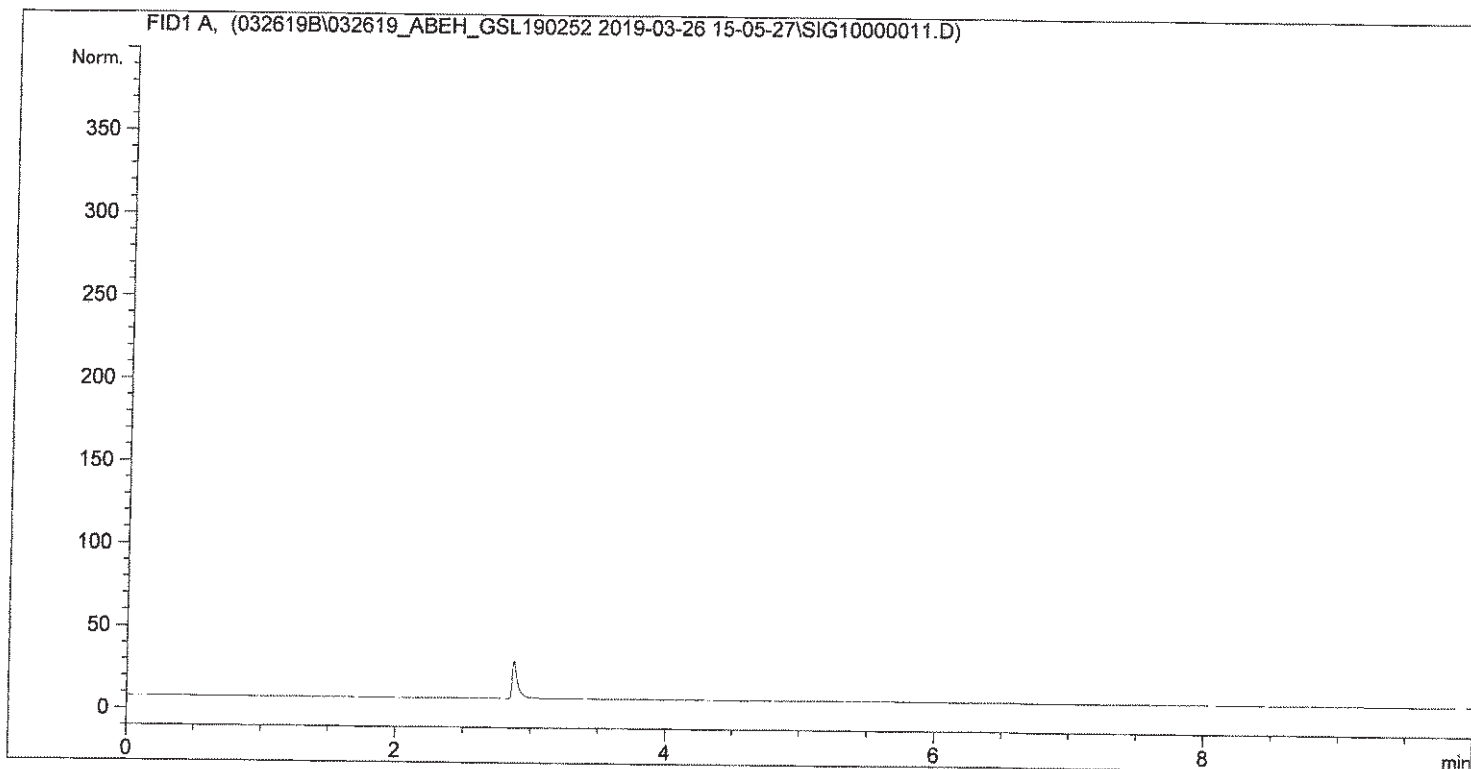
1 Warnings or Errors :

Warning : Calibrated compound(s) not found

=====
*** End of Report ***

```

=====
Acq. Operator   : edecker                               Seq. Line :    7
Acq. Instrument : GC#10                               Location  : Vial 7
Injection Date  : 3/26/2019 6:47:51 PM                Inj       :    1
                                                    Inj Volume: 1 µl
Acq. Method     : C:\CHEM32\1\DATA\032619B\032619_ABEH_GSL190252 2019-03-26 15-05-27\
                  FRONT_M18_ABEH_IN_MEOH_032519.M
Last changed    : 3/26/2019 1:55:14 PM by edecker
Analysis Method : C:\CHEM32\1\METHODS\FRONT_M18_ABEH_IN_MEOH_032519.M
Last changed    : 3/27/2019 10:02:19 AM by dyeddula
                  (modified after loading)
Sample Info     : GSL_190252-003
                  Method:M18
=====
  
```



External Standard Report

```

Sorted By      : Signal
Calib. Data Modified : Tuesday, March 26, 2019 12:02:38 PM
Multiplier:    : 1.0000
Dilution:      : 1.0000
Use Multiplier & Dilution Factor with ISTDs
  
```

Signal 1: FID1 A,

RetTime [min]	Type	Area [pA*s]	Amt/Area	Amount [ppm]	Grp	Name
1.250	-	-	-	-	-	Hexane
3.335	-	-	-	-	-	Benzene
5.471	-	-	-	-	-	Acetaldehyde
6.150	-	-	-	-	-	Ethlybenzene

ew
3/27/19

RetTime [min]	Type	Area [pA*s]	Amt/Area	Amount [ppm]	Grp	Name
Totals :				0.00000		

1 Warnings or Errors :

Warning : Calibrated compound(s) not found

=====
=====
Area Percent Report
=====

Sorted By : Signal
Calib. Data Modified : Tuesday, March 26, 2019 12:02:38 PM
Multiplier: : 1.0000
Dilution: : 1.0000
Use Multiplier & Dilution Factor with ISTDs

Signal 1: FID1 A,

Peak #	RetTime [min]	Type	Width [min]	Area [pA*s]	Area %	Name
1	1.250		0.0000	0.00000	0.00000	Hexane
2	3.335		0.0000	0.00000	0.00000	Benzene
3	5.471		0.0000	0.00000	0.00000	Acetaldehyde
4	6.150		0.0000	0.00000	0.00000	Ethlybenzene

Totals : 0.00000 0.0000

Uncalibrated Peaks: n.a.

1 Warnings or Errors :

Warning : Calibrated compound(s) not found

=====
*** End of Report ***

RetTime [min]	Type	Area [pA*s]	Amt/Area	Amount [ppm]	Grp	Name
Totals :				0.00000		

1 Warnings or Errors :

Warning : Calibrated compound(s) not found

=====
=====
Area Percent Report
=====

Sorted By : Signal
Calib. Data Modified : Tuesday, March 26, 2019 12:02:38 PM
Multiplier: : 1.0000
Dilution: : 1.0000
Use Multiplier & Dilution Factor with ISTDs

Signal 1: FID1 A,

Peak #	RetTime [min]	Type	Width [min]	Area [pA*s]	Area %	Name
1	1.250		0.0000	0.00000	0.00000	Hexane
2	3.335		0.0000	0.00000	0.00000	Benzene
3	5.471		0.0000	0.00000	0.00000	Acetaldehyde
4	6.150		0.0000	0.00000	0.00000	Ethlybenzene

Totals : 0.00000 0.0000
Uncalibrated Peaks: n.a.

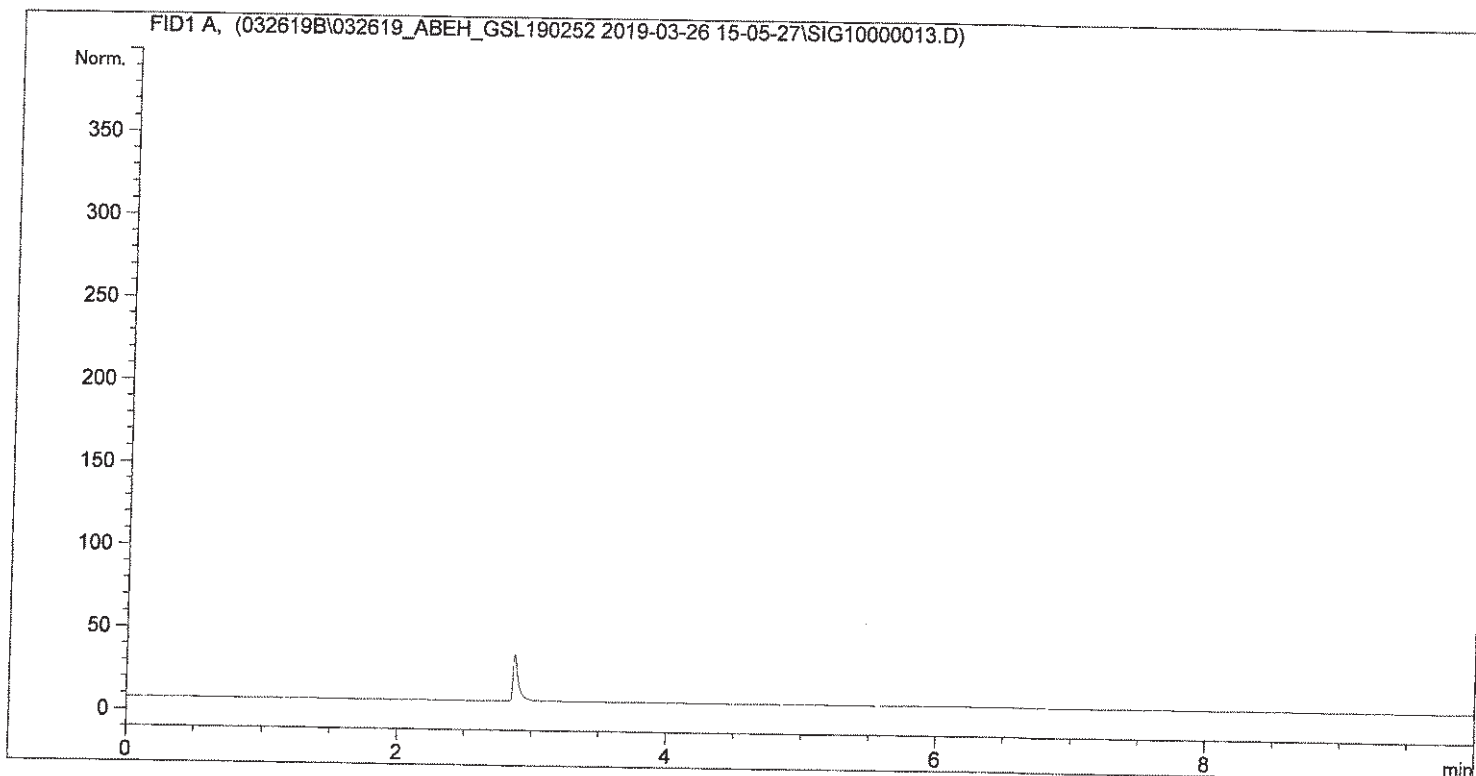
1 Warnings or Errors :

Warning : Calibrated compound(s) not found

=====
*** End of Report ***

```

=====
Acq. Operator   : edecker                               Seq. Line :    7
Acq. Instrument : GC#10                               Location  : Vial 7
Injection Date  : 3/26/2019 7:30:29 PM                Inj       :    3
                                                    Inj Volume: 1 µl
Acq. Method     : C:\CHEM32\1\DATA\032619B\032619_ABEH_GSL190252 2019-03-26 15-05-27\
                  FRONT_M18_ABEH_IN_MEOH_032519.M
Last changed    : 3/26/2019 1:55:14 PM by edecker
Analysis Method : C:\CHEM32\1\METHODS\FRONT_M18_ABEH_IN_MEOH_032519.M
Last changed    : 3/27/2019 10:02:19 AM by dyeddula
                  (modified after loading)
Sample Info     : GSL_190252-003
                  Method:M18
=====
  
```



External Standard Report

```

Sorted By      : Signal
Calib. Data Modified : Tuesday, March 26, 2019 12:02:38 PM
Multiplier:    : 1.0000
Dilution:      : 1.0000
Use Multiplier & Dilution Factor with ISTDs
  
```

Signal 1: FID1 A,

RetTime [min]	Type	Area [pA*s]	Amt/Area	Amount [ppm]	Grp	Name
1.250	-	-	-	-	-	Hexane
3.335	-	-	-	-	-	Benzene
5.471	-	-	-	-	-	Acetaldehyde
6.150	-	-	-	-	-	Ethlybenzene

sw
3/27/19

RetTime [min]	Type	Area [pA*s]	Amt/Area	Amount [ppm]	Grp	Name
Totals :				0.00000		

1 Warnings or Errors :

Warning : Calibrated compound(s) not found

=====
=====
Area Percent Report
=====

Sorted By : Signal
Calib. Data Modified : Tuesday, March 26, 2019 12:02:38 PM
Multiplier: : 1.0000
Dilution: : 1.0000
Use Multiplier & Dilution Factor with ISTDs

Signal 1: FID1 A,

Peak #	RetTime [min]	Type	Width [min]	Area [pA*s]	Area %	Name
1	1.250		0.0000	0.00000	0.00000	Hexane
2	3.335		0.0000	0.00000	0.00000	Benzene
3	5.471		0.0000	0.00000	0.00000	Acetaldehyde
4	6.150		0.0000	0.00000	0.00000	Ethlybenzene

Totals : 0.00000 0.0000
Uncalibrated Peaks: n.a.

1 Warnings or Errors :

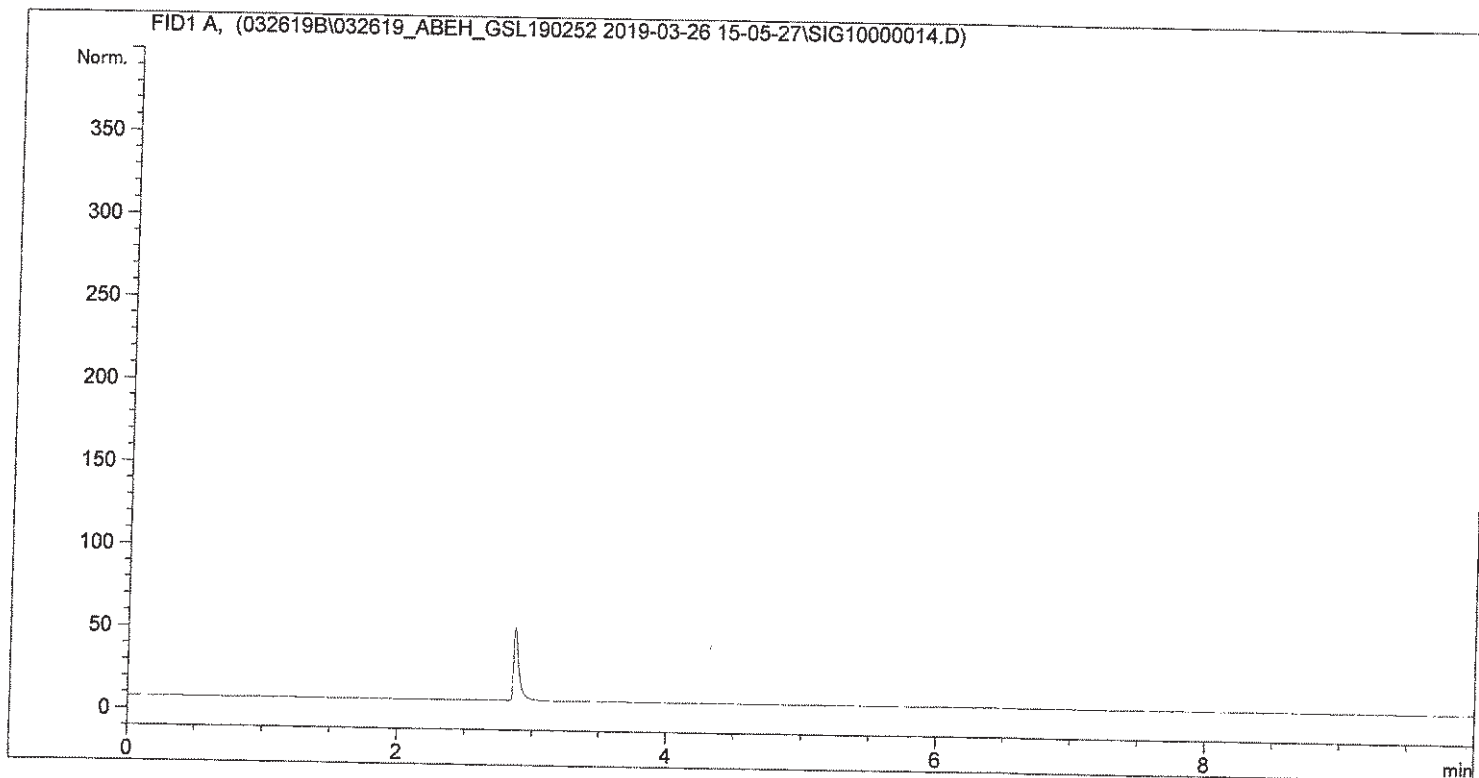
Warning : Calibrated compound(s) not found

=====
=====
*** End of Report ***

```

=====
Acq. Operator   : edecker                               Seq. Line :    8
Acq. Instrument : GC#10                               Location  : Vial 8
Injection Date  : 3/26/2019 7:51:50 PM                Inj       :    1
                                                    Inj Volume: 1 µl
Acq. Method     : C:\CHEM32\1\DATA\032619B\032619_ABEH_GSL190252 2019-03-26 15-05-27\
                  FRONT_M18_ABEH_IN_MEOH_032519.M
Last changed    : 3/26/2019 1:55:14 PM by edecker
Analysis Method : C:\CHEM32\1\METHODS\FRONT_M18_ABEH_IN_MEOH_032519.M
Last changed    : 3/27/2019 10:02:19 AM by dyeddula
                  (modified after loading)
Sample Info     : GSL_190252-004
  
```

Method:M18



External Standard Report

```

=====
Sorted By       : Signal
Calib. Data Modified : Tuesday, March 26, 2019 12:02:38 PM
Multiplier:     : 1.0000
Dilution:       : 1.0000
Use Multiplier & Dilution Factor with ISTDs
  
```

Signal 1: FID1 A,

RetTime [min]	Type	Area [pA*s]	Amt/Area	Amount [ppm]	Grp	Name
1.250	-	-	-	-	-	Hexane
3.335	-	-	-	-	-	Benzene
5.471	-	-	-	-	-	Acetaldehyde

dy
3/27/19

RetTime [min]	Type	Area [pA*s]	Amt/Area	Amount [ppm]	Grp	Name
6.150	-	-	-	-		Ethlybenzene

Totals : 0.00000

1 Warnings or Errors :

Warning : Calibrated compound(s) not found

=====
=====
Area Percent Report
=====

Sorted By : Signal
Calib. Data Modified : Tuesday, March 26, 2019 12:02:38 PM
Multiplier: : 1.0000
Dilution: : 1.0000
Use Multiplier & Dilution Factor with ISTDs

Signal 1: FID1 A,

Peak #	RetTime [min]	Type	Width [min]	Area [pA*s]	Area %	Name
1	1.250		0.0000	0.00000	0.00000	Hexane
2	3.335		0.0000	0.00000	0.00000	Benzene
3	5.471		0.0000	0.00000	0.00000	Acetaldehyde
4	6.150		0.0000	0.00000	0.00000	Ethlybenzene

Totals : 0.00000 0.0000

Uncalibrated Peaks: n.a.

1 Warnings or Errors :

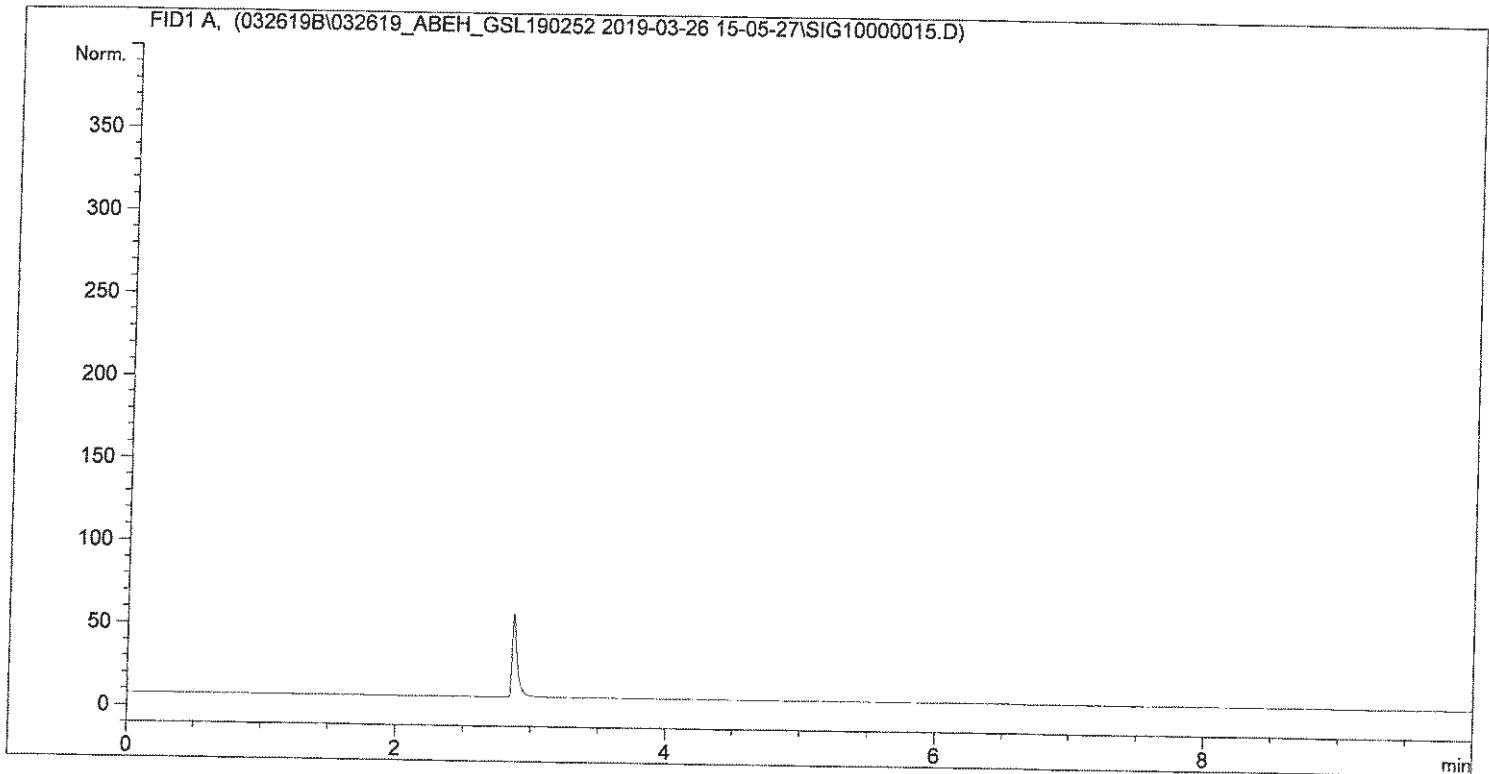
Warning : Calibrated compound(s) not found

=====
*** End of Report ***

```

=====
Acq. Operator   : edecker                               Seq. Line :    8
Acq. Instrument : GC#10                               Location  : Vial 8
Injection Date  : 3/26/2019 8:13:22 PM                Inj       :    2
                                                    Inj Volume: 1 µl
Acq. Method     : C:\CHEM32\1\DATA\032619B\032619_ABEH_GSL190252 2019-03-26 15-05-27\
                  FRONT_M18_ABEH_IN_MEOH_032519.M
Last changed    : 3/26/2019 1:55:14 PM by edecker
Analysis Method : C:\CHEM32\1\METHODS\FRONT_M18_ABEH_IN_MEOH_032519.M
Last changed    : 3/27/2019 10:02:19 AM by dyeddula
                  (modified after loading)
Sample Info     : GSL_190252-004
  
```

Method:M18



External Standard Report

```

=====
Sorted By           : Signal
Calib. Data Modified : Tuesday, March 26, 2019 12:02:38 PM
Multiplier:         : 1.0000
Dilution:           : 1.0000
Use Multiplier & Dilution Factor with ISTDs
  
```

Signal 1: FID1 A,

RetTime [min]	Type	Area [pA*s]	Amt/Area	Amount [ppm]	Grp	Name
1.250	-	-	-	-	-	Hexane
3.335	-	-	-	-	-	Benzene
5.471	-	-	-	-	-	Acetaldehyde

aw
3/27/19

RetTime [min]	Type	Area [pA*s]	Amt/Area	Amount [ppm]	Grp	Name
6.150	-	-	-	-		Ethlybenzene

Totals : 0.00000

1 Warnings or Errors :

Warning : Calibrated compound(s) not found

=====
=====
Area Percent Report
=====

Sorted By : Signal
Calib. Data Modified : Tuesday, March 26, 2019 12:02:38 PM
Multiplier: : 1.0000
Dilution: : 1.0000
Use Multiplier & Dilution Factor with ISTDs

Signal 1: FID1 A,

Peak #	RetTime [min]	Type	Width [min]	Area [pA*s]	Area %	Name
1	1.250		0.0000	0.00000	0.00000	Hexane
2	3.335		0.0000	0.00000	0.00000	Benzene
3	5.471		0.0000	0.00000	0.00000	Acetaldehyde
4	6.150		0.0000	0.00000	0.00000	Ethlybenzene

Totals : 0.00000 0.0000

Uncalibrated Peaks: n.a.

1 Warnings or Errors :

Warning : Calibrated compound(s) not found

=====
=====
*** End of Report ***

RetTime [min]	Type	Area [pA*s]	Amt/Area	Amount [ppm]	Grp	Name
6.150	-	-	-	-		Ethlybenzene

Totals : 0.00000

1 Warnings or Errors :

Warning : Calibrated compound(s) not found

=====
=====
Area Percent Report
=====

Sorted By : Signal
Calib. Data Modified : Tuesday, March 26, 2019 12:02:38 PM
Multiplier: : 1.0000
Dilution: : 1.0000
Use Multiplier & Dilution Factor with ISTDs

Signal 1: FID1 A,

Peak #	RetTime [min]	Type	Width [min]	Area [pA*s]	Area %	Name
1	1.250		0.0000	0.00000	0.00000	Hexane
2	3.335		0.0000	0.00000	0.00000	Benzene
3	5.471		0.0000	0.00000	0.00000	Acetaldehyde
4	6.150		0.0000	0.00000	0.00000	Ethlybenzene

Totals : 0.00000 0.0000

Uncalibrated Peaks: n.a.

1 Warnings or Errors :

Warning : Calibrated compound(s) not found

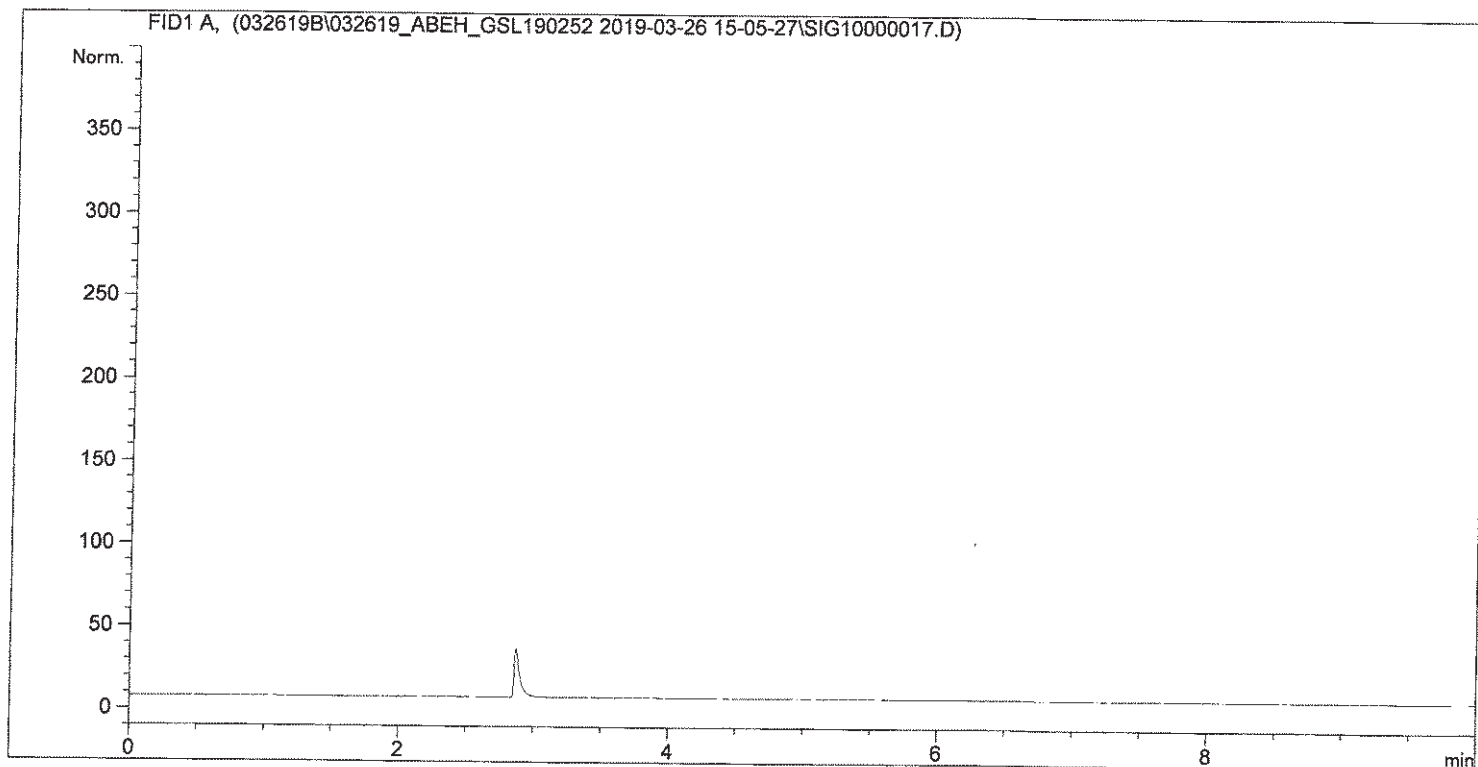
=====
*** End of Report ***

```

=====
Acq. Operator   : edecker                               Seq. Line :    9
Acq. Instrument : GC#10                               Location  : Vial 9
Injection Date  : 3/26/2019 8:56:45 PM                Inj       :    1
                                                    Inj Volume: 1 µl

Acq. Method     : C:\CHEM32\1\DATA\032619B\032619_ABEH_GSL190252 2019-03-26 15-05-27\
                  FRONT_M18_ABEH_IN_MEOH_032519.M
Last changed    : 3/26/2019 1:55:14 PM by edecker
Analysis Method : C:\CHEM32\1\METHODS\FRONT_M18_ABEH_IN_MEOH_032519.M
Last changed    : 3/27/2019 10:02:19 AM by dyeddula
                  (modified after loading)

Sample Info     : GSL_190252-005
                  Method:M18
=====
  
```



External Standard Report

```

Sorted By      : Signal
Calib. Data Modified : Tuesday, March 26, 2019 12:02:38 PM
Multiplier:    : 1.0000
Dilution:     : 1.0000
Use Multiplier & Dilution Factor with ISTDs
  
```

Signal 1: FID1 A,

RetTime [min]	Type	Area [pA*s]	Amt/Area	Amount [ppm]	Grp	Name
1.250	-	-	-	-	-	Hexane
3.335	-	-	-	-	-	Benzene
5.471	-	-	-	-	-	Acetaldehyde
6.150	-	-	-	-	-	Ethlybenzene

Handwritten: 3/27/19

RetTime [min]	Type	Area [pA*s]	Amt/Area	Amount [ppm]	Grp	Name
Totals :				0.00000		

1 Warnings or Errors :

Warning : Calibrated compound(s) not found

=====
=====
Area Percent Report
=====

Sorted By : Signal
Calib. Data Modified : Tuesday, March 26, 2019 12:02:38 PM
Multiplier: : 1.0000
Dilution: : 1.0000
Use Multiplier & Dilution Factor with ISTDs

Signal 1: FID1 A,

Peak #	RetTime [min]	Type	Width [min]	Area [pA*s]	Area %	Name
1	1.250		0.0000	0.00000	0.00000	Hexane
2	3.335		0.0000	0.00000	0.00000	Benzene
3	5.471		0.0000	0.00000	0.00000	Acetaldehyde
4	6.150		0.0000	0.00000	0.00000	Ethlybenzene

Totals : 0.00000 0.0000

Uncalibrated Peaks: n.a.

1 Warnings or Errors :

Warning : Calibrated compound(s) not found

=====
*** End of Report ***

RetTime [min]	Type	Area [pA*s]	Amt/Area	Amount [ppm]	Grp	Name
Totals :				0.00000		

1 Warnings or Errors :

Warning : Calibrated compound(s) not found

=====
=====
Area Percent Report
=====

Sorted By : Signal
Calib. Data Modified : Tuesday, March 26, 2019 12:02:38 PM
Multiplier: : 1.0000
Dilution: : 1.0000
Use Multiplier & Dilution Factor with ISTDs

Signal 1: FID1 A,

Peak #	RetTime [min]	Type	Width [min]	Area [pA*s]	Area %	Name
1	1.250		0.0000	0.00000	0.00000	Hexane
2	3.335		0.0000	0.00000	0.00000	Benzene
3	5.471		0.0000	0.00000	0.00000	Acetaldehyde
4	6.150		0.0000	0.00000	0.00000	Ethlybenzene

Totals : 0.00000 0.0000

Uncalibrated Peaks: n.a.

1 Warnings or Errors :

Warning : Calibrated compound(s) not found

=====
=====
*** End of Report ***

RetTime [min]	Type	Area [pA*s]	Amt/Area	Amount [ppm]	Grp	Name
Totals :				0.00000		

1 Warnings or Errors :

Warning : Calibrated compound(s) not found

=====
=====
Area Percent Report
=====

Sorted By : Signal
Calib. Data Modified : Tuesday, March 26, 2019 12:02:38 PM
Multiplier: : 1.0000
Dilution: : 1.0000
Use Multiplier & Dilution Factor with ISTDs

Signal 1: FID1 A,

Peak #	RetTime [min]	Type	Width [min]	Area [pA*s]	Area %	Name
1	1.250		0.0000	0.00000	0.00000	Hexane
2	3.335		0.0000	0.00000	0.00000	Benzene
3	5.471		0.0000	0.00000	0.00000	Acetaldehyde
4	6.150		0.0000	0.00000	0.00000	Ethlybenzene

Totals : 0.00000 0.0000

Uncalibrated Peaks: n.a.

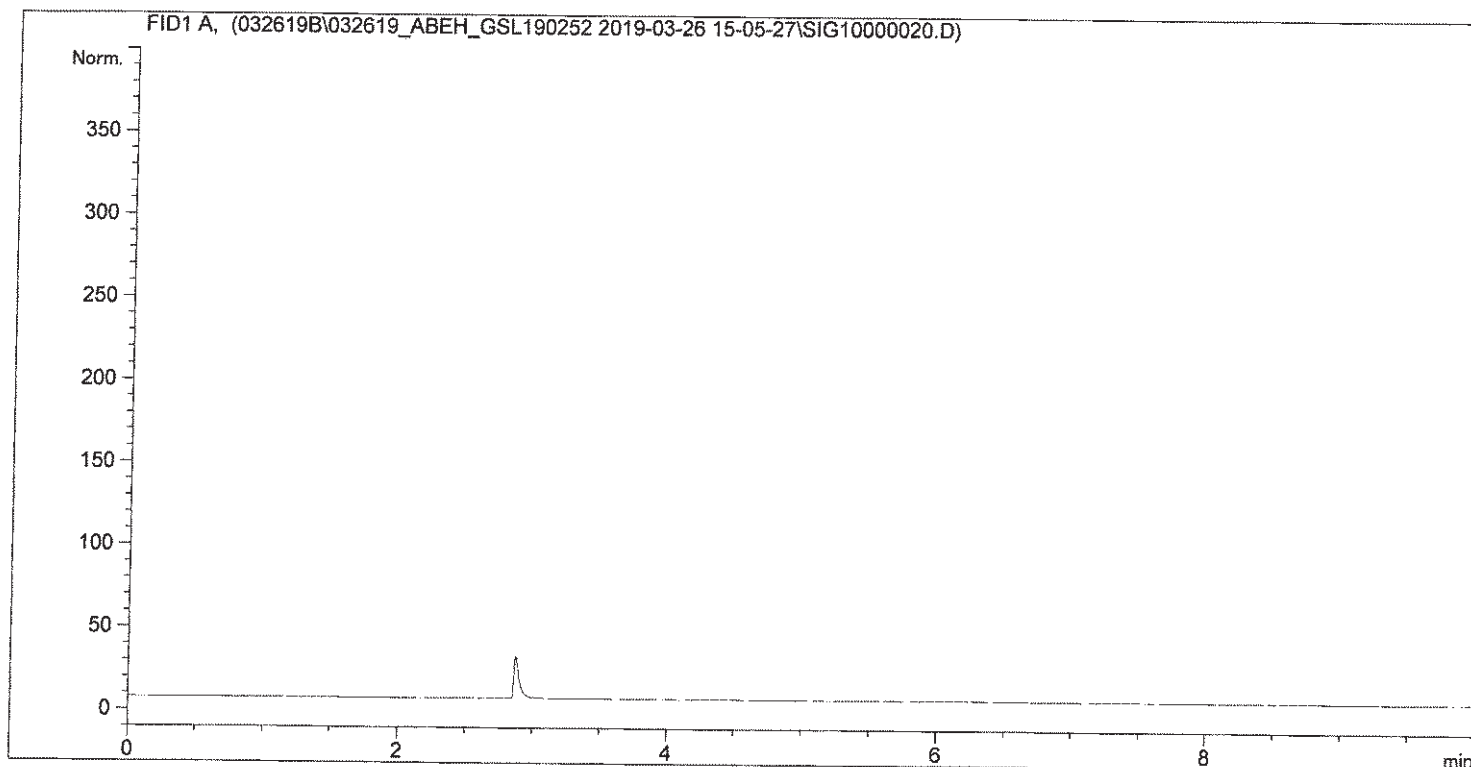
1 Warnings or Errors :

Warning : Calibrated compound(s) not found

=====
*** End of Report ***

```

=====
Acq. Operator   : edecker                               Seq. Line :   10
Acq. Instrument : GC#10                                 Location  : Vial 10
Injection Date  : 3/26/2019 10:02:28 PM                Inj       :    1
                                                    Inj Volume: 1 µl
Acq. Method     : C:\CHEM32\1\DATA\032619B\032619_ABEH_GSL190252 2019-03-26 15-05-27\
                  FRONT_M18_ABEH_IN_MEOH_032519.M
Last changed    : 3/26/2019 1:55:14 PM by edecker
Analysis Method : C:\CHEM32\1\METHODS\FRONT_M18_ABEH_IN_MEOH_032519.M
Last changed    : 3/27/2019 10:02:19 AM by dyeddula
                  (modified after loading)
Sample Info     : GSL_190252-006
                  Method:M18
  
```



External Standard Report

```

Sorted By      : Signal
Calib. Data Modified : Tuesday, March 26, 2019 12:02:38 PM
Multiplier:    : 1.0000
Dilution:      : 1.0000
Use Multiplier & Dilution Factor with ISTDs
  
```

Signal 1: FID1 A,

RetTime [min]	Type	Area [pA*s]	Amt/Area	Amount [ppm]	Grp	Name
1.250	-	-	-	-	-	Hexane
3.335	-	-	-	-	-	Benzene
5.471	-	-	-	-	-	Acetaldehyde
6.150	-	-	-	-	-	Ethlybenzene

Handwritten: 20
3/27/19

RetTime [min]	Type	Area [pA*s]	Amt/Area	Amount [ppm]	Grp	Name
Totals :				0.00000		

1 Warnings or Errors :

Warning : Calibrated compound(s) not found

=====
=====
Area Percent Report
=====

Sorted By : Signal
Calib. Data Modified : Tuesday, March 26, 2019 12:02:38 PM
Multiplier: : 1.0000
Dilution: : 1.0000
Use Multiplier & Dilution Factor with ISTDs

Signal 1: FID1 A,

Peak #	RetTime [min]	Type	Width [min]	Area [pA*s]	Area %	Name
1	1.250		0.0000	0.00000	0.00000	Hexane
2	3.335		0.0000	0.00000	0.00000	Benzene
3	5.471		0.0000	0.00000	0.00000	Acetaldehyde
4	6.150		0.0000	0.00000	0.00000	Ethlybenzene

Totals : 0.00000 0.0000
Uncalibrated Peaks: n.a.

1 Warnings or Errors :

Warning : Calibrated compound(s) not found

=====
*** End of Report ***

RetTime [min]	Type	Area [pA*s]	Amt/Area	Amount [ppm]	Grp	Name
Totals :				0.00000		

1 Warnings or Errors :

Warning : Calibrated compound(s) not found

=====
=====
Area Percent Report
=====

Sorted By : Signal
Calib. Data Modified : Tuesday, March 26, 2019 12:02:38 PM
Multiplier: : 1.0000
Dilution: : 1.0000
Use Multiplier & Dilution Factor with ISTDs

Signal 1: FID1 A,

Peak #	RetTime [min]	Type	Width [min]	Area [pA*s]	Area %	Name
1	1.250		0.0000	0.00000	0.00000	Hexane
2	3.335		0.0000	0.00000	0.00000	Benzene
3	5.471		0.0000	0.00000	0.00000	Acetaldehyde
4	6.150		0.0000	0.00000	0.00000	Ethlybenzene

Totals : 0.00000 0.0000

Uncalibrated Peaks: n.a.

1 Warnings or Errors :

Warning : Calibrated compound(s) not found

=====
*** End of Report ***

RetTime [min]	Type	Area [pA*s]	Amt/Area	Amount [ppm]	Grp	Name
Totals :				0.00000		

1 Warnings or Errors :

Warning : Calibrated compound(s) not found

=====
=====
Area Percent Report
=====

Sorted By : Signal
Calib. Data Modified : Tuesday, March 26, 2019 12:02:38 PM
Multiplier: : 1.0000
Dilution: : 1.0000
Use Multiplier & Dilution Factor with ISTDs

Signal 1: FID1 A,

Peak #	RetTime [min]	Type	Width [min]	Area [pA*s]	Area %	Name
1	1.250		0.0000	0.00000	0.00000	Hexane
2	3.335		0.0000	0.00000	0.00000	Benzene
3	5.471		0.0000	0.00000	0.00000	Acetaldehyde
4	6.150		0.0000	0.00000	0.00000	Ethlybenzene

Totals : 0.00000 0.0000
Uncalibrated Peaks: n.a.

1 Warnings or Errors :

Warning : Calibrated compound(s) not found

=====
*** End of Report ***

RetTime [min]	Type	Area [pA*s]	Amt/Area	Amount [ppm]	Grp	Name
Totals :				0.00000		

1 Warnings or Errors :

Warning : Calibrated compound(s) not found

=====
=====
Area Percent Report
=====

Sorted By : Signal
Calib. Data Modified : Tuesday, March 26, 2019 12:02:38 PM
Multiplier: : 1.0000
Dilution: : 1.0000
Use Multiplier & Dilution Factor with ISTDs

Signal 1: FID1 A,

Peak #	RetTime [min]	Type	Width [min]	Area [pA*s]	Area %	Name
1	1.250		0.0000	0.00000	0.00000	Hexane
2	3.335		0.0000	0.00000	0.00000	Benzene
3	5.471		0.0000	0.00000	0.00000	Acetaldehyde
4	6.150		0.0000	0.00000	0.00000	Ethlybenzene

Totals : 0.00000 0.0000

Uncalibrated Peaks: n.a.

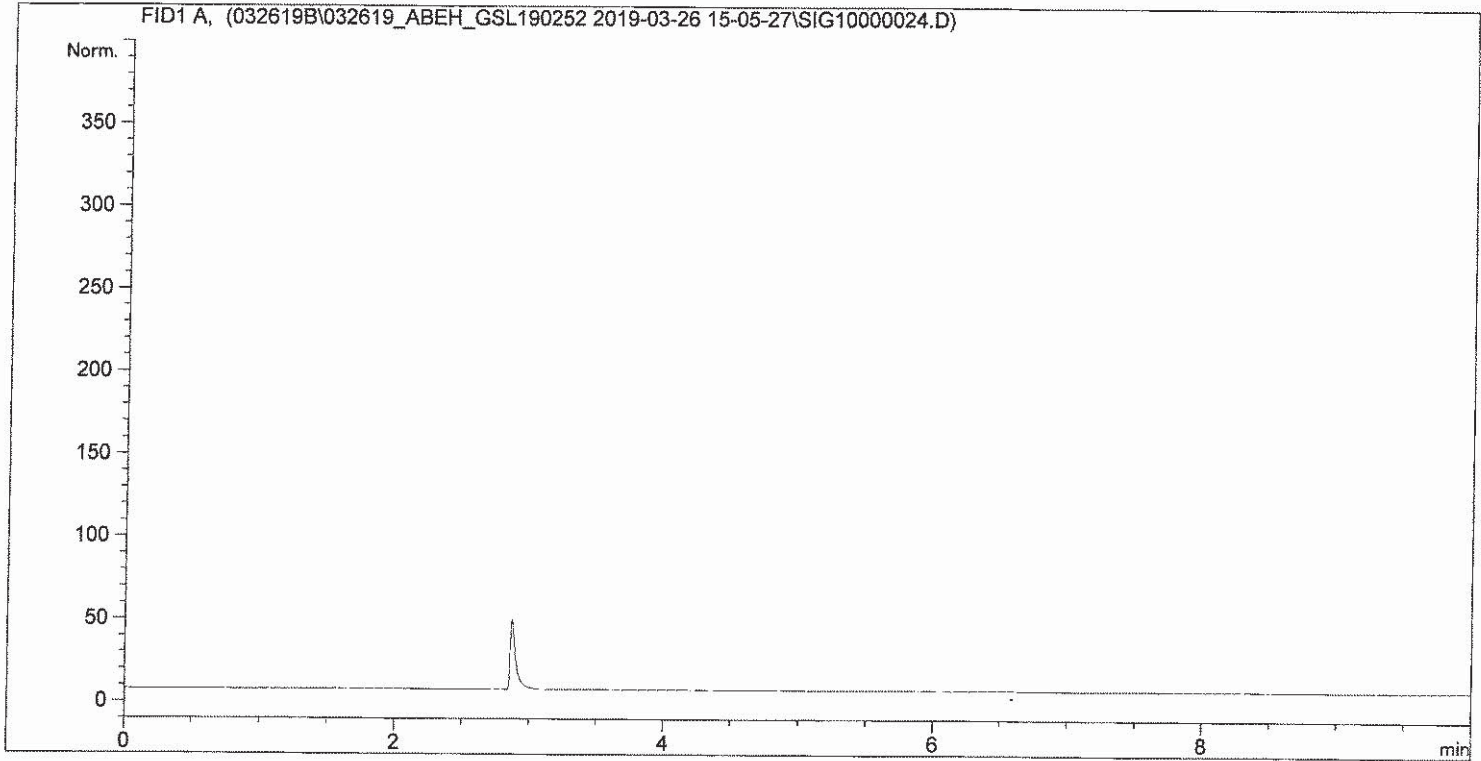
1 Warnings or Errors :

Warning : Calibrated compound(s) not found

=====
=====
*** End of Report ***

```

=====
Acq. Operator   : edecker                               Seq. Line :   11
Acq. Instrument : GC#10                                 Location  : Vial 11
Injection Date  : 3/26/2019 11:29:17 PM                Inj       :    2
                                                    Inj Volume: 1 µl
Acq. Method     : C:\CHEM32\1\DATA\032619B\032619_ABEH_GSL190252 2019-03-26 15-05-27\
                  FRONT_M18_ABEH_IN_MEOH_032519.M
Last changed    : 3/26/2019 1:55:14 PM by edecker
Analysis Method : C:\CHEM32\1\METHODS\FRONT_M18_ABEH_IN_MEOH_032519.M
Last changed    : 3/27/2019 10:02:19 AM by dyeddula
                  (modified after loading)
Sample Info     : GSL_190252-007
                  Method:M18
=====
  
```



External Standard Report

```

Sorted By      : Signal
Calib. Data Modified : Tuesday, March 26, 2019 12:02:38 PM
Multiplier:    : 1.0000
Dilution:      : 1.0000
Use Multiplier & Dilution Factor with ISTDs
  
```

Signal 1: FID1 A,

RetTime [min]	Type	Area [pA*s]	Amt/Area	Amount [ppm]	Grp	Name
1.250	-	-	-	-	-	Hexane
3.335	-	-	-	-	-	Benzene
5.471	-	-	-	-	-	Acetaldehyde
6.150	-	-	-	-	-	Ethlybenzene

SW
3/27/19

RetTime [min]	Type	Area [pA*s]	Amt/Area	Amount [ppm]	Grp	Name
Totals :				0.00000		

1 Warnings or Errors :

Warning : Calibrated compound(s) not found

=====
=====
Area Percent Report
=====

Sorted By : Signal
Calib. Data Modified : Tuesday, March 26, 2019 12:02:38 PM
Multiplier: : 1.0000
Dilution: : 1.0000
Use Multiplier & Dilution Factor with ISTDs

Signal 1: FID1 A,

Peak #	RetTime [min]	Type	Width [min]	Area [pA*s]	Area %	Name
1	1.250		0.0000	0.00000	0.00000	Hexane
2	3.335		0.0000	0.00000	0.00000	Benzene
3	5.471		0.0000	0.00000	0.00000	Acetaldehyde
4	6.150		0.0000	0.00000	0.00000	Ethlybenzene

Totals : 0.00000 0.0000

Uncalibrated Peaks: n.a.

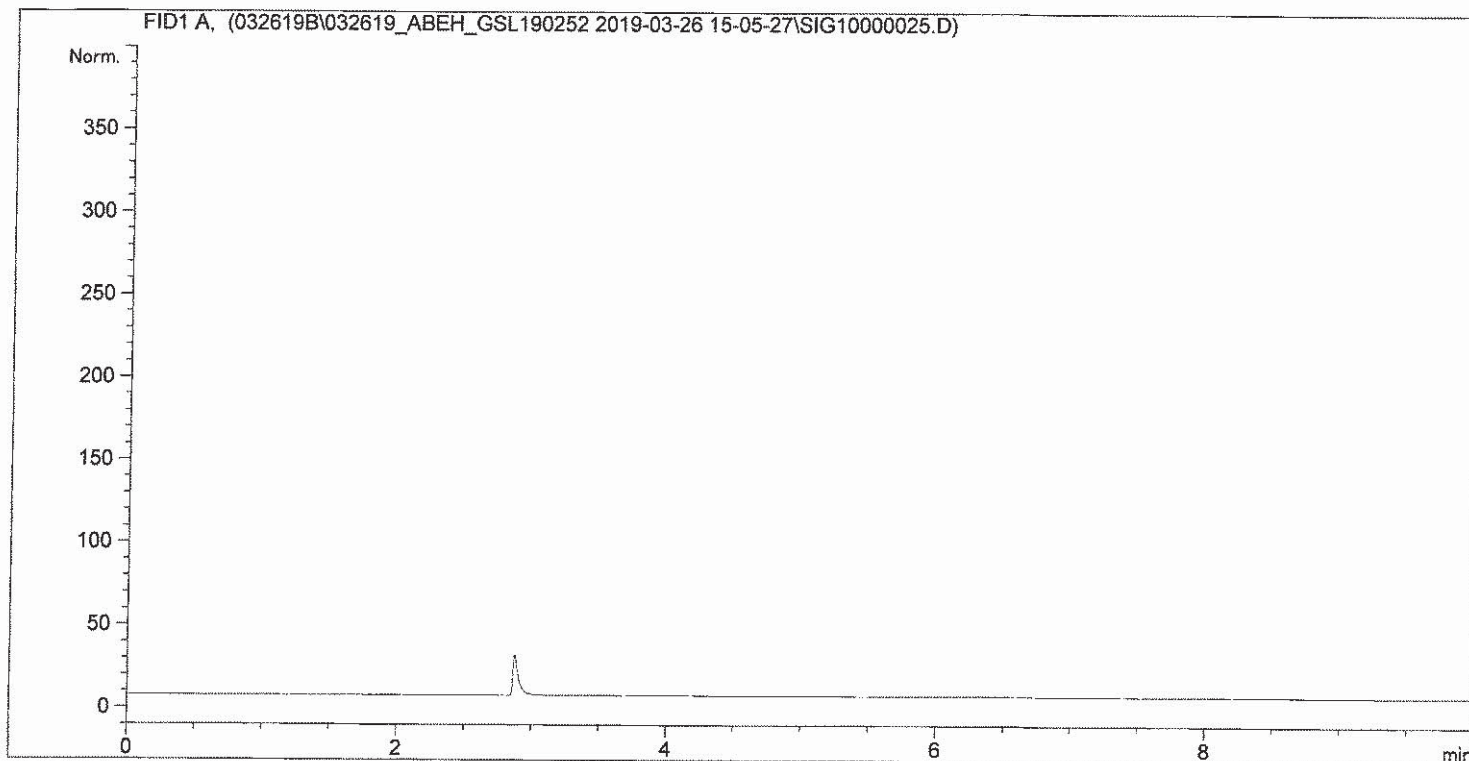
1 Warnings or Errors :

Warning : Calibrated compound(s) not found

=====
*** End of Report ***

```

=====
Acq. Operator   : edecker                               Seq. Line :   11
Acq. Instrument : GC#10                               Location  : Vial 11
Injection Date  : 3/26/2019 11:50:35 PM              Inj       :    3
                                                    Inj Volume: 1 µl
Acq. Method     : C:\CHEM32\1\DATA\032619B\032619_ABEH_GSL190252 2019-03-26 15-05-27\
                  FRONT_M18_ABEH_IN_MEOH_032519.M
Last changed    : 3/26/2019 1:55:14 PM by edecker
Analysis Method : C:\CHEM32\1\METHODS\FRONT_M18_ABEH_IN_MEOH_032519.M
Last changed    : 3/27/2019 10:02:19 AM by dyeddula
                  (modified after loading)
Sample Info     : GSL_190252-007
                  Method:M18
=====
  
```



External Standard Report

```

Sorted By      : Signal
Calib. Data Modified : Tuesday, March 26, 2019 12:02:38 PM
Multiplier:    : 1.0000
Dilution:      : 1.0000
Use Multiplier & Dilution Factor with ISTDs
  
```

Signal 1: FID1 A,

RetTime [min]	Type	Area [pA*s]	Amt/Area	Amount [ppm]	Grp	Name
1.250	-	-	-	-	-	Hexane
3.335	-	-	-	-	-	Benzene
5.471	-	-	-	-	-	Acetaldehyde
6.150	-	-	-	-	-	Ethlybenzene

EW
3/27/19

RetTime [min]	Type	Area [pA*s]	Amt/Area	Amount [ppm]	Grp	Name
Totals :				0.00000		

1 Warnings or Errors :

Warning : Calibrated compound(s) not found

=====
=====
Area Percent Report
=====

Sorted By : Signal
Calib. Data Modified : Tuesday, March 26, 2019 12:02:38 PM
Multiplier: : 1.0000
Dilution: : 1.0000
Use Multiplier & Dilution Factor with ISTDs

Signal 1: FID1 A,

Peak #	RetTime [min]	Type	Width [min]	Area [pA*s]	Area %	Name
1	1.250		0.0000	0.00000	0.00000	Hexane
2	3.335		0.0000	0.00000	0.00000	Benzene
3	5.471		0.0000	0.00000	0.00000	Acetaldehyde
4	6.150		0.0000	0.00000	0.00000	Ethlybenzene

Totals : 0.00000 0.0000
Uncalibrated Peaks: n.a.

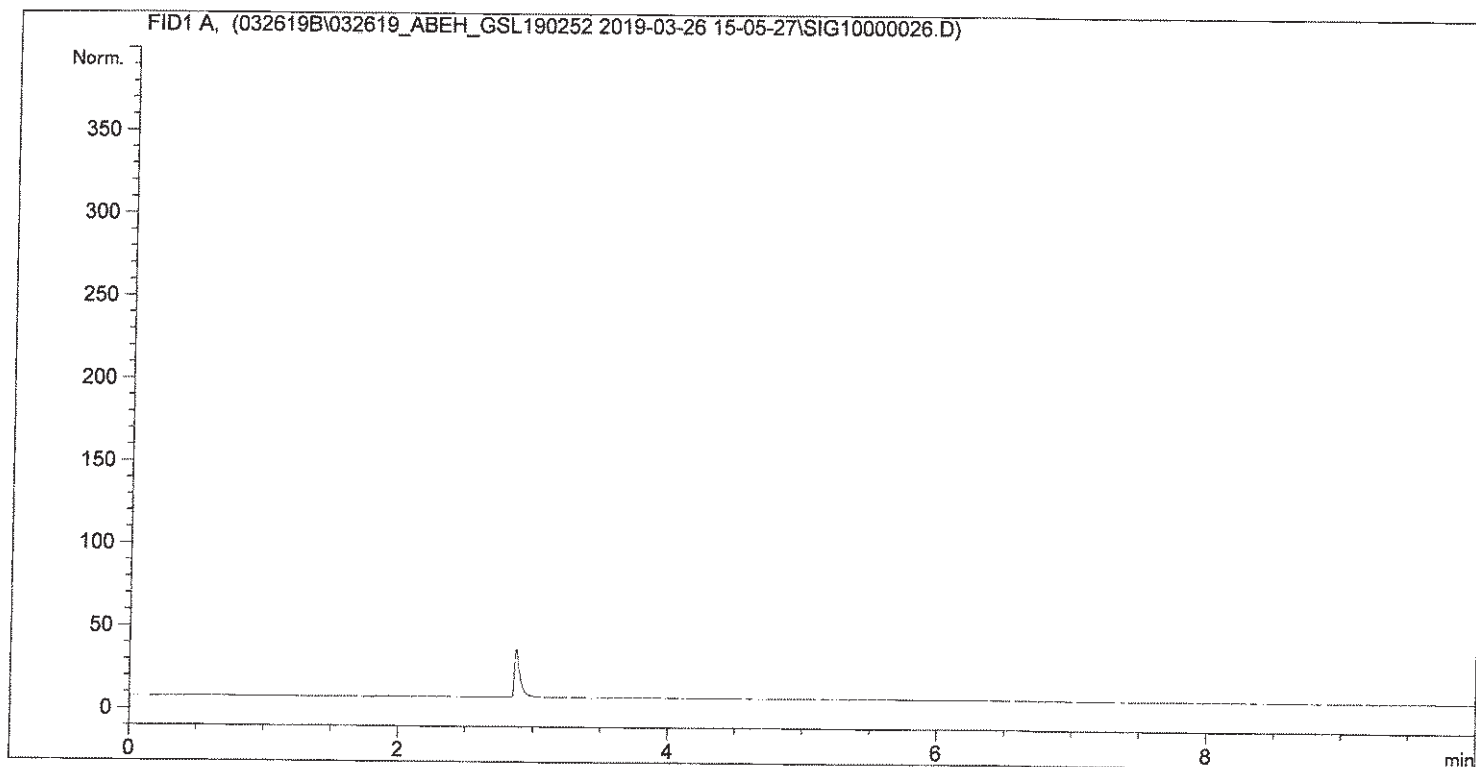
1 Warnings or Errors :

Warning : Calibrated compound(s) not found

=====
*** End of Report ***

```

=====
Acq. Operator   : edecker                               Seq. Line :   12
Acq. Instrument : GC#10                               Location  : Vial 12
Injection Date  : 3/27/2019 12:11:49 AM              Inj       :    1
                                                    Inj Volume: 1 µl
Acq. Method     : C:\CHEM32\1\DATA\032619B\032619_ABEH_GSL190252 2019-03-26 15-05-27\
                  FRONT_M18_ABEH_IN_MEOH_032519.M
Last changed    : 3/26/2019 1:55:14 PM by edecker
Analysis Method : C:\CHEM32\1\METHODS\FRONT_M18_ABEH_IN_MEOH_032519.M
Last changed    : 3/27/2019 10:02:19 AM by dyeddula
                  (modified after loading)
Sample Info     : GSL_190252-008
                  Method:M18
=====
  
```



External Standard Report

```

Sorted By      : Signal
Calib. Data Modified : Tuesday, March 26, 2019 12:02:38 PM
Multiplier:    : 1.0000
Dilution:      : 1.0000
Use Multiplier & Dilution Factor with ISTDs
  
```

Signal 1: FID1 A,

RetTime [min]	Type	Area [pA*s]	Amt/Area	Amount [ppm]	Grp	Name
1.250	-	-	-	-	-	Hexane
3.335	-	-	-	-	-	Benzene
5.471	-	-	-	-	-	Acetaldehyde
6.150	-	-	-	-	-	Ethlybenzene

dy
3/27/19

RetTime [min]	Type	Area [pA*s]	Amt/Area	Amount [ppm]	Grp	Name
Totals :				0.00000		

1 Warnings or Errors :

Warning : Calibrated compound(s) not found

=====
=====
Area Percent Report
=====

Sorted By : Signal
Calib. Data Modified : Tuesday, March 26, 2019 12:02:38 PM
Multiplier: : 1.0000
Dilution: : 1.0000
Use Multiplier & Dilution Factor with ISTDs

Signal 1: FID1 A,

Peak #	RetTime [min]	Type	Width [min]	Area [pA*s]	Area %	Name
1	1.250		0.0000	0.00000	0.00000	Hexane
2	3.335		0.0000	0.00000	0.00000	Benzene
3	5.471		0.0000	0.00000	0.00000	Acetaldehyde
4	6.150		0.0000	0.00000	0.00000	Ethlybenzene

Totals : 0.00000 0.0000

Uncalibrated Peaks: n.a.

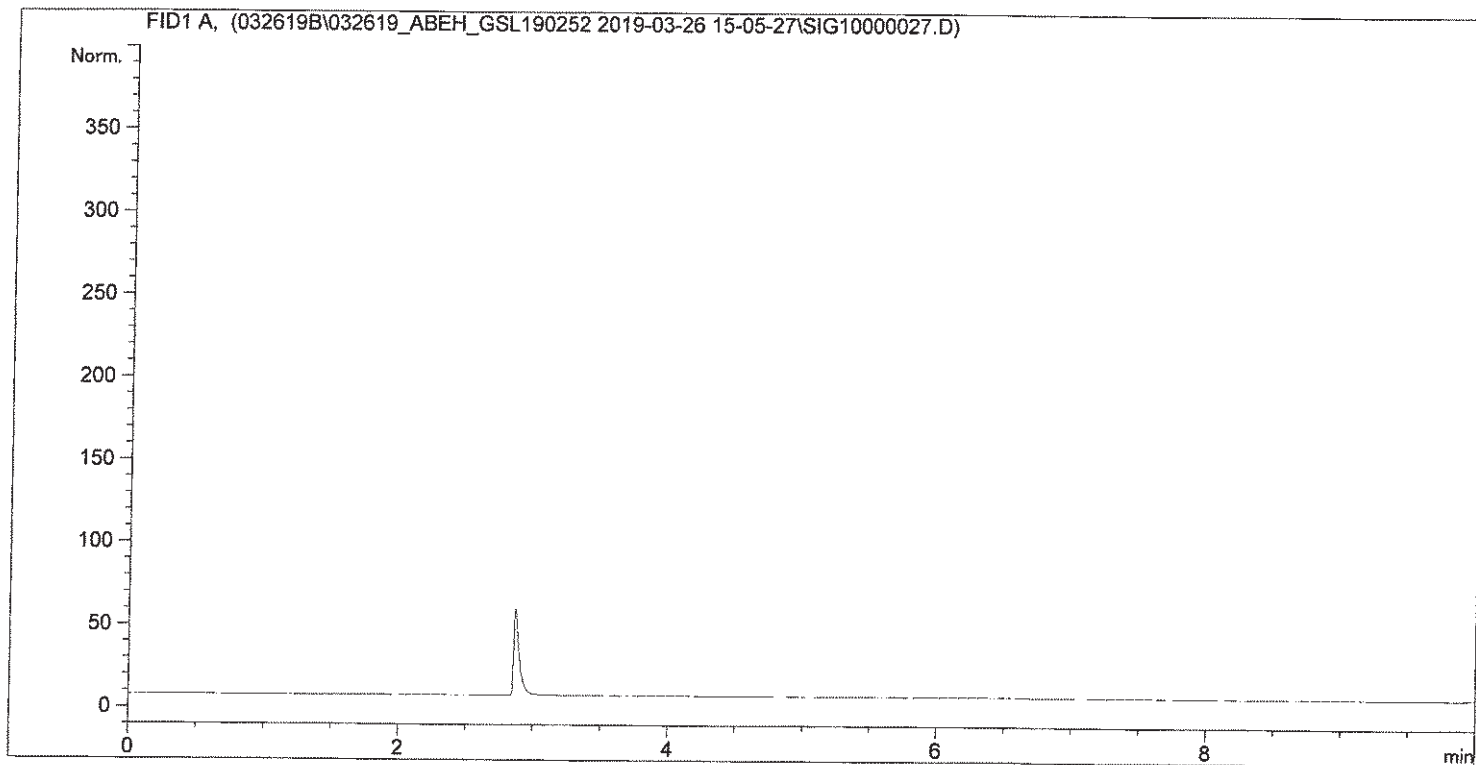
1 Warnings or Errors :

Warning : Calibrated compound(s) not found

=====
*** End of Report ***

```

=====
Acq. Operator   : edecker                               Seq. Line :   12
Acq. Instrument : GC#10                               Location  : Vial 12
Injection Date  : 3/27/2019 12:33:28 AM              Inj       :    2
                                                    Inj Volume: 1 µl
Acq. Method     : C:\CHEM32\1\DATA\032619B\032619_ABEH_GSL190252 2019-03-26 15-05-27\
                  FRONT_M18_ABEH_IN_MEOH_032519.M
Last changed    : 3/26/2019 1:55:14 PM by edecker
Analysis Method : C:\CHEM32\1\METHODS\FRONT_M18_ABEH_IN_MEOH_032519.M
Last changed    : 3/27/2019 10:02:19 AM by dyeddula
                  (modified after loading)
Sample Info     : GSL_190252-008
                  Method:M18
  
```



External Standard Report

```

Sorted By      : Signal
Calib. Data Modified : Tuesday, March 26, 2019 12:02:38 PM
Multiplier:    : 1.0000
Dilution:     : 1.0000
Use Multiplier & Dilution Factor with ISTDs
  
```

Signal 1: FID1 A,

RetTime [min]	Type	Area [pA*s]	Amt/Area	Amount [ppm]	Grp	Name
1.250	-	-	-	-	-	Hexane
3.335	-	-	-	-	-	Benzene
5.471	-	-	-	-	-	Acetaldehyde
6.150	-	-	-	-	-	Ethlybenzene

dy
3/27/19

RetTime [min]	Type	Area [pA*s]	Amt/Area	Amount [ppm]	Grp	Name
Totals :				0.00000		

1 Warnings or Errors :

Warning : Calibrated compound(s) not found

=====
=====
Area Percent Report
=====

Sorted By : Signal
Calib. Data Modified : Tuesday, March 26, 2019 12:02:38 PM
Multiplier: : 1.0000
Dilution: : 1.0000
Use Multiplier & Dilution Factor with ISTDs

Signal 1: FID1 A,

Peak #	RetTime [min]	Type	Width [min]	Area [pA*s]	Area %	Name
1	1.250		0.0000	0.00000	0.00000	Hexane
2	3.335		0.0000	0.00000	0.00000	Benzene
3	5.471		0.0000	0.00000	0.00000	Acetaldehyde
4	6.150		0.0000	0.00000	0.00000	Ethlybenzene

Totals : 0.00000 0.0000

Uncalibrated Peaks: n.a.

1 Warnings or Errors :

Warning : Calibrated compound(s) not found

=====
*** End of Report ***

RetTime [min]	Type	Area [pA*s]	Amt/Area	Amount [ppm]	Grp	Name
Totals :				0.00000		

1 Warnings or Errors :

Warning : Calibrated compound(s) not found

=====
=====
Area Percent Report
=====

Sorted By : Signal
Calib. Data Modified : Tuesday, March 26, 2019 12:02:38 PM
Multiplier: : 1.0000
Dilution: : 1.0000
Use Multiplier & Dilution Factor with ISTDs

Signal 1: FID1 A,

Peak #	RetTime [min]	Type	Width [min]	Area [pA*s]	Area %	Name
1	1.250		0.0000	0.00000	0.00000	Hexane
2	3.335		0.0000	0.00000	0.00000	Benzene
3	5.471		0.0000	0.00000	0.00000	Acetaldehyde
4	6.150		0.0000	0.00000	0.00000	Ethlybenzene

Totals : 0.00000 0.0000

Uncalibrated Peaks: n.a.

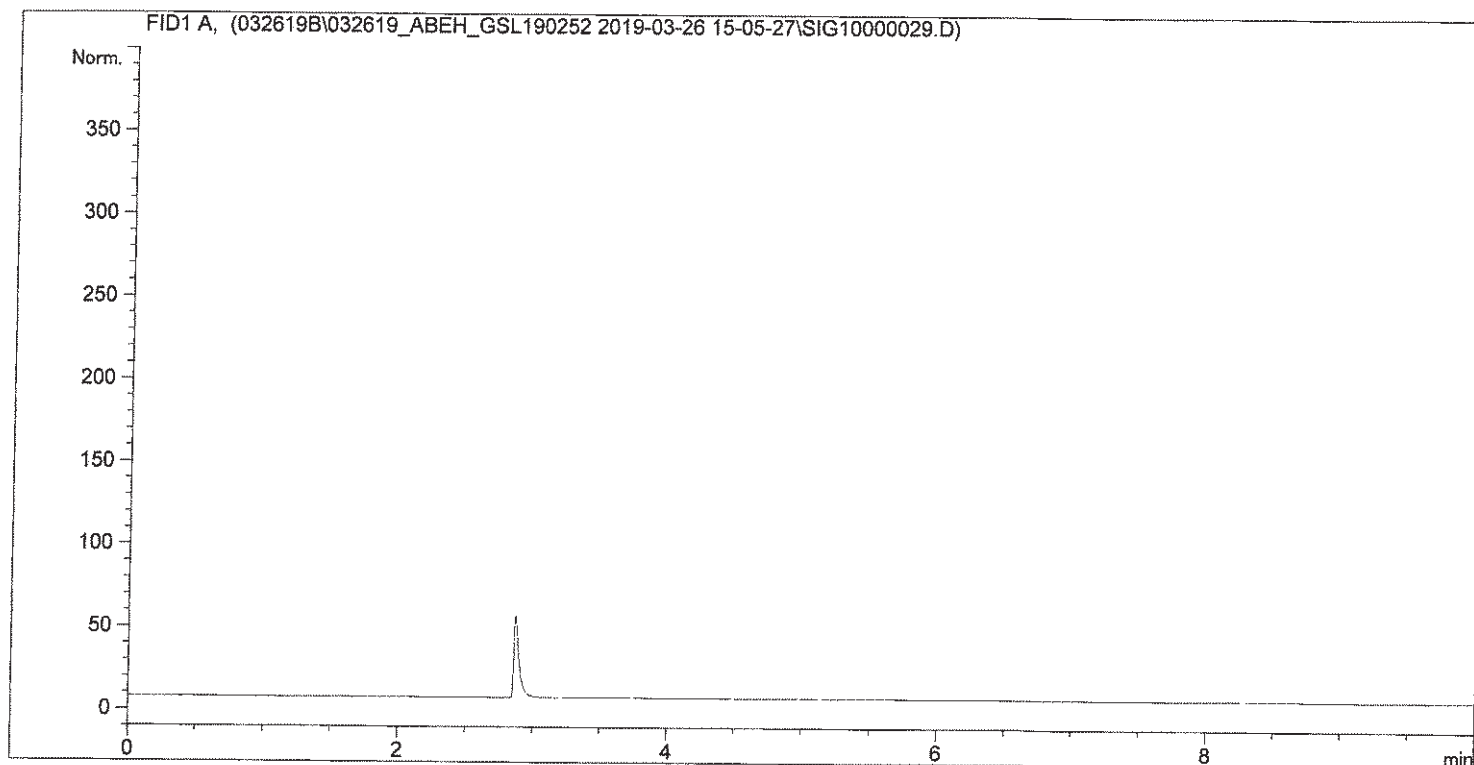
1 Warnings or Errors :

Warning : Calibrated compound(s) not found

=====
=====
*** End of Report ***

```

=====
Acq. Operator   : edecker                               Seq. Line :   13
Acq. Instrument : GC#10                               Location  : Vial 13
Injection Date  : 3/27/2019 1:17:22 AM                Inj       :    1
                                                    Inj Volume: 1 µl
Acq. Method     : C:\CHEM32\1\DATA\032619B\032619_ABEH_GSL190252 2019-03-26 15-05-27\
                  FRONT_M18_ABEH_IN_MEOH_032519.M
Last changed    : 3/26/2019 1:55:14 PM by edecker
Analysis Method : C:\CHEM32\1\METHODS\FRONT_M18_ABEH_IN_MEOH_032519.M
Last changed    : 3/27/2019 10:02:19 AM by dyeddula
                  (modified after loading)
Sample Info     : GSL_190252-009
                  Method:M18
=====
  
```



External Standard Report

```

Sorted By      : Signal
Calib. Data Modified : Tuesday, March 26, 2019 12:02:38 PM
Multiplier:    : 1.0000
Dilution:      : 1.0000
Use Multiplier & Dilution Factor with ISTDs
  
```

Signal 1: FID1 A,

RetTime [min]	Type	Area [pA*s]	Amt/Area	Amount [ppm]	Grp	Name
1.250	-	-	-	-	-	Hexane
3.335	-	-	-	-	-	Benzene
5.471	-	-	-	-	-	Acetaldehyde
6.150	-	-	-	-	-	Ethlybenzene

no
3/27/19

RetTime [min]	Type	Area [pA*s]	Amt/Area	Amount [ppm]	Grp	Name
Totals :				0.00000		

1 Warnings or Errors :

Warning : Calibrated compound(s) not found

=====
=====
Area Percent Report
=====

Sorted By : Signal
Calib. Data Modified : Tuesday, March 26, 2019 12:02:38 PM
Multiplier: : 1.0000
Dilution: : 1.0000
Use Multiplier & Dilution Factor with ISTDs

Signal 1: FID1 A,

Peak #	RetTime [min]	Type	Width [min]	Area [pA*s]	Area %	Name
1	1.250		0.0000	0.00000	0.00000	Hexane
2	3.335		0.0000	0.00000	0.00000	Benzene
3	5.471		0.0000	0.00000	0.00000	Acetaldehyde
4	6.150		0.0000	0.00000	0.00000	Ethlybenzene

Totals : 0.00000 0.0000
Uncalibrated Peaks: n.a.

1 Warnings or Errors :

Warning : Calibrated compound(s) not found

=====
*** End of Report ***

RetTime [min]	Type	Area [pA*s]	Amt/Area	Amount [ppm]	Grp	Name
Totals :				0.00000		

1 Warnings or Errors :

Warning : Calibrated compound(s) not found

=====
=====
Area Percent Report
=====

Sorted By : Signal
Calib. Data Modified : Tuesday, March 26, 2019 12:02:38 PM
Multiplier: : 1.0000
Dilution: : 1.0000
Use Multiplier & Dilution Factor with ISTDs

Signal 1: FID1 A,

Peak #	RetTime [min]	Type	Width [min]	Area [pA*s]	Area %	Name
1	1.250		0.0000	0.00000	0.00000	Hexane
2	3.335		0.0000	0.00000	0.00000	Benzene
3	5.471		0.0000	0.00000	0.00000	Acetaldehyde
4	6.150		0.0000	0.00000	0.00000	Ethlybenzene

Totals : 0.00000 0.0000
Uncalibrated Peaks: n.a.

1 Warnings or Errors :

Warning : Calibrated compound(s) not found

=====
=====
*** End of Report ***

RetTime [min]	Type	Area [pA*s]	Amt/Area	Amount [ppm]	Grp	Name
Totals :				0.00000		

1 Warnings or Errors :

Warning : Calibrated compound(s) not found

=====
=====
Area Percent Report
=====

Sorted By : Signal
Calib. Data Modified : Tuesday, March 26, 2019 12:02:38 PM
Multiplier: : 1.0000
Dilution: : 1.0000
Use Multiplier & Dilution Factor with ISTDs

Signal 1: FID1 A,

Peak #	RetTime [min]	Type	Width [min]	Area [pA*s]	Area %	Name
1	1.250		0.0000	0.00000	0.00000	Hexane
2	3.335		0.0000	0.00000	0.00000	Benzene
3	5.471		0.0000	0.00000	0.00000	Acetaldehyde
4	6.150		0.0000	0.00000	0.00000	Ethlybenzene

Totals : 0.00000 0.0000

Uncalibrated Peaks: n.a.

1 Warnings or Errors :

Warning : Calibrated compound(s) not found

=====
*** End of Report ***

RetTime [min]	Type	Area [pA*s]	Amt/Area	Amount [ppm]	Grp	Name
Totals :				0.00000		

1 Warnings or Errors :

Warning : Calibrated compound(s) not found

=====
=====
Area Percent Report
=====

Sorted By : Signal
Calib. Data Modified : Tuesday, March 26, 2019 12:02:38 PM
Multiplier: : 1.0000
Dilution: : 1.0000
Use Multiplier & Dilution Factor with ISTDs

Signal 1: FID1 A,

Peak #	RetTime [min]	Type	Width [min]	Area [pA*s]	Area %	Name
1	1.250		0.0000	0.00000	0.00000	Hexane
2	3.335		0.0000	0.00000	0.00000	Benzene
3	5.471		0.0000	0.00000	0.00000	Acetaldehyde
4	6.150		0.0000	0.00000	0.00000	Ethlybenzene

Totals : 0.00000 0.0000
Uncalibrated Peaks: n.a.

1 Warnings or Errors :

Warning : Calibrated compound(s) not found

=====
*** End of Report ***

RetTime [min]	Type	Area [pA*s]	Amt/Area	Amount [ppm]	Grp	Name
Totals :				0.00000		

1 Warnings or Errors :

Warning : Calibrated compound(s) not found

=====
=====
Area Percent Report
=====

Sorted By : Signal
Calib. Data Modified : Tuesday, March 26, 2019 12:02:38 PM
Multiplier: : 1.0000
Dilution: : 1.0000
Use Multiplier & Dilution Factor with ISTDs

Signal 1: FID1 A,

Peak #	RetTime [min]	Type	Width [min]	Area [pA*s]	Area %	Name
1	1.250		0.0000	0.00000	0.00000	Hexane
2	3.335		0.0000	0.00000	0.00000	Benzene
3	5.471		0.0000	0.00000	0.00000	Acetaldehyde
4	6.150		0.0000	0.00000	0.00000	Ethlybenzene

Totals : 0.00000 0.0000

Uncalibrated Peaks: n.a.

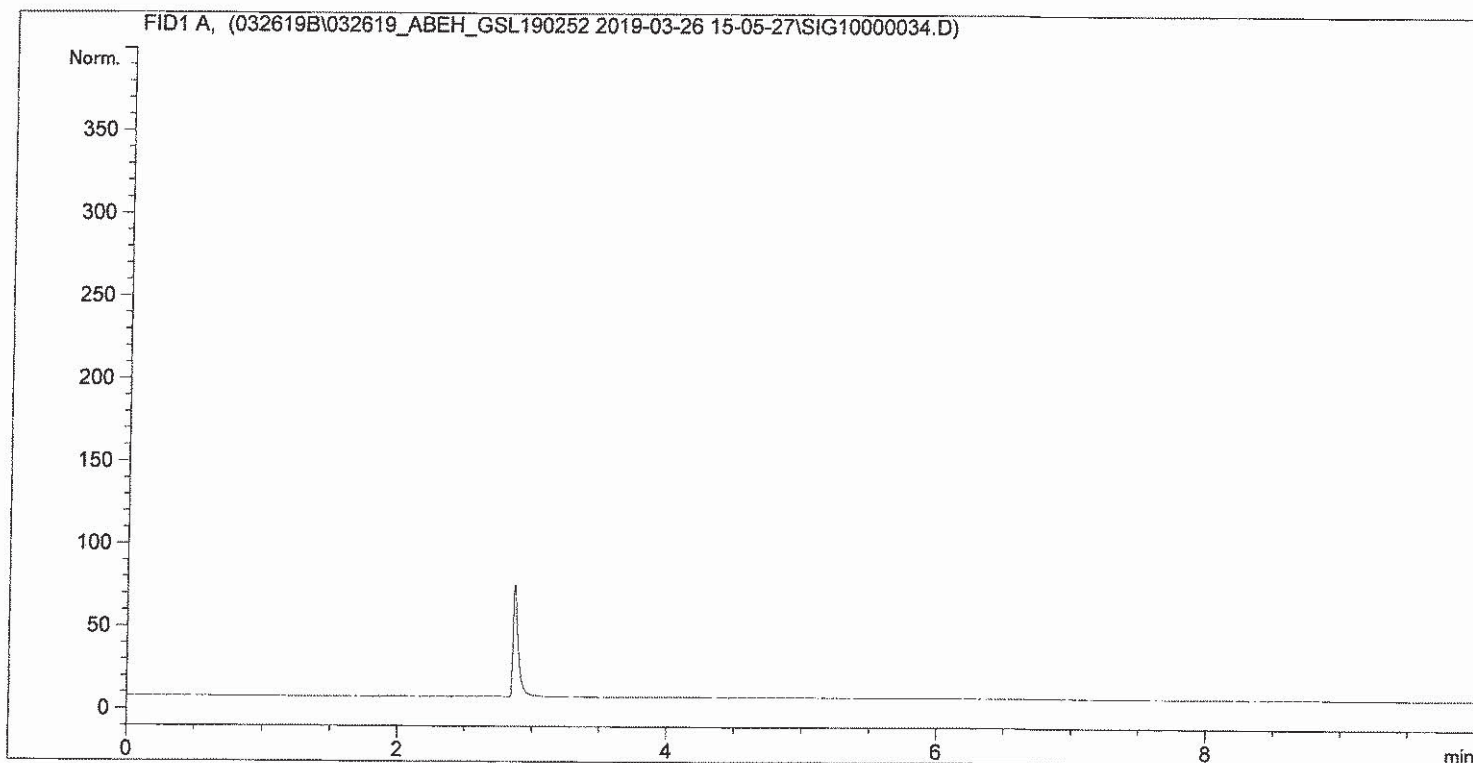
1 Warnings or Errors :

Warning : Calibrated compound(s) not found

=====
=====
*** End of Report ***

```

=====
Acq. Operator   : edecker                               Seq. Line :   14
Acq. Instrument : GC#10                               Location  : Vial 14
Injection Date  : 3/27/2019 3:06:41 AM                Inj       :    3
                                                    Inj Volume: 1 µl
Acq. Method     : C:\CHEM32\1\DATA\032619B\032619_ABEH_GSL190252 2019-03-26 15-05-27\
                  FRONT_M18_ABEH_IN_MEOH_032519.M
Last changed    : 3/26/2019 1:55:14 PM by edecker
Analysis Method : C:\CHEM32\1\METHODS\FRONT_M18_ABEH_IN_MEOH_032519.M
Last changed    : 3/27/2019 10:02:19 AM by dyeddula
                  (modified after loading)
Sample Info     : GSL_190252-010
                  Method:M18
=====
  
```



External Standard Report

```

Sorted By      : Signal
Calib. Data Modified : Tuesday, March 26, 2019 12:02:38 PM
Multiplier:    : 1.0000
Dilution:     : 1.0000
Use Multiplier & Dilution Factor with ISTDs
  
```

Signal 1: FID1 A,

RetTime [min]	Type	Area [pA*s]	Amt/Area	Amount [ppm]	Grp	Name
1.250	-	-	-	-	-	Hexane
3.335	-	-	-	-	-	Benzene
5.471	-	-	-	-	-	Acetaldehyde
6.150	-	-	-	-	-	Ethlybenzene

aw
3/27/19

RetTime [min]	Type	Area [pA*s]	Amt/Area	Amount [ppm]	Grp	Name
Totals :				0.00000		

1 Warnings or Errors :

Warning : Calibrated compound(s) not found

=====
=====
Area Percent Report
=====

Sorted By : Signal
Calib. Data Modified : Tuesday, March 26, 2019 12:02:38 PM
Multiplier: : 1.0000
Dilution: : 1.0000
Use Multiplier & Dilution Factor with ISTDs

Signal 1: FID1 A,

Peak #	RetTime [min]	Type	Width [min]	Area [pA*s]	Area %	Name
1	1.250		0.0000	0.00000	0.00000	Hexane
2	3.335		0.0000	0.00000	0.00000	Benzene
3	5.471		0.0000	0.00000	0.00000	Acetaldehyde
4	6.150		0.0000	0.00000	0.00000	Ethlybenzene

Totals : 0.00000 0.0000

Uncalibrated Peaks: n.a.

1 Warnings or Errors :

Warning : Calibrated compound(s) not found

=====
*** End of Report ***

RetTime [min]	Type	Area [pA*s]	Amt/Area	Amount [ppm]	Grp	Name
Totals :				0.00000		

1 Warnings or Errors :

Warning : Calibrated compound(s) not found

=====
=====
Area Percent Report
=====

Sorted By : Signal
Calib. Data Modified : Tuesday, March 26, 2019 12:02:38 PM
Multiplier: : 1.0000
Dilution: : 1.0000
Use Multiplier & Dilution Factor with ISTDs

Signal 1: FID1 A,

Peak #	RetTime [min]	Type	Width [min]	Area [pA*s]	Area %	Name
1	1.250		0.0000	0.00000	0.00000	Hexane
2	3.335		0.0000	0.00000	0.00000	Benzene
3	5.471		0.0000	0.00000	0.00000	Acetaldehyde
4	6.150		0.0000	0.00000	0.00000	Ethlybenzene

Totals : 0.00000 0.0000

Uncalibrated Peaks: n.a.

1 Warnings or Errors :

Warning : Calibrated compound(s) not found

=====
*** End of Report ***

RetTime [min]	Type	Area [pA*s]	Amt/Area	Amount [ppm]	Grp	Name
Totals :				0.00000		

1 Warnings or Errors :

Warning : Calibrated compound(s) not found

=====
=====
Area Percent Report
=====

Sorted By : Signal
Calib. Data Modified : Tuesday, March 26, 2019 12:02:38 PM
Multiplier: : 1.0000
Dilution: : 1.0000
Use Multiplier & Dilution Factor with ISTDs

Signal 1: FID1 A,

Peak #	RetTime [min]	Type	Width [min]	Area [pA*s]	Area %	Name
1	1.250		0.0000	0.00000	0.00000	Hexane
2	3.335		0.0000	0.00000	0.00000	Benzene
3	5.471		0.0000	0.00000	0.00000	Acetaldehyde
4	6.150		0.0000	0.00000	0.00000	Ethlybenzene

Totals : 0.00000 0.0000
Uncalibrated Peaks: n.a.

1 Warnings or Errors :

Warning : Calibrated compound(s) not found

=====
*** End of Report ***

RetTime [min]	Type	Area [pA*s]	Amt/Area	Amount [ppm]	Grp	Name
Totals :				0.00000		

1 Warnings or Errors :

Warning : Calibrated compound(s) not found

=====
=====
Area Percent Report
=====

Sorted By : Signal
Calib. Data Modified : Tuesday, March 26, 2019 12:02:38 PM
Multiplier: : 1.0000
Dilution: : 1.0000
Use Multiplier & Dilution Factor with ISTDs

Signal 1: FID1 A,

Peak #	RetTime [min]	Type	Width [min]	Area [pA*s]	Area %	Name
1	1.250		0.0000	0.00000	0.00000	Hexane
2	3.335		0.0000	0.00000	0.00000	Benzene
3	5.471		0.0000	0.00000	0.00000	Acetaldehyde
4	6.150		0.0000	0.00000	0.00000	Ethlybenzene

Totals : 0.00000 0.0000

Uncalibrated Peaks: n.a.

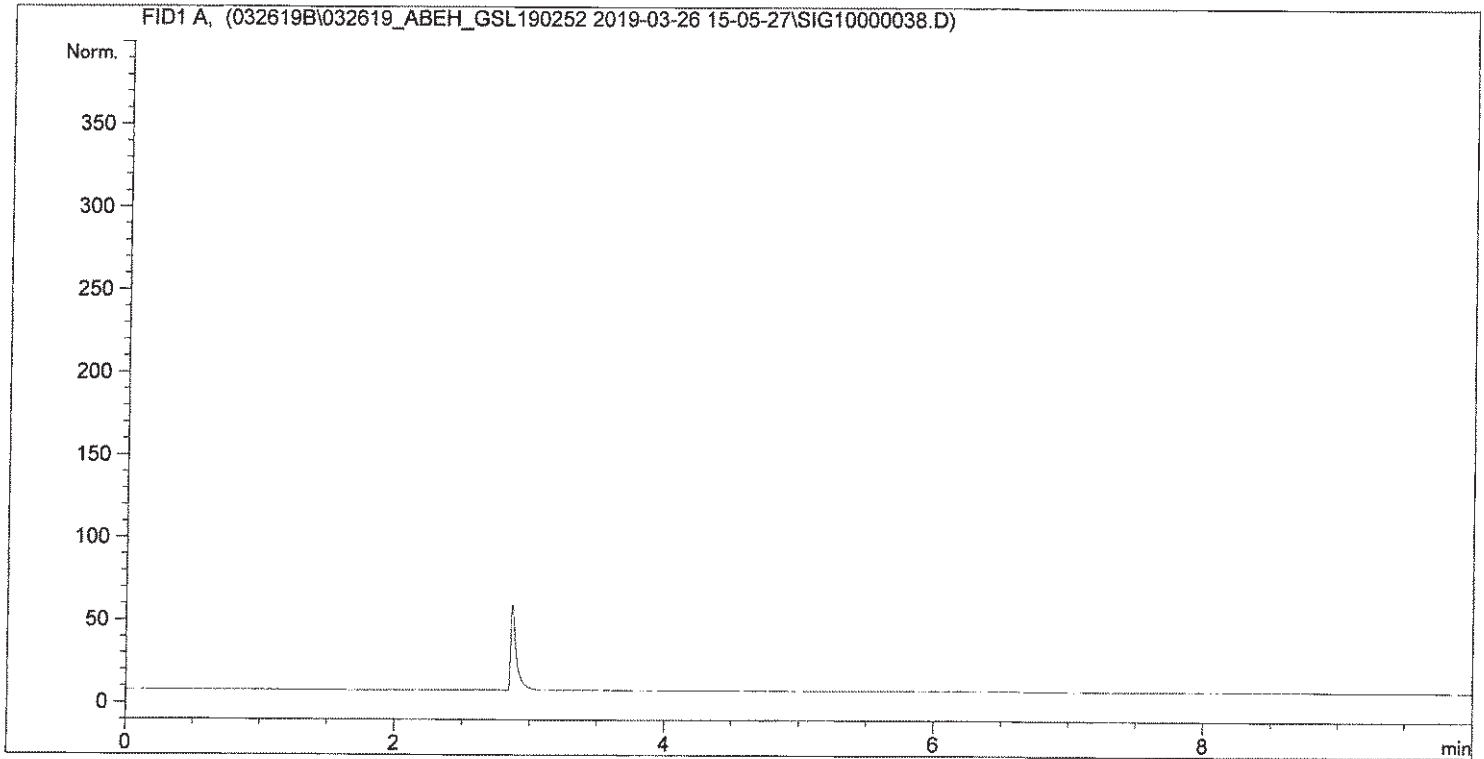
1 Warnings or Errors :

Warning : Calibrated compound(s) not found

=====
*** End of Report ***

```

=====
Acq. Operator   : edecker                      Seq. Line :   16
Acq. Instrument : GC#10                       Location  : Vial 16
Injection Date  : 3/27/2019 4:34:19 AM        Inj       :    1
                                                Inj Volume: 1 µl
Acq. Method     : C:\CHEM32\1\DATA\032619B\032619_ABEH_GSL190252 2019-03-26 15-05-27\
                FRONT_M18_ABEH_IN_MEOH_032519.M
Last changed    : 3/26/2019 1:55:14 PM by edecker
Analysis Method : C:\CHEM32\1\METHODS\FRONT_M18_ABEH_IN_MEOH_032519.M
Last changed    : 3/27/2019 10:02:19 AM by dyeddu
                (modified after loading)
Sample Info     : GSL_190252-012
                Method:M18
=====
  
```



External Standard Report

```

=====
Sorted By       : Signal
Calib. Data Modified : Tuesday, March 26, 2019 12:02:38 PM
Multiplier:     : 1.0000
Dilution:      : 1.0000
Use Multiplier & Dilution Factor with ISTDs
  
```

Signal 1: FID1 A,

RetTime [min]	Type	Area [pA*s]	Amt/Area	Amount [ppm]	Grp	Name
1.250	-	-	-	-	-	Hexane
3.335	-	-	-	-	-	Benzene
5.471	-	-	-	-	-	Acetaldehyde
6.150	-	-	-	-	-	Ethlybenzene

Handwritten: 3/27/19

RetTime [min]	Type	Area [pA*s]	Amt/Area	Amount [ppm]	Grp	Name
Totals :				0.00000		

1 Warnings or Errors :

Warning : Calibrated compound(s) not found

=====
=====
Area Percent Report
=====

Sorted By : Signal
Calib. Data Modified : Tuesday, March 26, 2019 12:02:38 PM
Multiplier: : 1.0000
Dilution: : 1.0000
Use Multiplier & Dilution Factor with ISTDs

Signal 1: FID1 A,

Peak #	RetTime [min]	Type	Width [min]	Area [pA*s]	Area %	Name
1	1.250		0.0000	0.00000	0.00000	Hexane
2	3.335		0.0000	0.00000	0.00000	Benzene
3	5.471		0.0000	0.00000	0.00000	Acetaldehyde
4	6.150		0.0000	0.00000	0.00000	Ethlybenzene

Totals : 0.00000 0.0000
Uncalibrated Peaks: n.a.

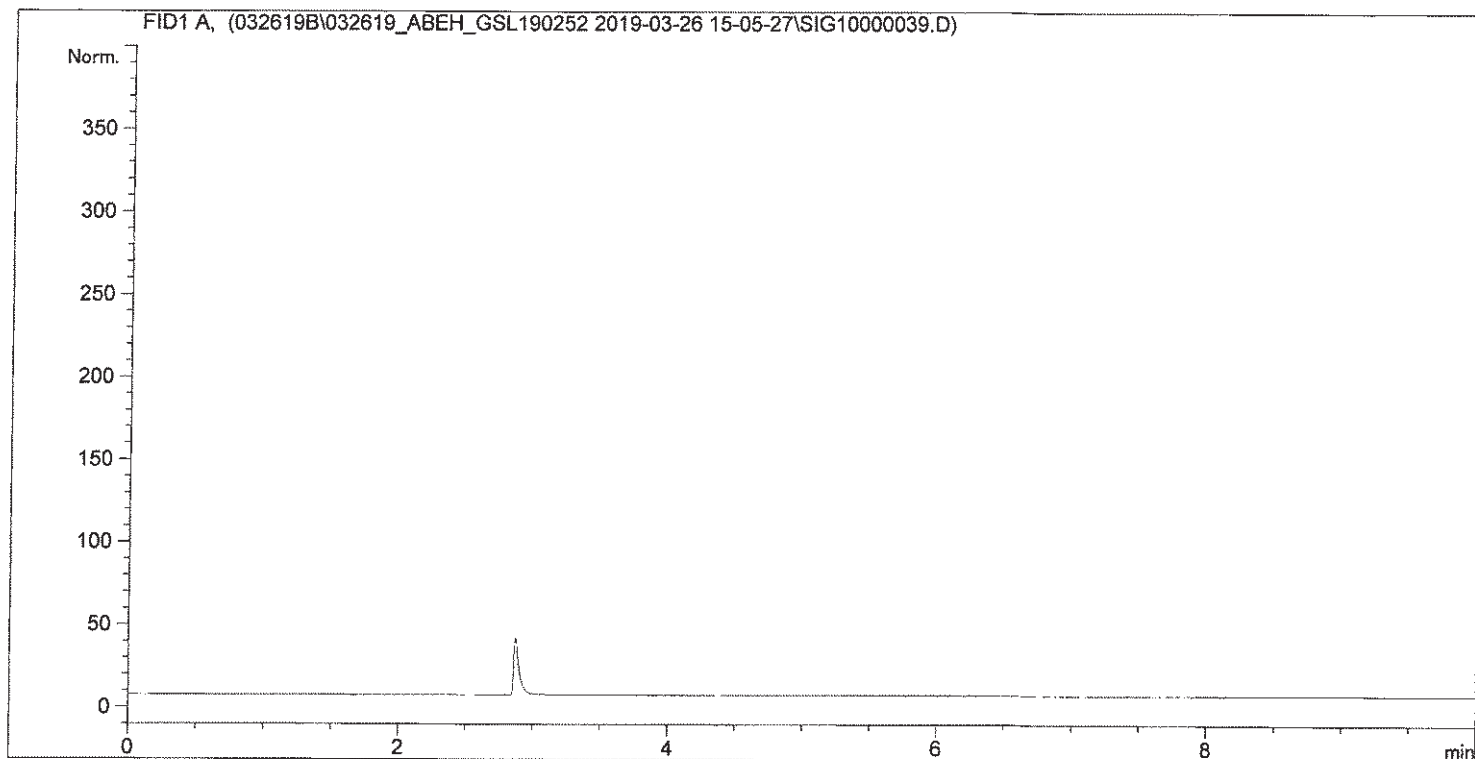
1 Warnings or Errors :

Warning : Calibrated compound(s) not found

=====
*** End of Report ***

```

=====
Acq. Operator   : edecker                               Seq. Line :   16
Acq. Instrument : GC#10                               Location  : Vial 16
Injection Date  : 3/27/2019 4:56:54 AM                Inj       :    2
                                                    Inj Volume: 1 µl
Acq. Method     : C:\CHEM32\1\DATA\032619B\032619_ABEH_GSL190252 2019-03-26 15-05-27\
                  FRONT_M18_ABEH_IN_MEOH_032519.M
Last changed    : 3/26/2019 1:55:14 PM by edecker
Analysis Method : C:\CHEM32\1\METHODS\FRONT_M18_ABEH_IN_MEOH_032519.M
Last changed    : 3/27/2019 10:02:19 AM by dyeddula
                  (modified after loading)
Sample Info     : GSL_190252-012
                  Method:M18
=====
  
```



External Standard Report

```

Sorted By      : Signal
Calib. Data Modified : Tuesday, March 26, 2019 12:02:38 PM
Multiplier:    : 1.0000
Dilution:     : 1.0000
Use Multiplier & Dilution Factor with ISTDs
  
```

Signal 1: FID1 A,

RetTime [min]	Type	Area [pA*s]	Amt/Area	Amount [ppm]	Grp	Name
1.250	-	-	-	-	-	Hexane
3.335	-	-	-	-	-	Benzene
5.471	-	-	-	-	-	Acetaldehyde
6.150	-	-	-	-	-	Ethlybenzene

ed
3/27/19

RetTime [min]	Type	Area [pA*s]	Amt/Area	Amount [ppm]	Grp	Name
Totals :				0.00000		

1 Warnings or Errors :

Warning : Calibrated compound(s) not found

=====
=====
Area Percent Report
=====

Sorted By : Signal
Calib. Data Modified : Tuesday, March 26, 2019 12:02:38 PM
Multiplier: : 1.0000
Dilution: : 1.0000
Use Multiplier & Dilution Factor with ISTDs

Signal 1: FID1 A,

Peak #	RetTime [min]	Type	Width [min]	Area [pA*s]	Area %	Name
1	1.250		0.0000	0.00000	0.00000	Hexane
2	3.335		0.0000	0.00000	0.00000	Benzene
3	5.471		0.0000	0.00000	0.00000	Acetaldehyde
4	6.150		0.0000	0.00000	0.00000	Ethlybenzene

Totals : 0.00000 0.0000

Uncalibrated Peaks: n.a.

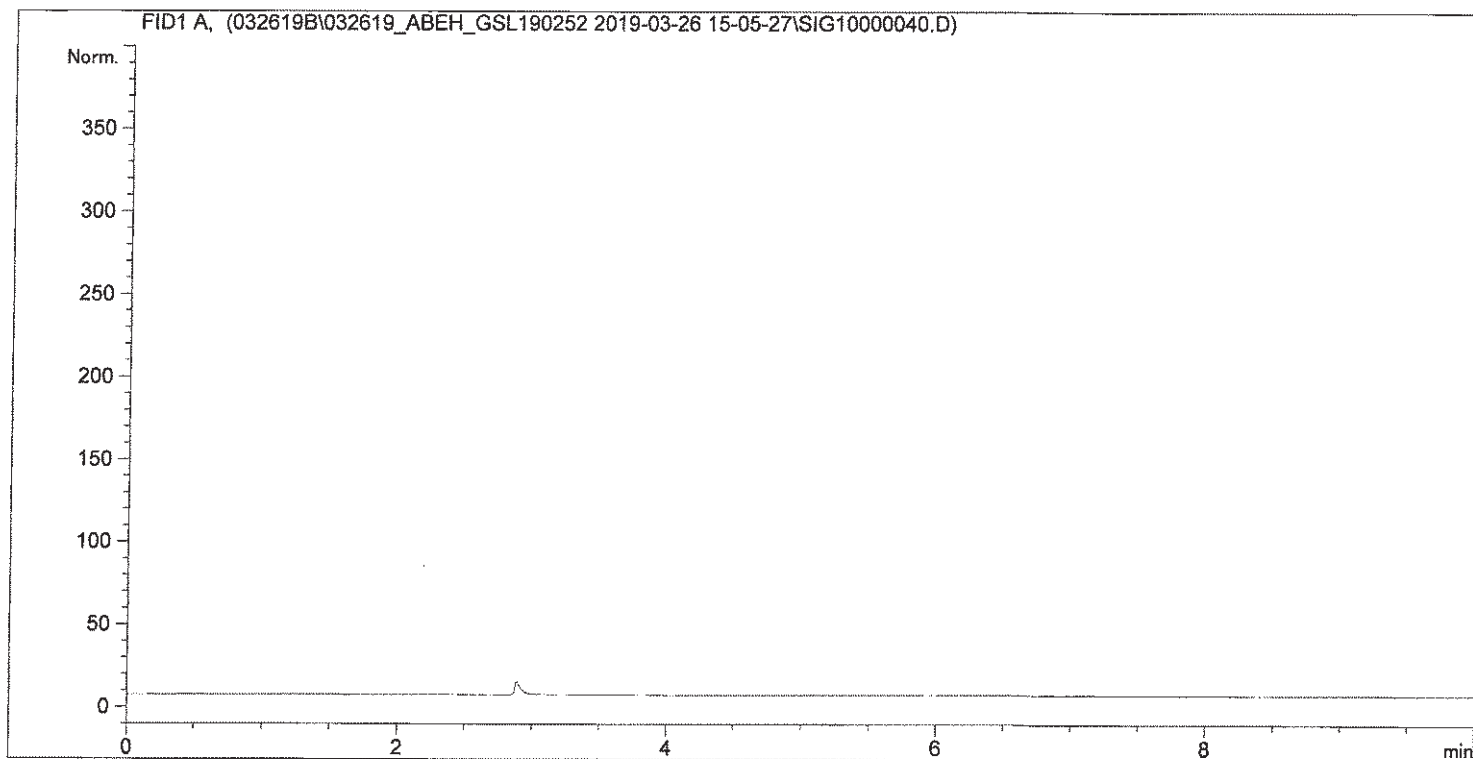
1 Warnings or Errors :

Warning : Calibrated compound(s) not found

=====
*** End of Report ***

```

=====
Acq. Operator   : edecker                      Seq. Line : 16
Acq. Instrument : GC#10                       Location  : Vial 16
Injection Date  : 3/27/2019 5:18:50 AM        Inj       : 3
                                                Inj Volume: 1 µl
Acq. Method     : C:\CHEM32\1\DATA\032619B\032619_ABEH_GSL190252 2019-03-26 15-05-27\
                FRONT_M18_ABEH_IN_MEOH_032519.M
Last changed    : 3/26/2019 1:55:14 PM by edecker
Analysis Method : C:\CHEM32\1\METHODS\FRONT_M18_ABEH_IN_MEOH_032519.M
Last changed    : 3/27/2019 10:02:19 AM by dyeddula
                (modified after loading)
Sample Info     : GSL_190252-012
                Method:M18
  
```



External Standard Report

```

Sorted By           : Signal
Calib. Data Modified : Tuesday, March 26, 2019 12:02:38 PM
Multiplier:         : 1.0000
Dilution:           : 1.0000
Use Multiplier & Dilution Factor with ISTDs
  
```

Signal 1: FID1 A,

RetTime [min]	Type	Area [pA*s]	Amt/Area	Amount [ppm]	Grp	Name
1.250	-	-	-	-	-	Hexane
3.335	-	-	-	-	-	Benzene
5.471	-	-	-	-	-	Acetaldehyde
6.150	-	-	-	-	-	Ethlybenzene

ewo
3/27/19

RetTime [min]	Type	Area [pA*s]	Amt/Area	Amount [ppm]	Grp	Name
Totals :				0.00000		

1 Warnings or Errors :

Warning : Calibrated compound(s) not found

=====
=====
Area Percent Report
=====

Sorted By : Signal
Calib. Data Modified : Tuesday, March 26, 2019 12:02:38 PM
Multiplier: : 1.0000
Dilution: : 1.0000
Use Multiplier & Dilution Factor with ISTDs

Signal 1: FID1 A,

Peak #	RetTime [min]	Type	Width [min]	Area [pA*s]	Area %	Name
1	1.250		0.0000	0.00000	0.00000	Hexane
2	3.335		0.0000	0.00000	0.00000	Benzene
3	5.471		0.0000	0.00000	0.00000	Acetaldehyde
4	6.150		0.0000	0.00000	0.00000	Ethlybenzene

Totals : 0.00000 0.0000
Uncalibrated Peaks: n.a.

1 Warnings or Errors :

Warning : Calibrated compound(s) not found

=====
*** End of Report ***

RetTime [min]	Type	Area [pA*s]	Amt/Area	Amount [ppm]	Grp	Name
Totals :				0.00000		

1 Warnings or Errors :

Warning : Calibrated compound(s) not found

=====
=====
Area Percent Report
=====

Sorted By : Signal
Calib. Data Modified : Tuesday, March 26, 2019 12:02:38 PM
Multiplier: : 1.0000
Dilution: : 1.0000
Use Multiplier & Dilution Factor with ISTDs

Signal 1: FID1 A,

Peak #	RetTime [min]	Type	Width [min]	Area [pA*s]	Area %	Name
1	1.250		0.0000	0.00000	0.00000	Hexane
2	3.335		0.0000	0.00000	0.00000	Benzene
3	5.471		0.0000	0.00000	0.00000	Acetaldehyde
4	6.150		0.0000	0.00000	0.00000	Ethlybenzene

Totals : 0.00000 0.0000
Uncalibrated Peaks: n.a.

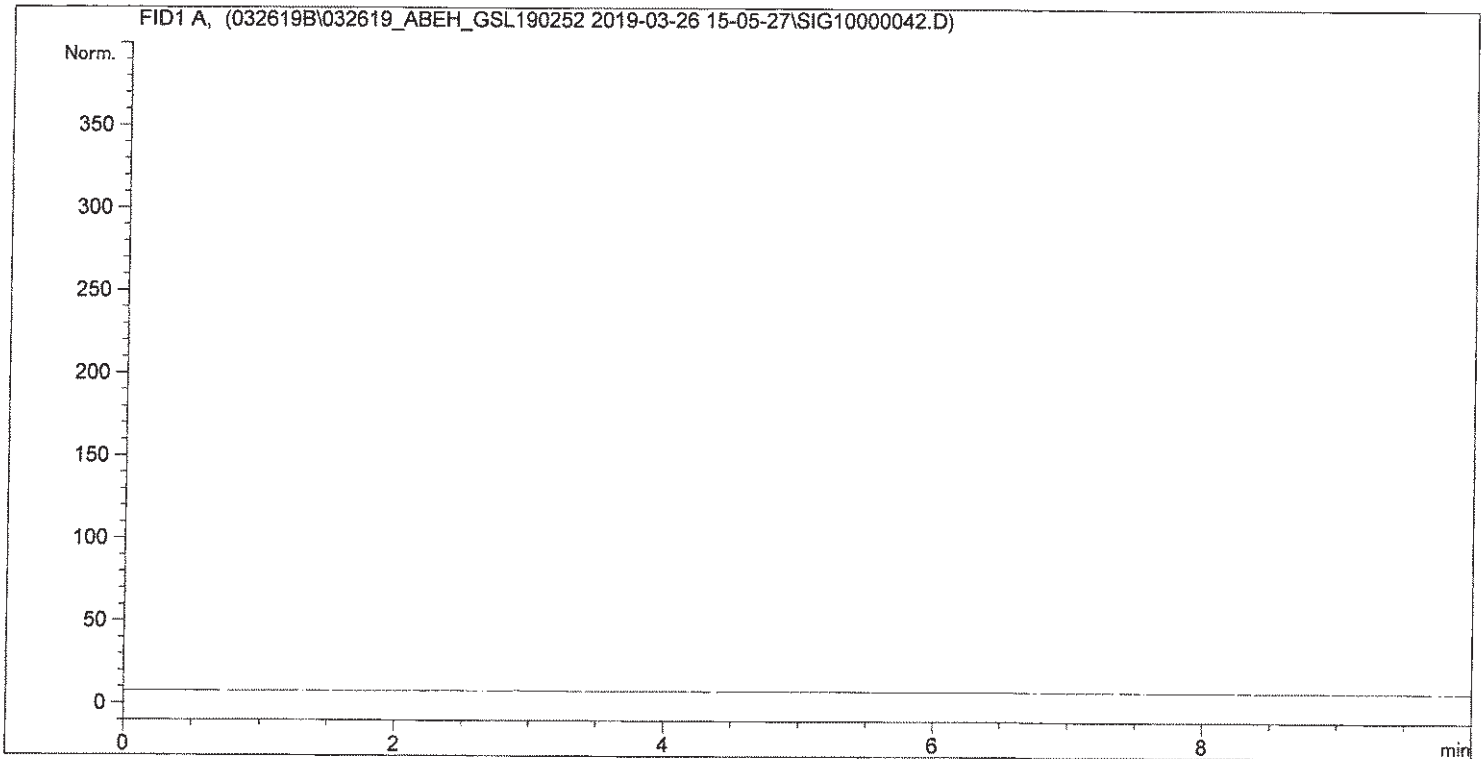
1 Warnings or Errors :

Warning : Calibrated compound(s) not found

=====
*** End of Report ***

```

=====
Acq. Operator   : edecker                               Seq. Line :   17
Acq. Instrument : GC#10                               Location  : Vial 17
Injection Date  : 3/27/2019 6:02:15 AM                Inj       :    2
                                                    Inj Volume: 1 µl
Acq. Method     : C:\CHEM32\1\DATA\032619B\032619_ABEH_GSL190252 2019-03-26 15-05-27\
                  FRONT_M18_ABEH_IN_MEOH_032519.M
Last changed    : 3/26/2019 1:55:14 PM by edecker
Analysis Method : C:\CHEM32\1\METHODS\FRONT_M18_ABEH_IN_MEOH_032519.M
Last changed    : 3/27/2019 10:02:19 AM by dyeddula
                  (modified after loading)
Sample Info     : GSL_190252-013
                  Method:M18
=====
  
```



External Standard Report

```

=====
Sorted By           :      Signal
Calib. Data Modified :      Tuesday, March 26, 2019 12:02:38 PM
Multiplier:         :      1.0000
Dilution:           :      1.0000
Use Multiplier & Dilution Factor with ISTDs
=====
  
```

Signal 1: FID1 A,

RetTime [min]	Type	Area [pA*s]	Amt/Area	Amount [ppm]	Grp	Name
1.250	-	-	-	-	-	Hexane
3.335	-	-	-	-	-	Benzene
5.471	-	-	-	-	-	Acetaldehyde
6.150	-	-	-	-	-	Ethlybenzene

RetTime [min]	Type	Area [pA*s]	Amt/Area	Amount [ppm]	Grp	Name
Totals :				0.00000		

1 Warnings or Errors :

Warning : Calibrated compound(s) not found

=====
=====
Area Percent Report
=====

Sorted By : Signal
Calib. Data Modified : Tuesday, March 26, 2019 12:02:38 PM
Multiplier: : 1.0000
Dilution: : 1.0000
Use Multiplier & Dilution Factor with ISTDs

Signal 1: FID1 A,

Peak #	RetTime [min]	Type	Width [min]	Area [pA*s]	Area %	Name
1	1.250		0.0000	0.00000	0.00000	Hexane
2	3.335		0.0000	0.00000	0.00000	Benzene
3	5.471		0.0000	0.00000	0.00000	Acetaldehyde
4	6.150		0.0000	0.00000	0.00000	Ethlybenzene

Totals : 0.00000 0.0000
Uncalibrated Peaks: n.a.

1 Warnings or Errors :

Warning : Calibrated compound(s) not found

=====
*** End of Report ***

RetTime [min]	Type	Area [pA*s]	Amt/Area	Amount [ppm]	Grp	Name
Totals :				0.00000		

1 Warnings or Errors :

Warning : Calibrated compound(s) not found

=====
=====
Area Percent Report
=====

Sorted By : Signal
Calib. Data Modified : Tuesday, March 26, 2019 12:02:38 PM
Multiplier: : 1.0000
Dilution: : 1.0000
Use Multiplier & Dilution Factor with ISTDs

Signal 1: FID1 A,

Peak #	RetTime [min]	Type	Width [min]	Area [pA*s]	Area %	Name
1	1.250		0.0000	0.00000	0.00000	Hexane
2	3.335		0.0000	0.00000	0.00000	Benzene
3	5.471		0.0000	0.00000	0.00000	Acetaldehyde
4	6.150		0.0000	0.00000	0.00000	Ethlybenzene

Totals : 0.00000 0.0000

Uncalibrated Peaks: n.a.

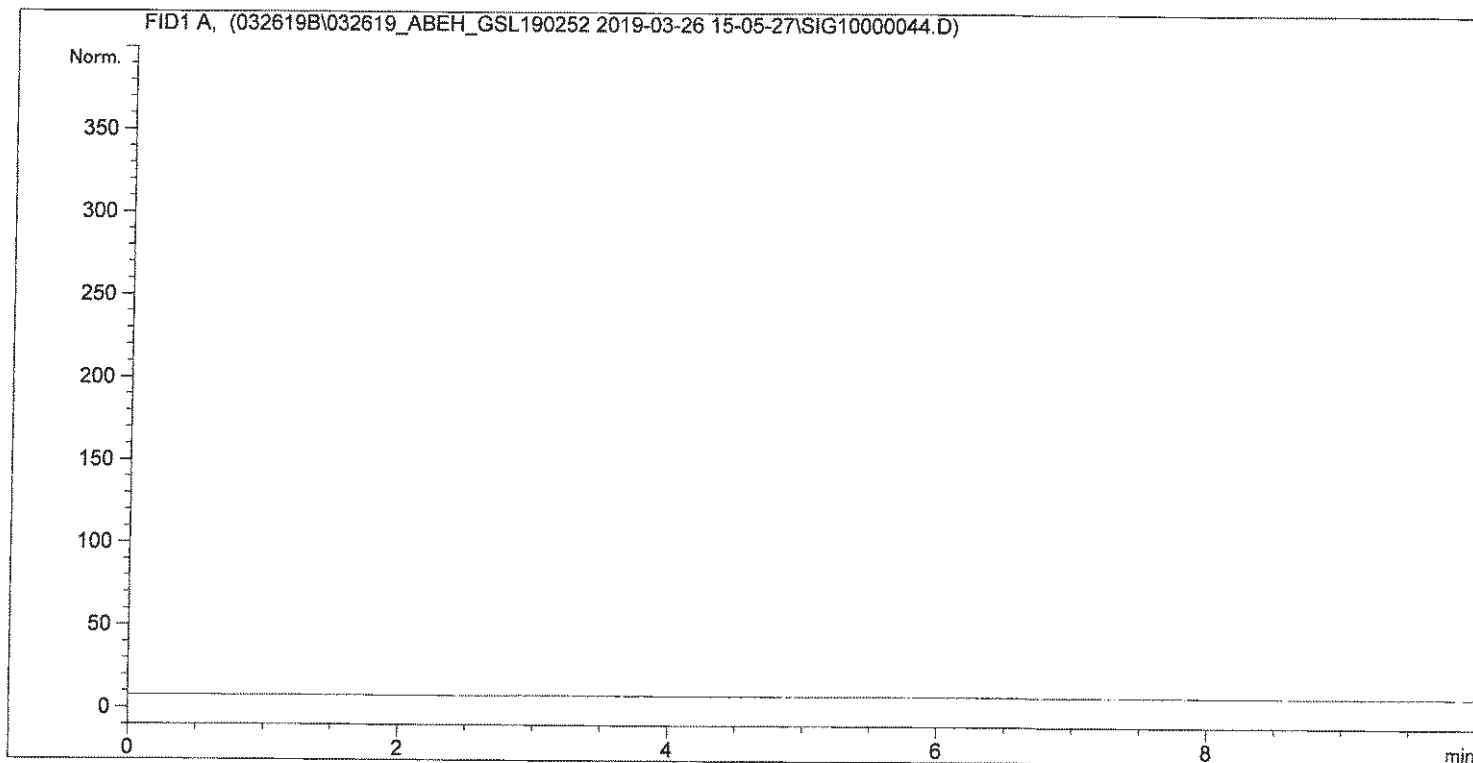
1 Warnings or Errors :

Warning : Calibrated compound(s) not found

=====
*** End of Report ***

```

=====
Acq. Operator   : edecker                               Seq. Line :   18
Acq. Instrument : GC#10                                 Location  : Vial 18
Injection Date  : 3/27/2019 6:46:48 AM                 Inj       :    1
                                                    Inj Volume: 1 µl
Acq. Method     : C:\CHEM32\1\DATA\032619B\032619_ABEH_GSL190252 2019-03-26 15-05-27\
                  FRONT_M18_ABEH_IN_MEOH_032519.M
Last changed    : 3/26/2019 1:55:14 PM by edecker
Analysis Method : C:\CHEM32\1\METHODS\FRONT_M18_ABEH_IN_MEOH_032519.M
Last changed    : 3/27/2019 10:02:19 AM by dyeddule
                  (modified after loading)
Sample Info     : GSL_190252-014
                  Method:M18
=====
  
```



External Standard Report

```

Sorted By      : Signal
Calib. Data Modified : Tuesday, March 26, 2019 12:02:38 PM
Multiplier:    : 1.0000
Dilution:      : 1.0000
Use Multiplier & Dilution Factor with ISTDs
  
```

Signal 1: FID1 A,

RetTime [min]	Type	Area [pA*s]	Amt/Area	Amount [ppm]	Grp	Name
1.250	-	-	-	-	-	Hexane
3.335	-	-	-	-	-	Benzene
5.471	-	-	-	-	-	Acetaldehyde
6.150	-	-	-	-	-	Ethlybenzene

no
3/27/19

RetTime [min]	Type	Area [pA*s]	Amt/Area	Amount [ppm]	Grp	Name
Totals :				0.00000		

1 Warnings or Errors :

Warning : Calibrated compound(s) not found

=====
=====
Area Percent Report
=====

Sorted By : Signal
Calib. Data Modified : Tuesday, March 26, 2019 12:02:38 PM
Multiplier: : 1.0000
Dilution: : 1.0000
Use Multiplier & Dilution Factor with ISTDs

Signal 1: FID1 A,

Peak #	RetTime [min]	Type	Width [min]	Area [pA*s]	Area %	Name
1	1.250		0.0000	0.00000	0.00000	Hexane
2	3.335		0.0000	0.00000	0.00000	Benzene
3	5.471		0.0000	0.00000	0.00000	Acetaldehyde
4	6.150		0.0000	0.00000	0.00000	Ethlybenzene

Totals : 0.00000 0.0000

Uncalibrated Peaks: n.a.

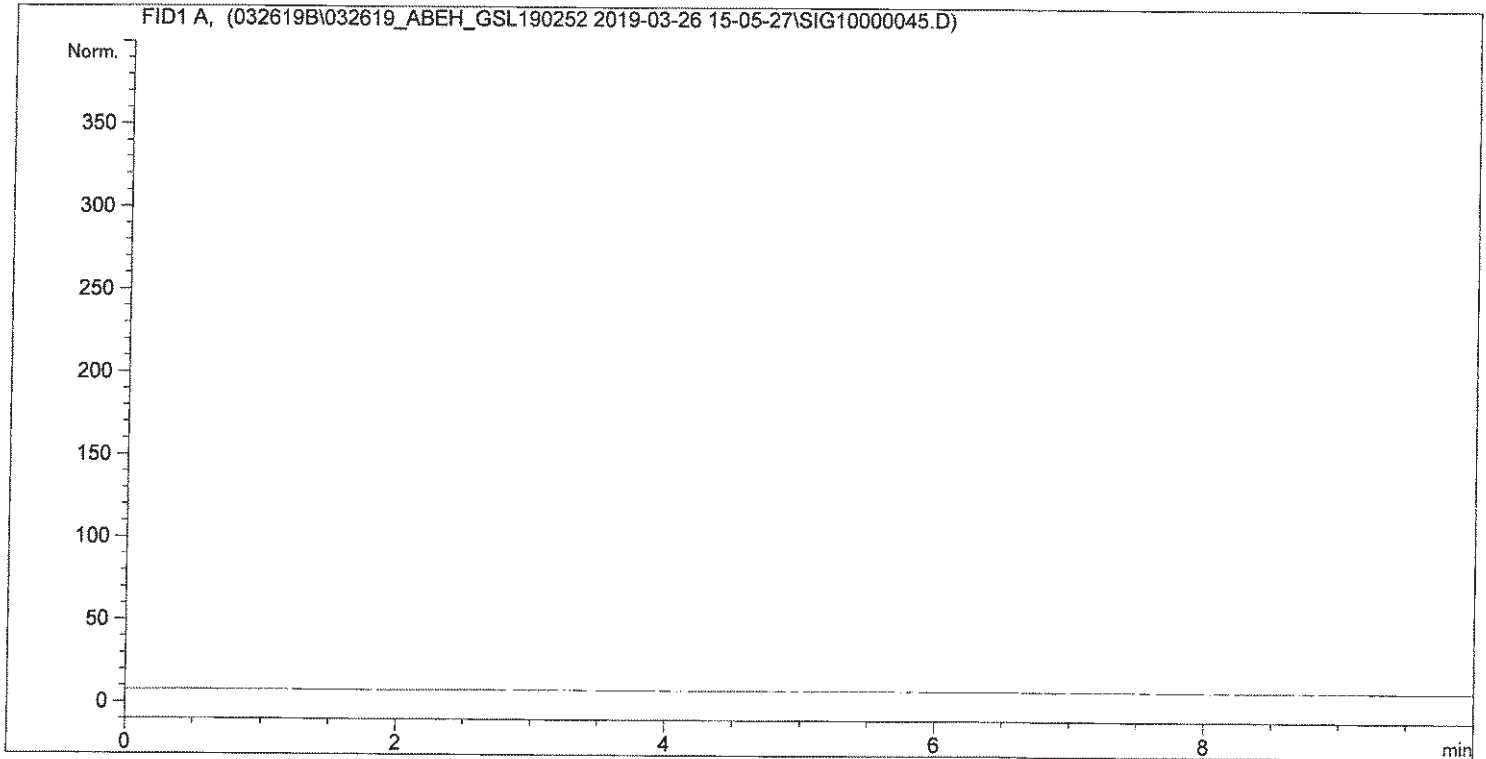
1 Warnings or Errors :

Warning : Calibrated compound(s) not found

=====
*** End of Report ***

```

=====
Acq. Operator   : edecker                               Seq. Line :   18
Acq. Instrument : GC#10                               Location  : Vial 18
Injection Date  : 3/27/2019 7:08:33 AM                Inj       :    2
                                                    Inj Volume: 1 µl
Acq. Method     : C:\CHEM32\1\DATA\032619B\032619_ABEH_GSL190252 2019-03-26 15-05-27\
                  FRONT_M18_ABEH_IN_MEOH_032519.M
Last changed    : 3/26/2019 1:55:14 PM by edecker
Analysis Method : C:\CHEM32\1\METHODS\FRONT_M18_ABEH_IN_MEOH_032519.M
Last changed    : 3/27/2019 10:02:19 AM by dyeddula
                  (modified after loading)
Sample Info     : GSL_190252-014
                  Method:M18
=====
  
```



External Standard Report

```

Sorted By      : Signal
Calib. Data Modified : Tuesday, March 26, 2019 12:02:38 PM
Multiplier:    : 1.0000
Dilution:     : 1.0000
Use Multiplier & Dilution Factor with ISTDs
  
```

Signal 1: FID1 A,

RetTime [min]	Type	Area [pA*s]	Amt/Area	Amount [ppm]	Grp	Name
1.250	-	-	-	-		Hexane
3.335	-	-	-	-		Benzene
5.471	-	-	-	-		Acetaldehyde
6.150	-	-	-	-		Ethlybenzene

and
3/27/19

RetTime [min]	Type	Area [pA*s]	Amt/Area	Amount [ppm]	Grp	Name
Totals :				0.00000		

1 Warnings or Errors :

Warning : Calibrated compound(s) not found

=====
=====
Area Percent Report
=====

Sorted By : Signal
Calib. Data Modified : Tuesday, March 26, 2019 12:02:38 PM
Multiplier: : 1.0000
Dilution: : 1.0000
Use Multiplier & Dilution Factor with ISTDs

Signal 1: FID1 A,

Peak #	RetTime [min]	Type	Width [min]	Area [pA*s]	Area %	Name
1	1.250		0.0000	0.00000	0.00000	Hexane
2	3.335		0.0000	0.00000	0.00000	Benzene
3	5.471		0.0000	0.00000	0.00000	Acetaldehyde
4	6.150		0.0000	0.00000	0.00000	Ethlybenzene

Totals : 0.00000 0.0000
Uncalibrated Peaks: n.a.

1 Warnings or Errors :

Warning : Calibrated compound(s) not found

=====
*** End of Report ***

RetTime [min]	Type	Area [pA*s]	Amt/Area	Amount [ppm]	Grp	Name
Totals :				0.00000		

1 Warnings or Errors :

Warning : Calibrated compound(s) not found

=====
=====
Area Percent Report
=====

Sorted By : Signal
Calib. Data Modified : Tuesday, March 26, 2019 12:02:38 PM
Multiplier: : 1.0000
Dilution: : 1.0000
Use Multiplier & Dilution Factor with ISTDs

Signal 1: FID1 A,

Peak #	RetTime [min]	Type	Width [min]	Area [pA*s]	Area %	Name
1	1.250		0.0000	0.00000	0.00000	Hexane
2	3.335		0.0000	0.00000	0.00000	Benzene
3	5.471		0.0000	0.00000	0.00000	Acetaldehyde
4	6.150		0.0000	0.00000	0.00000	Ethlybenzene

Totals : 0.00000 0.0000

Uncalibrated Peaks: n.a.

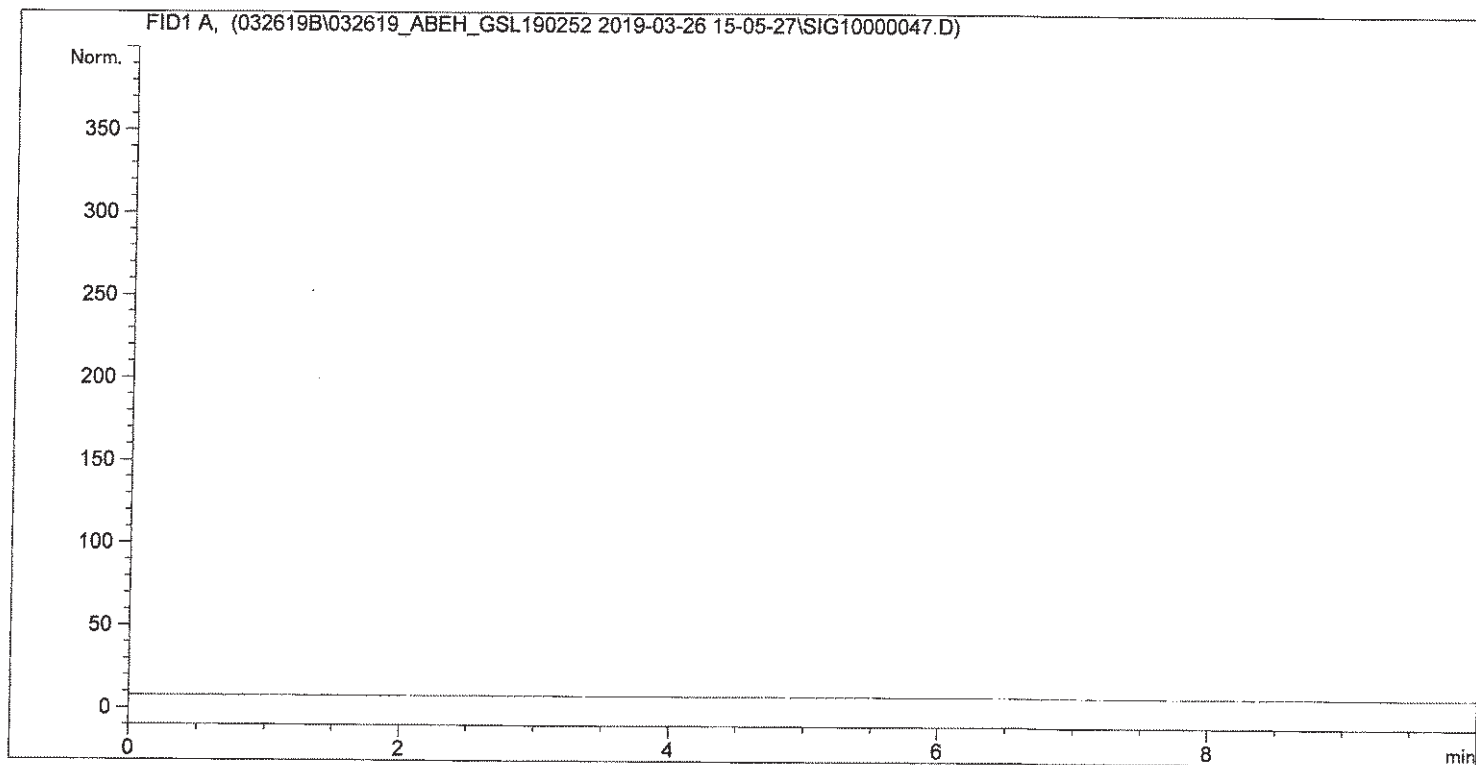
1 Warnings or Errors :

Warning : Calibrated compound(s) not found

=====
*** End of Report ***

```

=====
Acq. Operator   : edecker                               Seq. Line :   19
Acq. Instrument : GC#10                               Location  : Vial 19
Injection Date  : 3/27/2019 7:52:22 AM                Inj       :    1
                                                    Inj Volume: 1 µl
Acq. Method     : C:\CHEM32\1\DATA\032619B\032619_ABEH_GSL190252 2019-03-26 15-05-27\
                  FRONT_M18_ABEH_IN_MEOH_032519.M
Last changed    : 3/26/2019 1:55:14 PM by edecker
Analysis Method : C:\CHEM32\1\METHODS\FRONT_M18_ABEH_IN_MEOH_032519.M
Last changed    : 3/27/2019 10:02:19 AM by dyeddula
                  (modified after loading)
Sample Info     : GSL_190252-015
                  Method:M18
=====
  
```



External Standard Report

```

Sorted By      : Signal
Calib. Data Modified : Tuesday, March 26, 2019 12:02:38 PM
Multiplier:    : 1.0000
Dilution:     : 1.0000
Use Multiplier & Dilution Factor with ISTDs
  
```

Signal 1: FID1 A,

RetTime [min]	Type	Area [pA*s]	Amt/Area	Amount [ppm]	Grp	Name
1.250	-	-	-	-	-	Hexane
3.335	-	-	-	-	-	Benzene
5.471	-	-	-	-	-	Acetaldehyde
6.150	-	-	-	-	-	Ethlybenzene

dy
3/27/19

RetTime [min]	Type	Area [pA*s]	Amt/Area	Amount [ppm]	Grp	Name
Totals :				0.00000		

1 Warnings or Errors :

Warning : Calibrated compound(s) not found

=====
=====
Area Percent Report
=====

Sorted By : Signal
Calib. Data Modified : Tuesday, March 26, 2019 12:02:38 PM
Multiplier: : 1.0000
Dilution: : 1.0000
Use Multiplier & Dilution Factor with ISTDs

Signal 1: FID1 A,

Peak #	RetTime [min]	Type	Width [min]	Area [pA*s]	Area %	Name
1	1.250		0.0000	0.00000	0.00000	Hexane
2	3.335		0.0000	0.00000	0.00000	Benzene
3	5.471		0.0000	0.00000	0.00000	Acetaldehyde
4	6.150		0.0000	0.00000	0.00000	Ethlybenzene

Totals : 0.00000 0.0000

Uncalibrated Peaks: n.a.

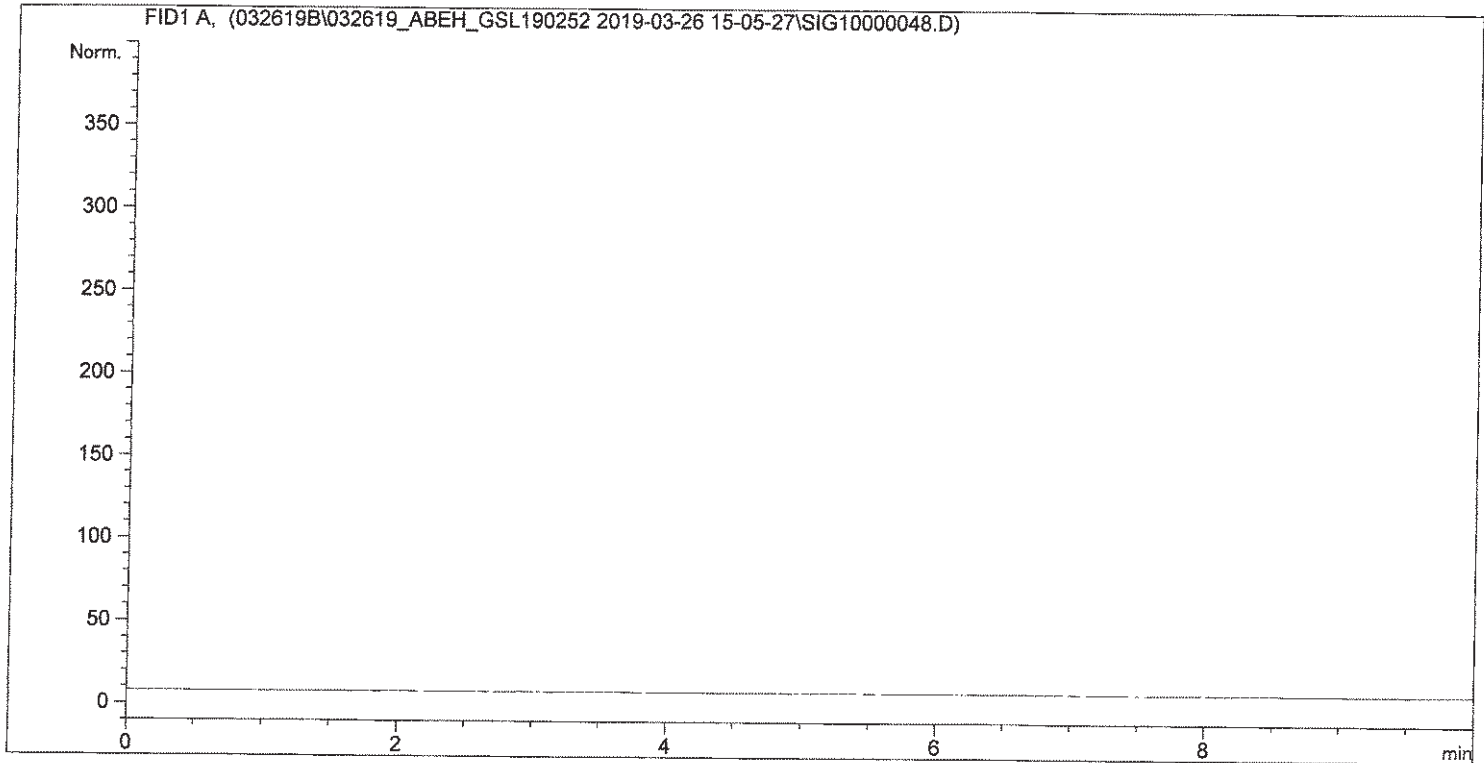
1 Warnings or Errors :

Warning : Calibrated compound(s) not found

=====
=====
*** End of Report ***

```

=====
Acq. Operator   : edecker                               Seq. Line :   19
Acq. Instrument : GC#10                               Location  : Vial 19
Injection Date  : 3/27/2019 8:14:20 AM                Inj       :    2
                                                    Inj Volume: 1 µl
Acq. Method     : C:\CHEM32\1\DATA\032619B\032619_ABEH_GSL190252 2019-03-26 15-05-27\
                  FRONT_M18_ABEH_IN_MEOH_032519.M
Last changed    : 3/26/2019 1:55:14 PM by edecker
Analysis Method : C:\CHEM32\1\METHODS\FRONT_M18_ABEH_IN_MEOH_032519.M
Last changed    : 3/27/2019 10:02:19 AM by dyeddula
                  (modified after loading)
Sample Info     : GSL_190252-015
                  Method:M18
=====
  
```



External Standard Report

```

Sorted By           : Signal
Calib. Data Modified : Tuesday, March 26, 2019 12:02:38 PM
Multiplier:         : 1.0000
Dilution:           : 1.0000
Use Multiplier & Dilution Factor with ISTDs
  
```

Signal 1: FID1 A,

RetTime [min]	Type	Area [pA*s]	Amt/Area	Amount [ppm]	Grp	Name
1.250	-	-	-	-	-	Hexane
3.335	-	-	-	-	-	Benzene
5.471	-	-	-	-	-	Acetaldehyde
6.150	-	-	-	-	-	Ethlybenzene

dy
3/27/19

RetTime [min]	Type	Area [pA*s]	Amt/Area	Amount [ppm]	Grp	Name
Totals :				0.00000		

1 Warnings or Errors :

Warning : Calibrated compound(s) not found

=====
=====
Area Percent Report
=====

Sorted By : Signal
Calib. Data Modified : Tuesday, March 26, 2019 12:02:38 PM
Multiplier: : 1.0000
Dilution: : 1.0000
Use Multiplier & Dilution Factor with ISTDs

Signal 1: FID1 A,

Peak #	RetTime [min]	Type	Width [min]	Area [pA*s]	Area %	Name
1	1.250		0.0000	0.00000	0.00000	Hexane
2	3.335		0.0000	0.00000	0.00000	Benzene
3	5.471		0.0000	0.00000	0.00000	Acetaldehyde
4	6.150		0.0000	0.00000	0.00000	Ethlybenzene

Totals : 0.00000 0.0000
Uncalibrated Peaks: n.a.

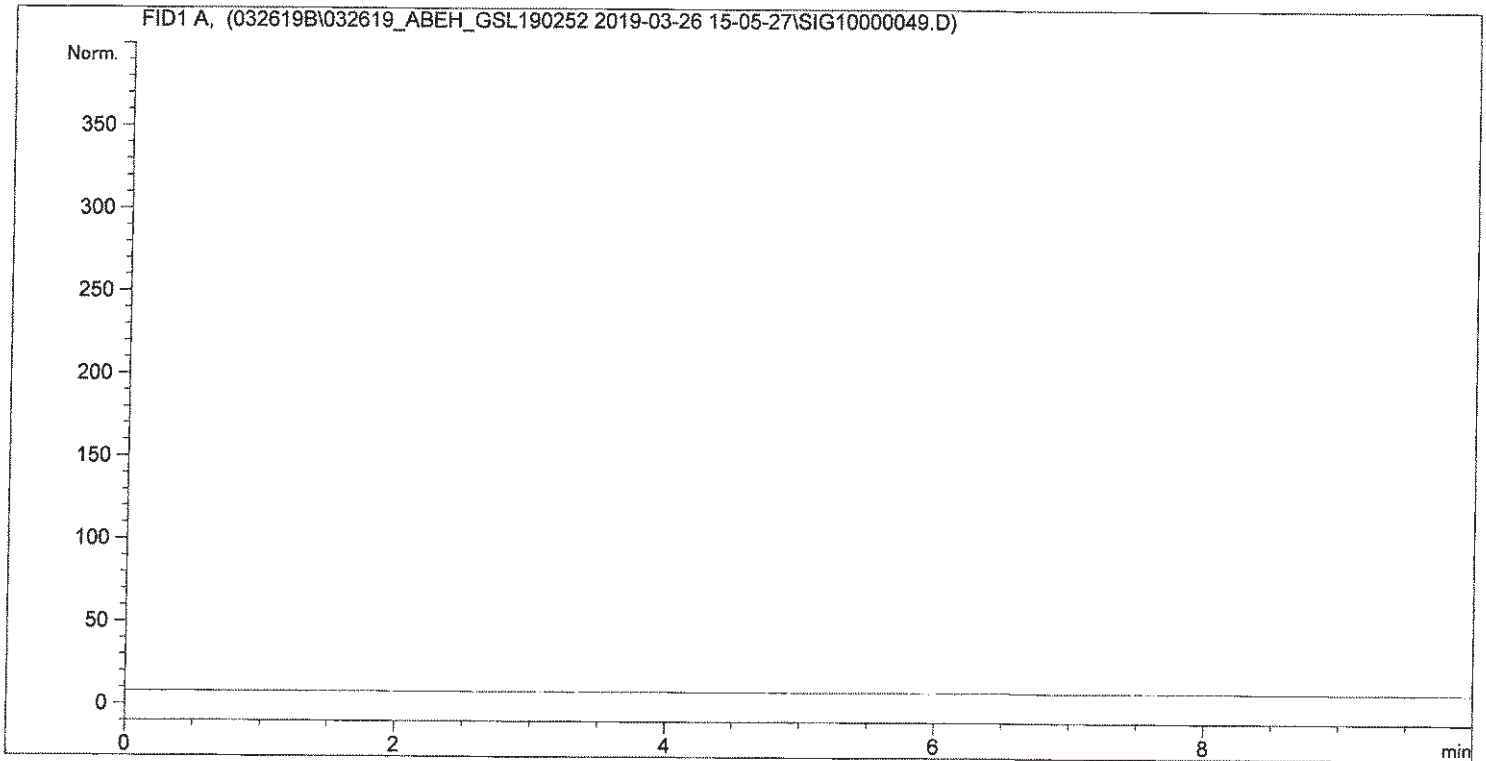
1 Warnings or Errors :

Warning : Calibrated compound(s) not found

=====
*** End of Report ***

```

=====
Acq. Operator   : edecker                               Seq. Line :   19
Acq. Instrument : GC#10                               Location  : Vial 19
Injection Date  : 3/27/2019 8:37:31 AM                 Inj       :    3
                                                    Inj Volume: 1 µl
Acq. Method     : C:\CHEM32\1\DATA\032619B\032619_ABEH_GSL190252 2019-03-26 15-05-27\
                  FRONT_M18_ABEH_IN_MEOH_032519.M
Last changed    : 3/26/2019 1:55:14 PM by edecker
Analysis Method : C:\CHEM32\1\METHODS\FRONT_M18_ABEH_IN_MEOH_032519.M
Last changed    : 3/27/2019 10:02:19 AM by dyeddula
                  (modified after loading)
Sample Info     : GSL_190252-015
                  Method:M18
=====
  
```



External Standard Report

```

Sorted By           :      Signal
Calib. Data Modified :      Tuesday, March 26, 2019 12:02:38 PM
Multiplier:         :      1.0000
Dilution:           :      1.0000
Use Multiplier & Dilution Factor with ISTDs
  
```

Signal 1: FID1 A,

RetTime [min]	Type	Area [pA*s]	Amt/Area	Amount [ppm]	Grp	Name
1.250	-	-	-	-	-	Hexane
3.335	-	-	-	-	-	Benzene
5.471	-	-	-	-	-	Acetaldehyde
6.150	-	-	-	-	-	Ethlybenzene

dy
3/27/19

RetTime [min]	Type	Area [pA*s]	Amt/Area	Amount [ppm]	Grp	Name
Totals :				0.00000		

1 Warnings or Errors :

Warning : Calibrated compound(s) not found

=====
=====
Area Percent Report
=====

Sorted By : Signal
Calib. Data Modified : Tuesday, March 26, 2019 12:02:38 PM
Multiplier: : 1.0000
Dilution: : 1.0000
Use Multiplier & Dilution Factor with ISTDs

Signal 1: FID1 A,

Peak #	RetTime [min]	Type	Width [min]	Area [pA*s]	Area %	Name
1	1.250		0.0000	0.00000	0.00000	Hexane
2	3.335		0.0000	0.00000	0.00000	Benzene
3	5.471		0.0000	0.00000	0.00000	Acetaldehyde
4	6.150		0.0000	0.00000	0.00000	Ethlybenzene

Totals : 0.00000 0.0000
Uncalibrated Peaks: n.a.

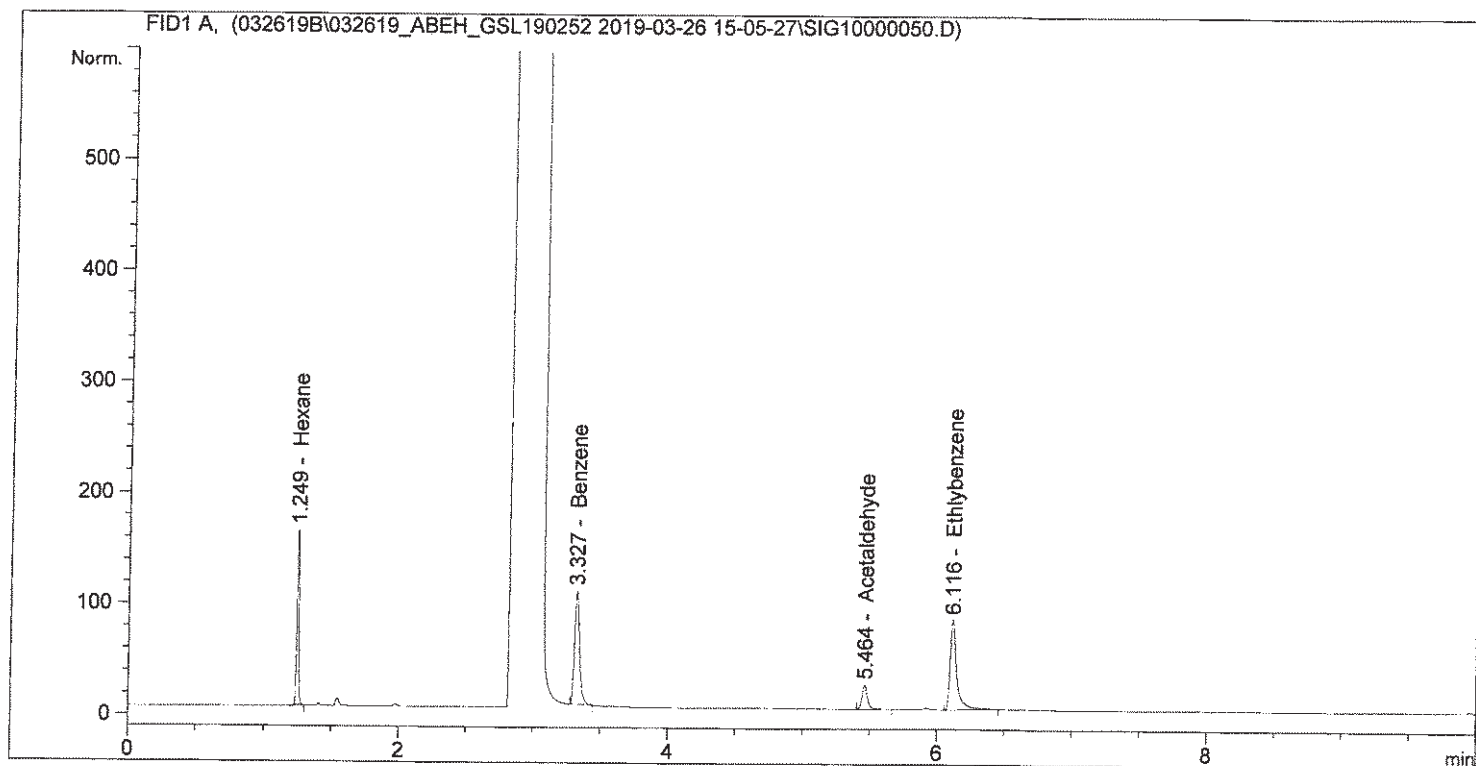
1 Warnings or Errors :

Warning : Calibrated compound(s) not found

=====
*** End of Report ***

```

=====
Acq. Operator   : edecker                               Seq. Line :   20
Acq. Instrument : GC#10                               Location  : Vial 1
Injection Date  : 3/27/2019 9:22:10 AM                Inj       :    1
                                                    Inj Volume: 1 µl
Acq. Method     : C:\CHEM32\1\DATA\032619B\032619_ABEH_GSL190252 2019-03-26 15-05-27\
                  FRONT_M18_ABEH_IN_MEOH_032519.M
Last changed    : 3/26/2019 1:55:14 PM by edecker
Analysis Method : C:\CHEM32\1\METHODS\FRONT_M18_ABEH_IN_MEOH_032519.M
Last changed    : 3/27/2019 9:55:32 AM by dyeddula
                  (modified after loading)
Sample Info     : POSTCCV - 8X of ABEH Stock Standard
                  Method:M18
=====
  
```



External Standard Report

```

Sorted By           : Signal
Calib. Data Modified : Tuesday, March 26, 2019 12:02:38 PM
Multiplier:         : 1.0000
Dilution:           : 1.0000
Use Multiplier & Dilution Factor with ISTDs
  
```

Signal 1: FID1 A,

RetTime [min]	Type	Area [pA*s]	Amt/Area	Amount [ppm]	Grp	Name
1.249	BBA	156.76776	1.92207	301.31855		Hexane
3.327	BBA	261.29941	1.57995	412.83915		Benzene
5.464	BBA	60.67430	6.04535	366.79742		Acetaldehyde
6.116	BBA	272.93744	1.49177	407.16098		Ethylbenzene

SW
3/27/19

RetTime [min]	Type	Area [pA*s]	Amt/Area	Amount [ppm]	Grp	Name
----- ----- ----- ----- ----- ----- -----						
Totals :				1488.11609		

=====
*** End of Report ***

QC 09261

Formaldehyde Analysis M323	
Date of Analysis:	3/14/2019
Analyst:	JP
Instrument:	UV/VIS #1 (Spectrophotometer)
Wave length:	412 nm

Calibration Curve - Formaldehyde			
	Concentration (µg/mL)	Absorbance	Response Factor
STD 1	0.1	0.016	6.250
STD 2	0.5	0.075	6.667
STD 3	2.0	0.302	6.623
STD 4	5.0	0.761	6.570
STD 5	10.0	1.500	6.667
STD 6	15.0	2.245	6.682
	AVG RF:	6.576	
	S.D.:	0.165	
	%RSD:	2.508	
	Correlation(r²):	1.000	
	Slope:	6.683	

Test Samples	Absorbance	Concentration (µg/mL)	True Value (µg/mL)	% Recovery
ICV/LCS	0.299	1.966	2.00	98.32
BLANK	0.000	0.000		
GSL_190252-001	0.074	0.487		
GSL_190252-002	0.565	3.716		
GSL_190252-002DUP	0.567	3.729		
GSL_190252-002MS	0.753	4.952	2.00	98.97
(1.6mL sample+400µL Std.)				
GSL_190252-003	0.599	3.939		
GSL_190252-003DUP	0.598	3.933		
GSL_190252-003MS	0.779	5.123	2.00	98.58
(1.6mL sample+400µL Std.)				
GSL_190252-004	0.449	2.953		
GSL_190252-005	0.434	2.854		
GSL_190252-006	0.475	3.124		

Analyst Signature: *Jack P. P...*

Date: 3-27-19

Peer/Technical Director (in Training): *Emily ...*

Date: 3/27/19

Lab/QA-QC Manager: _____

Date: _____

Formaldehyde Analysis M323	
Date of Analysis:	3/14/2019
Analyst:	JP
Instrument:	UV/VIS #1 (Spectrophotometer)
Wave length:	412 nm

Calibration Curve - Formaldehyde			
	Concentration (µg/mL)	Absorbance	Response Factor
STD 1	0.1	0.016	6.250
STD 2	0.5	0.075	6.667
STD 3	2.0	0.302	6.623
STD 4	5.0	0.761	6.570
STD 5	10.0	1.500	6.667
STD 6	15.0	2.245	6.682
AVG RF:			6.576
S.D.:			0.165
%RSD:			2.508
Correlation(r ²):			1.000
Slope:			6.683

Test Samples	Absorbance	Concentration (µg/mL)	True Value (µg/mL)	% Recovery
GSL_190252-007	0.209	1.374		
GSL_190252-008	0.284	1.868		
GSL_190252-009	0.277	1.822		
GSL_190252-010	0.168	1.105		
GSL_190252-011	0.121	0.796		
GSL_190252-012	0.223	1.467		
GSL_190252-013	0.196	1.289		
GSL_190252-014	0.181	1.190		
GSL_190252-015	0.129	0.848		
POST CCV	0.302	1.986	2.00	99.30

Analyst Signature: *Jacob P. [Signature]*

Date: 3-27-19

Peer/Technical Director (in Training): _____

Date: _____

Lab/QA-QC Manager: _____

Date: _____

Your P.O. #: 19-0420
 Your Project #: 19-0420
 Site Location: CATERPILLAR INC.

Attention: Data Reports

Alliance Source Testing, LLC
 214 Central Circle SW
 Decatur, AL
 USA 35603

Report Date: 2019/03/28
 Report #: R5648469
 Version: 1 - Final

CERTIFICATE OF ANALYSIS

MAXXAM JOB #: B963893
Received: 2019/03/15, 14:30

Sample Matrix: Stack Sampling Train
 # Samples Received: 16

Analyses	Quantity	Date	Date	Laboratory Method	Reference
		Extracted	Analyzed		
SVOCs in MM5 SamplingTrain (EPA0010)	1	2019/03/18	2019/03/25	BRL SOP-00200	EPA 8270D/M0010 m
SVOCs in MM5 SamplingTrain (EPA0010)	9	2019/03/18	2019/03/26	BRL SOP-00200	EPA 8270D/M0010 m
SVOCs in MM5 SamplingTrain (EPA0010)	6	2019/03/18	2019/03/27	BRL SOP-00200	EPA 8270D/M0010 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.

Your P.O. #: 19-0420
Your Project #: 19-0420
Site Location: CATERPILLAR INC.

Attention: Data Reports

Alliance Source Testing, LLC
214 Central Circle SW
Decatur, AL
USA 35603

Report Date: 2019/03/28
Report #: R5648469
Version: 1 - Final

CERTIFICATE OF ANALYSIS

MAXXAM JOB #: B963893
Received: 2019/03/15, 14:30

Encryption Key

Please direct all questions regarding this Certificate of Analysis to your Project Manager.
Clayton Johnson, Project Manager - Air Toxics, Source Evaluation
Email: CJohnson@maxxam.ca
Phone# (905)817-5769

=====
This report has been generated and distributed using a secure automated process.

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.

EPA M0010 SEMIVOLATILES IN MM5 TRAINS (STACK SAMPLING TRAIN)

Maxxam ID		JEF800		JEF801	JEF802	JEF803		
Sampling Date		2019/03/08 13:15		2019/03/08 11:25	2019/03/08 12:25	2019/03/08 14:40		
	UNITS	M0010- BLANK	RDL	M0010- LC 10%- R1	M0010- LC 10%- R2	M0010- LC 10%- R3	RDL	QC Batch
1-Chloronaphthalene	ug	<4	4	<4	<4	<4	4	6024851
1-Methylnaphthalene	ug	<6	6	63	68	67	6	6024851
2-Methylnaphthalene	ug	<4	4	105	137	126	20	6024851
Acenaphthene	ug	<1	1	<3	<3	<3	3	6024851
Acenaphthylene	ug	<1	1	<3	<3	<3	3	6024851
Anthracene	ug	<0.8	0.8	<1	<1	<1	1	6024851
Benzo(a)anthracene	ug	<0.8	0.8	<0.8	<0.8	<0.8	0.8	6024851
Benzo(a)pyrene	ug	<1	1	<1	<1	<1	1	6024851
Benzo(b)fluoranthene	ug	<0.8	0.8	<0.8	<0.8	<0.8	0.8	6024851
Benzo(g,h,i)perylene	ug	<0.8	0.8	<0.8	<0.8	<0.8	0.8	6024851
Benzo(k)fluoranthene	ug	<1	1	<1	<1	<1	1	6024851
Biphenyl	ug	<4	4	24	25	26	4	6024851
Chrysene	ug	<0.8	0.8	<0.8	<0.8	<0.8	0.8	6024851
Dibenz(a,h)anthracene	ug	<0.8	0.8	<0.8	<0.8	<0.8	0.8	6024851
Fluoranthene	ug	<0.8	0.8	<2	<2	<2	2	6024851
Fluorene	ug	<0.8	0.8	5.8	6.7	6.8	0.8	6024851
Indeno(1,2,3-cd)pyrene	ug	<1	1	<1	<1	<1	1	6024851
Naphthalene	ug	<1	1	133	173	160	6	6024851
Phenanthrene	ug	<0.8	0.8	13.2	13.3	13.7	0.8	6024851
Pyrene	ug	<1	1	13	13	14	1	6024851
Surrogate Recovery (%)								
2,4,6-Tribromophenol	%	88		95	93	95		6024851
2,6-Dibromo-4-fluorophenol (FS)	%	78		76	81	88		6024851
2-Fluorobiphenyl	%	76		96	97	96		6024851
2-Fluorophenol	%	78		83	82	93		6024851
D10-Pyrene (FS)	%	100		100	112	104		6024851
D14-Terphenyl	%	97		106	111	106		6024851
D5-Nitrobenzene	%	76		107	111	114		6024851
D6-Phenol	%	79		91	89	100		6024851
RDL = Reportable Detection Limit QC Batch = Quality Control Batch								

EPA M0010 SEMIVOLATILES IN MM5 TRAINS (STACK SAMPLING TRAIN)

Maxxam ID		JEF879	JEF880		JEF881		JEF883		
Sampling Date		2019/03/07 15:20	2019/03/07 16:55		2019/03/07 18:45		2019/03/06 18:50		
	UNITS	M0010- LC 25%- R1	M0010- LC 25%- R2	RDL	M0010- LC 25%- R3	RDL	M0010- LC 50%- R1	RDL	QC Batch
1-Chloronaphthalene	ug	<4	<4	4	<4	4	<4	4	6024851
1-Methylnaphthalene	ug	34	38	6	37	6	24	6	6024851
2-Methylnaphthalene	ug	66	70	4	69	4	45	4	6024851
Acenaphthene	ug	<3	<3	3	<3	3	<3	3	6024851
Acenaphthylene	ug	<3	<3	3	<3	3	<3	3	6024851
Anthracene	ug	<0.8	<0.8	0.8	<1	1	<0.8	0.8	6024851
Benzo(a)anthracene	ug	<0.8	<0.8	0.8	<0.8	0.8	<0.8	0.8	6024851
Benzo(a)pyrene	ug	<1	<1	1	<1	1	<1	1	6024851
Benzo(b)fluoranthene	ug	<0.8	<0.8	0.8	<0.8	0.8	<0.8	0.8	6024851
Benzo(g,h,i)perylene	ug	<0.8	<0.8	0.8	<0.8	0.8	<0.8	0.8	6024851
Benzo(k)fluoranthene	ug	<1	<1	1	<1	1	<1	1	6024851
Biphenyl	ug	14	15	4	14	4	10	4	6024851
Chrysene	ug	<0.8	<0.8	0.8	<0.8	0.8	<0.8	0.8	6024851
Dibenz(a,h)anthracene	ug	<0.8	<0.8	0.8	<0.8	0.8	<0.8	0.8	6024851
Fluoranthene	ug	<0.8	<0.8	0.8	<2	2	<0.8	0.8	6024851
Fluorene	ug	3.1	3.1	0.8	3.4	0.8	2.3	0.8	6024851
Indeno(1,2,3-cd)pyrene	ug	<1	<1	1	<1	1	<1	1	6024851
Naphthalene	ug	77	84	1	83	1	40	1	6024851
Phenanthrene	ug	8.0	7.1	0.8	8.2	0.8	4.5	0.8	6024851
Pyrene	ug	9	7	1	10	1	6	1	6024851
Surrogate Recovery (%)									
2,4,6-Tribromophenol	%	60	67		61		41		6024851
2,6-Dibromo-4-fluorophenol (FS)	%	52	61		49		37		6024851
2-Fluorobiphenyl	%	93	96		95		91		6024851
2-Fluorophenol	%	76	86		78		62		6024851
D10-Pyrene (FS)	%	107	116		114		113		6024851
D14-Terphenyl	%	105	114		111		114		6024851
D5-Nitrobenzene	%	107	109		112		104		6024851
D6-Phenol	%	88	97		89		81		6024851
RDL = Reportable Detection Limit QC Batch = Quality Control Batch									

EPA M0010 SEMIVOLATILES IN MM5 TRAINS (STACK SAMPLING TRAIN)

Maxxam ID		JEF884	JEF885	JEF886	JEF887		
Sampling Date		2019/03/07 10:50	2019/03/07 12:40	2019/03/06 12:00	2019/03/06 14:20		
	UNITS	M0010- LC 50%- R2	M0010- LC 50%- R3	M0010- LC 75%- R1	M0010- LC 75%- R2	RDL	QC Batch
1-Chloronaphthalene	ug	<4	<4	<4	<4	4	6024851
1-Methylnaphthalene	ug	25	26	35	33	6	6024851
2-Methylnaphthalene	ug	46	49	65	63	4	6024851
Acenaphthene	ug	<3	<3	<3	<3	3	6024851
Acenaphthylene	ug	<3	<3	<3	<3	3	6024851
Anthracene	ug	<0.8	<0.8	<0.8	<0.8	0.8	6024851
Benzo(a)anthracene	ug	<0.8	<0.8	<0.8	<0.8	0.8	6024851
Benzo(a)pyrene	ug	<1	<1	<1	<1	1	6024851
Benzo(b)fluoranthene	ug	<0.8	<0.8	<0.8	<0.8	0.8	6024851
Benzo(g,h,i)perylene	ug	<0.8	<0.8	<0.8	<0.8	0.8	6024851
Benzo(k)fluoranthene	ug	<1	<1	<1	<1	1	6024851
Biphenyl	ug	10	11	34	14	4	6024851
Chrysene	ug	<0.8	<0.8	<0.8	<0.8	0.8	6024851
Dibenz(a,h)anthracene	ug	<0.8	<0.8	<0.8	<0.8	0.8	6024851
Fluoranthene	ug	<0.8	<0.8	<0.8	<0.8	0.8	6024851
Fluorene	ug	2.0	2.3	3.5	3.4	0.8	6024851
Indeno(1,2,3-cd)pyrene	ug	<1	<1	<1	<1	1	6024851
Naphthalene	ug	44	47	62	60	1	6024851
Phenanthrene	ug	4.4	4.8	7.4	6.3	0.8	6024851
Pyrene	ug	5	5	8	7	1	6024851
Surrogate Recovery (%)							
2,4,6-Tribromophenol	%	49	49	41	16 (1)		6024851
2,6-Dibromo-4-fluorophenol (FS)	%	51	47	28	23		6024851
2-Fluorobiphenyl	%	96	99	95	89		6024851
2-Fluorophenol	%	66	69	60	33		6024851
D10-Pyrene (FS)	%	114	113	104	102		6024851
D14-Terphenyl	%	110	108	103	101		6024851
D5-Nitrobenzene	%	102	108	109	105		6024851
D6-Phenol	%	83	87	80	62		6024851
RDL = Reportable Detection Limit QC Batch = Quality Control Batch (1) Surrogate recovery below lower control limit due to matrix interference. This may represent a low bias in some results.							

EPA M0010 SEMIVOLATILES IN MM5 TRAINS (STACK SAMPLING TRAIN)

Maxxam ID		JEF888		JEF889		JEF890		
Sampling Date		2019/03/06 16:30		2019/03/05 13:20		2019/03/05 15:10		
	UNITS	M0010- LC 75%-R3	RDL	M0010- LC 100%-R1	RDL	M0010- LC 100%-R2	RDL	QC Batch
1-Chloronaphthalene	ug	<4	4	<4	4	<4	4	6024851
1-Methylnaphthalene	ug	36	6	47	6	48	6	6024851
2-Methylnaphthalene	ug	67	4	87	4	100	4	6024851
Acenaphthene	ug	<3	3	<3	3	<3	3	6024851
Acenaphthylene	ug	<3	3	<3	3	<3	3	6024851
Anthracene	ug	<1	1	<1	1	<1	1	6024851
Benzo(a)anthracene	ug	<0.8	0.8	<0.8	0.8	<0.8	0.8	6024851
Benzo(a)pyrene	ug	<1	1	<1	1	<1	1	6024851
Benzo(b)fluoranthene	ug	<0.8	0.8	<0.8	0.8	<0.8	0.8	6024851
Benzo(g,h,i)perylene	ug	<0.8	0.8	<0.8	0.8	<0.8	0.8	6024851
Benzo(k)fluoranthene	ug	<1	1	<1	1	<1	1	6024851
Biphenyl	ug	15	4	18	4	140	20	6024851
Chrysene	ug	<0.8	0.8	<0.8	0.8	<0.8	0.8	6024851
Dibenz(a,h)anthracene	ug	<0.8	0.8	<0.8	0.8	<0.8	0.8	6024851
Fluoranthene	ug	<0.8	0.8	<2	2	<2	2	6024851
Fluorene	ug	3.0	0.8	4.0	0.8	6.0	0.8	6024851
Indeno(1,2,3-cd)pyrene	ug	<1	1	<1	1	<1	1	6024851
Naphthalene	ug	64	1	73	1	72	1	6024851
Phenanthrene	ug	7.6	0.8	10.1	0.8	11.0	0.8	6024851
Pyrene	ug	8	1	11	1	11	1	6024851
Surrogate Recovery (%)								
2,4,6-Tribromophenol	%	43		39		43		6024851
2,6-Dibromo-4-fluorophenol (FS)	%	38		27		33		6024851
2-Fluorobiphenyl	%	92		99		102		6024851
2-Fluorophenol	%	63		56		58		6024851
D10-Pyrene (FS)	%	102		114		111		6024851
D14-Terphenyl	%	103		113		112		6024851
D5-Nitrobenzene	%	108		120		117		6024851
D6-Phenol	%	82		81		78		6024851
RDL = Reportable Detection Limit QC Batch = Quality Control Batch								

EPA M0010 SEMIVOLATILES IN MM5 TRAINS (STACK SAMPLING TRAIN)

Maxxam ID		JEF891		
Sampling Date		2019/03/05 18:40		
	UNITS	M0010- LC 100%- R3	RDL	QC Batch
1-Chloronaphthalene	ug	<4	4	6024851
1-Methylnaphthalene	ug	46	6	6024851
2-Methylnaphthalene	ug	85	4	6024851
Acenaphthene	ug	<3	3	6024851
Acenaphthylene	ug	<3	3	6024851
Anthracene	ug	<1	1	6024851
Benzo(a)anthracene	ug	<0.8	0.8	6024851
Benzo(a)pyrene	ug	<1	1	6024851
Benzo(b)fluoranthene	ug	<0.8	0.8	6024851
Benzo(g,h,i)perylene	ug	<0.8	0.8	6024851
Benzo(k)fluoranthene	ug	<1	1	6024851
Biphenyl	ug	16	4	6024851
Chrysene	ug	<0.8	0.8	6024851
Dibenz(a,h)anthracene	ug	<0.8	0.8	6024851
Fluoranthene	ug	<2	2	6024851
Fluorene	ug	4.3	0.8	6024851
Indeno(1,2,3-cd)pyrene	ug	<1	1	6024851
Naphthalene	ug	68	1	6024851
Phenanthrene	ug	9.9	0.8	6024851
Pyrene	ug	9	1	6024851
Surrogate Recovery (%)				
2,4,6-Tribromophenol	%	23 (1)		6024851
2,6-Dibromo-4-fluorophenol (FS)	%	16		6024851
2-Fluorobiphenyl	%	89		6024851
2-Fluorophenol	%	42		6024851
D10-Pyrene (FS)	%	103		6024851
D14-Terphenyl	%	104		6024851
D5-Nitrobenzene	%	107		6024851
D6-Phenol	%	66		6024851
RDL = Reportable Detection Limit QC Batch = Quality Control Batch (1) Surrogate recovery below lower control limit due to matrix interference. This may represent a low bias in some results.				

TEST SUMMARY

Maxxam ID: JEF800
Sample ID: M0010- BLANK
Matrix: Stack Sampling Train

Collected: 2019/03/08
Shipped:
Received: 2019/03/15

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
SVOCs in MM5 SamplingTrain (EPA0010)	GC/MS	6024851	2019/03/18	2019/03/25	Fan (Carrie) Jiang

Maxxam ID: JEF801
Sample ID: M0010- LC 10%- R1
Matrix: Stack Sampling Train

Collected: 2019/03/08
Shipped:
Received: 2019/03/15

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
SVOCs in MM5 SamplingTrain (EPA0010)	GC/MS	6024851	2019/03/18	2019/03/27	Fan (Carrie) Jiang

Maxxam ID: JEF802
Sample ID: M0010- LC 10%- R2
Matrix: Stack Sampling Train

Collected: 2019/03/08
Shipped:
Received: 2019/03/15

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
SVOCs in MM5 SamplingTrain (EPA0010)	GC/MS	6024851	2019/03/18	2019/03/26	Fan (Carrie) Jiang

Maxxam ID: JEF803
Sample ID: M0010- LC 10%- R3
Matrix: Stack Sampling Train

Collected: 2019/03/08
Shipped:
Received: 2019/03/15

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
SVOCs in MM5 SamplingTrain (EPA0010)	GC/MS	6024851	2019/03/18	2019/03/27	Fan (Carrie) Jiang

Maxxam ID: JEF879
Sample ID: M0010- LC 25%- R1
Matrix: Stack Sampling Train

Collected: 2019/03/07
Shipped:
Received: 2019/03/15

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
SVOCs in MM5 SamplingTrain (EPA0010)	GC/MS	6024851	2019/03/18	2019/03/27	Fan (Carrie) Jiang

Maxxam ID: JEF880
Sample ID: M0010- LC 25%- R2
Matrix: Stack Sampling Train

Collected: 2019/03/07
Shipped:
Received: 2019/03/15

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
SVOCs in MM5 SamplingTrain (EPA0010)	GC/MS	6024851	2019/03/18	2019/03/27	Fan (Carrie) Jiang

Maxxam ID: JEF881
Sample ID: M0010- LC 25%- R3
Matrix: Stack Sampling Train

Collected: 2019/03/07
Shipped:
Received: 2019/03/15

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
SVOCs in MM5 SamplingTrain (EPA0010)	GC/MS	6024851	2019/03/18	2019/03/27	Fan (Carrie) Jiang

TEST SUMMARY

Maxxam ID: JEF883
Sample ID: M0010- LC 50%- R1
Matrix: Stack Sampling Train

Collected: 2019/03/06
Shipped:
Received: 2019/03/15

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
SVOCs in MM5 SamplingTrain (EPA0010)	GC/MS	6024851	2019/03/18	2019/03/27	Fan (Carrie) Jiang

Maxxam ID: JEF884
Sample ID: M0010- LC 50%- R2
Matrix: Stack Sampling Train

Collected: 2019/03/07
Shipped:
Received: 2019/03/15

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
SVOCs in MM5 SamplingTrain (EPA0010)	GC/MS	6024851	2019/03/18	2019/03/26	Fan (Carrie) Jiang

Maxxam ID: JEF885
Sample ID: M0010- LC 50%- R3
Matrix: Stack Sampling Train

Collected: 2019/03/07
Shipped:
Received: 2019/03/15

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
SVOCs in MM5 SamplingTrain (EPA0010)	GC/MS	6024851	2019/03/18	2019/03/26	Fan (Carrie) Jiang

Maxxam ID: JEF886
Sample ID: M0010- LC 75%- R1
Matrix: Stack Sampling Train

Collected: 2019/03/06
Shipped:
Received: 2019/03/15

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
SVOCs in MM5 SamplingTrain (EPA0010)	GC/MS	6024851	2019/03/18	2019/03/26	Fan (Carrie) Jiang

Maxxam ID: JEF887
Sample ID: M0010- LC 75%- R2
Matrix: Stack Sampling Train

Collected: 2019/03/06
Shipped:
Received: 2019/03/15

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
SVOCs in MM5 SamplingTrain (EPA0010)	GC/MS	6024851	2019/03/18	2019/03/26	Fan (Carrie) Jiang

Maxxam ID: JEF888
Sample ID: M0010- LC 75%- R3
Matrix: Stack Sampling Train

Collected: 2019/03/06
Shipped:
Received: 2019/03/15

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
SVOCs in MM5 SamplingTrain (EPA0010)	GC/MS	6024851	2019/03/18	2019/03/26	Fan (Carrie) Jiang

Maxxam ID: JEF889
Sample ID: M0010- LC 100%- R1
Matrix: Stack Sampling Train

Collected: 2019/03/05
Shipped:
Received: 2019/03/15

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
SVOCs in MM5 SamplingTrain (EPA0010)	GC/MS	6024851	2019/03/18	2019/03/26	Fan (Carrie) Jiang

TEST SUMMARY

Maxxam ID: JEF890
Sample ID: M0010- LC 100%- R2
Matrix: Stack Sampling Train

Collected: 2019/03/05
Shipped:
Received: 2019/03/15

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
SVOCs in MM5 SamplingTrain (EPA0010)	GC/MS	6024851	2019/03/18	2019/03/26	Fan (Carrie) Jiang

Maxxam ID: JEF891
Sample ID: M0010- LC 100%- R3
Matrix: Stack Sampling Train

Collected: 2019/03/05
Shipped:
Received: 2019/03/15

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
SVOCs in MM5 SamplingTrain (EPA0010)	GC/MS	6024851	2019/03/18	2019/03/26	Fan (Carrie) Jiang

GENERAL COMMENTS

All impingers extracted past hold time.

Due to matrix interferences, detection limits of Acenaphthylene, Acenaphthene, Anthracene and Fluoranthene raised for some samples.

Sample JEF801 [M0010- LC 10%- R1] : Due to high concentration of some of the target analytes, sample required dilution. Detection limits for those compounds were adjusted accordingly.

Sample JEF802 [M0010- LC 10%- R2] : Due to high concentration of some of the target analytes, sample required dilution. Detection limits for those compounds were adjusted accordingly.

Sample JEF803 [M0010- LC 10%- R3] : Due to high concentration of some of the target analytes, sample required dilution. Detection limits for those compounds were adjusted accordingly.

Sample JEF890 [M0010- LC 100%- R2] : Due to high concentration of Biphenyl, sample required dilution. Detection limit for this compound was 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
	6024851	FJI	Spiked Blank	1-Chloronaphthalene	2019/03/25		87	%	N/A
				1-Methylnaphthalene	2019/03/25		96	%	40 - 125
				2,4,6-Tribromophenol	2019/03/25		97	%	24 - 121
				2-Fluorobiphenyl	2019/03/25		91	%	30 - 115
				2-Fluorophenol	2019/03/25		85	%	30 - 130
				2-Methylnaphthalene	2019/03/25		94	%	40 - 125
				Acenaphthene	2019/03/25		99	%	40 - 125
				Acenaphthylene	2019/03/25		96	%	40 - 125
				Anthracene	2019/03/25		95	%	40 - 125
				Benzo(a)anthracene	2019/03/25		99	%	40 - 125
				Benzo(a)pyrene	2019/03/25		93	%	40 - 125
				Benzo(b)fluoranthene	2019/03/25		96	%	40 - 125
				Benzo(g,h,i)perylene	2019/03/25		92	%	40 - 125
				Benzo(k)fluoranthene	2019/03/25		88	%	40 - 125
				Chrysene	2019/03/25		100	%	40 - 125
				D14-Terphenyl	2019/03/25		98	%	18 - 137
				D5-Nitrobenzene	2019/03/25		91	%	23 - 120
				D6-Phenol	2019/03/25		84	%	24 - 113
				Dibenz(a,h)anthracene	2019/03/25		96	%	40 - 125
				Fluoranthene	2019/03/25		101	%	40 - 125
				Fluorene	2019/03/25		97	%	40 - 125
				Indeno(1,2,3-cd)pyrene	2019/03/25		89	%	40 - 125
				Naphthalene	2019/03/25		97	%	40 - 125
				Phenanthrene	2019/03/25		96	%	40 - 125
				Pyrene	2019/03/25		99	%	40 - 125
				Biphenyl	2019/03/25		91	%	40 - 125
	6024851	FJI	RPD	1-Chloronaphthalene	2019/03/25	4.0		%	50
				1-Methylnaphthalene	2019/03/25	3.0		%	50
				2-Methylnaphthalene	2019/03/25	3.2		%	50
				Acenaphthene	2019/03/25	2.0		%	50
				Acenaphthylene	2019/03/25	3.0		%	50
				Anthracene	2019/03/25	4.4		%	50
				Benzo(a)anthracene	2019/03/25	3.9		%	50
				Benzo(a)pyrene	2019/03/25	3.2		%	50
				Benzo(b)fluoranthene	2019/03/25	2.4		%	50
				Benzo(g,h,i)perylene	2019/03/25	2.8		%	50
				Benzo(k)fluoranthene	2019/03/25	9.6		%	50
				Chrysene	2019/03/25	5.5		%	50
				Dibenz(a,h)anthracene	2019/03/25	2.9		%	50
				Fluoranthene	2019/03/25	5.5		%	50
				Fluorene	2019/03/25	5.2		%	50
				Indeno(1,2,3-cd)pyrene	2019/03/25	3.3		%	50
				Naphthalene	2019/03/25	5.2		%	50
				Phenanthrene	2019/03/25	5.1		%	50
				Pyrene	2019/03/25	3.3		%	50
				Biphenyl	2019/03/25	3.2		%	50
	6024851	FJI	Method Blank	1-Chloronaphthalene	2019/03/25	<4		ug	
				1-Methylnaphthalene	2019/03/25	<6		ug	
				2,4,6-Tribromophenol	2019/03/25		89	%	24 - 121
				2-Fluorobiphenyl	2019/03/25		97	%	30 - 115
				2-Fluorophenol	2019/03/25		91	%	30 - 130
				2-Methylnaphthalene	2019/03/25	<4		ug	

QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	% Recovery	UNITS	QC Limits
			Acenaphthene	2019/03/25	<1		ug	
			Acenaphthylene	2019/03/25	<1		ug	
			Anthracene	2019/03/25	<0.8		ug	
			Benzo(a)anthracene	2019/03/25	<0.8		ug	
			Benzo(a)pyrene	2019/03/25	<1		ug	
			Benzo(b)fluoranthene	2019/03/25	<0.8		ug	
			Benzo(g,h,i)perylene	2019/03/25	<0.8		ug	
			Benzo(k)fluoranthene	2019/03/25	<1		ug	
			Chrysene	2019/03/25	<0.8		ug	
			D14-Terphenyl	2019/03/25		108	%	18 - 137
			D5-Nitrobenzene	2019/03/25		99	%	23 - 120
			D6-Phenol	2019/03/25		92	%	24 - 113
			Dibenz(a,h)anthracene	2019/03/25	<0.8		ug	
			Fluoranthene	2019/03/25	<0.8		ug	
			Fluorene	2019/03/25	<0.8		ug	
			Indeno(1,2,3-cd)pyrene	2019/03/25	<1		ug	
			Naphthalene	2019/03/25	<1		ug	
			Phenanthrene	2019/03/25	<0.8		ug	
			Pyrene	2019/03/25	<1		ug	
			Biphenyl	2019/03/25	<4		ug	

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

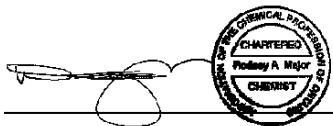
Spiked Blank: A blank matrix sample to which a known amount of the analyte, usually from a second source, has been added. Used to evaluate method accuracy.

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.

VALIDATION SIGNATURE PAGE

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

A handwritten signature in black ink is written over a horizontal line. To the right of the signature is a circular seal. The seal has a double border. The outer border contains the text "ORGANIC PROCESSING LAB" at the top and "LABORATORY" at the bottom. The inner border contains the text "CHARTERED" at the top and "CHEMIST" at the bottom. In the center of the seal, the name "Rodney A. Major" is printed.

Rodney Major, Manager Organic Processing Lab

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.

Chain of Custody Form

B963893

Maxxam <small>Analytics Inc.</small>		5555 N. Service Road Burlington, Ontario L7L 5H7 www.maxxamanalytics.com		Toll Free: 1-800-668-0639 Phone: (905) 332-8788 Fax: (905) 332-9169		Page <u>1</u> of <u>1</u>														
CLIENT INFORMATION SECTION Company Name: <u>Alliance Source Testing, LLC</u> Project Manager: <u>Adam Robinson</u> e-mail: <u>adam.robinson@stacktest.com</u> Address: <u>1201 Parkway View Drive</u> <u>Pittsburgh, PA 15205</u> Phone: <u>(412) 668-4040</u> Fax: <u>903-747-3800</u> Sampled by: <u>Kunji Kinoshita</u>		ANALYSIS REQUESTED																		
MAXXAM use only		Field Sample ID	# Bottles	Collection Date	Collection Time	Initial Impinger Charge Volumes (mL)*	SV-48 0010 - Polycyclic Aromatic Hydrocarbons, Naphthalene													
		Generator - LC 100% Run 1	25	3/5/19	1520	200	✓													
		Generator - LC 100% Run 2	25	3/5/19	1510	200	✓													
		Generator - LC 100% Run 3	25	3/5/19	1840	200	✓													
		Generator LC 75% Run 1	5	3/6/19	1200	200	✓													
		Generator LC 75% Run 2	5	3/6/19	1420	200	✓													
		Generator LC 75% Run 3	5	3/6/19	1630	200	✓													
		Generator LC 50% Run 1	5	3/6/19	1450	200	✓													
		Generator LC 50% Run 2	5	3/7/19	1050	200	✓													
		Generator LC 50% Run 3	5	3/7/19	1240	200	✓													
TAT Requirement STD 10 Business day <input checked="" type="checkbox"/> Rush 5 Business day <input type="checkbox"/> Rush 2 Business day <input type="checkbox"/> Rush 1 Business day <input type="checkbox"/> Other (specify): _____		PROJECT INFORMATION Project #: <u>19-0420</u> Name: <u>Caterpillar Inc.</u> PO #: <u>19-0420</u> Maxxam Quote #: _____ Maxxam Contact: <u>Clayton Johnson</u>		REPORTING REQUIREMENTS Summary Report only <input checked="" type="checkbox"/> Summary Report & Raw Data Package ** <input type="checkbox"/> ** additional cost may apply		PROJECT SPECIFIC COMMENTS * Initial Impinger charge volumes are required before the following analysis can be started: Method 26, CTM-027 & Method 8														
Client Signature: <u>[Signature]</u> Affiliation: <u>AST</u> Date/Time: <u>3/4/19 15:30</u>		Received by: <u>[Signature]</u> Affiliation: <u>MAXXAM</u> Date/Time: <u>3/11/19</u>		Method 23 / TO9A 2005 WHO <input type="checkbox"/> 1989 NATO TEF <input type="checkbox"/> 1998 WHO <input type="checkbox"/> TEF x DL <input type="checkbox"/> TEF x 0 DL <input type="checkbox"/> TEF x 0.5 DL <input type="checkbox"/>																

FIDELENTAMWEMER1 2019/03/16 12.3/12.4/12.1 12.2/12.0/12.3
 Fidele Ntamwemeri 14:30 13.1/12.7/11.8

Appendix D

Dry Gas Meter Calibration				
Console ID	--	2026		
Meter S/N	--	2026		
Critical Orifice S/N	--	CO-1667s		
Initial Barometric Pressure, in. Hg	(P _i)	29.05		
Final Barometric Pressure, in. Hg	(P _f)	29.05		
Average Barometric Pressure, in. Hg	(P _a)	29.05		
Critical Orifice ID	(Y)	7	19	28
K' Factor, ft ³ ·R ^{1/2} / in. WC·min	(K')	0.1839	0.5111	0.7684
Vacuum Pressure, in. Hg	(V _p)	24.0	21.0	18.0
Initial DGM Volume, ft ³	(V _{m_i})	257.100	267.800	262.600
Final DGM Volume, ft ³	(V _{m_f})	262.170	273.140	267.610
Total DGM Volume, ft ³	(V _m)	5.070	5.340	5.010
Ambient Temperature, °F	(T _a)	66	67	67
Initial DGM Temperature, °F	(T _{m_i})	64	67	66
Final DGM Temperature, °F	(T _{m_f})	65	67	66
Average DGM Temperature, °F	(T _m)	65	67	66
Elapsed Time	(Θ)	21.0	8.0	5.0
Meter Orifice Pressure, in. WC	(ΔH)	0.17	1.30	3.10
Standard Meter volume, ft ³	(V _{mstd})	4.9585	5.2126	4.9221
Standard Critical Orifice Volume, ft ³	(V _{cr})	4.8931	5.1756	4.8632
Meter Correction Factor	(Y)	0.987	0.993	0.988
Tolerance	--	0.002	0.004	0.001
Orifice Calibration Value	(ΔH @)	1.723	1.705	1.811
Tolerance	--	0.024	0.041	0.065
Meter Correction Factor	(Y)	0.989		
Orifice Calibration Value	(ΔH @)	1.746		

Thermocouple Sensor Calibration					
Reference Calibrator Make		Omega			
Reference Calibrator Model		CL3512A			
Reference Calibrator S/N		13000701			
Reference Temp.		Display Temp.		Accuracy	Difference
°F	°R	°F	°R	%	°F
0	460	0	460	0.0	0
68	528	68	528	0.0	0
100	560	100	560	0.0	0
223	683	223	683	0.0	0
248	708	249	709	-0.1	1
273	733	275	735	-0.3	2
300	760	303	763	-0.4	3
400	860	402	862	-0.2	2
500	960	502	962	-0.2	2
600	1,060	602	1,062	-0.2	2
700	1,160	706	1,166	-0.5	6
800	1,260	807	1,267	-0.6	7
900	1,360	907	1,367	-0.5	7
1,000	1,460	1,007	1,467	-0.5	7
1,100	1,560	1,108	1,568	-0.5	8
1,200	1,660	1,209	1,669	-0.5	9

Calibration Performed By Shawn Joint

Date 1/3/19

Dry Gas Meter Calibration				
Console ID	--	1690		
Meter S/N	--	80163		
Critical Orifice S/N	--	CO-1667s		
Initial Barometric Pressure, in. Hg	(Pb _i)	28.88		
Final Barometric Pressure, in. Hg	(Pb _F)	28.88		
Average Barometric Pressure, in. Hg	(Pb)	28.88		
Critical Orifice ID	(Y)	7	19	28
K' Factor, ft ³ ·R ^{1/2} / in. WC·min	(K')	0.1839	0.5111	0.7684
Vacuum Pressure, in. Hg	(V _p)	26.0	22.0	20.0
Initial DGM Volume, ft ³	(Vm _i)	709.500	699.200	692.000
Final DGM Volume, ft ³	(Vm _F)	714.520	704.560	698.980
Total DGM Volume, ft ³	(Vm)	5.020	5.360	6.980
Ambient Temperature, °F	(Ta)	65	65	65
Initial DGM Temperature, °F	(Tm _i)	66	65	65
Final DGM Temperature, °F	(Tm _F)	68	66	63
Average DGM Temperature, °F	(Tm)	67	66	64
Elapsed Time	(Θ)	21.0	8.0	7.0
Meter Orifice Pressure, in. WC	(ΔH)	0.17	1.40	3.20
Standard Meter volume, ft ³	(Vmstd)	4.8577	5.2178	6.8454
Standard Critical Orifice Volume, ft ³	(Vcr)	4.8691	5.1552	6.7816
Meter Correction Factor	(Y)	1.002	0.988	0.991
Tolerance	--	0.009	0.006	0.003
Orifice Calibration Value	(ΔH @)	1.721	1.846	1.881
Tolerance	--	0.095	0.030	0.065
Meter Correction Factor	(Y)	0.994		
Orifice Calibration Value	(ΔH @)	1.816		

Thermocouple Sensor Calibration					
Reference Calibrator Make		Omega			
Reference Calibrator Model		CL3512A			
Reference Calibrator S/N		13001011			
Reference Temp.		Display Temp.		Accuracy	Difference
°F	°R	°F	°R	%	°F
0	460	0	460	0.0	0
68	528	68	528	0.0	0
100	560	100	560	0.0	0
223	683	223	683	0.0	0
248	708	248	708	0.0	0
273	733	273	733	0.0	0
300	760	300	760	0.0	0
400	860	400	860	0.0	0
500	960	500	960	0.0	0
600	1,060	601	1,061	-0.1	1
700	1,160	702	1,162	-0.2	2
800	1,260	802	1,262	-0.2	2
900	1,360	903	1,363	-0.2	3
1,000	1,460	1,003	1,463	-0.2	3
1,100	1,560	1,103	1,563	-0.2	3
1,200	1,660	1,204	1,664	-0.2	4

Calibration Performed By Shawn Joint

Date 11/28/18

Dry Gas Meter Calibration				
Console ID	--	2051		
Meter S/N	--	2051		
Critical Orifice S/N	--	CO-1667s		
Initial Barometric Pressure, in. Hg	(Pb _i)	29.07		
Final Barometric Pressure, in. Hg	(Pb _f)	29.07		
Average Barometric Pressure, in. Hg	(Pb)	29.07		
Critical Orifice ID	(Y)	7	19	28
K' Factor, ft ³ ·R ^{1/2} / in. WC·min	(K')	0.1839	0.5111	0.7684
Vacuum Pressure, in. Hg	(V _p)	25.0	22.0	18.0
Initial DGM Volume, ft ³	(Vm _i)	826.500	841.000	834.000
Final DGM Volume, ft ³	(Vm _f)	831.720	846.360	839.940
Total DGM Volume, ft ³	(Vm)	5.220	5.360	5.940
Ambient Temperature, °F	(Ta)	68	68	68
Initial DGM Temperature, °F	(Tm _i)	65	69	68
Final DGM Temperature, °F	(Tm _f)	67	70	68
Average DGM Temperature, °F	(Tm)	66	70	68
Elapsed Time	(θ)	22.0	8.0	6.0
Meter Orifice Pressure, in. WC	(ΔH)	0.16	1.40	3.10
Standard Meter volume, ft ³	(Vmstd)	5.0940	5.2123	5.8176
Standard Critical Orifice Volume, ft ³	(Vcr)	5.1199	5.1743	5.8344
Meter Correction Factor	(Y)	1.005	0.993	1.003
Tolerance	--	0.005	0.008	0.003
Orifice Calibration Value	(ΔH @)	1.622	1.831	1.806
Tolerance	--	0.131	0.078	0.053
Meter Correction Factor	(Y)	1.000		
Orifice Calibration Value	(ΔH @)	1.753		

Thermocouple Sensor Calibration					
Reference Calibrator Make		Omega			
Reference Calibrator Model		CL3512A			
Reference Calibrator S/N		13001011			
Reference Temp.		Display Temp.		Accuracy	Difference
°F	°R	°F	°R	%	°F
0	460	0	460	0.0	0
68	528	68	528	0.0	0
100	560	98	558	0.4	2
223	683	225	685	-0.3	2
248	708	250	710	-0.3	2
273	733	275	735	-0.3	2
300	760	300	760	0.0	0
400	860	400	860	0.0	0
500	960	500	960	0.0	0
600	1,060	600	1,060	0.0	0
700	1,160	700	1,160	0.0	0
800	1,260	802	1,262	-0.2	2
900	1,360	902	1,362	-0.1	2
1,000	1,460	1,004	1,464	-0.3	4
1,100	1,560	1,104	1,564	-0.3	4
1,200	1,660	1,205	1,665	-0.3	5

Calibration Performed By SPJ

Date Conducted: 5/7/18

Dry Gas Meter Calibration										
Console ID	--	2071								
Meter S/N	--	3604417								
Critical Orifice S/N	--	2700								
Initial Barometric Pressure, in. Hg	(P _b _i)	29.10								
Final Barometric Pressure, in. Hg	(P _b _f)	29.10								
Average Barometric Pressure, in. Hg	(P _b)	29.1								
Orifice Nominal Flow, lpm	(Q)	0.43			0.87			1.83		
Run No.	--	1	2	3	1	2	3	1	2	3
K' Factor, ft ³ ·R ^{1/2} / in. WC·min	(K')	0.3405			0.6878			1.4398		
Vacuum Pressure, in. Hg	(V _p)	20.0	20.0	20.0	19.0	19.0	19.0	16.0	16.0	16.0
Initial DGM Volume, ft ³	(V _m _i)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Final DGM Volume, ft ³	(V _m _f)	5.875	5.403	5.399	5.439	5.431	5.441	7.530	5.597	5.637
Total DGM Volume, ft ³	(V _m)	5.875	5.403	5.399	5.439	5.431	5.441	7.530	5.597	5.637
Ambient Temperature, °F	(T _a)	71	71	71	71	71	71	70	70	70
Initial Inlet DGM Temperature, °F	(T _m _i)	74	75	75	72	73	73	70	72	72
Final Inlet DGM Temperature, °F	(T _m _{fi})	74	75	75	72	73	73	71	72	72
Initial Outlet DGM Temperature, °F	(T _m _{io})	74	76	76	73	73	74	70	72	72
Final Outlet DGM Temperature, °F	(T _m _{fo})	74	76	76	73	73	74	71	72	72
Average Outlet DGM Temperature, °F	(T _m)	74	76	75.5	73	73	74	71	72	72
Elapsed Time	(Θ)	13.0	12.0	12.0	6.0	6.0	6.0	4.0	3.0	3.0
Meter Orifice Pressure, in. WC	(ΔH)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Standard Meter volume, ft ³	(V _m _{std})	5.6508	5.1823	5.1784	5.2462	5.2336	5.2383	7.2905	5.4037	5.4423
Standard Critical Orifice Volume, ft ³	(V _{cr})	5.5916	5.1614	5.1614	5.2130	5.2130	5.2130	7.2819	5.4614	5.4614
Meter Correction Factor	(Y)	0.9895	0.9960	0.9967	0.9937	0.9961	0.9952	0.9988	1.0107	1.0035
Tolerance	--	-0.46%	0.19%	0.27%	-0.13%	0.11%	0.02%	-0.55%	0.63%	-0.08%
Meter Correction Factor	(Y)	0.9941			0.9950			1.0043		

Calibration Performed By Shawn Joint

Date 9/27/18

Dry Gas Meter Calibration				
Console ID	--	2027		
Meter S/N	--	2027		
Critical Orifice S/N	--	CO-1667s		
Initial Barometric Pressure, in. Hg	(Pb _i)	29.05		
Final Barometric Pressure, in. Hg	(Pb _f)	29.05		
Average Barometric Pressure, in. Hg	(Pb)	29.05		
Critical Orifice ID	(Y)	7	19	28
K' Factor, ft ³ ·R ^{1/2} / in. WC·min	(K')	0.1839	0.5111	0.7684
Vacuum Pressure, in. Hg	(V _p)	25.0	21.0	18.0
Initial DGM Volume, ft ³	(Vm _i)	445.100	437.800	431.400
Final DGM Volume, ft ³	(Vm _f)	450.760	445.030	437.340
Total DGM Volume, ft ³	(Vm)	5.660	7.230	5.940
Ambient Temperature, °F	(Ta)	67	66	66
Initial DGM Temperature, °F	(Tm _i)	67	66	66
Final DGM Temperature, °F	(Tm _f)	67	67	66
Average DGM Temperature, °F	(Tm)	67	67	66
Elapsed Time	(θ)	24.0	11.0	6.0
Meter Orifice Pressure, in. WC	(ΔH)	0.18	1.40	3.20
Standard Meter volume, ft ³	(Vmstd)	5.5094	7.0660	5.8372
Standard Critical Orifice Volume, ft ³	(Vcr)	5.5868	7.1233	5.8414
Meter Correction Factor	(Y)	1.014	1.008	1.001
Tolerance	--	0.006	0.000	0.007
Orifice Calibration Value	(ΔH @)	1.819	1.835	1.866
Tolerance	--	0.021	0.005	0.026
Meter Correction Factor	(Y)	1.008		
Orifice Calibration Value	(ΔH @)	1.840		

Thermocouple Sensor Calibration					
Reference Calibrator Make		Omega			
Reference Calibrator Model		CL3512A			
Reference Calibrator S/N		13001011			
Reference Temp.		Display Temp.		Accuracy	Difference
°F	°R	°F	°R	%	°F
0	460	0	460	0.0	0
68	528	68	528	0.0	0
100	560	100	560	0.0	0
223	683	223	683	0.0	0
248	708	248	708	0.0	0
273	733	274	734	-0.1	1
300	760	302	762	-0.3	2
400	860	400	860	0.0	0
500	960	500	960	0.0	0
600	1,060	600	1,060	0.0	0
700	1,160	700	1,160	0.0	0
800	1,260	802	1,262	-0.2	2
900	1,360	902	1,362	-0.1	2
1,000	1,460	1,004	1,464	-0.3	4
1,100	1,560	1,104	1,564	-0.3	4
1,200	1,660	1,204	1,664	-0.2	4

Calibration Performed By Shawn Joint

Date Conducted: 1/3/19

Location Caterpillar, Inc - Virginia Beach, VA

Source 3516HD Generator (LC 10)

Project No. 2019-0420

Parameter PM/CPM

Date	Nozzle ID	Nozzle Diameter (in.)			Dn (Average)	Difference	Criteria	
		#1	#2	#3				
3/8/19	SS-603	0.308	0.310	0.310	0.309	0.002	≤ 0.004 in.	
Date	Pitot ID	Evidence of damage?	Evidence of mis-alignment?	Calibration or Repair required?				
3/8/19	P-403-2	no	no	no				
Date	Probe ID	Reference Temp. (°F)	Indicated Temp. (°F)	Difference	Criteria	Probe Length		
3/8/19	PR-402-0	470.0	468.0	0.2%	± 1.5 % (absolute)	2.0		
Date	Barometric Pressure	Evidence of damage?	Reading Verified	Calibration or Repair required?	Weather Station Location			
3/8/19	Weather Station	NA	NA	NA	Virginia Beach, VA			
Date	Meter Box ID	Positive Pressure Leak Check						
3/8/19	2026	Pass						

Location Caterpillar, Inc - Virginia Beach, VA

Source 3516HD Generator (L10)

Project No. 2019-0420

Parameter Arsenic, Cadmium, Nickel

Date	Nozzle ID	Nozzle Diameter (in.)			Dn (Average)	Difference	Criteria
		#1	#2	#3			
3/8/19	GL601	0.310	0.310	0.309	0.310	0.001	≤ 0.004 in.
Date	Pitot ID	Evidence of damage?	Evidence of mis-alignment?	Calibration or Repair required?			
3/8/19	P403-2	no	no	no			
Date	Probe ID	Reference Temp. (°F)	Indicated Temp. (°F)	Difference	Criteria	Probe Length	
3/8/19	PR402-2			--	± 1.5 % (absolute)	--	
Date	Barometric Pressure	Evidence of damage?	Reading Verified	Calibration or Repair required?	Weather Station Location		
3/8/19	Weather Station	NA	NA	NA	Virginia Beach, VA		
Date	Meter Box ID	Positive Pressure Leak Check					
3/8/19	1690	Pass					

Location Caterpillar, Inc - Virginia Beach, VA

Source 3516HD Generator (L10)

Project No. 2019-0420

Parameter Hexavalent Chromium

Date	Nozzle ID	Nozzle Diameter (in.)			Dn (Average)	Difference	Criteria
		#1	#2	#3			
3/8/19	GL602	0.310	0.310	0.310	0.310	0.000	≤ 0.004 in.
Date	Pitot ID	Evidence of damage?	Evidence of mis-alignment?	Calibration or Repair required?			
3/8/19	P403-2	no	no	no			
Date	Probe ID	Reference Temp. (°F)	Indicated Temp. (°F)	Difference	Criteria	Probe Length	
3/8/19	PR403-2	472.0	470.0	0.2%	± 1.5 % (absolute)	--	
Date	Barometric Pressure	Evidence of damage?	Reading Verified	Calibration or Repair required?	Weather Station Location		
3/8/19	Weather Station	NA	NA	NA	Virginia Beach, VA		
Date	Meter Box ID	Positive Pressure Leak Check					
3/8/19	2051	Pass					

Location Caterpillar, Inc - Virginia Beach, VA

Source 3516HD Generator (LC 10)

Project No. 2019-0420

Parameter Polycyclic Aromatic Hydrocarbons, Naphthalene

Date	Nozzle ID	Nozzle Diameter (in.)			Dn (Average)	Difference	Criteria
		#1	#2	#3			
3/8/19	SS-402	0.312	0.311	0.314	0.312	0.003	≤ 0.004 in.
Date	Pitot ID	Evidence of damage?	Evidence of mis-alignment?	Calibration or Repair required?			
3/8/19	P-403-2	no	no	no			
Date	Probe ID	Reference Temp. (°F)	Indicated Temp. (°F)	Difference	Criteria	Probe Length	
3/8/19	PR-403	465.0	464.0	0.1%	± 1.5 % (absolute)	3.0	
Date	Barometric Pressure	Evidence of damage?	Reading Verified	Calibration or Repair required?	Weather Station Location		
3/8/19	Weather Station	NA	NA	NA	Virginia Beach, VA		
Date	Meter Box ID	Positive Pressure Leak Check					
3/8/19	2027	Pass					

Location Caterpillar, Inc - Virginia Beach, VA

Source 3516HD Generator (LC 25)

Project No. 2019-0420

Parameter PM/CPM

Date	Nozzle ID	Nozzle Diameter (in.)			Dn (Average)	Difference	Criteria
		#1	#2	#3			
3/7/19	S-15	0.251	0.253	0.250	0.251	0.003	≤ 0.004 in.
Date	Pitot ID	Evidence of damage?	Evidence of mis-alignment?	Calibration or Repair required?			
3/7/19	P-403-2	no	no	no			
Date	Probe ID	Reference Temp. (°F)	Indicated Temp. (°F)	Difference	Criteria	Probe Length	
3/7/19	PR-402-0	585.0	584.0	0.1%	± 1.5 % (absolute)	2.0	
Date	Barometric Pressure	Evidence of damage?	Reading Verified	Calibration or Repair required?	Weather Station Location		
3/7/19	Weather Station	NA	NA	NA	Virginia Beach, VA		
Date	Meter Box ID	Positive Pressure Leak Check					
3/7/19	2026	Pass					

Location Caterpillar, Inc - Virginia Beach, VA

Source 3516HD Generator (L25)

Project No. 2019-0420

Parameter Arsenic, Cadmium, Nickel

Date	Nozzle ID	Nozzle Diameter (in.)			Dn (Average)	Difference	Criteria	
		#1	#2	#3				
3/7/19	.257	0.257	0.257	0.257	0.257	0.000	≤ 0.004 in.	
Date	Pitot ID	Evidence of damage?	Evidence of mis-alignment?	Calibration or Repair required?				
3/7/19	P403-2	no	no	no				
Date	Probe ID	Reference Temp. (°F)	Indicated Temp. (°F)	Difference	Criteria	Probe Length		
3/7/19	PR402-2			--	± 1.5 % (absolute)	--		
Date	Barometric Pressure	Evidence of damage?	Reading Verified	Calibration or Repair required?	Weather Station Location			
3/7/19	Weather Station	NA	NA	NA	Virginia Beach, VA			
Date	Meter Box ID	Positive Pressure Leak Check						
3/7/19	1690	Pass						

Location Caterpillar, Inc - Virginia Beach, VA

Source 3516HD Generator (LC25)

Project No. 2019-0420

Parameter Hexavalent Chromium

Date	Nozzle ID	Nozzle Diameter (in.)			Dn (Average)	Difference	Criteria
		#1	#2	#3			
3/7/19	.258	0.258	0.258	0.258	0.258	0.000	≤ 0.004 in.
Date	Pitot ID	Evidence of damage?	Evidence of mis-alignment?	Calibration or Repair required?			
3/7/19	P403-2	no	no	no			
Date	Probe ID	Reference Temp. (°F)	Indicated Temp. (°F)	Difference	Criteria	Probe Length	
3/7/19	PR403-2			--	± 1.5 % (absolute)	--	
Date	Barometric Pressure	Evidence of damage?	Reading Verified	Calibration or Repair required?	Weather Station Location		
3/7/19	Weather Station	NA	NA	NA	Virginia Beach, VA		
Date	Meter Box ID	Positive Pressure Leak Check					
3/7/19	2051	Pass					

Location Caterpillar, Inc - Virginia Beach, VA

Source 3516HD Generator (LC 25)

Project No. 2019-0420

Parameter Polycyclic Aromatic Hydrocarbons, Naphthalene

Date	Nozzle ID	Nozzle Diameter (in.)			Dn (Average)	Difference	Criteria
		#1	#2	#3			
3/7/19	SS-402	0.250	0.246	0.248	0.248	0.004	≤ 0.004 in.
Date	Pitot ID	Evidence of damage?	Evidence of mis-alignment?	Calibration or Repair required?			
3/7/19	P-403-2	no	no	no			
Date	Probe ID	Reference Temp. (°F)	Indicated Temp. (°F)	Difference	Criteria	Probe Length	
3/7/19	PR-403	590.0	588.0	0.2%	± 1.5 % (absolute)	3.0	
Date	Barometric Pressure	Evidence of damage?	Reading Verified	Calibration or Repair required?	Weather Station Location		
3/7/19	Weather Station	NA	NA	NA	Virginia Beach, VA		
Date	Meter Box ID	Positive Pressure Leak Check					
3/7/19	2027	Pass					

Location Caterpillar, Inc - Virginia Beach, VA

Source 3516HD Generator (LC 50)

Project No. 2019-0420

Parameter PM/CPM

Date	Nozzle ID	Nozzle Diameter (in.)			Dn (Average)	Difference	Criteria	
		#1	#2	#3				
3/7/19	#7	0.208	0.209	0.208	0.208	0.001	≤ 0.004 in.	
Date	Pitot ID	Evidence of damage?	Evidence of mis-alignment?	Calibration or Repair required?				
3/7/19	P-403-2	no	no	no				
Date	Probe ID	Reference Temp. (°F)	Indicated Temp. (°F)	Difference	Criteria	Probe Length		
3/7/19	PR-402-0	660.0	659.0	0.1%	± 1.5 % (absolute)	2.0		
Date	Barometric Pressure	Evidence of damage?	Reading Verified	Calibration or Repair required?	Weather Station Location			
3/7/19	Weather Station	NA	NA	NA	Virginia Beach, VA			
Date	Meter Box ID	Positive Pressure Leak Check						
3/7/19	2026	Pass						

Location Caterpillar, Inc - Virginia Beach, VA

Source 3561HD Generator (L50)

Project No. 2019-0420

Parameter Arsenic, Cadmium, Nickel

Date	Nozzle ID	Nozzle Diameter (in.)			Dn (Average)	Difference	Criteria
		#1	#2	#3			
3/7/19	GL202	0.195	0.195	0.195	0.195	0.000	≤ 0.004 in.
Date	Pitot ID	Evidence of damage?	Evidence of mis-alignment?	Calibration or Repair required?			
3/7/19	P403-2	no	no	no			
Date	Probe ID	Reference Temp. (°F)	Indicated Temp. (°F)	Difference	Criteria	Probe Length	
3/7/19	PR402-2			--	± 1.5 % (absolute)	--	
Date	Barometric Pressure	Evidence of damage?	Reading Verified	Calibration or Repair required?	Weather Station Location		
3/7/19	Weather Station	NA	NA	NA	Virginia Beach, VA		
Date	Meter Box ID	Positive Pressure Leak Check					
3/7/19	1690	Pass					

Location Caterpillar, Inc - Virginia Beach, VA

Source 3561HD Generator (L50)

Project No. 2019-0420

Parameter Hexavalent Chromium

Date	Nozzle ID	Nozzle Diameter (in.)			Dn (Average)	Difference	Criteria	
		#1	#2	#3				
3/7/19	GL208	0.190	0.190	0.190	0.190	0.000	≤ 0.004 in.	
Date	Pitot ID	Evidence of damage?	Evidence of mis-alignment?	Calibration or Repair required?				
3/7/19	P403-2	no	no	no				
Date	Probe ID	Reference Temp. (°F)	Indicated Temp. (°F)	Difference	Criteria	Probe Length		
3/7/19	PR403-2			--	± 1.5 % (absolute)	--		
Date	Barometric Pressure	Evidence of damage?	Reading Verified	Calibration or Repair required?	Weather Station Location			
3/7/19	Weather Station	NA	NA	NA	Virginia Beach, VA			
Date	Meter Box ID	Positive Pressure Leak Check						
3/7/19	2051	Pass						

Location Caterpillar, Inc - Virginia Beach, VA

Source 3561HD Generator (LC 50)

Project No. 2019-0420

Parameter Polycyclic Aromatic Hydrocarbons, Naphthalene

Date	Nozzle ID	Nozzle Diameter (in.)			Dn (Average)	Difference	Criteria
		#1	#2	#3			
3/7/19	SS-303	0.204	0.205	0.205	0.205	0.001	≤ 0.004 in.
Date	Pitot ID	Evidence of damage?	Evidence of mis-alignment?	Calibration or Repair required?			
3/7/19	P-403-2	no	no	no			
Date	Probe ID	Reference Temp. (°F)	Indicated Temp. (°F)	Difference	Criteria	Probe Length	
3/7/19	PR-403	640.0	639.0	0.1%	± 1.5 % (absolute)	3.0	
Date	Barometric Pressure	Evidence of damage?	Reading Verified	Calibration or Repair required?	Weather Station Location		
3/7/19	Weather Station	NA	NA	NA	Virginia Beach, VA		
Date	Meter Box ID	Positive Pressure Leak Check					
3/7/19	2027	Pass					

Location Caterpillar, Inc - Virginia Beach, VA

Source 3516HD Generator (LC 75)

Project No. 2019-0420

Parameter PM/CPM

Date	Nozzle ID	Nozzle Diameter (in.)			Dn (Average)	Difference	Criteria
		#1	#2	#3			
3/6/19	#7	0.208	0.209	0.208	0.208	0.001	≤ 0.004 in.
Date	Pitot ID	Evidence of damage?	Evidence of mis-alignment?	Calibration or Repair required?			
3/6/19	P-403-2	no	no	no			
Date	Probe ID	Reference Temp. (°F)	Indicated Temp. (°F)	Difference	Criteria	Probe Length	
3/6/19	PR-402-0	666.0	664.0	0.2%	± 1.5 % (absolute)	2.0	
Date	Barometric Pressure	Evidence of damage?	Reading Verified	Calibration or Repair required?	Weather Station Location		
3/6/19	Weather Station	NA	NA	NA	Virginia Beach, VA		
Date	Meter Box ID	Positive Pressure Leak Check					
3/6/19	2026	Pass					

Location Caterpillar, Inc - Virginia Beach, VA

Source 3516HD Generator (L75)

Project No. 2019-0420

Parameter Arsenic, Cadmium, Nickel

Date	Nozzle ID	Nozzle Diameter (in.)			Dn (Average)	Difference	Criteria
		#1	#2	#3			
3/6/19	GL202	0.195	0.195	0.195	0.195	0.000	≤ 0.004 in.
Date	Pitot ID	Evidence of damage?	Evidence of mis-alignment?	Calibration or Repair required?			
3/6/19	P403-2	no	no	no			
Date	Probe ID	Reference Temp. (°F)	Indicated Temp. (°F)	Difference	Criteria	Probe Length	
3/6/19	PR4022	657.0	655.0	0.2%	± 1.5 % (absolute)	--	
Date	Barometric Pressure	Evidence of damage?	Reading Verified	Calibration or Repair required?	Weather Station Location		
3/6/19	Weather Station	NA	NA	NA	Virginia Beach, VA		
Date	Meter Box ID	Positive Pressure Leak Check					
3/6/19	1690	Pass					

Location Caterpillar, Inc - Virginia Beach, VA

Source 3516HD Generator (L75)

Project No. 2019-0420

Parameter Hexavalent Chromium

Date	Nozzle ID	Nozzle Diameter (in.)			Dn (Average)	Difference	Criteria
		#1	#2	#3			
3/6/19	GL208	0.190	0.190	0.190	0.190	0.000	≤ 0.004 in.
Date	Pitot ID	Evidence of damage?	Evidence of mis-alignment?	Calibration or Repair required?			
3/6/19	P403-2	no	no	no			
Date	Probe ID	Reference Temp. (°F)	Indicated Temp. (°F)	Difference	Criteria	Probe Length	
3/6/19	PR403-2			--	± 1.5 % (absolute)	--	
Date	Barometric Pressure	Evidence of damage?	Reading Verified	Calibration or Repair required?	Weather Station Location		
3/6/19	Weather Station	NA	NA	NA	Virginia Beach, VA		
Date	Meter Box ID	Positive Pressure Leak Check					
3/6/19	2051	Pass					

Location Caterpillar, Inc - Virginia Beach, VA

Source 3516HD Generator (LC 75)

Project No. 2019-0420

Parameter Polycyclic Aromatic Hydrocarbons, Naphthalene

Date	Nozzle ID	Nozzle Diameter (in.)			Dn (Average)	Difference	Criteria	
		#1	#2	#3				
3/6/19	SS-303	0.204	0.205	0.205	0.205	0.001	≤ 0.004 in.	
Date	Pitot ID	Evidence of damage?	Evidence of mis-alignment?	Calibration or Repair required?				
3/6/19	P-403-2	no	no	no				
Date	Probe ID	Reference Temp. (°F)	Indicated Temp. (°F)	Difference	Criteria	Probe Length		
3/6/19	PR-403	666.0	664.0	0.2%	± 1.5 % (absolute)	3.0		
Date	Barometric Pressure	Evidence of damage?	Reading Verified	Calibration or Repair required?	Weather Station Location			
3/6/19	Weather Station	NA	NA	NA	Virginia Beach, VA			
Date	Meter Box ID	Positive Pressure Leak Check						
3/6/19	2027	Pass						

Location Caterpillar, Inc - Virginia Beach, VA

Source 3516HD Generator (LC 100)

Project No. 2019-0420

Parameter PM/CPM

Date	Nozzle ID	Nozzle Diameter (in.)			Dn (Average)	Difference	Criteria
		#1	#2	#3			
3/5/19	#7	0.208	0.209	0.208	0.208	0.001	≤ 0.004 in.
Date	Pitot ID	Evidence of damage?	Evidence of mis-alignment?	Calibration or Repair required?			
3/5/19	P-403-2	no	no	no			
Date	Probe ID	Reference Temp. (°F)	Indicated Temp. (°F)	Difference	Criteria	Probe Length	
3/5/19	PR-402-0	727.0	724.0	0.3%	± 1.5 % (absolute)	2.0	
Date	Barometric Pressure	Evidence of damage?	Reading Verified	Calibration or Repair required?	Weather Station Location		
3/5/19	Weather Station	NA	NA	NA	Virginia Beach, VA		
Date	Meter Box ID	Positive Pressure Leak Check					
3/5/19	2026	Pass					

Location Caterpillar, Inc - Virginia Beach, VA

Source 3516HD Generator (L100)

Project No. 2019-0420

Parameter Arsenic, Cadmium, Nickel

Date	Nozzle ID	Nozzle Diameter (in.)			Dn (Average)	Difference	Criteria	
		#1	#2	#3				
3/5/19	GI202	0.195	0.195	0.195	0.195	0.000	≤ 0.004 in.	
Date	Pitot ID	Evidence of damage?	Evidence of mis-alignment?	Calibration or Repair required?				
3/5/19	P403-2	no	no	no				
Date	Probe ID	Reference Temp. (°F)	Indicated Temp. (°F)	Difference	Criteria	Probe Length		
3/5/19	PR402-1			--	± 1.5 % (absolute)	--		
Date	Barometric Pressure	Evidence of damage?	Reading Verified	Calibration or Repair required?	Weather Station Location			
3/5/19	Weather Station							
Date	Meter Box ID	Positive Pressure Leak Check						
		Pass						

Location Caterpillar, Inc - Virginia Beach, VA

Source 3516HD Generator (LC 100)

Project No. 2019-0420

Parameter Hexavalent Chromium

Date	Nozzle ID	Nozzle Diameter (in.)			Dn (Average)	Difference	Criteria	
		#1	#2	#3				
3/5/19	GL208	0.190	0.190	0.190	0.190	0.000	≤ 0.004 in.	
Date	Pitot ID	Evidence of damage?	Evidence of mis-alignment?	Calibration or Repair required?				
3/5/19	P403-2	no	no	no				
Date	Probe ID	Reference Temp. (°F)	Indicated Temp. (°F)	Difference	Criteria	Probe Length		
3/5/19	PR403-2			--	± 1.5 % (absolute)	--		
Date	Barometric Pressure	Evidence of damage?	Reading Verified	Calibration or Repair required?	Weather Station Location			
3/5/19	Weather Station							
Date	Meter Box ID	Positive Pressure Leak Check						
		Pass						

Location Caterpillar, Inc - Virginia Beach, VA

Source 3516HD Generator (LC 100)

Project No. 2019-0420

Parameter Polycyclic Aromatic Hydrocarbons, Naphthalene

Date	Nozzle ID	Nozzle Diameter (in.)			Dn (Average)	Difference	Criteria
		#1	#2	#3			
3/5/19	SS-303	0.204	0.205	0.205	0.205	0.001	≤ 0.004 in.
Date	Pitot ID	Evidence of damage?	Evidence of mis-alignment?	Calibration or Repair required?			
3/5/19	P-403-2	no	no	no			
Date	Probe ID	Reference Temp. (°F)	Indicated Temp. (°F)	Difference	Criteria	Probe Length	
3/5/19	PR-403	727.0	724.0	0.3%	± 1.5 % (absolute)	3.0	
Date	Barometric Pressure	Evidence of damage?	Reading Verified	Calibration or Repair required?	Weather Station Location		
3/5/19	Weather Station	NA	NA	NA	Virginia Beach, VA		
Date	Meter Box ID	Positive Pressure Leak Check					
3/5/19	2027	Pass					

Location Caterpillar, Inc - Virginia Beach, VA

Source 3516HD Generator (LC 10)

Project No. 2019-0420

	O ₂ Data			CO ₂ Data		
	Date/Time	3/8/19	10:45	Date/Time	3/8/19	10:45
Make/Model/SN	CAI	300	Z12035	CAI	300	Z12035
Parameter	Cylinder ID	Cylinder Concentration, %	Analyzer Concentration, %	Cylinder ID	Cylinder Concentration, %	Analyzer Concentration, %
Zero Gas		0.0	0.0		0.0	0.0
High Range Gas	SX89149	20.0	20.0	SX89149	20.0	20.0
Mid Range Gas	SX89149	10.0	10.0	SX89149	10.0	10.0
Concentration Span, %	20.0			20.0		
Required Accuracy, %	4.0			4.0		

Location Caterpillar, Inc - Virginia Beach, VA

Source 3516HD Generator (LC 50)

Project No. 2019-0420

	O ₂ Data			CO ₂ Data		
	Date/Time	3/7/19	10:30	Date/Time	3/7/19	10:30
Make/Model/SN	CAI	300	Z12035	CAI	300	Z12035
Parameter	Cylinder ID	Cylinder Concentration, %	Analyzer Concentration, %	Cylinder ID	Cylinder Concentration, %	Analyzer Concentration, %
Zero Gas		0.0	0.0		0.0	0.0
High Range Gas	SX89149	20.0	20.0	SX89149	20.0	20.0
Mid Range Gas	SX89149	10.0	10.0	SX89149	10.0	10.0
Concentration Span, %	20.0			20.0		
Required Accuracy, %	4.0			4.0		

Location Caterpillar, Inc - Virginia Beach, VA

Source 3516HD Generator (LC 75)

Project No. 2019-0420

	O ₂ Data			CO ₂ Data		
	Date/Time	3/6/19	11:45	Date/Time	3/6/19	11:45
Make/Model/SN	CAI	300	Z12035	CAI	300	Z12035
Parameter	Cylinder ID	Cylinder Concentration, %	Analyzer Concentration, %	Cylinder ID	Cylinder Concentration, %	Analyzer Concentration, %
Zero Gas		0.0	0.0		0.0	0.0
High Range Gas	SX89149	20.0	20.0	SX89149	20.0	20.0
Mid Range Gas	SX89149	10.0	10.0	SX89149	10.0	10.0
Concentration Span, %	20.0			20.0		
Required Accuracy, %	4.0			4.0		

Location Caterpillar, Inc - Virginia Beach, VA

Source 3516HD Generator (LC 100)

Project No. 2019-0420

	O ₂ Data			CO ₂ Data		
	Date/Time	3/5/19	12:15	Date/Time	3/5/19	12:15
Make/Model/SN	CAI	300	Z12035	CAI	300	Z12035
Parameter	Cylinder ID	Cylinder Concentration, %	Analyzer Concentration, %	Cylinder ID	Cylinder Concentration, %	Analyzer Concentration, %
Zero Gas		0.0	0.0		0.0	0.0
High Range Gas	SX89149	20.0	20.0	SX89149	20.0	20.0
Mid Range Gas	SX89149	10.0	10.0	SX89149	10.0	10.0
Concentration Span, %	20.0			20.0		
Required Accuracy, %	4.0			4.0		



MATHESON

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1650 Enterprise Parkway
Twinsburg, OH 44087
215-648-4000

Certificate of Analysis – EPA Protocol Mixtures

Customer: MATHESON VALLEY

Cylinder Number: SX-89149

Cylinder pressure: 2000 psig

Last Analysis date: 7/5/2018

Expiration Date: 6/28/2026

Protocol:	Reference #	Lot #
G1	732546	109-96-40402

DO NOT USE THIS CYLINDER WHEN THE PRESSURE FALLS BELOW 100 PSIG

REPLICATE RESPONSES

Component : Oxygen

Certified Conc: 20.00% ± 0.04%

Date: 6/28/2018

Date:

20.03%

20.00%

19.97%

Component: Carbon Dioxide

Certified Conc: 20.00% ± 0.06%

Date: 7/5/2018

Date:

19.99%

20.00%

20.00%

BALANCE GAS: Nitrogen

REFERENCE STANDARDS

Component: Oxygen

SRM #: PRM-O2

Sample #: C1399010.02

Cylinder #: M-692314

Concentration: 21.001%

Carbon Dioxide

NTRM-120916

171101

AM-11343

19.405 %

CERTIFICATION INSTRUMENTS

Component: Oxygen

Make/Model: Horiba MPA-510

Serial Number: 9XUYXODW

Measurement Principle: Paramagnetic

Last Calibration: 6/6/2018

Carbon Dioxide

Varian 3800 GC TCD

LR-92489

TCD

7/5/2018

Notes: G2688369

The certification was performed according to EPA Traceability Protocol for Assay and Certification of Gaseous Calibration Standards May 2012, using procedure G1 and/or G2. U.S EPA Vendor ID Number: D42018, PGVP Participation Date: 01/01/18, PGVP Renewal Date: 01/01/19. The expanded uncertainty listed for each component was calculated at a coverage factor of k=2 and at a level of confidence of 95%.

Analyst Philip D. Matt Date 7/5/2018

Appendix E

Performance Number: DM8266

Change Level: 04

SALES MODEL:	3516C	COMBUSTION:	DI
ENGINE POWER (BHP):	3,634	ENGINE SPEED (RPM):	1,800
GEN POWER WITH FAN (EKW):	2,500.0	HERTZ:	60
COMPRESSION RATIO:	14.7	FAN POWER (HP):	130.1
RATING LEVEL:	STANDBY	ASPIRATION:	TA
PUMP QUANTITY:	2	AFTERCOOLER TYPE:	ATAAC
FUEL TYPE:	DIESEL	AFTERCOOLER CIRCUIT TYPE:	JW+OC, ATAAC
MANIFOLD TYPE:	DRY	INLET MANIFOLD AIR TEMP (F):	122
GOVERNOR TYPE:	ADEM3	JACKET WATER TEMP (F):	210.2
ELECTRONICS TYPE:	ADEM3	TURBO CONFIGURATION:	PARALLEL
CAMSHAFT TYPE:	STANDARD	TURBO QUANTITY:	4
IGNITION TYPE:	CI	TURBOCHARGER MODEL:	GT6041BN-48T-1.10
INJECTOR TYPE:	EUI	CERTIFICATION YEAR:	2006
FUEL INJECTOR:	2501368	CRANKCASE BLOWBY RATE (FT3/HR):	3,619.4
REF EXH STACK DIAMETER (IN):	12	FUEL RATE (RATED RPM) NO LOAD (GAL/HR):	16.2
MAX OPERATING ALTITUDE (FT):	2,953	PISTON SPD @ RATED ENG SPD (FT/MIN):	2,539.4

INDUSTRY	SUBINDUSTRY	APPLICATION
ELECTRIC POWER	STANDARD	PACKAGED GENSET
OIL AND GAS	LAND PRODUCTION	PACKAGED GENSET

General Performance Data

GENSET POWER WITH FAN	PERCENT LOAD	ENGINE POWER	BRAKE MEAN EFF PRES (BMEP)	BRAKE SPEC FUEL CONSUMPTN (BSFC)	VOL FUEL CONSUMPTN (VFC)	INLET MFLD PRES	INLET MFLD TEMP	EXH MFLD TEMP	EXH MFLD PRES	ENGINE OUTLET TEMP
EKW	%	BHP	PSI	LB/BHP-HR	GAL/HR	IN-HG	DEG F	DEG F	IN-HG	DEG F
2,500.0	100	3,633	336	0.334	173.5	78.1	121.9	1,235.6	67.6	915.2
2,250.0	90	3,283	303	0.335	157.1	71.3	119.4	1,190.0	61.3	881.2
2,000.0	80	2,935	271	0.339	142.3	64.3	116.9	1,158.9	55.3	864.0
1,875.0	75	2,760	255	0.342	134.9	60.7	115.8	1,145.6	52.3	858.5
1,750.0	70	2,586	239	0.346	127.6	57.0	114.7	1,133.3	49.3	854.6
1,500.0	60	2,237	207	0.354	113.0	49.5	112.7	1,112.4	43.2	851.2
1,250.0	50	1,889	174	0.365	98.4	41.3	111.0	1,091.8	36.8	850.7
1,000.0	40	1,547	143	0.373	82.5	31.4	109.4	1,061.5	29.3	856.6
750.0	30	1,203	111	0.385	66.2	21.7	107.9	1,010.3	22.1	848.2
625.0	25	1,029	95	0.394	57.9	17.2	107.2	968.3	18.7	831.1
500.0	20	854	79	0.403	49.2	12.7	106.4	902.0	15.5	796.1
250.0	10	497	46	0.441	31.3	4.8	104.1	700.7	9.8	647.3

GENSET POWER WITH FAN	PERCENT LOAD	ENGINE POWER	COMPRESSOR OUTLET PRES	COMPRESSOR OUTLET TEMP	WET INLET AIR VOL FLOW RATE	ENGINE OUTLET WET EXH GAS VOL FLOW RATE	WET INLET AIR MASS FLOW RATE	WET EXH GAS MASS FLOW RATE	WET EXH VOL FLOW RATE (32 DEG F AND 29.98 IN HG)	DRY EXH VOL FLOW RATE (32 DEG F AND 29.98 IN HG)
EKW	%	BHP	IN-HG	DEG F	CFM	CFM	LB/HR	LB/HR	FT3/MIN	FT3/MIN
2,500.0	100	3,633	85	466.7	7,212.2	19,578.8	32,046.3	33,260.4	7,001.7	6,362.4
2,250.0	90	3,283	78	443.0	6,831.8	17,980.7	30,219.3	31,318.8	6,593.0	6,013.7
2,000.0	80	2,935	70	417.8	6,404.5	16,560.6	28,284.6	29,277.2	6,151.5	5,625.4
1,875.0	75	2,760	66	404.7	6,173.3	15,893.2	27,261.3	28,202.4	5,928.1	5,427.1
1,750.0	70	2,586	63	391.2	5,929.9	15,232.6	26,196.0	27,086.8	5,698.4	5,222.0
1,500.0	60	2,237	55	363.5	5,411.9	13,879.0	23,947.5	24,739.5	5,205.5	4,779.1
1,250.0	50	1,889	46	334.6	4,843.3	12,413.0	21,444.3	22,133.2	4,657.5	4,283.2
1,000.0	40	1,547	36	297.5	4,121.4	10,609.5	18,262.0	18,840.0	3,963.0	3,647.2
750.0	30	1,203	25	249.8	3,423.0	8,763.8	15,175.3	15,640.3	3,294.6	3,037.8
625.0	25	1,029	21	223.4	3,104.6	7,844.6	13,765.1	14,171.8	2,988.1	2,760.8
500.0	20	854	16	197.2	2,791.2	6,823.5	12,376.2	12,722.2	2,671.7	2,476.1
250.0	10	497	7	152.3	2,237.9	4,800.2	9,917.6	10,136.8	2,132.0	1,999.8

Heat Rejection Data

GENSET POWER WITH FAN	PERCENT LOAD	ENGINE POWER	REJECTION TO JACKET WATER	REJECTION TO ATMOSPHERE	REJECTION TO EXH	EXHUAUST RECOVERY TO 350F	FROM OIL COOLER	FROM AFTERCOOLER	WORK ENERGY	LOW HEAT VALUE ENERGY	HIGH HEAT VALUE ENERGY
EKW	%	BHP	BTU/MIN	BTU/MIN	BTU/MIN	BTU/MIN	BTU/MIN	BTU/MIN	BTU/MIN	BTU/MIN	BTU/MIN
2,500.0	100	3,633	46,992	9,146	142,265	79,907	19,835	44,723	154,077	372,403	396,702
2,250.0	90	3,283	44,242	8,557	127,929	70,449	17,960	39,380	139,243	337,204	359,207
2,000.0	80	2,935	41,477	8,162	116,879	63,561	16,262	34,167	124,444	305,311	325,233
1,875.0	75	2,760	40,076	8,007	111,588	60,518	15,425	31,612	117,053	289,608	308,505
1,750.0	70	2,586	38,657	7,874	106,293	57,637	14,588	29,085	109,651	273,881	291,752
1,500.0	60	2,237	35,755	7,684	95,729	52,220	12,915	24,201	94,874	242,485	258,307
1,250.0	50	1,889	32,626	7,527	85,184	46,626	11,245	19,401	80,109	211,118	224,893
1,000.0	40	1,547	29,235	7,262	72,693	40,153	9,427	13,873	65,583	176,995	188,544
750.0	30	1,203	25,476	6,784	59,425	32,726	7,565	8,706	51,005	142,037	151,305
625.0	25	1,029	23,394	6,435	52,542	28,568	6,621	6,496	43,653	124,317	132,429
500.0	20	854	21,006	5,995	44,739	23,683	5,624	4,534	36,223	105,594	112,484
250.0	10	497	15,737	5,026	27,795	12,371	3,578	1,916	21,071	67,181	71,564

Emissions Data

RATED SPEED POTENTIAL SITE VARIATION: 1800 RPM

GENSET POWER WITH FAN	EKW	2,500.0	1,875.0	1,250.0	625.0	250.0
PERCENT LOAD	%	100	75	50	25	10
ENGINE POWER	BHP	3,633	2,760	1,889	1,029	497
TOTAL NOX (AS NO2)	G/HR	22,948	14,101	7,004	3,568	3,185
TOTAL CO	G/HR	2,726	1,304	1,092	1,496	2,098
TOTAL HC	G/HR	500	499	543	408	437
PART MATTER	G/HR	185.5	123.7	132.1	139.5	141.0
TOTAL NOX (AS NO2)	(CORR 5% O2) MG/NM3	2,818.9	2,229.5	1,544.3	1,352.7	2,230.2
TOTAL CO	(CORR 5% O2) MG/NM3	351.8	213.9	252.3	594.6	1,552.7
TOTAL HC	(CORR 5% O2) MG/NM3	55.9	72.8	108.8	140.7	282.4
PART MATTER	(CORR 5% O2) MG/NM3	19.7	16.5	25.8	48.5	88.2
TOTAL NOX (AS NO2)	(CORR 5% O2) PPM	1,373	1,086	752	659	1,086
TOTAL CO	(CORR 5% O2) PPM	281	171	202	476	1,242
TOTAL HC	(CORR 5% O2) PPM	104	136	203	263	527
TOTAL NOX (AS NO2)	G/HP-HR	6.38	5.15	3.74	3.50	6.47
TOTAL CO	G/HP-HR	0.76	0.48	0.58	1.47	4.26
TOTAL HC	G/HP-HR	0.14	0.18	0.29	0.40	0.89
PART MATTER	G/HP-HR	0.05	0.05	0.07	0.14	0.29
TOTAL NOX (AS NO2)	LB/HR	50.59	31.09	15.44	7.87	7.02
TOTAL CO	LB/HR	6.01	2.88	2.41	3.30	4.62
TOTAL HC	LB/HR	1.10	1.10	1.20	0.90	0.96
PART MATTER	LB/HR	0.41	0.27	0.29	0.31	0.31

RATED SPEED NOMINAL DATA: 1800 RPM

GENSET POWER WITH FAN	EKW	2,500.0	1,875.0	1,250.0	625.0	250.0
PERCENT LOAD	%	100	75	50	25	10
ENGINE POWER	BHP	3,633	2,760	1,889	1,029	497
TOTAL NOX (AS NO2)	G/HR	19,123	11,751	5,837	2,974	2,654
TOTAL CO	G/HR	1,515	725	607	831	1,165
TOTAL HC	G/HR	376	375	408	307	329
TOTAL CO2	KG/HR	1,740	1,340	966	559	296
PART MATTER	G/HR	132.5	88.4	94.3	99.6	100.7
TOTAL NOX (AS NO2)	(CORR 5% O2) MG/NM3	2,349.1	1,857.9	1,286.9	1,127.3	1,858.5
TOTAL CO	(CORR 5% O2) MG/NM3	195.4	118.8	140.1	330.3	862.6
TOTAL HC	(CORR 5% O2) MG/NM3	42.1	54.8	81.8	105.8	212.3
PART MATTER	(CORR 5% O2) MG/NM3	14.1	11.8	18.4	34.7	63.0
TOTAL NOX (AS NO2)	(CORR 5% O2) PPM	1,144	905	627	549	905
TOTAL CO	(CORR 5% O2) PPM	156	95	112	264	690
TOTAL HC	(CORR 5% O2) PPM	79	102	153	197	396
TOTAL NOX (AS NO2)	G/HP-HR	5.32	4.30	3.12	2.92	5.39
TOTAL CO	G/HP-HR	0.42	0.26	0.32	0.82	2.37
TOTAL HC	G/HP-HR	0.10	0.14	0.22	0.30	0.67
PART MATTER	G/HP-HR	0.04	0.03	0.05	0.10	0.20
TOTAL NOX (AS NO2)	LB/HR	42.16	25.91	12.87	6.56	5.85
TOTAL CO	LB/HR	3.34	1.60	1.34	1.83	2.57
TOTAL HC	LB/HR	0.83	0.83	0.90	0.68	0.72
TOTAL CO2	LB/HR	3,836	2,955	2,130	1,233	654
PART MATTER	LB/HR	0.29	0.19	0.21	0.22	0.22
OXYGEN IN EXH	%	9.4	10.4	11.3	12.2	14.4
DRY SMOKE OPACITY	%	1.7	1.4	1.9	2.5	3.8
BOSCH SMOKE NUMBER		0.58	0.49	0.62	0.92	1.27

Regulatory Information

EPA TIER 2		2006 - 2010		
GASEOUS EMISSIONS DATA MEASUREMENTS PROVIDED TO THE EPA ARE CONSISTENT WITH THOSE DESCRIBED IN EPA 40 CFR PART 89 SUBPART D AND ISO 8178 FOR MEASURING HC, CO, PM, AND NOX. THE "MAX LIMITS" SHOWN BELOW ARE WEIGHTED CYCLE AVERAGES AND ARE IN COMPLIANCE WITH THE NON-ROAD REGULATIONS.				
Locality	Agency	Regulation	Tier/Stage	Max Limits - G/BKW - HR
U.S. (INCL CALIF)	EPA	NON-ROAD	TIER 2	CO: 3.5 NOx + HC: 6.4 PM: 0.20

EPA EMERGENCY STATIONARY		2011 - ----		
GASEOUS EMISSIONS DATA MEASUREMENTS PROVIDED TO THE EPA ARE CONSISTENT WITH THOSE DESCRIBED IN EPA 40 CFR PART 60 SUBPART IIII AND ISO 8178 FOR MEASURING HC, CO, PM, AND NOX. THE "MAX LIMITS" SHOWN BELOW ARE WEIGHTED CYCLE AVERAGES AND ARE IN COMPLIANCE WITH THE EMERGENCY STATIONARY REGULATIONS.				
Locality	Agency	Regulation	Tier/Stage	Max Limits - G/BKW - HR
U.S. (INCL CALIF)	EPA	STATIONARY	EMERGENCY STATIONARY	CO: 3.5 NOx + HC: 6.4 PM: 0.20

Altitude Derate Data

ALTITUDE CORRECTED POWER CAPABILITY (BHP)

AMBIENT OPERATING TEMP (F)	50	60	70	80	90	100	110	120	130	NORMAL
ALTITUDE (FT)										
0	3,634	3,634	3,634	3,634	3,634	3,634	3,634	3,634	3,634	3,634
1,000	3,634	3,634	3,634	3,634	3,634	3,634	3,634	3,625	3,563	3,634
2,000	3,634	3,634	3,634	3,634	3,634	3,614	3,551	3,490	3,430	3,634
3,000	3,634	3,634	3,634	3,607	3,542	3,478	3,417	3,358	3,301	3,634
4,000	3,634	3,604	3,536	3,470	3,407	3,346	3,288	3,231	3,176	3,574
5,000	3,534	3,466	3,401	3,338	3,277	3,218	3,162	3,107	3,055	3,461
6,000	3,398	3,332	3,270	3,209	3,151	3,094	3,040	2,987	2,937	3,351
7,000	3,266	3,203	3,142	3,084	3,028	2,974	2,922	2,871	2,823	3,243
8,000	3,137	3,077	3,019	2,963	2,909	2,857	2,807	2,758	2,712	3,137
9,000	3,013	2,955	2,899	2,845	2,794	2,744	2,696	2,649	2,604	3,034
10,000	2,892	2,837	2,783	2,732	2,682	2,634	2,588	2,543	2,500	2,933
11,000	2,776	2,722	2,671	2,621	2,574	2,528	2,483	2,441	2,399	2,835
12,000	2,663	2,611	2,562	2,515	2,469	2,425	2,382	2,341	2,301	2,739
13,000	2,553	2,504	2,457	2,411	2,367	2,325	2,284	2,245	2,207	2,645
14,000	2,447	2,400	2,354	2,311	2,269	2,228	2,189	2,151	2,115	2,554
15,000	2,344	2,299	2,256	2,214	2,174	2,135	2,097	2,061	2,026	2,465

Cross Reference

		Engine Arrangement	
Arrangement Number	Effective Serial Number	Engineering Model	Engineering Model Version
2666136	SBK00001	GS336	-
3994249	DD500001	GS716	-

		Test Specification Data				
Test Spec	Setting	Effective Serial Number	Engine Arrangement	Governor Type	Default Low Idle Speed	Default High Idle Speed
0K7009	LL5718	SBK00001	2666136	ADEM3		
3704978	GG0621	DD500001	3994249	ADEM3		

Supplementary Data

Type	Classification	Performance Number
SOUND	SOUND PRESSURE	DM8779

General Notes

General Notes DM8266 - 04
SOUND PRESSURE DATA FOR THIS RATING CAN BE FOUND IN PERFORMANCE NUMBER - DM8779

Performance Parameter Reference

Parameters Reference:DM9600-06

PERFORMANCE DEFINITIONS

PERFORMANCE DEFINITIONS DM9600

APPLICATION:

Engine performance tolerance values below are representative of a typical production engine tested in a calibrated dynamometer test cell at SAE J1995 standard reference conditions. Caterpillar maintains ISO9001:2000 certified quality management systems for engine test Facilities to assure accurate calibration of test equipment. Engine test data is corrected in accordance with SAE J1995. Additional reference material SAE J1228, J1349, ISO 8665, 3046-1:2002E, 3046-3:1989, 1585, 2534, 2288, and 9249 may apply in part or are similar to SAE J1995. Special engine rating request (SERR) test data shall be noted.

PERFORMANCE PARAMETER TOLERANCE FACTORS:

Power	+/- 3%
Torque	+/- 3%
Exhaust stack temperature	+/- 8%
Inlet airflow	+/- 5%
Intake manifold pressure-gage	+/- 10%
Exhaust flow	+/- 6%
Specific fuel consumption	+/- 3%
Fuel rate	+/- 5%
Specific DEF consumption	+/- 3%
DEF rate	+/- 5%
Heat rejection	+/- 5%
Heat rejection exhaust only	+/- 10%
Heat rejection CEM only	+/- 10%

Heat Rejection values based on using treated water.

Torque is included for truck and industrial applications, do not use for Gen Set or steady state applications.

On C7 - C18 engines, at speeds of 1100 RPM and under these values are provided for reference only, and may not meet the tolerance listed.

These values do not apply to C280/3600. For these models, see the tolerances listed below.

C280/3600 HEAT REJECTION TOLERANCE FACTORS:

Heat rejection	+/- 10%
Heat rejection to Atmosphere	+/- 50%
Heat rejection to Lube Oil	+/- 20%
Heat rejection to Aftercooler	+/- 5%

TEST CELL TRANSDUCER TOLERANCE FACTORS:

Torque	+/- 0.5%
Speed	+/- 0.2%
Fuel flow	+/- 1.0%
Temperature	+/- 2.0 C degrees
Intake manifold pressure	+/- 0.1 kPa

OBSERVED ENGINE PERFORMANCE IS CORRECTED TO SAE J1995 REFERENCE AIR AND FUEL CONDITIONS.

REFERENCE ATMOSPHERIC INLET AIR

FOR 3500 ENGINES AND SMALLER

SAE J1228 AUG2002 for marine engines, and J1995 JAN2014 for other engines, reference atmospheric pressure is 100 KPA (29.61 in hg), and standard temperature is 25deg C (77 deg F) at 30% relative humidity at the stated aftercooler water temp, or inlet manifold temp.

FOR 3600 ENGINES

Engine rating obtained and presented in accordance with ISO 3046/1 and SAE J1995 JANJAN2014 reference atmospheric pressure is 100 KPA (29.61 in hg), and standard temperature is 25deg C (77 deg F) at 30% relative humidity and 150M altitude at the stated aftercooler

water temperature.

MEASUREMENT LOCATION FOR INLET AIR TEMPERATURE

Location for air temperature measurement air cleaner inlet at stabilized operating conditions.

REFERENCE EXHAUST STACK DIAMETER

The Reference Exhaust Stack Diameter published with this dataset is only used for the calculation of Smoke Opacity values displayed in this dataset. This value does not necessarily represent the actual stack diameter of the engine due to the variety of exhaust stack adapter options available. Consult the price list, engine order or general dimension drawings for the actual stack diameter size ordered or options available.

REFERENCE FUEL

DIESEL

Reference fuel is #2 distillate diesel with a 35API gravity; A lower heating value is 42,780 KJ/KG (18,390 BTU/LB) when used at 29 (84.2), where the density is 838.9 G/Liter (7.001 Lbs/Gal).

GAS

Reference natural gas fuel has a lower heating value of 33.74 KJ/L (905 BTU/CU Ft). Low BTU ratings are based on 18.64 KJ/L (500 BTU/CU FT) lower heating value gas. Propane ratings are based on 87.56 KJ/L (2350 BTU/CU Ft) lower heating value gas.

ENGINE POWER (NET) IS THE CORRECTED FLYWHEEL POWER (GROSS) LESS EXTERNAL AUXILIARY LOAD

Engine corrected gross output includes the power required to drive standard equipment; lube oil, scavenge lube oil, fuel transfer, common rail fuel, separate circuit aftercooler and jacket water pumps. Engine net power available for the external (flywheel) load is calculated by subtracting the sum of auxiliary load from the corrected gross flywheel out put power. Typical auxiliary loads are radiator cooling fans, hydraulic pumps, air compressors and battery charging alternators. For Tier 4 ratings additional Parasitic losses would also include Intake, and Exhaust Restrictions.

ALTITUDE CAPABILITY

Altitude capability is the maximum altitude above sea level at standard temperature and standard pressure at which the engine could develop full rated output power on the current performance data set. Standard temperature values versus altitude could be seen on TM2001. When viewing the altitude capability chart the ambient temperature is the inlet air temp at the compressor inlet.

Engines with ADEM MEUI and HEUI fuel systems operating at conditions above the defined altitude capability derate for atmospheric pressure and temperature conditions outside the values defined, see TM2001. Mechanical governor controlled unit injector engines require a setting change for operation at conditions above the altitude defined on the engine performance sheet. See your Caterpillar technical representative for non standard ratings.

REGULATIONS AND PRODUCT COMPLIANCE

TMI Emissions information is presented at 'nominal' and 'Potential Site Variation' values for standard ratings. No tolerances are applied to the emissions data. These values are subject to change at any time. The controlling federal and local emission requirements need to be verified by your Caterpillar technical representative. Log on to the Technology and Solutions Divisions (T&SD) web page (https://pdgt.cat.com/cda/layout) for information including federal regulation applicability and time lines for implementation. Information for labeling and tagging requirements is also provided.

NOTES:

Regulation watch covers regulations in effect and future regulation changes for world, federal, state and local. This page includes

PERFORMANCE DATA[DM8266]

January 30, 2015

items on the watch list where a regulation change or product change might be pending and may need attention of the engine product group. For additional emissions information log on to the TMI web page.

Additional product information for specific market application is available.

Customer's may have special emission site requirements that need to be verified by the Caterpillar Product Group engineer.

HEAT REJECTION DEFINITIONS:

Diesel Circuit Type and HHV Balance : DM9500

EMISSIONS DEFINITIONS:

Emissions : DM1176

SOUND DEFINITIONS:

Sound Power : DM8702

Sound Pressure : TM7080

RATING DEFINITIONS:

Agriculture : TM6008

Fire Pump : TM6009

Generator Set : TM6035

Generator (Gas) : TM6041

Industrial Diesel : TM6010

Industrial (Gas) : TM6040

Irrigation : TM5749

Locomotive : TM6037

Marine Auxiliary : TM6036

Marine Prop (Except 3600) : TM5747

Marine Prop (3600 only) : TM5748

MSHA : TM6042

Oil Field (Petroleum) : TM6011

Off-Highway Truck : TM6039

On-Highway Truck : TM6038

Date Released : 5/12/14

ATTACHMENT 3

Generator Vendor Specification Sheets

Performance Number: DM9071

Change Level: 04

SALES MODEL:	C27	COMBUSTION:	DIRECT INJECTION
BRAND:	CAT	ENGINE SPEED (RPM):	1,800
MACHINE SALES MODEL:		HERTZ:	60
ENGINE POWER (BHP):	1,141	FAN POWER (HP):	37.5
GEN POWER WITH FAN (EKW):	750.0	ASPIRATION:	TA
COMPRESSION RATIO:	16.5	AFTERCOOLER TYPE:	ATAAC
RATING LEVEL:	STANDBY	AFTERCOOLER CIRCUIT TYPE:	JW+OC, ATAAC
PUMP QUANTITY:	1	INLET MANIFOLD AIR TEMP (F):	120
FUEL TYPE:	DIESEL	JACKET WATER TEMP (F):	210.2
MANIFOLD TYPE:	DRY	TURBO CONFIGURATION:	PARALLEL
GOVERNOR TYPE:	ADEM4	TURBO QUANTITY:	2
ELECTRONICS TYPE:	ADEM4	TURBOCHARGER MODEL:	GTA5008BS-56T-1.60
IGNITION TYPE:	CI	CERTIFICATION YEAR:	2006
INJECTOR TYPE:	EUI	PISTON SPD @ RATED ENG SPD (FT/MIN):	1,800.0
REF EXH STACK DIAMETER (IN):	10		
MAX OPERATING ALTITUDE (FT):	10,000		

INDUSTRY	SUBINDUSTRY	APPLICATION
ELECTRIC POWER	STANDARD	PACKAGED GENSET
OIL AND GAS	LAND PRODUCTION	PACKAGED GENSET

General Performance Data

GENSET POWER WITH FAN	PERCENT LOAD	ENGINE POWER	BRAKE MEAN EFF PRES (BMEP)	BRAKE SPEC FUEL CONSUMPTN (BSFC)	ISO BRAKE SPEC FUEL CONSUMPTN (BSFC)	VOL FUEL CONSUMPTN (VFC)	ISO VOL FUEL CONSUMPTN (VFC)
EKW	%	BHP	PSI	LB/BHP-HR	LB/BHP-HR	GAL/HR	GAL/HR
750.0	100	1,114	297	0.330	0.322	51.8	50.6
675.0	90	1,004	268	0.335	0.327	47.4	46.3
600.0	80	896	239	0.341	0.333	43.0	42.0
562.5	75	843	225	0.344	0.335	40.8	39.8
525.0	70	789	211	0.345	0.337	38.4	37.5
450.0	60	683	182	0.347	0.339	33.4	32.6
375.0	50	578	154	0.348	0.340	28.4	27.7
300.0	40	474	127	0.352	0.344	23.6	23.0
225.0	30	371	99	0.360	0.352	18.8	18.4
187.5	25	318	85	0.367	0.358	16.4	16.1
150.0	20	264	71	0.378	0.369	14.1	13.7
75.0	10	153	41	0.439	0.428	9.5	9.3

GENSET POWER WITH FAN	PERCENT LOAD	ENGINE POWER	INLET MFLD PRES	INLET MFLD TEMP	EXH MFLD TEMP	EXH MFLD PRES	ENGINE OUTLET TEMP	COMPRESSOR OUTLET PRES	COMPRESSOR OUTLET TEMP
EKW	%	BHP	IN-HG	DEG F	DEG F	IN-HG	DEG F	IN-HG	DEG F
750.0	100	1,114	51.5	119.8	1,204.2	35.8	945.7	54	335.3
675.0	90	1,004	46.8	116.4	1,176.6	32.4	931.7	49	316.3
600.0	80	896	42.0	113.3	1,148.2	29.0	914.7	44	298.2
562.5	75	843	39.3	111.4	1,132.6	27.2	905.1	41	286.8
525.0	70	789	36.1	109.0	1,113.1	25.1	894.3	38	272.2
450.0	60	683	29.4	103.9	1,064.7	20.7	866.4	31	243.3
375.0	50	578	22.7	99.1	1,003.6	16.3	830.2	24	214.7
300.0	40	474	16.8	96.8	923.0	12.8	774.0	18	186.6
225.0	30	371	11.5	94.9	822.7	9.7	698.7	13	158.4
187.5	25	318	9.0	94.1	764.6	8.4	653.4	10	144.1
150.0	20	264	6.8	93.3	700.1	7.2	601.6	8	131.1
75.0	10	153	3.7	91.8	548.5	5.5	474.1	5	113.2

General Performance Data (Continued)

GENSET POWER WITH FAN	PERCENT LOAD	ENGINE POWER	WET INLET AIR VOL FLOW RATE	ENGINE OUTLET WET EXH GAS VOL FLOW RATE	WET INLET AIR MASS FLOW RATE	WET EXH GAS MASS FLOW RATE	WET EXH VOL FLOW RATE (32 DEG F AND 29.98 IN HG)	DRY EXH VOL FLOW RATE (32 DEG F AND 29.98 IN HG)
EKW	%	BHP	CFM	CFM	LB/HR	LB/HR	FT3/MIN	FT3/MIN
750.0	100	1,114	2,047.9	5,523.3	8,813.1	9,180.6	1,932.4	1,751.0

PERFORMANCE DATA[DM9071]

March 18, 2023

675.0	90	1,004	1,943.4	5,168.6	8,352.2	8,688.5	1,826.5	1,659.7
600.0	80	896	1,842.2	4,822.6	7,905.6	8,211.2	1,725.3	1,572.8
562.5	75	843	1,785.4	4,620.1	7,641.5	7,931.0	1,664.4	1,519.5
525.0	70	789	1,711.2	4,361.8	7,314.5	7,586.8	1,583.9	1,447.8
450.0	60	683	1,549.1	3,852.2	6,603.9	6,840.9	1,428.3	1,308.9
375.0	50	578	1,379.7	3,349.0	5,865.3	6,066.5	1,276.5	1,173.4
300.0	40	474	1,228.7	2,857.7	5,210.7	5,377.9	1,138.9	1,051.3
225.0	30	371	1,085.8	2,365.3	4,598.2	4,731.8	1,004.0	932.2
187.5	25	318	1,016.7	2,116.4	4,304.7	4,421.4	934.9	871.2
150.0	20	264	955.9	1,883.0	4,046.4	4,146.4	872.4	816.6
75.0	10	153	875.3	1,504.7	3,701.7	3,769.1	792.3	751.1

Heat Rejection Data

GENSET POWER WITH FAN	PERCENT LOAD	ENGINE POWER	REJECTION TO JACKET WATER	REJECTION TO ATMOSPHERE	REJECTION TO EXH	EXHAUST RECOVERY TO 350F	FROM OIL COOLER	FROM AFTERCOOLER	WORK ENERGY	LOW HEAT VALUE ENERGY	HIGH HEAT VALUE ENERGY
EKW	%	BHP	BTU/MIN	BTU/MIN	BTU/MIN	BTU/MIN	BTU/MIN	BTU/MIN	BTU/MIN	BTU/MIN	BTU/MIN
750.0	100	1,114	18,168	6,121	41,248	23,382	6,001	7,653	47,258	112,670	120,022
675.0	90	1,004	16,830	5,599	38,360	21,557	5,489	6,721	42,591	103,055	109,779
600.0	80	896	15,354	5,086	35,666	19,722	4,986	5,885	38,003	93,613	99,721
562.5	75	843	14,621	4,822	34,127	18,699	4,728	5,431	35,732	88,766	94,559
525.0	70	789	13,886	4,536	32,294	17,513	4,447	4,898	33,459	83,488	88,936
450.0	60	683	12,429	3,947	28,414	14,931	3,870	3,801	28,962	72,655	77,396
375.0	50	578	10,977	3,350	24,232	12,266	3,285	2,735	24,499	61,668	65,692
300.0	40	474	10,408	2,784	19,378	9,542	2,730	1,876	20,121	51,252	54,597
225.0	30	371	9,659	2,224	14,770	6,845	2,180	1,164	15,715	40,931	43,602
187.5	25	318	9,060	1,943	12,725	5,538	1,904	861	13,480	35,756	38,089
150.0	20	264	8,158	1,664	11,023	4,279	1,631	608	11,205	30,622	32,620
75.0	10	153	5,369	1,121	8,709	1,888	1,099	302	6,505	20,638	21,985

Emissions Data

DIESEL

RATED SPEED NOMINAL DATA: 1800 RPM

GENSET POWER WITH FAN	EKW	750.0	562.5	375.0	187.5	75.0
PERCENT LOAD	%	100	75	50	25	10
ENGINE POWER	BHP	1,114	843	578	318	153
TOTAL NOX (AS NO2)	G/HR	5,621	3,210	2,049	1,405	936
TOTAL CO	G/HR	284	371	344	284	311
TOTAL HC	G/HR	27	46	51	47	58
TOTAL CO2	KG/HR	514	404	279	161	93
PART MATTER	G/HR	23.1	35.3	82.6	53.4	36.0
TOTAL NOX (AS NO2) (CORR 5% O2)	MG/NM3	2,551.8	1,859.1	1,733.2	2,096.3	2,549.5
TOTAL CO (CORR 5% O2)	MG/NM3	129.2	216.7	291.7	444.0	904.6
TOTAL HC (CORR 5% O2)	MG/NM3	10.4	23.5	37.4	64.3	146.5
PART MATTER (CORR 5% O2)	MG/NM3	8.6	17.6	59.4	68.1	90.3
TOTAL NOX (AS NO2) (CORR 5% O2)	PPM	1,243	906	844	1,021	1,242
TOTAL CO (CORR 5% O2)	PPM	103	173	233	355	724
TOTAL HC (CORR 5% O2)	PPM	19	44	70	120	273
TOTAL NOX (AS NO2)	G/HP-HR	5.09	3.83	3.56	4.43	6.12
TOTAL CO	G/HP-HR	0.26	0.44	0.60	0.90	2.03
TOTAL HC	G/HP-HR	0.02	0.06	0.09	0.15	0.38
PART MATTER	G/HP-HR	0.02	0.04	0.14	0.17	0.24
TOTAL NOX (AS NO2)	LB/HR	12.39	7.08	4.52	3.10	2.06
TOTAL CO	LB/HR	0.63	0.82	0.76	0.63	0.68
TOTAL HC	LB/HR	0.06	0.10	0.11	0.10	0.13
TOTAL CO2	LB/HR	1,133	891	615	354	204
PART MATTER	LB/HR	0.05	0.08	0.18	0.12	0.08
OXYGEN IN EXH	%	9.0	10.2	11.4	13.7	16.3
DRY SMOKE OPACITY	%	0.4	1.6	3.1	4.6	3.4

PERFORMANCE DATA[DM9071]

March 18, 2023

BOSCH SMOKE NUMBER	0.20	0.55	1.16	1.56	1.24
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RATED SPEED POTENTIAL SITE VARIATION: 1800 RPM

GENSET POWER WITH FAN	EKW	750.0	562.5	375.0	187.5	75.0
PERCENT LOAD	%	100	75	50	25	10
ENGINE POWER	BHP	1,114	843	578	318	153
TOTAL NOX (AS NO2)	G/HR	6,801	3,884	2,480	1,700	1,133
TOTAL CO	G/HR	531	693	642	531	581
TOTAL HC	G/HR	51	88	96	89	109
PART MATTER	G/HR	45.0	68.8	161.0	104.2	70.2
TOTAL NOX (AS NO2) (CORR 5% O2)	MG/NM3	3,087.7	2,249.5	2,097.2	2,536.5	3,084.9
TOTAL CO (CORR 5% O2)	MG/NM3	241.6	405.2	545.4	830.3	1,691.5
TOTAL HC (CORR 5% O2)	MG/NM3	19.7	44.5	70.6	121.6	276.9
PART MATTER (CORR 5% O2)	MG/NM3	16.7	34.3	115.9	132.9	176.2
TOTAL NOX (AS NO2) (CORR 5% O2)	PPM	1,504	1,096	1,022	1,235	1,503
TOTAL CO (CORR 5% O2)	PPM	193	324	436	664	1,353
TOTAL HC (CORR 5% O2)	PPM	37	83	132	227	517
TOTAL NOX (AS NO2)	G/HP-HR	6.16	4.64	4.31	5.37	7.41
TOTAL CO	G/HP-HR	0.48	0.83	1.12	1.68	3.80
TOTAL HC	G/HP-HR	0.05	0.10	0.17	0.28	0.71
PART MATTER	G/HP-HR	0.04	0.08	0.28	0.33	0.46
TOTAL NOX (AS NO2)	LB/HR	14.99	8.56	5.47	3.75	2.50
TOTAL CO	LB/HR	1.17	1.53	1.42	1.17	1.28
TOTAL HC	LB/HR	0.11	0.19	0.21	0.20	0.24
PART MATTER	LB/HR	0.10	0.15	0.36	0.23	0.15

Regulatory Information

EPA TIER 2		2006 - 2010			
GASEOUS EMISSIONS DATA MEASUREMENTS PROVIDED TO THE EPA ARE CONSISTENT WITH THOSE DESCRIBED IN EPA 40 CFR PART 89 SUBPART D AND ISO 8178 FOR MEASURING HC, CO, PM, AND NOX. THE "MAX LIMITS" SHOWN BELOW ARE WEIGHTED CYCLE AVERAGES AND ARE IN COMPLIANCE WITH THE NON-ROAD REGULATIONS.					
Locality	Agency	Regulation	Tier/Stage	Max Limits - G/BKW - HR	
U.S. (INCL CALIF)	EPA	NON-ROAD	TIER 2	CO: 3.5 NOx + HC: 6.4 PM: 0.20	

EPA EMERGENCY STATIONARY		2011 - ----			
GASEOUS EMISSIONS DATA MEASUREMENTS PROVIDED TO THE EPA ARE CONSISTENT WITH THOSE DESCRIBED IN EPA 40 CFR PART 60 SUBPART IIII AND ISO 8178 FOR MEASURING HC, CO, PM, AND NOX. THE "MAX LIMITS" SHOWN BELOW ARE WEIGHTED CYCLE AVERAGES AND ARE IN COMPLIANCE WITH THE EMERGENCY STATIONARY REGULATIONS.					
Locality	Agency	Regulation	Tier/Stage	Max Limits - G/BKW - HR	
U.S. (INCL CALIF)	EPA	STATIONARY	EMERGENCY STATIONARY	CO: 3.5 NOx + HC: 6.4 PM: 0.20	

Altitude Derate Data

STANDARD

ALTITUDE CORRECTED POWER CAPABILITY (BHP)

AMBIENT OPERATING TEMP (F)	30	40	50	60	70	80	90	100	110	120	130	140	NORMAL
ALTITUDE (FT)													
0	1,141	1,141	1,141	1,141	1,141	1,141	1,141	1,141	1,141	1,141	1,141	1,141	1,141
1,000	1,141	1,141	1,141	1,141	1,141	1,141	1,141	1,141	1,141	1,141	1,141	1,141	1,141
2,000	1,141	1,141	1,141	1,141	1,141	1,141	1,141	1,141	1,141	1,141	1,141	1,141	1,141
3,000	1,141	1,141	1,141	1,141	1,141	1,141	1,141	1,141	1,141	1,141	1,141	1,141	1,141
4,000	1,141	1,141	1,141	1,141	1,141	1,141	1,141	1,141	1,141	1,141	1,141	1,141	1,141
5,000	1,141	1,141	1,141	1,141	1,141	1,141	1,141	1,141	1,141	1,141	1,141	1,141	1,141
6,000	1,141	1,141	1,141	1,141	1,141	1,141	1,141	1,141	1,141	1,141	1,141	1,141	1,141
7,000	1,141	1,141	1,141	1,141	1,141	1,141	1,141	1,141	1,141	1,141	1,141	1,141	1,141
8,000	1,141	1,141	1,141	1,141	1,141	1,141	1,141	1,141	1,141	1,141	1,127	1,108	1,141

PERFORMANCE DATA[DM9071]

March 18, 2023

9,000	1,141	1,141	1,141	1,141	1,141	1,141	1,141	1,140	1,120	1,101	1,082	1,064	1,141
10,000	1,141	1,141	1,141	1,141	1,141	1,135	1,114	1,094	1,075	1,056	1,038	1,021	1,141
11,000	1,141	1,141	1,141	1,131	1,109	1,089	1,069	1,050	1,031	1,014	996	980	1,141
12,000	1,141	1,128	1,106	1,084	1,064	1,044	1,025	1,007	989	972	956	940	1,137
13,000	1,103	1,081	1,060	1,039	1,020	1,001	983	965	948	932	916	901	1,098
14,000	1,057	1,036	1,016	996	977	959	942	925	909	893	878	863	1,060
15,000	1,012	992	973	954	936	919	902	886	870	855	841	827	1,023

Cross Reference

Test Spec	Setting	Engine Arrangement	Engineering Model	Engineering Model Version	Start Effective Serial Number	End Effective Serial Number
0K7492	PP5659	2671232	GS327	-	MJE00001	
3704840	GG0522	3495619	GS603	LS	MJE00001	
0K4032	GG0384	3541450	GS582	-	PEN00001	
3704840	GG0522	3884919	GS603	-	MJE00001	
3704840	GG0522	6034727	PG458	-	MJE00001	

Performance Parameter Reference

Parameters Reference:DM9600-14

PERFORMANCE DEFINITIONS

PERFORMANCE DEFINITIONS DM9600

APPLICATION:

Engine performance tolerance values below are representative of a typical production engine tested in a calibrated dynamometer test cell at SAE J1995 standard reference conditions. Caterpillar maintains ISO9001:2000 certified quality management systems for engine test facilities to assure accurate calibration of test equipment. Engine test data is corrected in accordance with SAE J1995. Additional reference material SAE J1228, J1349, ISO 8665, 3046-1:2002E, 3046-3:1989, 1585, 2534, 2288, and 9249 may apply in part or are similar to SAE J1995. Special engine rating request (SERR) test data shall be noted.

PERFORMANCE PARAMETER TOLERANCE FACTORS:

Power +/- 3%

Torque +/- 3%

Exhaust stack temperature +/- 8%

Inlet airflow +/- 5%

Intake manifold pressure-gage +/- 10%

Exhaust flow +/- 6%

Specific fuel consumption +/- 3%

Fuel rate +/- 5%

Specific DEF consumption +/- 3%

DEF rate +/- 5%

Heat rejection +/- 5%

Heat rejection exhaust only +/- 10%

Heat rejection CEM only +/- 10%

Heat Rejection values based on using treated water.

Torque is included for truck and industrial applications, do not

use for Gen Set or steady state applications.

On C7 - C18 engines, at speeds of 1100 RPM and under these values

are provided for reference only, and may not meet the tolerance

listed.

On 3500 and C175 engines, at speeds below Peak Torque these values

are provided for reference only, and may not meet the tolerance

listed.

These values do not apply to C280/3600. For these models, see the

tolerances listed below.

C280/3600 HEAT REJECTION TOLERANCE FACTORS:

Heat rejection +/- 10%

Heat rejection to Atmosphere +/- 50%

Heat rejection to Lube Oil +/- 20%

Heat rejection to Aftercooler +/- 5%

TEST CELL TRANSDUCER TOLERANCE FACTORS:

Torque +/- 0.5%

Speed +/- 0.2%

Fuel flow +/- 1.0%

Temperature +/- 2.0 C degrees

Intake manifold pressure +/- 0.1 kPa

OBSERVED ENGINE PERFORMANCE IS CORRECTED TO SAE J1995 REFERENCE

AIR AND FUEL CONDITIONS.

REFERENCE ATMOSPHERIC INLET AIR

FOR 3500 ENGINES AND SMALLER

SAE J1228 AUG2002 for marine engines, and J1995 JAN2014 for other

engines, reference atmospheric pressure is 100 KPA (29.61 in hg),

PERFORMANCE DATA[DM9071]

and standard temperature is 25deg C (77 deg F) at 30% relative humidity at the stated aftercooler water temp, or inlet manifold temp.

FOR 3600 ENGINES

Engine rating obtained and presented in accordance with ISO 3046/1 and SAE J1995 JANJAN2014 reference atmospheric pressure is 100 KPA (29.61 in hg), and standard temperature is 25deg C (77 deg F) at 30% relative humidity and 150M altitude at the stated aftercooler water temperature.

MEASUREMENT LOCATION FOR INLET AIR TEMPERATURE

Location for air temperature measurement air cleaner inlet at stabilized operating conditions.

REFERENCE EXHAUST STACK DIAMETER

The Reference Exhaust Stack Diameter published with this dataset is only used for the calculation of Smoke Opacity values displayed in this dataset. This value does not necessarily represent the actual stack diameter of the engine due to the variety of exhaust stack adapter options available. Consult the price list, engine order or general dimension drawings for the actual stack diameter size ordered or options available.

REFERENCE FUEL

DIESEL

Reference fuel is #2 distillate diesel with a 35API gravity; A lower heating value is 42,780 KJ/KG (18,390 BTU/LB) when used at 15 deg C (59 deg F), where the density is 850 G/Liter (7.0936 Lbs/Gal).

GAS

Reference natural gas fuel has a lower heating value of 33.74 KJ/L (905 BTU/CU Ft). Low BTU ratings are based on 18.64 KJ/L (500 BTU/CU FT) lower heating value gas. Propane ratings are based on 87.56 KJ/L (2350 BTU/CU Ft) lower heating value gas.

ENGINE POWER (NET) IS THE CORRECTED FLYWHEEL POWER (GROSS) LESS EXTERNAL AUXILIARY LOAD

Engine corrected gross output includes the power required to drive standard equipment; lube oil, scavenge lube oil, fuel transfer, common rail fuel, separate circuit aftercooler and jacket water pumps. Engine net power available for the external (flywheel) load is calculated by subtracting the sum of auxiliary load from the corrected gross flywheel out put power. Typical auxiliary loads are radiator cooling fans, hydraulic pumps, air compressors and battery charging alternators. For Tier 4 ratings additional Parasitic losses would also include Intake, and Exhaust Restrictions.

ALTITUDE CAPABILITY

Altitude capability is the maximum altitude above sea level at standard temperature and standard pressure at which the engine could develop full rated output power on the current performance data set.

Standard temperature values versus altitude could be seen on TM2001.

When viewing the altitude capability chart the ambient temperature is the inlet air temp at the compressor inlet.

Engines with ADEM MEUI and HEUI fuel systems operating at conditions above the defined altitude capability derate for atmospheric pressure and temperature conditions outside the values defined, see TM2001.

Mechanical governor controlled unit injector engines require a setting change for operation at conditions above the altitude defined on the engine performance sheet. See your Caterpillar technical representative for non standard ratings.

REGULATIONS AND PRODUCT COMPLIANCE

TMI Emissions information is presented at 'nominal' and 'Potential Site Variation' values for standard ratings. No tolerances are applied to the emissions data. These values are subject to change at any time. The controlling federal and local emission requirements need to be verified by your Caterpillar technical representative.

Customer's may have special emission site requirements that need to be verified by the Caterpillar Product Group engineer.

EMISSION CYCLE LIMITS:

Cycle emissions Max Limits apply to cycle-weighted averages only. Emissions at individual load points may exceed the cycle-weighted limit.

WET & DRY EXHAUST/EMISSIONS DESCRIPTION:

Wet - Total exhaust flow or concentration of total exhaust flow

Dry - Total exhaust flow minus water vapor or concentration of exhaust flow with water vapor excluded

EMISSIONS DEFINITIONS:

Emissions : DM1176

EMISSION CYCLE DEFINITIONS

1. For constant-speed marine engines for ship main propulsion, including,diesel-electric drive, test cycle E2 shall be applied, for controllable-pitch propeller sets test cycle E2 shall be applied.
2. For propeller-law-operated main and propeller-law-operated auxiliary engines the test cycle E3 shall be applied.
3. For constant-speed auxiliary engines test cycle D2 shall be applied.

PERFORMANCE DATA[DM9071]

March 18, 2023

4. For variable-speed, variable-load auxiliary engines, not included above, test cycle C1 shall be applied.

HEAT REJECTION DEFINITIONS:

Diesel Circuit Type and HHV Balance : DM9500

HIGH DISPLACEMENT (HD) DEFINITIONS:

3500: EM1500

RATING DEFINITIONS:

Agriculture : TM6008

Fire Pump : TM6009

Generator Set : TM6035

Generator (Gas) : TM6041

Industrial Diesel : TM6010

Industrial (Gas) : TM6040

Irrigation : TM5749

Locomotive : TM6037

Marine Auxiliary : TM6036

Marine Prop (Except 3600) : TM5747

Marine Prop (3600 only) : TM5748

MSHA : TM6042

Oil Field (Petroleum) : TM6011

Off-Highway Truck : TM6039

On-Highway Truck : TM6038

SOUND DEFINITIONS:

Sound Power : DM8702

Sound Pressure : TM7080

Date Released : 10/27/21

Performance Number: DM7696

Change Level: 01

SALES MODEL:	C27	COMBUSTION:	DI
ENGINE POWER (BHP):	1,214	ENGINE SPEED (RPM):	1,800
GEN POWER WITH FAN (EKW):	800.0	HERTZ:	60
COMPRESSION RATIO:	16.5	FAN POWER (HP):	39.3
APPLICATION:	PACKAGED GENSET	ADDITIONAL PARASITICS (HP):	52.2
RATING LEVEL:	STANDBY	ASPIRATION:	TA
PUMP QUANTITY:	1	AFTERCOOLER TYPE:	ATAAC
FUEL TYPE:	DIESEL	AFTERCOOLER CIRCUIT TYPE:	JW+OC, ATAAC
MANIFOLD TYPE:	DRY	INLET MANIFOLD AIR TEMP (F):	120
GOVERNOR TYPE:	ADEM4	JACKET WATER TEMP (F):	210.2
ELECTRONICS TYPE:	ADEM4	TURBO CONFIGURATION:	PARALLEL
IGNITION TYPE:	CI	TURBO QUANTITY:	2
INJECTOR TYPE:	EUI	TURBOCHARGER MODEL:	GTA5008BS-56T-1.60
REF EXH STACK DIAMETER (IN):	10	CERTIFICATION YEAR:	2010
MAX OPERATING ALTITUDE (FT):	7,999	PISTON SPD @ RATED ENG SPD (FT/MIN):	1,800.0

General Performance Data

GENSET POWER WITH FAN	PERCENT LOAD	ENGINE POWER	BRAKE MEAN EFF PRES (BMEP)	BRAKE SPEC FUEL CONSUMPTN (BSFC)	VOL FUEL CONSUMPTN (VFC)	INLET MFLD PRES	INLET MFLD TEMP	EXH MFLD TEMP	EXH MFLD PRES	ENGINE OUTLET TEMP
EKW	%	BHP	PSI	LB/BHP-HR	GAL/HR	IN-HG	DEG F	DEG F	IN-HG	DEG F
800.0	100	1,214	324	0.330	57.3	58.6	120.5	1,230.6	41.1	952.5
720.0	90	1,100	294	0.334	52.5	53.7	115.2	1,195.3	37.5	932.4
640.0	80	988	264	0.339	47.8	48.4	113.4	1,168.6	33.4	919.7
600.0	75	932	249	0.341	45.4	45.5	113.0	1,155.3	31.2	913.8
560.0	70	876	234	0.342	42.9	42.2	111.6	1,138.9	28.8	906.0
480.0	60	765	204	0.344	37.6	34.9	107.3	1,095.6	23.9	882.8
400.0	50	654	175	0.346	32.3	27.3	102.5	1,039.6	19.1	850.4
320.0	40	545	145	0.349	27.1	20.4	98.3	967.7	14.9	804.3
240.0	30	436	116	0.355	22.1	14.5	95.0	875.5	11.4	739.0
200.0	25	380	101	0.359	19.5	11.7	93.6	822.1	9.9	699.4
160.0	20	324	86	0.366	17.0	9.1	92.4	763.2	8.5	654.7
80.0	10	210	56	0.402	12.0	5.1	92.2	626.6	6.3	544.7

GENSET POWER WITH FAN	PERCENT LOAD	ENGINE POWER	COMPRESSOR OUTLET PRES	COMPRESSOR OUTLET TEMP	WET INLET AIR VOL FLOW RATE	ENGINE OUTLET WET EXH GAS VOL FLOW RATE	WET INLET AIR MASS FLOW RATE	WET EXH GAS MASS FLOW RATE	WET EXH VOL FLOW RATE (32 DEG F AND 29.98 IN HG)	DRY EXH VOL FLOW RATE (32 DEG F AND 29.98 IN HG)
EKW	%	BHP	IN-HG	DEG F	CFM	CFM	LB/HR	LB/HR	FT3/MIN	FT3/MIN
800.0	100	1,214	61	362.1	2,216.4	6,011.7	9,543.1	9,944.2	2,093.1	1,894.9
720.0	90	1,100	57	341.6	2,124.9	5,659.3	9,125.9	9,493.8	1,998.8	1,815.5
640.0	80	988	51	320.7	2,001.3	5,260.8	8,572.1	8,906.9	1,875.2	1,707.1
600.0	75	932	48	309.9	1,930.4	5,042.0	8,257.4	8,575.1	1,805.0	1,645.1
560.0	70	876	44	295.4	1,851.1	4,797.3	7,907.3	8,207.3	1,727.2	1,576.0
480.0	60	765	37	264.1	1,678.1	4,260.9	7,148.0	7,411.6	1,560.5	1,427.2
400.0	50	654	29	233.3	1,497.7	3,697.0	6,361.6	6,588.0	1,387.5	1,272.0
320.0	40	545	22	203.3	1,329.0	3,157.0	5,630.4	5,820.5	1,228.0	1,129.6
240.0	30	436	16	173.6	1,175.4	2,643.8	4,970.3	5,124.7	1,084.4	1,003.3
200.0	25	380	13	158.7	1,102.8	2,392.1	4,660.7	4,797.2	1,014.7	942.2
160.0	20	324	10	143.8	1,032.8	2,142.5	4,363.5	4,482.1	945.3	881.3
80.0	10	210	6	121.2	926.9	1,716.6	3,911.4	3,995.6	840.3	792.1

Heat Rejection Data

GENSET POWER WITH FAN	PERCENT LOAD	ENGINE POWER	REJECTION TO JACKET WATER	REJECTION TO ATMOSPHERE	REJECTION TO EXH	EXHUAUST RECOVERY TO 350F	FROM OIL COOLER	FROM AFTERCOOLER	WORK ENERGY	LOW HEAT VALUE ENERGY	HIGH HEAT VALUE ENERGY
EKW	%	BHP	BTU/MIN	BTU/MIN	BTU/MIN	BTU/MIN	BTU/MIN	BTU/MIN	BTU/MIN	BTU/MIN	BTU/MIN
800.0	100	1,214	18,785	6,240	45,257	25,637	6,549	9,235	51,468	122,961	130,984
720.0	90	1,100	18,137	5,061	42,000	23,586	6,007	8,276	46,664	112,779	120,138
640.0	80	988	17,141	4,437	38,642	21,600	5,462	7,119	41,902	102,550	109,241
600.0	75	932	16,243	4,573	36,868	20,559	5,186	6,513	39,533	97,376	103,729
560.0	70	876	15,133	4,950	34,899	19,383	4,898	5,822	37,162	91,965	97,965
480.0	60	765	13,933	4,599	30,563	16,728	4,301	4,488	32,445	80,759	86,028
400.0	50	654	12,297	4,489	26,024	13,914	3,694	3,331	27,748	69,364	73,890
320.0	40	545	10,665	4,336	21,575	11,109	3,103	2,367	23,120	58,261	62,063
240.0	30	436	9,960	3,213	17,222	8,311	2,521	1,564	18,469	47,340	50,429
200.0	25	380	9,576	2,592	15,113	6,955	2,231	1,215	16,122	41,885	44,618
160.0	20	324	9,057	2,021	13,057	5,639	1,939	898	13,745	36,402	38,778
80.0	10	210	7,177	1,693	9,288	3,167	1,375	455	8,885	25,814	27,498

Emissions Data

RATED SPEED NOMINAL DATA: 1800 RPM

GENSET POWER WITH FAN	EKW	800.0	600.0	400.0	200.0	80.0
ENGINE POWER	BHP	1,214	932	654	380	210
PERCENT LOAD	%	100	75	50	25	10
TOTAL NOX (AS NO2)	G/HR	6,233	3,725	2,368	1,644	1,036
TOTAL CO	G/HR	276	344	337	275	303
TOTAL HC	G/HR	35	44	48	37	45
TOTAL CO2	KG/HR	563	445	315	188	116
PART MATTER	G/HR	28.4	26.7	44.2	51.1	52.3
TOTAL NOX (AS NO2)	(CORR 5% O2) MG/NM3	2,580.0	1,962.4	1,776.1	2,170.4	2,154.4
TOTAL CO	(CORR 5% O2) MG/NM3	115.1	183.6	258.3	383.5	733.8
TOTAL HC	(CORR 5% O2) MG/NM3	12.5	20.6	31.3	46.5	96.9
PART MATTER	(CORR 5% O2) MG/NM3	9.7	11.8	28.3	58.2	107.7
TOTAL NOX (AS NO2)	(CORR 5% O2) PPM	1,257	956	865	1,057	1,049
TOTAL CO	(CORR 5% O2) PPM	92	147	207	307	587
TOTAL HC	(CORR 5% O2) PPM	23	38	58	87	181
TOTAL NOX (AS NO2)	G/HP-HR	5.18	4.02	3.63	4.34	4.96
TOTAL CO	G/HP-HR	0.23	0.37	0.52	0.72	1.45
TOTAL HC	G/HP-HR	0.03	0.05	0.07	0.10	0.22
PART MATTER	G/HP-HR	0.02	0.03	0.07	0.13	0.25
TOTAL NOX (AS NO2)	LB/HR	13.74	8.21	5.22	3.62	2.28
TOTAL CO	LB/HR	0.61	0.76	0.74	0.61	0.67
TOTAL HC	LB/HR	0.08	0.10	0.11	0.08	0.10
TOTAL CO2	LB/HR	1,240	982	694	414	255
PART MATTER	LB/HR	0.06	0.06	0.10	0.11	0.12
OXYGEN IN EXH	%	8.9	10.0	11.1	13.1	15.4
DRY SMOKE OPACITY	%	0.2	1.1	2.6	4.3	5.3
BOSCH SMOKE NUMBER		0.14	0.39	0.96	1.51	1.69

RATED SPEED POTENTIAL SITE VARIATION: 1800 RPM (from 7/21/2017 data sheet - Nominal Data is same on both sheets)

GENSET POWER WITH FAN	EKW	800.0	600.0	400.0	200.0	80.0
PERCENT LOAD	%	100	75	50	25	10
ENGINE POWER	BHP	1,214	932	654	380	210
TOTAL NOX (AS NO2)	G/HR	7,541	4,507	2,865	1,989	1,253
TOTAL CO	G/HR	517	644	630	514	567
TOTAL HC	G/HR	66	83	90	71	85
PART MATTER	G/HR	55.4	52.1	86.3	99.7	101.9
TOTAL NOX (AS NO2)	(CORR 5% O2) MG/NM3	3,121.8	2,374.5	2,149.1	2,626.2	2,606.8
TOTAL CO	(CORR 5% O2) MG/NM3	215.2	343.4	483.1	717.2	1,372.2
TOTAL HC	(CORR 5% O2) MG/NM3	23.7	38.9	59.2	87.9	183.2
PART MATTER	(CORR 5% O2) MG/NM3	18.9	22.9	55.1	113.5	210.1
TOTAL NOX (AS NO2)	(CORR 5% O2) PPM	1,521	1,157	1,047	1,279	1,270
TOTAL CO	(CORR 5% O2) PPM	172	275	386	574	1,098
TOTAL HC	(CORR 5% O2) PPM	44	73	111	164	342
TOTAL NOX (AS NO2)	G/HP-HR	6.27	4.86	4.40	5.25	6.00
TOTAL CO	G/HP-HR	0.43	0.69	0.97	1.36	2.72
TOTAL HC	G/HP-HR	0.05	0.09	0.14	0.19	0.41
PART MATTER	G/HP-HR	0.05	0.06	0.13	0.26	0.49
TOTAL NOX (AS NO2)	LB/HR	16.63	9.94	6.32	4.38	2.76
TOTAL CO	LB/HR	1.14	1.42	1.39	1.13	1.25
TOTAL HC	LB/HR	0.15	0.18	0.20	0.16	0.19
PART MATTER	LB/HR	0.12	0.11	0.19	0.22	0.22

Regulatory Information

EPA TIER 2		2006 - 2010		
GASEOUS EMISSIONS DATA MEASUREMENTS ARE CONSISTENT WITH THOSE DESCRIBED IN EPA 40 CFR PART 89 SUBPART D AND ISO 8178 FOR MEASURING HC, CO, PM, AND NOX. GASEOUS EMISSIONS VALUES ARE WEIGHTED CYCLE AVERAGES AND ARE IN COMPLIANCE WITH THE NON-ROAD REGULATIONS.				
Locality	Agency	Regulation	Tier/Stage	Max Limits - G/BKW - HR
U.S. (INCL CALIF)	EPA	NON-ROAD	TIER 2	CO: 3.5 NOx + HC: 6.4 PM: 0.20

EPA EMERGENCY STATIONARY		2011 - ----		
GASEOUS EMISSIONS DATA MEASUREMENTS ARE CONSISTENT WITH THOSE DESCRIBED IN EPA 40 CFR PART 60 SUBPART IIII AND ISO 8178 FOR MEASURING HC, CO, PM, AND NOX. GASEOUS EMISSIONS LIMIT VALUES ARE WEIGHTED CYCLE AVERAGES AND ARE IN COMPLIANCE WITH THE NON-ROAD REGULATIONS.				
Locality	Agency	Regulation	Tier/Stage	Max Limits - G/BKW - HR
U.S. (INCL CALIF)	EPA	STATIONARY	EMERGENCY STATIONARY	CO: 3.5 NOx + HC: 6.4 PM: 0.20

Altitude Derate Data

ALTITUDE CORRECTED POWER CAPABILITY (BHP)

AMBIENT OPERATING TEMP (F)	50	60	70	80	90	100	110	120	130	NORMAL
ALTITUDE (FT)										
0	1,214	1,214	1,214	1,214	1,214	1,214	1,214	1,214	1,214	1,214
1,000	1,214	1,214	1,214	1,214	1,214	1,214	1,214	1,214	1,214	1,214
2,000	1,214	1,214	1,214	1,214	1,214	1,214	1,214	1,214	1,214	1,214
3,000	1,214	1,214	1,214	1,214	1,214	1,214	1,214	1,214	1,214	1,214
4,000	1,214	1,214	1,214	1,214	1,214	1,214	1,214	1,214	1,214	1,214
5,000	1,214	1,214	1,214	1,214	1,214	1,214	1,214	1,214	1,214	1,214
6,000	1,214	1,214	1,214	1,214	1,214	1,214	1,214	1,214	1,197	1,214
7,000	1,214	1,214	1,214	1,214	1,214	1,212	1,191	1,170	1,150	1,214
8,000	1,214	1,214	1,214	1,207	1,185	1,164	1,144	1,124	1,105	1,214
9,000	1,214	1,204	1,181	1,159	1,138	1,118	1,098	1,079	1,061	1,214
10,000	1,178	1,155	1,134	1,113	1,092	1,073	1,054	1,036	1,018	1,195
11,000	1,130	1,109	1,088	1,067	1,048	1,029	1,011	994	977	1,154
12,000	1,084	1,063	1,043	1,024	1,005	987	970	953	937	1,115
13,000	1,039	1,019	1,000	981	964	946	930	914	898	1,077
14,000	996	977	958	940	923	907	891	876	861	1,039
15,000	954	935	918	901	884	869	853	839	824	1,003

Cross Reference

		Engine Arrangement	
Arrangement Number	Effective Serial Number	Engineering Model	Engineering Model Version
2671232	MJE00001	GS327	-
3495619	MJE00001	GS603	LS
3541450	PEN00001	GS582	-

		Test Specification Data				
Test Spec	Setting	Effective Serial Number	Engine Arrangement	Governor Type	Default Low Idle Speed	Default High Idle Speed
0K7925	PP5660	MJE00001	2671232	ADEM4		
3704841	GG0523	MJE00001	3495619	ADEM4		
0K4031	GG0383	PEN00001	3541450	ADEM4		

Performance Parameter Reference

Parameters Reference:DM9600-05

PERFORMANCE DEFINITIONS

PERFORMANCE DEFINITIONS DM9600

APPLICATION:

Engine performance tolerance values below are representative of a typical production engine tested in a calibrated dynamometer test cell at SAE J1995 standard reference conditions. Caterpillar maintains ISO9001:2000 certified quality management systems for engine test Facilities to assure accurate calibration of test equipment. Engine test data is corrected in accordance with SAE J1995. Additional reference material SAE J1228, J1349, ISO 8665, 3046-1:2002E, 3046-3:1989, 1585, 2534, 2288, and 9249 may apply in part or are similar to SAE J1995. Special engine rating request(SERR)test data shall be noted.

PERFORMANCE PARAMETER TOLERANCE FACTORS:

Power	+/- 3%
Torque	+/- 3%
Exhaust stack temperature	+/- 8%
Inlet airflow	+/- 5%
Intake manifold pressure-gage	+/- 10%
Exhaust flow	+/- 6%
Specific fuel consumption	+/- 3%
Fuel rate	+/- 5%
Heat rejection	+/- 5%
Heat rejection exhaust only	+/- 10%

Torque is included for truck and industrial applications, do not use for Gen Set or steady state applications.

On C7 - C18 engines, at speeds of 1100 RPM and under these values are provided for reference only, and may not meet the tolerance listed.

These values do not apply to C280/3600. For these models, see the tolerances listed below.

C280/3600 HEAT REJECTION TOLERANCE FACTORS:

Heat rejection	+/- 10%
Heat rejection to Atmosphere	+/- 50%
Heat rejection to Lube Oil	+/- 20%
Heat rejection to Aftercooler	+/- 5%

TEST CELL TRANSDUCER TOLERANCE FACTORS:

Torque	+/- 0.5%
Speed	+/- 0.2%
Fuel flow	+/- 1.0%
Temperature	+/- 2.0 C degrees
Intake manifold pressure	+/- 0.1 kPa

OBSERVED ENGINE PERFORMANCE IS CORRECTED TO SAE J1995 REFERENCE AIR AND FUEL CONDITIONS.

REFERENCE ATMOSPHERIC INLET AIR

FOR 3500 ENGINES AND SMALLER

SAE J1228 reference atmospheric pressure is 100 KPA (29.61 in hg) and standard temperature is 25 (77) at 60% relative humidity.

FOR 3600 ENGINES

Engine rating obtained and presented in accordance with ISO 3046/1 and SAE J1995 JAN90 standard reference conditions of 25, 100 KPA 30% relative humidity and 150M altitude at the stated aftercooler water temperature.

MEASUREMENT LOCATION FOR INLET AIR TEMPERATURE

Location for air temperature measurement air cleaner inlet at stabilized operating conditions.

PERFORMANCE DATA[DM7696]

December 6, 2011

REFERENCE EXHAUST STACK DIAMETER

The Reference Exhaust Stack Diameter published with this dataset is only used for the calculation of Smoke Opacity values displayed in this dataset. This value does not necessarily represent the actual stack diameter of the engine due to the variety of exhaust stack adapter options available. Consult the price list, engine order or general dimension drawings for the actual stack diameter size ordered or options available.

REFERENCE FUEL

DIESEL

Reference fuel is #2 distillate diesel with a 35API gravity; A lower heating value is 42,780 KJ/KG (18,390 BTU/LB) when used at 29 (84.2), where the density is 838.9 G/Liter (7.001 Lbs/Gal).

GAS

Reference natural gas fuel has a lower heating value of 33.74 KJ/L (905 BTU/CU Ft). Low BTU ratings are based on 18.64 KJ/L (500 BTU/CU FT) lower heating value gas. Propane ratings are based on 87.56 KJ/L (2350 BTU/CU Ft) lower heating value gas.

ENGINE POWER (NET) IS THE CORRECTED FLYWHEEL POWER (GROSS) LESS EXTERNAL AUXILIARY LOAD

Engine corrected gross output includes the power required to drive standard equipment; lube oil, scavenge lube oil, fuel transfer, common rail fuel, separate circuit aftercooler and jacket water pumps. Engine net power available for the external (flywheel) load is calculated by subtracting the sum of auxiliary load from the corrected gross flywheel out put power. Typical auxiliary loads are radiator cooling fans, hydraulic pumps, air compressors and battery charging alternators.

ALTITUDE CAPABILITY

Altitude capability is the maximum altitude above sea level at standard temperature and standard pressure at which the engine could develop full rated output power on the current performance data set. Standard temperature values versus altitude could be seen on TM2001.

Engines with ADEM MEUI and HEUI fuel systems operating at conditions above the defined altitude capability derate for atmospheric pressure and temperature conditions outside the values defined, see TM2001. Mechanical governor controlled unit injector engines require a setting change for operation at conditions above the altitude defined on the engine performance sheet. See your Caterpillar technical representative for non standard ratings.

REGULATIONS AND PRODUCT COMPLIANCE

TMI Emissions information is presented at 'nominal' and 'not to exceed' values for standard ratings. No tolerances are applied to the emissions data. These values are subject to change at any time. The controlling federal and local emission requirements need to be verified by your Caterpillar technical representative. Log on to the Technology and Solutions Divisions (T&SD) web page (http://tsd.cat.com/etsd/index.cfm?tech_id=2635ICAL) for information including federal regulation applicability and time lines for implementation. Information for labeling and tagging requirements is also provided.

NOTES:

Regulation watch covers regulations in effect and future regulation changes for world, federal, state and local. This page includes items on the watch list where a regulation change or product change might be pending and may need attention of the engine product group. For additional emissions information log on to the TMI web page.

Additional product information for specific market application is available.

Customer's may have special emission site requirements that need to be verified by the Caterpillar Product Group engineer.

HEAT REJECTION DEFINITIONS:

Diesel Circuit Type and HHV Balance : DM9500

EMISSIONS DEFINITIONS:

Emissions : DM1176

SOUND DEFINITIONS:

PERFORMANCE DATA[DM7696]

December 6, 2011

Sound Power : DM8702

Sound Pressure : TM7080

RATING DEFINITIONS:

Agriculture : TM6008

Fire Pump : TM6009

Generator Set : TM6035

Generator (Gas) : TM6041

Industrial Diesel : TM6010

Industrial (Gas) : TM6040

Irrigation : TM5749

Locomotive : TM6037

Marine Auxiliary : TM6036

Marine Prop (Except 3600) : TM5747

Marine Prop (3600 only) : TM5748

MSHA : TM6042

Oil Field (Petroleum) : TM6011

Off-Highway Truck : TM6039

On-Highway Truck : TM6038

Date Released : 11/23/11

Performance Number: DM9933

Change Level: 03

SALES MODEL:	C32	COMBUSTION:	DI
ENGINE POWER (BHP):	1,474	ENGINE SPEED (RPM):	1,800
GEN POWER WITH FAN (EKW):	1,000.0	HERTZ:	60
COMPRESSION RATIO:	15.0	FAN POWER (HP):	56.3
APPLICATION:	PACKAGED GENSET	ADDITIONAL PARASITICS (HP):	1.3
RATING LEVEL:	STANDBY	ASPIRATION:	TA
SUB APPLICATION:	STANDARD	AFTERCOOLER TYPE:	ATAAC
PUMP QUANTITY:	1	AFTERCOOLER CIRCUIT TYPE:	JW+OC, ATAAC
FUEL TYPE:	DIESEL	INLET MANIFOLD AIR TEMP (F):	120
MANIFOLD TYPE:	DRY	JACKET WATER TEMP (F):	210.2
GOVERNOR TYPE:	ADEM4	TURBO CONFIGURATION:	PARALLEL
ELECTRONICS TYPE:	ADEM4	TURBO QUANTITY:	2
IGNITION TYPE:	CI	TURBOCHARGER MODEL:	GTB45518BS-52T-1.37
INJECTOR TYPE:	EUI	CERTIFICATION YEAR:	2007
REF EXH STACK DIAMETER (IN):	8	PISTON SPD @ RATED ENG SPD (FT/MIN):	1,913.4
MAX OPERATING ALTITUDE (FT):	997		

General Performance Data

GENSET POWER WITH FAN	PERCENT LOAD	ENGINE POWER	BRAKE MEAN EFF PRES (BMEP)	BRAKE SPEC FUEL CONSUMPTN (BSFC)	VOL FUEL CONSUMPTN (VFC)	INLET MFLD PRES	INLET MFLD TEMP	EXH MFLD TEMP	EXH MFLD PRES	ENGINE OUTLET TEMP
EKW	%	BHP	PSI	LB/BHP-HR	GAL/HR	IN-HG	DEG F	DEG F	IN-HG	DEG F
1,000.0	100	1,474	331	0.342	71.9	70.3	118.2	1,209.3	58.1	889.5
900.0	90	1,330	299	0.341	64.7	64.0	111.0	1,150.9	51.9	855.4
800.0	80	1,187	267	0.349	59.2	60.4	106.5	1,116.3	48.6	832.2
750.0	75	1,116	251	0.354	56.4	57.9	103.8	1,100.0	46.6	821.0
700.0	70	1,046	235	0.354	52.9	53.7	99.5	1,077.6	43.2	810.0
600.0	60	905	203	0.353	45.7	43.7	90.1	1,025.8	35.3	788.8
500.0	50	765	172	0.350	38.2	32.9	80.8	964.8	27.0	768.5
400.0	40	628	141	0.351	31.5	23.9	74.7	895.9	20.5	731.2
300.0	30	490	110	0.357	25.0	15.7	70.4	812.1	15.1	676.7
250.0	25	420	94	0.363	21.8	12.0	68.9	764.0	12.7	643.0
200.0	20	350	79	0.374	18.7	8.7	67.9	708.9	10.6	601.8
100.0	10	206	46	0.425	12.5	4.5	67.5	569.8	7.8	489.0

GENSET POWER WITH FAN	PERCENT LOAD	ENGINE POWER	COMPRESSOR OUTLET PRES	COMPRESSOR OUTLET TEMP	WET INLET AIR VOL FLOW RATE	ENGINE OUTLET WET EXH GAS VOL FLOW RATE	WET INLET AIR MASS FLOW RATE	WET EXH GAS MASS FLOW RATE	WET EXH VOL FLOW RATE (32 DEG F AND 29.98 IN HG)	DRY EXH VOL FLOW RATE (32 DEG F AND 29.98 IN HG)
EKW	%	BHP	IN-HG	DEG F	CFM	CFM	LB/HR	LB/HR	FT3/MIN	FT3/MIN
1,000.0	100	1,474	76	422.1	3,094.1	8,065.3	13,465.4	13,968.9	2,939.2	2,688.4
900.0	90	1,330	69	391.5	2,939.0	7,417.0	12,749.0	13,202.3	2,773.0	2,544.8
800.0	80	1,187	65	375.1	2,856.2	7,051.1	12,358.8	12,773.3	2,683.6	2,472.3
750.0	75	1,116	63	363.9	2,783.7	6,813.1	12,021.7	12,415.6	2,615.7	2,413.9
700.0	70	1,046	58	343.3	2,639.5	6,395.9	11,355.9	11,723.5	2,476.8	2,288.3
600.0	60	905	48	302.6	2,355.5	5,576.9	10,061.2	10,377.6	2,196.4	2,033.1
500.0	50	765	37	262.3	2,076.5	4,775.6	8,810.4	9,077.6	1,911.9	1,773.0
400.0	40	628	27	223.0	1,805.8	4,001.6	7,595.0	7,814.6	1,652.1	1,535.9
300.0	30	490	18	183.7	1,537.6	3,237.7	6,435.6	6,610.0	1,400.8	1,306.8
250.0	25	420	14	163.9	1,403.3	2,856.8	5,874.1	6,026.7	1,273.8	1,190.9
200.0	20	350	11	146.2	1,286.2	2,507.0	5,386.7	5,517.7	1,161.2	1,089.1
100.0	10	206	6	122.6	1,147.6	1,981.6	4,797.2	4,885.1	1,027.0	974.3

Heat Rejection Data

GENSET POWER WITH FAN	PERCENT LOAD	ENGINE POWER	REJECTION TO JACKET WATER	REJECTION TO ATMOSPHERE	REJECTION TO EXH	EXHAUST RECOVERY TO 350F	FROM OIL COOLER	FROM AFTERCOOLER	WORK ENERGY	LOW HEAT VALUE ENERGY	HIGH HEAT VALUE ENERGY
EKW	%	BHP	BTU/MIN	BTU/MIN	BTU/MIN	BTU/MIN	BTU/MIN	BTU/MIN	BTU/MIN	BTU/MIN	BTU/MIN
1,000.0	100	1,474	20,033	7,238	58,206	31,961	8,218	16,385	62,497	154,292	164,360
900.0	90	1,330	18,378	6,464	52,445	28,178	7,400	14,318	56,390	138,929	147,994
800.0	80	1,187	16,891	5,941	48,853	25,916	6,766	13,293	50,345	127,034	135,323
750.0	75	1,116	16,127	6,236	46,672	24,565	6,445	12,521	47,342	121,002	128,897
700.0	70	1,046	15,231	6,920	43,437	22,625	6,051	11,086	44,338	113,600	121,012
600.0	60	905	13,439	6,738	37,282	19,058	5,220	8,561	38,371	97,997	104,392
500.0	50	765	11,741	5,267	31,535	15,862	4,369	6,404	32,440	82,034	87,386
400.0	40	628	10,827	4,384	25,642	12,387	3,599	4,511	26,618	67,572	71,982
300.0	30	490	9,885	3,711	19,869	8,929	2,858	2,920	20,779	53,663	57,165
250.0	25	420	9,298	3,442	17,092	7,276	2,495	2,235	17,832	46,843	49,899
200.0	20	350	8,559	3,149	14,473	5,698	2,136	1,689	14,848	40,103	42,719
100.0	10	206	6,645	2,319	9,873	2,744	1,432	1,058	8,742	26,884	28,638

Emissions Data

RATED SPEED POTENTIAL SITE VARIATION: 1800 RPM

GENSET POWER WITH FAN	EKW	1,000.0	750.0	500.0	250.0	100.0
TOTAL NOX (AS NO2)	G/HR	8,726	5,093	3,335	2,252	1,328
TOTAL CO	G/HR	356	235	501	819	1,263
TOTAL HC	G/HR	37	104	99	75	153
PART MATTER	G/HR	51.8	39.2	67.6	105.5	83.2
TOTAL NOX (AS NO2)	(CORR 5% O2) MG/NM3	2,841.8	2,105.6	2,041.6	2,429.4	2,417.2
TOTAL CO	(CORR 5% O2) MG/NM3	116.1	93.7	305.5	894.8	2,570.4
TOTAL HC	(CORR 5% O2) MG/NM3	10.3	37.8	52.6	69.6	283.1
PART MATTER	(CORR 5% O2) MG/NM3	14.1	13.5	35.5	106.1	135.6
TOTAL NOX (AS NO2)	(CORR 5% O2) PPM	1,384	1,026	994	1,183	1,177
TOTAL CO	(CORR 5% O2) PPM	93	75	244	716	2,056
TOTAL HC	(CORR 5% O2) PPM	19	71	98	130	528
TOTAL NOX (AS NO2)	G/HP-HR	5.97	4.59	4.38	5.37	6.45
TOTAL CO	G/HP-HR	0.24	0.21	0.66	1.95	6.14
TOTAL HC	G/HP-HR	0.03	0.09	0.13	0.18	0.74
PART MATTER	G/HP-HR	0.04	0.04	0.09	0.25	0.40
TOTAL NOX (AS NO2)	LB/HR	19.24	11.23	7.35	4.96	2.93
TOTAL CO	LB/HR	0.79	0.52	1.10	1.81	2.78
TOTAL HC	LB/HR	0.08	0.23	0.22	0.17	0.34
PART MATTER	LB/HR	0.11	0.09	0.15	0.23	0.18

RATED SPEED NOMINAL DATA: 1800 RPM

GENSET POWER WITH FAN	EKW	1,000.0	750.0	500.0	250.0	100.0
TOTAL NOX (AS NO2)	G/HR	7,212	4,209	2,756	1,861	1,097
TOTAL CO	G/HR	191	126	268	438	676
TOTAL HC	G/HR	19	55	52	40	81
TOTAL CO2	KG/HR	721	564	380	217	124
PART MATTER	G/HR	26.6	20.1	34.7	54.1	42.7
TOTAL NOX (AS NO2)	(CORR 5% O2) MG/NM3	2,348.6	1,740.1	1,687.3	2,007.8	1,997.7
TOTAL CO	(CORR 5% O2) MG/NM3	62.1	50.1	163.4	478.5	1,374.6
TOTAL HC	(CORR 5% O2) MG/NM3	5.5	20.0	27.8	36.8	149.8
PART MATTER	(CORR 5% O2) MG/NM3	7.2	6.9	18.2	54.4	69.5
TOTAL NOX (AS NO2)	(CORR 5% O2) PPM	1,144	848	822	978	973
TOTAL CO	(CORR 5% O2) PPM	50	40	131	383	1,100
TOTAL HC	(CORR 5% O2) PPM	10	37	52	69	280
TOTAL NOX (AS NO2)	G/HP-HR	4.93	3.79	3.62	4.43	5.33
TOTAL CO	G/HP-HR	0.13	0.11	0.35	1.04	3.28
TOTAL HC	G/HP-HR	0.01	0.05	0.07	0.09	0.39
PART MATTER	G/HP-HR	0.02	0.02	0.05	0.13	0.21
TOTAL NOX (AS NO2)	LB/HR	15.90	9.28	6.08	4.10	2.42
TOTAL CO	LB/HR	0.42	0.28	0.59	0.97	1.49
TOTAL HC	LB/HR	0.04	0.12	0.12	0.09	0.18
TOTAL CO2	LB/HR	1,589	1,244	839	478	273
PART MATTER	LB/HR	0.06	0.04	0.08	0.12	0.09
OXYGEN IN EXH	%	10.1	11.5	12.2	13.5	15.7
DRY SMOKE OPACITY	%	0.7	0.7	1.4	3.0	2.2
BOSCH SMOKE NUMBER		0.18	0.16	0.58	1.31	0.99

Regulatory Information

EPA TIER 2		2006 - 2010			
GASEOUS EMISSIONS DATA MEASUREMENTS ARE CONSISTENT WITH THOSE DESCRIBED IN EPA 40 CFR PART 89 SUBPART D AND ISO 8178 FOR MEASURING HC, CO, PM, AND NOX. GASEOUS EMISSIONS VALUES ARE WEIGHTED CYCLE AVERAGES AND ARE IN COMPLIANCE WITH THE NON-ROAD REGULATIONS.					
Locality	Agency	Regulation	Tier/Stage	Max Limits - G/BKW - HR	
U.S. (INCL CALIF)	EPA	NON-ROAD	TIER 2	CO: 3.5 NOx + HC: 6.4 PM: 0.20	

EPA EMERGENCY STATIONARY		2011 - ----			
GASEOUS EMISSIONS DATA MEASUREMENTS ARE CONSISTENT WITH THOSE DESCRIBED IN EPA 40 CFR PART 60 SUBPART IIII AND ISO 8178 FOR MEASURING HC, CO, PM, AND NOX. GASEOUS EMISSIONS LIMIT VALUES ARE WEIGHTED CYCLE AVERAGES AND ARE IN COMPLIANCE WITH THE NON-ROAD REGULATIONS.					
Locality	Agency	Regulation	Tier/Stage	Max Limits - G/BKW - HR	
U.S. (INCL CALIF)	EPA	STATIONARY	EMERGENCY STATIONARY	CO: 3.5 NOx + HC: 6.4 PM: 0.20	

PERFORMANCE DATA [MHB00494]**NOVEMBER 20, 2014****(MHB00494)-ENGINE (G5Y00603)-GENERATOR (NAM00360)
-GENSET**For Help Desk Phone Numbers [Click here](#)

Perf No: DM8454

Change Level: 01

General	Heat Rejection	Emissions Regulatory	Altitude Derate	Cross Reference	General Notes	Supplementary Data	Perf Param Ref
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View PDF

SALES MODEL:	3516C	COMBUSTION:	DI
ENGINE POWER (BHP):	2,722	ENGINE SPEED (RPM):	1,800
GEN POWER WITH FAN (EKW):	1,825.0	HERTZ:	60
COMPRESSION RATIO:	14.7	FAN POWER (HP):	144.8
RATING LEVEL:	PRIME	ASPIRATION:	TA
PUMP QUANTITY:	2	AFTERCOOLER TYPE:	ATAAC
FUEL TYPE:	DIESEL	AFTERCOOLER CIRCUIT TYPE:	JW+OC, ATAAC
MANIFOLD TYPE:	DRY	INLET MANIFOLD AIR TEMP (F):	120
GOVERNOR TYPE:	ADEM3	JACKET WATER TEMP (F):	210.2
ELECTRONICS TYPE:	ADEM3	TURBO CONFIGURATION:	PARALLEL
CAMSHAFT TYPE:	STANDARD	TURBO QUANTITY:	4
IGNITION TYPE:	CI	TURBOCHARGER MODEL:	GTA5518BN-56T-1.12
INJECTOR TYPE:	EUI	CERTIFICATION YEAR:	2008
FUEL INJECTOR:	2664387	CRANKCASE BLOWBY RATE (FT3/HR):	2,690.7
REF EXH STACK DIAMETER (IN):	12	FUEL RATE (RATED RPM) NO LOAD (GAL/HR):	13.7
MAX OPERATING ALTITUDE (FT):	3,937	PISTON SPD @ RATED ENG SPD (FT/MIN):	2,244.1

INDUSTRY	SUB INDUSTRY	APPLICATION
ELECTRIC POWER	STANDARD	PACKAGED GENSET

General Performance Data [Top](#)

GENSET POWER WITH FAN	PERCENT LOAD	ENGINE POWER	BRAKE MEAN EFF PRES (BMEP)	BRAKE SPEC FUEL CONSUMPTN (BSFC)	VOL FUEL CONSUMPTN (VFC)	INLET MFLD PRES	INLET MFLD TEMP	EXH MFLD TEMP	EXH MFLD PRES	ENGINE OUTLET TEMP
EKW	%	BHP	PSI	LB/BHP-HR	GAL/HR	IN-HG	DEG F	DEG F	IN-HG	DEG F
1,825.0	100	2,721	284	0.330	128.4	74.6	120.0	1,080.6	67.3	729.8
1,642.5	90	2,450	256	0.335	117.1	69.8	118.7	1,040.1	62.0	702.9
1,460.0	80	2,188	229	0.341	106.6	64.8	117.4	1,005.1	56.8	683.4
1,368.8	75	2,059	215	0.345	101.4	62.1	116.8	987.9	54.2	675.3
1,277.5	70	1,931	202	0.348	96.0	59.1	116.1	970.6	51.4	667.6
1,095.0	60	1,678	175	0.355	85.0	52.1	114.7	936.4	44.9	654.3
912.5	50	1,429	149	0.357	72.9	42.7	113.1	897.8	36.8	647.4
730.0	40	1,181	123	0.358	60.3	31.8	111.4	849.9	27.9	643.2
547.5	30	932	97	0.368	49.0	22.7	110.4	792.6	20.9	633.2
456.2	25	806	84	0.377	43.4	18.8	110.1	757.8	18.0	624.1
365.0	20	678	71	0.391	37.9	15.2	109.7	717.6	15.4	611.2
182.5	10	416	43	0.448	26.7	9.1	109.1	599.5	11.0	542.8

GENSET POWER WITH FAN	PERCENT LOAD	ENGINE POWER	COMPRESSOR OUTLET PRES	COMPRESSOR OUTLET TEMP	WET INLET AIR VOL FLOW RATE	ENGINE OUTLET WET EXH GAS VOL FLOW RATE	WET INLET AIR MASS FLOW RATE	WET EXH GAS MASS FLOW RATE	WET EXH VOL FLOW RATE (32 DEG F AND 29.98 IN HG)	DRY EXH VOL FLOW RATE (32 DEG F AND 29.98 IN HG)
EKW	%	BHP	IN-HG	DEG F	CFM	CFM	LB/HR	LB/HR	FT3/MIN	FT3/MIN
1,825.0	100	2,721	79	435.7	6,268.9	14,338.0	27,207.2	28,105.6	5,926.5	5,492.9
1,642.5	90	2,450	74	412.9	6,078.0	13,483.9	26,275.7	27,094.6	5,702.7	5,307.2
1,460.0	80	2,188	69	390.8	5,848.9	12,707.3	25,203.9	25,948.7	5,465.7	5,103.8
1,368.8	75	2,059	66	380.0	5,717.7	12,303.7	24,603.8	25,313.9	5,329.9	4,984.5
1,277.5	70	1,931	63	368.2	5,567.0	11,865.4	23,915.9	24,589.3	5,175.4	4,847.0
1,095.0	60	1,678	56	340.7	5,183.9	10,864.4	22,185.9	22,781.5	4,795.0	4,502.4
912.5	50	1,429	46	303.3	4,622.0	9,569.6	19,690.3	20,200.9	4,249.9	3,997.8
730.0	40	1,181	34	258.8	3,948.4	8,096.6	16,730.6	17,153.0	3,609.6	3,400.7
547.5	30	932	25	218.2	3,368.4	6,825.8	14,210.5	14,552.7	3,071.0	2,900.3
456.2	25	806	21	199.4	3,113.1	6,238.2	13,110.4	13,414.0	2,830.1	2,677.7
365.0	20	678	17	181.4	2,876.7	5,668.5	12,097.3	12,362.8	2,602.6	2,467.9
182.5	10	416	11	149.1	2,472.2	4,547.9	10,369.3	10,556.0	2,230.7	2,131.7

Heat Rejection Data [Top](#)

GENSET POWER WITH FAN	PERCENT LOAD	ENGINE POWER	REJECTION TO JACKET WATER	REJECTION TO ATMOSPHERE	REJECTION TO EXH	EXHUAUST RECOVERY TO 350F	FROM OIL COOLER	FROM AFTERCOOLER	WORK ENERGY	LOW HEAT VALUE ENERGY	HI HE VA EN
EKW	%	BHP	BTU/MIN	BTU/MIN	BTU/MIN	BTU/MIN	BTU/MIN	BTU/MIN	BTU/MIN	BTU/MIN	BT
1,825.0	100	2,721	41,176	7,412	94,610	44,575	14,683	34,659	115,390	275,674	29
1,642.5	90	2,450	38,527	7,062	86,743	39,775	13,387	31,101	103,910	251,335	26
1,460.0	80	2,188	36,026	6,778	79,970	35,886	12,183	27,695	92,774	228,740	24
1,368.8	75	2,059	34,762	6,647	76,682	34,111	11,589	26,040	87,309	217,577	23
1,277.5	70	1,931	33,450	6,524	73,236	32,303	10,979	24,222	81,880	206,135	21
1,095.0	60	1,678	30,660	6,282	65,884	28,619	9,717	20,121	71,174	182,439	19
912.5	50	1,429	27,479	6,000	57,347	24,769	8,336	15,125	60,594	156,515	16
730.0	40	1,181	24,011	5,699	48,105	20,709	6,897	9,899	50,098	129,496	13
547.5	30	932	20,680	5,394	39,921	16,936	5,597	6,112	39,536	105,077	11
456.2	25	806	18,997	5,238	36,022	15,084	4,965	4,652	34,192	93,210	99
365.0	20	678	17,246	5,079	32,081	13,220	4,333	3,430	28,772	81,353	86
182.5	10	416	13,382	4,712	23,624	8,251	3,047	1,543	17,652	57,208	60

Emissions Data [Top](#)

Units Filter

RATED SPEED POTENTIAL SITE VARIATION: 1800 RPM

GENSET POWER WITH FAN	EKW	1,825.0	1,368.8	912.5	456.2	182.5
ENGINE POWER	BHP	2,721	2,059	1,429	806	416
PERCENT LOAD	%	100	75	50	25	10
TOTAL NOX (AS NO2)	G/HR	16,211	8,787	5,621	4,219	3,018
TOTAL CO	G/HR	1,310	758	1,119	1,803	1,832
TOTAL HC	G/HR	463	490	508	414	450
PART MATTER	G/HR	100.3	99.7	149.3	256.4	204.4
TOTAL NOX (AS NO2)	(CORR 5% O2) MG/NM3	3,031.7	2,151.1	1,936.1	2,415.5	2,867.1
TOTAL CO	(CORR 5% O2) MG/NM3	237.1	174.2	373.5	931.1	1,712.5
TOTAL HC	(CORR 5% O2) MG/NM3	73.4	97.2	140.5	198.7	377.7
PART MATTER	(CORR 5% O2) MG/NM3	15.6	20.0	46.6	122.2	158.8
TOTAL NOX (AS NO2)	(CORR 5% O2) PPM	1,477	1,048	943	1,177	1,397
TOTAL CO	(CORR 5% O2) PPM	190	139	299	745	1,370
TOTAL HC	(CORR 5% O2) PPM	137	181	262	371	705

GENSET POWER WITH FAN	EKW	1,825.0	1,368.8	912.5	456.2	182.5
ENGINE POWER	BHP	2,721	2,059	1,429	806	416
PERCENT LOAD	%	100	75	50	25	10
TOTAL NOX (AS NO2)	G/HP-HR	5.99	4.29	3.95	5.24	7.26
TOTAL CO	G/HP-HR	0.48	0.37	0.79	2.24	4.40
TOTAL HC	G/HP-HR	0.17	0.24	0.36	0.51	1.08
PART MATTER	G/HP-HR	0.04	0.05	0.10	0.32	0.49
TOTAL NOX (AS NO2)	LB/HR	35.74	19.37	12.39	9.30	6.65
TOTAL CO	LB/HR	2.89	1.67	2.47	3.97	4.04
TOTAL HC	LB/HR	1.02	1.08	1.12	0.91	0.99
PART MATTER	LB/HR	0.22	0.22	0.33	0.57	0.45

RATED SPEED NOMINAL DATA: 1800 RPM

GENSET POWER WITH FAN	EKW	1,825.0	1,368.8	912.5	456.2	182.5
ENGINE POWER	BHP	2,721	2,059	1,429	806	416
PERCENT LOAD	%	100	75	50	25	10
TOTAL NOX (AS NO2)	G/HR	13,509	7,322	4,684	3,516	2,515
TOTAL CO	G/HR	728	421	622	1,002	1,018
TOTAL HC	G/HR	348	368	382	311	339
TOTAL CO2	KG/HR	1,261	998	717	426	259
PART MATTER	G/HR	71.6	71.2	106.6	183.1	146.0
TOTAL NOX (AS NO2)	(CORR 5% O2) MG/NM3	2,526.5	1,792.6	1,613.4	2,012.9	2,389.2
TOTAL CO	(CORR 5% O2) MG/NM3	131.7	96.8	207.5	517.3	951.4
TOTAL HC	(CORR 5% O2) MG/NM3	55.2	73.1	105.6	149.4	284.0
PART MATTER	(CORR 5% O2) MG/NM3	11.1	14.3	33.3	87.3	113.4
TOTAL NOX (AS NO2)	(CORR 5% O2) PPM	1,231	873	786	981	1,164
TOTAL CO	(CORR 5% O2) PPM	105	77	166	414	761
TOTAL HC	(CORR 5% O2) PPM	103	136	197	279	530
TOTAL NOX (AS NO2)	G/HP-HR	4.99	3.57	3.29	4.37	6.05
TOTAL CO	G/HP-HR	0.27	0.21	0.44	1.24	2.45
TOTAL HC	G/HP-HR	0.13	0.18	0.27	0.39	0.81
PART MATTER	G/HP-HR	0.03	0.03	0.07	0.23	0.35
TOTAL NOX (AS NO2)	LB/HR	29.78	16.14	10.33	7.75	5.55
TOTAL CO	LB/HR	1.60	0.93	1.37	2.21	2.24
TOTAL HC	LB/HR	0.77	0.81	0.84	0.69	0.75
TOTAL CO2	LB/HR	2,781	2,199	1,581	939	570
PART MATTER	LB/HR	0.16	0.16	0.24	0.40	0.32
OXYGEN IN EXH	%	11.4	12.6	13.5	14.3	15.8
DRY SMOKE OPACITY	%	0.4	0.5	1.8	3.8	3.1
BOSCH SMOKE NUMBER		0.18	0.23	0.60	1.25	1.14

Regulatory Information [Top](#)

EPA TIER 2		2006 - 2010				
GASEOUS EMISSIONS DATA MEASUREMENTS PROVIDED TO THE EPA ARE CONSISTENT WITH THOSE DESCRIBED IN EPA 40 CFR PART 89 SUBPART D AND ISO 8178 FOR MEASURING HC, CO, PM, AND NOX. THE "MAX LIMITS" SHOWN BELOW ARE WEIGHTED CYCLE AVERAGES AND ARE IN COMPLIANCE WITH THE NON-ROAD REGULATIONS.						
Locality	Agency	Regulation	Tier/Stage	Max Limits - G/BKW - HR		
U.S. (INCL CALIF)	EPA	NON-ROAD	TIER 2	CO: 3.5 NOx + HC: 6.4 PM: 0.20		
EPA EMERGENCY STATIONARY		2011 - ----				
GASEOUS EMISSIONS DATA MEASUREMENTS PROVIDED TO THE EPA ARE CONSISTENT WITH THOSE DESCRIBED IN EPA 40 CFR PART 60 SUBPART IIII AND ISO 8178 FOR MEASURING HC, CO, PM, AND NOX. THE "MAX LIMITS" SHOWN BELOW ARE WEIGHTED CYCLE AVERAGES AND ARE IN COMPLIANCE WITH THE EMERGENCY STATIONARY REGULATIONS.						
Locality	Agency	Regulation	Tier/Stage	Max Limits - G/BKW - HR		
U.S. (INCL CALIF)	EPA	STATIONARY	EMERGENCY STATIONARY	CO: 3.5 NOx + HC: 6.4 PM: 0.20		

Altitude Derate Data [Top](#)

ALTITUDE CORRECTED POWER CAPABILITY (BHP)

GEN SET PACKAGE PERFORMANCE DATA [DM8263]

Performance Number: DM8263

Sales Model: 3516CDITA	Combustion: DI	Aspr: TA
Engine Power: 2000 W/F EKW 2080 W/O F EKW 2,937 HP	Speed: 1,800 RPM	After Cooler: ATAAC
Manifold Type: DRY	Governor Type: ADEM3	After Cooler Temp(F): 122
Turbo Quantity: 4	Engine App: GP	Turbo Arrangement: Parallel
Hertz: 60	Engine Rating: PGS	Strategy:
Rating Type: STANDBY	Certification: EPA TIER-2 2006 -	

General Performance Data

GEN W/F EKW	PERCENT LOAD	ENGINE POWER BHP	ENGINE BMEP PSI	FUEL RATE LB/BHP-HR	FUEL RATE GPH	INTAKE MFLD TEMP DEG F	INTAKE MFLD P IN-HG	INTAKE AIR FLOW CFM	EXH MFLD TEMP DEG F	EXH STACK TEMP DEG F	EXH GAS FLOW CFM
2,000.0	100	2937	307	0.331	138.9	121.5	78.7	6,367.2	1,123.2	769.6	15,234.8
1,800.0	90	2641	276	0.333	125.5	119.7	73.4	6,130.6	1,070.1	730.6	14,193.0
1,600.0	80	2353	246	0.338	113.5	118.2	68.3	5,897.6	1,028.7	704.5	13,292.5
1,500.0	75	2212	231	0.341	107.8	117.5	65.5	5,763.4	1,009.6	694.2	12,861.6
1,400.0	70	2071	216	0.345	102.1	117.0	62.5	5,615.0	990.7	685.4	12,434.3
1,200.0	60	1795	188	0.353	90.4	115.3	55.7	5,247.8	953.2	669.6	11,449.0
1,000.0	50	1521	159	0.358	77.7	113.7	46.6	4,718.0	914.4	659.1	10,184.8
800.0	40	1253	131	0.358	64.1	111.9	35.1	4,001.2	865.2	655.3	8,606.2
600.0	30	979	102	0.365	51.0	110.7	24.3	3,330.2	804.7	648.3	7,126.5
500.0	25	839	88	0.375	44.9	110.1	19.8	3,044.1	767.5	639.7	6,459.1
400.0	20	698	73	0.389	38.7	109.8	15.7	2,782.8	724.6	627.4	5,819.9
200.0	10	409	43	0.451	26.4	109.0	8.9	2,348.4	596.1	554.4	4,580.3

Heat Rejection Data

GEN W/F EKW	PERCENT LOAD	REJ TO JW BTU/MN	REJ TO ATMOS BTU/MN	REJ TO EXHAUST BTU/MN	EXH RCOV TO 350F BTU/MN	FROM OIL CLR BTU/MN	FROM AFT CLR BTU/MN	WORK ENERGY BTU/MN	LHV ENERGY BTU/MN	HHV ENERGY BTU/MN
2,000.0	100	42,482	7,791	103,617	49,704	14,900	37,875	124,545	298,055	317,505
1,800.0	90	39,468	7,336	93,494	43,107	13,478	33,724	111,977	269,336	286,909
1,600.0	80	36,681	6,938	85,475	38,387	12,170	29,970	99,750	243,687	259,611
1,500.0	75	35,316	6,824	81,779	36,340	11,545	28,151	93,778	231,404	246,531
1,400.0	70	33,951	6,654	78,139	34,406	10,976	26,274	87,864	219,233	233,508
1,200.0	60	31,108	6,369	70,462	30,539	9,725	22,179	76,092	193,983	206,665
1,000.0	50	27,809	6,085	61,704	26,444	8,360	17,232	64,490	166,799	177,718
800.0	40	24,170	5,801	51,695	22,122	6,881	11,545	53,116	137,568	146,554
600.0	30	20,473	5,460	42,311	17,971	5,460	6,711	41,515	109,531	116,697
500.0	25	18,653	5,289	37,875	15,924	4,834	5,005	35,601	96,281	102,593
400.0	20	16,777	5,118	33,383	13,876	4,152	3,583	29,572	83,144	88,546
200.0	10	12,682	4,720	23,999	8,474	2,843	1,479	17,345	56,586	60,282

EMISSIONS DATA

EPA TIER-2 2006 - ***** B5
 Gaseous emissions data measurements are consistent with those described in EPA 40 CFR PART 89 SUBPART D and ISO 8178 for measuring HC, CO, PM, and NOx.

Gaseous emissions values are WEIGHTED CYCLE AVERAGES and are in compliance with the following non-road regulations:

LOCALITY	AGENCY/LEVEL	MAX LIMITS - g/kw-hr		
U.S. (incl Calif)	EPA/TIER-2	CO:3.5	NOx + HC:6.4	PM:0.20

EXHAUST STACK DIAMETER	12 IN
WET EXHAUST MASS	29,056.9 LB/HR
WET EXHAUST FLOW (768.20 F STACK TEMP)	15,245.36 CFM
WET EXHAUST FLOW RATE (32 DEG F AND 29.98 IN HG)	6,071.00 STD CFM
DRY EXHAUST FLOW RATE (32 DEG F AND 29.98 IN HG)	5,562.07 STD CFM
FUEL FLOW RATE	138 GAL/HR

RATED SPEED "Nominal Data"

GEN PWR EKW	PERCENT LOAD	ENGINE POWER BHP	TOTAL NOX (AS NO2) LB/HR	TOTAL CO LB/HR	TOTAL HC LB/HR	TOTAL CO2 LB/HR	PART MATTER LB/HR	OXYGEN IN EXHAUST PERCENT	DRY SMOKE OPACITY PERCENT	BOSCH SMOKE NUMBER
2,000.0	100	2937	34.89	1.91	0.69	3,021.7	0.170	10.80	0.5	1.28
1,500.0	75	2212	18.78	1.04	0.84	2,348.7	0.160	12.30	0.8	1.28
1,000.0	50	1521	10.71	1.11	0.85	1,692.1	0.200	13.40	1.4	1.28
500.0	25	839	7.86	2.18	0.71	974.4	0.400	14.20	4.1	1.31
200.0	10	409	5.41	2.25	0.75	565.0	0.320	15.90	3.8	1.31

RATED SPEED "Nominal Data"

GEN PWR EKW	PERCENT LOAD	ENGINE POWER BKW	TOTAL NOX (AS NO2) G/HP-HR	TOTAL CO G/HP-HR	TOTAL HC G/HP-HR	PART MATTER G/HP-HR	OXYGEN IN EXHAUST PERCENT	DRY SMOKE OPACITY PERCENT	BOSCH SMOKE NUMBER
2,000.0	100	2,190.3	5.39	0.29	0.11	0.03	10.80	0.5	1.28
1,500.0	75	1,649.1	3.85	0.21	0.17	0.03	12.30	0.8	1.28
1,000.0	50	1,134.3	3.19	0.33	0.25	0.06	13.40	1.4	1.28
500.0	25	625.5	4.25	1.18	0.38	0.22	14.20	4.1	1.31
200.0	10	305.2	5.99	2.49	0.83	0.35	15.90	3.8	1.31

Mission Critical Standby 2500 kW 3125 kVA

60 Hz 1800 rpm 480 Volts



TECHNICAL DATA

Open Generator Set - - 1800 rpm/60 Hz/480 Volts	DM9228	
EPA Certified for Stationary Emergency Application (EPA Tier 2 emissions levels)		
Generator Set Package Performance Genset Power rating @ 0.8 pf Genset Power rating with fan	3125 kVA 2500 kW	
Fuel Consumption 100% load with fan 75% load with fan 50% load with fan	656.8 L/hr 510.8 L/hr 372.4 L/hr	173.5 Gal/hr 134.9 Gal/hr 98.4 Gal/hr
Cooling System¹ Air flow restriction (system) Engine Coolant capacity with radiator/exp. tank Engine coolant capacity Radiator coolant capacity	0.12 kPa 504.0 L 233.0 L 271.0 L	0.48 in. water 133.1 gal 61.6 gal 71.6 gal
Inlet Air Combustion air inlet flow rate	204.2 m ³ /min	7211.3 cfm
Exhaust System Exhaust stack gas temperature Exhaust gas flow rate Exhaust flange size (internal diameter) Exhaust system backpressure (maximum allowable)	490.7 ° C 554.5 m ³ /min 203.2 mm 6.7 kPa	915.3 ° F 19582.0 cfm 8.0 in 26.9 in. water
Heat Rejection Heat rejection to coolant (total) Heat rejection to exhaust (total) Heat rejection to aftercooler Heat rejection to atmosphere from engine Heat rejection to atmosphere from generator	826 kW 2502 kW 786 kW 161 kW 101.5 kW	46975 Btu/min 142288 Btu/min 44700 Btu/min 9156 Btu/min 5772.3 Btu/min
Alternator² Motor starting capability @ 30% voltage dip Frame Temperature Rise	7736 skVA 1844 125 ° C	225 ° F
Lube System Sump refill with filter	401.3 L	106.0 gal
Emissions (Nominal)³ NOx g/hp-hr CO g/hp-hr HC g/hp-hr PM g/hp-hr	5.32 g/hp-hr .42 g/hp-hr .1 g/hp-hr .037 g/hp-hr	

¹ For ambient and altitude capabilities consult your Cat dealer. Air flow restriction (system) is added to existing restriction from factory.

² Generator temperature rise is based on a 40 degree C ambient per NEMA MG1-32. UL 2200 Listed packages may have oversized generators with a different temperature rise and motor starting characteristics.

³ Emissions data measurement procedures are consistent with those described in EPA CFR 40 Part 89, Subpart D & E and ISO8178-1 for measuring HC, CO, PM, NOx. Data shown is based on steady state operating conditions of 77°F, 28.42 in HG and number 2 diesel fuel with 35° API and LHV of 18,390 btu/lb. The nominal emissions data shown is subject to instrumentation, measurement, facility and engine to engine variations. Emissions data is based on 100% load and thus cannot be used to compare to EPA regulations which use values based on a weighted cycle.

PERFORMANCE DATA[DM8266]

Performance Number: DM8266

Change Level: 04

SALES MODEL:	3516C	COMBUSTION:	DI
ENGINE POWER (BHP):	3,634	ENGINE SPEED (RPM):	1,800
GEN POWER WITH FAN (EKW):	2,500.0	HERTZ:	60
COMPRESSION RATIO:	14.7	FAN POWER (HP):	130.1
APPLICATION:	PACKAGED GENSET	ASPIRATION:	TA
RATING LEVEL:	STANDBY	AFTERCOOLER TYPE:	ATAAC
PUMP QUANTITY:	2	AFTERCOOLER CIRCUIT TYPE:	JW+OC, ATAAC
FUEL TYPE:	DIESEL	INLET MANIFOLD AIR TEMP (F):	122
MANIFOLD TYPE:	DRY	JACKET WATER TEMP (F):	210.2
GOVERNOR TYPE:	ADEM3	TURBO CONFIGURATION:	PARALLEL
ELECTRONICS TYPE:	ADEM3	TURBO QUANTITY:	4
CAMSHAFT TYPE:	STANDARD	TURBOCHARGER MODEL:	GT6041BN-48T-1.10
IGNITION TYPE:	CI	CERTIFICATION YEAR:	2006
INJECTOR TYPE:	EUI	CRANKCASE BLOWBY RATE (FT3/HR):	3,619.4
FUEL INJECTOR:	2501368	FUEL RATE (RATED RPM) NO LOAD (GAL/HR):	16.2
REF EXH STACK DIAMETER (IN):	12	PISTON SPD @ RATED ENG SPD (FT/MIN):	2,539.4
MAX OPERATING ALTITUDE (FT):	2,953		

General Performance Data

GENSET POWER WITH FAN	PERCENT LOAD	ENGINE POWER	BRAKE MEAN EFF PRES (BMEP)	BRAKE SPEC FUEL CONSUMPTN (BSFC)	VOL FUEL CONSUMPTN (VFC)	INLET MFLD PRES	INLET MFLD TEMP	EXH MFLD TEMP	EXH MFLD PRES	ENGINE OUTLET TEMP
EKW	%	BHP	PSI	LB/BHP-HR	GAL/HR	IN-HG	DEG F	DEG F	IN-HG	DEG F
2,500.0	100	3,633	336	0.334	173.5	78.1	121.9	1,235.6	67.6	915.2
2,250.0	90	3,283	303	0.335	157.1	71.3	119.4	1,190.0	61.3	881.2
2,000.0	80	2,935	271	0.339	142.3	64.3	116.9	1,158.9	55.3	864.0
1,875.0	75	2,760	255	0.342	134.9	60.7	115.8	1,145.6	52.3	858.5
1,750.0	70	2,586	239	0.346	127.6	57.0	114.7	1,133.3	49.3	854.6
1,500.0	60	2,237	207	0.354	113.0	49.5	112.7	1,112.4	43.2	851.2
1,250.0	50	1,889	174	0.365	98.4	41.3	111.0	1,091.8	36.8	850.7
1,000.0	40	1,547	143	0.373	82.5	31.4	109.4	1,061.5	29.3	856.6
750.0	30	1,203	111	0.385	66.2	21.7	107.9	1,010.3	22.1	848.2
625.0	25	1,029	95	0.394	57.9	17.2	107.2	968.3	18.7	831.1
500.0	20	854	79	0.403	49.2	12.7	106.4	902.0	15.5	796.1
250.0	10	497	46	0.441	31.3	4.8	104.1	700.7	9.8	647.3

GENSET POWER WITH FAN	PERCENT LOAD	ENGINE POWER	COMPRESSOR OUTLET PRES	COMPRESSOR OUTLET TEMP	WET INLET AIR VOL FLOW RATE	ENGINE OUTLET WET EXH GAS VOL FLOW RATE	WET INLET AIR MASS FLOW RATE	WET EXH GAS MASS FLOW RATE	WET EXH VOL FLOW RATE (32 DEG F AND 29.98 IN HG)	DRY EXH VOL FLOW RATE (32 DEG F AND 29.98 IN HG)
EKW	%	BHP	IN-HG	DEG F	CFM	CFM	LB/HR	LB/HR	FT3/MIN	FT3/MIN
2,500.0	100	3,633	85	466.7	7,212.2	19,578.8	32,046.3	33,260.4	7,001.7	6,362.4
2,250.0	90	3,283	78	443.0	6,831.8	17,980.7	30,219.3	31,318.8	6,593.0	6,013.7
2,000.0	80	2,935	70	417.8	6,404.5	16,560.6	28,284.6	29,277.2	6,151.5	5,625.4
1,875.0	75	2,760	66	404.7	6,173.3	15,893.2	27,261.3	28,202.4	5,928.1	5,427.1
1,750.0	70	2,586	63	391.2	5,929.9	15,232.6	26,196.0	27,086.8	5,698.4	5,222.0
1,500.0	60	2,237	55	363.5	5,411.9	13,879.0	23,947.5	24,739.5	5,205.5	4,779.1
1,250.0	50	1,889	46	334.6	4,843.3	12,413.0	21,444.3	22,133.2	4,657.5	4,283.2
1,000.0	40	1,547	36	297.5	4,121.4	10,609.5	18,262.0	18,840.0	3,963.0	3,647.2
750.0	30	1,203	25	249.8	3,423.0	8,763.8	15,175.3	15,640.3	3,294.6	3,037.8
625.0	25	1,029	21	223.4	3,104.6	7,844.6	13,765.1	14,171.8	2,988.1	2,760.8
500.0	20	854	16	197.2	2,791.2	6,823.5	12,376.2	12,722.2	2,671.7	2,476.1
250.0	10	497	7	152.3	2,237.9	4,800.2	9,917.6	10,136.8	2,132.0	1,999.8

PERFORMANCE DATA[DM8266]

December 21, 2011

Emissions Data**RATED SPEED NOT TO EXCEED DATA: 1800 RPM**

GENSET POWER WITH FAN	EKW	2,500.0	1,875.0	1,250.0	625.0	250.0
ENGINE POWER	BHP	3,633	2,760	1,889	1,029	497
PERCENT LOAD	%	100	75	50	25	10
TOTAL NOX (AS NO2)	G/HR	22,948	14,101	7,004	3,568	3,185
TOTAL CO	G/HR	2,726	1,304	1,092	1,496	2,098
TOTAL HC	G/HR	500	499	543	408	437
PART MATTER	G/HR	185.5	123.7	132.1	139.5	141.0
TOTAL NOX (AS NO2)	(CORR 5% O2) MG/NM3	2,818.9	2,229.5	1,544.3	1,352.7	2,230.2
TOTAL CO	(CORR 5% O2) MG/NM3	351.8	213.9	252.3	594.6	1,562.7
TOTAL HC	(CORR 5% O2) MG/NM3	55.9	72.8	108.8	140.7	282.4
PART MATTER	(CORR 5% O2) MG/NM3	19.7	16.5	25.8	48.5	88.2
TOTAL NOX (AS NO2)	(CORR 5% O2) PPM	1,373	1,086	752	659	1,086
TOTAL CO	(CORR 5% O2) PPM	281	171	202	476	1,242
TOTAL HC	(CORR 5% O2) PPM	104	136	203	263	527
TOTAL NOX (AS NO2)	G/HP-HR	6.38	5.15	3.74	3.50	6.47
TOTAL CO	G/HP-HR	0.76	0.48	0.58	1.47	4.26
TOTAL HC	G/HP-HR	0.14	0.18	0.29	0.40	0.89
PART MATTER	G/HP-HR	0.05	0.05	0.07	0.14	0.29
TOTAL NOX (AS NO2)	LB/HR	50.59	31.09	15.44	7.87	7.02
TOTAL CO	LB/HR	6.01	2.88	2.41	3.30	4.62
TOTAL HC	LB/HR	1.10	1.10	1.20	0.90	0.96
PART MATTER	LB/HR	0.41	0.27	0.29	0.31	0.31

RATED SPEED NOMINAL DATA: 1800 RPM

GENSET POWER WITH FAN	EKW	2,500.0	1,875.0	1,250.0	625.0	250.0
ENGINE POWER	BHP	3,633	2,760	1,889	1,029	497
PERCENT LOAD	%	100	75	50	25	10
TOTAL NOX (AS NO2)	G/HR	19,123	11,751	5,837	2,974	2,654
TOTAL CO	G/HR	1,515	725	607	831	1,165
TOTAL HC	G/HR	376	375	408	307	329
TOTAL CO2	KG/HR	1,740	1,340	966	559	296
PART MATTER	G/HR	132.5	88.4	94.3	99.6	100.7
TOTAL NOX (AS NO2)	(CORR 5% O2) MG/NM3	2,349.1	1,857.9	1,286.9	1,127.3	1,858.5
TOTAL CO	(CORR 5% O2) MG/NM3	195.4	118.8	140.1	330.3	862.6
TOTAL HC	(CORR 5% O2) MG/NM3	42.1	54.8	81.8	105.8	212.3
PART MATTER	(CORR 5% O2) MG/NM3	14.1	11.8	18.4	34.7	63.0
TOTAL NOX (AS NO2)	(CORR 5% O2) PPM	1,144	905	627	549	905
TOTAL CO	(CORR 5% O2) PPM	156	95	112	264	690
TOTAL HC	(CORR 5% O2) PPM	79	102	153	197	396
TOTAL NOX (AS NO2)	G/HP-HR	5.32	4.30	3.12	2.92	5.39
TOTAL CO	G/HP-HR	0.42	0.26	0.32	0.82	2.37
TOTAL HC	G/HP-HR	0.10	0.14	0.22	0.30	0.67
PART MATTER	G/HP-HR	0.04	0.03	0.05	0.10	0.20
TOTAL NOX (AS NO2)	LB/HR	42.16	25.91	12.87	6.56	5.85
TOTAL CO	LB/HR	3.34	1.60	1.34	1.83	2.57
TOTAL HC	LB/HR	0.83	0.83	0.90	0.68	0.72
TOTAL CO2	LB/HR	3,836	2,955	2,130	1,233	654
PART MATTER	LB/HR	0.29	0.19	0.21	0.22	0.22
OXYGEN IN EXH	%	9.4	10.4	11.3	12.2	14.4
DRY SMOKE OPACITY	%	1.7	1.4	1.9	2.5	3.8
BOSCH SMOKE NUMBER		0.58	0.49	0.62	0.92	1.27

DIESEL ENGINE-GENERATOR SET

2250-XC6DT2

2250 kW / 60 Hz / Standby
480 - 13.8kV

(Reference 2045-XC6DT2 for Prime Rating Technical Data)



SYSTEM RATINGS

Standby

Voltage (L-L)	480V**	600V	4160V	12470V	13200V	13800V
Phase	3	3	3	3	3	3
PF	0.8	0.8	0.8	0.8	0.8	0.8
Hz	60	60	60	60	60	60
kW	2250	2250	2250	2250	2250	2250
kVA	2812.5	2812.5	2812.5	2812.5	2812.5	2812.5
AMPS	3383	2706	390	130	123	118
skVA@30%						
Voltage Dip	8400	3900	5000	C/F	C/F	C/F
Generator Model*	744RSL4058	1020FDS1013	744FSM4376	1020FDH5584	1020FDH5584	1020FDH5584
Temp Rise	130 °C/40 °C	130 °C/40 °C	130 °C/40 °C	130 °C/40 °C	130 °C/40 °C	130 °C/40 °C
Connection	4 BAR WYE	6 LEAD WYE	6 LEAD WYE	6 LEAD WYE	6 LEAD WYE	6 LEAD WYE

* The Generator Model Number identified in the table is for standard C Series Configuration. Consult the factory for alternate configuration.

** UL 2200 Offered

CERTIFICATIONS AND STANDARDS

// **Emissions** – EPA Tier 2 Certified

// **Engine-generator set is designed and manufactured in facilities certified to standards ISO 9001:2008 and ISO 14001:2004**

// **Seismic Certification – Optional**

- IBC Certification
- OSHPD Pre-Approval

// **UL 2200 Listed – Optional**

// **Performance Assurance Certification (PAC)**

- Engine-Generator Set Tested to ISO 8528-5 for Transient Response
- Verified product design, quality and performance integrity
- All engine systems are prototype and factory tested

// **Power Rating**

- Accepts Rated Load in One Step Per NFPA 110
- Permissible average power output during 24 hours of operation is approved up to 85%.

APPLICATION DATA

// Engine

Manufacturer	MTU
Model	16V 4000 G83 (T1638A36)
Type	4-Cycle
Arrangement	16-V
Displacement: L (in ³)	76.3 (4,656)
Bore: cm (in)	17 (6.69)
Stroke: cm (in)	21 (8.27)
Compression Ratio	16.5:1
Rated RPM	1,800
Engine Governor	Electronic Isochronous (ADEC)
Maximum Power: kWm (bhp)	2,500 (3,351)
Speed Regulation	±0.25%
Air Cleaner	Dry

// Liquid Capacity (Lubrication)

Total Oil System: L (gal)	300 (79.3)
Engine Jacket Water Capacity: L (gal)	175 (46.2)
After Cooler Water Capacity: L (gal)	50 (13.2)
System Coolant Capacity: L (gal)	651 (172)

// Electrical

Electric Volts DC	24
Cold Cranking Amps Under -17.8 °C (0 °F)	2,600

// Fuel System

Fuel Supply Connection Size	#16 JIC 37° Female 1" NPT Adapter Provided
Fuel Return Connection Size	#16 JIC 37° Female 1" NPT Adapter Provided
Maximum Fuel Lift: m (ft)	1 (3)
Recommended Fuel	Diesel #2
Total Fuel Flow: L/hr (gal/hr)	1,020 (269)

// Fuel Consumption

	STANDBY
At 100% of Power Rating: L/hr (gal/hr)	617 (163)
At 75% of Power Rating: L/hr (gal/hr)	467 (123)
At 50% of Power Rating: L/hr (gal/hr)	325 (86)

// Cooling - Radiator System

	STANDBY
Ambient Capacity of Radiator: °C (°F)	40 (104)
Maximum Restriction of Cooling Air, Intake, and Discharge Side of Rad.: kPa (in. H ₂ O)	0.25 (1)
Water Pump Capacity: L/min (gpm)	1,350 (357)
After Cooler Pump Capacity: L/min (gpm)	583 (154)
Heat Rejection to Coolant: kW (BTUM)	967 (54,993)
Heat Rejection to After Cooler: kW (BTUM)	748 (42,539)
Heat Radiated to Ambient: kW (BTUM)	206 (11,711)

// Air Requirements

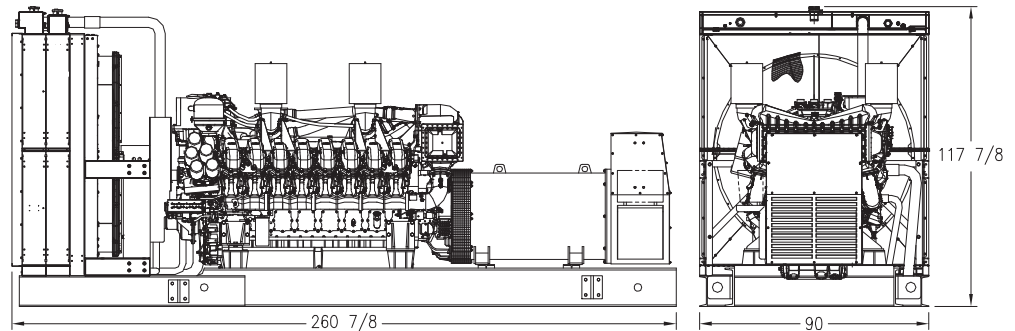
	STANDBY
Aspirating: *m ³ /min (SCFM)	192 (6,780)
Air Flow Required for Rad. Cooled Unit: *m ³ /min (SCFM)	2,520 (89,005)
Remote Cooled Applications; Air Flow Required for Dissipation of Radiated Gen-set Heat for a Max of 25 °F Rise: *m ³ /min (SCFM)	752 (26,412)

* Air density = 1.184 kg/m³ (0.0739 lbm/ft³)

// Exhaust System

	STANDBY
Gas Temp. (Stack): °C (°F)	505 (941)
Gas Volume at Stack Temp: m ³ /min (CFM)	504 (17,799)
Maximum Allowable Back Pressure: kPa (in. H ₂ O)	8.5 (34.1)

WEIGHTS AND DIMENSIONS



Drawing above for illustration purposes only, based on standard open power 480 volt engine-generator set. Lengths may vary with other voltages. Do not use for installation design. See website for unit specific template drawings.

System	Dimensions (L x W x H)	Weight (less tank)
OPU	6,630 x 2,290 x 2,990 mm (260.88 x 90 x 117.88 in)	16,994 kg (37,466 lb)

Weights and dimensions are based on open power units and are estimates only. Consult the factory for accurate weights and dimensions for your specific engine-generator set.

SOUND DATA

Unit Type	Standby Full Load
Level 0: Open Power Unit (dBA)	93.8

Sound data is provided at 7 m (23 ft). Engine-generator set tested in accordance with ISO 8528-10 and with infinite exhaust.

EMISSIONS DATA

NO _x + NMHC	CO	PM
5.44	0.7	0.05

All units are in g/hp-hr and at 100% load.

Emission levels of the engine may vary as a function of ambient temperature, barometric pressure, humidity, fuel type and quality, installation parameters, measuring instrumentation, etc. The data provided are laboratory results from one engine representing this rating. The data was obtained under controlled environmental conditions with calibrated instrumentation traceable to the United States National Bureau of Standards and in compliance with US EPA regulations found within 40 CFR Part 89. The weighted cycle value (not shown) from each engine is guaranteed to be below the US EPA Standards at the US EPA defined conditions.

RATING DEFINITIONS AND CONDITIONS

- // Standby ratings apply to installations served by a reliable utility source. The standby rating is applicable to varying loads for the duration of a power outage. No overload capability for this rating. Ratings are in accordance with ISO 8528-1, ISO 3046-1, BS 5514, AS 2789, and DIN 6271.
- // Deration Factor:
 - Altitude:** Consult your local MTU Onsite Energy Power Generation Distributor for altitude derations.
 - Temperature:** Consult your local MTU Onsite Energy Power Generation Distributor for temperature derations.

Materials and specifications subject to change without notice.

C/F = Consult Factory/MTU Onsite Energy Distributor

Revision	-				
Change index					

Motordaten

engine data

	Genset	Marine	O & G	Rail	C & I
Application	X				
Engine model	16V4000G83				
Application group	3D,3H				
Emission Stage/Optimisation	EPA Tier 2				
Test cycle	D2				
fuel sulphur content [ppm]	5				
mg/mN³ values base on residual oxygen value of [%]	measured				

Motor Rohemissionen*

Engine raw emissions*

Cycle point	[-]	n1	n2	n3	n4	n5	n6	n7	n8
Power (P/PN)	[-]	1	0,75	0,50	0,25	0,10			
Power	[kW]	2499	1875	1250	625	250			
Speed (n/nN)	[-]	1	1	1	1	1			
Speed	[rpm]	1800	1800	1800	1800	1800			
Exhaust temperature after turbine	[°C]	478	399	353	319	242			
Exhaust massflow	[kg/h]	14561	13409	11228	7812	5842			
Exhaust back pressure	[mbar]	-	-	-	-	-			
NOx	[g/kWh]	6,7	5,7	4,6	4,5	8,0			
	[mg/mN³]	1764	1205	762	531	497			
CO	[g/kWh]	0,7	0,6	0,9	1,9	4,0			
	[mg/mN³]	175	117	137	202	231			
HC	[g/kWh]	0,09	0,14	0,22	0,42	1,39			
	[mg/mN³]	22	27	33	46	80			
O2	[%]	9,5	11,7	13,2	14,6	16,3			
Particulate measured	[g/kWh]	0,05	0,07	0,16	0,36	0,51			
	[mg/mN³]	11	13	24	39	29			
Particulate calculated	[g/kWh]	-	-	-	-	-			
	[mg/mN³]	-	-	-	-	-			
Dust (only TA-Luft)	[mg/mN³]	-	-	-	-	-			
FSN	[-]	0,5	0,5	0,9	1,2	0,4			
NO/NO2**	[-]	-	-	-	-	-			
CO2	[g/kWh]	657,9	662,9	698,4	800,8	1095,6			
	[mg/mN³]	158466	128381	106626	87108	63101			
SO2	[g/kWh]	0,002	0,002	0,002	0,003	0,003			
	[mg/mN³]	0,5	0,4	0,3	0,3	0,2			


* Emission data measurement procedures are consistent with the respective emission evaluation process. Noncertified engines are measured to sales data (TVU/TEN) standard conditions.

These boundary conditions might not be representative for detailed dimensioning of exhaust gas aftertreatment, in this case it is recommended to contact the responsible department for more information.

Measurements are subject to variation. The nominal emission data shown is subject to instrumentation, measurement, facility, and engine-to-engine variations.

All data applies to an engine in new condition. Over extended operating time deterioration may occur which might have an impact on emission. Exhaust temperature depends on engine ambient conditions.

** No standard test. To be measured on demand.

					Benennung/Title	
					Emissionsdatenblatt	
					Emission Data Sheet	
				MTU Friedrichshafen GmbH		
b	„Not to exceed“-Werte überarbeitet	08.04.15	Lenhof	Datum/Date	Name/Name	Zeichnungs-Nr./Drawing No.
a	Hinzugefügt „Not to exceed“-Werte	21.01.14	Lenhof	Bearbeiter/Drawn by	18.07.2012	
-	Freigabe	26.07.12	Link	Geprüft/Checked	25.07.2012	Rehm
Buchstabe/Revision	Änderung/Modifikation	Datum/Date	Name/Name	Org.-Einheit/Dept.	TKF	Schneemann
EDS 4000 0429						

Vers.2.0

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Revision	a	b			
Change index					

Motordaten

engine data

	Genset	Marine	O & G	Rail	C & I
Application	X				
Engine model	16V4000G83				
Application group	3D,3H				
Emission Stage/Optimisation	EPA Tier 2				
Test cycle	D2				
Fuel sulphur content [ppm]	5				
mg/mN³ values base on residual oxygen value of [%]	measured				

Not to exceed Werte*

not to exceed values*

Cycle point	[-]	n1	n2	n3	n4	n5	n6	n7	n8
Power (P/PN)	[-]	1	0,75	0,50	0,25				
Power	[kW]	2499	1875	1250	625				
Speed (n/nN)	[-]	1	1	1	1				
Speed	[rpm]	1800	1800	1800	1800				
Exhaust back pressure	[mbar]	-	-	-	-				
NOx	[g/kWh]	8,7	7,4	6,0	6,7				
	[mg/mN³]	2293	1567	990	796				
CO	[g/kWh]	1,2	1,0	1,7	3,7				
	[mg/mN³]	298	198	260	403				
HC	[g/kWh]	0,16	0,24	0,41	0,85				
	[mg/mN³]	38	47	63	92				
O2	[%]	9,5	11,7	13,2	14,6				
Particulate measured	[g/kWh]	0,07	0,11	0,24	0,54				
	[mg/mN³]	17	21	36	59				

* Calculated values are not proven by tests and therefore the accuracy cannot be guaranteed.

Emissions data measurement procedures are consistent with those described in the applicable rules and standards.

The NOx, CO, HC and PM emission data tabulated here were taken from a single new engine under the test conditions shown above and are valid for the following conditions:

- Ambient air pressure 1 bar
- Air intake temperature approx. 25°C
- Rel. Humidity 30%-60%
- New Engine
- New standard- air filter
- Exhaust gas back pressure according the given value in this EDS
- Fuel according to EN 590 or US EPA 40CFR89
- Coolant and Lubricants according MTU Fuels and Lubricants Specification

The nominal emissions data shown is subject to instrumentation, measurement, facility and engine to engine variations. Emissions data is based on single operating points and thus cannot be used to compare to EPA regulations which use values based on a weighted cycle. Emissions data may vary depending on the type of exhaust gas aftertreatment that may be installed on the engine, therefore it is suggested that the engine manufacturer be contacted directly for further information.

Field emission test data are not guaranteed to these levels. Actual field test results may vary due to test site conditions, installation, fuel specification, test procedures, and instrumentation. Over time deterioration may occur which may have an impact on emission levels. Engine operation with excessive air intake or exhaust restriction beyond published maximum limits, or with improper maintenance, may result in elevated emission levels.


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GASEOUS EMISSIONS DATA MEASUREMENTS ARE CONSISTENT WITH THOSE DESCRIBED IN EPA 40 CFR PART 60 SUBPART IIII FOR MEASURING HC, CO, PM, AND NOX.

Locality	Agency	Regulation	Tier/Stage	Max. Limit G/(kW -HR)
U.S. (INCL CALIF)	EPA	Stationary	Emergency Stationary	T2 T3
			Tier 2 (>560kW)	NOx+ 6,4 4,0
			Tier 3 (<560kW)	CO: 3,5 3,5
				PM: 0,20 0,20

** No standard test. To be measured on demand.

							Benennung/Title
				MTU Friedrichshafen GmbH			Emissionsdatenblatt Emission Data Sheet
b	„Not to exceed“-Werte überarbeitet	08.04.15	Lenhof	Datum/Date	Name/Name		Zeichnungs-Nr./Drawing No.
a	Hinzugefügt "Not to exceed"-Werte	21.01.14	Lenhof	Bearbeiter/Drawn by	18.07.2012	Lenhof	
-	Freigabe	26.07.12	Link	Geprüft/Checked	25.07.2012	Rehm	
Buchstabe/ Revision	Änderung Modifikation	Datum Date	Name Name	Org.-Einheit/Dept.	TKF	Schneemann	EDS 4000 0429

Vers.2.0

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PERFORMANCE DATA[EM3842]

September 27, 2021

Performance Number: EM3842

Change Level: 02

SALES MODEL:	C18	COMBUSTION:	DIRECT INJECTION
BRAND:	CAT	ENGINE SPEED (RPM):	1,800
ENGINE POWER (BHP):	1,112	HERTZ:	60
GEN POWER WITH FAN (EKW):	750.0	FAN POWER (HP):	42.2
COMPRESSION RATIO:	14	ADDITIONAL PARASITICS (HP):	3.4
RATING LEVEL:	STANDBY	ASPIRATION:	TA
PUMP QUANTITY:	1	AFTERCOOLER TYPE:	ATAAC
FUEL TYPE:	DIESEL	AFTERCOOLER CIRCUIT TYPE:	JW+OC, ATAAC
MANIFOLD TYPE:	DRY	INLET MANIFOLD AIR TEMP (F):	120
GOVERNOR TYPE:	ELEC	JACKET WATER TEMP (F):	192.2
CAMSHAFT TYPE:	STANDARD	TURBO CONFIGURATION:	PARALLEL
IGNITION TYPE:	CI	TURBO QUANTITY:	2
INJECTOR TYPE:	EUI	TURBOCHARGER MODEL:	GTD5008 0.75 A/R
REF EXH STACK DIAMETER (IN):	6	CERTIFICATION YEAR:	2018
MAX OPERATING ALTITUDE (FT):	3,553	PISTON SPD @ RATED ENG SPD (FT/MIN):	2,161.4

INDUSTRY	SUBINDUSTRY	APPLICATION
ELECTRIC POWER	STANDARD	PACKAGED GENSET

General Performance Data

GENSET POWER WITH FAN	PERCENT LOAD	ENGINE POWER	BRAKE MEAN EFF PRES (BMEP)	BRAKE SPEC FUEL CONSUMPTN (BSFC)	ISO BRAKE SPEC FUEL CONSUMPTN (BSFC)	VOL FUEL CONSUMPTN (VFC)	ELEC SPEC FUEL CONSUMPTN (ESFC)	ISO ELEC SPEC FUEL CONSUMPTN (ESFC)
EKW	%	BHP	PSI	LB/BHP-HR	LB/BHP-HR	GAL/HR	LB/EKW-HR	LB/EKW-HR
750.0	100	1,112	442	0.342	0.335	53.6	0.507	0.497
675.0	90	1,002	399	0.345	0.339	48.8	0.513	0.503
600.0	80	894	356	0.355	0.348	44.8	0.529	0.519
562.5	75	840	334	0.362	0.355	42.8	0.540	0.530
525.0	70	787	313	0.357	0.350	39.6	0.535	0.525
450.0	60	680	271	0.347	0.340	33.3	0.524	0.514
375.0	50	575	229	0.350	0.344	28.4	0.537	0.527
300.0	40	471	187	0.356	0.349	23.6	0.559	0.548
225.0	30	367	146	0.365	0.358	18.9	0.596	0.585
187.5	25	315	125	0.373	0.366	16.6	0.627	0.615
150.0	20	262	104	0.384	0.377	14.2	0.672	0.660
75.0	10	155	62	0.436	0.428	9.5	0.903	0.886

GENSET POWER WITH FAN	PERCENT LOAD	ENGINE POWER	INLET MFLD PRES	INLET MFLD TEMP	EXH MFLD TEMP	EXH MFLD PRES	ENGINE OUTLET TEMP	COMPRESSOR OUTLET PRES	COMPRESSOR OUTLET TEMP
EKW	%	BHP	IN-HG	DEG F	DEG F	IN-HG	DEG F	IN-HG	DEG F
750.0	100	1,112	99.6	120.6	1,297.4	91.1	847.3	106	491.8
675.0	90	1,002	94.8	116.3	1,237.8	85.6	808.8	101	471.6
600.0	80	894	90.6	110.2	1,190.8	81.2	779.6	97	456.4
562.5	75	840	88.9	106.0	1,168.7	79.4	765.3	95	449.8
525.0	70	787	83.3	102.6	1,123.3	73.0	732.9	89	427.8
450.0	60	680	70.0	97.1	1,044.2	59.2	681.5	75	378.6
375.0	50	575	58.7	92.6	995.6	48.8	659.1	63	343.0
300.0	40	471	46.1	89.2	946.5	38.8	636.5	50	296.8
225.0	30	367	33.0	85.9	891.7	28.9	613.3	36	248.4
187.5	25	315	26.7	84.2	861.7	23.9	601.4	30	224.2
150.0	20	262	20.9	82.5	823.8	19.2	583.1	23	199.8
75.0	10	155	10.7	79.1	696.6	12.2	500.0	13	150.3

General Performance Data (Continued)

GENSET POWER WITH FAN	PERCENT LOAD	ENGINE POWER	WET INLET AIR VOL FLOW RATE	ENGINE OUTLET WET EXH GAS VOL FLOW RATE	WET INLET AIR MASS FLOW RATE	WET EXH GAS MASS FLOW RATE	WET EXH VOL FLOW RATE (32 DEG F AND 29.98 IN HG)	DRY EXH VOL FLOW RATE (32 DEG F AND 29.98 IN HG)
EKW	%	BHP	CFM	CFM	LB/HR	LB/HR	FT3/MIN	FT3/MIN
750.0	100	1,112	2,375.0	6,028.4	10,393.9	10,773.8	2,267.8	2,078.6
675.0	90	1,002	2,311.8	5,661.5	10,079.7	10,425.9	2,194.5	2,019.7
600.0	80	894	2,255.1	5,366.3	9,808.8	10,125.6	2,129.1	1,967.2

PERFORMANCE DATA[EM3842]

September 27, 2021

562.5	75	840	2,232.7	5,242.8	9,695.0	9,998.8	2,104.4	1,948.0
525.0	70	787	2,128.6	4,886.8	9,201.8	9,479.4	2,014.8	1,868.9
450.0	60	680	1,924.5	4,154.8	8,250.4	8,484.5	1,790.1	1,665.9
375.0	50	575	1,724.0	3,614.1	7,338.5	7,539.3	1,588.3	1,481.3
300.0	40	471	1,496.1	3,059.1	6,324.6	6,492.2	1,372.1	1,282.4
225.0	30	367	1,252.4	2,494.4	5,258.7	5,392.8	1,143.0	1,070.6
187.5	25	315	1,129.6	2,211.4	4,728.5	4,845.9	1,024.7	960.8
150.0	20	262	1,009.9	1,930.2	4,215.5	4,316.3	910.1	854.6
75.0	10	155	782.1	1,374.8	3,253.5	3,321.2	704.3	665.3

Heat Rejection Data

GENSET POWER WITH FAN	PERCENT LOAD	ENGINE POWER	REJECTION TO JACKET WATER	REJECTION TO ATMOSPHERE	REJECTION TO EXH	EXHAUST RECOVERY TO 350F	FROM OIL COOLER	FROM AFTERCOOLER	WORK ENERGY	LOW HEAT VALUE ENERGY	HIGH HEAT VALUE ENERGY
EKW	%	BHP	BTU/MIN	BTU/MIN	BTU/MIN	BTU/MIN	BTU/MIN	BTU/MIN	BTU/MIN	BTU/MIN	BTU/MIN
750.0	100	1,112	12,818	8,047	40,603	22,636	6,204	15,452	47,163	116,484	124,084
675.0	90	1,002	11,743	6,958	37,522	20,109	5,654	14,340	42,509	106,146	113,072
600.0	80	894	10,952	6,200	35,048	18,214	5,186	13,597	37,916	97,360	103,713
562.5	75	840	10,640	5,836	33,785	17,352	4,962	13,346	35,638	93,166	99,245
525.0	70	787	9,859	5,705	30,827	15,116	4,587	11,983	33,363	86,117	91,736
450.0	60	680	8,318	5,623	24,979	11,650	3,854	9,300	28,853	72,352	77,073
375.0	50	575	7,503	5,062	21,470	9,629	3,289	7,357	24,380	61,743	65,772
300.0	40	471	6,805	4,763	17,924	7,664	2,736	5,257	19,977	51,373	54,726
225.0	30	367	6,315	4,137	14,360	5,834	2,190	3,423	15,572	41,123	43,806
187.5	25	315	6,146	3,592	12,622	4,998	1,918	2,650	13,357	36,017	38,367
150.0	20	262	5,811	3,166	10,852	4,120	1,647	1,979	11,122	30,914	32,931
75.0	10	155	4,464	2,714	7,429	2,021	1,106	928	6,579	20,759	22,114

Emissions Data

DIESEL

RATED SPEED NOMINAL DATA: 1800 RPM

GENSET POWER WITH FAN	EKW	750.0	562.5	375.0	187.5	75.0
PERCENT LOAD	%	100	75	50	25	10
ENGINE POWER	BHP	1,112	840	575	315	155
TOTAL NOX (AS NO2)	G/HR	5,965	3,126	2,054	1,344	778
TOTAL CO	G/HR	243	232	76	312	1,148
TOTAL HC	G/HR	66	67	47	55	458
TOTAL CO2	KG/HR	552	441	292	172	96
PART MATTER	G/HR	33.7	34.4	21.3	25.5	73.8
TOTAL NOX (AS NO2) (CORR 5% O2)	MG/NM3	2,468.0	1,615.7	1,594.0	1,789.0	1,769.3
TOTAL CO (CORR 5% O2)	MG/NM3	100.1	120.0	57.8	462.4	3,203.4
TOTAL HC (CORR 5% O2)	MG/NM3	23.5	29.8	32.1	65.0	1,156.1
PART MATTER (CORR 5% O2)	MG/NM3	11.7	15.2	14.2	30.4	185.1
TOTAL NOX (AS NO2) (CORR 15% O2)	MG/NM3	915.8	599.5	591.5	663.9	656.5
TOTAL CO (CORR 15% O2)	MG/NM3	37.1	44.5	21.4	171.6	1,188.7
TOTAL HC (CORR 15% O2)	MG/NM3	8.7	11.1	11.9	24.1	429.0
PART MATTER (CORR 15% O2)	MG/NM3	4.3	5.7	5.3	11.3	68.7
TOTAL NOX (AS NO2) (CORR 5% O2)	PPM	1,202	787	776	871	862
TOTAL CO (CORR 5% O2)	PPM	80	96	46	370	2,563
TOTAL HC (CORR 5% O2)	PPM	44	56	60	121	2,158
TOTAL NOX (AS NO2) (CORR 15% O2)	PPM	446	292	288	323	320
TOTAL CO (CORR 15% O2)	PPM	30	36	17	137	951
TOTAL HC (CORR 15% O2)	PPM	16	21	22	45	801
TOTAL NOX (AS NO2)	G/HP-HR	5.42	3.75	3.59	4.27	5.02
TOTAL CO	G/HP-HR	0.22	0.28	0.13	0.99	7.41
TOTAL HC	G/HP-HR	0.06	0.08	0.08	0.17	2.96
PART MATTER	G/HP-HR	0.03	0.04	0.04	0.08	0.48
TOTAL NOX (AS NO2)	G/KW-HR	7.37	5.09	4.88	5.81	6.83
TOTAL CO	G/KW-HR	0.30	0.38	0.18	1.35	10.07

PERFORMANCE DATA[EM3842]

September 27, 2021

TOTAL HC	G/KW-HR	0.08	0.11	0.11	0.24	4.02
PART MATTER	G/KW-HR	0.04	0.06	0.05	0.11	0.65
TOTAL NOX (AS NO2)	LB/HR	13.15	6.89	4.53	2.96	1.72
TOTAL CO	LB/HR	0.54	0.51	0.17	0.69	2.53
TOTAL HC	LB/HR	0.14	0.15	0.10	0.12	1.01
TOTAL CO2	LB/HR	1,217	971	644	380	211
PART MATTER	LB/HR	0.07	0.08	0.05	0.06	0.16
OXYGEN IN EXH	%	9.8	11.5	12.7	13.5	14.9
DRY SMOKE OPACITY	%	0.5	0.8	0.5	1.0	0.5
BOSCH SMOKE NUMBER		0.71	0.79	0.71	0.86	0.71

RATED SPEED POTENTIAL SITE VARIATION: 1800 RPM

GENSET POWER WITH FAN	EKW	750.0	562.5	375.0	187.5	75.0
PERCENT LOAD	%	100	75	50	25	10
ENGINE POWER	BHP	1,112	840	575	315	155
TOTAL NOX (AS NO2)	G/HR	6,442	3,376	2,219	1,451	840
TOTAL CO	G/HR	454	434	142	583	2,147
TOTAL HC	G/HR	124	126	89	103	866
PART MATTER	G/HR	65.6	67.1	41.6	49.7	144.0
TOTAL NOX (AS NO2) (CORR 5% O2)	MG/NM3	2,665.4	1,745.0	1,721.5	1,932.2	1,910.9
TOTAL CO (CORR 5% O2)	MG/NM3	187.1	224.5	108.1	864.7	5,990.4
TOTAL HC (CORR 5% O2)	MG/NM3	44.4	56.3	60.6	122.9	2,185.0
PART MATTER (CORR 5% O2)	MG/NM3	22.8	29.7	27.7	59.3	361.0
TOTAL NOX (AS NO2) (CORR 15% O2)	MG/NM3	989.1	647.5	638.8	717.0	709.1
TOTAL CO (CORR 15% O2)	MG/NM3	69.4	83.3	40.1	320.9	2,222.8
TOTAL HC (CORR 15% O2)	MG/NM3	16.5	20.9	22.5	45.6	810.8
PART MATTER (CORR 15% O2)	MG/NM3	8.4	11.0	10.3	22.0	134.0
TOTAL NOX (AS NO2) (CORR 5% O2)	PPM	1,298	850	839	941	931
TOTAL CO (CORR 5% O2)	PPM	150	180	86	692	4,792
TOTAL HC (CORR 5% O2)	PPM	83	105	113	229	4,079
TOTAL NOX (AS NO2) (CORR 15% O2)	PPM	482	315	311	349	345
TOTAL CO (CORR 15% O2)	PPM	56	67	32	257	1,778
TOTAL HC (CORR 15% O2)	PPM	31	39	42	85	1,513
TOTAL NOX (AS NO2)	G/HP-HR	5.85	4.05	3.88	4.62	5.42
TOTAL CO	G/HP-HR	0.41	0.52	0.25	1.85	13.85
TOTAL HC	G/HP-HR	0.11	0.15	0.16	0.33	5.59
PART MATTER	G/HP-HR	0.06	0.08	0.07	0.16	0.93
TOTAL NOX (AS NO2)	G/KW-HR	7.95	5.50	5.27	6.28	7.37
TOTAL CO	G/KW-HR	0.56	0.71	0.34	2.52	18.83
TOTAL HC	G/KW-HR	0.15	0.21	0.21	0.45	7.60
PART MATTER	G/KW-HR	0.08	0.11	0.10	0.22	1.26
TOTAL NOX (AS NO2)	LB/HR	14.20	7.44	4.89	3.20	1.85
TOTAL CO	LB/HR	1.00	0.96	0.31	1.28	4.73
TOTAL HC	LB/HR	0.27	0.28	0.20	0.23	1.91
PART MATTER	LB/HR	0.14	0.15	0.09	0.11	0.32

Regulatory Information

EPA EMERGENCY STATIONARY		2011 - ----		
GASEOUS EMISSIONS DATA MEASUREMENTS PROVIDED TO THE EPA ARE CONSISTENT WITH THOSE DESCRIBED IN EPA 40 CFR PART 60 SUBPART IIII AND ISO 8178 FOR MEASURING HC, CO, PM, AND NOX. THE "MAX LIMITS" SHOWN BELOW ARE WEIGHTED CYCLE AVERAGES AND ARE IN COMPLIANCE WITH THE EMERGENCY STATIONARY REGULATIONS.				
Locality	Agency	Regulation	Tier/Stage	Max Limits - G/BKW - HR
U.S. (INCL CALIF)	EPA	STATIONARY	EMERGENCY STATIONARY	CO: 3.5 NOx + HC: 6.4 PM: 0.20

Altitude Derate Data

STANDARD

ALTITUDE CORRECTED POWER CAPABILITY (BHP)

Performance Number: EM1899

Change Level: 00

SALES MODEL:	3512C	COMBUSTION:	DIRECT INJECTION
BRAND:	CAT	ENGINE SPEED (RPM):	1,800
ENGINE POWER (BHP):	2,206	HERTZ:	60
GEN POWER WITH FAN (EKW):	1,500.0	FAN POWER (HP):	88.5
COMPRESSION RATIO:	14.7	ASPIRATION:	TA
RATING LEVEL:	MISSION CRITICAL STANDBY	AFTERCOOLER TYPE:	ATAAC
PUMP QUANTITY:	1	AFTERCOOLER CIRCUIT TYPE:	JW+OC, ATAAC
FUEL TYPE:	DIESEL	INLET MANIFOLD AIR TEMP (F):	122
MANIFOLD TYPE:	DRY	JACKET WATER TEMP (F):	210.2
GOVERNOR TYPE:	ADEM3	TURBO CONFIGURATION:	PARALLEL
ELECTRONICS TYPE:	ADEM3	TURBO QUANTITY:	4
CAMSHAFT TYPE:	STANDARD	TURBOCHARGER MODEL:	GTB4708BN-52T-0.96
IGNITION TYPE:	CI	CERTIFICATION YEAR:	2006
INJECTOR TYPE:	EUI	CRANKCASE BLOWBY RATE (FT3/HR):	2,203.4
FUEL INJECTOR:	3920220	FUEL RATE (RATED RPM) NO LOAD (GAL/HR):	9.8
UNIT INJECTOR TIMING (IN):	64.34	PISTON SPD @ RATED ENG SPD (FT/MIN):	2,244.1
REF EXH STACK DIAMETER (IN):	10		
MAX OPERATING ALTITUDE (FT):	3,937		

INDUSTRY	SUBINDUSTRY	APPLICATION
ELECTRIC POWER	STANDARD	PACKAGED GENSET
OIL AND GAS	LAND PRODUCTION	PACKAGED GENSET

General Performance Data

THIS STANDBY RATING IS FOR A STANDBY ONLY ENGINE ARRANGEMENT. RERATING THE ENGINE TO A PRIME OR CONTINUOUS RATING IS NOT PERMITTED.

GENSET POWER WITH FAN	PERCENT LOAD	ENGINE POWER	BRAKE MEAN EFF PRES (BMEP)	BRAKE SPEC FUEL CONSUMPTN (BSFC)	VOL FUEL CONSUMPTN (VFC)
EKW	%	BHP	PSI	LB/BHP-HR	GAL/HR
1,500.0	100	2,206	307	0.332	103.2
1,350.0	90	1,983	276	0.336	94.0
1,200.0	80	1,768	246	0.343	85.5
1,125.0	75	1,662	232	0.346	81.0
1,050.0	70	1,556	217	0.348	76.4
900.0	60	1,349	188	0.352	67.0
750.0	50	1,144	159	0.355	57.3
600.0	40	940	131	0.359	47.6
450.0	30	736	103	0.368	38.1
375.0	25	632	88	0.376	33.5
300.0	20	527	73	0.388	28.8
150.0	10	312	43	0.443	19.5

GENSET POWER WITH FAN	PERCENT LOAD	ENGINE POWER	INLET MFLD PRES	INLET MFLD TEMP	EXH MFLD TEMP	EXH MFLD PRES	ENGINE OUTLET TEMP	COMPRESSOR OUTLET PRES	COMPRESSOR OUTLET TEMP
EKW	%	BHP	IN-HG	DEG F	DEG F	IN-HG	DEG F	IN-HG	DEG F
1,500.0	100	2,206	77.5	120.9	1,145.6	74.6	756.6	82	449.8
1,350.0	90	1,983	72.2	116.1	1,102.7	68.8	727.5	77	428.8
1,200.0	80	1,768	66.9	113.2	1,069.1	63.0	713.4	71	409.0
1,125.0	75	1,662	63.4	111.5	1,052.3	59.5	706.7	68	396.6
1,050.0	70	1,556	59.7	109.8	1,035.2	55.8	700.0	64	382.6
900.0	60	1,349	51.1	107.1	1,000.5	47.6	687.3	55	350.3
750.0	50	1,144	40.6	107.5	963.6	38.4	696.7	44	309.9
600.0	40	940	30.0	108.4	921.9	29.4	702.2	33	266.6
450.0	30	736	20.9	107.1	856.0	21.9	685.3	23	224.6
375.0	25	632	16.9	106.2	809.5	18.8	664.9	19	204.3
300.0	20	527	13.3	105.2	754.5	16.0	636.4	15	184.2
150.0	10	312	7.3	103.2	609.7	11.4	540.6	9	148.8

General Performance Data (Continued)

GENSET POWER WITH FAN	PERCENT LOAD	ENGINE POWER	WET INLET AIR VOL FLOW RATE	ENGINE OUTLET WET EXH GAS VOL FLOW RATE	WET INLET AIR MASS FLOW RATE	WET EXH GAS MASS FLOW RATE	WET EXH VOL FLOW RATE (32 DEG F AND 29.98 IN)	DRY EXH VOL FLOW RATE (32 DEG F AND 29.98 IN)
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PERFORMANCE DATA[EM1899]

July 6, 2021

EKW	%	BHP	CFM	CFM	LB/HR	LB/HR	HG)	
							FT3/MIN	FT3/MIN
1,500.0	100	2,206	4,937.2	11,734.1	21,796.5	22,529.1	4,743.3	4,317.6
1,350.0	90	1,983	4,734.5	10,945.3	20,885.8	21,551.9	4,532.9	4,136.4
1,200.0	80	1,768	4,506.7	10,265.9	19,853.4	20,459.8	4,302.7	3,938.4
1,125.0	75	1,662	4,371.2	9,868.8	19,223.0	19,797.6	4,160.2	3,812.8
1,050.0	70	1,556	4,218.1	9,442.4	18,511.1	19,053.3	4,003.2	3,672.9
900.0	60	1,349	3,862.4	8,508.3	16,857.2	17,332.4	3,647.3	3,352.3
750.0	50	1,144	3,375.7	7,435.0	14,666.1	15,072.5	3,161.3	2,907.1
600.0	40	940	2,868.4	6,329.0	12,406.6	12,744.3	2,678.2	2,465.5
450.0	30	736	2,431.9	5,278.8	10,481.3	10,752.0	2,266.9	2,093.3
375.0	25	632	2,243.0	4,776.5	9,654.1	9,891.7	2,088.3	1,933.3
300.0	20	527	2,069.9	4,283.3	8,899.4	9,103.9	1,921.3	1,784.5
150.0	10	312	1,782.1	3,338.5	7,648.3	7,786.4	1,641.0	1,539.0

Heat Rejection Data

GENSET POWER WITH FAN	PERCENT LOAD	ENGINE POWER	REJECTION TO JACKET WATER	REJECTION TO ATMOSPHERE	REJECTION TO EXH	EXHAUST RECOVERY TO 350F	FROM OIL COOLER	FROM AFTERCOOLER	WORK ENERGY	LOW HEAT VALUE ENERGY	HIGH HEAT VALUE ENERGY
EKW	%	BHP	BTU/MIN	BTU/MIN	BTU/MIN	BTU/MIN	BTU/MIN	BTU/MIN	BTU/MIN	BTU/MIN	BTU/MIN
1,500.0	100	2,206	28,541	7,072	79,477	38,355	11,956	29,539	93,547	224,476	239,123
1,350.0	90	1,983	26,761	6,706	72,346	33,940	10,882	26,874	84,110	204,315	217,647
1,200.0	80	1,768	25,085	6,393	66,713	30,942	9,897	24,071	74,958	185,825	197,950
1,125.0	75	1,662	24,176	6,249	63,549	29,350	9,376	22,404	70,466	176,039	187,526
1,050.0	70	1,556	23,227	6,110	60,309	27,693	8,845	20,631	66,004	166,069	176,905
900.0	60	1,349	21,222	5,841	53,634	24,225	7,759	16,788	57,205	145,683	155,189
750.0	50	1,144	19,059	5,564	46,826	21,662	6,636	12,311	48,509	124,586	132,716
600.0	40	940	16,790	5,286	39,874	18,604	5,512	8,066	39,882	103,489	110,241
450.0	30	736	14,427	4,840	32,601	14,897	4,416	4,955	31,201	82,917	88,327
375.0	25	632	13,189	4,570	28,900	12,838	3,876	3,774	26,809	72,772	77,520
300.0	20	527	11,900	4,299	25,149	10,707	3,336	2,793	22,353	62,628	66,715
150.0	10	312	9,090	3,818	17,468	6,020	2,253	1,375	13,214	42,301	45,061

Sound Data

SOUND PRESSURE DATA FOR THIS RATING CAN BE FOUND IN PERFORMANCE NUMBER - DM8779.

Emissions Data

DIESEL

RATED SPEED NOMINAL DATA: 1800 RPM

GENSET POWER WITH FAN	EKW	1,500.0	1,125.0	750.0	375.0	150.0
PERCENT LOAD	%	100	75	50	25	10
ENGINE POWER	BHP	2,206	1,662	1,144	632	312
TOTAL NOX (AS NO2)	G/HR	11,972	6,055	4,029	3,061	2,359
TOTAL CO	G/HR	1,050	653	925	1,092	1,055
TOTAL HC	G/HR	264	286	269	213	248
TOTAL CO2	KG/HR	1,096	853	602	352	204
PART MATTER	G/HR	69.7	70.8	107.8	131.4	80.1
TOTAL NOX (AS NO2) (CORR 5% O2)	MG/NM3	2,373.9	1,502.6	1,392.6	1,845.1	2,472.7
TOTAL CO (CORR 5% O2)	MG/NM3	237.3	186.8	395.9	825.9	1,323.0
TOTAL HC (CORR 5% O2)	MG/NM3	51.7	71.9	92.7	131.8	270.9
PART MATTER (CORR 5% O2)	MG/NM3	13.0	16.8	39.1	78.6	82.6
TOTAL NOX (AS NO2) (CORR 5% O2)	PPM	1,156	732	678	899	1,204
TOTAL CO (CORR 5% O2)	PPM	190	149	317	661	1,058
TOTAL HC (CORR 5% O2)	PPM	97	134	173	246	506
TOTAL NOX (AS NO2)	G/HP-HR	5.48	3.68	3.55	4.87	7.62
TOTAL CO	G/HP-HR	0.48	0.40	0.81	1.74	3.40
TOTAL HC	G/HP-HR	0.12	0.17	0.24	0.34	0.80

PERFORMANCE DATA[EM1899]

July 6, 2021

PART MATTER	G/HP-HR	0.03	0.04	0.09	0.21	0.26
TOTAL NOX (AS NO2)	LB/HR	26.39	13.35	8.88	6.75	5.20
TOTAL CO	LB/HR	2.32	1.44	2.04	2.41	2.32
TOTAL HC	LB/HR	0.58	0.63	0.59	0.47	0.55
TOTAL CO2	LB/HR	2,417	1,881	1,327	776	449
PART MATTER	LB/HR	0.15	0.16	0.24	0.29	0.18
OXYGEN IN EXH	%	11.2	12.3	12.9	13.9	15.8
DRY SMOKE OPACITY	%	1.0	1.3	2.9	5.0	3.0
BOSCH SMOKE NUMBER		0.37	0.45	1.06	1.60	1.11

RATED SPEED POTENTIAL SITE VARIATION: 1800 RPM

GENSET POWER WITH FAN	EKW	1,500.0	1,125.0	750.0	375.0	150.0
PERCENT LOAD	%	100	75	50	25	10
ENGINE POWER	BHP	2,206	1,662	1,144	632	312
TOTAL NOX (AS NO2)	G/HR	14,366	7,266	4,835	3,673	2,831
TOTAL CO	G/HR	1,890	1,176	1,665	1,965	1,898
TOTAL HC	G/HR	351	381	358	283	329
PART MATTER	G/HR	97.6	99.1	150.9	184.0	112.2
TOTAL NOX (AS NO2) (CORR 5% O2)	MG/NM3	2,848.7	1,803.1	1,671.1	2,214.1	2,967.2
TOTAL CO (CORR 5% O2)	MG/NM3	427.2	336.3	712.5	1,486.6	2,381.4
TOTAL HC (CORR 5% O2)	MG/NM3	68.8	95.6	123.3	175.3	360.2
PART MATTER (CORR 5% O2)	MG/NM3	18.2	23.5	54.8	110.0	115.7
TOTAL NOX (AS NO2) (CORR 5% O2)	PPM	1,388	878	814	1,078	1,445
TOTAL CO (CORR 5% O2)	PPM	342	269	570	1,189	1,905
TOTAL HC (CORR 5% O2)	PPM	128	178	230	327	672
TOTAL NOX (AS NO2)	G/HP-HR	6.58	4.41	4.26	5.85	9.14
TOTAL CO	G/HP-HR	0.87	0.71	1.47	3.13	6.13
TOTAL HC	G/HP-HR	0.16	0.23	0.32	0.45	1.06
PART MATTER	G/HP-HR	0.04	0.06	0.13	0.29	0.36
TOTAL NOX (AS NO2)	LB/HR	31.67	16.02	10.66	8.10	6.24
TOTAL CO	LB/HR	4.17	2.59	3.67	4.33	4.18
TOTAL HC	LB/HR	0.77	0.84	0.79	0.62	0.73
PART MATTER	LB/HR	0.22	0.22	0.33	0.41	0.25

Regulatory Information

EPA EMERGENCY STATIONARY		2011 - ----			
GASEOUS EMISSIONS DATA MEASUREMENTS PROVIDED TO THE EPA ARE CONSISTENT WITH THOSE DESCRIBED IN EPA 40 CFR PART 60 SUBPART IIII AND ISO 8178 FOR MEASURING HC, CO, PM, AND NOX. THE "MAX LIMITS" SHOWN BELOW ARE WEIGHTED CYCLE AVERAGES AND ARE IN COMPLIANCE WITH THE EMERGENCY STATIONARY REGULATIONS.					
Locality	Agency	Regulation	Tier/Stage	Max Limits - G/BKW - HR	
U.S. (INCL CALIF)	EPA	STATIONARY	EMERGENCY STATIONARY	CO: 3.5 NOx + HC: 6.4 PM: 0.20	

Altitude Derate Data

STANDARD

ALTITUDE CORRECTED POWER CAPABILITY (BHP)

AMBIENT OPERATING TEMP (F)	30	40	50	60	70	80	90	100	110	120	130	140	NORMAL
ALTITUDE (FT)													
0	2,206	2,206	2,206	2,206	2,206	2,206	2,206	2,206	2,206	2,206	2,206	2,096	2,206
1,000	2,206	2,206	2,206	2,206	2,206	2,206	2,206	2,206	2,206	2,206	2,162	2,074	2,206
2,000	2,206	2,206	2,206	2,206	2,206	2,206	2,206	2,206	2,206	2,176	2,118	2,007	2,206
3,000	2,206	2,206	2,206	2,206	2,206	2,206	2,206	2,173	2,135	2,098	2,052	1,919	2,206
4,000	2,201	2,201	2,201	2,201	2,201	2,171	2,132	2,094	2,057	2,021	1,963	1,831	2,201
5,000	2,129	2,129	2,129	2,129	2,129	2,092	2,054	2,017	1,982	1,947	1,875	1,743	2,129
6,000	2,059	2,059	2,059	2,059	2,053	2,015	1,978	1,943	1,909	1,876	1,765	1,677	2,059
7,000	1,992	1,992	1,992	1,992	1,976	1,940	1,904	1,870	1,838	1,787	1,677	1,588	1,992

ATTACHMENT 4

Engine Oil Data

SAFETY DATA SHEET

SECTION 1 PRODUCT AND COMPANY IDENTIFICATION

PRODUCT

Product Name: CAT DEO-ULS 15W-40
Product Description: Base Oil and Additives
Product Code: 20202040B022, 452607-00, 97AJ57
Intended Use: Diesel engine oil

COMPANY IDENTIFICATION

Supplier: EXXON MOBIL CORPORATION
22777 Springwoods Village Parkway
Spring, TX 77253 USA

24 Hour Health Emergency: 609-737-4411
Transportation Emergency Phone: 800-424-9300 or 703-527-3887 CHEMTREC
Product Technical Information: 800-662-4525
MSDS Internet Address: www.exxon.com, www.mobil.com

SECTION 2 HAZARDS IDENTIFICATION

This material is not hazardous according to regulatory guidelines (see (M)SDS Section 15).

Other hazard information:

HAZARD NOT OTHERWISE CLASSIFIED (HNOC): None as defined under 29 CFR 1910.1200.

PHYSICAL / CHEMICAL HAZARDS

No significant hazards.

HEALTH HAZARDS

High-pressure injection under skin may cause serious damage. Excessive exposure may result in eye, skin, or respiratory irritation.

ENVIRONMENTAL HAZARDS

No significant hazards.

NFPA Hazard ID:	Health: 0	Flammability: 1	Reactivity: 0
HMS Hazard ID:	Health: 0	Flammability: 1	Reactivity: 0

NOTE: This material should not be used for any other purpose than the intended use in Section 1 without expert advice. Health studies have shown that chemical exposure may cause potential human health risks which may vary

Product Name: CAT DEO-ULS 15W-40

Revision Date: 14 Oct 2016

Page 2 of 11

from person to person.

SECTION 3 COMPOSITION / INFORMATION ON INGREDIENTS

This material is defined as a mixture.

Hazardous Substance(s) or Complex Substance(s) required for disclosure

Name	CAS#	Concentration*	GHS Hazard Codes
ALKYL PHENOL	125643-61-0	1 - < 5%	H413
C14-16-18 ALKYL PHENOL	CONFIDENTIAL	0.1 - < 1%	H317
ZINC ALKYL DITHIOPHOSPHATE	113706-15-3	0.1 - < 1%	H303, H315, H318, H401, H411

* All concentrations are percent by weight unless material is a gas. Gas concentrations are in percent by volume.

As per paragraph (i) of 29 CFR 1910.1200, formulation is considered a trade secret and specific chemical identity and exact percentage (concentration) of composition may have been withheld. Specific chemical identity and exact percentage composition will be provided to health professionals, employees, or designated representatives in accordance with applicable provisions of paragraph (i).

SECTION 4 FIRST AID MEASURES

INHALATION

Remove from further exposure. For those providing assistance, avoid exposure to yourself or others. Use adequate respiratory protection. If respiratory irritation, dizziness, nausea, or unconsciousness occurs, seek immediate medical assistance. If breathing has stopped, assist ventilation with a mechanical device or use mouth-to-mouth resuscitation.

SKIN CONTACT

Wash contact areas with soap and water. If product is injected into or under the skin, or into any part of the body, regardless of the appearance of the wound or its size, the individual should be evaluated immediately by a physician as a surgical emergency. Even though initial symptoms from high pressure injection may be minimal or absent, early surgical treatment within the first few hours may significantly reduce the ultimate extent of injury.

EYE CONTACT

Flush thoroughly with water. If irritation occurs, get medical assistance.

INGESTION

First aid is normally not required. Seek medical attention if discomfort occurs.

SECTION 5 FIRE FIGHTING MEASURES

EXTINGUISHING MEDIA

Appropriate Extinguishing Media: Use water fog, foam, dry chemical or carbon dioxide (CO₂) to extinguish flames.

Inappropriate Extinguishing Media: Straight Streams of Water

FIRE FIGHTING

Fire Fighting Instructions: Evacuate area. Prevent runoff from fire control or dilution from entering streams, sewers, or drinking water supply. Firefighters should use standard protective equipment and in enclosed spaces, self-contained breathing apparatus (SCBA). Use water spray to cool fire exposed surfaces and to protect personnel.

Hazardous Combustion Products: Aldehydes, Incomplete combustion products, Oxides of carbon, Smoke, Fume, Sulfur oxides

FLAMMABILITY PROPERTIES

Flash Point [Method]: >215°C (419°F) [ASTM D-92]

Flammable Limits (Approximate volume % in air): LEL: 0.9 UEL: 7.0

Autoignition Temperature: N/D

SECTION 6

ACCIDENTAL RELEASE MEASURES

NOTIFICATION PROCEDURES

In the event of a spill or accidental release, notify relevant authorities in accordance with all applicable regulations. US regulations require reporting releases of this material to the environment which exceed the applicable reportable quantity or oil spills which could reach any waterway including intermittent dry creeks. The National Response Center can be reached at (800)424-8802.

PROTECTIVE MEASURES

Avoid contact with spilled material. See Section 5 for fire fighting information. See the Hazard Identification Section for Significant Hazards. See Section 4 for First Aid Advice. See Section 8 for advice on the minimum requirements for personal protective equipment. Additional protective measures may be necessary, depending on the specific circumstances and/or the expert judgment of the emergency responders.

For emergency responders: Respiratory protection: respiratory protection will be necessary only in special cases, e.g., formation of mists. Half-face or full-face respirator with filter(s) for dust/organic vapor or Self Contained Breathing Apparatus (SCBA) can be used depending on the size of spill and potential level of exposure. If the exposure cannot be completely characterized or an oxygen deficient atmosphere is possible or anticipated, SCBA is recommended. Work gloves that are resistant to hydrocarbons are recommended. Gloves made of polyvinyl acetate (PVA) are not water-resistant and are not suitable for emergency use. Chemical goggles are recommended if splashes or contact with eyes is possible. Small spills: normal antistatic work clothes are usually adequate. Large spills: full body suit of chemical resistant, antistatic material is recommended.

SPILL MANAGEMENT

Land Spill: Stop leak if you can do it without risk. Recover by pumping or with suitable absorbent.

Water Spill: Stop leak if you can do it without risk. Confine the spill immediately with booms. Warn other shipping. Remove from the surface by skimming or with suitable absorbents. Seek the advice of a specialist before using dispersants.

Water spill and land spill recommendations are based on the most likely spill scenario for this material; however, geographic conditions, wind, temperature, (and in the case of a water spill) wave and current direction and speed may greatly influence the appropriate action to be taken. For this reason, local experts should be

Product Name: CAT DEO-ULS 15W-40

Revision Date: 14 Oct 2016

Page 4 of 11

consulted. Note: Local regulations may prescribe or limit action to be taken.

ENVIRONMENTAL PRECAUTIONS

Large Spills: Dike far ahead of liquid spill for later recovery and disposal. Prevent entry into waterways, sewers, basements or confined areas.

SECTION 7

HANDLING AND STORAGE

HANDLING

Avoid contact with used product. Prevent small spills and leakage to avoid slip hazard. Material can accumulate static charges which may cause an electrical spark (ignition source). When the material is handled in bulk, an electrical spark could ignite any flammable vapors from liquids or residues that may be present (e.g., during switch-loading operations). Use proper bonding and/or ground procedures. However, bonding and grounds may not eliminate the hazard from static accumulation. Consult local applicable standards for guidance. Additional references include American Petroleum Institute 2003 (Protection Against Ignitions Arising out of Static, Lightning and Stray Currents) or National Fire Protection Agency 77 (Recommended Practice on Static Electricity) or CENELEC CLC/TR 50404 (Electrostatics - Code of practice for the avoidance of hazards due to static electricity).

Static Accumulator: This material is a static accumulator.

STORAGE

The type of container used to store the material may affect static accumulation and dissipation. Do not store in open or unlabelled containers.

SECTION 8

EXPOSURE CONTROLS / PERSONAL PROTECTION

Exposure limits/standards for materials that can be formed when handling this product: When mists/aerosols can occur the following are recommended: 5 mg/m³ - ACGIH TLV (inhalable fraction), 5 mg/m³ - OSHA PEL.

NOTE: Limits/standards shown for guidance only. Follow applicable regulations.

No biological limits allocated.

ENGINEERING CONTROLS

The level of protection and types of controls necessary will vary depending upon potential exposure conditions.

Control measures to consider:

No special requirements under ordinary conditions of use and with adequate ventilation.

PERSONAL PROTECTION

Personal protective equipment selections vary based on potential exposure conditions such as applications, handling practices, concentration and ventilation. Information on the selection of protective equipment for use with this material, as provided below, is based upon intended, normal usage.

Product Name: CAT DEO-ULS 15W-40

Revision Date: 14 Oct 2016

Page 5 of 11

Respiratory Protection: If engineering controls do not maintain airborne contaminant concentrations at a level which is adequate to protect worker health, an approved respirator may be appropriate. Respirator selection, use, and maintenance must be in accordance with regulatory requirements, if applicable. Types of respirators to be considered for this material include:

No special requirements under ordinary conditions of use and with adequate ventilation.

For high airborne concentrations, use an approved supplied-air respirator, operated in positive pressure mode. Supplied air respirators with an escape bottle may be appropriate when oxygen levels are inadequate, gas/vapor warning properties are poor, or if air purifying filter capacity/rating may be exceeded.

Hand Protection: Any specific glove information provided is based on published literature and glove manufacturer data. Glove suitability and breakthrough time will differ depending on the specific use conditions. Contact the glove manufacturer for specific advice on glove selection and breakthrough times for your use conditions. Inspect and replace worn or damaged gloves. The types of gloves to be considered for this material include:

No protection is ordinarily required under normal conditions of use.

Eye Protection: If contact is likely, safety glasses with side shields are recommended.

Skin and Body Protection: Any specific clothing information provided is based on published literature or manufacturer data. The types of clothing to be considered for this material include:

No skin protection is ordinarily required under normal conditions of use. In accordance with good industrial hygiene practices, precautions should be taken to avoid skin contact.

Specific Hygiene Measures: Always observe good personal hygiene measures, such as washing after handling the material and before eating, drinking, and/or smoking. Routinely wash work clothing and protective equipment to remove contaminants. Discard contaminated clothing and footwear that cannot be cleaned. Practice good housekeeping.

ENVIRONMENTAL CONTROLS

Comply with applicable environmental regulations limiting discharge to air, water and soil. Protect the environment by applying appropriate control measures to prevent or limit emissions.

SECTION 9 PHYSICAL AND CHEMICAL PROPERTIES

Note: Physical and chemical properties are provided for safety, health and environmental considerations only and may not fully represent product specifications. Contact the Supplier for additional information.

GENERAL INFORMATION

Physical State: Liquid

Color: Brown

Odor: Characteristic

Odor Threshold: N/D

IMPORTANT HEALTH, SAFETY, AND ENVIRONMENTAL INFORMATION

Relative Density (at 15 °C): 0.867

Flammability (Solid, Gas): N/A

Flash Point [Method]: >215°C (419°F) [ASTM D-92]

Flammable Limits (Approximate volume % in air): LEL: 0.9 UEL: 7.0

Autoignition Temperature: N/D

Product Name: CAT DEO-ULS 15W-40

Revision Date: 14 Oct 2016

Page 6 of 11

Boiling Point / Range: > 316°C (600°F)

Decomposition Temperature: N/D

Vapor Density (Air = 1): N/D

Vapor Pressure: < 0.013 kPa (0.1 mm Hg) at 20 °C

Evaporation Rate (n-butyl acetate = 1): N/D

pH: N/A

Log Pow (n-Octanol/Water Partition Coefficient): > 3.5

Solubility in Water: Negligible

Viscosity: 109 cSt (109 mm²/sec) at 40 °C | 14.1 cSt (14.1 mm²/sec) at 100°C

Oxidizing Properties: See Hazards Identification Section.

OTHER INFORMATION

Freezing Point: N/D

Melting Point: N/A

Pour Point: -27°C (-17°F)

DMSO Extract (mineral oil only), IP-346: < 3 %wt

SECTION 10	STABILITY AND REACTIVITY
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REACTIVITY: See sub-sections below.

STABILITY: Material is stable under normal conditions.

CONDITIONS TO AVOID: Excessive heat. High energy sources of ignition.

MATERIALS TO AVOID: Strong oxidizers

HAZARDOUS DECOMPOSITION PRODUCTS: Material does not decompose at ambient temperatures.

POSSIBILITY OF HAZARDOUS REACTIONS: Hazardous polymerization will not occur.

SECTION 11	TOXICOLOGICAL INFORMATION
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INFORMATION ON TOXICOLOGICAL EFFECTS

Hazard Class	Conclusion / Remarks
Inhalation	
Acute Toxicity: No end point data for material.	Minimally Toxic. Based on assessment of the components.
Irritation: No end point data for material.	Negligible hazard at ambient/normal handling temperatures.
Ingestion	
Acute Toxicity: No end point data for material.	Minimally Toxic. Based on assessment of the components.
Skin	
Acute Toxicity: No end point data for material.	Minimally Toxic. Based on assessment of the components.
Skin Corrosion/Irritation: No end point data for material.	Negligible irritation to skin at ambient temperatures. Based on assessment of the components.
Eye	
Serious Eye Damage/Irritation: No end point	May cause mild, short-lasting discomfort to eyes. Based on

Product Name: CAT DEO-ULS 15W-40

Revision Date: 14 Oct 2016

Page 7 of 11

data for material.	assessment of the components.
Sensitization	
Respiratory Sensitization: No end point data for material.	Not expected to be a respiratory sensitizer.
Skin Sensitization: No end point data for material.	Not expected to be a skin sensitizer. Based on assessment of the components.
Aspiration: Data available.	Not expected to be an aspiration hazard. Based on physico-chemical properties of the material.
Germ Cell Mutagenicity: No end point data for material.	Not expected to be a germ cell mutagen. Based on assessment of the components.
Carcinogenicity: No end point data for material.	Not expected to cause cancer. Based on assessment of the components.
Reproductive Toxicity: No end point data for material.	Not expected to be a reproductive toxicant. Based on assessment of the components.
Lactation: No end point data for material.	Not expected to cause harm to breast-fed children.
Specific Target Organ Toxicity (STOT)	
Single Exposure: No end point data for material.	Not expected to cause organ damage from a single exposure.
Repeated Exposure: No end point data for material.	Not expected to cause organ damage from prolonged or repeated exposure. Based on assessment of the components.

OTHER INFORMATION

For the product itself:

Component concentrations in this formulation would not be expected to cause skin sensitization, based on tests of the components or similar formulations.

Diesel engine oils: Not carcinogenic in animals tests. Used and unused diesel engine oils did not produce any carcinogenic effects in chronic mouse skin painting studies.

Oils that are used in gasoline engines may become hazardous and display the following properties: Carcinogenic in animal tests. Caused mutations in vitro. Possible allergen and photoallergen. Contains polycyclic aromatic compounds (PAC) from combustion products of gasoline and/or thermal degradation products.

Contains:

Base oil severely refined: Not carcinogenic in animal studies. Representative material passes IP-346, Modified Ames test, and/or other screening tests. Dermal and inhalation studies showed minimal effects; lung non-specific infiltration of immune cells, oil deposition and minimal granuloma formation. Not sensitizing in test animals.

The following ingredients are cited on the lists below: None.

--REGULATORY LISTS SEARCHED--

1 = NTP CARC

3 = IARC 1

5 = IARC 2B

2 = NTP SUS

4 = IARC 2A

6 = OSHA CARC

SECTION 12

ECOLOGICAL INFORMATION

The information given is based on data available for the material, the components of the material, and similar materials.

Product Name: CAT DEO-ULS 15W-40

Revision Date: 14 Oct 2016

Page 8 of 11

ECOTOXICITY

Material -- Not expected to be harmful to aquatic organisms.

MOBILITY

Base oil component -- Low solubility and floats and is expected to migrate from water to the land. Expected to partition to sediment and wastewater solids.

PERSISTENCE AND DEGRADABILITY

Biodegradation:

Base oil component -- Expected to be inherently biodegradable

BIOACCUMULATION POTENTIAL

Base oil component -- Has the potential to bioaccumulate, however metabolism or physical properties may reduce the bioconcentration or limit bioavailability.

SECTION 13

DISPOSAL CONSIDERATIONS

Disposal recommendations based on material as supplied. Disposal must be in accordance with current applicable laws and regulations, and material characteristics at time of disposal.

DISPOSAL RECOMMENDATIONS

Product is suitable for burning in an enclosed controlled burner for fuel value or disposal by supervised incineration at very high temperatures to prevent formation of undesirable combustion products.

REGULATORY DISPOSAL INFORMATION

RCRA Information: The unused product, in our opinion, is not specifically listed by the EPA as a hazardous waste (40 CFR, Part 261D), nor is it formulated to contain materials which are listed as hazardous wastes. It does not exhibit the hazardous characteristics of ignitability, corrosivity or reactivity and is not formulated with contaminants as determined by the Toxicity Characteristic Leaching Procedure (TCLP). However, used product may be regulated.

Empty Container Warning Empty Container Warning (where applicable): Empty containers may contain residue and can be dangerous. Do not attempt to refill or clean containers without proper instructions. Empty drums should be completely drained and safely stored until appropriately reconditioned or disposed. Empty containers should be taken for recycling, recovery, or disposal through suitably qualified or licensed contractor and in accordance with governmental regulations. **DO NOT PRESSURISE, CUT, WELD, BRAZE, SOLDER, DRILL, GRIND, OR EXPOSE SUCH CONTAINERS TO HEAT, FLAME, SPARKS, STATIC ELECTRICITY, OR OTHER SOURCES OF IGNITION. THEY MAY EXPLODE AND CAUSE INJURY OR DEATH.**

SECTION 14

TRANSPORT INFORMATION

LAND (DOT): Not Regulated for Land Transport

Product Name: CAT DEO-ULS 15W-40

Revision Date: 14 Oct 2016

Page 9 of 11

LAND (TDG): Not Regulated for Land Transport

SEA (IMDG): Not Regulated for Sea Transport according to IMDG-Code

Marine Pollutant: No

AIR (IATA): Not Regulated for Air Transport

SECTION 15	REGULATORY INFORMATION
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OSHA HAZARD COMMUNICATION STANDARD: This material is not considered hazardous in accordance with OSHA HazCom 2012, 29 CFR 1910.1200.

Listed or exempt from listing/notification on the following chemical inventories: AICS, DSL, IECSC, PICCS, TSCA

Special Cases:

Inventory	Status
KECI	Restrictions Apply
TCSI	Restrictions Apply

SARA 302: No chemicals in this material are subject to the reporting requirements of SARA Title III, Section 302

SARA (311/312) REPORTABLE HAZARD CATEGORIES: None.

SARA (313) TOXIC RELEASE INVENTORY: This material contains no chemicals subject to the supplier notification requirements of the SARA 313 Toxic Release Program.

The following ingredients are cited on the lists below:

Chemical Name	CAS Number	List Citations
MAGNESIUM LONG CHAIN ALKARYL SULFONATE		6
ZINC ALKYL DITHIOPHOSPHATE	113706-15-3	15

--REGULATORY LISTS SEARCHED--

- | | | | |
|---------------|------------------|-------------------|-------------|
| 1 = ACGIH ALL | 6 = TSCA 5a2 | 11 = CA P65 REPRO | 16 = MN RTK |
| 2 = ACGIH A1 | 7 = TSCA 5e | 12 = CA RTK | 17 = NJ RTK |
| 3 = ACGIH A2 | 8 = TSCA 6 | 13 = IL RTK | 18 = PA RTK |
| 4 = OSHA Z | 9 = TSCA 12b | 14 = LA RTK | 19 = RI RTK |
| 5 = TSCA 4 | 10 = CA P65 CARC | 15 = MI 293 | |

Product Name: CAT DEO-ULS 15W-40

Revision Date: 14 Oct 2016

Page 10 of 11

Code key: CARC=Carcinogen; REPRO=Reproductive

SECTION 16	OTHER INFORMATION
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N/D = Not determined, N/A = Not applicable

KEY TO THE H-CODES CONTAINED IN SECTION 3 OF THIS DOCUMENT (for information only):

H303: May be harmful if swallowed; Acute Tox Oral, Cat 5

H315: Causes skin irritation; Skin Corr/Irritation, Cat 2

H317: May cause allergic skin reaction; Skin Sensitization, Cat 1

H318: Causes serious eye damage; Serious Eye Damage/Irr, Cat 1

H401: Toxic to aquatic life; Acute Env Tox, Cat 2

H411: Toxic to aquatic life with long lasting effects; Chronic Env Tox, Cat 2

H413: May cause long lasting harmful effects to aquatic life; Chronic Env Tox, Cat 4

THIS SAFETY DATA SHEET CONTAINS THE FOLLOWING REVISIONS:

Composition: Component Table information was modified.

Section 01: Company Contact Methods information was modified.

Section 01: Company Mailing Address information was modified.

Section 01: Product Intended Use information was modified.

Section 07: Handling and Storage - Handling information was modified.

Section 07: Handling and Storage - Storage Phrases information was modified.

Section 09: Flash Point C(F) information was modified.

Section 09: Pour Point C(F) information was modified.

Section 09: Relative Density - Header information was modified.

Section 09: Relative Density information was modified.

Section 09: Vapor Pressure information was deleted.

Section 09: Viscosity information was modified.

Section 11: Chronic Tox - Product information was modified.

Section 11: Other Health Effects information was added.

Section 13: Disposal Considerations - Disposal Recommendations information was modified.

Section 15: Inventory - Header information was added.

Section 15: Inventory - Header information was deleted.

Section 15: List Citations Table information was modified.

Section 15: National Chemical Inventory Listing information was modified.

Section 15: Special Cases - Header information was added.

Section 15: Special Cases - Header information was deleted.

Section 15: Special Cases Table information was added.

Section 15: Special Cases Table information was deleted.

Section 15: Status - Header information was added.

Section 15: Status - Header information was deleted.

Section 16: HCode Key information was modified.

Section 16: MSN, MAT ID information was modified.

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Product Name: CAT DEO-ULS 15W-40

Revision Date: 14 Oct 2016

Page 11 of 11

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Internal Use Only

MHC: 0B, 0B, 0, 0, 0, 0

PPEC: A

DGN: 7064527XUS (1024931)

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From: Bui, Doka <dokabui@amazon.com>
Sent: Friday, December 13, 2024 9:27 AM
To: Bowker, Jason <jbowker@amazon.com>
Subject: Pdx 4 engine oil

Morning Jason,

Below is the average amount of engine oil replaced per 3 year PM.

Thanks
Doka

In 2023 at the AZ4 campus:

PDX4 – Zero oil changes
PDX52 – 16 generators, 110 gallons of oil per unit = 1,760g
PDX55 – 11 generators, 110 gallons of oil per unit = 1,210g
PDX58 – 13 generators, 110 gallons of oil per unit = 1,430g
PDX61 – 14 generators, 110 gallons of oil per unit = 1,540g
Perdix – 6 C27 generators, 14.8 gallons of oil per unit = 88.8g
Perdix – 1 C32 generator, 24.8 gallons of oil per unit = 24.8g

Total = 6,053.6g

In 2024 at the AZ4 campus:

PDX4 – Zero oil changes
PDX52 – Zero oil changes
PDX55 – Zero oil changes
PDX58 – Zero oil changes
PDX61 – 14 generators, 110 gallons of oil per unit = 1,540g
Perdix – Zero oil changes
Perdix – Zero oil changes

Total = 1,540g