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**AIR EMISSION TEST REPORT
ENVIVA PELLETS GREENWOOD, LLC
Greenwood, South Carolina**

Prepared by

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TABLE OF CONTENTS

1. SUMMARY	1
1.1 Purpose and Scope	1
1.2 Test Results Summary	1
1.3 On-Site Test Program Personnel	4
2. TEST METHODS	6
2.1 Test Locations	6
2.2 Sampling Point Determination—EPA Method 1	9
2.3 Flue Gas Velocity and Volumetric Flow Rate—EPA Method 2	9
2.4 Flue Gas Moisture Content—EPA Method 4	9
2.5 Filterable and Condensable Particulate Matter—EPA Method 5 and Method 202	10
2.6 Oxygen/Carbon Dioxide, Nitrogen Oxides, Carbon Monoxide, and Volatile Organic Compounds—EPA Methods 3A, 7E, 10, 18, and 25A	12
2.7 FTIR Sampling System	15
3. SUMMARY AND DISCUSSIONS OF RESULTS	19
3.1 Dryer/RTO Test Results	19
3.2 Dry Hammermill Test Results	22
3.3 RCO 1 and RCO 2 Test Results	25
4.0 QUALITY ASSURANCE AND QUALITY CONTROL	30
4.1 Particulate Matter Tests, Methods 5 and 202	30
4.2 Oxygen, Carbon Dioxide, Nitrogen Oxides, Volatile Organic Compound and Carbon Monoxide Tests, Methods 3A, 7E, 10, and 25A	33
4.3 HAPs Tests, Method 320 and Method 321	42
APPENDIX IA. Method 5/Method 202 Field Data Sheets	44
APPENDIX IB. Method 5/Method 202 Laboratory Report AND Chain-of-Custody	59
APPENDIX IC. Method 3A, 7E, 10, 25A, AND Method 320 Data Sheets	76
APPENDIX ID. Method 18 Laboratory Report	109
APPENDIX IE. Calibration Gas Certification Sheets	192
APPENDIX IF. Sampling Equipment Calibration Data Sheets	201
APPENDIX IG. Process Data	209

APPENDIX IIA. Method 5/Method 202 Field Data Sheets	215
APPENDIX IIB. Method 5/Method 202 Laboratory Report AND Chain-of-Custody	226
APPENDIX IIC. Method 3A, 7E, 10, 25A, AND Method 320 Data Sheets.....	243
APPENDIX IID. Method 18 Laboratory Report.....	279
APPENDIX IIE. Calibration Gas Certification Sheets.....	358
APPENDIX IIF. Sampling Equipment Calibration Data Sheets.....	367
APPENDIX IIG. Process Data.....	371
 APPENDIX IIIA. Method 5/Method 202 Field Data Sheets	 379
APPENDIX IIIB. Method 5/Method 202 Laboratory Report AND Chain-of-Custody	387
APPENDIX IIIC. Method 3A, 7E, 10, 25A, AND Method 320 Data Sheets.....	402
APPENDIX IIID. Method 18 Laboratory Report.....	420
APPENDIX IIIE. Calibration Gas Certification Sheets.....	517
APPENDIX IIIF. Sampling Equipment Calibration Data Sheets.....	527
APPENDIX IIIG. Process Data.....	532

DEFINITIONS

Volatile Organic Compounds (VOC)—As used in this test report, volatile organic compounds mean total hydrocarbons measured in accordance with U.S. EPA Method 25A measured on a propane basis minus methane.

Organic Hazardous Air Pollutants—As used in this test report, organic hazardous air pollutants include only (1) methanol, (2) formaldehyde, and (3) acetaldehyde.

ACRONYMS

CEM	Continuous Emission Monitor
CPM	Condensable Particulate Matter
DHEC	South Carolina Department of Health and Environmental Conservation
DHM	Dry Hammermill
EPA	U.S. Environmental Protection Agency
FID	Flame Ionization Detector
FTIR	Fourier Transform Infrared Spectroscopy
HAPS	Hazardous Air Pollutants
ODT	Oven Dried Tons
OHAPS	Organic Hazardous Air Pollutants
RCO	Recuperative Catalytic Oxidizer
RTO	Regenerative Thermal Oxidizer
VOC	Volatile Organic Compounds as defined by DHEC

UNITS OF MEASURE

ACFM	Actual cubic feet per minute
DSCFM	Dry standard cubic feet per minute
gr./DSCF	Grains per dry standard cubic foot
in.	Inches
in. w.c.	Inches of water column
ppm	Parts per million
ppmvd	Parts per million volume, dry basis
ppmvw	Parts per million volume, wet basis
Lbs./hour	Pounds per hour

STANDARD CONDITIONS

Pressure	29.92 inches of mercury
Temperature	68 degrees Fahrenheit

SIGNIFICANT DIGITS AND DATA ROUNDING

All emissions data are expressed in a maximum of three digits and usually in two digits. All subordinate calculations used in calculating emissions are conducted carrying a minimum of five digits and usually nine digits. Significant digit and data rounding procedures are consistent with EPA policy.

AIR EMISSION TEST REPORT

ENVIVA PELLETS GREENWOOD, LLC

1. SUMMARY

1.1 Purpose and Scope

This air emission test report summarizes the procedures and results compiled at the Enviva Pellets Greenwood, LLC (Enviva) dry hammermill (DHM) and dryer regenerative thermal oxidizer (RTO) on December 4-5, 2018, on the pellet cooler RCO 2 stack on January 16, 2019, and on the pellet cooler RCO 1 stack on March 7, 2019. The stack and control device numbering used in this test plan are consistent with South Carolina DHEC permit 1240-0133-CBr1 and R2 and the Test Protocol approved by South Carolina DHEC on November 27, 2018.

Section 1.2 of this report provides a summary of the test results and the process operating conditions during the tests. Section 1.3 includes a list of the Enviva personnel, the DHEC test observers, and the Air Control Techniques, P.C. personnel on-site. Section 2 provides a summary of the emission test methods and the four sampling locations—Stacks S1, S3, S5, and S6. Section 3 includes the complete test results. Quality assurance data compiled during the test program are provided in Section 4 and the appendices. The supporting data and quality assurance information for the three test programs are provided in Appendix I for the December 2018 tests, Appendix II for the January 2019 tests, and Appendix III for the March 2019 tests.

Prior to the start of this emission test program, Air Control Techniques, P.C. conducted Method 320-based validation tests. The results of these tests confirmed the accuracy of Methods 320 and 321 for the measurement of methanol, formaldehyde, acetaldehyde, and hydrogen chloride in both combustion gas streams and systems handling ambient air. The results of these tests are summarized in a separate test report submitted to the South Carolina DHEC.

1.2 Test Results Summary

Dryer RTO System—The dryer RTO system includes a rotary dryer, a large diameter cyclone, a wet electrostatic precipitator (WESP), and a RTO. This system includes a 100-inch diameter 75-foot high stack. This stack was tested using U.S. EPA Reference Methods 2, 3A, 4, 5, 7E, 10, 25A, 202, 320, and 321. The Method 5 and 202 sampling trains were combined into a single unit. Table 1-1 provides a summary of the three test runs.

Table 1-1. Stack S1, Dryer/RTO Air Emissions			
Pollutant	Method	Pounds/Hour	Pounds/ODT
Filterable Particulate	5	0.35	0.0053
Condensable Particulate	202	1.5	0.023
Nitrogen Oxides as NO ₂	7E	18.5	0.28
Carbon Monoxide	10	9.9	0.15
Volatile Organic Compounds as Propane	25A	5.2	0.079
Methanol	320	0.0	0.0
Acetaldehyde	320	0.0	0.0
Formaldehyde	320	0.33	0.0050
Hydrogen Chloride	321	0.0	0.0

There were no quality assurance issues in these dryer stack tests. Prior to this test program, Air Control Techniques, P.C. conducted a set of validation tests that demonstrated the accuracy of Method 320 for the three organic hazardous air pollutants (HAPs) and Method 321 for hydrogen chloride in the RTO stack.

The production rates in the dryer system during the three test runs ranged from 64.1 to 67.0 ODT/hour. The wood being processed was 75% softwood, and the remainder hardwood. Supporting data can be found in Appendix IG.

Dry Hammermill System—The Dry Hammermill (DHM) system includes a set of five cyclo-filters equipped with PTFE membrane filter bags. This system includes a 62.5-inch diameter 60-foot high stack (S3). This stack was tested using U.S. EPA Reference Methods 2, 3A, 4, 5, 25A, 202, 320, and 321. The Method 5 and 202 sampling trains were combined into a single unit. There were three one-hour test runs using this set of EPA test methods. Table 1-2 provides a summary of the three test runs.

Table 1-2. Stack S3, DHM Air Emissions			
Pollutant	Method	Pounds/Hour	Pounds/ODT
Filterable Particulate	5	8.7	0.13
Condensable Particulate	202	0.20	0.0031
Volatile Organic Compounds as Propane	25A	35.4	0.55
Methanol	320	0.32	0.0049
Acetaldehyde	320	0.0	0.0
Formaldehyde	320	0.015	0.00023
Hydrogen Chloride	321	0.015	0.00023

There were no quality assurance issues in these tests. However, testing personnel noted that some large clumps of particulate matter were occasionally passing upward through the stack. These large clumps of material appeared to be solids that had accumulated on an inner surface of the cyclo-filter outlet ducts and/or on the lower portions of the stack during previous system maintenance periods. This condition biased the filterable particulate matter emissions to higher-than-normal levels. Post-test evaluation of the dry hammermill operating data indicated that they were not operating normally, which contributed to the higher than normal particulate matter test results.

Prior to this test program, Air Control Techniques, P.C. conducted a set of 320 validation tests to demonstrate the accuracy of Method 320 for the three organic hazardous air pollutants (HAPs) and Method 321 for hydrogen chloride for a DHM source that inherently has high oxygen concentrations, low moisture levels, and modest VOC levels. The production rates in the dry hammermill system during the three test runs ranged from 64.7 to 65.5 ODT/hour. The wood being processed was 75% softwood, and the remainder was hardwood.

Pellet Cooler Systems—Enviva has 5 pellet coolers. Two of the pellet coolers systems exhaust to RCO 2 serving Stack S6 on the north side of the Pellet Cooler Building. Three of the pellet cooler systems exhaust to RCO 1 serving Stack S5.

RCO 2 was tested on January 16, 2019 after the bypass damper was fixed. RCO 2 and the pellet cooler systems operated normally during these tests with the exception of four short-duration process interruptions during Run 5. The first two runs were voided due to sampling train leaks caused by the difficulty of moving the large Method 5/Method 202 sampling train in a space-constrained and awkwardly placed sampling port. The lift was repositioned after the second run allowing the operator better access for handling the Method 5/202 sampling train. The samples from all five runs were analyzed, and the results for Runs 3 through 5 are reported in Table 1-3. Only Runs 3, 4 and 5, which had successful post-test leak checks are being reported to demonstrate compliance. The data from Runs 1 and 2 are included in Appendix IIA and are provided only for informational purposes.

Table 1-3. Stack S6, Pellet Cooler RCO 2 Air Emissions			
Pollutant	Method	Pounds/Hour	Pounds/ODT
Filterable Particulate	5	0.22	0.0086
Condensable Particulate	202	0.10	0.0041
Nitrogen Oxides	7E	0.15	0.0063
Carbon Monoxide	10	0.10	0.042
Volatile Organic Compounds as Propane	25A	1.2	0.047
Methanol	320	0	0
Acetaldehyde	320	0	0
Formaldehyde	320	0.059	0.0025
Hydrogen Chloride	321	0	0

RCO 1 serving Pellet Coolers 1 through 9 on the south side of the Pellet Cooler Building was tested on March 7, 2019. This test followed modifications to an induced draft fan and damper to eliminate small bypass emissions. The results of the tests on Stack S5 on RCO 1 are summarized in Table 1-4.

Table 1-4. Stack S5, Pellet Cooler RCO 1 Air Emissions			
Pollutant	Method	Pounds/Hour	Pounds/ODT
Filterable Particulate	5	0.14	0.0036
Condensable Particulate	202	0.18	0.0046
Nitrogen Oxides	7E	0.26	0.0064
Carbon Monoxide	10	2.4	0.059
Volatile Organic Compounds as Propane	25A	1.4	0.035
Methanol	320	0.01	0.00026
Acetaldehyde	320	0.0	0.0
Formaldehyde	320	0.0	0.0
Hydrogen Chloride	321	0.0	0.0

1.3 On-Site Test Program Personnel

The Enviva Pellets Greenwood, LLC (Greenwood) Project Managers for this testing project were Bruce Peterson, Joe Harrell, and Wayne Franklin. They supervised collection of all process data.

The Air Control Techniques, P.C. project manager for the dryer and dry hammermill tests was John Richards. The Air Control Techniques, P.C. project manager for the pellet cooler RCO 1 and RCO 2 test programs was David Goshaw. Addresses and phone numbers of these individuals are provided below.

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Todd Brozell, P.E., QSTI, Jonas Gilbert, P.E., QSTI, Elias Gilbert, Tom Holder, QSTI, and Wallace Smith assisted John Richards and David Goshaw in one or more of the test programs.

Resolution Analytics, Inc. performed the analyses of all Method 5 and 202 samples. The project manager at this laboratory is Bruce Nemet.

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Mike Verzwylt was the South Carolina Department of Health and Environment on-site test observer. His contact information is listed below.

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2. TEST METHODS

2.1 Test Locations

Dryer/RTO Stack (S1)—The Dryer/RTO stack is shown in Figure 2-1. There are four ports spaced 90 degrees apart. Each of the ports is six inches diameter.

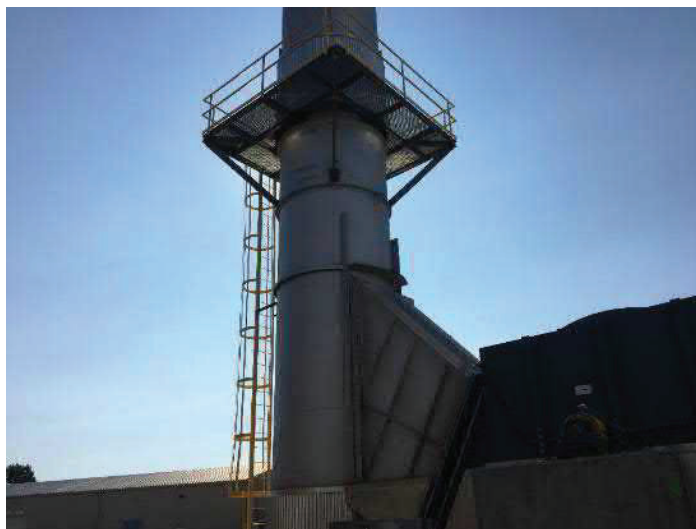


Figure 2-1. Dryer stack S1

Air Control Techniques, P.C. performed a stratification test at the Dryer Stack. The test results determined that the gas stream was unstratified. Accordingly, the CEM probe was mounted at a point that matched the approximate mean concentration.

The gas flow rate was measured in accordance with Method 2. Twenty-four traverse points were used—six sampling points on each of four traverses. The gas moisture content was measured using Method 4. A Method 3A analyzer was used to measure the oxygen and carbon dioxide concentration.

Prior to the compliance test runs, the cyclonic flow angles were checked. The average cyclonic angle was 0.8 degrees—well below the maximum allowed angle of 20 degrees. The S1 sampling port locations satisfied EPA Method 1 criteria.

DHM Stack (S3)—There are five fabric filters serving the five hammermills. The effluent gas streams from the five fabric filters combine into a single manifold leading to a single stack, S3, shown in Figure 2-2.



Figure 2-2. Hammermill building and stack

Stack S3 is 62.5 inches in diameter. There are four ports spaced 90 degrees apart. Each of the ports is five inches in diameter. The stack discharge point is 1.09 stack diameters upstream of the sampling ports, and the closest downstream disturbance is 4.8 stack diameters. Twenty-four sampling points (6 each on four traverses) were used for the Method 5/202 particulate matter tests. Twenty-four sampling points was also used for the Method 2 gas velocity traverses.

The CEM probe was mounted in the approximate center of the stack. A Method 3A analyzer was used to measure the oxygen concentration for all emission measurements.

RCO Stacks—The vertical sections of the exit ducts for the north side and south side RCOs provided the best sampling locations. Two ports were installed 90-degrees apart at the locations shown in Figures 2-3 through 2-5. With these two ports, it was possible to fully traverse the RCO exit ducts.



North Side RCO exit
duct sampling
location, Two 4-inch
ports 90-degrees
apart

Figure 2-3. Vertical RCO 2 exit duct on the north side of the Pellet Cooler Building



South Side RCO exit
duct sampling
location, Two 4-inch
ports 90 degrees apart

Figure 2-4. Vertical RCO 1 exit duct on the south side of the Pellet Cooler Building

The test crews at each of these two locations are shielded and sufficiently far from deflagration panels on the side walls of the fabric filters.

Due to the flow disturbances relatively close to the proposed sampling location, a total of 24 traverse points was used during the gas flow measurements.

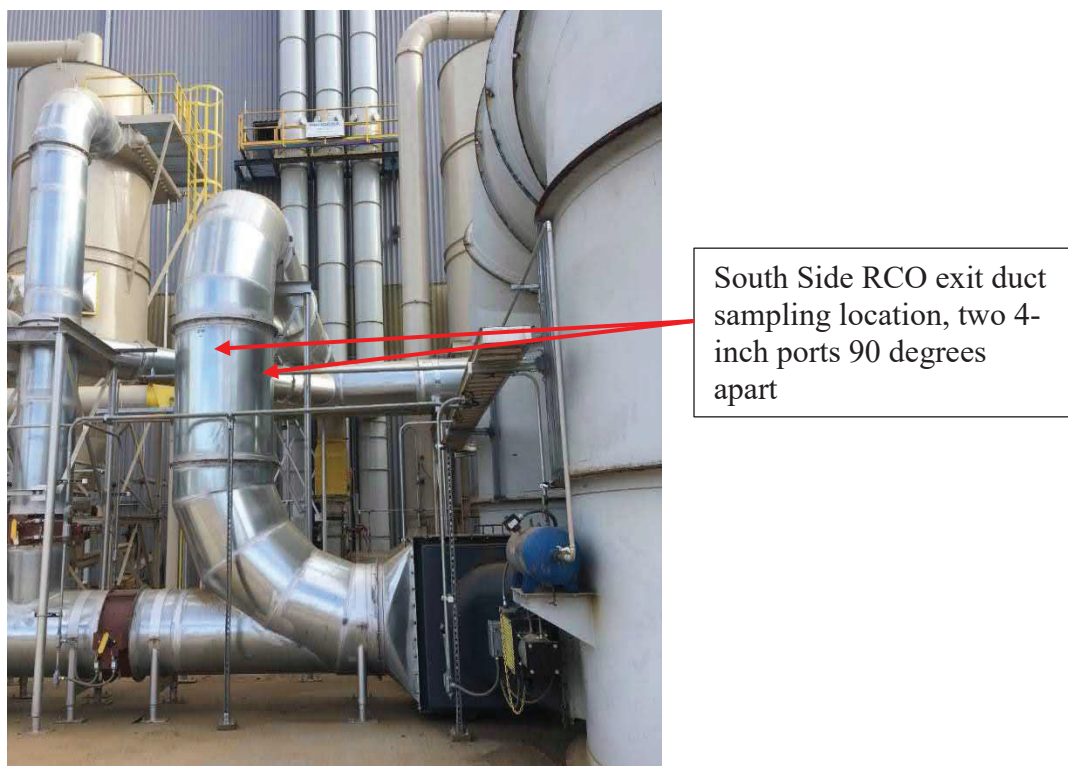


Figure 2-5. RCO 1 Exit Duct, South Side of the Pellet Cooler Building

2.2 Sampling Point Determination—EPA Method 1

The number and location of the traverse points used in the Method, 5/202 tests were determined according to the procedures outlined in U.S. EPA Reference Method 1. No traverse points were located within 1.0 inch of the stack wall.

2.3 Flue Gas Velocity and Volumetric Flow Rate—EPA Method 2

The flue gas velocity and volumetric flow rate during all of the emissions tests were determined according to the procedures outlined in U.S. EPA Reference Method 2. Velocity measurements were made using S-type Pitot tubes conforming to the geometric specifications outlined in Method 2. Accordingly, each Pitot tube was assigned a coefficient of 0.84. Velocity pressures were measured with fluid manometers. Effluent gas temperatures were measured with chromel-alumel thermocouples attached to digital readouts. A cyclonic flow check was performed at the sampling locations prior to testing.

2.4 Flue Gas Moisture Content—EPA Method 4

The flue gas moisture contents during each emissions test were determined in conjunction with each sampling train according to the sampling and analytical procedures outlined in EPA Method 4. The impingers were connected in series and contained reagents as listed in each of the method descriptions included in this protocol. The impingers were contained in an ice bath to assure

condensation of the flue gas stream moisture. Any moisture that was not condensed in the impingers was captured in the silica gel; therefore, all moisture was weighed and entered into moisture content calculations.

In addition to the Method 4 test results, Air Control Techniques, P.C. calculated the moisture content based on the average stack temperature at the sampling location. The calculated moisture content was compared with the measured value. The lower of the two moisture levels was used in the emission calculations.

2.5 Filterable and Condensable Particulate Matter—EPA Method 5 and Method 202

Air Control Techniques, P.C. used EPA Reference Methods 5 and 202 to determine filterable and condensable particulate matter emissions from the Dryer/RTO stack and from the Dry Hammermill stack. The testing was conducted in accordance with all applicable EPA sampling and quality assurance requirements. The test program consisted of a set of three one-hour test runs at both the Dryer/RTO Stack (S1) and the Dry Hammermill Stack (S3). The average of the three test runs at each source was computed.

Sample Collection—Samples were withdrawn isokinetically ($100\% \pm 10\%$) from the source using an EPA Method 5/202 sampling train. The duration of each test run was 60 minutes. The sampling train consisted of a stainless steel nozzle, a heated stainless steel lined probe with an S-type Pitot tube attached, a heated Method 5 filter, the Method 202 sampling train, and a metering console. The filterable particulate matter samples were collected on a glass fiber filter supported by a Teflon frit.

The Method 5 sampling train is shown in Figure 2-6. The four impingers used in the Method 4 moisture measurements were replaced with the Method 202 sampling train shown in Figure 2-7. A temperature sensor (not shown in Figure 2-3) was inserted into the filter housing in direct contact with the gas stream exiting the Method 5 filter.

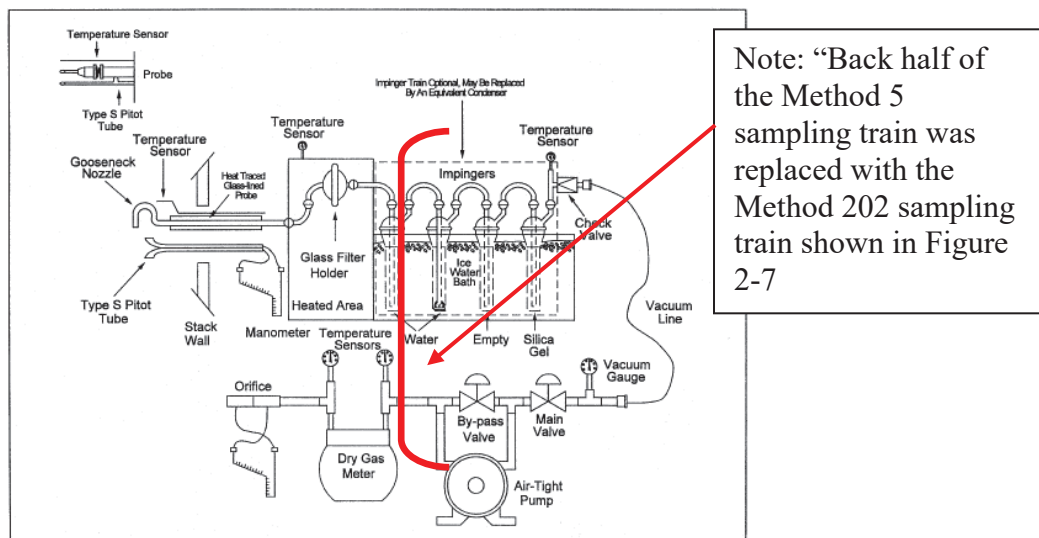


Figure 2-6. Method 5 Sampling Train
(From Figure 5-1 of U.S. EPA Method 5, 40 CFR Part 60, Appendix A)

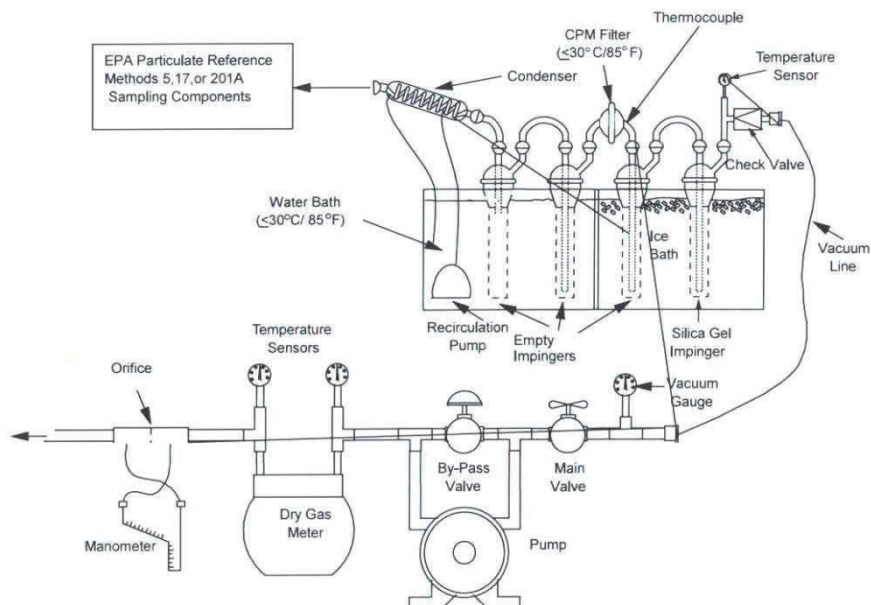


Figure 2-7. Method 202 Sampling Train Following the Method 5 Filter and Before Gas Stream Entry to the Main Valve and Dry Gas Meter

The EPA Method 202 sampling train included a water-cooled indirect heat exchanger, a knock-out impinger, an impinger that was initially dry, a Teflon membrane filter (CPM filter), and a pre-weighed silica gel impinger.

The initial knockout impinger and the initially dry impinger were maintained in a water bath at 65-85°F. The sample gas stream exiting the second impinger and entering the filter were at or below 85°F. Following each test run, the sampling train was purged with ultra-high purity nitrogen at a rate of 14 liters per minute for one hour to remove dissolved sulfur dioxide and other soluble gases.

Sample Recovery—The Method 5 filter was removed from the filter holder and placed in a uniquely identified petri dish. The petri dish was sealed for transport to the laboratory. Each impinger was weighed prior to and at the conclusion of each run. The weight gain due to moisture in the gas stream was summed and entered into moisture content calculations in accordance with EPA Reference Method 4. The nozzle, probe, and front half of the filter holder were rinsed and brushed with acetone and collected in a labeled glass jar.

The condenser, impingers, connecting glassware and front half of the CPM filter holder were rinsed with water and added to the collected purged water sample. All components were then rinsed with acetone and hexane and collected in a separate glass jar. The CPM filters were placed in uniquely identified petri dishes.

Sample Analysis - EPA Method 5 analytical procedures were used to analyze the filters and front-half acetone rinses for filterable particulate matter.

EPA Method 202 analytical procedures were used to analyze the back-half of the sampling train. The CPM filters were extracted with water and hexane. The inorganic extraction solvent rinses (water) were added to the collected water samples. The organic extraction solvent rinses (hexane) were added to the collected acetone/hexane rinse samples. The water samples were extracted with hexane, and the extraction solvent was combined with the acetone/hexane rinses. The organic fractions (acetone/hexane rinses and the hexane extraction solvent) were evaporated to dryness, desiccated, and weighed until consecutive weights agreed within ± 0.5 mg. The inorganic fractions (water samples) were evaporated to near dryness and resuspended in 50 mL of deionized water. The sample was then titrated to a neutral pH using sodium hydroxide, evaporated to dryness, desiccated, and weighed until consecutive weights agree within ± 0.5 mg. The total catch reported for each run was the sum of the organic and inorganic catches minus the field train blank catch weight or 2.0 mg, whichever was less.

As part of the Method 202 tests, Air Control Techniques, P.C. collected reagent blanks of the acetone, hexane, and deionized water used as rinse solvents. Air Control Techniques, P.C. also prepared and analyzed a field recovery blank and a proof blank. The field recovery blank and the proof blank were charged with 100 milliliters of degassed deionized water and assembled and recovered with components that had collected at least one test run.

2.6 Oxygen/Carbon Dioxide, Nitrogen Oxides, Carbon Monoxide, and Volatile Organic Compounds—EPA Methods 3A, 7E, 10, 18, and 25A

The sampling and analytical procedures for O₂/CO₂, CO, VOCs, and NO_x at the Dryer/RTO Stack (S1) and for O₂/CO₂ and VOC at the Dry Hammermill Stack (S3) were conducted in accordance with EPA Methods 3A, 7E, 10, and 25A. The measurement system consisted of a sample acquisition system, the individual gas analyzers, and a data acquisition system (DAS).

The sample acquisition system included an in-stack probe, a heated out-of-stack glass mat filter for particulate matter removal, a condenser, and a sample line leading to the continuous emission monitors in the mobile laboratory. All components of the sample acquisition system that contacted the sampled gas were constructed of Type 316 stainless steel or Teflon®. The sampled gas was continuously extracted from a central point within the duct at a constant rate ($\pm 10\%$) for the duration of each test run. Figure 2-8 provides a drawing of the CEM sampling system.

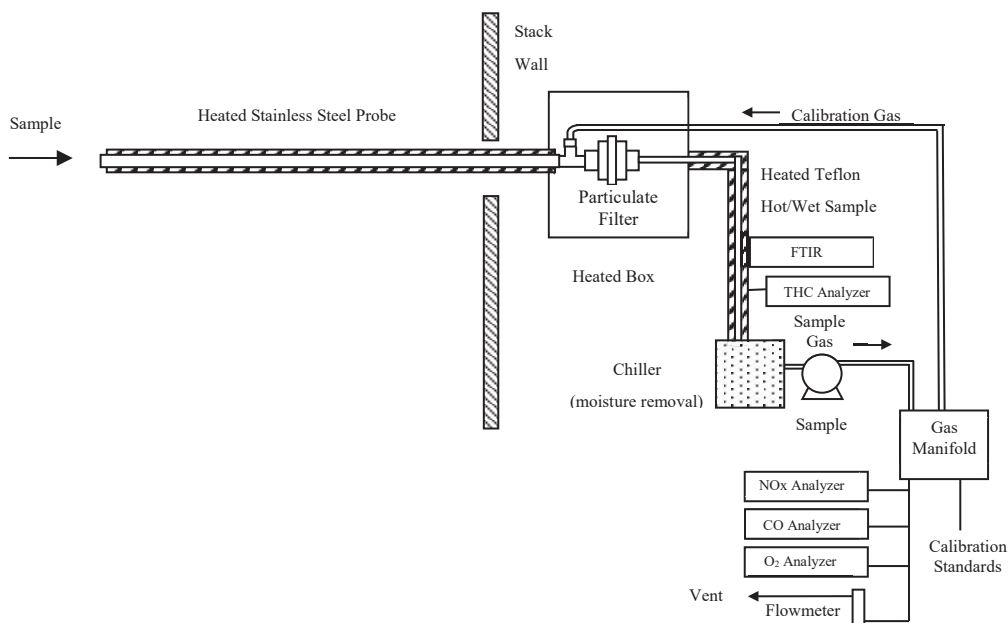


Figure 2-8. CEM Sampling System

A portion of the sample gas was routed through the distribution manifold board for delivery to the gas analyzers. The configuration of the sampling acquisition system allowed for the injection of gas standards directly to the analyzers or through the entire sampling system. All pretest and posttest calibration procedures were performed as outlined in the applicable EPA Reference Methods.

All of the gas standards were prepared according to the test methods using EPA Protocol procedures. Copies of the certificate of analysis documents for the gas standards used during the test program were available onsite and are provided in the emissions test report. The calibration gas concentrations are listed in Table 2-1 through 2-3. The analyzers used in this test program are listed in Table 2-4.

Table 2-1. Gas Cylinder Concentration Ranges, Dec. 4-5, 2018 Tests					
Parameter	O ₂ , %	CO ₂ , %	CO, ppmvd	VOC, ppmvd as propane	NO _x , Ppmvd
Zero Gas	0.0	0.0	0.0	0.0	0.0
Low-Level Gas	NA	NA	NA	30.07	NA
Mid-Level Gas	11.05	9.95	226.4	52.38	48.0
High-Level Gas	21.99	18.22	450	85.84	89.5
Calibration Span	21.99	18.22	450	100	89.5

Table 2-2. Gas Cylinder Concentration Ranges, January 16, 2019 Tests					
Parameter	O ₂ , %	CO ₂ , %	CO, ppmvd	VOC, ppmvd as Propane	NO _x , Ppmvd
Zero Gas	0.0	0.0	0.0	0.0	0.0
Low-Level Gas	NA	NA	NA	25.5	NA
Mid-Level Gas	11.05	9.95	125.6	52.38	48.0
High-Level Gas	21.99	18.22	226.4	85.84	89.5
Calibration Span	21.99	18.22	450	100	89.5

Table 2-3. Gas Cylinder Concentration Ranges, March 7, 2019 Tests					
Parameter	O ₂ , %	CO ₂ , %	CO, ppmvd	VOC, ppmvd as Propane	NO _x , ppmvd
Zero Gas	0.0	0.0	0.0	0.0	0.0
Low-Level Gas	NA	NA	NA	25.7	NA
Mid-Level Gas	11.05	10.0	46.1	50.2	49.8
High-Level Gas	21.8	18.2	89.5	85.8	89.5
Calibration Span	21.8	18.2	100	100	89.5

Table 2-4. Test Program Analyzers				
Analyte	Manufacturer	Model	Measurement Principle	Range
O ₂	California Analytical	200	Paramagnetic	25 %
CO ₂	California Analytical	200	Gas Filter Correlation NDIR	20 %
VOC	California Analytical	200M	Flame Ionization	100 ppm
NO _x	Teledyne/API	T200H	Chemiluminescent	100 ppm
CO	Teledyne/API	300 EM	NDIR	500 ppm

The CO and NO_x emissions were calculated on a pound per hour basis. The NO_x emissions were calculated based on the molecular weight of NO₂.

Outputs from the individual emission monitors were connected to a computerized data acquisition system. Outputs from the analyzer were sent to a portable computer via a National InstrumentsTM FieldPoint controller. The signals were downloaded to a STRATA[®] software

program every two seconds. The two-second readings were averaged for the duration of the test run.

Prior to the start of the emission tests, Air Control Techniques, P.C. conducted a stratification test in accordance with Section 8.1.2 of U.S. EPA Method 7E at the dryer/RTO sampling location. Sampling was conducted for a duration that exceeded twice the maximum system response time at each point. The point-to-point variations did not differ from the mean concentration by more than $\pm 5\%$ or 0.5 ppm. Accordingly, the gas streams were classified as unstratified, and sampling was conducted at a single point.

2.7 FTIR Sampling System

Sample gas was continuously passed through a sampling system, which included an in-stack probe, a heated out-of-stack glass mat filter for particulate matter removal, a Teflon® heat-traced sample line, a MIDAC Fourier Transform Infrared (FTIR) spectrometer, a Teflon® heated-head pump, and a gas manifold board as shown in Figure 2-9. All components of the sample acquisition system that contacted the sampled gas were Type 316 stainless steel or Teflon®. All components of the sampling system and the FTIR cell were maintained at or above 180° C. Air Control Techniques, P.C. ensured that the sampling system contained no “cold spots” to prevent loss of the target analytes. The sampling rate was maintained at greater than 10 liters per minute.

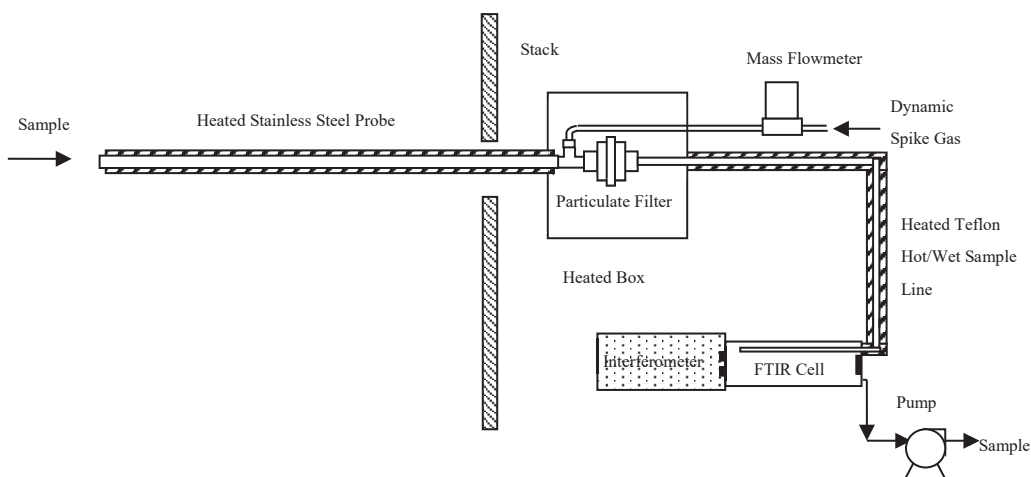


Figure 2-9. Method 320/321 Sampling System

The FTIR system included a MIDAC Corporation (Costa Mesa, CA) I-2001 spectrometer equipped with a heated, nominal 10-meter path absorption cell, a potassium bromide (KBr) beam splitter, zinc selenide (ZnSe) non-hygroscopic windows, and a liquid nitrogen-cooled Mercury Cadmium Telluride detector. Measurements were made using a MIDAC Model I-2001 high resolution Michelson interferometer with AutoQuant Pro V.4.0.0.136 software. Sampled gas was continuously passed through the sampling system, and sample spectra (based on 56 co-added interferograms) were recorded every minute. The system’s nominal spectral resolution

was 0.5 cm^{-1} . Samples and standards were analyzed at temperatures greater than 120°C and near ambient pressures.

The inside walls of the cells were polished stainless steel to minimize interaction of the sample with the cell walls, and the cell mirrors were bare gold. The gas pressure in the FTIR sample cell was monitored with a pressure transducer connected directly to the sample cell. The heated sample cell was wrapped in an insulating thermal jacket, and the temperature was controlled with type J thermocouples. The absorption cell volume was approximately 2 liters.

The FTIR system operated via a portable computer. A data archive storage system (USB Mass Storage Drive) was used for data backup. All interferograms, single beams, absorbance spectra, and background single beams were stored and archived. The Air Control Techniques, P.C. FTIR field operator documented the sampling parameters throughout the test program including the filename, time, cell pressure, cell temperature, spectra scan rate, corresponding background, and any relevant notes.

Spectral Analysis—Air Control Techniques used the program AutoquantPro™ Version 4.0.0.136 (©Midac Corporation) to collect and analyze all the infrared field data. The program allows the development and storage of analytical methods for analysis of spectral data (absorbance) files. The reference spectra used for these analyses were developed by MIDAC Corporation, EPA, and Air Control Techniques, P.C. One method for the task of determining the absorption path length and at least one additional method for determining the concentrations of the target compounds was developed for the test program.

Air Control Techniques, P.C. selected the analytical wavelengths and conducted analyses for analytical uncertainty and detection limit determination using reference spectra standards and prepared the computerized analytical programs for measuring HCl, methanol, formaldehyde, and acetaldehyde concentrations. The reference spectra used for these analyses were developed by EPA, Air Control Techniques, P.C., and the MIDAC Corporation. Prior to testing, an evaluation of possible analytical interferents (e.g., H_2O , CO_2 , CO, pinenes) for the gas stream was determined. Reference spectra of the possible interferents were included in the modeling program to minimize analytical uncertainty and detection limits of the target compounds. Water spectra were recorded onsite with the FTIR instrument used for the field testing to simulate the actual gas stream moisture. The recorded water spectra were included as the primary spectra for modeling.

The sampling method was adjusted following the test program to minimize interferences, reduce the detection limits, and increase the measurement accuracy of the target compounds. The method adjustments included the addition of water spectra collected during the test program.

Minimum Detectable Concentrations—The practical minimum detectable concentration (MDC) is instrument, compound, and interference specific. The actual sensitivity of the FTIR measurement system for the individual target analytes depends upon the specific infrared absorptivity (signal) and wavelength, the analysis region for each target analyte, the amount of instrument noise, the concentration of unaccounted interfering compounds in the sample gas, and the amount of spectral overlap imparted by these compounds in the wavelength region(s) used for the quantification of the target analytes.

The detection limit is the lowest concentration of an analyte for which its overall fractional uncertainty is required to be less than its analytical uncertainty limit. The MDC was calculated based on the Standard Error of the Estimated Concentration, or SEC, also known as the Marginal Standard Deviation. The SEC is a measure of the residual spectrum after the scaled reference spectra have been removed from the sample spectrum. The remaining “residual noise” was referenced against each target compound reference spectrum again, and the resulting concentration is the SEC.

The SEC represents the uncertainty of the concentration values for the target analyte and is based on the error variance. The error variance for the case of a single reference spectrum is calculated as the square root of the sums of the squares of the residual spectrum (R) as shown in Equation 1, where n is the number of observations.

$$\sigma^2 = \frac{\sum_i R_i^2}{(n-1)} \quad \text{Equation 1}$$

The SEC is calculated based on the error variance, the reference spectra concentration (C), and the spectrum (A).

$$SEC = \frac{\sigma C}{\sqrt{\sum_i A_i^2}} \quad \text{Equation 2}$$

The MDC values were calculated as two times the SEC, which provides greater than a 95% confidence interval.

Quality Assurance and Quality Control - A linearity test was performed on the detector. Calibration transfer standard (CTS) spectra were compared at three aperture settings. The CTS band areas agreed to within the uncertainty of the cylinder standard ($\pm 2\%$) and the RMSD noise in the system.

Air Control Techniques, P.C. conducted numerous on-site quality assurance checks including single beam backgrounds, CTS spectra tests, and dynamic analyte spiking. During testing, Air Control Techniques, P.C. conducted a quality assurance review of the spectral data. The review included visual inspection of the sample spectra against the reference spectra. Periodically, the target analyte concentrations were calculated separately and compared with the analytical results.

The FTIR extractive sampling system was leak checked from the probe to the pump outlet using a rotameter. A leak check was performed on the FTIR spectrometer cell under maximum vacuum and greater than ambient pressure for greater than two minutes. The cell leak was less than 4 percent of the cell volume.

Sample spectra were divided point-by-point by a 128-scan background recorded using UHP nitrogen. The single beam spectrum was constantly monitored, and a new background was generated at the beginning and end of each test day or if the signal transmittance (relative to the

background) changed by 5 percent or more (absorbance = -0.02 to 0.02) in any analytical spectral region indicating component build-up on the optical surfaces or alignment-related baseline shifts.

CTS tests were performed prior to and following each test run. CTS spectra were collected at the sampling resolution using the same optical configuration as for sample spectra. A cylinder of 100.9 ppm ethylene in nitrogen served as the CTS. The CTS gas was introduced to the FTIR and allowed to reach steady state. The CTS was used to determine the effective cell path length based on comparisons of the “field” CTS spectra to a laboratory CTS spectrum recorded by MIDAC.

EPA Method 320, EPA Method 321, and the equivalent ASTM Standard D6348-03 specify several analytical uncertainty parameters that the analyst must calculate to characterize the FTIR system performance including root mean square (RMA) noise. The RMA noise is a measure of the instrument accuracy for the target analyte and is calculated as the root mean square deviation (RMSD) of the absorbance values in the analytical region(s) from the mean absorbance value in the same region(s). The RMSD in the noise should be less than one tenth of the minimum analyte peak absorbance of sample or MDC in the target analytical region.

3. SUMMARY AND DISCUSSIONS OF RESULTS

3.1 Dryer/RTO Test Results

Objectives and Test Matrix—The objective of the test program was to measure air emissions exiting the Dryer/RTO stack. A matrix of the test methods used in this test program is provided in Table 3-1.

Table 3-1. Dryer/RTO Tests					
Stack	EPA Test Method	Target Analyte	Number of Runs	Run Times, Minutes	Analytical Measurement
S1 Dryer- RTO	Methods 1, 2, and 4	Stack Gas Volumetric Flow Rate	3	60	Velocity. Pressure, Gravimetric
	Method 3A	Oxygen and Carbon Dioxide	3	60	Paramagnetic and NDIR
	Method 5	Filterable Particulate Matter	3	60	Gravimetric
	Method 7E	Nitrogen Oxides as NO ₂	3	60	Chemiluminescence
	Method 10	Carbon Monoxide	3	60	NDIR
	Method 18	Methane	3	60	GC
	Method 25A	VOCs as Propane	3	60	FID
	Method 202	Condensable Particulate Matter	3	60	Gravimetric
	Method 320	Methanol, Formaldehyde, and Acetaldehyde	3	60	FTIR
	Method 321	HCl	3	60	FTIR

Summary of Results—The results of the particulate matter, VOC, CO, and NO_x tests are summarized in Table 3-2. The VOC data are expressed as propane. The NO_x data are expressed as NO₂. Methane, a non-VOC compound detected by Method 25A, was measured using Method 18. All of the methane analyses were between the laboratory minimum detection limit and the limit of quantification. Accordingly, the methane data were considered to be negligible and were not subtracted from the Method 25A VOC data.

Table 3-2. Test Results Summary, Dryer/RTO Stack				
Parameter	Run 1	Run 2	Run 3	Average
Test date	12/5/2018	12/5/2018	12/5/2018	N/A
Test time	8:40-9:47	10:47-11:57	12:15-13:27	N/A
Production Rate, ODT/hour	67.0	64.1	64.7	65.3
Gas Flow Rate, DSCFM	74,759	71,425	74,025	73,403
Gas Flow Rate, ACFM	166,531	154,608	158,373	159,837
Oxygen Concentration, % dry	12.53	12.78	13.40	12.90
Carbon Dioxide Concentration, % dry	7.89	7.56	7.12	7.52
Stack Gas Moisture Concentration, %	39.49	38.68	37.17	38.45
Stack Temperature, °F	252.2	241.3	250.2	247.9
Filterable Particulate Matter Emissions				
Emission Rate, Lbs./hour	0.57	0.34	0.13	0.35
Emission Factor, Lbs./ODT	0.0085	0.0053	0.0020	0.0053
Condensable Particulate Matter Emissions				
Emission Rate, Lbs./hour	1.7	1.5	1.3	1.5
Emission Factor, Lbs./ODT	0.025	0.023	0.021	0.023
Total Particulate Matter Emissions				
Emission Rate, Lbs./hour	2.3	1.8	1.5	1.9
Emission Factor, Lbs./ODT	0.034	0.028	0.023	0.028
Non-VOC Compounds				
Methane, ppm _{vd} as methane ¹	1.14	1.14	1.54	1.27
VOC Emissions as Propane				
Concentration, ppm _{vd} as propane	10.2	11.2	9.30	10.2
Emission Rate, Lbs./hour as propane	5.3	5.5	4.7	5.2
Emission, Lbs./ODT as propane	0.078	0.086	0.073	0.079
Carbon Monoxide Emissions				
Concentration, ppm _{vd}	29.2	35.4	27.9	30.8
Emissions, Lbs./hour	9.5	11.0	9.0	9.9
Emission Rate, Lbs./ODT	0.14	0.17	0.14	0.15
Nitrogen Oxide Emissions				
NO _x Concentration, ppm _{vd}	38.5	34.4	32.6	35.2
Emissions, Lbs./hour as NO ₂	20.6	17.6	17.3	18.5
Emission Rate, Lbs. NO ₂ /ODT	0.31	0.27	0.27	0.28

¹ All methane analyses were between the laboratory minimum detection limit and the limit of quantification.

Table 3-3 presents the HAP emissions data measured in accordance with Methods 320 and 321. All concentrations are expressed on a ppm dry basis (ppmvd).

Table 3-3. HAP Test Results, Dryer/RTO Stack				
Parameter	Run 1	Run 2	Run 3	Average
Test date	12/5/2018	12/5/2018	12/5/2018	N/A
Test time	8:40-9:47	10:47-11:57	12:15-13:27	N/A
Production Rate, ODT/hour	67.0	64.1	64.7	65.3
Methanol Emissions				
Concentration, ppm _{vd}	0.0	0.0	0.0	0.0
Emission Rate, Lbs./hour	0.0	0.0	0.0	0.0
Emission Lbs./ODT	0.0	0.0	0.0	0.0
Formaldehyde Emissions				
Concentration, ppm _{vd}	0.97	0.98	0.89	0.95
Emission Rate, Lbs./hour	0.34	0.33	0.32	0.33
Emission Lbs./ODT	0.0051	0.0052	0.0049	0.0050
Acetaldehyde Emissions				
Concentration, ppm _{vd}	0.0	0.0	0.0	0.0
Emission Rate, Lbs./hour	0.0	0.0	0.0	0.0
Emission Lbs./ODT	0.0	0.0	0.0	0.0
HCl Emissions				
Emission Factor, ppm _{vd}	0.0	0.0	0.0	0.0
Emission Rate, Lbs./hour	0.0	0.0	0.0	0.0
Emission Lbs./ODT	0.0	0.0	0.0	0.0
Total HAP Emissions				
Emission Rate, Lbs./hour, 4 analytes	0.34	0.33	0.32	0.33
Emission Lbs./ODT	0.0051	0.0052	0.0049	0.0050

All of the HAPs emissions were low as expected due to the high operating temperature of the RTO.

3.2 Dry Hammermill Test Results

Objectives and Test Matrix—The objective of the test program was to measure air emissions exiting the Dry Hammermill Stack (S3). A matrix of the test methods used in this test program is provided in Table 3-4

Table 3-4. Dry Hammermill Stack Tests					
Stack	EPA Test Method	Target Analyte	Number of Runs	Run Times, Minutes	Analytical Measurement
S3 DHM	Methods 1, 2, and 4	Stack Gas Volumetric Flow Rate	3	60	Velocity. Pressure, Gravimetric
	Method 3A	Oxygen and Carbon Dioxide	3	60	Paramagnetic and NDIR
	Method 5	Filterable Particulate Matter	3	60	Gravimetric
	Method 25A	VOCs as Propane	3	60	FID
	Method 202	Condensable Particulate Matter	3	60	Gravimetric
	Method 320	Methanol, Formaldehyde, and Acetaldehyde	3	60	FTIR
	Method 321	HCl	3	60	FTIR

Summary of Test Results—The results of the tests conducted at the dry hammermill stack (S3) are summarized in Tables 3-5 and 3-6.

Table 3-5. Test Results Summary, DHM Stack				
Parameter	Run 1	Run 2	Run 3	Average
Test date	12/4/2018	12/4/2018	12/4/2018	N/A
Test time	9:15-10:23	11:17-12:25	13:04-14:12	N/A
Production Rate, ODT/hour	65.4	64.90	64.6	65.0
Gas Flow Rate, DSCFM	62,212	64,491	64,891	63,865
Gas Flow Rate, ACFM	68,874	72,432	72,790	71,365
Oxygen Concentration, % dry	20.97	20.94	20.91	20.94
Carbon Dioxide Concentration, % dry	0.12	0.12	0.11	0.12
Stack Gas Moisture Concentration., %	3.94	4.22	4.33	4.17
Stack Temperature, °F	102.0	108.5	107.1	105.9
Filterable Particulate Matter Emissions				
Emission Rate, Lbs./hour	9.7	9.5	6.9	8.7
Emission Factor, Lbs./ODT	0.15	0.15	0.11	0.13
Condensable Particulate Matter Emissions				
Emission Rate, Lbs./hour	0.14	0.08	0.38	0.20
Emission Factor, Lbs./ODT	0.0021	0.0012	0.0059	0.0031
Total Particulate Matter Emissions				
Emission Rate, Lbs./hour	9.8	9.6	7.3	8.9
Emission Factor, Lbs./ODT	0.15	0.15	0.11	0.14
VOC Emissions as Propane				
Concentration, ppm _{vd} as propane	68.0	87.5	86.1	80.5
Emission Rate, Lbs./hour as propane	29.1	38.8	38.4	35.4
Emission, Lbs./ODT as propane	0.44	0.60	0.59	0.55

Table 3-6 presents the HAP emissions data measured in accordance with Methods 320 and 321. All concentrations are expressed on a ppm dry basis.

Table 3-6. HAP Test Results, Dry Hammermill Stack				
Parameter	Run 1	Run 2	Run 3	Average
Test date	12/4/2018	12/4/2018	12/4/2018	N/A
Test time	9:15-10:23	11:17-12:25	13:04-14:12	N/A
Production Rate, tons/hour	65.4	64.9	64.6	65.0
Methanol Emissions				
Concentration, ppm _{vd}	0.80	1.11	1.08	1.00
Emission Rate, Lbs./hour	0.25	0.36	0.35	0.32
Emission Rate, Lbs./ODT	0.0038	0.0055	0.0054	0.0049
Formaldehyde Emissions				
Concentration, ppm _{vd}	0.15	0.0	0.0	0.05
Emission Rate, Lbs./hour	0.045	0.0	0.0	0.015
Emission Rate, Lbs./ODT	0.00068	0.0	0.0	0.00023
Acetaldehyde Emissions				
Concentration, ppm _{vd}	0.0	0.0	0.0	0.00
Emission Rate, Lbs./hour	0.0	0.0	0.0	0.00
Emission Rate, Lbs./ODT	0.0	0.0	0.0	0.00
HCl Emissions				
Emission Factor, ppm _{vd}	0.13	0.0	0.0	0.04
Emission Rate, Lbs./hour	0.046	0.0	0.0	0.015
Emission Rate, Lbs./ODT	0.00070	0.0	0.0	0.00023
Total HAP Emissions				
Emission Rate, Lbs./hour, 4 analytes	0.35	0.36	0.35	0.35
Emission Rate, Lbs./ODT, 4 analytes	0.0052	0.0055	0.0054	0.0054

3.3 RCO 1 and RCO 2 Test Results

Objectives and Test Matrix—The objective of the test program was to measure air emissions exiting the Pellet Cooler Stacks S5 and S6. A matrix of the test methods used in this test program is provided in Table 3-7

Table 3-7. RCO 1 and RCO 2 Tests					
Stack	EPA Test Method	Target Analyte	Number of Runs	Run Times, Minutes	Analytical Measurement
S5 and S6 Pellet Coolers	Methods 1, 2, and 4	Stack Gas Volumetric Flow Rate	3	60	Velocity. Pressure, Gravimetric
	Method 3A	Oxygen and Carbon Dioxide	3	60	Paramagnetic and NDIR
	Method 5	Filterable Particulate Matter	3	60	Gravimetric
	Method 7E	Nitrogen Oxides	3	60	Chemiluminescent
	Method 10	Carbon Monoxide	3	60	Infrared
	Method 18	Methane	3	60	GC
	Method 25A	VOCs as Propane	3	60	FID
	Method 202	Condensable Particulate Matter	3	60	Gravimetric
	Method 320	Methanol, Formaldehyde, and Acetaldehyde	3	60	FTIR
	Method 321	HCl	3	60	FTIR

The results of the tests conducted on the RCO 1 Stack on March 7, 2019 are summarized in Tables 3-8 and 3-9. The VOC, CO, and NO_x data are expressed on a ppm dry basis. The VOC data are on a propane basis. The NO_x data are on a NO₂ basis.

Table 3-8. Test Results Summary, RCO 1, Pellet Cooler Stack S5				
Parameter	Run 1	Run 2	Run 3	Average
Test date	3/7/19	3/7/19	3/7/19	N/A
Test time	9:10-10:15	11:08-12:22	13:04-14:18	N/A
Production Rate, ODT/hour	39.5	40.3	40.5	40.1
Gas Flow Rate, DSCFM	32,231	31,820	30,659	31,570
Gas Flow Rate, ACFM	39,708	41,200	41,040	40,650
Oxygen Concentration, % dry	20.7	20.6	20.53	20.64
Carbon Dioxide Concentration, % dry	0.0	0.0	0.01	0.00
Stack Gas Moisture Concentration., %	5.97	6.34	7.02	6.44
Stack Temperature, °F	155.7	184.5	201.5	180.6
Filterable Particulate Matter Emissions				
Emission Rate, Lbs./hour	0.17	0.17	0.10	0.14
Emission Factor, Lbs./ODT	0.0043	0.0042	0.0024	0.0036
Condensable Particulate Matter Emissions				
Emission Rate, Lbs./hour	0.19	0.14	0.22	0.18
Emission Factor, Lbs./ODT	0.0047	0.0035	0.0054	0.0046
Total Particulate Matter Emissions				
Emission Rate, Lbs./hour	0.36	0.31	0.32	0.32
Emission Factor, Lbs./ODT	0.0090	0.0077	0.0078	0.0082
VOC Emissions as Propane				
Concentration, ppm _{vd} as propane	5.52	4.78	9.52	6.61
Emission Rate, Lbs./hour as propane	1.2	1.0	2.0	1.4
Emission, Lbs./ODT as propane	0.031	0.026	0.049	0.035
NO_x Emissions				
Concentration, ppm _{vd}	1.03	1.21	1.16	1.13
Emission Rate, Lbs./hour as NO ₂	0.24	0.28	0.26	0.26
Emission, Lbs./ODT as NO ₂	0.0060	0.0069	0.0063	0.0064
CO Emissions				
Concentration, ppm _{vd}	16.68	17.93	16.73	17.11
Emission Rate, Lbs./hour	2.3	2.5	2.2	2.4
Emission, Lbs./ODT	0.059	0.062	0.055	0.059

Methane, a non-VOC compound detected by Method 25A, was measured using Method 18. All of the methane analyses were between the laboratory minimum detection limit and the limit of quantification. Accordingly, the methane data were considered to be negligible and were not subtracted from the Method 25A VOC data.

Table 3-9 presents the RCO 1 HAP emissions data measured in accordance with Methods 320 and 321. All concentrations are expressed on a ppm dry basis. All of the HAP concentrations were below the detection limits of Method 320 and 321.

Table 3-9. HAP Test Results, RCO 1, Pellet Cooler Stack S5				
Parameter	Run 1	Run 2	Run 3	Average
Test date	3/7/19	3/7/19	3/7/19	N/A
Test time	9:10-10:15	11:08-12:22	13:04-14:18	N/A
Production Rate, tons/hour	41.7	42.3	42.3	42.1
Methanol Emissions				
Concentration, ppm _{vd}	0.0	0.0	0.19	0.07
Emission Rate, Lbs./hour	0.0	0.0	0.031	0.010
Emission Rate, Lbs./ODT	0.0	0.0	0.00077	0.00026
Formaldehyde Emissions				
Concentration, ppm _{vd}	0.0	0.0	0.0	0.0
Emission Rate, Lbs./hour	0.0	0.0	0.0	0.0
Emission Rate, Lbs./ODT	0.0	0.0	0.0	0.0
Acetaldehyde Emissions				
Concentration, ppm _{vd}	0.0	0.0	0.0	0.0
Emission Rate, Lbs./hour	0.0	0.0	0.0	0.0
Emission Rate, Lbs./ODT	0.0	0.0	0.0	0.0
HCl Emissions				
Emission Factor, ppm _{vd}	0.0	0.0	0.0	0.0
Emission Rate, Lbs./hour	0.0	0.0	0.0	0.0
Emission Rate, Lbs./ODT	0.0	0.0	0.0	0.0
Total HAP Emissions				
Emission Rate, Lbs./hour, 4 analytes	0.0	0.0	0.0	0.01
Emission Rate, Lbs./ODT, 4 analytes	0.0	0.0	0.0	0.00026

The results of the tests conducted on the RCO 2 Stack on January 16, 2019 are summarized in Tables 3-10 and 3-11. These tables summarize the data from Runs 3, 4, and 5. The data from Runs 1 and 2 were voided due to post-test leak check problems caused by the difficulty of moving the sampling train in a very space-constrained and awkwardly located sampling port. The data from Runs 1 and 2 are provided in Appendix IIA.

The VOC, CO, and NO_x data are expressed on a ppm dry basis. The VOC data are on a propane basis. The NO_x data are on a NO₂ basis.

Table 3-10. Test Results Summary, RCO 2, Pellet Cooler Stack S6				
Parameter	Run 3	Run 4	Run 5	Average
Test date	1/16/19	1/16/19	1/16/19	N/A
Test time	14:07-15:23	15:45-16:58	18:35-20:01	N/A
Production Rate, ODT/hour	25.1	25.2	22.90	24.4
Gas Flow Rate, DSCFM	22,698	22,867	22,202	22,589
Gas Flow Rate, ACFM	27,718	28,083	27,035	27,612
Oxygen Concentration, % dry	20.84	20.89	20.86	20.87
Carbon Dioxide Concentration, % dry	0.054	0.019	0.17	0.081
Stack Gas Moisture Concentration, %	5.12	5.02	4.54	4.90
Stack Temperature, °F	160.5	162.6	160.5	161.2
Filterable Particulate Matter Emissions				
Emission Rate, Lbs./hour	0.31	0.25	0.080	0.22
Emission Factor, Lbs./ODT	0.012	0.010	0.0032	0.0086
Condensable Particulate Matter Emissions				
Emission Rate, Lbs./hour	0.17	0.07	0.07	0.10
Emission Factor, Lbs./ODT	0.0069	0.0026	0.0029	0.0041
Total Particulate Matter Emissions				
Emission Rate, Lbs./hour	0.49	0.32	0.15	0.32
Emission Factor, Lbs./ODT	0.019	0.013	0.0064	0.013
VOC Emissions as Propane				
Concentration, ppm _{vd} as propane	7.30	7.93	7.03	7.42
Emission Rate, Lbs./hour as propane	1.1	1.2	1.1	1.2
Emission, Lbs./ODT as propane	0.045	0.049	0.047	0.047
NO_x Emissions				
Concentration, ppm _{vd}	0.87	0.95	1.01	0.94
Emission Rate, Lbs./hour as NO ₂	0.14	0.16	0.16	0.15
Emission, Lbs./ODT as NO ₂	0.0056	0.0062	0.0070	0.0063
CO Emissions				
Concentration, ppm _{vd}	11.36	10.26	9.52	10.38
Emission Rate, Lbs./hour	1.1	1.0	0.92	1.0
Emission, Lbs./ODT	0.045	0.041	0.040	0.042

Methane, a non-VOC compound detected by Method 25A, was measured using Method 18. All of the methane analyses were between the laboratory minimum detection limit and the limit of quantification. Accordingly, the methane data were considered to be negligible and were not subtracted from the Method 25A VOC data.

There were four process-related interruptions during Run 5. The data summarized in Tables 3-10 and 3-11 include only periods when the process was operating at the indicated production rate.

Table 3-11 presents the HAP emissions data measured in accordance with Methods 320 and 321. All concentrations are expressed on a ppm dry basis.

Table 3-11. HAP Test Results, RCO 2, Pellet Cooler Stack S6				
Parameter	Run 3	Run 4	Run 5	Average
Test date	1/16/19	1/16/19	1/16/19	N/A
Test time	14:07-15:23	15:45-16:57	18:37-20:01	N/A
Production Rate, tons/hour	25.06	25.21	22.90	24.39
Methanol Emissions				
Concentration, ppm _{vd}	0.0	0.0	0.0	0.0
Emission Rate, Lbs./hour	0.0	0.0	0.0	0.0
Emission Rate, Lbs./ODT	0.0	0.0	0.0	0.0
Formaldehyde Emissions				
Concentration, ppm _{vd}	0.46	0.46	0.76	0.56
Emission Rate, Lbs./hour	0.049	0.050	0.080	0.059
Emission Rate, Lbs./ODT	0.0020	0.0020	0.0033	0.0025
Acetaldehyde Emissions				
Concentration, ppm _{vd}	0.0	0.0	0.0	0.0
Emission Rate, Lbs./hour	0.0	0.0	0.0	0.0
Emission Rate, Lbs./ODT	0.0	0.0	0.0	0.0
HCl Emissions				
Emission Factor, ppm _{vd}	0.0	0.0	0.0	0.0
Emission Rate, Lbs./hour	0.0	0.0	0.0	0.0
Emission Rate, Lbs./ODT	0.0	0.0	0.0	0.0
Total HAP Emissions				
Emission Rate, Lbs./hour, 4 analytes	0.05	0.05	0.08	0.059
Emission Rate, Lbs./ODT, 4 analytes	0.0019	0.0019	0.0034	0.0025

4.0 QUALITY ASSURANCE AND QUALITY CONTROL

4.1 Particulate Matter Tests, Methods 5 and 202

The Method 5/202 tests met all of the EPA quality assurance requirements. As indicated in Tables 4-1 through 4-4, the isokinetic sampling rates were well within the 90% to 110% range. The sampling train post leak checks were all zero at vacuums that exceeded the maximum run vacuum. The probe, filter, impinger exit, and CPM filter temperatures were all consistent with the EPA methods. The measured cyclonic flow angle in the dryer stack was 0.83 degrees—well within the less than 20 degree requirement specified in Method 1.

Table 4-1. Method 5/Method 202 Quality Assurance Objectives and Results, Dryer/RTO Stack S1				
Parameter	Objectives	Test Run Values		
		Run 1	Run 2	Run 3
Number of traverse points	Method 1 criteria 24 points	24	24	24
Sample volume	>30 DSCF	43.54	38.80	38.24
Isokinetic sampling rate	90-110%	106.4	99.3	94.4
Post-test sample train leak check	<0.02 DSCF or 4% at maximum run vacuum	0	0	0
Probe temperatures	248±25°F	245-260	232-267	245-261
Filter temperatures	248±25°F	245-259	242-262	227-258
Maximum Impinger exit temperatures	<68°F	51	50	51
CPM filter exit temperature	65-85°F	69-77	69-79	69-79
Cyclonic flow angle	<20 degrees	0.83		

Table 4-2. Method 5/Method 202 Quality Assurance Objectives and Results, Dry Hammermill Stack S3				
Parameter	Objectives	Test Run Values		
		Run 1	Run 2	Run 3
Number of traverse points	Method 1 criteria, 24 points	24	24	24
Sample volume	>30 DSCF	40.99	42.49	42.99
Isokinetic sampling rate	90-110%	101.1	101.1	101.6
Post-test sample train leak check	<0.02 DSCF or 4% at maximum run vacuum	0	0	0
Probe temperatures	248±25°F	255-261	238-264	252-262
Filter temperatures	248±25°F	235-259	247-258	252-261
Maximum Impinger exit temperatures	<68°F	50	54	53
CPM filter exit temperature	65-85°F	69-75	69-73	71-79
Cyclonic flow angle	<20 degrees	4.1		

Table 4-3. Method 5/Method 202 Quality Assurance Objectives and Results, Pellet Cooler Stack S5, RCO 1				
Parameter	Objectives	Test Run Values		
		Run 1	Run 2	Run 3
Number of traverse points	Method 1 criteria, 24 points	24	24	24
Sample volume	>30 DSCF	47.74	47.50	46.50
Isokinetic sampling rate	90-110%	102.6	103.4	105.1
Post test sample train leak check	<0.02 DSCF or 4% at maximum run vacuum	0 @ 11	0 @ 9	0 @9.5
Probe temperatures	248±25°F	245-257	245-258	225-258
Filter temperatures	248±25°F	227-256	225-256	238-260
Maximum Impinger exit temperatures	<68°F	46	53	58
CPM filter exit temperature	65-85°F	70	80	80
Cyclonic flow angle	<20 degrees	3.04		

Table 4-4. Method 5/Method 202 Quality Assurance Objectives and Results, Pellet Cooler Stack S6, RCO 2				
Parameter	Objectives	Test Run Values		
		Run 3	Run 4	Run 5
Number of traverse points	Method 1 criteria, 24 points	24	24	24
Sample volume	>30 DSCF	44.807	45.544	43.969
Isokinetic sampling rate	90-110%	102.5	102.5	102.8
Post test sample train leak check	<0.02 DSCF or 4% at maximum run vacuum	0 @ 7	0 @ 12	0 @ 8
Probe temperatures	248±25°F	255-262	250-258	254-260
Filter temperatures	248±25°F	246-257	251-259	245-260
Maximum Impinger exit temperatures	<68°F	60	55	48
CPM filter exit temperature	65-85°F	75	77	75
Cyclonic flow angle	<20 degrees	2.71		

Method 202 Blanks—The Method 202 blank sample data for each of the three test periods are summarized in Table 4-5.

Table 4-5. Method 202 Blank Sample Analyses			
Sample	Milligrams		
	December 4-5	January 16	March 7
Proof Blank	1.4	1.8	1.2
Field Blank	1.9	2.0	1.1
Acetone Reagent	0.0 in 184 ml	0.2 in 196 ml	0.0 in 144 ml
Deionized Water	0.0 in 200 ml	0.6 in 200 ml	0.0 in 146 ml
Hexane Reagent	0.2 in 154 ml	0.5 in 190 ml	0.0 in 70 ml

All of the reagents used in the January 16, 2019 RCO 2 tests were slightly above the 1.0 ppm by weight value specified in Method 202. This was discussed with the laboratory. They indicated that these reagent blank values are in the same range as those in tests conducted by their other emission testing clients.

S-Type Pitot Tube Calibration—All S-Type Pitot tubes used in this project conformed to EPA guidelines concerning construction and geometry. Pitot tubes were inspected prior to use, and a Pitot tube coefficient of 0.84 was used.

Sample Nozzle Calibration—Glass nozzles were used for isokinetic sampling on the combined Method 5/Method 202 sampling trains. All nozzles were thoroughly cleaned, visually inspected, and calibrated according to the procedure outlined in Section 3.4.2 of EPA Publication No. 600/4-77-027b.

Temperature Monitor—The thermocouples used in this project was calibrated using the procedures described in Section 3.4.2 of EPA Publication No. 600/4-77-027b. Each temperature sensor was calibrated at a minimum of three points over the anticipated range of use against an NIST-traceable mercury in glass thermometer.

Dry Gas Meter Calibration—The dry gas meter was fully calibrated to determine the volume correction factor prior to field use. Post-test calibration checks were performed as soon as possible after the equipment has been returned to the shop. Pre-and post-test calibrations agreed within ± 5 percent. The calibration procedure is documented in Section 3.3.2 of EPA Publication No. 600/4-77-237b.

Moisture Scale Calibration—The scale used at the test location to determine flue gas moisture content was calibrated using a standard set of weights.

4.2 Oxygen, Carbon Dioxide, Nitrogen Oxides, Volatile Organic Compound and Carbon Monoxide Tests, Methods 3A, 7E, 10, and 25A

Dryer/RTO Stack S1—Oxygen, carbon monoxide, nitrogen oxides, volatile organic compounds, and carbon monoxide were determined using EPA Methods 3A, 7E, 10, and 25A. These tests met all of the EPA quality assurance requirements for these methods. The quality assurance data are summarized in Tables 4-6 through 4-10 for the Dryer/RTO stack S1.

Table 4-6. Quality Assurance Results – Dryer/RTO Stack S1.				
Oxygen				
Linearity Tests				
Parameter	Allowable	Test Series		
Zero, %	±2	0.00		
Mid, %	±2	0.00		
High, %	±2	0.20		
System Tests				
Parameter	Allowable	Run 1	Run 2	Run 3
Zero Bias (Pre), %	±5	0.20	0.10	0.20
Zero Bias (Post), %	±5	0.20	0.20	0.20
Up-scale Bias (Pre), %	±5	0.00	0.10	-0.10
Up-scale Bias (Post), %	±5	0.10	-0.10	0.20
Zero Drift, %	±3	0.00	0.10	0.10
Up-scale Drift, %	±3	0.10	0.20	0.20
Response Time, sec	N/A	35		

Table 4-7. Quality Assurance Results – Dryer/RTO Stack S1 Carbon Dioxide				
Linearity Tests				
Parameter	Allowable	Test Series		
Zero, %	±2	0.50		
Mid, %	±2	0.30		
High, %	±2	0.20		
System Tests				
Parameter	Allowable	Run 1	Run 2	Run 3
Zero Bias (Pre), %	±5	0.00	0.00	0.00
Zero Bias (Post), %	±5	0.00	0.00	0.00
Up-scale Bias (Pre), %	±5	-0.20	0.10	0.70
Up-scale Bias (Post), %	±5	0.10	0.70	-0.20
Zero Drift, %	±3	0.00	0.00	0.00
Up-scale Drift, %	±3	0.40	0.50	0.90
Response Time, sec	N/A	40		

Table 4-8. Quality Assurance Results – Dryer/RTO Stack 1 Nitrogen Oxides				
Linearity Tests				
Parameter	Allowable	Test Series		
Zero, %	±2	0.20		
Mid Level, %	±2	-0.20		
High Level, %	±2	0.00		
System Tests				
Parameter	Allowable	Run 1	Run 2	Run 3
Zero Bias (Pre), %	±5	0.10	0.30	0.40
Zero Bias (Post), %	±5	0.30	0.40	0.40
Up-scale Bias (Pre), %	±5	-0.60	-0.80	-0.70
Up-scale Bias (Post), %	±5	-0.80	-0.70	-3.20
Zero Drift, %	±3	0.2	0.20	0.00
Up-scale Drift, %	±3	0.2	0.10	2.40
Response Time, sec	N/A	35		

Table 4-9. Quality Assurance Results – Dryer/RTO Stack S1 Carbon Monoxide				
Linearity Tests				
Parameter	Allowable	Test Series		
Zero, %	±2	0.10		
Mid, %	±2	0.50		
High, %	±2	0.00		
System Tests				
Parameter	Allowable	Run 1	Run 2	Run 3
Zero Bias (Pre), %	±5	0.10	0.10	0.10
Zero Bias (Post), %	±5	0.10	0.10	-0.10
Up-scale Bias (Pre), %	±5	0.10	-0.20	-0.20
Up-scale Bias (Post), %	±5	-0.20	-0.20	-0.10
Zero Drift, %	±3	0.00	0.00	0.20
Up-scale Drift, %	±3	0.30	0.00	0.10
Response Time, sec	N/A	35		

Table 4-10. Quality Assurance Results – Dryer/RTO Stack S1 VOCs				
Linearity Tests				
Parameter	Allowable	Test Series		
Zero, %	±5	0.10		
Low, %	±5	0.80		
Mid, %	±5	-0.50		
High, %	±5	0.00		
System Tests				
Parameter	Allowable	Run 1	Run 2	Run 3
Zero Bias (Pre), %	±5	0.00	0.00	0.30
Zero Bias (Post), %	±5	0.00	0.30	0.30
Up-scale Bias (Pre), %	±5	0.00	0.20	0.10
Up-scale Bias (Post), %	±5	0.20	0.10	-0.10
Zero Drift, %	±3	0.00	0.20	0.00
Up-scale Drift, %	±3	0.20	-0.10	-0.10
Response Time, sec	N/A	25		

Dry Hammermill Stack S3—Oxygen, carbon dioxide and volatile organic compounds were determined using EPA Methods 3A and 25A. These tests met all of the EPA quality assurance requirements for these methods. The quality assurance data are summarized in Tables 4-11 through 4-13 for the Dry Hammermill stack S3.

Table 4-11. Quality Assurance Results – Dry Hammermill Stack S3 Oxygen				
Linearity Tests				
Parameter	Allowable	Test Series		
Zero, %	±2	0.10		
Mid, %	±2	0.20		
High, %	±2	0.10		
System Tests				
Parameter	Allowable	Run 1	Run 2	Run 3
Zero Bias (Pre), %	±5	1.50	0.60	0.80
Zero Bias (Post), %	±5	0.60	0.80	1.00
Up-scale Bias (Pre), %	±5	-0.50	-0.20	-0.10
Up-scale Bias (Post), %	±5	-0.20	-0.10	-0.30
Zero Drift, %	±3	1.00	0.20	0.20
Up-scale Drift, %	±3	0.40	0.00	0.10
Response Time, sec	N/A	30		

Table 4-12. Quality Assurance Results – Dry Hammermill Stack S3 Carbon Dioxide				
Linearity Tests				
Parameter	Allowable	Test Series		
Zero, %	±2	0.70		
Mid, %	±2	0.30		
High, %	±2	0.10		
System Tests				
Parameter	Allowable	Run 1	Run 2	Run 3
Zero Bias (Pre), %	±5	-0.10	0.00	0.00
Zero Bias (Post), %	±5	0.00	0.00	0.20
Up-scale Bias (Pre), %	±5	-0.30	0.20	0.20
Up-scale Bias (Post), %	±5	0.20	0.20	-0.10
Zero Drift, %	±3	0.10	0.00	0.20
Up-scale Drift, %	±3	0.30	0.00	0.20
Response Time, sec	N/A	35		

Table 4-13. Quality Assurance Results – Dry Hammermill Stack S3 VOCs				
Linearity Tests				
Parameter	Allowable	Test Series		
Zero, %	±5	0.10		
Low, %	±5	0.10		
Mid, %	±5	0.00		
High, %	±5	-0.20		
System Tests				
Parameter	Allowable	Run 1	Run 2	Run 3
Zero Bias (Pre), %	±5	0.00	-0.10	0.00
Zero Bias (Post), %	±5	-0.20	0.00	0.20
Up-scale Bias (Pre), %	±5	0.00	-0.60	-0.50
Up-scale Bias (Post), %	±5	-0.60	-0.50	-0.10
Zero Drift, %	±3	-0.20	0.10	0.20
Up-scale Drift, %	±3	-0.60	0.10	0.40
Response Time, sec	N/A	30		

Pellet Cooler RCO 1 Stack S5—Oxygen, carbon monoxide, nitrogen oxides, volatile organic compounds, and carbon monoxide were determined using EPA Methods 3A, 7E, 10, and 25A. These tests met all of the EPA quality assurance requirements for these methods. The quality assurance data are summarized in Tables 4-14 through 4-18 for the Pellet Cooler Stack S5.

Table 4-14. Quality Assurance Results – Pellet Cooler RCO 1 Stack S5 Oxygen				
Linearity Tests				
Parameter	Allowable	Test Series		
Zero, %	±2	-0.1		
Mid, %	±2	-0.2		
High, %	±2	0.2		
System Tests				
Parameter	Allowable	Run 1	Run 2	Run 3
Zero Bias (Pre), %	±5	0.1	0.3	0.6
Zero Bias (Post), %	±5	0.3	0.6	0.2
Up-scale Bias (Pre), %	±5	-0.3	-0.1	-0.4
Up-scale Bias (Post), %	±5	-0.1	-0.4	0.1
Zero Drift, %	±3	0.2	0.3	0.5
Up-scale Drift, %	±3	0.3	0.3	0.5
Response Time, sec	N/A	35		

Table 4-15. Quality Assurance Results –Pellet Cooler RCO 1 Stack S5 Carbon Dioxide				
Linearity Tests				
Parameter	Allowable	Test Series		
Zero, %	±2	0		
Mid, %	±2	0.6		
High, %	±2	0		
System Tests				
Parameter	Allowable	Run 1	Run 2	Run 3
Zero Bias (Pre), %	±5	0.0	0.0	0.0
Zero Bias (Post), %	±5	0.0	0.0	0.0
Up-scale Bias (Pre), %	±5	-1.7	-1.6	-2.3
Up-scale Bias (Post), %	±5	-0.7	-2.3	-1.0
Zero Drift, %	±3	0.0	0.0	0.0
Up-scale Drift, %	±3	0.9	1.6	1.3
Response Time, sec	N/A	40		

Table 4-16. Quality Assurance Results – Pellet Cooler RCO 1 Stack S5 VOCs				
Linearity Tests				
Parameter	Allowable	Test Series		
Zero, %	±5	0.1		
Low, %	±5	2.1		
Mid, %	±5	-0.7		
High, %	±5	-0.1		
System Tests				
Parameter	Allowable	Run 1	Run 2	Run 3
Zero Bias (Pre), %	±5	-0.4	-0.7	-0.3
Zero Bias (Post), %	±5	-0.7	-0.3	-0.6
Up-scale Bias (Pre), %	±5	0.1	0.3	0.8
Up-scale Bias (Post), %	±5	0.3	0.8	-0.8
Zero Drift, %	±3	-0.3	0.4	-0.3
Up-scale Drift, %	±3	0.1	0.5	-1.5
Response Time, sec	N/A	30		

Table 4-17. Quality Assurance Results – Pellet Cooler RCO 1 Stack S5 Nitrogen Oxides				
Linearity Tests				
Parameter	Allowable	Test Series		
Zero, %	±2	0.1		
Mid Level, %	±2	-0.3		
High Level, %	±2	0		
System Tests				
Parameter	Allowable	Run 1	Run 2	Run 3
Zero Bias (Pre), %	±5	-0.1	-0.5	0.0
Zero Bias (Post), %	±5	-0.5	0.0	-0.2
Up-scale Bias (Pre), %	±5	0.2	-1.9	-0.6
Up-scale Bias (Post), %	±5	-1.9	-0.6	-0.4
Zero Drift, %	±3	0.4	0.5	0.1
Up-scale Drift, %	±3	2.1	1.3	0.2
Response Time, sec	N/A	35		

Table 4-18 Quality Assurance Results – Pellet Cooler RCO 1 Stack S5 Carbon Monoxide				
Linearity Tests				
Parameter	Allowable	Test Series		
Zero, %	±2	0		
Mid, %	±2	-0.6		
High, %	±2	0		
System Tests				
Parameter	Allowable	Run 1	Run 2	Run 3
Zero Bias (Pre), %	±5	0.0	1.0	0.6
Zero Bias (Post), %	±5	1.0	0.6	0.4
Up-scale Bias (Pre), %	±5	2.5	1.8	2.6
Up-scale Bias (Post), %	±5	1.8	2.6	1.9
Zero Drift, %	±3	1.0	0.4	0.1
Up-scale Drift, %	±3	1.6	0.8	0.7
Response Time, sec	N/A	30		

Pellet Cooler RCO 2 Stack S6—Oxygen, carbon monoxide, nitrogen oxides, volatile organic compounds, and carbon monoxide were determined using EPA Methods 3A, 7E, 10, and 25A. These tests met all of the EPA quality assurance requirements for these methods. The quality assurance data are summarized in Tables 4-19 through 4-23 for the Pellet Cooler stack S6.

Table 4-19 Quality Assurance Results – Pellet Cooler RCO 2 Stack S6 Oxygen				
Linearity Tests				
Parameter	Allowable	Test Series		
Zero, %	±2	0.0		
Mid, %	±2	0.1		
High, %	±2	0.2		
System Tests				
Parameter	Allowable	Run 1	Run 2	Run 3
Zero Bias (Pre), %	±5	0.1	0.0	0.0
Zero Bias (Post), %	±5	0.0	0.0	0.0
Up-scale Bias (Pre), %	±5	-0.1	-0.3	-0.7
Up-scale Bias (Post), %	±5	-0.3	-0.7	-0.2
Zero Drift, %	±3	0.0	0.0	0.1
Up-scale Drift, %	±3	0.1	0.4	0.5
Response Time, sec	N/A	35		

Table 4-20. Quality Assurance Results –Pellet Cooler RCO 2 Stack S6 Carbon Dioxide				
Linearity Tests				
Parameter	Allowable	Test Series		
Zero, %	±2	-0.3		
Mid, %	±2	0.2		
High, %	±2	-0.1		
System Tests				
Parameter	Allowable	Run 1	Run 2	Run 3
Zero Bias (Pre), %	±5	0.4	0.1	-0.5
Zero Bias (Post), %	±5	0.1	-0.5	1.1
Up-scale Bias (Pre), %	±5	-0.3	-0.1	-0.2
Up-scale Bias (Post), %	±5	-0.1	-0.2	0.0
Zero Drift, %	±3	0.3	0.6	1.6
Up-scale Drift, %	±3	0.2	0.1	0.2
Response Time, sec	N/A	30		

Table 4-21. Quality Assurance Results – Pellet Cooler RCO 2 Stack S6 VOCs				
Linearity Tests				
Parameter	Allowable	Test Series		
Zero, %	±5	0.1		
Low, %	±5	3.4		
Mid, %	±5	-0.1		
High, %	±5	0.0		
System Tests				
Parameter	Allowable	Run 1	Run 2	Run 3
Zero Bias (Pre), %	±5	-0.4	-0.3	0.2
Zero Bias (Post), %	±5	-0.3	0.2	0.1
Up-scale Bias (Pre), %	±5	-0.1	-0.5	-0.2
Up-scale Bias (Post), %	±5	-0.5	-0.2	0.1
Zero Drift, %	±3	0.2	0.4	-0.1
Up-scale Drift, %	±3	-0.5	0.4	0.3
Response Time, sec	N/A	25		

Table 4-22. Quality Assurance Results – Pellet Cooler RCO 2 Stack S6 Nitrogen Oxides				
Linearity Tests				
Parameter	Allowable	Test Series		
Zero, %	±2	0.0		
Mid Level, %	±2	0.0		
High Level, %	±2	0.1		
System Tests				
Parameter	Allowable	Run 1	Run 2	Run 3
Zero Bias (Pre), %	±5	0.4	0.3	0.1
Zero Bias (Post), %	±5	0.3	0.1	0.0
Up-scale Bias (Pre), %	±5	-0.2	-0.3	-0.6
Up-scale Bias (Post), %	±5	-0.3	-0.6	-0.1
Zero Drift, %	±3	0.2	0.2	0.1
Up-scale Drift, %	±3	0.0	0.3	0.4
Response Time, sec	N/A	30		

Table 4-23. Quality Assurance Results – Pellet Cooler RCO 2 Stack S6 Carbon Monoxide				
Linearity Tests				
Parameter	Allowable	Test Series		
Zero, %	±2	0.0		
Mid, %	±2	0.9		
High, %	±2	0.2		
System Tests				
Parameter	Allowable	Run 1	Run 2	Run 3
Zero Bias (Pre), %	±5	0.3	0.2	0.4
Zero Bias (Post), %	±5	0.2	0.4	0.1
Up-scale Bias (Pre), %	±5	-0.4	-0.5	-0.5
Up-scale Bias (Post), %	±5	-0.5	-0.5	0.2
Zero Drift, %	±3	0.1	0.2	0.3
Up-scale Drift, %	±3	0.2	0.0	0.7
Response Time, sec	N/A	35		

4.3 HAPs Tests, Method 320 and Method 321

Air Control Techniques, P.C. performed daily quality assurance checks. Background scans and calibration transfer standard (CTS) spectra tests were performed prior to and following each test series. An analyte spike was performed using a methanol/SF₆ calibration standard.

The flow rate at the outlet of the pump was measured while the probe was plugged to verify that the sampling system was leak free. The flow rate was less than 200 ml/min. The FTIR cell was tested for leaks by closing the valve while the cell was at minimum absolute pressure. The cell pressure remained constant for at least two minutes.

Background Spectra—Sample spectra were divided point-by-point by a 128-scan background recorded using nitrogen. The single beam spectrum was constantly monitored, and a new background was generated at the beginning and end of each test day or when residual and absorbance spectra indicated component build-up on the optical surfaces or alignment-related baseline shifts.

Calibration Transfer Standards and Absorption Path Lengths—A cylinder of 99.79 ppm ethylene in nitrogen served as the CTS. A CTS gas was introduced to the FTIR and allowed to reach steady state. The CTS was used to determine the effective cell path length based on comparisons of the “field” CTS spectra to a laboratory CTS spectrum recorded by MIDAC. As shown in Table 4-24, the maximum path length deviation was less than 5% of the average during the test program.

Table 4-24. CTS Results Summary							
Source	Date	Time	CTS (m)	Cell Pressure (psi)	Cell Temp (°C)	Deviation from Previous	Deviation from Average
Dry Hammermill	12/4/18	0736	8.19	14.42	181	NA	0.1%
	12/4/18	1459	8.20	14.37	181	-0.1%	-0.1%
Dryer/RTO	12/5/18	736	8.034	14.490	181	NA	0.1%
	12/5/18	1403	8.055	14.43	181	-0.3%	-0.1%
Pellet Cooler RCO 1	3/7/19	748	8,12	14.86	181	NA	0.0
Pellet Cooler RCO 2	1/15/19	730	7.98	14.70	181	NA	0.0

Minimum Detectable Concentration—EPA Method 320 and the equivalent ASTM Standard D6348-03 specify a number of analytical uncertainty parameters that the analyst may calculate to characterize the FTIR system performance. Emissions were calculated using the detection limit for this run. The MDL were calculated as follows.

$$\text{MDL (ppm)} = \text{SEC} \times 2$$

Analytes with a SEC value that is twice the measured concentration are classified as a non-detectable concentration, and the reported value is 0.0. The MDL values for each test are listed in Appendix C of each of the three appendices.

QA Review—An analysis of possible analytical interferents (e.g., H₂O, CO₂, CO, pinenes) for this gas stream was determined prior to the test program. Reference spectra of the possible interferents were entered into the modeling program to minimize analytical uncertainty and detection limits of the target compounds.

Water spectra were recorded onsite with the FTIR instruments that were used for the field testing to simulate the actual gas stream moisture. The recorded water spectra were included as the primary spectra for modeling.

APPENDIX I-A
Method 5-Method 202 Data Sheets

Date 12/3/2018

Client	Enviva	
Job #	2333	
Plant Name	Enviva, Greenwood	
City, State	Greenwood, SC	
Sampling Location	RTO Dryer	

No. of Ports Available	4
No. of Ports Used	4
Port Inside Diameter, Inches	4
Distance From Far Wall To Outside Of Port, Inches	106
Nipple Length And/Or Wall Thickness, Inches	6
Depth Of Stack Or Duct, Inches	100
Stack Or Duct Width (if rectangular), Inches	
Equiv. Diameter = $2DW/(D+W)$, Inches	
Stack/Duct Area, Square Feet	54.542

	$(\pi R^2 \text{ or } L \times W)$
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	Upstream	Downstream
Distance to Flow Disturbances, feet	30	20
Diameters	3.6	2.4

[illegible]

0.0000 - 0.0625 - 0	0.5625 - 0.6875 - 5/8
0.0625 - 0.1875 - 1/8	0.6875 - 0.8125 - 3/4
0.1875 - 0.3125 - 1/4	0.8125 - 0.9375 - 7/8
0.3125 - 0.4375 - 3/8	0.9375 - 1.0000 - 1
0.4375 - 0.5625 - 1/2	

Diameters			
Velocity	Up	Down	Particulate
12	>7.00	>1.75	12
12	6	1.5	16
16	5	1.25	20
16	2	0.5	24 or 25

Note: If more than 8 and 2 diameters and duct is greater than 12" and less than 24", use 8 or 9 points.

Location of Points in Circular Stacks or Ducts											
	4	6	8	10	12	14	16	18	20	22	24
1	6.7	4.4	3.2	2.6	2.1	1.8	1.6	1.4	1.3	1.1	1.1
2	25.0	14.6	10.5	8.2	6.7	5.7	4.9	4.4	3.9	3.5	3.2
3	75.0	29.6	19.4	14.6	11.8	9.9	8.5	7.5	6.7	6.0	5.5
4	93.3	70.4	32.3	22.6	17.7	14.6	12.5	10.9	9.7	8.7	7.9
5		85.4	67.7	34.2	25.0	20.1	16.9	14.6	12.9	1106	10.5
6		95.6	80.6	65.8	35.6	26.9	22.0	18.8	16.5	14.6	13.2
7			89.5	77.4	64.4	36.6	28.3	23.6	20.4	18.0	16.1
8			96.8	85.4	75.0	63.4	37.5	29.6	25.0	21.8	19.4
9				91.8	82.3	73.1	62.5	38.2	30.6	26.2	23
10				97.4	88.2	79.9	71.7	61.8	38.8	31.5	27.2
11					93.3	85.4	78.0	70.4	61.2	39.3	32.3
12					97.9	90.1	83.1	76.4	69.4	60.7	39.8
13						94.3	87.5	81.2	75	68.5	60.2
14						98.2	91.5	85.4	79.6	73.8	67.7
15							95.1	89.1	83.5	78.2	72.8
16							98.4	92.5	87.1	82.0	77
17								95.6	90.3	85.4	80.6
18								98.6	93.3	88.4	83.9
19									96.1	91.3	86.8
20									98.7	94.0	89.5
21										96.5	92.1
22										98.9	94.5
23											96.8
24											99.

[illegible]

PRELIMINARY INFORMATION						
Plant Name	Enviva, Greenwood		Date	11/28/2018		
City, State	Greenwood, SC		Project #	2333		
Personnel	TH, JG, EG		Pitot Identification	6H		
Test Location	Dryer		Pitot Coefficient (Cp)	0.84		
Stack Dimensions			Pressures			
Length of Stack (D)	100	in	Barometric Pressure (Pb)	29.9	in Hg	
Width of Stack (W)		in	Static Pressure (Pg)	-0.385	in H ₂ O	
Area of Stack (As)	54.542	ft ²	Absolute Stack Pressure (Ps)	29.87	in Hg	
Stack Gas Composition						
Carbon Dioxide (%CO ₂)	7.0		Moisture Content (Bws)	35.00	%	
Oxygen (%O ₂)	14.0		Dry Molecular Weight (Md)	29.68	lb/lb-mole	
Nitrogen Concentration (%N ₂)	79.0		Wet Molecular Weight (Ms)	25.59	lb/lb-mole	
Start	Preliminary Traverse					
	Pitot Tube Leak Checks			A	B	
	Port	Point	Angle, °	Δp, in H ₂ O	Temp. °F	ft/sec
	A	1	1	0.58	261	52.88
		2	0	0.57	269	52.94
		3	0	0.60	254	53.76
		4	3	0.40	244	43.58
		5	0	0.51	252	49.49
		6	0	0.83	268	63.84
	B	1	0	0.55	260	51.68
		2	0	0.66	260	56.45
		3	1	1.15	260	74.74
		4	3	0.66	260	56.45
		5	2	0.43	260	45.70
		6	0	0.32	260	39.42
	End					
Average Angle, Degrees		0.83				
Average Velocity Pressure		0.5879				
		259.0				
Average Stack Gas Velocity (ft/sec)		53.40				
Actual Cubic Feet per minute (ACFM)		174,743				
Dry Standard Cubic Feet per Minute (DSCFM)		83,276				

Air Control Techniques, P.C.
Isokinetic Sampling Train Field Data Sheet

Job #	Run ID	M5/202-1
2333	Method	5/202

IDENTIFICATION INFORMATION				PRELIMINARY CHECKS AND DATA														
Plant	Enviva, Greenwood			<table border="1"> <tr> <td>Actual</td> <td>Req'd</td> <td>Vacuum</td> </tr> <tr> <td>Pre Leak Check, ACFM</td> <td>0.00</td> <td><0.02 or 4%</td> <td>8</td> </tr> <tr> <td>Post Leak Check, ACFM</td> <td>0.00</td> <td>0.020</td> <td>9</td> </tr> </table>				Actual	Req'd	Vacuum	Pre Leak Check, ACFM	0.00	<0.02 or 4%	8	Post Leak Check, ACFM	0.00	0.020	9
Actual	Req'd	Vacuum																
Pre Leak Check, ACFM	0.00	<0.02 or 4%	8															
Post Leak Check, ACFM	0.00	0.020	9															
City, State	Greenwood, SC																	
Test Location	Dryer																	
Date	12/5/18		Filter ID 1	<table border="1"> <tr> <td>A</td> <td>B</td> </tr> <tr> <td>Pitot Pre Leak Check</td> <td>5</td> <td>6</td> </tr> <tr> <td>Pitot Post Leak Check</td> <td>4</td> <td>4</td> </tr> </table>				A	B	Pitot Pre Leak Check	5	6	Pitot Post Leak Check	4	4			
A	B																	
Pitot Pre Leak Check	5	6																
Pitot Post Leak Check	4	4																
Start	8:40		Filter ID 2															
Stop	9:47		Filter ID 3															
Meterbox ID	909033	TH, JG, EC	Operator*	<table border="1"> <tr> <td>Ambient Temperature</td> <td>33</td> </tr> <tr> <td>Static Pressure, In. H₂O</td> <td>-0.39</td> </tr> <tr> <td>Barometric Pressure, In. Hg</td> <td>29.97</td> </tr> </table>				Ambient Temperature	33	Static Pressure, In. H ₂ O	-0.39	Barometric Pressure, In. Hg	29.97					
Ambient Temperature	33																	
Static Pressure, In. H ₂ O	-0.39																	
Barometric Pressure, In. Hg	29.97																	
ΔH@	1.898		Stack TC ID															
Gamma (Y)	0.9744		Tedlar Bags															
Ideal Nozzle	0.299		Orsat Pump															
Nozzle Dia.	0.302		Probe Length/Type															
Nozzle ID	M22	3.16	K Factor	ACTUAL MOISTURE & GAS COMPOSITION <table border="1"> <tr> <td>Water Recovered, grams</td> <td>602.6</td> <td>Moisture, %</td> <td>39.49</td> </tr> <tr> <td>CO₂ %</td> <td>7.89</td> <td>O₂ %</td> <td>12.53</td> </tr> </table>				Water Recovered, grams	602.6	Moisture, %	39.49	CO ₂ %	7.89	O ₂ %	12.53			
Water Recovered, grams	602.6	Moisture, %	39.49															
CO ₂ %	7.89	O ₂ %	12.53															
Probe ID	4A		Umbilic ID															

Sampling Information															
Point	Time Per Pt. (Min.)	Elapsed Time (h:m:s)	Dry Gas Meter (cu.ft.)	Velocity ΔP (In H ₂ O)	Meter Temp (°F)	Stack Temp (°F)	Actual ΔH (in H ₂ O)	Probe Temp (°F)	Filter Temp (°F)	Exit Temp (°F)	CPM Temp (°F)	Pump Vac (in. Hg)	Target ΔH (in H ₂ O)	Run ISO % Pt	Lk √ During Run
1	2.5	0	314.658	0.45	43	260	1.5	260	258	41	70	4	1.452	104.7	LC 1
2	2.5	2:30	316.35	0.59	43	249	1.9	251	254	37	71	5	1.933	91.8	
3	2.5	5:0	318.06	0.55	44	253	1.8	258	257	37	71	5	1.793	100.7	
4	2.5	7:30	319.87	0.4	45	244	1.3	253	254	39	72	4	1.324	105.9	LC-2
5	2.5	10:0	321.51	0.35	45	248	1.2	253	253	41	69	4	1.153	108.7	
6	2.5	12:30	323.08	0.3	45	257	0.98	253	255	41	69	3.5	0.976	106.5	
1	2.5	15:0	324.496	0.55	45	257	1.8	257	255	42	69	5	1.791	93.2	LC-3
2	2.5	17:30	326.17	0.59	46	264	1.9	257	256	43	69	5	1.903	93.8	
3	2.5	20:0	327.91	0.62	46	252	2	258	256	44	70	6	2.032	99.1	
4	2.5	22:30	329.81	0.71	47	258	2.3	258	256	45	73	7	2.312	93.9	LC-4
5	2.5	25:0	331.73	0.7	47	247	2.3	257	256	48	75	7	2.313	96.8	
6	2.5	27:30	333.71	0.61	47	244	2	257	255	51	77	6	2.024	105.6	
1	2.5	30:0	335.734	0.4	47	246	1.3	246	245	48	69	4	1.325	106.7	LC-5
2	2.5	32:30	337.39	0.45	48	262	1.5	245	255	44	69	4.5	1.463	100.0	
3	2.5	35:0	339.02	0.72	48	247	2.4	253	250	44	71	5	2.389	90.9	
4	2.5	37:30	340.91	0.77	48	258	2.5	253	247	42	70	6	2.510	106.4	LC-6
5	2.5	40:0	343.18	0.78	48	243	2.6	250	249	42	71	6	2.596	101.0	
6	2.5	42:30	345.37	0.71	48	239	2.4	253	250	42	71	6	2.376	93.6	
1	2.5	45:0	347.314	0.46	49	261	1.5	253	257	42	70	5	1.496	100.2	LC-7
2	2.5	47:30	348.97	0.57	49	254	1.9	250	249	41	72	5	1.876	95.8	
3	2.5	50:0	350.74	0.6	49	257	2	254	259	42	72	5	1.965	104.2	
4	2.5	52:30	352.71	0.42	49	269	1.4	252	257	42	72	5	1.352	101.9	LC-8
5	2.5	55:0	354.31	0.37	50	241	1.2	251	245	42	72	5	1.243	101.5	
6	2.5	57:30	355.84	0.3	50	243	1.1	248	250	43	72	5	1.006	107.4	
		1:00:0	357.296												

Total	Averages					Maximum and Minimum Values					Run ISO
Vm 42.638	0.530	46.9	252.2	1.783	260	259	51	77	7		106.4
Vmstd 43.536	in. H ₂ O	°F	°F	in H ₂ O	245	245	37	69			%

Run Notes:

Air Control Techniques, P.C.
Isokinetic Sampling Train Field Data Sheet

Job #	Run ID	M5/202-2
2333	Method	5/202

IDENTIFICATION INFORMATION				PRELIMINARY CHECKS AND DATA			
Plant	Enviva, Greenwood			Pre Leak Check, ACFM	Actual	Req'd	Vacuum
City, State	Greenwood, SC				0.00	<0.02 or 4%	9
Test Location	Dryer			Post Leak Check, ACFM	0.00	0.020	11
Date	12/5/18		Filter ID 1	A B			
Start	10:47		Filter ID 2	Pitot Pre Leak Check			
Stop	11:57		Filter ID 3	3 4.5			
Meterbox ID	909033	TH, JG, EC	Personnel	Pitot Post Leak Check			
ΔH@	1.898	4B	Stack TC ID	5 4			
Gamma (Y)	0.9744		Tedlar Bags	Ambient Temperature			
Ideal Nozzle	0.313		Orsat Pump	49			
Nozzle Dia.	0.302		Probe Length/Type	Static Pressure, In. H ₂ O			
Nozzle ID	4-3	2.91	K Factor	-0.39			
Probe ID	4B	0	Umbilicle ID	Barometric Pressure, In. Hg			
				29.97			
ACTUAL MOISTURE & GAS COMPOSITION							
Water Recovered, grams				519.1	Moisture, %		38.68
CO ₂ %				7.56	O ₂ %		12.78

Sampling Information															
Point	Time Per Pt. (Min.)	Elapsed Time (h:m:s)	Dry Gas Meter (cu.ft.)	Velocity ΔP (In H ₂ O)	Meter Temp (°F)	Stack Temp (°F)	Actual ΔH (in H ₂ O)	Probe Temp (°F)	Filter Temp (°F)	Exit Temp (°F)	CPM Temp (°F)	Pump Vac (in. Hg)	Target ΔH (in H ₂ O)	Run ISO % Pt	Lk √ During Run
1	2.5	0	358.986	0.4	50	255	1.2	250	245	43	70	3	1.166	104.5	LC 1
2	2.5	2:30	360.51	0.46	50	248	1.4	250	242	40	69	3	1.356	103.8	
3	2.5	5:0	362.14	0.5	51	57	2	267	258	39	69	4	2.021	98.1	
4	2.5	7:30	364.02	0.76	51	247	2.2	264	255	41	70	4	2.243	98.5	LC-2
5	2.5	10:0	366.01	0.84	51	247	2.5	243	256	41	70	5	2.478	101.8	
6	2.5	12:30	368.17	0.51	52	238	1.5	256	254	44	72	3.5	1.526	100.3	
1	2.5	15:0	369.847	0.52	53	255	1.5	242	257	44	70	3.5	1.525	100.1	LC-3
2	2.5	17:30	371.52	0.58	53	246	1.75	241	253	46	75	4	1.723	99.2	
3	2.5	20:0	373.28	0.63	53	255	2	253	257	46	79	4.5	1.847	108.9	
4	2.5	22:30	375.28	0.675	54	265	1.95	251	256	48	79	4.5	1.954	90.9	LC-4
5	2.5	25:0	377	0.72	54	255	2.2	258	259	49	78	5	2.114	105.8	
6	2.5	27:30	379.08	0.75	54	244	2.3	253	259	50	78	5	2.235	99.9	
1	2.5	30:0	381.1	0.54	54	248	1.6	245	251	50	79	4	1.600	104.4	LC-5
2	2.5	32:30	382.89	0.61	54	245	1.8	254	257	49	78	4	1.818	92.6	
3	2.5	35:0	384.58	0.56	54	267	1.6	232	258	48	79	4	1.618	102.2	
4	2.5	37:30	386.34	0.45	54	243	1.3	256	252	48	76	4	1.345	103.1	LC-6
5	2.5	40:0	387.96	0.42	55	258	1.2	257	262	47	71	3.5	1.232	94.3	
6	2.5	42:30	389.38	0.28	55	238	0.85	256	257	46	71	3	0.845	103.9	
1	2.5	45:0	390.677	0.3	56	242	0.9	250	252	46	71	3	0.903	101.8	LC-7
2	2.5	47:30	391.99	0.22	56	250	0.65	232	251	43	72	2.5	0.655	96.4	
3	2.5	50:0	393.05	0.21	56	263	0.61	252	255	43	72	2.5	0.614	109.0	
4	2.5	52:30	394.21	0.3	56	241	0.69	257	256	43	74	2.5	0.905	97.5	LC-8
5	2.5	55:0	395.47	0.21	57	247	0.63	253	256	43	73	2	0.629	90.9	
6	2.5	57:30	396.45	0.2	57	238	0.61	253	255	43	74	2	0.607	101.8	
		1:00:0	397.528												

	Total	Averages					Maximum and Minimum Values					Run ISO
V _m	38.542	0.465	53.8	241.3	1.456	267	262	50	79	5		99.3
V _{mstd}	38.800	in. H ₂ O	°F	°F	in H ₂ O	232	242	39	69			%

Run Notes:

Air Control Techniques, P.C.
Isokinetic Sampling Train Field Data Sheet

Job #	Run ID	M5/202-3
2333	Method	5/202

IDENTIFICATION INFORMATION				PRELIMINARY CHECKS AND DATA			
Plant	Enviva, Greenwood			Pre Leak Check, ACFM	Actual	Req'd	Vacuum
City, State	Greenwood, SC				0.00	<0.02 or 4%	9
Test Location	Dryer			Post Leak Check, ACFM	0.00	0.020	10.5
Date	12/5/18		Filter ID 1	A B			
Start	12:15		Filter ID 2	Pitot Pre Leak Check	3	6	
Stop	13:27		Filter ID 3	Pitot Post Leak Check	5.4	6.5	
Meterbox ID	909033	TH, JG, EC	Personnel	Ambient Temperature	46		
ΔH@	1.898	4A	Stack TC ID	Static Pressure, In. H ₂ O	-0.39		
Gamma (Y)	0.9744		Tedlar Bags	Barometric Pressure, In. Hg	29.97		
Ideal Nozzle	0.319		Orsat Pump				
Nozzle Dia.	0.302		Probe Length/Type	ACTUAL MOISTURE & GAS COMPOSITION			
Nozzle ID	M22	3.06	K Factor	Water Recovered, grams	479.9	Moisture, %	37.17
Probe ID	4A	0	Umbilicle ID	CO ₂ %	7.12	O ₂ %	13.40

Sampling Information																
Point	Time Per Pt. (Min.)	Elapsed Time (h:m:s)	Dry Gas Meter (cu.ft.)	Velocity ΔP (In H ₂ O)	Meter Temp (°F)	Stack Temp (°F)	Actual ΔH (in H ₂ O)	Probe Temp (°F)	Filter Temp (°F)	Exit Temp (°F)	CPM Temp (°F)	Pump Vac (in. Hg)	Target ΔH (in H ₂ O)	Run ISO % Pt	Run ISO % Cum	Lk ✓ During Run
1	2.5	0	397.799	0.32	58	245	0.89	254	227	49	69	3	0.983	98.5	98.5	LC 1
2	2.5	2:30	399.13	0.23	59	266	0.62	260	256	43	79	2	0.688	91.9	95.6	
3	2.5	5:0	400.17	0.22	59	254	0.61	260	253	43	76	2	0.670	99.5	96.8	
4	2.5	7:30	401.28	0.22	59	247	0.61	256	252	43	73	2	0.677	94.5	96.3	LC-2
5	2.5	10:0	402.34	0.2	59	262	0.54	261	253	43	69	2	0.602	99.2	96.8	
6	2.5	12:30	403.39	0.2	60	247	0.56	260	256	44	69	2	0.616	95.4	96.6	
1	2.5	15:0	404.412	0.58	61	248	1.6	250	254	45	72	4	1.789	100.3	97.4	LC-3
2	2.5	17:30	406.24	0.57	61	257	1.6	254	236	43	70	4	1.731	91.4	96.4	
3	2.5	20:0	407.88	0.6	61	239	1.7	255	250	44	69	4	1.869	90.1	95.5	
4	2.5	22:30	409.56	0.45	62	247	1.3	256	256	45	71	3.5	1.388	94.4	95.4	LC-4
5	2.5	25:0	411.08	0.38	62	266	1	256	258	46	69	3	1.143	98.9	95.7	
6	2.5	27:30	412.525	0.335	62	244	1	253	256	46	69	3	1.040	97.7	95.9	
1	2.5	30:0	413.886	0.52	63	256	1.4	257	257	47	70	4	1.590	92.5	95.5	LC-5
2	2.5	32:30	415.48	0.56	63	240	1.6	256	257	47	72	4	1.750	93.5	95.4	
3	2.5	35:0	417.17	0.72	64	247	2.2	255	258	48	72	5	2.231	93.1	95.2	
4	2.5	37:30	419.07	0.72	64	251	1.9	260	255	50	75	5	2.215	98.2	95.4	LC-6
5	2.5	40:0	421.07	0.62	64	247	1.9	258	257	51	77	5	1.919	106.6	96.3	
6	2.5	42:30	423.09	0.63	64	244	2	256	255	51	79	5	1.959	96.4	96.3	
1	2.5	45:0	424.934	0.35	64	245	1.1	251	242	48	74	3.5	1.086	106.1	96.7	LC-7
2	2.5	47:30	426.45	0.56	64	244	1.7	245	247	47	74	4	1.744	98.6	96.9	
3	2.5	50:0	428.23	0.75	64	253	2.3	254	254	46	73	5.5	2.303	97.4	96.9	
4	2.5	52:30	430.25	0.85	64	251	2.6	255	254	47	73	5.5	2.614	97.8	96.9	LC-8
5	2.5	55:0	432.41	0.85	64	254	2	251	232	47	75	5	2.601	92.0	96.6	
6	2.5	57:30	434.44	0.78	65	251	2.4	257	247	46	74	5	2.405	92.5	96.4	
	2.5	1:00:0	436.401													

	Total	Averages				Maximum and Minimum Values			
Vm	38.602	0.485	62.1	250.2	1.464	261	258	51	79
Vmstd	38.240	in. H ₂ O	°F	°F	in H ₂ O	245	227	43	69

Run ISO
94.4
%

Run Notes:

Method 4 - Air Control Techniques, P.C.

Date 12/5/2018

Source Information

Plant Name	Enviva, Greenwood	Job #	2333
City, State	Greenwood, SC	Personnel	TTB, JG
Sampling Location	Dryer	Balance	

Sampling Information

Run Number	M5/202-1	M5/202-2	M5/202-3	
Filter Identification	14653	14654	14655	
Sampling Date	12/5/2018	12/5/2018	12/5/2018	

Moisture DataImpinger 1 - Empty

Final Weight, grams	961.8	870.3	850.6	
Initial Weight, grams	396.8	400.1	397.1	
Condensed Water, grams	565.0	470.2	453.5	

Impinger 2 - Empty

Final Weight, grams	610.0	611.6	588.7	
Initial Weight, grams	592.8	593.2	580.8	
Condensed Water, grams	17.2	18.4	7.9	

Impinger 3

Final Weight, grams	696.5	777.2	704.2	
Initial Weight, grams	688.2	760.4	696.5	
Condensed Water, grams	8.3	16.8	7.7	

Silica Gel

Final Weight, grams	832.7	841.7	821.9	
Initial Weight, grams	820.6	828.0	811.1	
Adsorbed Water, grams	12.1	13.7	10.8	

Total Water, grams	602.6	519.1	479.9	
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Sampling Train Purge Data

Purge Start	1008	1211	1345	
Purge End	1108	1311	1445	

Plant Name Enviva, Greenwood
City, State Greenwood, SC

Project # 2333
Test Location Dryer

Parameter	Nomenclature/ Units	M5/202-1	M5/202-2	M5/202-3	Averages
Date		12/5/2018	12/5/2018	12/5/2018	
Run Time	θ, minutes	60	60	60	
Nozzle Diameter	inches	0.302	0.302	0.302	
Stack Area	As - sq. ft.	54.54	54.54	54.54	
Production Rate	ODT/hour	67.0	64.1	64.7	65.3
Pitot Tube Coefficient	Cp	0.84	0.84	0.84	
Meter Calibration Factor	Y	0.9744	0.9744	0.9744	
Barometric Pressure, inches Hg	Bp - in Hg	29.97	29.97	29.97	
Static Pressure	Pg - in. H ₂ O	-0.39	-0.39	-0.39	
Stack Pressure	Ps - in.Hg	29.94	29.94	29.94	
Meter Box Pressure Differential	Δ H - in. H ₂ O	1.78	1.46	1.46	
Average Velocity Head	Δ P - in. H ₂ O	0.5303	0.4654	0.4851	
Volume of Gas Sampled	V _m - cu. ft.	42.638	38.542	38.602	
Dry Gas Meter Temperature	T _m - °F	46.9	53.8	62.1	
Stack Temperature	T _s - °F	252.2	241.3	250.2	247.9
Stack Temperature	T _s - °C	122.3	116.3	121.2	
Liquid Collected	grams	602.6	519.1	479.9	
Oxygen	O ₂ %	12.53	12.78	13.40	12.90
Carbon Dioxide	CO ₂ %	7.89	7.56	7.12	7.52
Nitrogen	N ₂ %	79.58	79.66	79.48	
Volume of Gas Sampled, Dry	V _{m(std)} - cu. ft.	43.536	38.800	38.240	40.192
Volume of Gas Sampled, Dry	V _{m(std)} - cu. M	1.233	1.099	1.083	
Volume of Gas Sampled, Dry	V _{m(std)} - N cu. M	1.148	1.023	1.008	
Volume of Water Vapor	V _{w(std)} - cu. ft.	28.413	24.476	22.627	
Moisture Content	% H ₂ O	39.49	38.68	37.17	38.45
Saturation Moisture	% H ₂ O	100.00	100.00	100.00	
Dry Mole Fraction	M _{fd}	0.605	0.613	0.628	
Gas Molecular Weight, Dry	M _d	29.76	29.72	29.68	
Gas Molecular Weight, Wet	M _s	25.12	25.19	25.34	
Gas Velocity	vs - ft./sec.	50.89	47.24	48.40	48.84
Gas Velocity	m/sec.	15.51	14.40	14.75	
Volumetric Air Flow, Actual	Q _{aw} - ACFM	166,531	154,608	158,373	159,837
Volumetric Air Flow, Actual	m ³ /min	4,716	4,378	4,485	
Volumetric Air Flow, Standard	Q _{sd} - DSCFM	74,759	71,425	74,025	73,403
Volumetric Air Flow, Standard	Nm ³ /min	1,971	1,883	1,952	
Isokinetic Sampling Rate	I %	106.4	99.3	94.4	
FILTERABLE PARTICULATE MATTER EMISSIONS					
Filterable Particulate Catch	mg	2.5	1.4	0.5	
Concentration	gr/DSCF	0.0009	0.0006	0.0002	0.0005
Mass Emission Rate	lb/hr	0.57	0.34	0.13	0.35
Mass Emission Rate	lbs./ODT	0.0085	0.0053	0.0020	0.0053
CONDENSABLE PARTICULATE MATTER EMISSIONS					
Condensable Particulate Catch	mg	7.5	6	5.2	
Concentration	gr/DSCF	0.0027	0.0024	0.0021	0.0024
Mass Emission Rate	lbs./hr	1.70	1.46	1.33	1.50
Mass Emission Rate	lbs./ODT	0.025	0.023	0.021	0.023
TOTAL PARTICULATE MATTER EMISSIONS					
Mass Emission Rate	lb/hr	2.3	1.8	1.5	1.8
Mass Emission Rate	lbs./ODT	0.034	0.028	0.023	0.028

Date 12/3/2018

Client	Enviva	
Job #	2333	
Plant Name	Enviva, Greenwood	
City, State	Greenwood, SC	
Sampling Location	Dry Hammermill	
No. of Ports Available	4	
No. of Ports Used	4	
Port Inside Diameter, Inches	4	
Distance From Far Wall To Outside Of Port, Inches	68.5	
Nipple Length And/Or Wall Thickness, Inches	6	
Depth Of Stack Or Duct, Inches	62.5	
Stack Or Duct Width (if rectangular), Inches		
Equiv. Diameter = $2DW/(D+W)$, Inches		
Stack/Duct Area, Square Feet	21.305	
$(\pi R^2 \text{ or } L \times W)$		
	Upstream	Downstream
Distance to Flow Disturbances, feet	5.7	25
Diameters	1.09	4.8

[illegible]

0.0000 - 0.0625 - 0	0.5625 - 0.6875 - 5/8
0.0625 - 0.1875 - 1/8	0.6875 - 0.8125 - 3/4
0.1875 - 0.3125 - 1/4	0.8125 - 0.9375 - 7/8
0.3125 - 0.4375 - 3/8	0.9375 - 1.0000 - 1
0.4375 - 0.5625 - 1/2	

Diameters			
Velocity	Up	Down	Particulate
12	>7.00	>1.75	12
12	6	1.5	16
16	5	1.25	20
16	2	0.5	24 or 25

Note: If more than 8 and 2 diameters and duct is greater than 12" and less than 24", use 8 or 9 points.

Location of Points in Circular Stacks or Ducts											
	4	6	8	10	12	14	16	18	20	22	24
1	6.7	4.4	3.2	2.6	2.1	1.8	1.6	1.4	1.3	1.1	1.1
2	25.0	14.6	10.5	8.2	6.7	5.7	4.9	4.4	3.9	3.5	3.2
3	75.0	29.6	19.4	14.6	11.8	9.9	8.5	7.5	6.7	6.0	5.5
4	93.3	70.4	32.3	22.6	17.7	14.6	12.5	10.9	9.7	8.7	7.9
5		85.4	67.7	34.2	25.0	20.1	16.9	14.6	12.9	1106	10.5
6		95.6	80.6	65.8	35.6	26.9	22.0	18.8	16.5	14.6	13.2
7			89.5	77.4	64.4	36.6	28.3	23.6	20.4	18.0	16.1
8			96.8	85.4	75.0	63.4	37.5	29.6	25.0	21.8	19.4
9				91.8	82.3	73.1	62.5	38.2	30.6	26.2	23
10				97.4	88.2	79.9	71.7	61.8	38.8	31.5	27.2
11					93.3	85.4	78.0	70.4	61.2	39.3	32.3
12					97.9	90.1	83.1	76.4	69.4	60.7	39.8
13						94.3	87.5	81.2	75	68.5	60.2
14						98.2	91.5	85.4	79.6	73.8	67.7
15							95.1	89.1	83.5	78.2	72.8
16							98.4	92.5	87.1	82.0	77
17								95.6	90.3	85.4	80.6
18								98.6	93.3	88.4	83.9
19									96.1	91.3	86.8
20									98.7	94.0	89.5
21										96.5	92.1
22										98.9	94.5
23											96.8
24											99

[illegible]

PRELIMINARY INFORMATION						
Plant Name	Enviva, Greenwood		Date	11/28/2018		
City, State	Greenwood, SC		Project #	2333		
Personnel	TH, JG, EG		Pitot Identification	3A		
Test Location	DHM		Pitot Coefficient (Cp)	0.84		
Stack Dimensions			Pressures			
Length of Stack (D)	62.5	in	Barometric Pressure (Pb)	29.9	in Hg	
Width of Stack (W)		in	Static Pressure (Pg)	-0.31	in H ₂ O	
Area of Stack (As)	21.305	ft ²	Absolute Stack Pressure (Ps)	29.88	in Hg	
Stack Gas Composition						
Carbon Dioxide (%CO ₂)	0.0		Moisture Content (Bws)	4.00	%	
Oxygen (%O ₂)	20.9		Dry Molecular Weight (Md)	28.84	lb/lb-mole	
Nitrogen Concentration (%N ₂)	79.1		Wet Molecular Weight (Ms)	28.40	lb/lb-mole	
Start	Preliminary Traverse					
	Pitot Tube Leak Checks			A	B	
	Port	Point	Angle, °	Δp, in H ₂ O	Temp. °F	ft/sec
	A	1	5	0.82	99	52.78
		2	0	1.05	99	59.72
		3	2	1.10	99	61.13
		4	2	0.83	99	53.10
		5	0	0.95	99	56.81
		6	-8	1.25	99	65.16
	B	1	19	1.25	99	65.16
		2	4	1.35	99	67.72
		3	0	1.15	99	62.50
		4	5	1.10	98	61.07
		5	2	1.30	99	66.45
		6	2	1.20	99	63.85
	End					
Average Angle, Degrees		4.08				
Average Velocity Pressure			1.1059			
				98.9		
Average Stack Gas Velocity (ft/sec)				61.29		
Actual Cubic Feet per minute (ACFM)				78,345		
Dry Standard Cubic Feet per Minute (DSCFM)				70,949		

Air Control Techniques, P.C.
Isokinetic Sampling Train Field Data Sheet

Job #	Run ID	M5/202-1
2333	Method	5/202

IDENTIFICATION INFORMATION				PRELIMINARY CHECKS AND DATA																													
Plant	Enviva, Greenwood			<table border="1"> <tr> <td></td> <td>Actual</td> <td>Req'd</td> <td>Vacuum</td> </tr> <tr> <td>Pre Leak Check, ACFM</td> <td>0.00</td> <td><0.02 or 4%</td> <td>6</td> </tr> <tr> <td>Post Leak Check, ACFM</td> <td>0.00</td> <td>0.020</td> <td>8</td> </tr> </table>					Actual	Req'd	Vacuum	Pre Leak Check, ACFM	0.00	<0.02 or 4%	6	Post Leak Check, ACFM	0.00	0.020	8														
	Actual	Req'd	Vacuum																														
Pre Leak Check, ACFM	0.00	<0.02 or 4%	6																														
Post Leak Check, ACFM	0.00	0.020	8																														
City, State	Greenwood, SC																																
Test Location	DHM																																
Date	12/4/18		Filter ID 1	<table border="1"> <tr> <td></td> <td>A</td> <td>B</td> </tr> <tr> <td>Pitot Pre Leak Check</td> <td>4</td> <td>5</td> </tr> <tr> <td>Pitot Post Leak Check</td> <td>3</td> <td>7</td> </tr> <tr> <td>Ambient Temperature</td> <td colspan="2">40</td> </tr> <tr> <td>Start</td> <td>9:15</td> <td></td> <td>Filter ID 2</td> <td colspan="2">Static Pressure, In. H₂O</td> <td>-0.31</td> </tr> <tr> <td>Stop</td> <td>10:23</td> <td></td> <td>Filter ID 3</td> <td colspan="2">Barometric Pressure, In. Hg</td> <td>29.97</td> </tr> </table>					A	B	Pitot Pre Leak Check	4	5	Pitot Post Leak Check	3	7	Ambient Temperature	40		Start	9:15		Filter ID 2	Static Pressure, In. H ₂ O		-0.31	Stop	10:23		Filter ID 3	Barometric Pressure, In. Hg		29.97
	A	B																															
Pitot Pre Leak Check	4	5																															
Pitot Post Leak Check	3	7																															
Ambient Temperature	40																																
Start	9:15		Filter ID 2	Static Pressure, In. H ₂ O		-0.31																											
Stop	10:23		Filter ID 3	Barometric Pressure, In. Hg		29.97																											
Meterbox ID	909033	TH, JG, EC	Operator*																														
ΔH@	1.898		Stack TC ID																														
Gamma (Y)	0.9744		Tedlar Bags																														
Ideal Nozzle	0.201		Orsat Pump																														
Nozzle Dia.	0.206		Probe Length/Type																														
Nozzle ID	M11	1.72	K Factor																														
Probe ID	3A		Umbilic ID																														

ACTUAL MOISTURE & GAS COMPOSITION

Water Recovered, grams	35.7	Moisture, %	3.94
CO ₂ %	0.12	O ₂ %	20.95

Sampling Information

Point	Time Per Pt. (Min.)	Elapsed Time (h:m:s)	Dry Gas Meter (cu.ft.)	Velocity ΔP (In H ₂ O)	Meter Temp (°F)	Stack Temp (°F)	Actual ΔH (in H ₂ O)	Probe Temp (°F)	Filter Temp (°F)	Exit Temp (°F)	CPM Temp (°F)	Pump Vac (in. Hg)	Target ΔH (in H ₂ O)	Run ISO % Pt	Run ISO % Cum	Lk √ During Run
1	2.5	0	183.434	0.87	60	99	1.5	261	235	34	69	3	1.545	103.3	103.3	LC 1
2	2.5	2:30	185.21	0.88	60	100	1.6	255	245	41	74	3	1.560	94.3	98.8	
3	2.5	5:0	186.84	0.95	60	98	1.7	261	259	41	73	3	1.690	100.7	99.4	
4	2.5	7:30	188.65	0.96	60	100	1.7	261	256	42	73	3.5	1.701	103.1	100.4	LC-2
5	2.5	10:0	190.51	0.9	61	102	1.6	260	255	44	72	3	1.592	97.8	99.9	
6	2.5	12:30	192.22	0.6	61	99	1.1	260	259	46	72	2	1.067	109.7	101.2	
1	2.5	15:0	193.791	0.97	61	99	1.7	255	254	47	71	3	1.728	102.8	101.5	LC-3
2	2.5	17:30	195.66	0.9	65	99	1.6	257	255	49	71	3	1.613	99.7	101.2	
3	2.5	20:0	197.42	0.95	67	102	1.7	257	251	50	71	3	1.700	100.8	101.2	
4	2.5	22:30	199.25	0.85	65	104	1.5	255	256	50	74	3	1.510	108.4	101.9	LC-4
5	2.5	25:0	201.103	0.78	65	101	1.4	260	259	49	75	3	1.394	100.3	101.8	
6	2.5	27:30	202.75	0.56	65	94	1	259	254	46	75	2.5	1.013	108.4	102.2	
1	2.5	30:0	204.269	0.99	65	97	1.8	260	254	44	75	3.5	1.784	95.5	101.6	LC-5
2	2.5	32:30	206.04	0.92	65	100	1.6	260	253	43	74	3	1.645	101.5	101.6	
3	2.5	35:0	207.85	0.9	65	102	1.6	255	254	43	74	3	1.605	100.5	101.6	
4	2.5	37:30	209.62	0.82	65	104	1.5	255	256	44	72	3	1.457	106.6	101.9	LC-6
5	2.5	40:0	211.41	0.7	65	105	1.2	255	254	45	75	2.5	1.242	106.4	102.1	
6	2.5	42:30	213.06	0.57	65	106	1	260	257	45	74	2.5	1.010	103.7	102.2	
1	2.5	45:0	214.511	0.9	65	106	1.6	260	256	46	75	3	1.596	102.5	102.2	LC-7
2	2.5	47:30	216.31	0.92	65	106	1.6	255	256	44	73	3	1.629	95.8	101.9	
3	2.5	50:0	218.01	0.95	68	105	1.7	256	255	45	72	3	1.695	100.9	101.8	
4	2.5	52:30	219.84	0.98	68	106	1.7	256	255	46	72	3	1.745	93.4	101.4	LC-8
5	2.5	55:0	221.56	0.95	67	107	1.7	255	257	45	72	3	1.685	92.4	101.0	
6	2.5	57:30	223.23	0.82	67	107	1.5	255	256	45	72	3	1.454	103.6	101.1	
		1:00:0	224.971													

Total	Averages					Maximum and Minimum Values				
Vm 41.537	0.853	64.2	102.0	1.525	261	259	50	75	4	
Vmstd 40.991	in. H ₂ O	°F	°F	in H ₂ O	255	235	34	69		

Run ISO
101.1
%

Run Notes:

Air Control Techniques, P.C.
Isokinetic Sampling Train Field Data Sheet

Job #	Run ID	M5/202-2
2333	Method	5/202

IDENTIFICATION INFORMATION				PRELIMINARY CHECKS AND DATA			
Plant	Enviva, Greenwood			Actual Req'd Vacuum Pre Leak Check, ACFM 0.00 <0.02 or 4% 7 Post Leak Check, ACFM 0.00 0.020 9			
City, State	Greenwood, SC						
Test Location	DHM						
Date	12/4/18		Filter ID 1				
Start	11:17		Filter ID 2				
Stop	12:25		Filter ID 3				
Meterbox ID	909033	TH, JG, EC	Personnel				
ΔH@	1.898	3B	Stack TC ID				
Gamma (Y)	0.9744		Tedlar Bags				
Ideal Nozzle	0.213		Orsat Pump				
Nozzle Dia.	0.206		Probe Length/Type				
Nozzle ID	M12	1.78	K Factor				
Probe ID	3B	0	Umbilicle ID				
				ACTUAL MOISTURE & GAS COMPOSITION Water Recovered, grams 39.7 Moisture, % 4.22 CO ₂ % 0.12 O ₂ % 20.95			

Sampling Information															
Point	Time Per Pt. (Min.)	Elapsed Time (h:m:s)	Dry Gas Meter (cu.ft.)	Velocity ΔP (In H ₂ O)	Meter Temp (°F)	Stack Temp (°F)	Actual ΔH (in H ₂ O)	Probe Temp (°F)	Filter Temp (°F)	Exit Temp (°F)	CPM Temp (°F)	Pump Vac (in. Hg)	Target ΔH (in H ₂ O)	Run ISO % Pt	Lk ✓ During Run
1	2.5	0	225.602	0.99	65	100	1.8	261	254	54	71	3.5	1.774	102.1	LC 1
2	2.5	2:30	227.49	1.2	65	100	2.1	261	258	48	69	4.5	2.148	93.4	
3	2.5	5:0	229.39	1.2	65	103	2.1	260	256	46	69	4.5	2.135	103.0	
4	2.5	7:30	231.48	1.4	65	109	2.5	262	256	46	69	4.5	2.465	93.2	LC-2
5	2.5	10:0	233.51	1.1	65	106	1.9	261	257	49	72	4.5	1.945	101.6	
6	2.5	12:30	235.48	1.2	66	107	2.1	261	256	49	73	4.5	2.125	102.1	
1	2.5	15:0	237.549	1.1	68	106	2	262	257	50	73	4.5	1.958	103.2	LC-3
2	2.5	17:30	239.56	1	68	109	1.8	260	256	50	73	4.5	1.771	99.7	
3	2.5	20:0	241.41	1.1	69	110	1.9	258	256	50	73	4.5	1.949	108.4	
4	2.5	22:30	243.52	1	70	110	1.8	238	257	51	70	4	1.775	100.0	LC-4
5	2.5	25:0	245.38	0.97	70	110	1.7	256	258	51	71	4	1.722	96.0	
6	2.5	27:30	247.14	0.7	71	109	1.2	261	253	51	71	4	1.248	107.9	
1	2.5	30:0	248.826	0.86	71	108	1.5	254	257	51	70	3.5	1.538	104.7	LC-5
2	2.5	32:30	250.64	0.82	71	111	1.5	261	257	50	70	3.5	1.457	104.9	
3	2.5	35:0	252.41	0.78	72	111	1.4	262	254	51	69	3.5	1.389	104.3	
4	2.5	37:30	254.13	0.71	72	111	1.3	262	257	50	69	3	1.264	99.1	LC-6
5	2.5	40:0	255.69	0.7	72	111	1.3	262	251	51	69	3	1.247	99.8	
6	2.5	42:30	257.25	0.55	72	106	0.99	262	254	50	73	3	0.988	100.0	
1	2.5	45:0	258.642	0.95	72	110	1.7	255	256	50	70	4	1.697	101.0	LC-7
2	2.5	47:30	260.48	0.92	72	112	1.6	264	253	48	72	4	1.634	95.0	
3	2.5	50:0	262.18	0.94	72	111	1.7	261	254	49	72	4.5	1.673	109.4	
4	2.5	52:30	264.16	0.92	72	111	1.6	249	255	49	72	4	1.637	98.3	LC-8
5	2.5	55:0	265.92	0.83	72	112	1.5	256	254	49	72	4	1.475	96.5	
6	2.5	57:30	267.56	0.67	72	111	1.2	254	247	48	72	3.5	1.193	99.5	
		1:00:0	269.081												

Total	Averages					Maximum and Minimum Values					Run ISO
Vm 43.479	0.931	69.5	108.5	1.675	264	258	54	73	5		101.1
Vmstd 42.487	in. H ₂ O	°F	°F	in H ₂ O	238	247	46	69			%

Run Notes:

Air Control Techniques, P.C.
Isokinetic Sampling Train Field Data Sheet

Job #	Run ID	M5/202-3
2333	Method	5/202

IDENTIFICATION INFORMATION				PRELIMINARY CHECKS AND DATA			
Plant	Enviva, Greenwood			Actual Req'd Vacuum Pre Leak Check, ACFM 0.00 <0.02 or 4% 9 Post Leak Check, ACFM 0.00 0.020 11			
City, State	Greenwood, SC						
Test Location	DHM						
Date	12/4/18		Filter ID 1				
Start	13:04		Filter ID 2				
Stop	14:12		Filter ID 3				
Meterbox ID	909033	TH, JG, EC	Personnel				
ΔH@	1.898	3A	Stack TC ID				
Gamma (Y)	0.9744		Tedlar Bags				
Ideal Nozzle	0.208		Orsat Pump				
Nozzle Dia.	0.206		Probe Length/Type				
Nozzle ID	M11	1.77	K Factor				
Probe ID	3A	0	Umbilicle ID				
				ACTUAL MOISTURE & GAS COMPOSITION Water Recovered, grams 41.3 Moisture, % 4.33 CO2 % 0.11 O2 % 20.91			

Sampling Information															
Point	Time Per Pt. (Min.)	Elapsed Time (h:m:s)	Dry Gas Meter (cu.ft.)	Velocity ΔP (in H ₂ O)	Meter Temp (°F)	Stack Temp (°F)	Actual ΔH (in H ₂ O)	Probe Temp (°F)	Filter Temp (°F)	Exit Temp (°F)	CPM Temp (°F)	Pump Vac (in. Hg)	Target ΔH (in H ₂ O)	Run ISO % Pt	Lk √ During Run
1	2.5	0	269.967	1	68	103	1.8	252	257	52	73	3	1.784	100.7	LC 1
2	2.5	2:30	271.84	1.1	68	100	2	259	252	44	71	3.5	1.971	94.6	
3	2.5	5:0	273.69	1.3	68	101	2.3	260	261	46	71	4	2.324	103.2	
4	2.5	7:30	275.88	1.1	69	103	2	261	257	50	73	4	1.962	107.0	LC-2
5	2.5	10:0	277.97	0.98	69	104	1.7	261	257	51	75	3.5	1.746	96.5	
6	2.5	12:30	279.75	0.9	69	105	1.6	261	256	52	76	3	1.602	98.9	
1	2.5	15:0	281.497	0.92	71	107	1.6	261	257	51	75	3	1.638	95.2	LC-3
2	2.5	17:30	283.2	0.85	71	106	1.8	259	256	51	73	3.5	1.516	104.1	
3	2.5	20:0	284.99	0.8	72	106	1.5	258	255	50	72	3	1.429	108.2	
4	2.5	22:30	286.8	0.77	73	106	1.4	259	256	50	72	3	1.379	102.7	LC-4
5	2.5	25:0	288.49	0.74	73	106	1.4	259	256	50	72	3	1.326	102.9	
6	2.5	27:30	290.15	0.64	73	107	1.2	258	254	50	72	2.75	1.145	103.9	
1	2.5	30:0	291.707	1.05	75	107	1.9	261	256	50	74	3.5	1.886	94.7	LC-5
2	2.5	32:30	293.53	1.05	74	109	2	261	257	48	76	4	1.872	103.8	
3	2.5	35:0	295.52	0.97	75	109	1.9	261	257	49	78	3.75	1.733	107.2	
4	2.5	37:30	297.5	0.92	75	110	1.7	262	256	49	78	3.5	1.641	102.4	LC-6
5	2.5	40:0	299.34	0.86	76	110	1.6	261	257	50	78	3.25	1.537	105.7	
6	2.5	42:30	301.18	0.69	77	109	1.25	260	257	50	79	3	1.238	100.5	
1	2.5	45:0	302.754	1	78	110	1.8	260	257	52	76	3.5	1.796	101.7	LC-7
2	2.5	47:30	304.67	1.15	78	111	2	261	257	51	77	3	2.059	91.2	
3	2.5	50:0	306.51	1.1	79	111	1.95	260	257	51.5	78	4	1.973	100.4	
4	2.5	52:30	308.495	1.05	79	111	1.9	260	257	52	78	4	1.883	102.2	LC-8
5	2.5	55:0	310.47	1	79	110	1.8	259	257	53	78	4	1.797	107.6	
6	2.5	57:30	312.5	0.83	80	110	1.5	259	256	53	78	3	1.495	104.4	
	2.5	1:00:0	314.3												

	Total	Averages					Maximum and Minimum Values					Run ISO	
Vm	44.333	0.942	73.7	107.1	1.733	262	261	53	79	4		101.6	
Vmstd	42.990	in. H ₂ O	°F	°F	in H ₂ O	252	252	44	71			%	

Run Notes:

Method 4 - Air Control Techniques, P.C.

Date 12/4/2018

Source Information

Plant Name	Enviva, Greenwood	Job #	2333
City, State	Greenwood, SC	Personnel	TTB, JG, EG
Sampling Location	DHM	Balance	

Sampling Information

Run Number	M5/202-1	M5/202-2	M5/202-3	
Filter Identification	14650	14651	14652	
Sampling Date	12/4/2018	12/4/2018	12/4/2018	

Moisture DataImpinger 1 - Empty

Final Weight, grams	412.9	408.3	411.2	
Initial Weight, grams	398.5	396.6	399.3	
Condensed Water, grams	14.4	11.7	11.9	

Impinger 2 - Empty

Final Weight, grams	595.1	546.2	596.0	
Initial Weight, grams	590.8	540.5	592.5	
Condensed Water, grams	4.3	5.7	3.5	

Impinger 3

Final Weight, grams	748.2	688.2	760.4	
Initial Weight, grams	740.9	677.6	748.2	
Condensed Water, grams	7.3	10.6	12.2	

Silica Gel

Final Weight, grams	815.9	820.6	829.6	
Initial Weight, grams	806.2	808.9	815.9	
Adsorbed Water, grams	9.7	11.7	13.7	

Total Water, grams	35.7	39.7	41.3	
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Sampling Train Purge Data

Purge Start	1035	1240	1430	
Purge End	1135	1341	1530	

Plant Name Enviva, Greenwood
City, State Greenwood, SC

Project # 2333
Test Location DHM

Parameter	Nomenclature/ Units	M5/202-1	M5/202-2	M5/202-3	Averages
Date		12/4/2018	12/4/2018	12/4/2018	
Run Time	θ , minutes	60.0	60.0	60.0	
Nozzle Diameter	inches	0.206	0.206	0.206	
Stack Area	As - sq. ft.	21.3	21.3	21.3	
Production Rate	ODT/hour	65.4	64.9	64.6	65.0
Pitot Tube Coefficient	Cp	0.84	0.84	0.84	
Meter Calibration Factor	Y	0.9744	0.9744	0.9744	
Barometric Pressure, inches Hg	Bp - in. Hg	29.97	29.97	29.97	
Static Pressure	Pg - in. H ₂ O	-0.31	-0.31	-0.31	
Stack Pressure	Ps - in. Hg	29.95	29.95	29.95	
Meter Box Pressure Differential	ΔH - in. H ₂ O	1.53	1.67	1.73	
Average Velocity Head	ΔP - in. H ₂ O	0.8528	0.9314	0.9424	
Volume of Gas Sampled	V _m - cu. ft.	41.537	43.479	44.333	
Dry Gas Meter Temperature	T _m - °F	64.2	69.5	73.7	
Stack Temperature	T _s - °F	102.0	108.5	107.1	105.9
Stack Temperature	T _s - °C	38.9	42.5	41.7	
Liquid Collected	grams	35.7	39.7	41.3	
Oxygen	O ₂ %	20.95	20.95	20.91	20.94
Carbon Dioxide	CO ₂ %	0.12	0.12	0.11	0.12
Nitrogen	N ₂ %	78.93	78.93	78.99	
Volume of Gas Sampled, Dry	V _{m(std)} - cu. ft.	40.991	42.487	42.990	42.156
Volume of Gas Sampled, Dry	V _{m(std)} - cu. M	1.161	1.203	1.217	
Volume of Gas Sampled, Dry	V _{m(std)} - N cu. M	1.081	1.120	1.134	
Volume of Water Vapor	V _{w(std)} - cu. ft.	1.683	1.872	1.947	
Moisture Content	% H ₂ O	3.94	4.22	4.33	4.17
Saturation Moisture	% H ₂ O	6.85	8.29	7.97	
Dry Mole Fraction	M _{fd}	0.961	0.958	0.957	
Gas Molecular Weight, Dry	M _d	28.86	28.86	28.85	
Gas Molecular Weight, Wet	M _s	28.43	28.40	28.38	
Gas Velocity	vs - ft./sec.	53.88	56.66	56.94	55.83
Gas Velocity	m/sec.	16.42	17.27	17.36	
Volumetric Air Flow, Actual	Q _{aw} - ACFM	68,874	72,432	72,790	71,365
Volumetric Air Flow, Actual	m ³ /min	1,950	2,051	2,061	
Volumetric Air Flow, Standard	Q _{sd} - DSCFM	62,212	64,491	64,891	63,865
Volumetric Air Flow, Standard	Nm ³ /min	1,640	1,701	1,711	
Isokinetic Sampling Rate	I %	101.1	101.1	101.6	
FILTERABLE PARTICULATE MATTER EMISSIONS					
Filterable Particulate Catch	mg	48.2	47.4	34.8	
Concentration	gr/DSCF	0.0181	0.0172	0.0125	0.0160
Mass Emission Rate	lb/hr	9.7	9.5	6.9	8.7
Mass Emission Rate	lbs/ODT	0.15	0.15	0.11	0.13
CONDENSABLE PARTICULATE MATTER EMISSIONS					
Condensable Particulate Catch	mg	0.7	0.4	1.9	
Concentration	gr/DSCF	0.0003	0.0001	0.0007	0.0004
Mass Emission Rate	lb/hr	0.14	0.08	0.38	0.20
Mass Emission Rate	lbs/ODT	0.0021	0.0012	0.0059	0.0031
TOTAL PARTICULATE MATTER EMISSIONS					
Mass Emission Rate	lb/hr	9.8	9.6	7.3	8.9
Mass Emission Rate	lbs/ODT	0.15	0.15	0.11	0.14

APPENDIX I-B
Method 5-Method 202 Laboratory Report

RESOLUTION ANALYTICS, INC.

Specialists in Air Emissions Analysis

ANALYTICAL REPORT

CLIENT: **AIR CONTROL TECHNIQUES, INC.**

PROJECT: **2333**

ANALYTICAL SERVICES PROVIDED:

- **FILTERABLE & CONDENSIBLE PARTICULATE MATTER**
(EPA METHOD 5/202)

Confirmation of Data Review:

The analytical data and results provided in this report have been checked thoroughly for accuracy, has been performed and validated in accordance with the approved methods, and relate only to the samples provided for this project report.

The results contained herein shall not be reproduced except in full, without written approval of Resolution Analytics.

Date of Review: **December 16, 2018**



J. Bruce Nemet
Quality Assurance Officer

www.resolutionanalytics.com
208 Technology Park Lane, Ste 110, Fuquay-Varina, NC 27526



Client: Air Control Techniques
RFA #: 2333
Method: EPA M5

Report Summary

SAMPLE ID	TOTAL FILTERABLE PARTICULATE
Limit of Detection	0.2 mg
Acetone Blank	0.0 mg (in 184 mls)
S3-M5/202-1	48.2 mg
S3-M5/202-2	47.4 mg
S3-M5/202-3	34.8 mg
S1-M5/202-1	2.5 mg
S1-M5/202-2	1.4 mg
S1-M5/202-3	0.5 mg

RESOLUTION ANALYTICS, INC.

Specialists in Air Emissions Analysis

Client: Air Control Techniques
RFA #: 2333
Method: M202

Report Summary

SAMPLE ID	Organic CPM	Inorganic CPM	Total CPM ¹
Limit of Detection	0.1 mg	0.1 mg	0.2 mg
Acetone Blank			0.0 mg (in 184 ml)
Hexane Blank			0.2 mg (in 154 ml)
DI H ₂ O Blank			0.0 mg (in 200 ml)
M5/202-PB	1.1 mg	0.3 mg	1.4 mg
M5/202-FB	1.6 mg	0.3 mg	1.9 mg
S3-M5/202-1	2.3 mg	0.3 mg	0.7 mg
S3-M5/202-2	1.8 mg	0.5 mg	0.4 mg
S3-M5/202-3	3.8 mg	0.0 mg	1.9 mg
S1-M5/202-1	7.3 mg	2.1 mg	7.5 mg
S1-M5/202-2	5.8 mg	2.1 mg	6.0 mg
S1-M5/202-3	5.1 mg	2.0 mg	5.2 mg

¹ Total Condensable Particulate Matter (CPM) results have been Field Blank corrected up to a maximum of 2.0 mg.



Control Techniques, P.C.

331 East Durham Road
Cary, North Carolina 27513

Office (919) 460-7871
Fax (919) 460-7897

2333: M5/202
Page 4 of 16

Chain of Custody / Transmittal

JOB #: 2333 **PO# -** 8145-2333

TO: Resolution Analytics, Inc. Attn: Jeff Coppe33e (919) 346-5740


208 Technology Park Lane Suite 110

Fuquay Varina, North Carolina 27526

Samples sent by: Todd Brozell Date 12/7/18

SAMPLE NUMBER	COMPONENTS	ANALYSIS
S3-M5/202-1,2,3	<ul style="list-style-type: none">• M5 Filter• F¹/₂ Acetone Rinse• B¹/₂ Acetone/Hexane Rinse• CPM Filter• Impinger Catch and DI Rinse	Total Particulate by Methods 5/202
S1-M5/202-1,2,3	<ul style="list-style-type: none">• M5 Filter• F¹/₂ Acetone Rinse• B¹/₂ Acetone/Hexane Rinse• CPM Filter• Impinger Catch and DI Rinse	Total Particulate by Methods 5/202
M5/202-FB Field Blank	<ul style="list-style-type: none">• B¹/₂ Acetone/Hexane Rinse• CPM Filter• Impinger Catch and DI Rinse	Total Particulate by Methods 5/202
M5/202-PB Proof Blank	<ul style="list-style-type: none">• B¹/₂ Acetone/Hexane Rinse• CPM Filter• Impinger Catch and DI Rinse	Total Particulate by Methods 5/202
Blanks	<ul style="list-style-type: none">• Acetone Blank M5• Hexane Blank M202• DI H₂O Blank M202	Total Particulate by Methods 5/202

Five Day Turnaround

Relinquished by: 

Date 12/7/18

Received by: 

Date

12/10/18



Client: Air Control Techniques
RFA #: 2333
Date Received: 12/10/18
Date Analyzed: 12/10/18
Analyst: JSC
Analysis: EPA M5
Analyte(s): Filterable PM

Analytical Narrative

Sample Matrix & Components:

Dry Filters, Front¹/₂ Acetone Rinses, Acetone Blank

Summary of Sample Prep:

The acetone rinses were transferred to pre-tared teflon "baggies" in a low humidity environment. The acetone rinses were evaporated then desiccated for 24 hours, after which time they were weighed daily every six hours until consecutive weights agreed within ± 0.5 mg. The filters were baked 2 to 3 hours at 105° C, cooled in a desiccator and weighed.

All weights were recorded to the nearest 0.1 mg and include filterable particulate catch only. The total catch reported for each run is a sum of the filter and rinse catches. The acetone blank catch has been subtracted from sample rinse catches in proportion with their respective volumes.

Summary of Instrumentation:

Denver model Pinnacle Series analytical balance

Analytical Detection Limit(s): 0.1 mg per fraction

Miscellaneous Comments Regarding Sample Analysis: (Note unusual catch weights, interferences, odd sample behavior, and steps taken to confirm unusual results. Also note any deviations from standard analytical procedures, together with justification and possible affect on results. Specify samples when applicable.)

No modifications to EPA Method 5 analytical procedure were made. See data sheets for individual sample descriptions.

PARTICULATE SAMPLING LABORATORY RESULTS

Client: Air Control Techniques				RFA #: 2333			
Method: EPA M5							
Run Number		S3-M5/202-1		S3-M5/202-2		S3-M5/202-3	
Filter Container #							
<u>Date</u>		<u>Init</u>		<u>Date</u>		<u>Date</u>	
12/12/18		JSC	0.5035	12/12/18	0.4937	12/12/18	0.4916
Baggie Tare Wt., g.			0.0000		0.0000		0.0000
Filter Tare Wt., g.		83Q-14650	0.4782	83Q-14651	0.4715	83Q-14652	0.4760
FILTER SAMPLE WT., g.			0.0253		0.0222		0.0156
Front ½ Rinse Container #							
<u>Date</u>		<u>Init</u>	776	<u>Date</u>	3361	<u>Date</u>	3870
12/14/18		JSC F	3.4933	12/14/18 F	3.8191	12/14/18 F	3.8565
12/13/18		JSC	3.4935	12/13/18	3.8193	12/13/18 F	3.8565
Tare Wt., g.		(100 ml)	3.4704	(100 ml)	3.7939	(86 ml)	3.8373
RINSE SAMPLE WT., g.			0.0229		0.0252		0.0192
Filter Catch, mg.			25.3		22.2		15.6
Rinse Catch, mg.			22.9		25.2		19.2
Rinse Blank Residue, mg.			0.0		0.0		0.0
Net Rinse Catch, mg.			22.9		25.2		19.2
FILTERABLE PARTICULATE, mg.			48.2		47.4		34.8

Legend: F = Final Weight

Notes & Comments:

PARTICULATE SAMPLING LABORATORY RESULTS

Client: Air Control Techniques Method: EPA M5				RFA #: 2333			
Run Number		S1-M5/202-1		S1-M5/202-2		S1-M5/202-3	

Filter Container #							
	<u>Date</u>	<u>Init</u>		<u>Date</u>		<u>Date</u>	
	12/12/18	JSC	0.4640	12/12/18	0.4633	12/12/18	0.4669
Baggie Tare Wt., g.			0.0000		0.0000		0.0000
Filter Tare Wt., g.	83Q-14653		0.4639	83Q-14654	0.4638	83Q-14655	0.4674
FILTER SAMPLE WT., g.			0.0001		-0.0005 *		-0.0005 *
*Filter Fragments In Rinse(Yes, No)?				NO		NO	

Front ½ Rinse Container #		1199		2851		2706	
	<u>Date</u>	<u>Init</u>		<u>Date</u>		<u>Date</u>	

	12/14/18	JSC	F	3.8982	12/14/18	F	3.6719	12/14/18	F	3.6739
	12/13/18	JSC		3.8983	12/13/18		3.6722	12/13/18		3.6743
Tare Wt., g.		(70 ml)		3.8958	(72 ml)		3.6705	(78 ml)		3.6734
RINSE SAMPLE WT., g.				0.0024			0.0014			0.0005

Filter Catch, mg.	0.1	0.0 **	0.0 **
Rinse Catch, mg.	2.4	1.4	0.5
Rinse Blank Residue, mg.	0.0	0.0	0.0
Net Rinse Catch, mg.	2.4	1.4	0.5
FILTERABLE PARTICULATE, mg.	2.5	1.4	0.5

**Negative results adjusted to zero.

Legend: F = Final Weight

Notes & Comments:

REAGENT BLANK LABORATORY RESULTS

Client: Air Control Techniques Method: EPA M5		RFA #: 2333
Run Number	Acetone Blank	

Sample ID/Container #	Date	Init	3097

	12/14/18	JSC		3.7982
	12/13/18	JSC	F	3.7978
Tare Wt., g.	(184	ml)	3.7978
SAMPLE WT., g.				0.0000

Blank Beaker #	3097
Final wt., mg.	3.7978
Tare wt., mg.	3.7978
Residue, mg.	0.0
Volume, ml.	184
Density, mg/ml	785.0
Conc., mg/mg	0.00E+00 ✓
Upper Limit, mg	1.00E-05

Legend: F = Final Weight

Notes & Comments:

RESOLUTION ANALYTICS, INC.

Specialists in Air Emissions Analysis

Client: Air Control Techniques

RFA #: 2333

Date Received: 12/10/18

Date Analyzed: 12/10/18

Analyst: JSC

Analysis: M202

Analyte(s): Condensible PM

Analytical Narrative

Sample Matrix & Components:

H₂O liquid impinger samples, organic impinger rinses, CPM filter, reagent blanks

Summary of Sample Prep and Analysis:

The samples were received in the lab at a temperature of less than 85° F, and logged in our custody records. The teflon filters were each sonicated/extracted 3 times with DI H₂O, then 3 times with hexane. The extract was added to the appropriate sample fraction. The impinger contents were extracted 3 times with hexane and the extracts were combined with the organic rinses, then evaporated in pretared teflon baggies. The water fraction was evaporated in pretared teflon baggies to near dryness at 105° C, then at ambient until completely dry. When needed, the water fractions were resuspended in 50 mls DI H₂O, titrated with 0.1 N NH₄OH until acid neutralization, and then evaporated using the same procedure as before. Samples were then desiccated for 24 hours and weighed at a minimum of 6 hour intervals to constant weight. All weights were recorded to the nearest 0.1 mg. Where field blanks have been provided, samples have been blank corrected up to a maximum of 2.0 mg.

Summary of Instrumentation:

Denver model Pinnacle Series analytical balance

Analytical Detection Limit(s): 0.1 mg per fraction

Miscellaneous Comments Regarding Sample Analysis: (Note unusual catch weights, interferences, odd sample behavior, and steps taken to confirm unusual results. Also note any deviations from standard analytical procedures, together with justification and possible affect on results. Specify samples when applicable).

No modifications to M202 analytical procedure were made. See data sheets for individual sample notes and comments.

CONDENSIBLE PARTICULATE MATTER LABORATORY RESULTS

Client: Air Control Techniques Method: M202				RFA #: 2333			
Run Number		S3-M5/202-1		S3-M5/202-2		S3-M5/202-3	
Acetone/Hexane Container #		2775		1561		1281	
Date Init		Date		Date		Date	
12/14/18 JSC F		3.5833		12/14/18 F		3.6056	
12/13/18 JSC		3.5838		12/13/18		3.6059	
Tare Wt., g.		3.5810		3.6038		3.8497	
RINSE SAMPLE WT., g.		0.0023		0.0018		3.8501	
						3.8459	
						0.0038	
DI H ₂ O Container #		2987		2810		2211	
Date Init		Date		Date		Date	
12/14/18 JSC F		3.7044		12/14/18 F		3.8828	
12/13/18 JSC		3.7045		12/13/18		3.8832	
Tare Wt., g.		3.7041		3.8823		3.5765	
RINSE SAMPLE WT., g.		0.0003		0.0005		3.5767	
						3.5765	
						0.0000	
Organic CPM Mass, mg.		2.3		1.8		3.8	
Inorganic CPM Mass, mg		0.3		0.5		0.0	
Volume of NH ₄ OH Added (N=0.1), ml		0.00		0.00		0.00	
Correction For NH ₃ Added, mg		0.00		0.00		0.00	
Adjusted Inorganic CPM Mass, mg		0.3		0.5		0.0	
Total CPM Mass, mg *		0.7		0.4		1.9	

* Total CPM Mass results have been Field Train Blank corrected up to a maximum of 2.0 mg.

Notes & Comments:

CONDENSIBLE PARTICULATE MATTER LABORATORY RESULTS

Client: Air Control Techniques Method: M202				RFA #: 2333			
Run Number		S1-M5/202-1		S1-M5/202-2		S1-M5/202-3	
Acetone/Hexane Container #		3888		3437		2824	
Date		Init		Date		Date	
12/14/18		JSC F	3.6830	12/14/18 F		12/14/18 F	
12/13/18		JSC	3.6832	12/13/18		12/13/18	
Tare Wt., g.			3.6757				
RINSE SAMPLE WT., g.			0.0073				
DI H ₂ O Container #		2585		3378		3192	
Date		Init		Date		Date	
12/14/18		JSC F	3.4500	12/14/18 F		12/14/18 F	
12/13/18		JSC	3.4502	12/13/18		12/13/18	
Tare Wt., g.			3.4479				
RINSE SAMPLE WT., g.			0.0021				
Organic CPM Mass, mg.		7.3		5.8		5.1	
Inorganic CPM Mass, mg		2.1		2.1		2.0	
Volume of NH ₄ OH Added (N=0.1), ml							
Correction For NH ₃ Added, mg		0.00		0.00		0.00	
Adjusted Inorganic CPM Mass, mg		2.1		2.1		2.0	
Total CPM Mass, mg *		7.5		6.0		5.2	
* Total CPM Mass results have been Field Train Blank corrected up to a maximum of 2.0 mg.							

Notes & Comments:

FIELD TRAIN BLANK LABORATORY RESULTS

Client: Air Control Techniques Method: M202	RFA #: 2333
Run Number	M5/202-PB

Acetone/Hexane Container # 2955

Date	Init
------	------

	12/14/18	JSC	F	3.8184
	12/13/18	JSC		3.8188
Tare Wt., g.				3.8173
RINSE SAMPLE WT., g.				0.0011

DI H₂O Container # 2312

Date	Init
------	------

	12/14/18	JSC	F	3.5153
	12/13/18	JSC		3.5154
Tare Wt., g.				3.5150
RINSE SAMPLE WT., g.				0.0003

Organic CPM Mass, mg.	1.1
Inorganic CPM Mass, mg	0.3
Volume of NH ₄ OH Added (N=0.1), ml	
Correction For NH ₃ Added, mg	0.00
Adjusted Inorganic CPM Mass, mg	0.3
Total Proof Blank CPM Mass, mg	1.4

Notes & Comments:

FIELD TRAIN BLANK LABORATORY RESULTS

Client: Air Control Techniques Method: M202	RFA #: 2333
Run Number	M5/202-FB

Acetone/Hexane Container # 2446

Date	Init
------	------

12/14/18	JSC	F	3.7845
12/13/18	JSC		3.7848
Tare Wt., g.			3.7829
RINSE SAMPLE WT., g.			0.0016

DI H₂O Container # 3269

Date	Init
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12/14/18	JSC	F	3.6584
12/13/18	JSC		3.6585
Tare Wt., g.			3.6581
RINSE SAMPLE WT., g.			0.0003

Organic CPM Mass, mg.	1.6
Inorganic CPM Mass, mg	0.3
Volume of NH ₄ OH Added (N=0.1), ml	
Correction For NH ₃ Added, mg	0.00
Adjusted Inorganic CPM Mass, mg	0.3
Total Field Train Blank CPM Mass, mg	1.9

Notes & Comments:

FIELD REAGENT BLANK LABORATORY RESULTS

Client: Air Control Techniques Method: M202				RFA #: 2333			
Run Number		Acetone		Hexane		DI H₂O	

Container #			3097		4003		3299
	Date	Init		Date		Date	

	12/14/18	JSC		12/14/18	F		12/14/18	F	
	12/13/18	JSC	F	12/13/18	F		12/13/18	F	
Tare Wt., g.	(184	ml)		(154	ml)		(200	ml)	
SAMPLE WT., g.									

Field Reagent Blank Mass, mg	0.0	0.2	0.0
Field Reagent Blank Concentration, mg/mg	0.00E+00	1.98E-06	0.00E+00

Notes & Comments:

5 DAY QT ✓

Date Received: 12/10/18
Date Analyzed: 12/10/18

[illegible]

QT ✓

Date Received: 12/10/18
Date Analyzed: 12/10/18

[illegible]

APPENDIX I-C
CEMs Data Sheets

Enviva		RTO Dryer Exhaust			
Parameters	Units	Run 1	Run 2	Run 3	Average
Date		5-Dec-18	5-Dec-18	5-Dec-18	
Run Time		0840-0947	1047-1157	1216-1327	
Oxygen	%	12.53	12.78	13.40	12.90
Moisture	%	39.49	38.68	37.17	38.45
Volumetric Flow Rate, Std	DSCFM	74,759	71,425	74,025	73,403
Dryer Process Rate	ODT/hr	67.0	64.1	64.7	65.3
VOC Emissions	Units	Run 1	Run 2	Run 3	Average
Concentration (actual)	ppmv _w as C ₃	6.19	6.88	5.82	6.30
Concentration (dry)	ppmv _d as C ₃	10.2	11.2	9.3	10.2
Emission Rate (propane)	lb/hr as C ₃ H ₈	5.3	5.5	4.7	5.2
Emission Factor (propane)	lb/ODT as C ₃ H ₈	0.078	0.086	0.073	0.079
NOx Emissions	Units	Run 1	Run 2	Run 3	Average
Concentration (dry)	ppm _{vd}	38.48	34.36	32.63	35.16
Emission Rate	lb/hr	20.6	17.6	17.3	18.5
Emission Factor	lb/ODT as NO ₂	0.31	0.27	0.27	0.28
CO Emissions	Units	Run 1	Run 2	Run 3	Average
Concentration (dry)	ppm _{vd}	29.22	35.35	27.9	30.831
Emission Rate	lb/hr	9.5	11.0	9.0	9.9
Emission Factor	lb/ODT	0.14	0.17	0.14	0.15

Facility: Enviva
Date: 12/5/18

Source: RTO Dryer Exhaust

HAP		Methanol	Acetaldehyde	Formaldehyde	HCl	Supporting Data
Formula		CH ₄ O	CH ₃ CHO	CH ₂ O	C ₆ H ₆	
Mol Weight	lb/lb mole	32.04	44.05	30.31	36.46	
Response Factor		0.65	1.00	0.00	0.00	
Run 1						
Conc	ppm wet	0.00	0.00	0.59	0.00	
Conc	ppm dry	0.00	0.00	0.97	0.00	39.49 % Moisture
Mass Emissions	lb/hr	0.00	0.00	0.34	0.00	74,759 DSCFM
Emission Factor	lb/ODT	0.00	0.00	0.0051	0.00	67.00 ODT/hr
Run 2						
Conc	ppm wet	0.00	0.00	0.60	0.00	
Conc	ppm dry	0.00	0.00	0.98	0.00	38.68 % Moisture
Mass Emissions	lb/hr	0.00	0.00	0.33	0.00	71,425 DSCFM
Emission Factor	lb/ODT	0.00	0.00	0.0051	0.00	64.10 ODT/hr
Run 3						
Conc	ppm wet	0.00	0.00	0.56	0.00	
Conc	ppm dry	0.00	0.00	0.89	0.00	37.17 % Moisture
Mass Emissions	lb/hr	0.00	0.00	0.31	0.00	74,025 DSCFM
Emission Factor	lb/ODT	0.00	0.00	0.0048	0.00	64.70 ODT/hr
Averages						
Conc	ppm wet	0.00	0.00	0.58	0.00	
Conc	ppm dry	0.00	0.00	0.95	0.00	38.45 % Moisture
Mass Emissions	lb/hr	0.00	0.00	0.33	0.00	73,403 DSCFM
Emission Factor	lb/ODT	0.00	0.00	0.0050	0.00	
ND values						

Enviva
RTO Dryer Exhaust

Date: 5-Dec-18
Run Time: 0840-0947

Run 1

Parameter	Symbol	O ₂ %	CO ₂ %	CO ppm	NOx ppm	THC ppm (as C ₃ H ₈)
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Analyzer Calibration Error - Calibration Standards

Zero Gas	$C_{v, zero}$	0.0	0.0	0.0	0.0	0.0
Low-Level Gas	$C_{v, low}$	N/A	N/A	N/A	N/A	30.07
Mid-Level Gas	$C_{v, mid}$	11.05	9.952	226.4	48.0	52.38
High-Level Gas	$C_{v, high}$	21.99	18.22	450.0	89.5	85.84
Calibration Span	CS	21.99	18.22	983.4	90	175

Analyzer Calibration Error - Instrument Response

Zero Gas	$C_{Dir, zero}$	0.00	0.09	0.25	0.2	0.1
Low-Level Gas	$C_{Dir, low}$	N/A	N/A	N/A	N/A	30.3
Mid-Level Gas	$C_{Dir, mid}$	11.04	10	228.6	47.82	52.14
High-Level Gas	$C_{Dir, high}$	22.04	18.26	450	89.5	85.88

Analyzer Calibration Error - Results (Percent of Span)

Zero Gas	ACE_{zero}	0.0	0.5	0.1	0.2	0.1
Low-Level Gas	ACE_{low}	N/A	N/A	N/A	N/A	0.8
Mid-Level Gas	ACE_{mid}	0.0	0.3	0.5	-0.2	-0.5
High-Level Gas	ACE_{high}	0.2	0.2	0.0	0.0	0.0
Specification	ACE_{spec}	±2	±2	±2	±2	±5

System Calibrations - Instrument Response

Initial Zero	$C_{s, zero (pre)}$	0.05	0.09	0.8	0.3	0.1
Final Zero	$C_{s, zero (post)}$	0.04	0.09	0.9	0.5	0.17
Upscale Gas Standard	C_{MA}	11.05	9.95	226.4	48.0	52.4
Initial Upscale	$C_{v, up (pre)}$	11.044	9.96	229	47.3	52.14
Final Upscale	$C_{v, up (post)}$	11.07	10.02	227.5	47.1	52.42

System Bias - Results (Percent)

Zero (pre)	$SB_{i (zero)}$	0.2	0.0	0.1	0.1	0.0
Zero (post)	$SB_{final (zero)}$	0.2	0.0	0.1	0.3	0.0
Upscale (pre)	$SB_{i (upscale)}$	0.0	-0.2	0.1	-0.6	0.0
Upscale (post)	$SB_{final (upscale)}$	0.1	0.1	-0.2	-0.8	0.2
Specification	SB_{spec}	±5	±5	±5	±5	NA

System Drift - Results (Percent)

Zero	D_{zero}	0.0	0.0	0.0	0.2	0.0
Upscale	$D_{upscale}$	0.1	0.4	0.3	0.2	0.2
Specification	D_{spec}	±3	3.0	3.0	3.0	±3

Response Test - Results (seconds)

Upscale Test		35	40	35	35	NA
Zero Test		35	40	35	35	NA
Response Time		35	40	35	35	25

Calibration Correction

Raw Average	C_{ave}	12.53	7.89	30.2	37.9	6.42
Bias Average - Zero	C_0	0.04	0.09	0.85	0.38	N/A
Bias Average - Upscale	C_M	11.06	9.99	228.25	47.20	N/A
Conc. Methane (J), wet C3	C_{me}	NA	NA	NA	NA	0.23
Corrected Run Average	C_{Gas}	12.53	7.84	29.22	38.48	6.19

Enviva
RTO Dryer Exhaust

Date: 5-Dec-18
Run Time: 1047-1157

Run 2

Parameter	Symbol	O ₂ %	CO ₂ %	CO ppm	NOx ppm	THC ppm (as C ₃ H ₈)
Analyzer Calibration Error - Calibration Standards						
Zero Gas	$C_{v, zero}$	0.0	0.0	0.0	0.0	0.0
Low-Level Gas	$C_{v, low}$	N/A	N/A	N/A	N/A	30.1
Mid-Level Gas	$C_{v, mid}$	11.1	10.0	226.4	48.0	52.4
High-Level Gas	$C_{v, high}$	22.0	18.2	450.0	89.5	85.8
Calibration Span	CS	22.0	18.2	450.0	89.5	175
Analyzer Calibration Error - Instrument Response						
Zero Gas	$C_{Dir, zero}$	0.0	0.1	0.3	0.2	0.1
Low-Level Gas	$C_{Dir, low}$	N/A	N/A	N/A	N/A	30.3
Mid-Level Gas	$C_{Dir, mid}$	11.0	10.0	228.6	47.8	52.1
High-Level Gas	$C_{Dir, high}$	22.0	18.3	450.0	89.5	85.9
Analyzer Calibration Error - Results (Percent of Span)						
Zero Gas	ACE_{zero}	0.0	0.5	0.1	0.2	0.1
Low-Level Gas	ACE_{low}	N/A	N/A	N/A	N/A	0.8
Mid-Level Gas	ACE_{mid}	0.0	0.3	0.5	-0.2	-0.5
High-Level Gas	ACE_{high}	0.2	0.2	0.0	0.0	0.0
Specification	ACE_{spec}	±2	±2	±2	±2	±5
System Calibrations - Instrument Response						
Initial Zero	$C_{s, zero (pre)}$	0.01	0.09	0.90	0.46	0.17
Final Zero	$C_{s, zero (post)}$	0.035	0.09	0.9	0.6	0.59
Upscale Gas Standard	C_{MA}	11.05	9.95	226.4	48.0	52.4
Initial Upscale	$C_{v, up (pre)}$	11.07	10.024	227.5	47.1	52.42
Final Upscale	$C_{v, up (post)}$	11.025	10.119	227.7	47.16	52.23
System Bias - Results (Percent)						
Zero (pre)	$SB_{i (zero)}$	0.1	0.0	0.1	0.3	0.0
Zero (post)	$SB_{final (zero)}$	0.2	0.0	0.1	0.4	0.3
Upscale (pre)	$SB_{i (upscale)}$	0.1	0.1	-0.2	-0.8	0.2
Upscale (post)	$SB_{final (upscale)}$	-0.1	0.7	-0.2	-0.7	0.1
Specification	SB_{spec}	±5	±5	±5	±5	NA
System Drift - Results (Percent)						
Zero	D_{zero}	0.1	0.0	0.0	0.2	0.2
Upscale	$D_{upscale}$	0.2	0.5	0.0	0.1	-0.1
Specification	D_{spec}	±3	3.0	3.0	3.0	±3
Response Test - Results (seconds)						
Upscale Test		35	40	35	35	NA
Zero Test		35	40	35	35	NA
Response Time		35	40	35	35	25
Calibration Correction						
Raw Average	C_{ave}	12.77	7.67	36.3	33.89	7.11
Bias Average - Zero	C_0	0.02	0.09	0.90	0.53	N/A
Bias Average - Upscale	C_M	11.05	10.07	227.60	47.13	N/A
Conc. Methane (J), wet C3	C_{me}	NA	NA	NA	NA	0.23
Corrected Run Average	C_{Gas}	12.78	7.56	35.35	34.36	6.88

Enviva
RTO Dryer Exhaust

Date: 5-Dec-18
Run Time: 1216-1327

Run 3

Parameter	Symbol	O ₂ %	CO ₂ %	CO ppm	NOx ppm	THC ppm (as C ₃ H ₈)
Analyzer Calibration Error - Calibration Standards						
Zero Gas	$C_{v, zero}$	0.0	0.0	0.0	0.0	0.0
Low-Level Gas	$C_{v, low}$	N/A	N/A	N/A	N/A	30.1
Mid-Level Gas	$C_{v, mid}$	11.1	10.0	226.4	48.0	52.4
High-Level Gas	$C_{v, high}$	22.0	18.2	450.0	89.5	85.8
Calibration Span	CS	21.99	18.22	450.0	89.5	175.0
Analyzer Calibration Error - Instrument Response						
Zero Gas	$C_{Dir, zero}$	0.0	0.1	0.3	0.2	0.09
Low-Level Gas	$C_{Dir, low}$	N/A	N/A	N/A	N/A	30.3
Mid-Level Gas	$C_{Dir, mid}$	11.0	10.0	228.6	47.8	52.1
High-Level Gas	$C_{Dir, high}$	22.0	18.3	450.0	89.5	85.9
Analyzer Calibration Error - Results (Percent of Span)						
Zero Gas	ACE_{zero}	0.0	0.5	0.1	0.2	0.1
Low-Level Gas	ACE_{low}	N/A	N/A	N/A	N/A	0.8
Mid-Level Gas	ACE_{mid}	0.0	0.3	0.5	-0.2	-0.5
High-Level Gas	ACE_{high}	0.2	0.2	0.0	0.0	0.0
Specification	ACE_{spec}	±2	±2	±2	±2	±5
System Calibrations - Instrument Response						
Initial Zero	$C_{s, zero (pre)}$	0.04	0.09	0.90	0.60	0.59
Final Zero	$C_{s, zero (post)}$	0.048	0.09		0.59	0.6
Upscale Gas Standard	C_{MA}	11.05	9.95	226.4	48.0	52.4
Initial Upscale	$C_{v, up (pre)}$	11.025	10.119	227.7	47.16	52.23
Final Upscale	$C_{v, up (post)}$	11.078	9.962	228.2	45	52.02
System Bias - Results (Percent)						
Zero (pre)	$SB_{i (zero)}$	0.2	0.0	0.1	0.4	0.3
Zero (post)	$SB_{final (zero)}$	0.2	0.0	-0.1	0.4	0.3
Upscale (pre)	$SB_{i (upscale)}$	-0.1	0.7	-0.2	-0.7	0.1
Upscale (post)	$SB_{final (upscale)}$	0.2	-0.2	-0.1	-3.2	-0.1
Specification	SB_{spec}	±5	±5	±5	±5	NA
System Drift - Results (Percent)						
Zero	D_{zero}	0.1	0.0	0.2	0.0	0.0
Upscale	$D_{upscale}$	0.2	0.9	0.1	2.4	-0.1
Specification	D_{spec}	±3	3.0	3.0	3.0	±3
Response Test - Results (seconds)						
Upscale Test		35	40	35	35	NA
Zero Test		35	40	35	35	NA
Response Time		35	40	35	35	25
Calibration Correction						
Raw Average	C_{ave}	13.40	7.12	28.9	31.5	6.14
Bias Average - Zero	C_0	0.04	0.09	0.90	0.60	N/A
Bias Average - Upscale	C_M	11.05	10.04	227.95	46.08	N/A
Conc. Methane (J), wet C3	C_{me}	NA	NA	NA	NA	0.32
Corrected Run Average	C_{Gas}	13.40	7.12	27.92	32.63	5.82

Test Run 4 Begin. STRATA Version 3.2.112

Operator: David Goshaw

Plant Name: Enviva Greenwood

Location: DHM Stack

		O2 %	CO2 ppm	THC ppm	NOx ppm	CO ppm
Start Averaging						
12/5/2018	8:40:21	12.585	7.818	8.1	38.68	19.4
12/5/2018	8:41:22	12.697	7.696	3.16	38.25	32.5
12/5/2018	8:42:22	12.611	7.753	9.04	37.91	34.9
12/5/2018	8:43:22	12.719	7.741	4.93	37.84	32
12/5/2018	8:44:22	12.796	7.596	6.19	37.5	32.6
12/5/2018	8:45:22	12.494	7.822	7.75	37.36	15.9
12/5/2018	8:46:22	12.434	7.955	2.87	38.16	25.3
12/5/2018	8:47:22	12.536	7.92	8.71	38.9	25.2
12/5/2018	8:48:22	12.466	7.872	4.72	38.93	29
12/5/2018	8:49:22	12.475	7.974	6.88	38.64	39.7
12/5/2018	8:50:22	12.499	7.981	8.44	38.35	32
12/5/2018	8:51:22	12.482	7.839	3.16	37.72	37
12/5/2018	8:52:22	12.286	8.062	8.64	37.59	28.8
12/5/2018	8:53:22	12.21	8.215	4.96	38.29	22.9
12/5/2018	8:54:22	12.484	8.047	6.8	38.57	34
12/5/2018	8:55:22	12.507	7.858	8.54	38.01	29.1
12/5/2018	8:56:22	12.517	7.913	3.82	37.51	40.8
12/5/2018	8:57:22	12.6	7.837	8.83	37.61	36
12/5/2018	8:58:22	12.596	7.778	4.59	37.3	20.3
12/5/2018	8:59:22	12.47	7.949	6.69	37.12	29.2
12/5/2018	9:00:22	12.295	8.089	8.28	37.76	21.7
12/5/2018	9:01:22	12.455	8.002	3.1	38.1	33.9
12/5/2018	9:02:22	12.386	8.004	8.86	37.75	36.8
12/5/2018	9:03:22	12.477	7.949	4.91	37.64	33.7
12/5/2018	9:04:22	12.509	7.982	6.84	37.65	39
12/5/2018	9:05:22	12.523	7.882	7.99	37.5	20.4
12/5/2018	9:06:22	12.694	7.794	3.31	37.3	28.4
12/5/2018	9:07:22	12.643	7.786	9.04	36.96	25.2
12/5/2018	9:08:22	12.796	7.685	4.67	36.52	28.9
12/5/2018	9:09:22	12.695	7.672	7.04	36.4	39.6
12/5/2018	9:10:22	12.438	7.875	8.29	36.9	34.5
12/5/2018	9:11:22	12.567	7.963	2.82	37.65	31.6
Pause						
12/5/2018	9:12:22	15.345	7.461	8.33	36.32	23.2
12/5/2018	9:13:22	17.012	2.053	4.68	13.33	13.8
End Pause						
12/5/2018	9:14:22	12.692	7.191	7.19	31.36	29.8
12/5/2018	9:15:22	12.524	7.866	8.26	37.48	27.7
12/5/2018	9:16:22	12.727	7.757	4.13	37.48	40.2
12/5/2018	9:17:21	12.643	7.755	9.09	37.12	35.2
12/5/2018	9:18:21	12.605	7.812	4.01	37.15	19.3
12/5/2018	9:19:23	12.662	7.821	7.01	37.3	26
12/5/2018	9:20:22	12.57	7.835	8.27	37.37	18.5

Test Run 4 Begin. STRATA Version 3.2.112

Operator: David Goshaw

Plant Name: Enviva Greenwood

Location: DHM Stack

		O2 %	CO2 ppm	THC ppm	NOx ppm	CO ppm
12/5/2018	9:21:23	12.668	7.724	3.16	37.35	32.9
12/5/2018	9:22:22	12.615	7.844	9.21	37.33	35
12/5/2018	9:23:22	12.592	7.841	4.76	37.31	35
12/5/2018	9:24:22	12.656	7.853	6.72	37.43	36.3
12/5/2018	9:25:22	12.654	7.791	7.85	37.56	20.1
12/5/2018	9:26:22	12.498	7.793	3.26	37.49	32.4
12/5/2018	9:27:22	12.391	8.09	9.26	38.01	28.5
12/5/2018	9:28:22	12.434	7.934	4.44	38.51	29.3
12/5/2018	9:29:22	12.44	8.027	8.53	38.38	40.8
12/5/2018	9:30:22	12.51	7.956	9	38.3	34.4
12/5/2018	9:31:22	12.597	7.909	3.5	38.11	28.8
12/5/2018	9:32:22	12.625	7.823	8.74	37.9	22.5
12/5/2018	9:33:22	12.515	7.887	3.93	37.87	22.5
12/5/2018	9:34:21	12.593	7.933	7.64	38.14	31.7
12/5/2018	9:35:21	12.626	7.811	8.22	38.17	27.7
12/5/2018	9:36:21	12.632	7.737	3.46	37.83	40.8
12/5/2018	9:37:22	12.435	7.95	8.37	37.99	36.1
12/5/2018	9:38:22	12.445	8.014	4.08	38.56	22.7
12/5/2018	9:39:22	12.457	7.979	7.22	38.72	30.1
12/5/2018	9:40:22	12.212	8.134	8.46	38.89	21.5
12/5/2018	9:41:22	12.342	8.146	3.43	39.42	34.7
12/5/2018	9:42:22	12.373	8.106	9.22	39.69	37.3
12/5/2018	9:43:22	12.521	7.892	4.3	39.26	36.9
12/5/2018	9:44:21	12.582	7.927	7.27	38.88	34.7
12/5/2018	9:45:21	12.579	7.847	7.72	38.55	14.8
12/5/2018	9:46:23	12.506	7.871	3.15	38.21	28.4
12/5/2018	9:47:22	12.411	8.024	8.76	38.26	26.1
Average	2910 sam	12.534	7.891	6.42	37.91	30.2

Test Run 4 End

Test Run 5 Begin. STRATA Version 3.2.112

Operator: David Goshaw

Plant Name: Enviva Greenwood

Location: Dryer

		O2 %	CO2 ppm	THC ppm	NOx ppm	CO ppm
12/5/2018	10:48:00	12.562	7.878	3.54	37.45	28.4
12/5/2018	10:49:00	12.605	7.875	9.14	36.98	24.8
12/5/2018	10:50:00	12.545	7.885	3.88	36.16	34.7
12/5/2018	10:51:00	12.568	7.897	8.64	35.82	33.4
12/5/2018	10:52:01	12.613	7.82	7.51	35.93	13.6
12/5/2018	10:53:01	12.59	7.827	3.44	36	23.5
12/5/2018	10:54:01	12.588	7.947	8.59	36.35	21.4
12/5/2018	10:55:01	12.725	7.755	3.23	36.39	29.2
12/5/2018	10:56:00	12.618	7.733	8.74	35.97	37.2
12/5/2018	10:57:00	12.471	7.84	7.78	36.03	34
12/5/2018	10:58:01	12.496	7.995	3.32	36.59	34.1
12/5/2018	10:59:01	12.682	7.857	8.55	36.59	24.1
12/5/2018	11:00:01	12.665	7.73	3.23	35.68	24.8
12/5/2018	11:01:01	12.728	7.833	8.35	35.27	30.1
12/5/2018	11:02:01	12.807	7.647	8.01	35.05	27.7
12/5/2018	11:03:01	12.99	7.535	4.4	34.44	39.1
12/5/2018	11:04:01	13.139	7.418	9.31	34.04	36.4
12/5/2018	11:05:01	12.986	7.344	3.65	33.82	20.5
12/5/2018	11:06:01	12.752	7.613	8.05	34.13	23.3
12/5/2018	11:07:01	12.606	7.787	7.59	35.03	17.4
12/5/2018	11:08:00	12.57	7.887	3.29	35.64	33.1
12/5/2018	11:09:00	12.689	7.829	8.56	35.86	32.9
12/5/2018	11:10:00	12.736	7.735	3.31	35.55	36.1
12/5/2018	11:11:00	12.694	7.727	7.82	35.21	37.1
12/5/2018	11:12:00	12.607	7.876	7.05	35.27	19.3
12/5/2018	11:13:00	12.411	7.928	3.66	35.48	30.2
12/5/2018	11:14:01	12.463	8.017	8.32	35.93	25.4
12/5/2018	11:15:01	12.513	7.933	2.81	36.15	29.4
12/5/2018	11:16:01	12.579	7.904	8.59	35.88	39.6
12/5/2018	11:17:01	12.66	7.826	7.85	35.56	33.8
12/5/2018	11:18:01	12.691	7.809	3.17	35.47	30.4
12/5/2018	11:19:01	12.729	7.774	7.97	35.64	21.5
12/5/2018	11:20:01	12.847	7.603	2.95	35.49	23.6
12/5/2018	11:21:01	12.817	7.637	7.99	35.36	30.1
12/5/2018	11:22:01	12.805	7.663	7.59	35.38	27.7
12/5/2018	11:23:01	12.967	7.63	4.15	34.93	41.7
12/5/2018	11:24:01	12.987	7.518	8.25	34.56	36.1
12/5/2018	11:25:01	13.097	7.413	2.29	34.51	24
12/5/2018	11:26:01	13.107	7.349	7.62	34.31	27.1
12/5/2018	11:27:01	12.782	7.575	7.16	34.31	20.8
12/5/2018	11:28:00	12.882	7.626	3.53	34.79	31.6
12/5/2018	11:29:00	12.948	7.593	8.74	35.07	30.3
12/5/2018	11:30:00	13.008	7.424	3.43	34.93	39.5
12/5/2018	11:31:00	13.076	7.429	8.33	35.02	34.5

Test Run 5 Begin. STRATA Version 3.2.112

Operator: David Goshaw

Plant Name: Enviva Greenwood

Location: Dryer

		O2 %	CO2 ppm	THC ppm	NOx ppm	CO ppm
12/5/2018	11:32:00	13.028	7.445	7.31	35.14	15.4
12/5/2018	11:33:01	13.083	7.359	3.35	34.93	25.5
12/5/2018	11:34:01	13.055	7.429	7.88	34.83	21
12/5/2018	11:35:01	13.176	7.323	2.65	34.61	27.5
12/5/2018	11:36:01	13.249	7.235	8.28	34.09	32.1
12/5/2018	11:37:01	13.244	7.233	7.21	33.78	32.7
12/5/2018	11:38:01	13.318	7.216	2.87	33.44	31.1
Pause						
12/5/2018	11:39:00	14.232	7.179	7.62	33.04	15.1
12/5/2018	11:40:00	16.093	3.988	2.88	20.58	15.8
12/5/2018	11:41:01	13.259	7.001	8.04	32.97	24.1
12/5/2018	11:42:01	13.286	7.232	7.35	33.73	25.3
12/5/2018	11:43:01	13.126	7.311	3.44	33.79	35.7
End Pause						
12/5/2018	11:44:01	13.226	7.307	7.96	34.1	32.2
12/5/2018	11:45:01	13.318	7.187	2.37	34.32	27.1
12/5/2018	11:46:01	13.127	7.261	7.48	34.12	19.7
12/5/2018	11:47:01	12.792	7.543	7.15	34.49	18.4
12/5/2018	11:48:00	13.128	7.52	3.13	35.17	31.8
12/5/2018	11:49:00	13.137	7.352	8.02	34.66	29.4
12/5/2018	11:50:01	13.141	7.313	2.84	33.53	36.6
12/5/2018	11:51:00	12.953	7.511	7.6	33.39	38.6
12/5/2018	11:52:01	12.946	7.495	6.65	33.69	17.7
12/5/2018	11:53:01	13.002	7.479	3	33.81	28
12/5/2018	11:54:01	12.906	7.58	7.73	34.05	22.7
12/5/2018	11:55:01	12.9	7.52	2.48	34.03	28.7
12/5/2018	11:56:01	12.875	7.634	8.14	33.89	35.2
12/5/2018	11:57:00	12.77	7.672	7.11	33.89	36.3

Test Run 5 End

Run 3

Operator: David Goshaw

Plant Name: Enviva Greenwood

Location: Dryer Stack

		O2 %	CO2 ppm	THC ppm	NOx ppm	CO ppm
Start Averaging						
12/5/2018	12:17:04	12.801	7.712	8.16	35.6	36.3
12/5/2018	12:18:04	13.176	7.511	3.07	34.71	32.2
12/5/2018	12:19:04	13.321	7.229	7.38	34.1	23.9
12/5/2018	12:20:04	13.335	7.122	3.11	33.23	25.2
12/5/2018	12:21:04	13.347	7.181	7.07	32.83	29
12/5/2018	12:22:04	13.574	7.013	7.75	32.45	29
12/5/2018	12:23:04	13.797	6.809	4.22	31.49	41.3
12/5/2018	12:24:04	13.85	6.658	8.43	30.76	36.4
12/5/2018	12:25:04	13.812	6.691	3.42	30.31	26.7
12/5/2018	12:26:04	13.719	6.738	6.94	30.1	19.9
12/5/2018	12:27:04	13.344	6.975	6.92	30.46	17.5
12/5/2018	12:28:04	13.288	7.174	3.14	31.41	26.4
12/5/2018	12:29:04	13.39	7.155	8.37	32.35	32.7
12/5/2018	12:30:04	13.391	7.087	3.92	32.39	39.3
12/5/2018	12:31:04	13.35	7.179	7.57	32.22	40.3
12/5/2018	12:32:03	13.248	7.263	6.96	32.66	24.2
12/5/2018	12:33:05	13.036	7.296	3.26	32.78	27.3
12/5/2018	12:34:05	12.757	7.73	8.45	34.78	27.8
12/5/2018	12:35:03	12.876	7.562	3.85	33.53	40
12/5/2018	12:36:05	13.048	7.581	8.88	34.4	48
12/5/2018	12:37:05	13.074	7.392	8.45	33.96	43.2
12/5/2018	12:38:04	13.146	7.417	3.09	33.38	35
12/5/2018	12:39:04	12.969	7.449	7.82	33.13	22.1
12/5/2018	12:40:04	12.898	7.571	3.61	33.47	22.3
12/5/2018	12:41:04	13.013	7.597	8.03	33.93	27.7
12/5/2018	12:42:04	13.177	7.322	8.31	33.39	26.6
12/5/2018	12:43:04	13.118	7.358	4.19	32.48	40.6
12/5/2018	12:44:04	13.155	7.344	8.78	32.55	36.6
12/5/2018	12:45:05	13.142	7.407	3.7	32.94	20.6
12/5/2018	12:46:04	13.151	7.358	7.59	33.22	25.1
12/5/2018	12:47:04	13.299	7.293	8.04	33.21	18.2
12/5/2018	12:48:04	13.34	7.159	3.82	32.68	27.9
12/5/2018	12:49:04	13.425	7.139	8.79	31.98	32.4
12/5/2018	12:50:04	13.417	7.127	4.06	31.32	41.8
12/5/2018	12:51:04	13.501	7.052	7.41	31.33	43.2
12/5/2018	12:52:04	13.325	7.141	6.96	31.41	20.4
12/5/2018	12:53:04	13.333	7.165	3.2	31.09	28.8
12/5/2018	12:54:04	13.292	7.225	8.24	31.25	21.3
12/5/2018	12:55:04	13.328	7.147	3.83	31.39	30.8
12/5/2018	12:56:05	13.318	7.194	8.74	31.37	39.7
12/5/2018	12:57:05	13.271	7.166	8.38	31.51	36.1
12/5/2018	12:58:04	13.497	7.139	3.57	31.57	35
12/5/2018	12:59:04	13.509	6.971	7.93	31.2	18.1

Run 3

Operator: David Goshaw

Plant Name: Enviva Greenwood

Location: Dryer Stack

		O2 %	CO2 ppm	THC ppm	NOx ppm	CO ppm
12/5/2018	13:00:04	13.351	7.101	3.1	31.13	21.6
12/5/2018	13:01:04	13.393	7.223	7.42	31.86	24
12/5/2018	13:02:04	13.399	7.111	7.6	31.84	28.6
12/5/2018	13:03:04	13.571	6.997	3.75	31.03	41.7
12/5/2018	13:04:04	13.54	6.966	8.28	30.48	38.3
12/5/2018	13:05:04	13.58	6.93	2.9	30.2	30.9
12/5/2018	13:06:04	13.453	7.015	7.25	30.3	23.3
Pause						
12/5/2018	13:07:04	13.33	7.095	7.05	30.61	21.9
12/5/2018	13:08:03	16.184	5.822	3.1	28.53	26.3
12/5/2018	13:09:03	13.525	5.788	8.07	24.74	28.5
End Pause						
12/5/2018	13:10:03	13.542	6.999	3.71	30.96	36
12/5/2018	13:11:05	13.659	6.885	8.51	29.67	36.9
12/5/2018	13:12:05	13.795	6.833	7.58	29.35	19.5
12/5/2018	13:13:04	13.747	6.766	3.67	28.97	21
12/5/2018	13:14:04	13.806	6.792	7.9	29.01	18.6
12/5/2018	13:15:04	13.953	6.605	3.06	29.04	26.8
12/5/2018	13:16:04	13.918	6.643	8.95	28.7	30.4
12/5/2018	13:17:04	13.934	6.593	7.97	28.44	33.5
12/5/2018	13:18:04	13.886	6.645	3.78	28.17	30.6
12/5/2018	13:19:04	13.761	6.746	7.78	28.26	15.6
12/5/2018	13:20:04	13.517	6.921	2.74	29.7	17.7
12/5/2018	13:21:04	13.509	7.085	7.73	29.98	19
12/5/2018	13:22:04	13.494	7.038	7.33	28.83	24.5
12/5/2018	13:23:04	13.564	6.945	3.62	29.04	32.7
12/5/2018	13:24:04	13.39	7.103	8.23	29.02	33.4
12/5/2018	13:25:04	13.404	7.076	2.48	30.82	24.8
12/5/2018	13:26:04	13.417	7.108	7.57	31.62	17.5
12/5/2018	13:27:04	13.22	7.23	7.05	31.57	17.6
Average	3044 samples	13.397	7.119	6.14	31.52	28.9
Test Run 6 End						

Date	Form- aldehyde (ppm)	SEC (ppm)	HCI (ppm)	SEC (ppm)	Methanol (ppm)	SEC (ppm)	acet- aldehyde (ppm)	SEC (ppm)
0840-0947	0.585	0.109	0.000	0.132	0.022	1.154	0.015	0.441
1047-1157	0.600	0.086	0.000	0.100	0.034	1.067	0.000	0.423
1216-1327	0.560	0.073	0.000	0.089	0.058	1.014	0.000	0.340
Note: Shaded indicates conc.< 2 x SEC, and is a none-detect value								
12/5/2018 8:09	0.919	0.096	0.441	0.115	0.164	1.111	0.000	0.380
12/5/2018 8:10	0.485	0.095	0.000	0.113	0.000	1.120	0.000	0.372
12/5/2018 8:11	0.731	0.105	0.000	0.124	0.000	1.156	0.000	0.404
12/5/2018 8:12	0.886	0.107	0.000	0.126	0.000	1.169	0.000	0.413
12/5/2018 8:13	0.386	0.106	0.000	0.126	0.000	1.163	0.000	0.416
12/5/2018 8:14	1.023	0.105	0.000	0.124	0.000	1.143	0.000	0.400
12/5/2018 8:15	0.569	0.108	0.000	0.124	0.000	1.174	0.000	0.417
12/5/2018 8:16	0.603	0.112	0.000	0.130	0.000	1.163	0.000	0.431
12/5/2018 8:17	0.766	0.107	0.000	0.126	0.000	1.162	0.000	0.414
12/5/2018 8:18	0.325	0.109	0.000	0.131	0.000	1.165	0.000	0.429
12/5/2018 8:19	0.955	0.113	0.000	0.138	0.006	1.153	0.000	0.454
12/5/2018 8:20	0.490	0.113	0.000	0.136	0.000	1.144	0.000	0.449
12/5/2018 8:21	0.688	0.114	0.000	0.136	0.000	1.144	0.000	0.451
12/5/2018 8:22	0.856	0.119	0.000	0.140	0.001	1.164	0.000	0.477
12/5/2018 8:23	0.285	0.118	0.000	0.140	0.000	1.181	0.000	0.459
12/5/2018 8:24	0.808	0.118	0.000	0.137	0.000	1.152	0.000	0.465
12/5/2018 8:25	0.468	0.119	0.000	0.140	0.000	1.161	0.000	0.473
12/5/2018 8:26	0.708	0.122	0.000	0.144	0.000	1.157	0.000	0.493
12/5/2018 8:27	0.943	0.115	0.000	0.139	0.000	1.135	0.000	0.458
12/5/2018 8:28	0.481	0.120	0.000	0.144	0.000	1.143	0.000	0.480
12/5/2018 8:29	0.929	0.117	0.000	0.143	0.000	1.169	0.000	0.466
12/5/2018 8:30	0.488	0.121	0.000	0.143	0.000	1.167	0.000	0.486
12/5/2018 8:31	0.587	0.124	0.000	0.148	0.000	1.174	0.000	0.498
12/5/2018 8:32	0.765	0.119	0.000	0.144	0.018	1.192	0.000	0.478
12/5/2018 8:33	0.313	0.115	0.000	0.138	0.000	1.171	0.000	0.460
12/5/2018 8:34	0.917	0.123	0.000	0.144	0.035	1.175	0.000	0.488
12/5/2018 8:35	0.515	0.118	0.000	0.140	0.000	1.177	0.000	0.469
12/5/2018 8:36	0.529	0.123	0.000	0.146	0.000	1.175	0.000	0.485
12/5/2018 8:37	0.760	0.118	0.000	0.141	0.001	1.175	0.000	0.473
12/5/2018 8:38	0.306	0.116	0.000	0.140	0.000	1.166	0.000	0.471
12/5/2018 8:39	0.944	0.119	0.000	0.142	0.039	1.153	0.000	0.479
12/5/2018 8:40	0.595	0.122	0.000	0.146	0.000	1.166	0.000	0.486
12/5/2018 8:41	0.672	0.123	0.000	0.146	0.000	1.160	0.000	0.488
12/5/2018 8:42	0.907	0.119	0.000	0.142	0.000	1.144	0.000	0.473
12/5/2018 8:43	0.203	0.118	0.000	0.143	0.000	1.162	0.000	0.471
12/5/2018 8:44	0.824	0.118	0.000	0.141	0.070	1.178	0.000	0.471
12/5/2018 8:45	0.481	0.115	0.000	0.140	0.000	1.176	0.000	0.473
12/5/2018 8:46	0.553	0.117	0.000	0.139	0.000	1.158	0.000	0.475
12/5/2018 8:47	0.841	0.117	0.000	0.139	0.053	1.174	0.000	0.471
12/5/2018 8:48	0.322	0.113	0.000	0.133	0.000	1.173	0.000	0.457
12/5/2018 8:49	0.826	0.115	0.000	0.135	0.057	1.160	0.000	0.460
12/5/2018 8:50	0.474	0.119	0.000	0.142	0.000	1.189	0.000	0.478
12/5/2018 8:51	0.514	0.116	0.000	0.142	0.000	1.194	0.000	0.467
12/5/2018 8:52	0.833	0.119	0.000	0.144	0.075	1.184	0.000	0.473
12/5/2018 8:53	0.366	0.115	0.000	0.138	0.000	1.161	0.000	0.468
12/5/2018 8:54	0.964	0.115	0.000	0.137	0.034	1.166	0.000	0.462
12/5/2018 8:55	0.632	0.115	0.000	0.137	0.000	1.156	0.000	0.464
12/5/2018 8:56	0.518	0.116	0.000	0.141	0.000	1.148	0.000	0.465

Date	Form- aldehyde (ppm)	SEC (ppm)	HCI (ppm)	SEC (ppm)	Methanol (ppm)	SEC (ppm)	acet- aldehyde (ppm)	SEC (ppm)
12/5/2018 8:57	0.849	0.114	0.000	0.138	0.059	1.162	0.000	0.456
12/5/2018 8:58	0.267	0.115	0.000	0.137	0.000	1.176	0.000	0.464
12/5/2018 8:59	0.794	0.117	0.000	0.137	0.037	1.168	0.000	0.469
12/5/2018 9:00	0.470	0.114	0.000	0.141	0.000	1.160	0.000	0.460
12/5/2018 9:01	0.609	0.109	0.000	0.131	0.000	1.157	0.000	0.447
12/5/2018 9:02	0.901	0.111	0.000	0.135	0.084	1.161	0.000	0.449
12/5/2018 9:03	0.249	0.110	0.000	0.131	0.000	1.149	0.000	0.443
12/5/2018 9:04	0.789	0.111	0.000	0.134	0.000	1.146	0.000	0.445
12/5/2018 9:05	0.545	0.108	0.000	0.129	0.000	1.141	0.000	0.428
12/5/2018 9:06	0.602	0.107	0.000	0.131	0.000	1.130	0.000	0.426
12/5/2018 9:07	0.884	0.104	0.000	0.125	0.017	1.145	0.000	0.422
12/5/2018 9:08	0.411	0.110	0.000	0.136	0.000	1.155	0.000	0.436
12/5/2018 9:09	0.879	0.108	0.000	0.131	0.074	1.151	0.000	0.426
12/5/2018 9:10	0.543	0.108	0.000	0.133	0.000	1.147	0.000	0.431
12/5/2018 9:11	0.554	0.056	0.000	0.068	0.197	0.400	1.037	0.240
12/5/2018 9:12	0.681	0.095	0.000	0.111	0.139	1.135	0.000	0.379
12/5/2018 9:13	0.193	0.097	0.000	0.120	0.000	1.164	0.000	0.408
12/5/2018 9:14	0.749	0.102	0.000	0.121	0.072	1.145	0.000	0.416
12/5/2018 9:15	0.478	0.101	0.000	0.118	0.000	1.147	0.000	0.405
12/5/2018 9:16	0.464	0.098	0.000	0.118	0.000	1.156	0.000	0.406
12/5/2018 9:17	0.754	0.104	0.000	0.125	0.040	1.154	0.000	0.413
12/5/2018 9:18	0.233	0.102	0.000	0.126	0.000	1.148	0.000	0.417
12/5/2018 9:19	0.823	0.111	0.000	0.136	0.033	1.154	0.000	0.446
12/5/2018 9:20	0.472	0.104	0.000	0.125	0.000	1.165	0.000	0.422
12/5/2018 9:21	0.617	0.109	0.000	0.133	0.000	1.154	0.000	0.431
12/5/2018 9:22	0.765	0.104	0.000	0.125	0.026	1.159	0.000	0.415
12/5/2018 9:23	0.130	0.104	0.000	0.126	0.000	1.148	0.000	0.417
12/5/2018 9:24	0.743	0.113	0.000	0.135	0.000	1.157	0.000	0.446
12/5/2018 9:25	0.480	0.114	0.000	0.139	0.000	1.196	0.000	0.448
12/5/2018 9:26	0.488	0.109	0.000	0.130	0.000	1.175	0.000	0.436
12/5/2018 9:27	0.906	0.110	0.000	0.132	0.050	1.177	0.000	0.440
12/5/2018 9:28	0.431	0.109	0.000	0.133	0.000	1.173	0.000	0.445
12/5/2018 9:29	1.054	0.107	0.000	0.130	0.080	1.158	0.000	0.437
12/5/2018 9:30	0.636	0.106	0.000	0.127	0.000	1.143	0.000	0.436
12/5/2018 9:31	0.564	0.106	0.000	0.132	0.000	1.157	0.000	0.440
12/5/2018 9:32	0.762	0.110	0.000	0.135	0.040	1.156	0.000	0.436
12/5/2018 9:33	0.135	0.111	0.000	0.132	0.000	1.153	0.000	0.439
12/5/2018 9:34	0.768	0.106	0.000	0.127	0.038	1.149	0.000	0.425
12/5/2018 9:35	0.439	0.111	0.000	0.134	0.000	1.169	0.000	0.443
12/5/2018 9:36	0.371	0.110	0.000	0.132	0.000	1.181	0.000	0.444
12/5/2018 9:37	0.613	0.107	0.000	0.128	0.055	1.164	0.000	0.423
12/5/2018 9:38	0.143	0.107	0.000	0.129	0.000	1.183	0.000	0.426
12/5/2018 9:39	0.777	0.115	0.000	0.139	0.032	1.191	0.000	0.457
12/5/2018 9:40	0.543	0.112	0.000	0.136	0.000	1.185	0.000	0.446
12/5/2018 9:41	0.563	0.109	0.000	0.131	0.000	1.164	0.000	0.441
12/5/2018 9:42	0.854	0.112	0.000	0.136	0.056	1.171	0.000	0.443
12/5/2018 9:43	0.237	0.113	0.000	0.141	0.000	1.157	0.000	0.459
12/5/2018 9:44	0.802	0.110	0.000	0.132	0.077	1.161	0.000	0.448
12/5/2018 9:45	0.522	0.108	0.000	0.133	0.000	1.173	0.000	0.447
12/5/2018 9:46	0.535	0.113	0.000	0.137	0.000	1.163	0.000	0.465
12/5/2018 9:47	0.192	0.083	0.000	0.103	0.000	1.416	0.000	0.365

Date	Time	CTS Scan (pathlength)	SEC (ppm)	Cell Pressure (psi)	Cell Temp (deg C)	Deviation from Previous	Deviation from Average
5-Dec	736	8.03	0.113	14.490	181	NA	0.1%
5-Dec	1403	8.055	0.115	14.43	181	-0.3%	-0.1%
Average		8.045	0.114				

Stratification Test

Point	Average Reading					Variation from Mean		
	O2	CO2		NOx		O2	CO2	NOx
1	14.25	6.73	7.35	29.42	13.90	0.16	0.19	0.06
2	14.12	6.87	7.91	29.32	14.43	0.03	0.05	0.04
3	14.05	6.96	7.02	29.55	14.40	0.04	0.04	0.19
4	13.94	7.07	7.46	29.60	22.97	0.15	0.16	0.24
5	14.08	6.95	7.65	28.91	11.67	0.00	0.03	0.45
6								
7								
8								
9								
10								
11								
12								
Mean	14.09	6.91	7.48	29.36	15.47			
Maximum Variation From Mean						0.2	0.2	0.5
Percent of Mean						1.16	2.72	1.53
Result						Unstratified	Unstratified	Unstratified

Specifications (%)

≤5	Unstratified (single point testing)
>5 and ≤10	Minimally Stratified (3-point testing required)
>10	Stratified (12-point testing required)

Enviva		DHM Exhaust			
Parameters	Units	Run 1	Run 2	Run 3	Average
Date		4-Dec-18	4-Dec-18	4-Dec-18	
Run Time		0915-1023	1118-1225	1304-1412	
Oxygen	%	20.97	20.94	20.91	20.94
Moisture	%	3.94	4.22	4.33	4.17
Volumetric Flow Rate, Std	DSCFM	62,212	64,491	64,891	63,865
Dryer Process Rate	ODT/hr	65.4	64.9	64.6	65.0
VOC Emissions	Units	Run 1	Run 2	Run 3	Average
Concentration (actual)	ppmv _w as C ₃	65.6	83.8	82.3	77.2
Concentration (dry)	ppmv _d as C ₃	68.3	87.5	86.1	80.6
Emission Rate (propane)	lb/hr as C ₃ H ₈	29.2	38.8	38.4	35.4
Emission Factor (propane)	lb/ODT	0.45	0.60	0.59	0.55

Facility: Enviva
Date: 12/4/18

Source: DHM Exhaust

HAP		Methanol	Acet-aldehyde	Form-aldehyde	HCl	
Formula		CH ₃ OH	CH ₃ CHO	CH ₂ O	HCl	
Mol Weight lb/lb mole		32.04	44.05	30.31	36.46	
Run 1						
Conc	ppm wet	0.77	0.00	0.15	0.12	
Conc	ppm dry	0.80	0.00	0.15	0.13	3.94 % Moisture
Mass Emissions	lb/hr	0.25	0.00	0.045	0.046	62,212 DSCFM
Emission Factor	lb/ODT	0.0038	0.00	0.00068	0.00070	65.4 ODT/hr
Run 2						
Conc	ppm wet	1.07	0.00	0.00	0.00	
Conc	ppm dry	1.11	0.00	0.00	0.00	4.22 % Moisture
Mass Emissions	lb/hr	0.36	0.00	0.00	0.00	64,491 DSCFM
Emission Factor	lb/ODT	0.0055	0.00	0.00	0.00	64.9 ODT/hr
Run 3						
Conc	ppm wet	1.04	0.00	0.00	0.00	
Conc	ppm dry	1.08	0.00	0.00	0.00	4.33 % Moisture
Mass Emissions	lb/hr	0.35	0.00	0.00	0.00	64,891 DSCFM
Emission Factor	lb/ODT	0.0054	0.00	0.00	0.00	64.6 ODT/hr
Averages						
Conc	ppm wet	0.96	0.00	0.05	0.04	
Conc	ppm dry	1.00	0.00	0.05	0.04	4.17 % Moisture
Mass Emissions	lb/hr	0.32	0.00	0.015	0.015	63,865 DSCFM
Emission Factor	lb/ODT	0.0049	0.00	0.00023	0.00023	
ND values						

Enviva
DHM Exhaust

Date: 4-Dec-18
Run Time: 0915-1023

Run 1

Parameter	Symbol	O ₂ %	CO ₂ %	THC ppm (as C ₃ H ₈)
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Analyzer Calibration Error - Calibration Standards

Zero Gas	$C_{v, zero}$	0.0	0.0	0.0
Low-Level Gas	$C_{v, low}$	N/A	N/A	30.07
Mid-Level Gas	$C_{v, mid}$	11.05	9.952	52.38
High-Level Gas	$C_{v, high}$	21.99	18.22	85.84
Calibration Span	CS	21.99	18.22	175

Analyzer Calibration Error - Instrument Response

Zero Gas	$C_{Dir, zero}$	0.02	0.12	0.1
Low-Level Gas	$C_{Dir, low}$	N/A	N/A	30.1
Mid-Level Gas	$C_{Dir, mid}$	11.083	10	52.37
High-Level Gas	$C_{Dir, high}$	22.02	18.23	85.5

Analyzer Calibration Error - Results (Percent of Span)

Zero Gas	ACE_{zero}	0.1	0.7	0.1
Low-Level Gas	ACE_{low}	N/A	N/A	0.1
Mid-Level Gas	ACE_{mid}	0.2	0.3	0.0
High-Level Gas	ACE_{high}	0.1	0.1	-0.2
Specification	ACE_{spec}	±2	±2	±5

System Calibrations - Instrument Response

Initial Zero	$C_{s, zero (pre)}$	0.36	0.11	0.1
Final Zero	$C_{s, zero (post)}$	0.14	0.12	-0.17
Upscale Gas Standard	C_{MA}	21.99	18.22	52.4
Initial Upscale	$C_{v, up (pre)}$	21.905	18.20	52.37
Final Upscale	$C_{v, up (post)}$	21.987	18.26	51.37

System Bias - Results (Percent)

Zero (pre)	$SB_i (zero)$	1.5	-0.1	0.0
Zero (post)	$SB_{final} (zero)$	0.6	0.0	-0.2
Upscale (pre)	$SB_i (upscale)$	-0.5	-0.2	0.0
Upscale (post)	$SB_{final} (upscale)$	-0.2	0.2	-0.6
Specification	SB_{spec}	±5	±5	NA

System Drift - Results (Percent)

Zero	D_{zero}	1.0	0.1	-0.2
Upscale	$D_{upscale}$	0.4	0.3	-0.6
Specification	D_{spec}	±3	3.0	±3

Response Test - Results (seconds)

Upscale Test		30	35	NA
Zero Test		30	35	NA
Response Time		30	35	30

Calibration Correction

Raw Average	C_{ave}	20.94	0.12	65.6
Bias Average - Zero	C_0	0.25	0.12	N/A
Bias Average - Upscale	C_M	21.95	18.23	N/A
Corrected Run Average	C_{Gas}	20.97	0.00	65.6

Enviva
DHM Exhaust

Date: 4-Dec-18
Run Time: 1118-1225

Run 2

Parameter	Symbol	O ₂ %	CO ₂ %	THC ppm (as C ₃ H ₈)
Analyzer Calibration Error - Calibration Standards				
Zero Gas	$C_{v, zero}$	0.0	0.0	0.0
Low-Level Gas	$C_{v, low}$	N/A	N/A	30.07
Mid-Level Gas	$C_{v, mid}$	11.1	10.0	52.38
High-Level Gas	$C_{v, high}$	22.0	18.2	85.84
Calibration Span	CS	22.0	18.2	175
Analyzer Calibration Error - Instrument Response				
Zero Gas	$C_{Dir, zero}$	0.0	0.1	0.1
Low-Level Gas	$C_{Dir, low}$	N/A	N/A	30.1
Mid-Level Gas	$C_{Dir, mid}$	11.1	10.0	52.4
High-Level Gas	$C_{Dir, high}$	22.0	18.2	85.5
Analyzer Calibration Error - Results (Percent of Span)				
Zero Gas	ACE_{zero}	0.1	0.7	0.1
Low-Level Gas	ACE_{low}	N/A	N/A	0.1
Mid-Level Gas	ACE_{mid}	0.2	0.3	0.0
High-Level Gas	ACE_{high}	0.1	0.1	-0.2
Specification	ACE_{spec}	±2	±2	±5
System Calibrations - Instrument Response				
Initial Zero	$C_{s, zero (pre)}$	0.14	0.12	-0.09
Final Zero	$C_{s, zero (post)}$	0.187	0.13	0.08
Upscale Gas Standard	C_{MA}	21.99	18.22	52.4
Initial Upscale	$C_{v, up (pre)}$	21.987	18.26	51.37
Final Upscale	$C_{v, up (post)}$	21.995	18.263	51.46
System Bias - Results (Percent)				
Zero (pre)	$SB_i (zero)$	0.6	0.0	-0.1
Zero (post)	$SB_{final} (zero)$	0.8	0.0	0.0
Upscale (pre)	$SB_i (upscale)$	-0.2	0.2	-0.6
Upscale (post)	$SB_{final} (upscale)$	-0.1	0.2	-0.5
Specification	SB_{spec}	±5	±5	NA
System Drift - Results (Percent)				
Zero	D_{zero}	0.2	0.0	0.1
Upscale	$D_{upscale}$	0.0	0.0	0.1
Specification	D_{spec}	±3	3.0	±3
Response Test - Results (seconds)				
Upscale Test		30	35	NA
Zero Test		30	35	NA
Response Time		30	35	30
Calibration Correction				
Raw Average	C_{ave}	20.95	0.12	83.79
Bias Average - Zero	C_0	0.17	0.12	N/A
Bias Average - Upscale	C_M	21.99	18.26	N/A
Corrected Run Average	C_{Gas}	20.94	-0.01	83.8

Enviva
DHM Exhaust

Date: 4-Dec-18
Run Time: 1304-1412

Run 3

Parameter	Symbol	O ₂ %	CO ₂ %	THC ppm (as C ₃ H ₈)
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Analyzer Calibration Error - Calibration Standards

Zero Gas	$C_{v, zero}$	0.0	0.0	0.0
Low-Level Gas	$C_{v, low}$	N/A	N/A	30.1
Mid-Level Gas	$C_{v, mid}$	11.1	10.0	52.4
High-Level Gas	$C_{v, high}$	22.0	18.2	85.8
Calibration Span	CS	21.99	18.22	175.0

Analyzer Calibration Error - Instrument Response

Zero Gas	$C_{Dir, zero}$	0.0	0.1	0.10
Low-Level Gas	$C_{Dir, low}$	N/A	N/A	30.1
Mid-Level Gas	$C_{Dir, mid}$	11.1	10.0	52.4
High-Level Gas	$C_{Dir, high}$	22.0	18.2	85.5

Analyzer Calibration Error - Results (Percent of Span)

Zero Gas	ACE_{zero}	0.1	0.7	0.1
Low-Level Gas	ACE_{low}	N/A	N/A	0.1
Mid-Level Gas	ACE_{mid}	0.2	0.3	0.0
High-Level Gas	ACE_{high}	0.1	0.1	-0.2
Specification	ACE_{spec}	±2	±2	±5

System Calibrations - Instrument Response

Initial Zero	$C_{s, zero (pre)}$	0.19	0.13	0.08
Final Zero	$C_{s, zero (post)}$	0.23	0.16	0.47
Upscale Gas Standard	C_{MA}	21.99	18.22	52.4
Initial Upscale	$C_{v, up (pre)}$	21.995	18.263	51.46
Final Upscale	$C_{v, up (post)}$	21.963	18.22	52.2

System Bias - Results (Percent)

Zero (pre)	$SB_i (zero)$	0.8	0.0	0.0
Zero (post)	$SB_{final} (zero)$	1.0	0.2	0.2
Upscale (pre)	$SB_i (upscale)$	-0.1	0.2	-0.5
Upscale (post)	$SB_{final} (upscale)$	-0.3	-0.1	-0.1
Specification	SB_{spec}	±5	±5	NA

System Drift - Results (Percent)

Zero	D_{zero}	0.2	0.2	0.2
Upscale	$D_{upscale}$	0.1	0.2	0.4
Specification	D_{spec}	±3	3.0	±3

Response Test - Results (seconds)

Upscale Test		30	35	NA
Zero Test		30	35	NA
Response Time		30	35	30

Calibration Correction

Raw Average	C_{ave}	20.91	0.11	82.3
Bias Average - Zero	C_o	0.21	0.14	N/A
Bias Average - Upscale	C_M	21.98	18.24	N/A
Corrected Run Average	C_{Gas}	20.91	0.11	82.3

Test Run 1 Begin. STRATA Version 3.2.112

Operator: David Goshaw
 Plant Name: Enviva Greenwood
 Location: DHM Stack

		O2 %	CO2 ppm	THC ppm	O2 Volts	CO2 Volts	THC Volts
Start Averaging							
12/4/2018	9:16:24	20.943	0.111	73.05	8.417	0.045	2.495
12/4/2018	9:17:24	20.944	0.112	60.56	8.418	0.045	2.079
12/4/2018	9:18:24	20.945	0.111	42.67	8.418	0.045	1.482
12/4/2018	9:19:25	20.95	0.114	35.82	8.42	0.045	1.254
12/4/2018	9:20:24	20.95	0.113	38.92	8.42	0.045	1.357
12/4/2018	9:21:24	20.951	0.113	45.73	8.421	0.045	1.584
12/4/2018	9:22:23	20.948	0.113	53.06	8.419	0.045	1.829
12/4/2018	9:23:24	20.949	0.112	60.15	8.419	0.045	2.065
12/4/2018	9:24:24	20.946	0.112	65.15	8.418	0.045	2.232
12/4/2018	9:25:24	20.948	0.112	69.73	8.419	0.045	2.384
12/4/2018	9:26:24	20.951	0.111	74.45	8.421	0.044	2.542
12/4/2018	9:27:24	20.951	0.11	76.45	8.42	0.044	2.608
12/4/2018	9:28:23	20.951	0.112	77.1	8.421	0.045	2.63
12/4/2018	9:29:24	20.945	0.114	76.31	8.418	0.046	2.604
12/4/2018	9:30:24	20.947	0.118	72.31	8.419	0.047	2.47
12/4/2018	9:31:24	20.936	0.118	68.63	8.415	0.047	2.348
12/4/2018	9:32:24	20.937	0.117	57.28	8.415	0.047	1.969
12/4/2018	9:33:24	20.942	0.117	43.16	8.417	0.047	1.499
12/4/2018	9:34:24	20.952	0.117	39.6	8.421	0.047	1.38
12/4/2018	9:35:24	20.952	0.117	42.96	8.421	0.047	1.492
12/4/2018	9:36:24	20.952	0.116	49.92	8.421	0.046	1.724
12/4/2018	9:37:24	20.957	0.114	57.59	8.423	0.046	1.98
12/4/2018	9:38:23	20.953	0.114	63.62	8.421	0.046	2.181
12/4/2018	9:39:24	20.956	0.115	67.37	8.422	0.046	2.306
12/4/2018	9:40:24	20.955	0.114	71.1	8.422	0.046	2.43
12/4/2018	9:41:23	20.952	0.115	74.07	8.421	0.046	2.529
12/4/2018	9:42:24	20.947	0.115	72.76	8.419	0.046	2.485
12/4/2018	9:43:24	20.949	0.114	55.4	8.42	0.046	1.907
12/4/2018	9:44:24	20.955	0.115	35.21	8.422	0.046	1.234
12/4/2018	9:45:23	20.951	0.116	30.72	8.421	0.046	1.084
12/4/2018	9:46:24	20.948	0.12	33.63	8.419	0.048	1.181
12/4/2018	9:47:24	20.95	0.12	31.1	8.42	0.048	1.097
12/4/2018	9:48:23	20.954	0.12	33.67	8.422	0.048	1.182
12/4/2018	9:49:24	20.956	0.12	39.77	8.422	0.048	1.386
12/4/2018	9:50:24	20.954	0.12	46.11	8.422	0.048	1.597
12/4/2018	9:51:24	20.952	0.119	51.73	8.421	0.048	1.784
Pause							
End Pause							
12/4/2018	9:53:24	20.957	0.117	61.13	8.423	0.047	2.098
12/4/2018	9:54:24	20.957	0.118	68.74	8.423	0.047	2.351
12/4/2018	9:55:23	20.952	0.122	72.18	8.421	0.049	2.466
12/4/2018	9:56:24	20.95	0.122	73.76	8.42	0.049	2.519

Test Run 1 Begin. STRATA Version 3.2.112

Operator: David Goshaw
 Plant Name: Enviva Greenwood
 Location: DHM Stack

		O2 %	CO2 ppm	THC ppm	O2 Volts	CO2 Volts	THC Volts
12/4/2018	9:57:24	20.951	0.123	74.75	8.42	0.049	2.552
12/4/2018	9:58:24	20.949	0.123	75.56	8.42	0.049	2.579
12/4/2018	9:59:24	20.949	0.123	76.09	8.419	0.049	2.596
12/4/2018	10:00:23	20.949	0.122	77.07	8.42	0.049	2.629
12/4/2018	10:01:24	20.95	0.123	78.08	8.42	0.049	2.663
12/4/2018	10:02:24	20.95	0.123	79.06	8.42	0.049	2.695
12/4/2018	10:03:23	20.948	0.123	80.35	8.419	0.049	2.738
12/4/2018	10:04:25	20.951	0.123	82.52	8.42	0.049	2.811
12/4/2018	10:05:24	20.949	0.123	86.06	8.42	0.049	2.929
12/4/2018	10:06:24	20.948	0.123	88.89	8.419	0.049	3.023
12/4/2018	10:07:23	20.946	0.123	90.19	8.419	0.049	3.066
12/4/2018	10:08:24	20.945	0.124	82.14	8.418	0.049	2.798
12/4/2018	10:09:24	20.948	0.123	76.74	8.419	0.049	2.618
12/4/2018	10:10:23	20.948	0.124	78.08	8.419	0.05	2.663
12/4/2018	10:11:24	20.945	0.123	79.87	8.418	0.049	2.722
12/4/2018	10:12:24	20.947	0.123	73.72	8.419	0.049	2.517
12/4/2018	10:13:24	20.95	0.123	72.59	8.42	0.049	2.48
12/4/2018	10:14:23	20.951	0.123	74.22	8.42	0.049	2.534
12/4/2018	10:15:24	20.945	0.123	76.73	8.418	0.049	2.618
12/4/2018	10:16:24	20.948	0.124	78.91	8.419	0.049	2.69
12/4/2018	10:17:24	20.947	0.123	79.41	8.419	0.049	2.707
12/4/2018	10:18:24	20.951	0.124	79.77	8.421	0.049	2.719
12/4/2018	10:19:24	20.95	0.123	80.35	8.42	0.049	2.738
12/4/2018	10:20:23	20.954	0.123	81.19	8.421	0.049	2.766
12/4/2018	10:21:24	20.481	0.123	82.43	8.232	0.049	2.808
12/4/2018	10:22:24	20.949	0.123	83.82	8.42	0.049	2.854
Avg		20.94233	0.1185	65.62515	8.416985	0.047364	2.24753

Test Run 2 Begin. STRATA Version 3.2.112

Operator: David Goshaw

Plant Name: Enviva Greenwood

Location: DHM Stack

		O2 %	CO2 ppm	THC ppm	O2 Volts
Start Averaging					
12/4/2018	11:18:18	20.954	0.121	58.22	8.421
12/4/2018	11:19:19	20.956	0.121	57.21	8.422
12/4/2018	11:20:19	20.953	0.118	60.1	8.421
12/4/2018	11:21:18	20.953	0.119	61.9	8.421
12/4/2018	11:22:18	20.951	0.118	64.57	8.42
12/4/2018	11:23:18	20.95	0.119	67.09	8.42
12/4/2018	11:24:19	20.95	0.118	68.96	8.42
12/4/2018	11:25:19	20.955	0.116	70.42	8.422
12/4/2018	11:26:18	20.953	0.117	71.18	8.421
12/4/2018	11:27:19	20.959	0.114	71.74	8.423
12/4/2018	11:28:18	20.958	0.115	72.59	8.423
12/4/2018	11:29:18	20.959	0.113	73.15	8.424
12/4/2018	11:30:19	20.961	0.114	74.36	8.424
12/4/2018	11:31:19	20.959	0.114	75.49	8.424
12/4/2018	11:32:18	20.962	0.113	76.38	8.425
12/4/2018	11:33:18	20.962	0.113	77.83	8.425
12/4/2018	11:34:19	20.963	0.113	79.34	8.425
12/4/2018	11:35:19	20.963	0.114	80.72	8.425
12/4/2018	11:36:18	20.967	0.113	82.44	8.427
12/4/2018	11:37:18	20.964	0.113	83.99	8.426
12/4/2018	11:38:19	20.965	0.112	85.54	8.426
12/4/2018	11:39:18	20.957	0.119	86.25	8.423
12/4/2018	11:40:18	20.953	0.121	86.57	8.421
12/4/2018	11:41:19	20.957	0.12	86.11	8.423
12/4/2018	11:42:19	20.957	0.12	85.42	8.423
12/4/2018	11:43:18	20.953	0.12	83.66	8.421
12/4/2018	11:44:18	20.959	0.12	82.04	8.424
12/4/2018	11:45:19	20.952	0.12	81.05	8.421
12/4/2018	11:46:18	20.952	0.121	80.66	8.421
12/4/2018	11:47:18	20.951	0.12	80.66	8.42
12/4/2018	11:48:19	20.952	0.12	81.48	8.421
12/4/2018	11:49:18	20.948	0.12	82.94	8.419
12/4/2018	11:50:18	20.948	0.12	84.16	8.419
12/4/2018	11:51:18	20.954	0.12	85.61	8.421
12/4/2018	11:52:18	20.951	0.119	87.16	8.42
12/4/2018	11:53:19	20.953	0.117	89.61	8.421
12/4/2018	11:54:19	20.953	0.117	91.64	8.421
12/4/2018	11:55:18	20.948	0.117	93.61	8.419
12/4/2018	11:56:19	20.951	0.117	94.81	8.421

Pause

End Pause

Test Run 2 Begin. STRATA Version 3.2.112

Operator: David Goshaw

Plant Name: Enviva Greenwood

Location: DHM Stack

		O2 %	CO2 ppm	THC ppm	O2 Volts
12/4/2018	11:59:18	20.952	0.117	86.6	8.421
12/4/2018	12:00:19	20.95	0.118	89.21	8.42
12/4/2018	12:01:18	20.947	0.118	90.97	8.419
12/4/2018	12:02:19	20.947	0.119	90.74	8.419
12/4/2018	12:03:18	20.946	0.118	89.75	8.418
12/4/2018	12:04:18	20.944	0.119	89.12	8.418
12/4/2018	12:05:19	20.944	0.119	89.03	8.418
12/4/2018	12:06:18	20.941	0.119	89.81	8.416
12/4/2018	12:07:18	20.944	0.118	90.97	8.418
12/4/2018	12:08:18	20.943	0.119	91.77	8.417
12/4/2018	12:09:19	20.945	0.119	92.15	8.418
12/4/2018	12:10:18	20.942	0.119	92.33	8.417
12/4/2018	12:11:18	20.945	0.119	93.7	8.418
12/4/2018	12:12:19	20.94	0.119	95.06	8.416
12/4/2018	12:13:18	20.937	0.121	95.72	8.415
12/4/2018	12:14:19	20.94	0.121	96.03	8.416
12/4/2018	12:15:19	20.941	0.121	95.93	8.416
12/4/2018	12:16:18	20.938	0.12	95.34	8.415
12/4/2018	12:17:19	20.938	0.12	93.95	8.415
12/4/2018	12:18:19	20.937	0.12	93.08	8.415
12/4/2018	12:19:18	20.938	0.12	92.26	8.415
12/4/2018	12:20:18	20.937	0.12	90.95	8.415
12/4/2018	12:21:19	20.931	0.119	90.41	8.413
12/4/2018	12:22:19	20.935	0.12	89.51	8.414
12/4/2018	12:23:18	20.945	0.128	90.23	8.418
12/4/2018	12:24:19	20.943	0.127	90.67	8.417
Average	2883 sampl	20.95	0.118	83.79	8.42

Test Run 2 End

Test Run 3 Begin. STRATA Version 3.2.112

Operator: David Goshaw

Plant Name Enviva Greenwood

Location: DHM Stack

		O2 %	CO2 ppm	THC ppm
Start Averaging				
12/4/2018	13:04:58	20.913	0.113	63.32
12/4/2018	13:05:59	20.91	0.115	65.39
12/4/2018	13:06:59	20.914	0.115	67.18
12/4/2018	13:07:59	20.912	0.114	68.43
12/4/2018	13:08:59	20.911	0.115	69.45
12/4/2018	13:09:58	20.91	0.114	69.84
12/4/2018	13:10:59	20.91	0.115	71.47
12/4/2018	13:11:59	20.913	0.114	73.46
12/4/2018	13:12:59	20.908	0.115	74.62
12/4/2018	13:13:58	20.911	0.115	74.94
12/4/2018	13:14:58	20.909	0.115	75.8
12/4/2018	13:15:59	20.911	0.114	77.14
12/4/2018	13:16:58	20.909	0.113	78.77
12/4/2018	13:17:58	20.909	0.112	79.68
12/4/2018	13:18:59	20.912	0.112	80.79
12/4/2018	13:19:59	20.91	0.11	82.46
12/4/2018	13:20:59	20.91	0.112	82.64
12/4/2018	13:21:59	20.912	0.113	82.81
12/4/2018	13:22:58	20.906	0.112	83.72
12/4/2018	13:23:59	20.91	0.112	84.36
12/4/2018	13:24:59	20.909	0.11	85.39
12/4/2018	13:25:58	20.91	0.111	86.61
12/4/2018	13:26:59	20.908	0.108	87.65
12/4/2018	13:27:59	20.909	0.111	80.87
12/4/2018	13:28:59	20.909	0.111	73.9
12/4/2018	13:29:58	20.909	0.109	72.09
12/4/2018	13:30:58	20.905	0.113	72.6
12/4/2018	13:31:59	20.914	0.104	74.47
12/4/2018	13:32:59	20.92	0.096	76.04
12/4/2018	13:33:58	20.909	0.099	76.11
12/4/2018	13:34:59	20.916	0.093	76.63
12/4/2018	13:35:59	20.919	0.091	77.5
12/4/2018	13:36:59	20.917	0.092	79.64
12/4/2018	13:37:59	20.905	0.102	81.92
12/4/2018	13:38:58	20.899	0.105	83.1
12/4/2018	13:39:59	20.898	0.106	83.87
12/4/2018	13:40:59	20.9	0.104	85.59
12/4/2018	13:41:58	20.9	0.104	87.4
12/4/2018	13:42:59	20.898	0.104	90.23
12/4/2018	13:43:59	20.899	0.104	92.03
12/4/2018	13:44:59	20.9	0.105	92.96
12/4/2018	13:45:58	20.902	0.104	92.77
12/4/2018	13:46:59	20.905	0.105	92.59

Test Run 3 Begin. STRATA Version 3.2.112

Operator: David Goshaw

Plant Name Enviva Greenwood

Location: DHM Stack

		O2 %	CO2 ppm	THC ppm
12/4/2018	13:47:59	20.905	0.104	91.46
12/4/2018	13:48:58	20.903	0.105	90.04
12/4/2018	13:49:59	20.904	0.104	88.67
12/4/2018	13:50:59	20.905	0.105	87

Pause

12/4/2018	13:55:58	20.907	0.106	85.92
12/4/2018	13:56:59	20.905	0.105	86.93
End Pause				
12/4/2018	13:57:59	20.902	0.105	87.83
12/4/2018	13:58:58	20.906	0.105	89.97
12/4/2018	13:59:58	20.904	0.105	91.87
12/4/2018	14:00:59	20.905	0.105	92.4
12/4/2018	14:01:59	20.904	0.105	93.2
12/4/2018	14:02:58	20.902	0.105	93.25
12/4/2018	14:03:58	20.903	0.105	92.78
12/4/2018	14:04:59	20.904	0.105	91.38
12/4/2018	14:05:59	20.903	0.105	88.84
12/4/2018	14:06:58	20.902	0.105	86.69
12/4/2018	14:07:59	20.903	0.104	85.11
12/4/2018	14:08:59	20.903	0.105	84.56
12/4/2018	14:09:58	20.901	0.104	84.27
12/4/2018	14:10:59	20.9	0.105	84.3
12/4/2018	14:11:59	20.901	0.104	84.49

20.90691 0.107219 82.33109

Date	Form- aldehyde (ppm)	SEC (ppm)	HCI (ppm)	SEC (ppm)	Methanol (ppm)	SEC (ppm)	Acet- aldehyde (ppm)	SEC (ppm)
Run 1	0.146	0.063	0.124	0.056	0.771	0.217	0.258	0.180
	0.146		0.124		0.771		0.360	
Run 2	-0.014	0.075	0.065	0.056	1.067	0.205	0.299	0.189
	0.150		0.113		1.067		0.377	
12/4/2018 9:15	0.035	0.062	0.232	0.056	0.762	0.163	0.374	0.179
12/4/2018 9:16	0.106	0.052	0.164	0.055	0.536	0.14	0.277	0.172
12/4/2018 9:17	0.079	0.048	0.196	0.056	0.49	0.129	0.188	0.166
12/4/2018 9:18	0.028	0.049	0.155	0.049	0.524	0.13	0.139	0.164
12/4/2018 9:19	0.095	0.052	0.14	0.053	0.576	0.139	0.22	0.166
12/4/2018 9:20	0.14	0.057	0.126	0.054	0.644	0.148	0.278	0.176
12/4/2018 9:21	0.252	0.06	0.197	0.056	0.734	0.157	0.28	0.177
12/4/2018 9:22	0.272	0.062	0.269	0.058	0.773	0.164	0.257	0.179
12/4/2018 9:23	0.156	0.065	0.179	0.056	0.794	0.17	0.342	0.179
12/4/2018 9:24	0.111	0.066	0.059	0.053	0.852	0.175	0.393	0.178
12/4/2018 9:25	0.119	0.068	0.061	0.054	0.89	0.178	0.394	0.184
12/4/2018 9:26	0.126	0.071	0.147	0.06	0.906	0.18	0.324	0.185
12/4/2018 9:27	0.125	0.069	0.099	0.056	0.894	0.179	0.32	0.18
12/4/2018 9:28	0.11	0.067	0.162	0.056	0.844	0.174	0.227	0.177
12/4/2018 9:29	0.036	0.066	0.154	0.056	0.782	0.169	0.417	0.182
12/4/2018 9:30	0.069	0.061	0.173	0.054	0.695	0.156	0.163	0.178
12/4/2018 9:31	0.102	0.051	0.187	0.056	0.554	0.135	0.366	0.174
12/4/2018 9:32	0.188	0.049	0.161	0.054	0.478	0.128	0.28	0.17
12/4/2018 9:33	0.221	0.053	0.133	0.056	0.555	0.134	0.253	0.172
12/4/2018 9:34	0.178	0.054	0.158	0.055	0.615	0.142	0.215	0.173
12/4/2018 9:35	0.153	0.059	0.218	0.054	0.642	0.151	0.43	0.173
12/4/2018 9:36	0.147	0.062	0.163	0.057	0.726	0.158	0.262	0.182
12/4/2018 9:37	0.081	0.063	0.187	0.056	0.726	0.164	0.137	0.177
12/4/2018 9:38	0.075	0.066	0.069	0.055	0.796	0.17	0.288	0.183
12/4/2018 9:39	0.149	0.067	0.09	0.054	0.861	0.177	0.304	0.184
12/4/2018 9:40	0.108	0.068	0.071	0.057	0.894	0.181	0.303	0.181
12/4/2018 9:41	0.051	0.062	0.154	0.058	0.749	0.169	0.26	0.175
12/4/2018 9:42	0.137	0.049	0.21	0.054	0.487	0.138	0.24	0.172
12/4/2018 9:43	0.195	0.045	0.2	0.051	0.401	0.122	0.128	0.169
12/4/2018 9:44	0.281	0.048	0.088	0.055	0.387	0.117	0.371	0.165
12/4/2018 9:45	0.198	0.045	0.192	0.052	0.4	0.11	0.201	0.165
12/4/2018 9:46	0.129	0.048	0.176	0.055	0.455	0.114	0.115	0.169
12/4/2018 9:47	0.109	0.05	0.138	0.053	0.517	0.125	0.159	0.173
12/4/2018 9:48	0.081	0.052	0.172	0.053	0.581	0.138	0.313	0.172
12/4/2018 9:49	0.06	0.056	0.169	0.057	0.661	0.146	0.331	0.175
12/4/2018 9:50	0.007	0.052	0.157	0.053	0.557	0.129	0.363	0.169
12/4/2018 9:51								
12/4/2018 9:52								
12/4/2018 9:53	0.232	0.066	0.093	0.056	0.933	0.172	0.416	0.186
12/4/2018 9:54	0.36	0.067	0.119	0.058	0.962	0.175	0.532	0.183
12/4/2018 9:55	0.381	0.067	0.132	0.054	0.965	0.177	0.25	0.179
12/4/2018 9:56	0.237	0.069	0.128	0.058	0.939	0.18	0.476	0.185
12/4/2018 9:57	0.188	0.069	0.066	0.058	0.911	0.179	0.23	0.186
12/4/2018 9:58	0.083	0.07	0.129	0.057	0.967	0.182	0.465	0.185
12/4/2018 9:59	0.139	0.071	0.069	0.058	0.976	0.183	0.327	0.183

Date	Form- aldehyde (ppm)	SEC (ppm)	HCI (ppm)	SEC (ppm)	Methanol (ppm)	SEC (ppm)	Acet- aldehyde (ppm)	SEC (ppm)
12/4/2018 10:00	0.149	0.069	0.079	0.054	0.993	0.181	0.091	0.179
12/4/2018 10:01	0.091	0.072	0.04	0.056	0.997	0.184	0.116	0.186
12/4/2018 10:02	0.112	0.074	0.097	0.06	1.013	0.185	0.204	0.19
12/4/2018 10:03	0.165	0.074	0.077	0.057	1.029	0.188	0.44	0.189
12/4/2018 10:04	0.209	0.079	0.1	0.061	1.053	0.186	0.269	0.194
12/4/2018 10:05	0.283	0.075	0.045	0.058	1.04	0.189	0.387	0.192
12/4/2018 10:06	0.196	0.074	0.16	0.058	0.956	0.186	0.372	0.189
12/4/2018 10:07	0.202	0.07	0.077	0.058	0.894	0.176	0.447	0.188
12/4/2018 10:08	0.124	0.069	0.056	0.056	0.902	0.177	0.262	0.186
12/4/2018 10:09	0.125	0.072	0.051	0.059	0.905	0.178	0.322	0.187
12/4/2018 10:10	0.13	0.068	0.128	0.058	0.877	0.174	0.051	0.186
12/4/2018 10:11	0.07	0.069	0.179	0.058	0.874	0.171	0.137	0.187
12/4/2018 10:12	0.089	0.068	0.051	0.056	0.842	0.174	0.018	0.185
12/4/2018 10:13	0.08	0.07	0.137	0.054	0.873	0.176	0.225	0.185
12/4/2018 10:14	0.175	0.072	0.041	0.057	0.903	0.18	0.14	0.185
12/4/2018 10:15	0.245	0.073	0.089	0.059	0.891	0.181	0.213	0.189
12/4/2018 10:16	0.286	0.071	0.083	0.054	0.902	0.183	0.257	0.185
12/4/2018 10:17	0.206	0.071	0.063	0.057	0.903	0.183	0.231	0.188
12/4/2018 10:18	0.181	0.072	0.09	0.057	0.906	0.186	0.111	0.194
12/4/2018 10:19	0.145	0.074	0.029	0.058	0.966	0.187	0.066	0.185
12/4/2018 10:20	0.124	0.075	0.053	0.057	0.96	0.189	0.033	0.191
12/4/2018 10:21	0.15	0.077	0.055	0.06	0.994	0.188	0.056	0.195
12/4/2018 10:22	0.087	0.065	0.116	0.056	0.86	0.72	0.079	0.18
12/4/2018 10:23	0.05	0.028	0.073	0.036	-0.254	3.179	0.182	0.16
12/4/2018 11:18	0.057	0.061	0.047	0.057	0.764	0.151	0.151	0.181
12/4/2018 11:19	-0.063	0.064	0.118	0.058	0.757	0.154	0.206	0.184
12/4/2018 11:20	-0.016	0.063	0.142	0.056	0.771	0.157	0.161	0.177
12/4/2018 11:21	-0.054	0.066	0.132	0.053	0.826	0.161	0.246	0.18
12/4/2018 11:22	-0.055	0.067	0.078	0.056	0.874	0.165	0.059	0.183
12/4/2018 11:23	-0.016	0.068	0.073	0.057	0.886	0.165	0.204	0.188
12/4/2018 11:24	-0.052	0.066	0.007	0.056	0.876	0.168	0.15	0.183
12/4/2018 11:25	-0.013	0.07	0.055	0.058	0.854	0.166	0.396	0.188
12/4/2018 11:26	0.069	0.068	0.062	0.056	0.866	0.169	0.394	0.183
12/4/2018 11:27	0.079	0.068	0.077	0.057	0.884	0.169	0.219	0.184
12/4/2018 11:28	0.026	0.069	0.101	0.058	0.959	0.171	0.354	0.191
12/4/2018 11:29	-0.006	0.072	0.102	0.056	0.906	0.171	0.25	0.186
12/4/2018 11:30	0.026	0.071	0.115	0.057	0.911	0.172	0.137	0.188
12/4/2018 11:31	-0.014	0.072	0.035	0.059	0.965	0.174	0.288	0.193
12/4/2018 11:32	-0.103	0.071	0.069	0.054	0.972	0.176	0.353	0.187
12/4/2018 11:33	-0.083	0.074	0.028	0.057	0.993	0.176	0.336	0.188
12/4/2018 11:34	-0.029	0.073	0.092	0.056	0.975	0.175	0.254	0.186
12/4/2018 11:35	-0.016	0.076	0.078	0.058	1.054	0.176	0.294	0.192
12/4/2018 11:36	-0.003	0.074	0.052	0.053	1.081	0.177	0.399	0.189
12/4/2018 11:37	0.05	0.075	0.084	0.058	1.048	0.177	0.298	0.192
12/4/2018 11:38	0.006	0.075	0.146	0.053	1.062	0.177	0.406	0.188
12/4/2018 11:39	-0.051	0.073	0.032	0.054	1.125	0.18	0.475	0.186
12/4/2018 11:40	-0.047	0.076	-0.021	0.052	1.078	0.178	0.243	0.193
12/4/2018 11:41	-0.096	0.076	0.064	0.057	1.068	0.178	0.405	0.185
12/4/2018 11:42	-0.09	0.074	0.075	0.058	1.059	0.176	0.31	0.189
12/4/2018 11:43	-0.063	0.073	0.086	0.053	1.034	0.176	0.223	0.185
12/4/2018 11:44	-0.04	0.075	0.03	0.053	1.082	0.174	-0.016	0.186

Date	Form- aldehyde (ppm)	SEC (ppm)	HCI (ppm)	SEC (ppm)	Methanol (ppm)	SEC (ppm)	Acet- aldehyde (ppm)	SEC (ppm)
12/4/2018 11:45	0.011	0.074	0.072	0.059	1.042	0.176	0.147	0.196
12/4/2018 11:46	0.11	0.075	0.039	0.061	1.069	0.174	-0.137	0.197
12/4/2018 11:47	0.118	0.074	0.047	0.06	1.056	0.174	-0.121	0.196
12/4/2018 11:48	0.016	0.075	0.071	0.058	1.047	0.175	0.171	0.191
12/4/2018 11:49	-0.029	0.078	0.052	0.059	1.066	0.177	0.232	0.19
12/4/2018 11:50	-0.098	0.076	0.099	0.052	1.074	0.177	0.218	0.184
12/4/2018 11:51	-0.111	0.079	0.028	0.058	1.109	0.177	0.323	0.187
12/4/2018 11:52	-0.104	0.079	0.054	0.053	1.126	0.178	0.369	0.184
12/4/2018 11:53	-0.085	0.081	0.042	0.058	1.117	0.178	0.243	0.191
12/4/2018 11:54	-0.109	0.081	0.025	0.056	1.147	0.178	0.381	0.191
12/4/2018 11:55								
12/4/2018 11:56	0.195	0.07	0.088	0.06	1.105	0.168	0.521	0.183
12/4/2018 11:57	0.124	0.076	0.071	0.055	1.106	0.173	0.442	0.19
12/4/2018 11:58	0.038	0.078	0.141	0.057	1.167	0.176	0.423	0.189
12/4/2018 11:59	0.055	0.078	0.057	0.053	1.223	0.178	0.51	0.186
12/4/2018 12:00	-0.016	0.08	0.093	0.055	1.193	0.179	0.512	0.193
12/4/2018 12:01	-0.003	0.078	0.044	0.056	1.111	0.178	0.325	0.187
12/4/2018 12:03	-0.049	0.079	0.061	0.057	1.1	0.179	0.375	0.191
12/4/2018 12:04	-0.037	0.08	0.078	0.056	1.105	0.177	0.326	0.188
12/4/2018 12:05	-0.038	0.078	0.11	0.059	1.125	0.179	0.54	0.188
12/4/2018 12:06	0.036	0.081	0.072	0.055	1.135	0.18	0.435	0.185
12/4/2018 12:07	0.077	0.078	0.027	0.056	1.167	0.179	0.633	0.189
12/4/2018 12:08	0.035	0.079	0.067	0.055	1.138	0.178	0.51	0.189
12/4/2018 12:09	0.054	0.081	0.05	0.058	1.174	0.178	0.46	0.198
12/4/2018 12:10	-0.037	0.081	0.091	0.054	1.182	0.179	0.413	0.187
12/4/2018 12:11	-0.026	0.081	0.015	0.058	1.219	0.181	0.492	0.19
12/4/2018 12:12	-0.055	0.081	0.015	0.058	1.237	0.181	0.429	0.193
12/4/2018 12:13	-0.084	0.084	0.043	0.056	1.257	0.18	0.344	0.192
12/4/2018 12:14	-0.076	0.082	0.021	0.056	1.225	0.182	0.583	0.184
12/4/2018 12:15	-0.092	0.083	0.11	0.056	1.243	0.181	0.424	0.197
12/4/2018 12:16	0.003	0.08	0.027	0.053	1.257	0.181	0.289	0.189
12/4/2018 12:17	0.089	0.079	0.032	0.057	1.269	0.18	0.366	0.189
12/4/2018 12:18	0.092	0.078	0.056	0.054	1.266	0.182	0.316	0.184
12/4/2018 12:19	0.067	0.078	0.07	0.058	1.246	0.18	0.24	0.189
12/4/2018 12:20	-0.02	0.078	-0.002	0.06	1.25	0.18	0.358	0.194
12/4/2018 12:21	-0.016	0.08	0.101	0.059	1.27	0.178	0.032	0.195
12/4/2018 12:22	-0.081	0.08	0.077	0.059	1.228	0.18	-0.008	0.194
12/4/2018 12:23	-0.101	0.08	0.013	0.057	1.25	0.18	0.133	0.202
12/4/2018 12:24	-0.048	0.08	0.081	0.059	1.267	0.181	0.085	0.196
12/4/2018 12:25	-0.108	0.042	0.08	0.046	0.292	2.17	0.183	0.172

	Form- aldehyde (ppm)	SEC (ppm)	HCl (ppm)	SEC (ppm)	Methanol (ppm)	SEC (ppm)	acet- aldehyde (ppm)	SEC (ppm)
	-0.096	0.071	0.030	0.055	1.036	0.323	0.133	0.189
	0.142		0.110		1.036		0.379	
1:04 PM	-0.22	0.064	0.103	0.053	0.881	0.15	0.13	0.178
1:05 PM	-0.159	0.068	0.104	0.057	0.882	0.153	0.123	0.188
1:06 PM	-0.137	0.067	0.101	0.058	0.896	0.155	0.017	0.191
1:07 PM	-0.146	0.065	0.054	0.053	0.934	0.154	-0.152	0.181
1:08 PM	-0.076	0.065	0.067	0.054	0.933	0.156	-0.026	0.184
1:09 PM	0.003	0.068	0.112	0.061	0.879	0.153	0.02	0.191
1:10 PM	0.027	0.069	0.136	0.056	0.961	0.157	-0.028	0.187
1:11 PM	-0.01	0.069	0.123	0.056	0.984	0.158	0.247	0.188
1:12 PM	-0.098	0.07	0.058	0.06	1.012	0.163	0.048	0.191
1:13 PM	-0.104	0.071	0.061	0.06	1.027	0.164	0.043	0.196
1:14 PM	-0.129	0.072	0.147	0.057	1.021	0.168	0.174	0.193
1:15 PM	-0.138	0.073	0.028	0.057	1.026	0.168	0.131	0.19
1:16 PM	-0.126	0.072	0.101	0.057	1.072	0.172	0.192	0.187
1:17 PM	-0.185	0.071	0.056	0.055	1.078	0.172	0.095	0.182
1:18 PM	-0.122	0.073	0.075	0.057	1.097	0.174	0.072	0.19
1:19 PM	-0.054	0.075	0.06	0.054	1.11	0.174	0.17	0.189
1:20 PM	0.033	0.074	-0.01	0.053	1.121	0.172	0.212	0.191
1:21 PM	-0.044	0.075	0.063	0.057	1.127	0.175	-0.035	0.196
1:22 PM	-0.115	0.075	0.042	0.058	1.151	0.176	0.331	0.193
1:23 PM	-0.084	0.075	0.083	0.055	1.17	0.175	0.208	0.187
1:24 PM	-0.132	0.075	-0.007	0.058	1.152	0.176	0.45	0.196
1:25 PM	-0.179	0.077	0.019	0.058	1.229	0.177	0.299	0.193
1:26 PM	-0.129	0.075	0.015	0.058	1.18	0.175	0.097	0.192
1:27 PM	-0.123	0.069	0.003	0.056	1.069	0.168	-0.005	0.182
1:28 PM	-0.092	0.069	-0.003	0.059	1.028	0.164	0.024	0.19
1:29 PM	-0.077	0.069	0.015	0.057	1.008	0.163	0.295	0.19
1:30 PM	0.021	0.068	0.092	0.055	1.089	0.167	0.371	0.187
1:31 PM	0.004	0.071	0.027	0.058	1.129	0.168	0.044	0.189
1:32 PM	-0.082	0.069	0.059	0.06	1.179	0.17	0.03	0.196
1:33 PM	-0.17	0.072	0.111	0.056	1.183	0.173	0.046	0.19
1:34 PM	-0.121	0.073	0.055	0.057	1.16	0.173	0.023	0.191
1:35 PM	-0.103	0.073	0.098	0.057	1.151	0.174	0.029	0.187
1:36 PM	-0.166	0.074	0.073	0.056	1.136	0.175	0.068	0.19
1:37 PM	-0.147	0.074	0.052	0.057	1.206	0.174	0.085	0.191
1:38 PM	-0.124	0.076	0.022	0.06	1.169	0.177	-0.01	0.202
1:39 PM	-0.061	0.075	0.051	0.056	1.197	0.176	0.017	0.191
1:40 PM	0	0.075	0.028	0.056	1.196	0.178	-0.005	0.192
1:41 PM	0.029	0.079	0.081	0.059	1.23	0.178	-0.037	0.201
1:42 PM	-0.103	0.078	-0.026	0.055	1.247	0.18	0.1	0.193
1:43 PM	-0.11	0.079	0.031	0.057	1.282	0.18	0.021	0.194
1:44 PM	-0.095	0.08	0.021	0.057	1.283	0.181	0.059	0.196
1:45 PM	-0.153	0.08	0.008	0.057	1.269	0.181	0.071	0.189
1:46 PM	-0.175	0.08	-0.013	0.057	1.257	0.18	0.044	0.197
1:47 PM	-0.132	0.079	-0.032	0.055	1.227	0.182	0.105	0.191
1:48 PM	-0.102	0.079	-0.042	0.061	1.223	0.183	0.291	0.198
1:49 PM	-0.073	0.075	0.012	0.055	1.191	0.18	0.132	0.185
1:50 PM	-0.014	0.077	0.038	0.057	1.175	0.18	0.004	0.199
1:51 PM	-0.004	0.076	0.052	0.055	1.165	0.18	0.307	0.196
1:52 PM	-0.004	0.073	0.009	0.059	1.105	0.177	0.191	0.195
1:53 PM								

	Form- aldehyde (ppm)	SEC (ppm)	HCl (ppm)	SEC (ppm)	Methanol (ppm)	SEC (ppm)	acet- aldehyde (ppm)	SEC (ppm)
1:54 PM	-0.052	0.076	0.092	0.058	1.185	0.181	0.1	0.195
1:55 PM	-0.144	0.079	-0.012	0.057	1.172	0.183	0.121	0.195
1:56 PM	-0.126	0.077	0.006	0.056	1.188	0.182	0.173	0.189
1:57 PM	-0.129	0.079	-0.039	0.06	1.218	0.184	0.111	0.199
1:58 PM	-0.058	0.08	-0.019	0.057	1.233	0.184	0.396	0.196
1:59 PM	-0.035	0.081	0.009	0.057	1.272	0.185	0.085	0.196
2:00 PM	0.027	0.08	-0.01	0.058	1.308	0.185	0.425	0.201
2:01 PM	0.039	0.08	0.031	0.058	1.323	0.188	0.223	0.196
2:02 PM	0.017	0.081	-0.026	0.053	1.321	0.185	0.28	0.196
2:03 PM	-0.081	0.081	-0.028	0.057	1.273	0.186	0.32	0.197
2:04 PM	-0.089	0.077	0.001	0.057	1.298	0.185	0.14	0.195
2:05 PM	-0.134	0.076	-0.019	0.055	1.283	0.186	0.296	0.195
2:06 PM	-0.134	0.078	0.027	0.057	1.221	0.185	0.254	0.191
2:07 PM	-0.099	0.076	0.033	0.057	1.247	0.184	0.203	0.195
2:08 PM	-0.036	0.076	0.032	0.053	1.246	0.183	0.156	0.192
2:09 PM	0.065	0.077	0.054	0.058	1.253	0.184	0.315	0.194
2:10 PM	0.054	0.075	-0.035	0.053	1.276	0.186	0.209	0.192
2:11 PM	0.073	0.075	-0.029	0.054	1.286	0.185	0.088	0.191
2:12 PM	-0.044	0.041	0.04	0.045	0.307	2.087	-0.151	0.164
2:13 PM	-0.164	0.026	0.005	0.033	-0.319	3.134	0.054	0.152
2:14 PM	-0.211	0.026	0.005	0.034	-0.333	3.148	-0.136	0.152
2:15 PM	-0.181	0.027	-0.012	0.035	-0.36	3.136	0.012	0.152
2:16 PM	-0.385	0.043	-0.06	0.038	-0.137	0.802	0.268	0.167
2:17 PM	-0.497	0.052	-0.055	0.048	0.039	0.034	0.358	0.182
2:18 PM	-0.418	0.051	-0.142	0.044	0.192	0.036	0.376	0.18
2:19 PM	0.022	0.074	0.024	0.057	1.235	0.175	0.197	0.192

Date	Time	CTS Scan (pathlength)	SEC (ppm)	Cell Pressure (psi)	Cell Temp (deg C)	Deviation from Previous	Deviation from Average
4-Dec	0736	8.19	0.118	14.42	181	NA	0.1%
4-Dec	1459	8.1962	0.117	14.37	181	-0.1%	-0.1%
Average		8.191	0.118				

APPENDIX I-D
Methane Laboratory Report

Air Control Techniques, P.C.

301 East Durham Rd.
Cary, NC 27513

ENV – Greenwood
Project # 2333

Analytical Report
(1218-052)

EPA Method 18 (Bags)
Methane



Enthalpy Analytical, LLC

Phone: (919) 850 - 4392 / Fax: (919) 850 - 9012 / www.enthalpy.com
800-1 Capitola Drive Durham, NC 27713-4385

I certify that to the best of my knowledge all analytical data presented in this report:

- Have been checked for completeness
- Are accurate, error-free, and legible
- Have been conducted in accordance with approved protocol, and that all deviations and analytical problems are summarized in the appropriate narrative(s)

This analytical report was prepared in Portable Document Format (.PDF) and contains ??? pages.

Report Issued: xx/xx/xxxx



Summary of Results

Enthalpy Analytical

Company: Air Control Techniques PC

Job No.: 1218-052 EPA Method 18 (Bags)

Client No.: 2333

Summary Table - Methane

<u>Sample ID</u>	<i>S1-M18-1</i>	<i>S1-M18-2</i>	<i>S1-M18-3</i>
<u>Adjusted Concentration (ppm)</u>	1.14 J	1.14 J	1.54 J

Results

Enthalpy Analytical

Company: Air Control Techniques PC
Job No.: 1218-052 EPA Method 18 (Bags)
Client No.: 2333

Methane

Sample ID	Filename #1	Filename #2	Filename #3	Inj1DateTime	Analysis Method	Curve Min	Curve Max	MDL	Ret Time (min)	Ret Time (min)	Ret Time (min)	%dif RT	Conc #1	Conc #2	Conc #3	%dif conc	DF	Avg Conc ppm	Spike Rec %	Adj. Conc ppm	Flag
S1-M18-1 SP	022B0601.D	022B0602.D	022B0603.D	12-09-2018 14:20	BETTP773_C1-C6_XAS.M	5.00	49,920	0.816	1.38	1.38	1.38	0.0	13.6	13.3	13.1	1.7	1	13.3			
S1-M18-1	018B0101.D	018B0102.D	018B0103.D	12-07-2018 09:49	BETTP773_C1-C7.M	5.00	49,920	0.816	1.38	1.38	1.38	0.1	1.01	1.01	0.982	1.8	1	1.00	87.5%	1.14	J
S1-M18-2	028B0201.D	028B0202.D	028B0203.D	12-07-2018 10:52	BETTP773_C1-C7.M	5.00	49,920	0.816	1.38	1.38	1.38	0.0	0.994	0.998	1.01	1.0	1	1.00	87.5%	1.14	J
S1-M18-3	022B0301.D	022B0302.D	022B0303.D	12-07-2018 11:56	BETTP773_C1-C7.M	5.00	49,920	0.816	1.38	1.38	1.38	0.0	1.33	1.36	1.36	1.4	1	1.35	87.5%	1.54	J

Enthalpy Analytical

Company: Air Control Techniques PC

Job No.: 1218-052 EPA Method 18 (Bags)

Client No.: 2333

Spike Hold Times

Spiked Bag	Time Spiked	Spike Analyzed	Hold Time Hours	Related Bag	Related Bag Sampled Date	Bag Analyzed	Hold Time Hours
S1-M18-1 SP	12-07-2018 12:25	12-09-2018 14:20	49.9	S1-M18-1	12-05-2018 09:00	12-07-2018 09:49	48.8
				S1-M18-2	12-05-2018 11:00	12-07-2018 10:52	47.9
				S1-M18-3	12-05-2018 12:30	12-07-2018 11:56	47.4

Enthalpy Analytical

Company: Air Control Techniques PC

Job No.: 1218-052 EPA Method 18 (Bags)

Client No.: 2333

Spiked Bag

S1-M18-1 SP		Methane
Before Spiking	Inj1 (ppmv)	1.01
	Inj2 (ppmv)	1.01
	Inj3 (ppmv)	0.982
	Avg ppmv	1.00
	Bag vol L NTP	2.48
Gas Spike	Cylinder	CC703691
	Expires	3/21/21
	Press/Temp	764.8 / 68.0
	Vol (mL)	400
	Cyl Dil Factor	1
	Cyl Conc (ppmv)	102
	Vol (mL NTP)	403
		0.0411
Totals	Sp Bag Vol L NTP	2.88
	Corrected Initial (ppmv)	0.860
	Spike Amount (mL NTP)	0.0411
	Spike Amount (ppmv)	14.2
	Expected (ppmv)	15.1
Result	Inj1 (ppmv)	13.6
	Inj2 (ppmv)	13.3
	Inj3 (ppmv)	13.1
	Avg (ppmv)	13.3
Recovery		87.5%

Narrative Summary

Enthalpy Analytical Narrative Summary

Company	Air Control Techniques PC
Job #	1218-052 - EPA Method 18 (Bags)
Client #	2333

Custody	Matthew St. Lawrence of Enthalpy Analytical, LLC received the samples on 12/7/18 at ambient temperature after being relinquished by Air Control Techniques, PC. The samples were received in good condition. Prior to, during, and after analysis, the samples were kept under lock with access only to authorized personnel by Enthalpy Analytical, LLC.
Analysis	<p>The samples were analyzed for methane using the analytical procedures in EPA Method 18, Measurement of Gaseous Organic Compound Emissions by Gas Chromatography (40 CFR Part 60, Appendix A).</p> <p>The standards and samples were analyzed following the procedures specified in section 8.2.1, Integrated Bag Sampling and Analysis.</p> <p>All samples and standards were introduced directly to the column using an automated multi-port Valco gas sampling valve equipped with a stainless steel loop. Methane was referenced to certified gas phase standards.</p> <p>The analyses were performed using the Agilent Technologies Model 6890N Gas Chromatograph "Betty" (S/N US10430048) equipped with a Flame Ionization Detector.</p>
Calibration	<p>The calibration curves are located in the Raw Data section of this report and referenced in the Analysis Method column on the Detailed Results page.</p> <p>For each calibration curve used, the first page of the curve contains all method specific parameters (i.e., curve type, origin, weight, etc.) used to quantify the samples. The calibration curve section also includes a table with the Retention Time (RetTime), Level (Lvl), Amount (corresponding units), Area, Response Factor (Amt/Area) and the analyte Name. The calibration table is used to identify (by retention time) and quantify each target compound.</p>
Chromatographic Conditions	The acquisition method GC142P133_CAL.M is included in the Raw Data section of this report.

Enthalpy Analytical Narrative Summary

(continued)

QC Notes

As required by the method, a recovery study was performed on a bag sample. The bag sample *SI-M18-1* was spiked on 12/7/18 at 12:25 PM. The recovery efficiency value met the method-required limits of 70 to 130%. The recovery efficiency value was used to adjust the results following equation 18-7 of Method 18.

The analysis of the laboratory method blank did not contain methane at a concentration greater than the detection limit.

Reporting Notes

These analyses met the requirements of the TNI Standard. Any deviations from the requirements of the reference method or TNI Standard have been stated above.

The results presented in this report are representative of the samples as provided to the laboratory.

General Reporting Notes

The following are general reporting notes that are applicable to all Enthalpy Analytical, LLC data reports, unless specifically noted otherwise.

- Any analysis which refers to the method as “**Type**” represents a planned deviation from the reference method. For instance a Hydrogen Sulfide assay from a Tedlar bag would be labeled as “EPA Method 16-Type” because Tedlar bags are not mentioned as one of the collection options in EPA Method 16.
- The acronym **MDL** represents the Minimum Detection Limit. Below this value the laboratory cannot determine the presence of the analyte of interest reliably.
- The acronym **LOQ** represents the Limit of Quantification. Below this value the laboratory cannot quantitate the analyte of interest within the criteria of the method.
- The acronym **ND** following a value indicates a non-detect or analytical result below the MDL.
- The letter **J** in the Qualifier or Flag column in the results indicates that the value is between the MDL and the LOQ. The laboratory can positively identify the analyte of interest as present, but the value should be considered an estimate.
- The letter **E** in the Qualifier or Flag column indicates an analytical result exceeding 100% of the highest calibration point. The associated value should be considered as an estimate.
- Sample results are presented ‘as measured’ for single injection methodologies, or an average value if multiple injections are made. If all injections are below the MDL, the sample is considered non-detect and the ND value is presented. If one, but not all, are below the MDL, the MDL value is used for any injections that are below the MDL. For example, if the MDL is 0.500 and LOQ is 1.00, and the instrument measures 0.355, 0.620, and 0.442 - the result reported is the average of 0.500, 0.620, and 0.500 - - - i.e. 0.540 with a J flag.
- When a spike recovery (Bag Spike, Collocated Spike Train, or liquid matrix spike) is being calculated, the native (unspiked) sample result is used in the calculations, as long as the value is above the MDL. If a sample is ND, then 0 is used as the native amount (not the MDL value).
- The acronym **DF** represents Dilution Factor. This number represents dilution of the sample during the preparation and/or analysis process. The analytical result taken from a laboratory instrument is multiplied by the DF to determine the final undiluted sample results.
- The addition of **MS** to the Sample ID represents a Matrix Spike. An aliquot of an actual sample is spiked with a known amount of analyte so that a percent recovery value can be determined. The MS analysis indicates what effect the sample matrix may have on the target analyte, i.e. whether or not anything in the sample matrix interferes with the analysis of the analyte(s).



General Reporting Notes

(continued)

- The addition of **MSD** to the Sample ID represents a Matrix Spike Duplicate. Prepared in the same manner as a MS, the use of duplicate matrix spikes allows further confirmation of laboratory quality by showing the consistency of results gained by performing the same steps multiple times.
- The addition of **LD** to the Sample ID represents a Laboratory Duplicate. The analyst prepares an additional aliquot of sample for testing and the results of the duplicate analysis are compared to the initial result. The result should have a difference value of within 10% of the initial result (if the results of the original analysis are greater than the LOQ).
- The addition of **AD** to the Sample ID represents an Alternate Dilution. The analyst prepares an additional aliquot at a different dilution factor (usually double the initial factor). This analysis helps confirm that no additional compound is present and coeluting or sharing absorbance with the analyte of interest, as they would have a different response/absorbance than the analyte of interest.
- The Sample ID **LCS** represents a Laboratory Control Sample. Clean matrix, similar to the client sample matrix, prepared and analyzed by the laboratory using the same reagents, spiking standards and procedures used for the client samples. The LCS is used to assess the control of the laboratory's analytical system. Whenever spikes are prepared for our client projects, two spikes are retained as LCSs. The LCSs are labeled with the associated project number and kept in-house at the appropriate temperature conditions. When the project samples are received for analysis, the LCSs are analyzed to confirm that the analyte could be recovered from the media, separate from the samples which were used on the project and which may have been affected by source matrix, sample collection, and/or sample transport.
- **Significant Figures:** Where the reported value is much greater than unity (1.00) in the units expressed, the number is rounded to a whole number of units, rather than to 3 significant figures. For example, a value of 10,456.45 ug catch is rounded to 10,456 ug. There are five significant digits displayed, but no confidence should be placed on more than two significant digits. In the case of small numbers, generally 3 significant figures are presented, but still only 2 should be used with confidence. Many neat materials are only certified to 3 digits, and as the mathematically correct final result is always 1 digit less than all its pre-cursors - 2 significant figures are what are most defensible.
- **Manual Integration:** The data systems used for processing will flag manually integrated peaks with an "M". There are several reasons a peak may be manually integrated. These reasons will be identified by the following two letter designations on sample chromatograms, if provided in the report. The peak was *not integrated* by the software "**NI**", the peak was *integrated incorrectly* by the software "**II**" or the *wrong peak* was integrated by the software "**WP**". These codes will accompany the analyst's manual integration stamp placed next to the compound name on the chromatogram.

Sample Custody

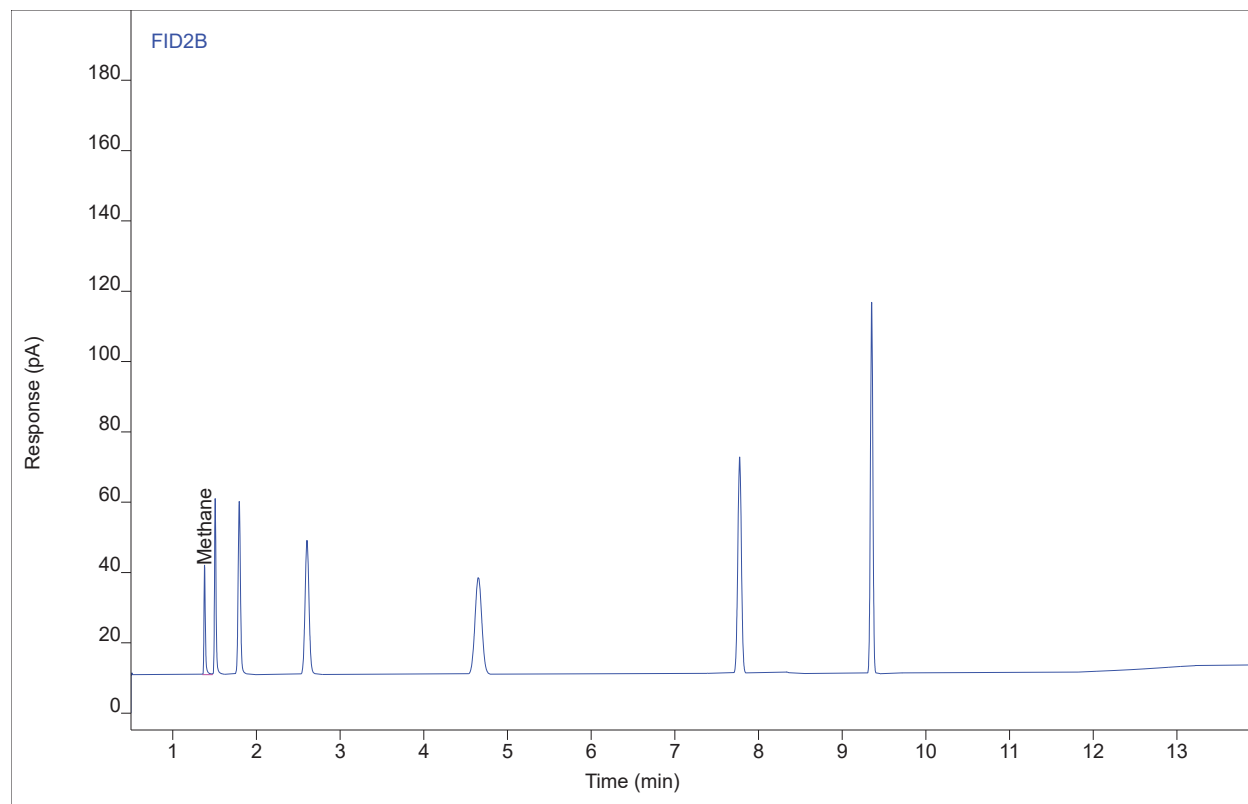
Raw Data

Chromatogram Report

Sample Name BettyP919 #C4 ENV(1=0,4=400)
Sequence Name BETTYP972A ver.3
Inj Data File 025B1001.D
File Location GC/2018/Betty/Quarter 4
Injection Date 12/7/2018 8:04 AM
File Modified 12/7/2018 10:03 AM
Instrument
Operator Justin Guenzler

Enthalpy Analytical

Sample Type Calibration
Vial Number Vial 25
Injection Volume 250
Injection 1 of 3
Acquisition Method GC142P133_CAL.M
Analysis Method BETTYP773_C1-C6_XAS.M
Method Modified 12/5/2018 7:48 AM
Printed 12/11/2018 3:48 PM



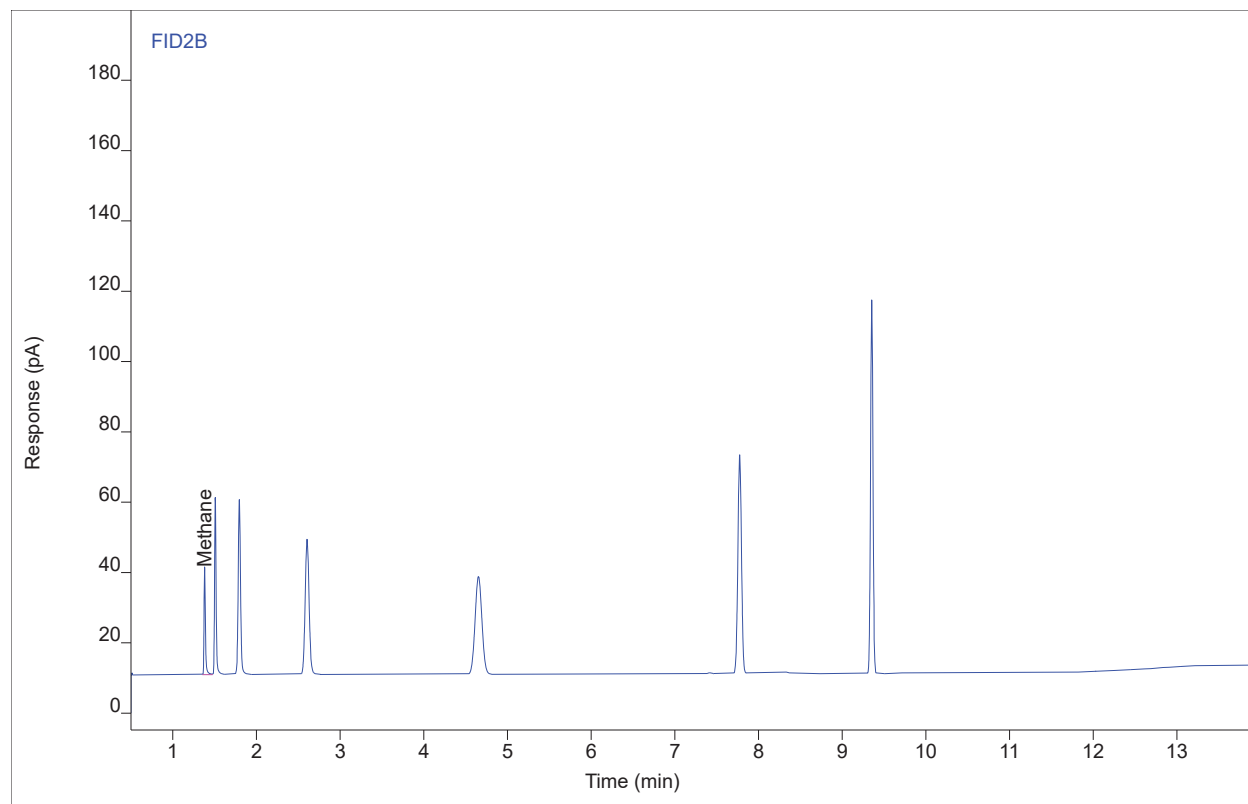
Compound	Type	RT	Area	Height	Amount	DF	SampAmt	Unit
Methane	BV	1.38	36.3358	31.0564	102.866	1	102.866	ppm

Chromatogram Report

Sample Name BettyP919 #C4 ENV(1=0,4=400)
Sequence Name BETTYP972A ver.3
Inj Data File 025B1002.D
File Location GC/2018/Betty/Quarter 4
Injection Date 12/7/2018 8:28 AM
File Modified 12/7/2018 10:03 AM
Instrument
Operator Justin Guenzler

Enthalpy Analytical

Sample Type Calibration
Vial Number Vial 25
Injection Volume 250
Injection 2 of 3
Acquisition Method GC142P133_CAL.M
Analysis Method BETTYP773_C1-C6_XAS.M
Method Modified 12/5/2018 7:48 AM
Printed 12/11/2018 3:48 PM



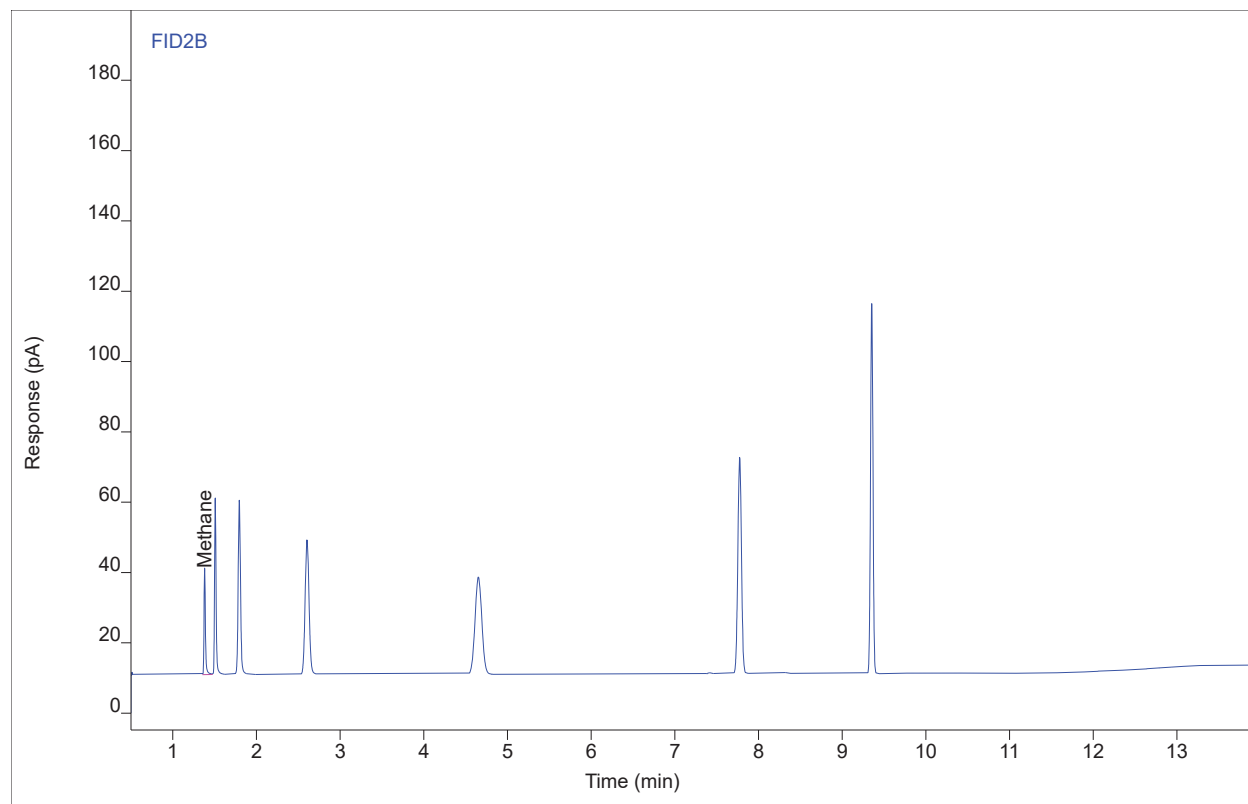
Compound	Type	RT	Area	Height	Amount	DF	SampAmt	Unit
Methane	BV	1.38	35.8488	30.6070	101.483	1	101.483	ppm

Chromatogram Report

Sample Name BettyP919 #C4 ENV(1=0,4=400)
Sequence Name BETTYP972A ver.3
Inj Data File 025B1003.D
File Location GC/2018/Betty/Quarter 4
Injection Date 12/7/2018 8:53 AM
File Modified 12/7/2018 10:03 AM
Instrument
Operator Justin Guenzler

Enthalpy Analytical

Sample Type Calibration
Vial Number Vial 25
Injection Volume 250
Injection 3 of 3
Acquisition Method GC142P133_CAL.M
Analysis Method BETTYP773_C1-C6_XAS.M
Method Modified 12/5/2018 7:48 AM
Printed 12/11/2018 3:48 PM



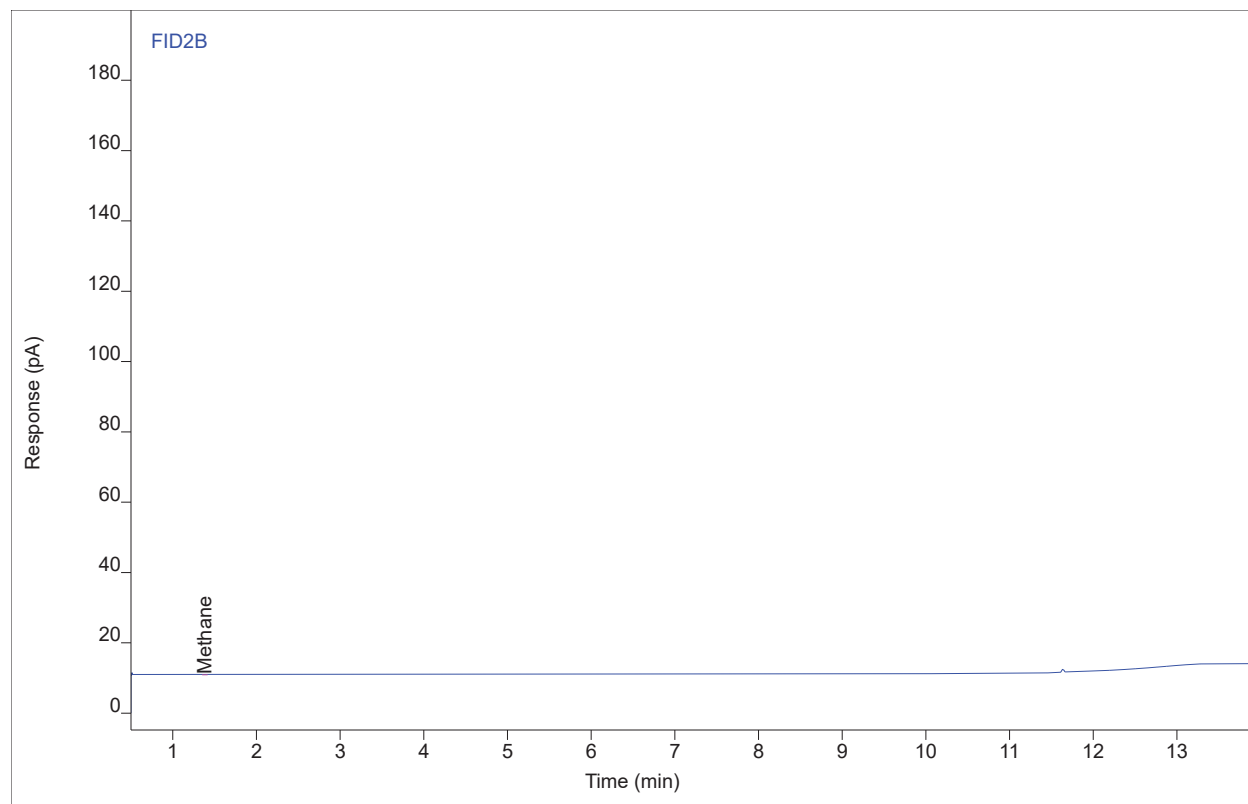
Compound	Type	RT	Area	Height	Amount	DF	SampAmt	Unit
Methane	BV	1.38	35.3424	30.2869	100.046	1	100.046	ppm

Chromatogram Report

Sample Name 1218-052.S1-M18-1.Bag
Sequence Name BETTYP973 ver.1
Inj Data File 018B0101.D
File Location GC/2018/Betty/Quarter 4
Injection Date 12/7/2018 9:49 AM
File Modified 12/8/2018 12:52 PM
Instrument
Operator Justin Guenzler

Enthalpy Analytical

Sample Type Sample
Vial Number Vial 18
Injection Volume 250
Injection 1 of 3
Acquisition Method GC142P133_CAL.M
Analysis Method BETTYP773_C1-C7.M
Method Modified 11/29/2018 8:27 AM
Printed 12/11/2018 3:48 PM



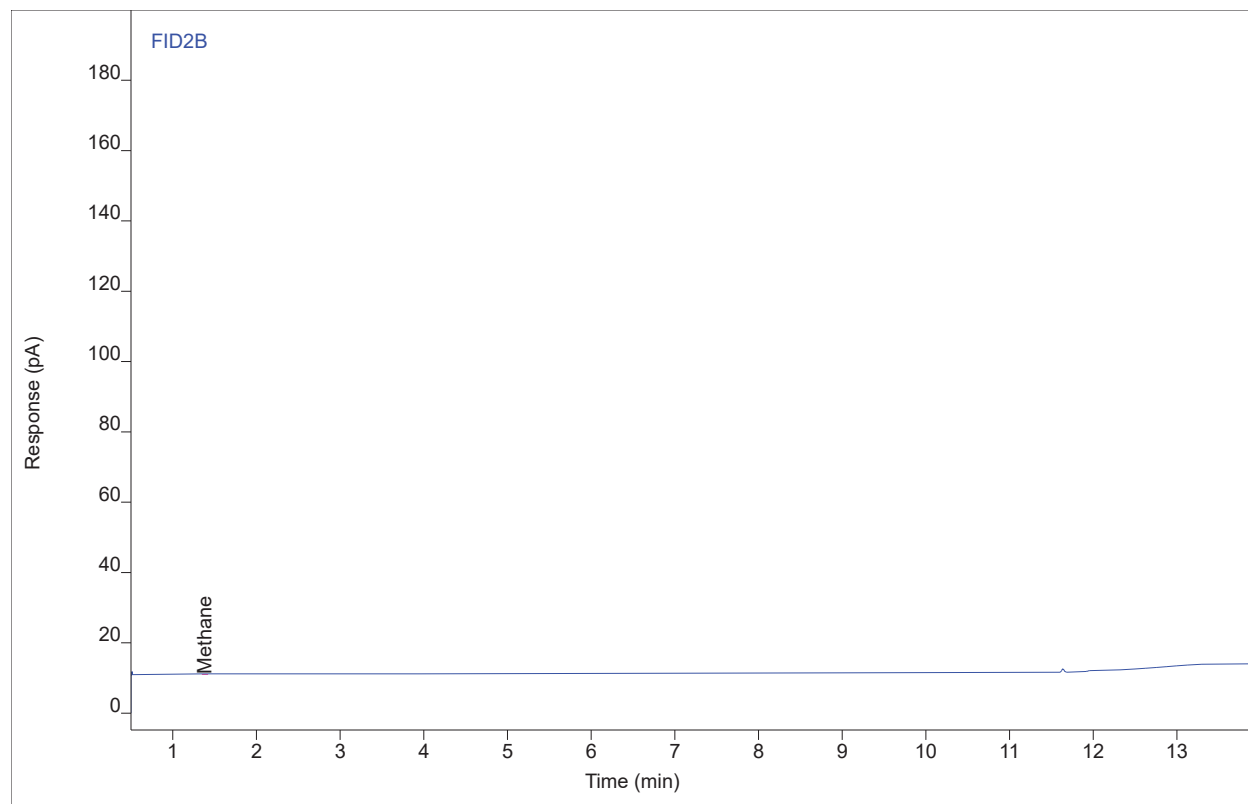
Compound	Type	RT	Area	Height	Amount	DF	SampAmt	Unit
Methane	BP	1.38	0.37460	0.25832	1.00827	1	1.00827	ppm

Chromatogram Report

Sample Name 1218-052.S1-M18-1.Bag
Sequence Name BETTYP973 ver.1
Inj Data File 018B0102.D
File Location GC/2018/Betty/Quarter 4
Injection Date 12/7/2018 10:10 AM
File Modified 12/8/2018 12:52 PM
Instrument
Operator Justin Guenzler

Enthalpy Analytical

Sample Type Sample
Vial Number Vial 18
Injection Volume 250
Injection 2 of 3
Acquisition Method GC142P133_CAL.M
Analysis Method BETTYP773_C1-C7.M
Method Modified 11/29/2018 8:27 AM
Printed 12/11/2018 3:48 PM



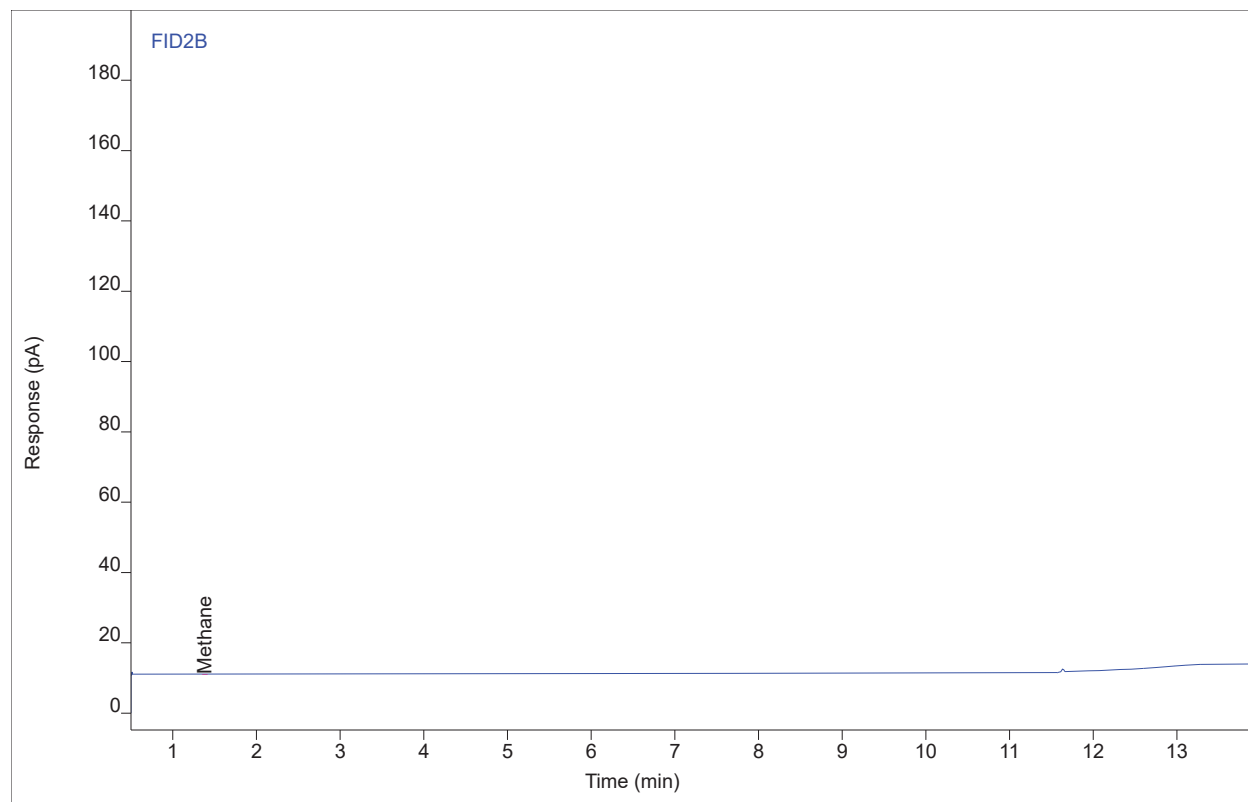
Compound	Type	RT	Area	Height	Amount	DF	SampAmt	Unit
Methane	BB	1.38	0.37466	0.26582	1.00845	1	1.00845	ppm

Chromatogram Report

Sample Name 1218-052.S1-M18-1.Bag
Sequence Name BETTYP973 ver.1
Inj Data File 018B0103.D
File Location GC/2018/Betty/Quarter 4
Injection Date 12/7/2018 10:31 AM
File Modified 12/8/2018 12:52 PM
Instrument
Operator Justin Guenzler

Enthalpy Analytical

Sample Type Sample
Vial Number Vial 18
Injection Volume 250
Injection 3 of 3
Acquisition Method GC142P133_CAL.M
Analysis Method BETTYP773_C1-C7.M
Method Modified 11/29/2018 8:27 AM
Printed 12/11/2018 3:48 PM



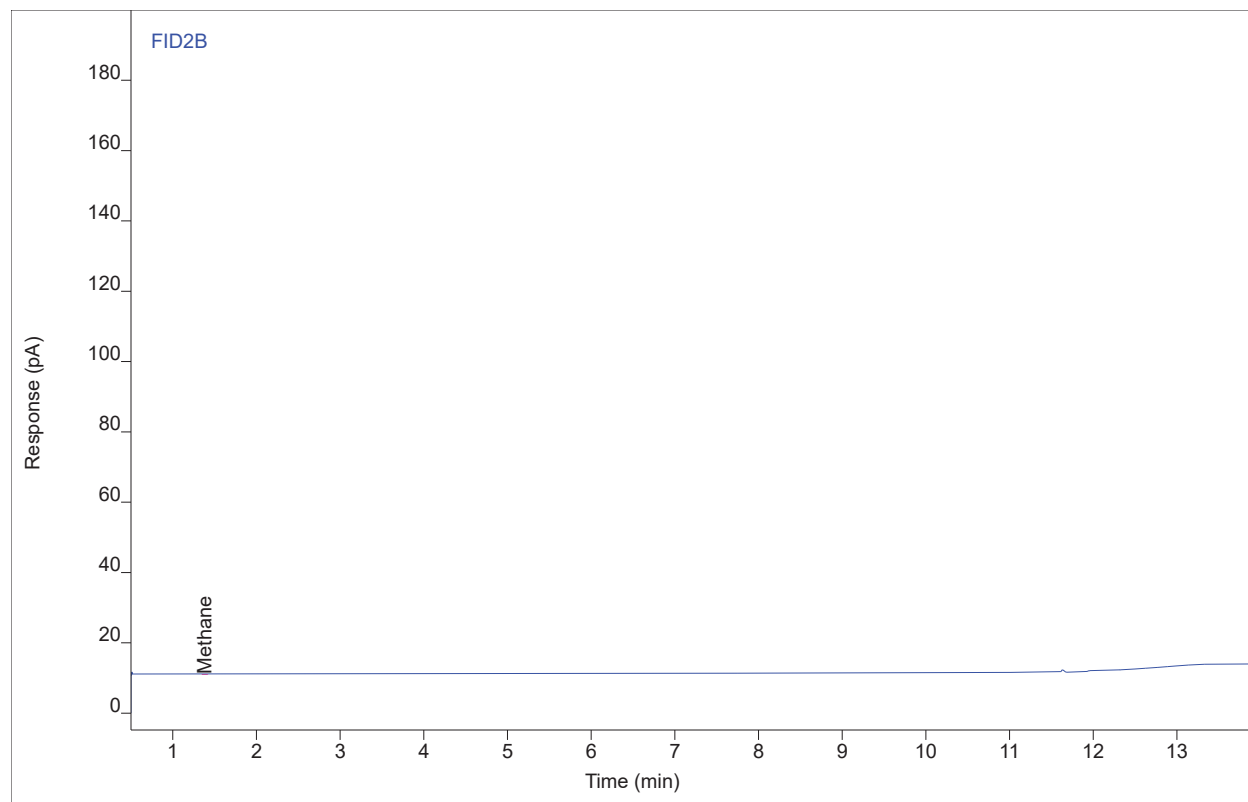
Compound	Type	RT	Area	Height	Amount	DF	SampAmt	Unit
Methane	BP	1.38	0.36487	0.26314	0.98210	1	0.98210	ppm

Chromatogram Report

Sample Name 1218-052.S1-M18-2.Bag
Sequence Name BETTYP973 ver.1
Inj Data File 028B0201.D
File Location GC/2018/Betty/Quarter 4
Injection Date 12/7/2018 10:52 AM
File Modified 12/8/2018 12:52 PM
Instrument
Operator Justin Guenzler

Enthalpy Analytical

Sample Type Sample
Vial Number Vial 28
Injection Volume 250
Injection 1 of 3
Acquisition Method GC142P133_CAL.M
Analysis Method BETTYP773_C1-C7.M
Method Modified 11/29/2018 8:27 AM
Printed 12/11/2018 3:48 PM



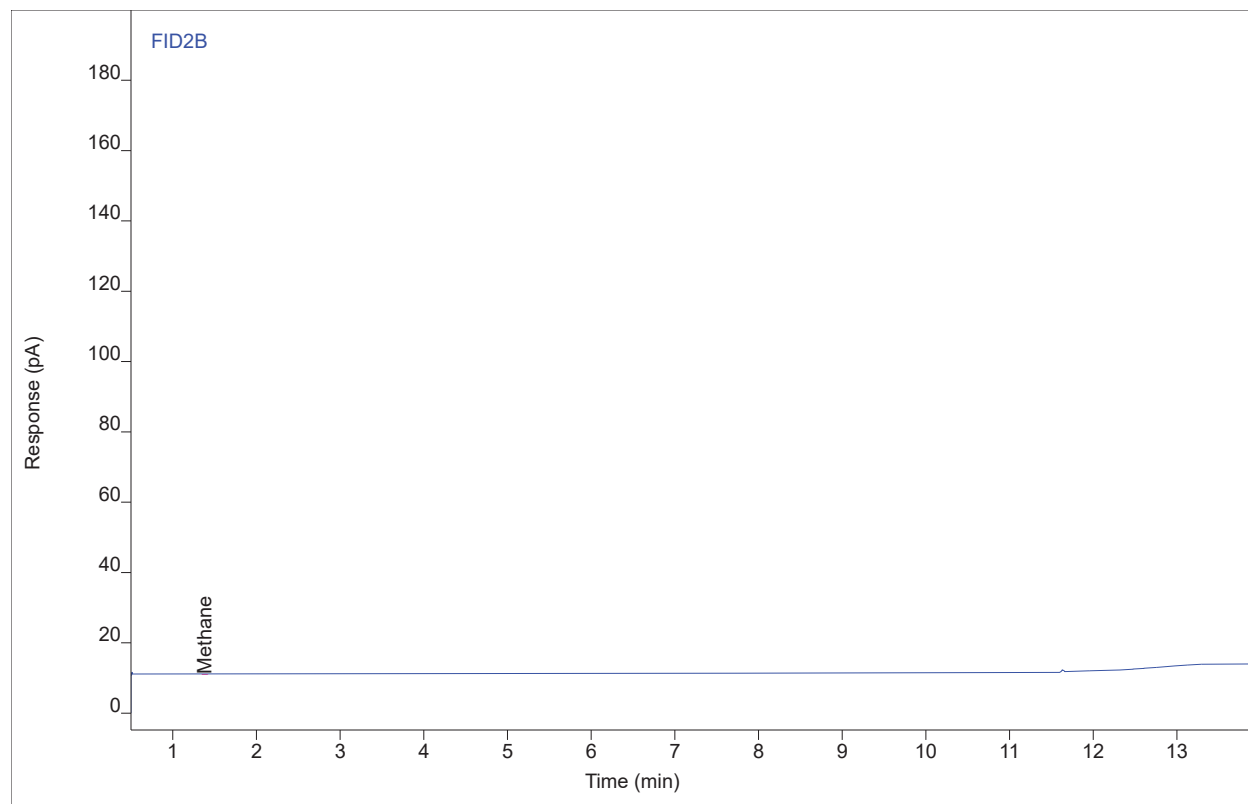
Compound	Type	RT	Area	Height	Amount	DF	SampAmt	Unit
Methane	BB	1.38	0.36927	0.25297	0.99394	1	0.99394	ppm

Chromatogram Report

Sample Name 1218-052.S1-M18-2.Bag
Sequence Name BETTYP973 ver.1
Inj Data File 028B0202.D
File Location GC/2018/Betty/Quarter 4
Injection Date 12/7/2018 11:13 AM
File Modified 12/8/2018 12:52 PM
Instrument
Operator Justin Guenzler

Enthalpy Analytical

Sample Type Sample
Vial Number Vial 28
Injection Volume 250
Injection 2 of 3
Acquisition Method GC142P133_CAL.M
Analysis Method BETTYP773_C1-C7.M
Method Modified 11/29/2018 8:27 AM
Printed 12/11/2018 3:48 PM



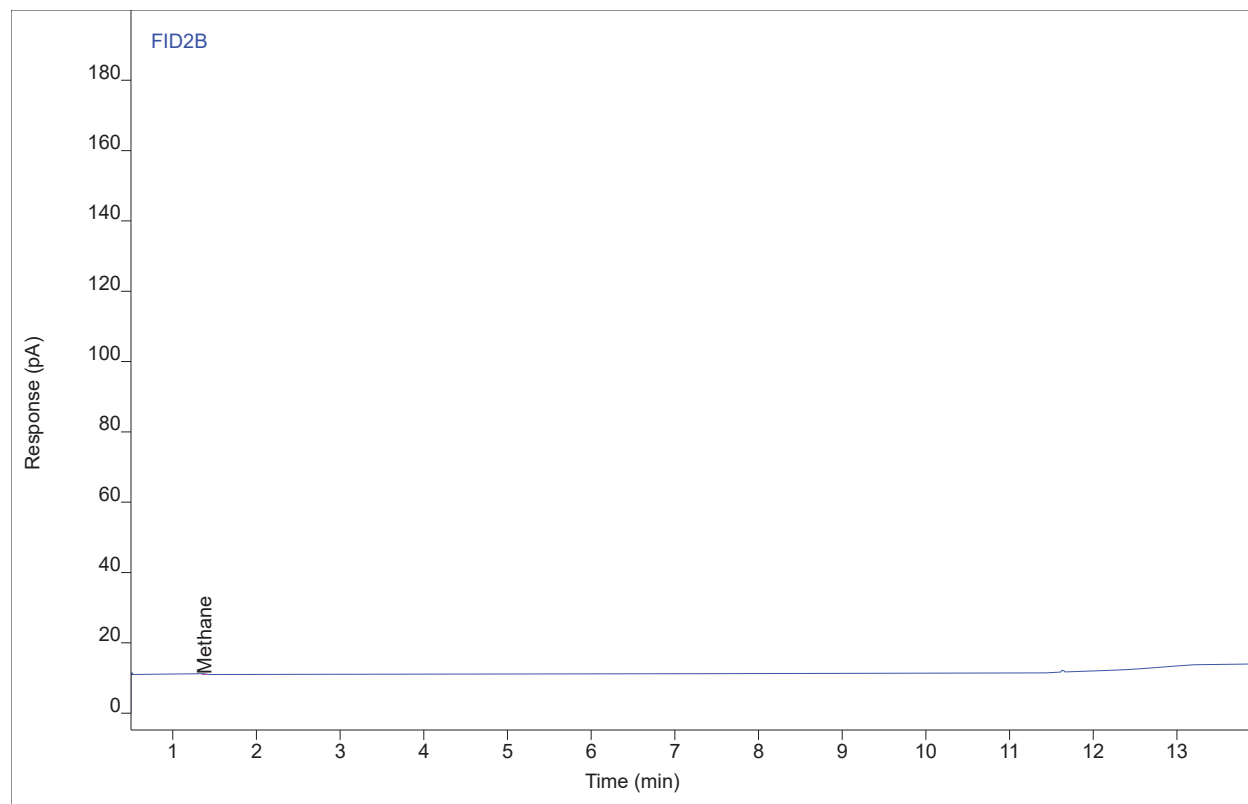
Compound	Type	RT	Area	Height	Amount	DF	SampAmt	Unit
Methane	BB	1.38	0.37092	0.24652	0.99837	1	0.99837	ppm

Chromatogram Report

Sample Name 1218-052.S1-M18-2.Bag
Sequence Name BETTYP973 ver.1
Inj Data File 028B0203.D
File Location GC/2018/Betty/Quarter 4
Injection Date 12/7/2018 11:35 AM
File Modified 12/8/2018 12:52 PM
Instrument
Operator Justin Guenzler

Enthalpy Analytical

Sample Type Sample
Vial Number Vial 28
Injection Volume 250
Injection 3 of 3
Acquisition Method GC142P133_CAL.M
Analysis Method BETTYP773_C1-C7.M
Method Modified 11/29/2018 8:27 AM
Printed 12/11/2018 3:48 PM



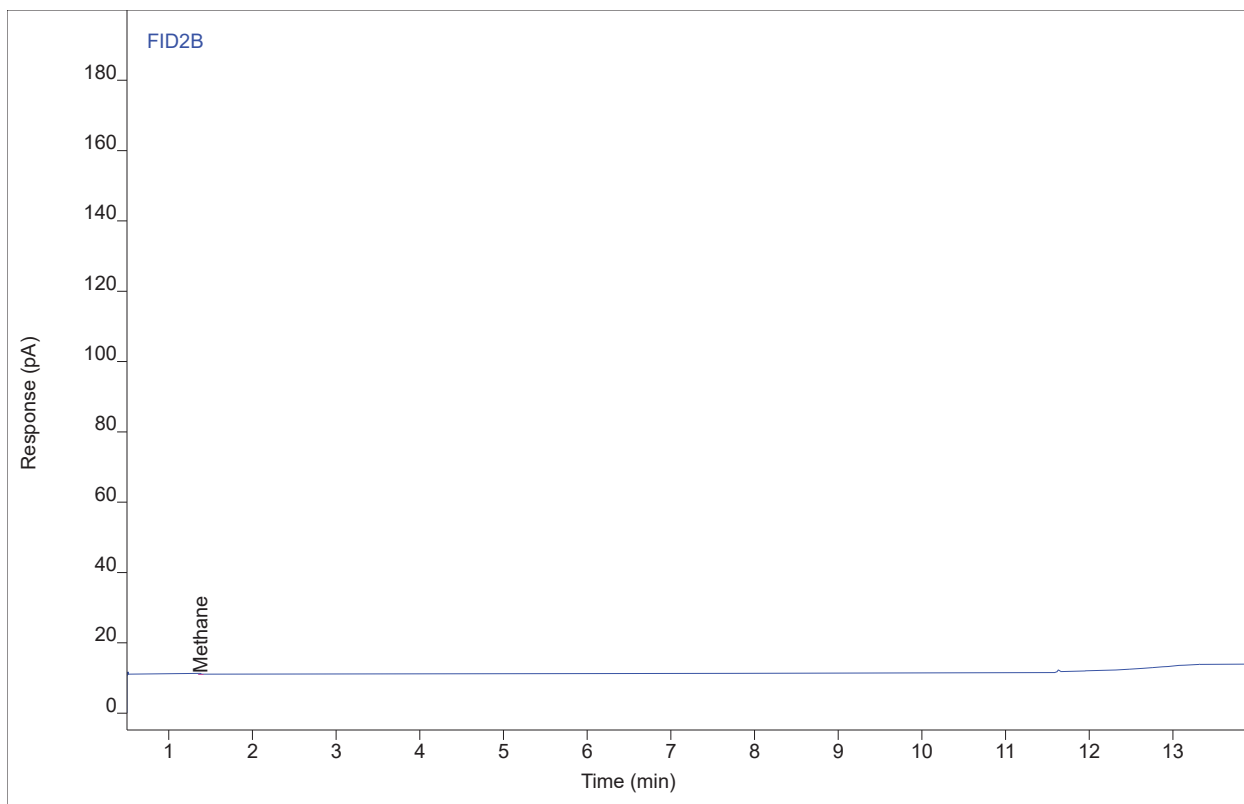
Compound	Type	RT	Area	Height	Amount	DF	SampAmt	Unit
Methane	BB	1.38	0.37563	0.24302	1.01105	1	1.01105	ppm

Chromatogram Report

Sample Name 1218-052.S1-M18-3.Bag
Sequence Name BETTYP973 ver.1
Inj Data File 022B0301.D
File Location GC/2018/Betty/Quarter 4
Injection Date 12/7/2018 11:56 AM
File Modified 12/8/2018 12:52 PM
Instrument
Operator Justin Guenzler

Enthalpy Analytical

Sample Type Sample
Vial Number Vial 22
Injection Volume 250
Injection 1 of 3
Acquisition Method GC142P133_CAL.M
Analysis Method BETTYP773_C1-C7.M
Method Modified 11/29/2018 8:27 AM
Printed 12/11/2018 3:48 PM



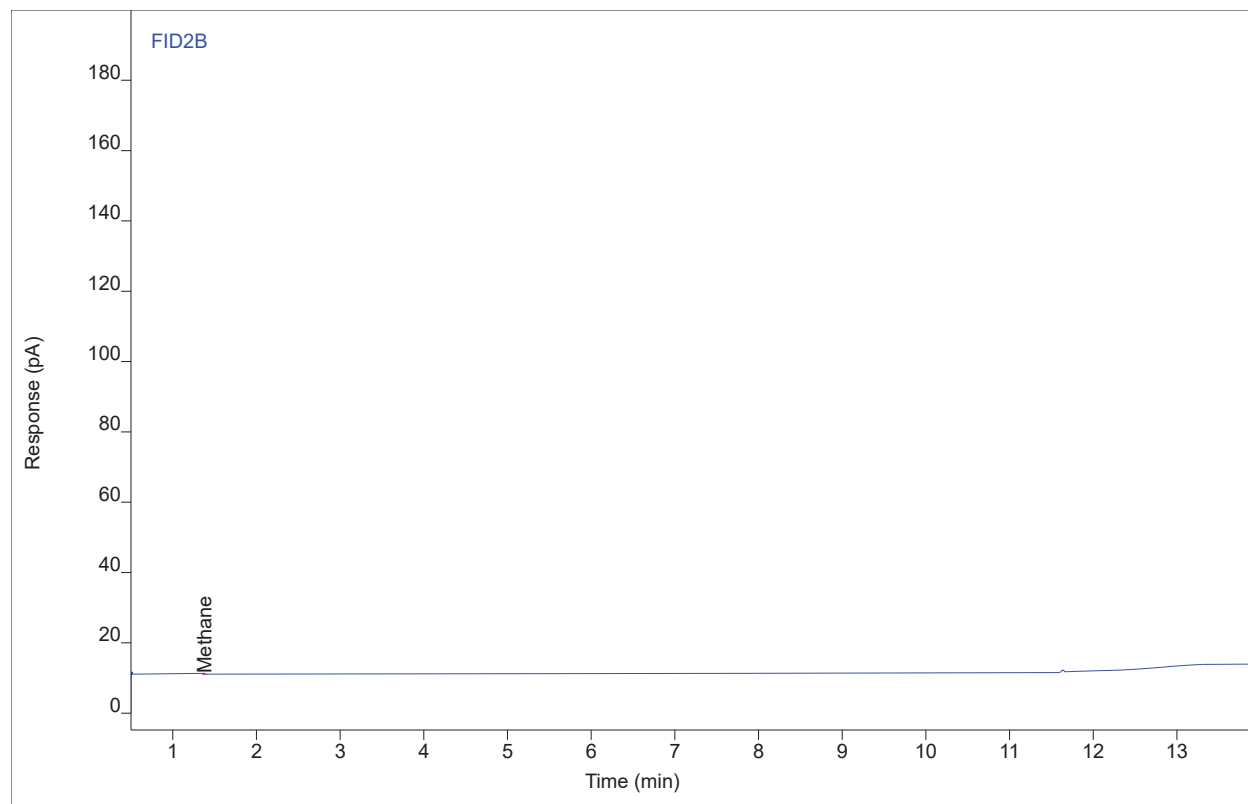
Compound	Type	RT	Area	Height	Amount	DF	SampAmt	Unit
Methane	BB	1.38	0.49498	0.37440	1.33229	1	1.33229	ppm

Chromatogram Report

Sample Name 1218-052.S1-M18-3.Bag
Sequence Name BETTYP973 ver.1
Inj Data File 022B0302.D
File Location GC/2018/Betty/Quarter 4
Injection Date 12/7/2018 12:17 PM
File Modified 12/8/2018 12:52 PM
Instrument
Operator Justin Guenzler

Enthalpy Analytical

Sample Type Sample
Vial Number Vial 22
Injection Volume 250
Injection 2 of 3
Acquisition Method GC142P133_CAL.M
Analysis Method BETTYP773_C1-C7.M
Method Modified 11/29/2018 8:27 AM
Printed 12/11/2018 3:48 PM



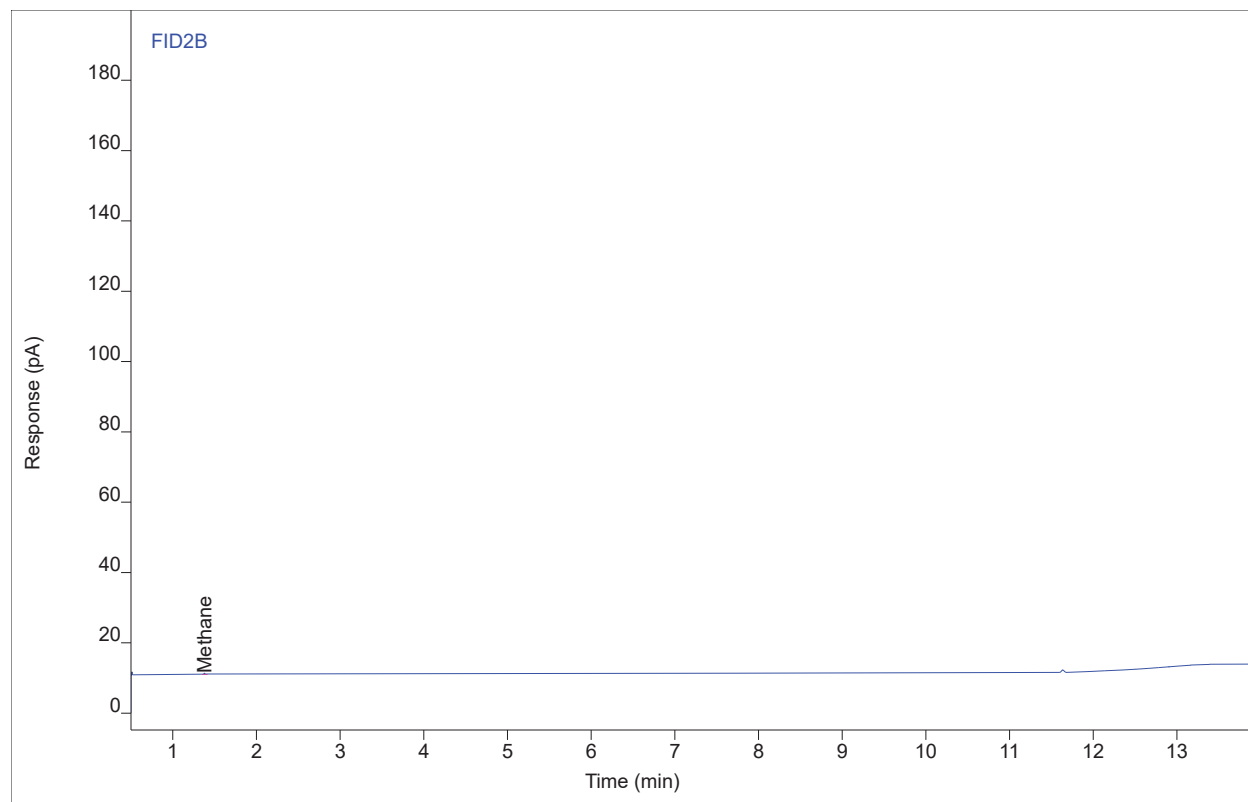
Compound	Type	RT	Area	Height	Amount	DF	SampAmt	Unit
Methane	BB	1.38	0.50399	0.37497	1.35655	1	1.35655	ppm

Chromatogram Report

Sample Name 1218-052.S1-M18-3.Bag
Sequence Name BETTYP973 ver.1
Inj Data File 022B0303.D
File Location GC/2018/Betty/Quarter 4
Injection Date 12/7/2018 12:38 PM
File Modified 12/8/2018 12:52 PM
Instrument
Operator Justin Guenzler

Enthalpy Analytical

Sample Type Sample
Vial Number Vial 22
Injection Volume 250
Injection 3 of 3
Acquisition Method GC142P133_CAL.M
Analysis Method BETTYP773_C1-C7.M
Method Modified 11/29/2018 8:27 AM
Printed 12/11/2018 3:48 PM



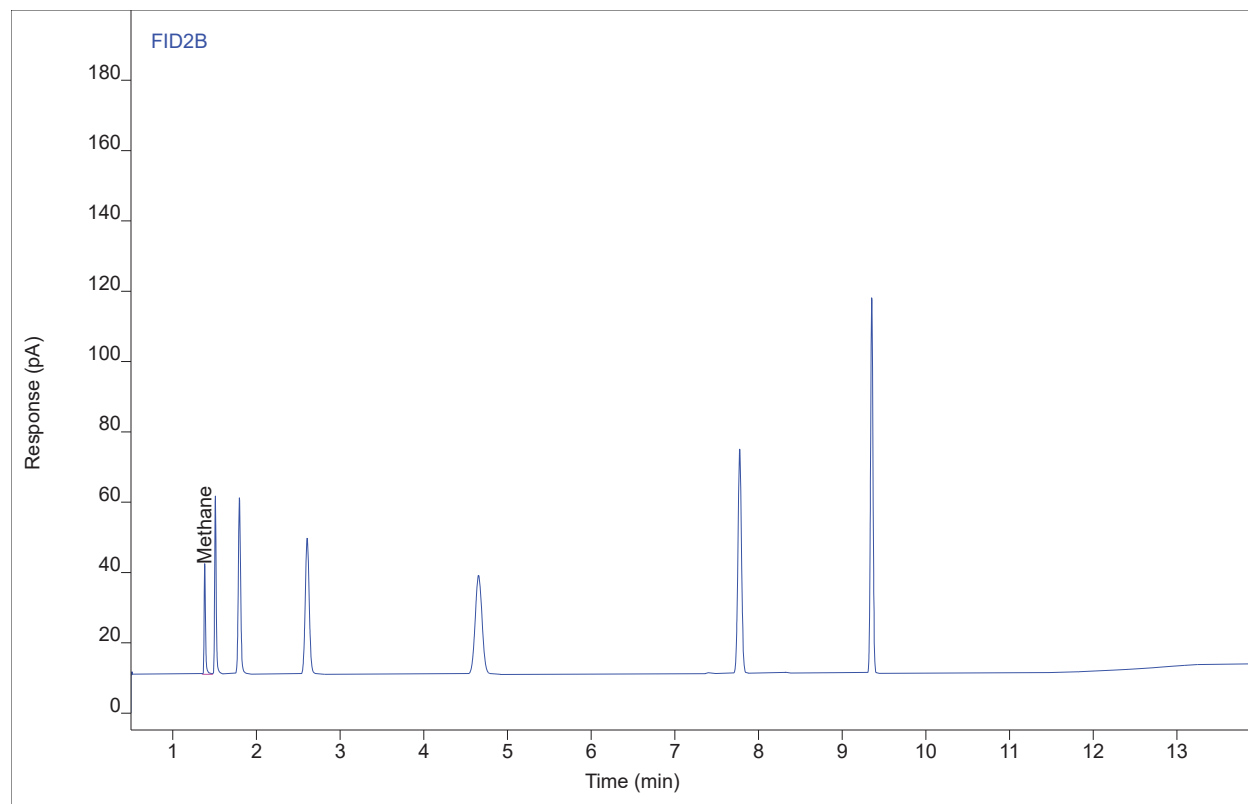
Compound	Type	RT	Area	Height	Amount	DF	SampAmt	Unit
Methane	BB	1.38	0.50690	0.38260	1.36439	1	1.36439	ppm

Chromatogram Report

Sample Name BettyP919 #C4 ENV(1=0,4=400)
Sequence Name BETTYP973 ver.1
Inj Data File 025B0701.D
File Location GC/2018/Betty/Quarter 4
Injection Date 12/8/2018 11:21 AM
File Modified 12/8/2018 12:53 PM
Instrument
Operator Nicholas Traversa

Enthalpy Analytical

Sample Type Calibration
Vial Number Vial 25
Injection Volume 250
Injection 1 of 3
Acquisition Method GC142P133_CAL.M
Analysis Method BETTYP773_C1-C7.M
Method Modified 11/29/2018 8:27 AM
Printed 12/11/2018 3:48 PM



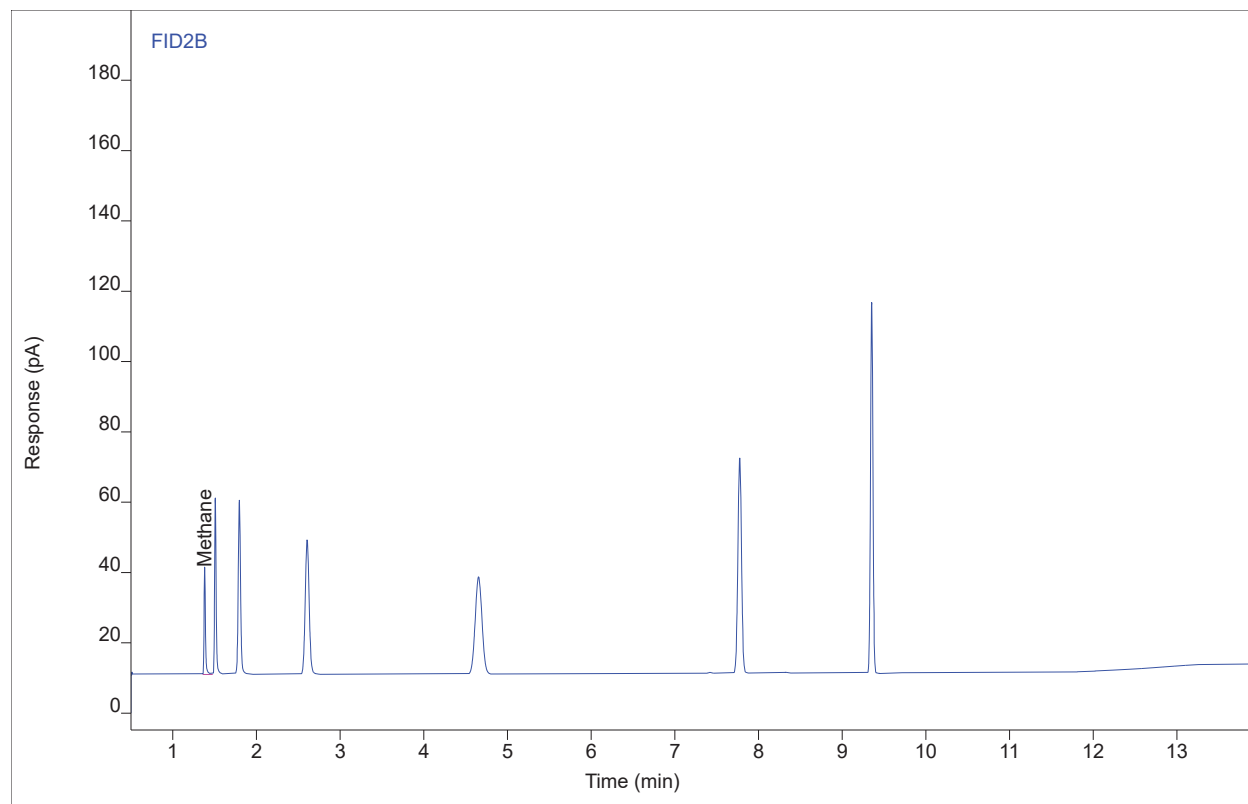
Compound	Type	RT	Area	Height	Amount	DF	SampAmt	Unit
Methane	BV	1.38	36.9312	31.3982	104.556	1	104.556	ppm

Chromatogram Report

Sample Name BettyP919 #C4 ENV(1=0,4=400)
Sequence Name BETTYP973 ver.1
Inj Data File 025B0702.D
File Location GC/2018/Betty/Quarter 4
Injection Date 12/8/2018 11:45 AM
File Modified 12/8/2018 12:53 PM
Instrument
Operator Nicholas Traversa

Enthalpy Analytical

Sample Type Calibration
Vial Number Vial 25
Injection Volume 250
Injection 2 of 3
Acquisition Method GC142P133_CAL.M
Analysis Method BETTYP773_C1-C7.M
Method Modified 11/29/2018 8:27 AM
Printed 12/11/2018 3:48 PM



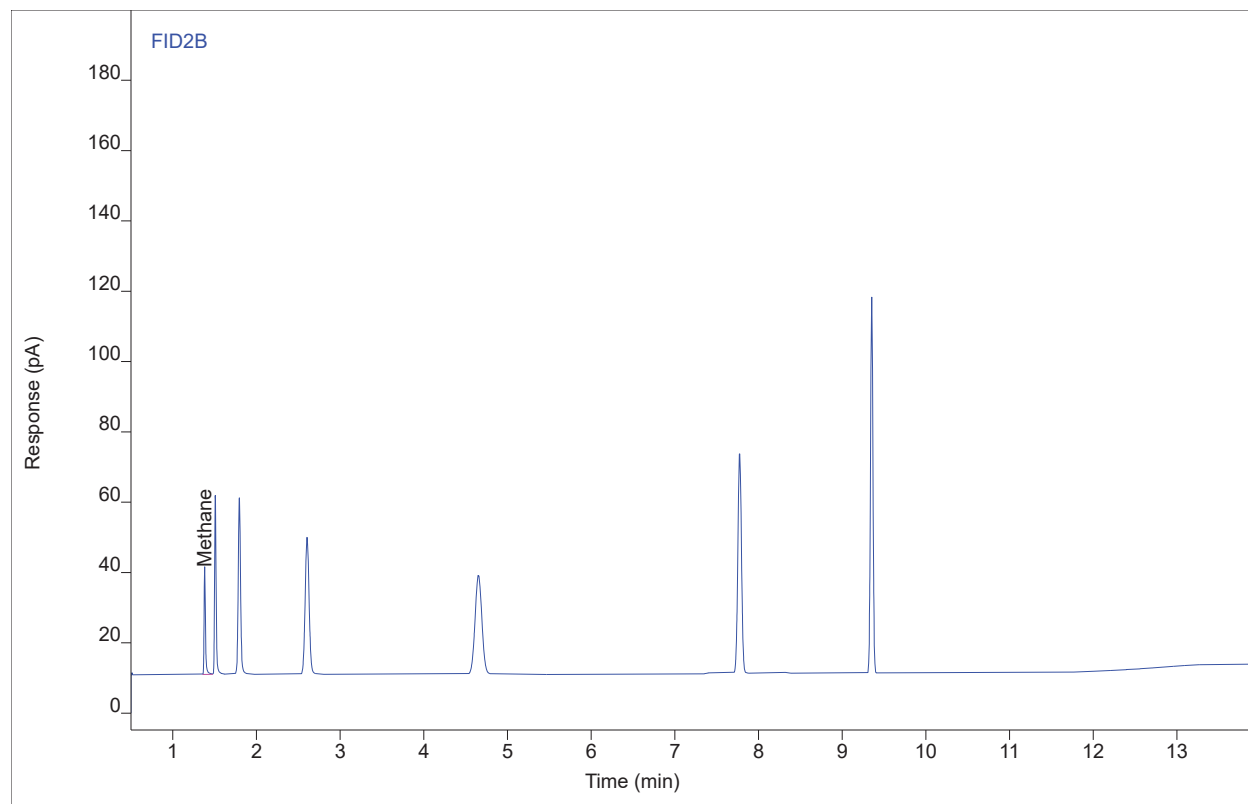
Compound	Type	RT	Area	Height	Amount	DF	SampAmt	Unit
Methane	BV	1.38	35.6187	30.5179	100.830	1	100.830	ppm

Chromatogram Report

Sample Name BettyP919 #C4 ENV(1=0,4=400)
Sequence Name BETTYP973 ver.1
Inj Data File 025B0703.D
File Location GC/2018/Betty/Quarter 4
Injection Date 12/8/2018 12:09 PM
File Modified 12/8/2018 12:53 PM
Instrument
Operator Nicholas Traversa

Enthalpy Analytical

Sample Type Calibration
Vial Number Vial 25
Injection Volume 250
Injection 3 of 3
Acquisition Method GC142P133_CAL.M
Analysis Method BETTYP773_C1-C7.M
Method Modified 11/29/2018 8:27 AM
Printed 12/11/2018 3:48 PM



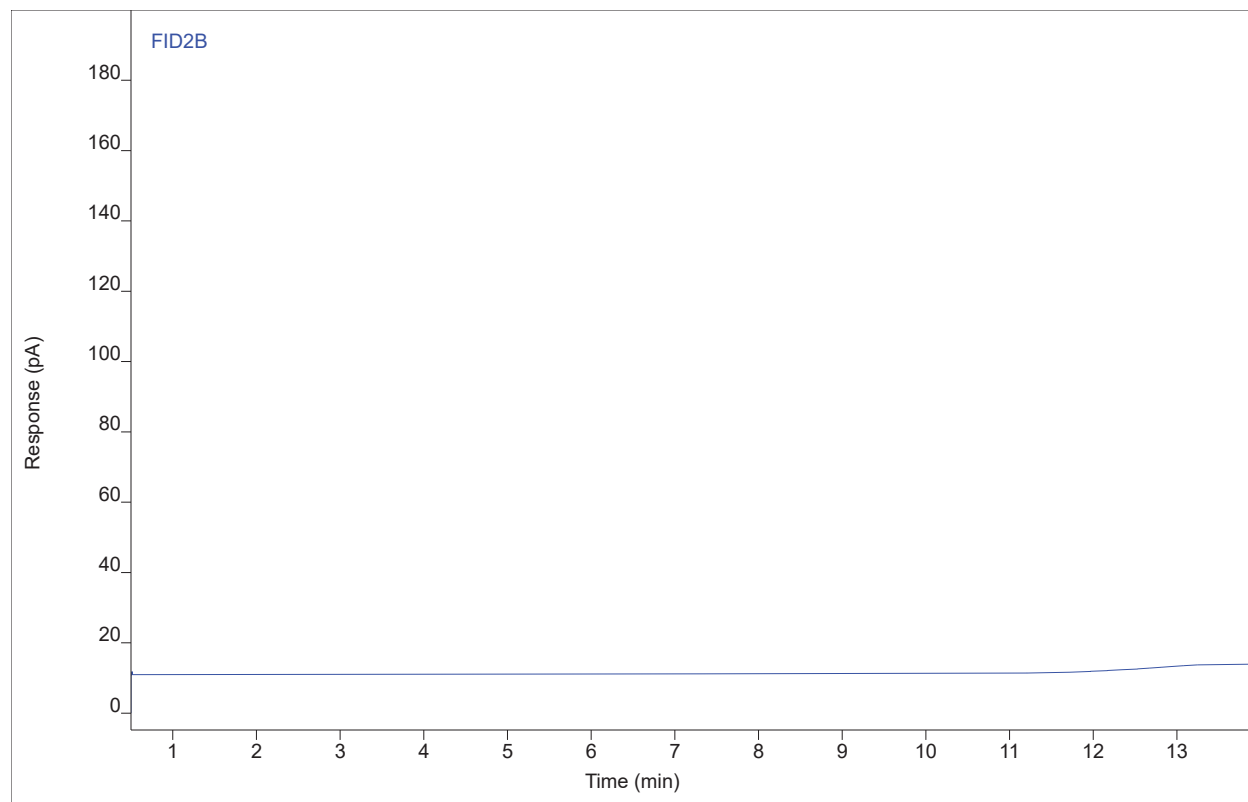
Compound	Type	RT	Area	Height	Amount	DF	SampAmt	Unit
Methane	BV	1.38	35.8770	30.5883	101.564	1	101.564	ppm

Chromatogram Report

Sample Name BettyP374 Method Blank 1 #MB
Sequence Name BETTYP974 ver.2
Inj Data File 017B0102.D
File Location GC/2018/Betty/Quarter 4
Injection Date 12/8/2018 1:25 PM
File Modified 12/11/2018 10:09 AM
Instrument Betty
Operator Justin Guenzler

Enthalpy Analytical

Sample Type Control
Vial Number Vial 17
Injection Volume 250
Injection 2 of 4
Acquisition Method GC142P133_CAL.M
Analysis Method BETTYP773_C1-C6_XAS.M
Method Modified 12/5/2018 7:48 AM
Printed 12/11/2018 3:48 PM



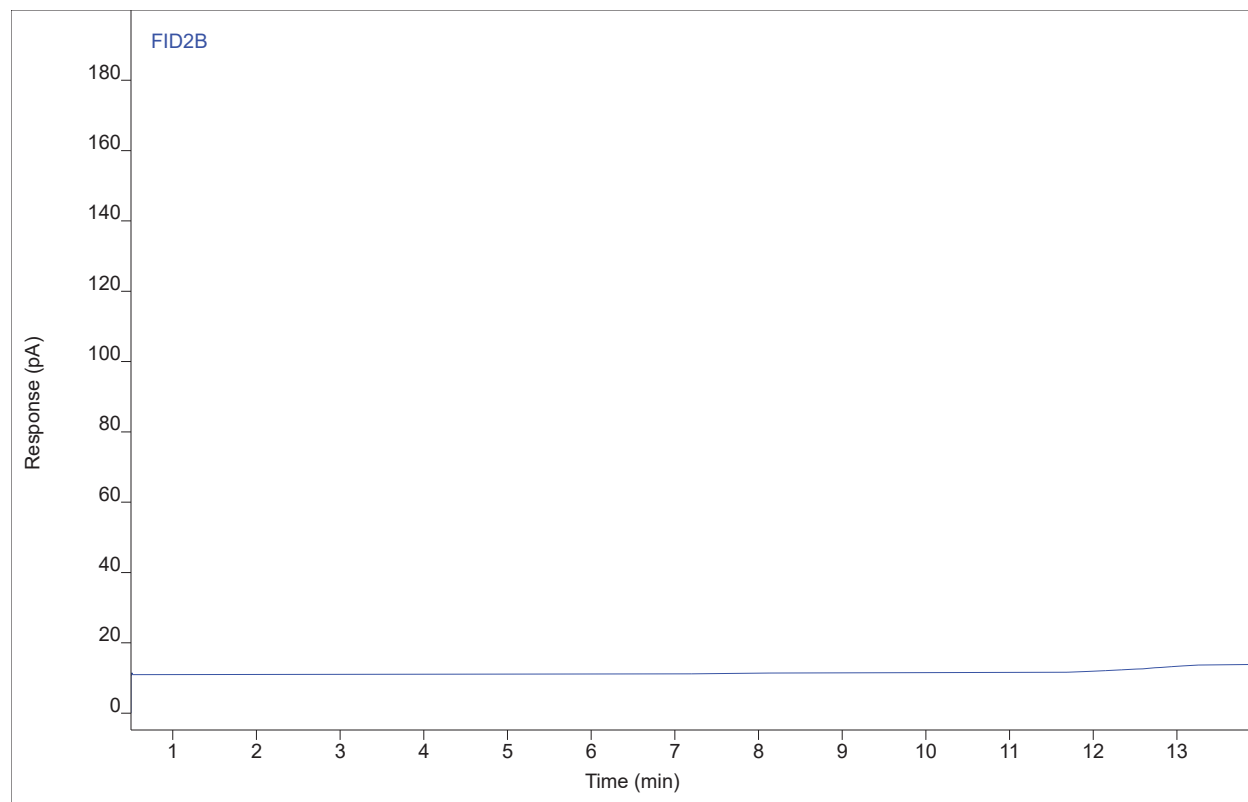
Compound	Type	RT	Area	Height	Amount	DF	SampAmt	Unit
Methane		(1.37)				1		

Chromatogram Report

Sample Name BettyP374 Method Blank 1 #MB
Sequence Name BETTYP974 ver.2
Inj Data File 017B0103.D
File Location GC/2018/Betty/Quarter 4
Injection Date 12/8/2018 1:46 PM
File Modified 12/11/2018 10:09 AM
Instrument Betty
Operator Justin Guenzler

Enthalpy Analytical

Sample Type Control
Vial Number Vial 17
Injection Volume 250
Injection 3 of 4
Acquisition Method GC142P133_CAL.M
Analysis Method BETTYP773_C1-C6_XAS.M
Method Modified 12/5/2018 7:48 AM
Printed 12/11/2018 3:48 PM



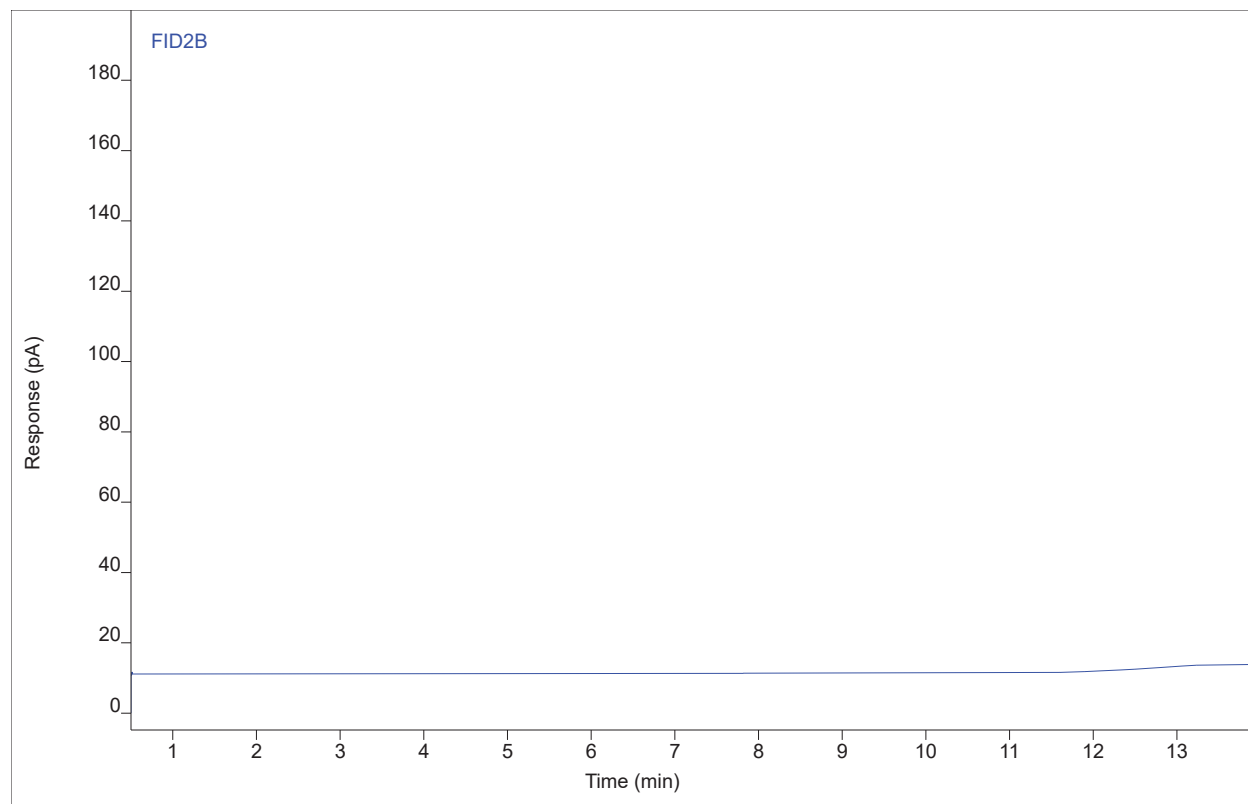
Compound	Type	RT	Area	Height	Amount	DF	SampAmt	Unit
Methane		(1.37)				1		

Chromatogram Report

Sample Name BettyP374 Method Blank 1 #MB
Sequence Name BETTYP974 ver.2
Inj Data File 017B0104.D
File Location GC/2018/Betty/Quarter 4
Injection Date 12/8/2018 2:07 PM
File Modified 12/11/2018 10:09 AM
Instrument Betty
Operator Justin Guenzler

Enthalpy Analytical

Sample Type Control
Vial Number Vial 17
Injection Volume 250
Injection 4 of 4
Acquisition Method GC142P133_CAL.M
Analysis Method BETTYP773_C1-C6_XAS.M
Method Modified 12/5/2018 7:48 AM
Printed 12/11/2018 3:48 PM



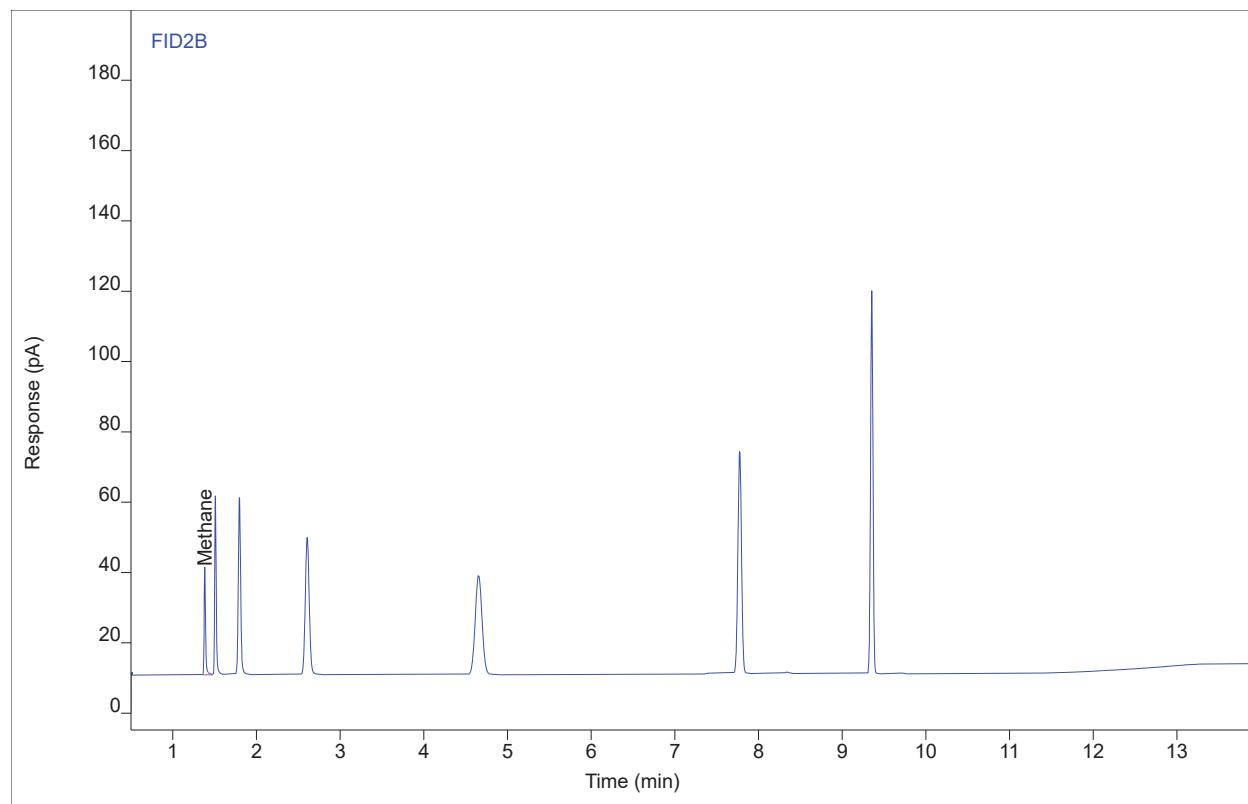
Compound	Type	RT	Area	Height	Amount	DF	SampAmt	Unit
Methane		(1.37)				1		

Chromatogram Report

Sample Name BettyP919 #C4 ENV(1=0,4=400)
Sequence Name BETTYP974 ver.2
Inj Data File 025B0302.D
File Location GC/2018/Betty/Quarter 4
Injection Date 12/9/2018 4:32 AM
File Modified 12/11/2018 10:09 AM
Instrument Betty
Operator Justin Guenzler

Enthalpy Analytical

Sample Type Calibration
Vial Number Vial 25
Injection Volume 250
Injection 2 of 4
Acquisition Method GC142P133_CAL.M
Analysis Method BETTYP773_C1-C6_XAS.M
Method Modified 12/5/2018 7:48 AM
Printed 12/11/2018 3:48 PM



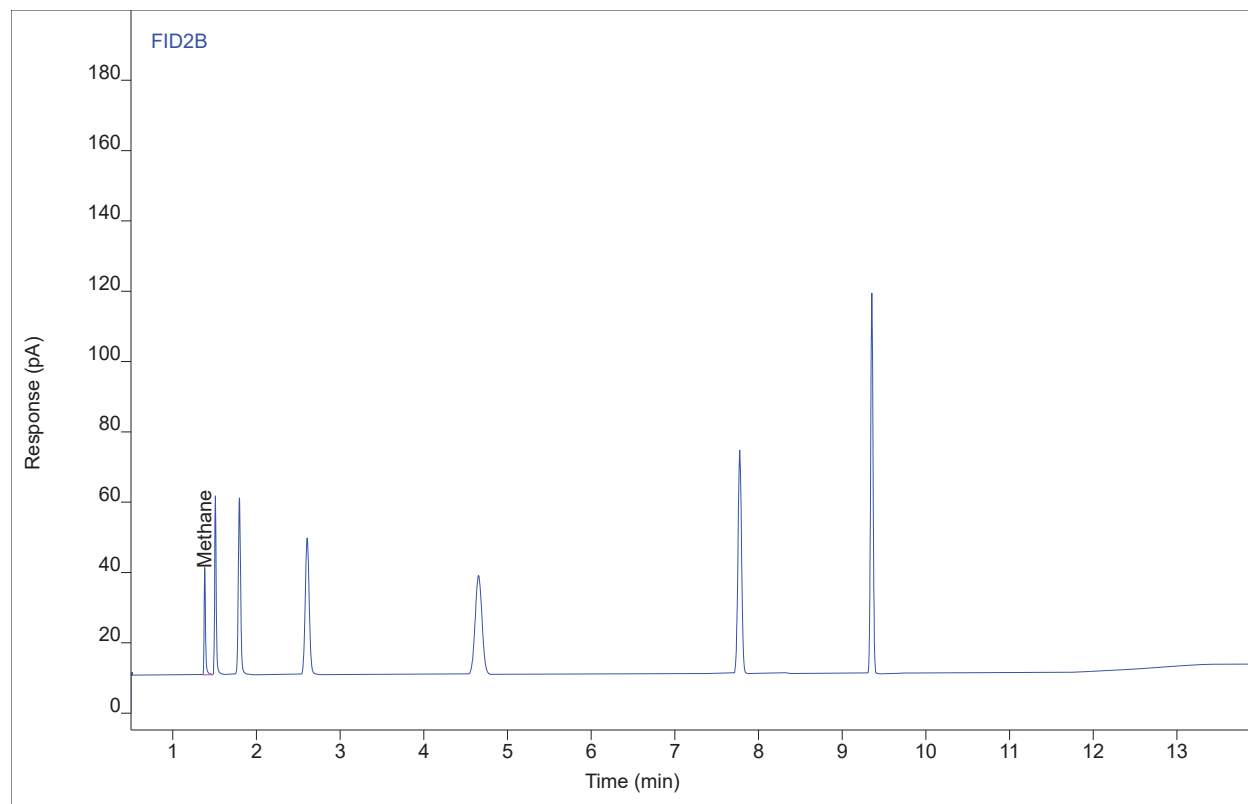
Compound	Type	RT	Area	Height	Amount	DF	SampAmt	Unit
Methane	BV	1.38	36.2809	30.7145	102.710	1	102.710	ppm

Chromatogram Report

Sample Name BettyP919 #C4 ENV(1=0,4=400)
Sequence Name BETTYP974 ver.2
Inj Data File 025B0303.D
File Location GC/2018/Betty/Quarter 4
Injection Date 12/9/2018 4:56 AM
File Modified 12/11/2018 10:09 AM
Instrument Betty
Operator Justin Guenzler

Enthalpy Analytical

Sample Type Calibration
Vial Number Vial 25
Injection Volume 250
Injection 3 of 4
Acquisition Method GC142P133_CAL.M
Analysis Method BETTYP773_C1-C6_XAS.M
Method Modified 12/5/2018 7:48 AM
Printed 12/11/2018 3:48 PM



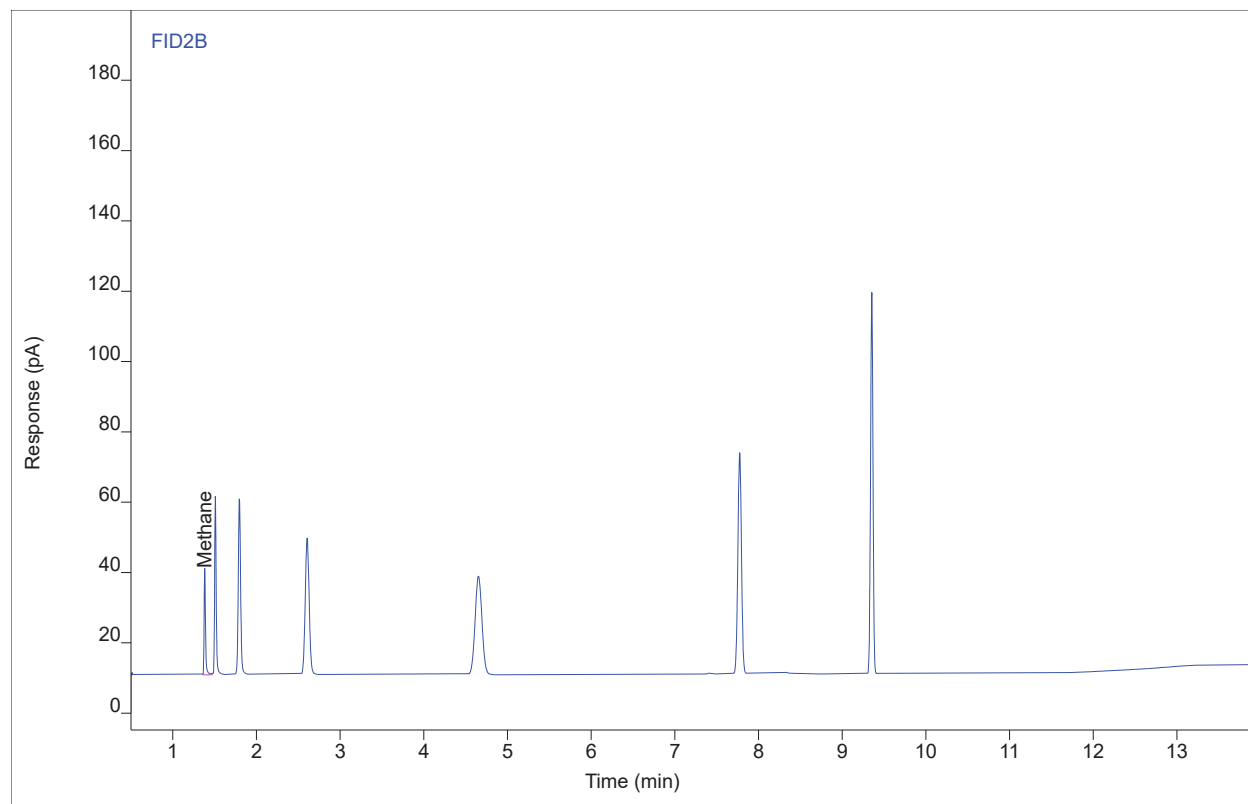
Compound	Type	RT	Area	Height	Amount	DF	SampAmt	Unit
Methane	BV	1.38	35.8732	30.4239	101.553	1	101.553	ppm

Chromatogram Report

Sample Name BettyP919 #C4 ENV(1=0,4=400)
Sequence Name BETTYP974 ver.2
Inj Data File 025B0304.D
File Location GC/2018/Betty/Quarter 4
Injection Date 12/9/2018 5:20 AM
File Modified 12/11/2018 10:09 AM
Instrument Betty
Operator Justin Guenzler

Enthalpy Analytical

Sample Type Calibration
Vial Number Vial 25
Injection Volume 250
Injection 4 of 4
Acquisition Method GC142P133_CAL.M
Analysis Method BETTYP773_C1-C6_XAS.M
Method Modified 12/5/2018 7:48 AM
Printed 12/11/2018 3:48 PM



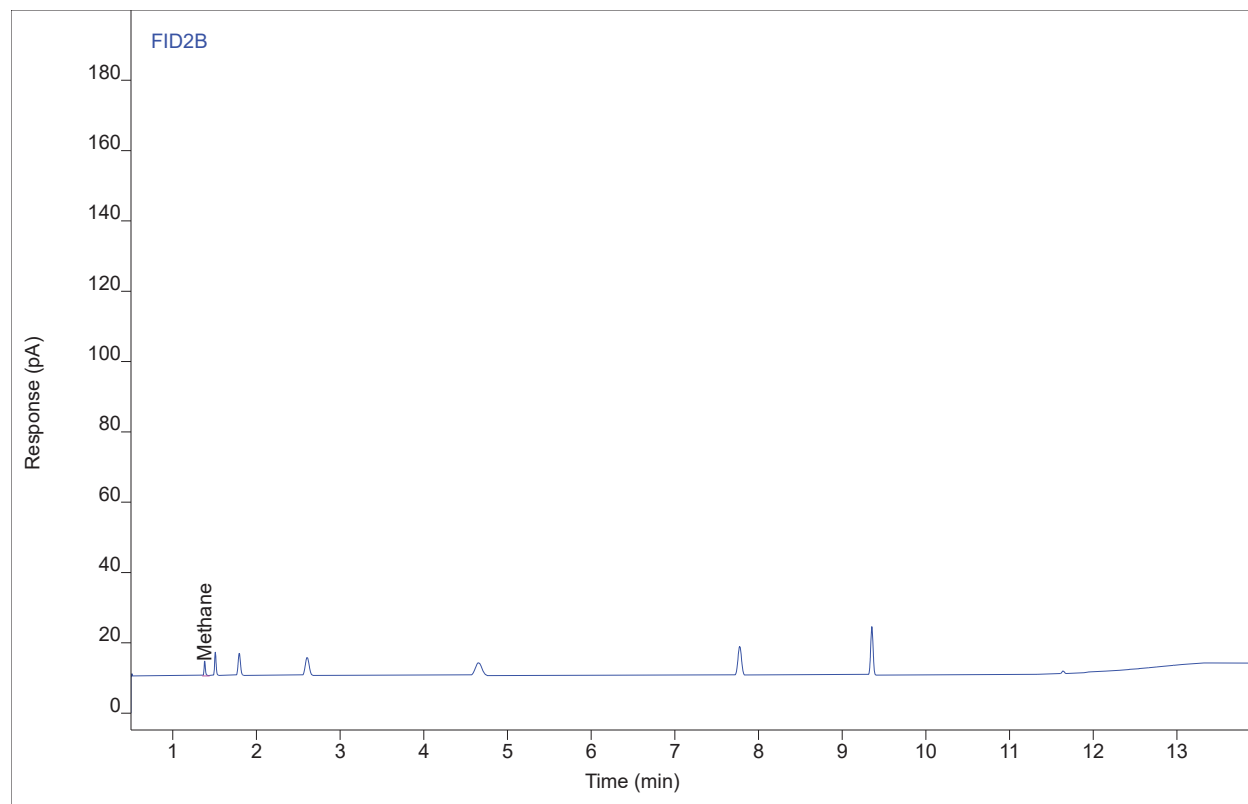
Compound	Type	RT	Area	Height	Amount	DF	SampAmt	Unit
Methane	BV	1.38	35.6105	30.2639	100.807	1	100.807	ppm

Chromatogram Report

Sample Name 1218-052.S1-M18-1 SP.Bag
Sequence Name BETTYP974 ver.2
Inj Data File 022B0601.D
File Location GC/2018/Betty/Quarter 4
Injection Date 12/9/2018 2:20 PM
File Modified 12/11/2018 10:09 AM
Instrument Betty
Operator Justin Guenzler

Enthalpy Analytical

Sample Type Sample
Vial Number Vial 22
Injection Volume 250
Injection 1 of 3
Acquisition Method GC142P133_CAL.M
Analysis Method BETTYP773_C1-C6_XAS.M
Method Modified 12/5/2018 7:48 AM
Printed 12/11/2018 3:48 PM



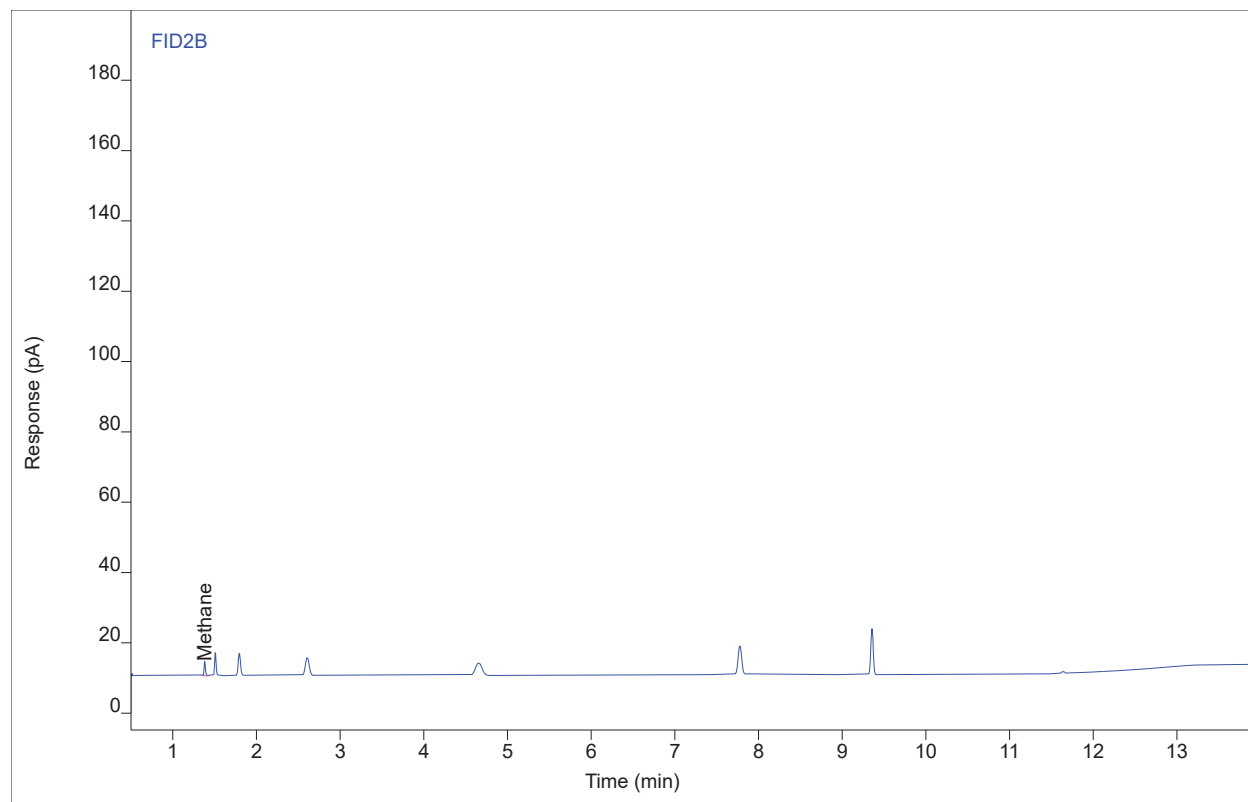
Compound	Type	RT	Area	Height	Amount	DF	SampAmt	Unit
Methane	BV	1.38	4.87233	4.24517	13.5572	1	13.5572	ppm

Chromatogram Report

Sample Name 1218-052.S1-M18-1 SP.Bag
Sequence Name BETTYP974 ver.2
Inj Data File 022B0602.D
File Location GC/2018/Betty/Quarter 4
Injection Date 12/9/2018 2:41 PM
File Modified 12/11/2018 10:09 AM
Instrument Betty
Operator Justin Guenzler

Enthalpy Analytical

Sample Type Sample
Vial Number Vial 22
Injection Volume 250
Injection 2 of 3
Acquisition Method GC142P133_CAL.M
Analysis Method BETTYP773_C1-C6_XAS.M
Method Modified 12/5/2018 7:48 AM
Printed 12/11/2018 3:48 PM



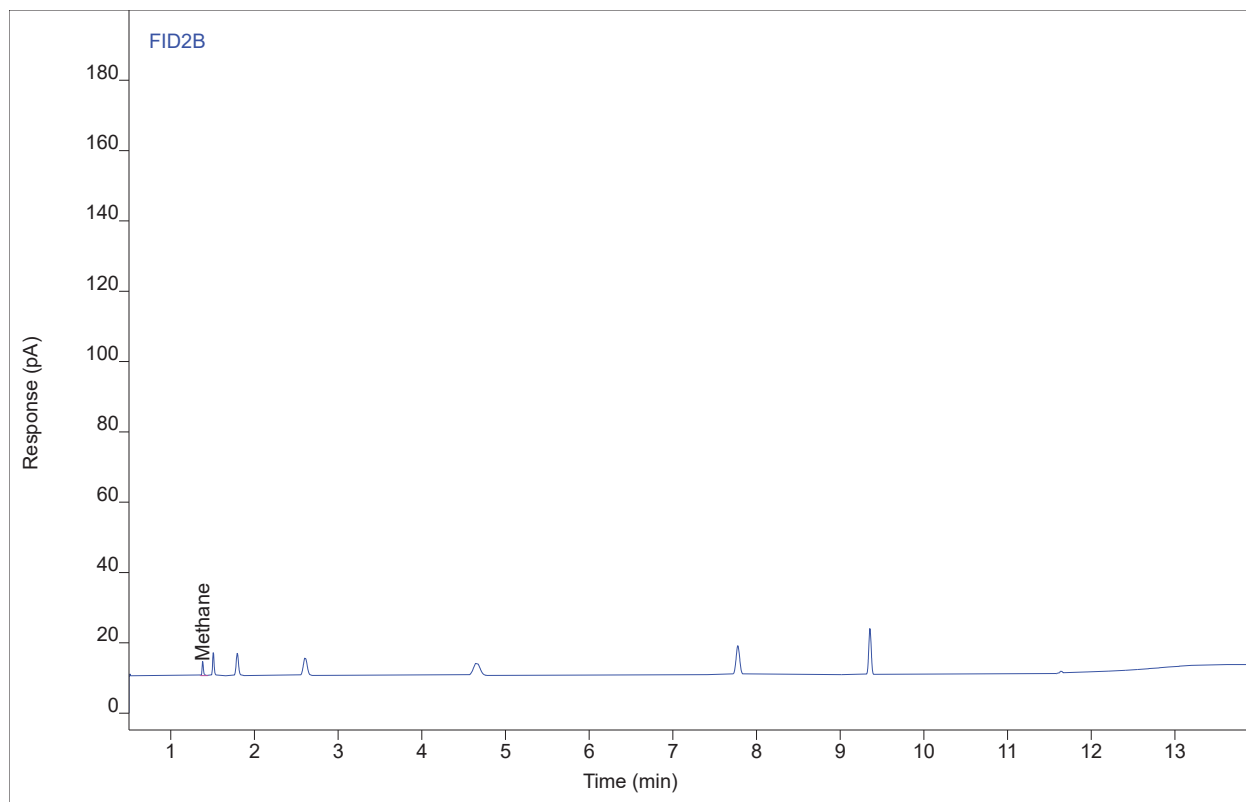
Compound	Type	RT	Area	Height	Amount	DF	SampAmt	Unit
Methane	BB	1.38	4.78405	4.18922	13.3066	1	13.3066	ppm

Chromatogram Report

Sample Name 1218-052.S1-M18-1 SP.Bag
Sequence Name BETTYP974 ver.2
Inj Data File 022B0603.D
File Location GC/2018/Betty/Quarter 4
Injection Date 12/9/2018 3:02 PM
File Modified 12/11/2018 10:09 AM
Instrument Betty
Operator Justin Guenzler

Enthalpy Analytical

Sample Type Sample
Vial Number Vial 22
Injection Volume 250
Injection 3 of 3
Acquisition Method GC142P133_CAL.M
Analysis Method BETTYP773_C1-C6_XAS.M
Method Modified 12/5/2018 7:48 AM
Printed 12/11/2018 3:48 PM



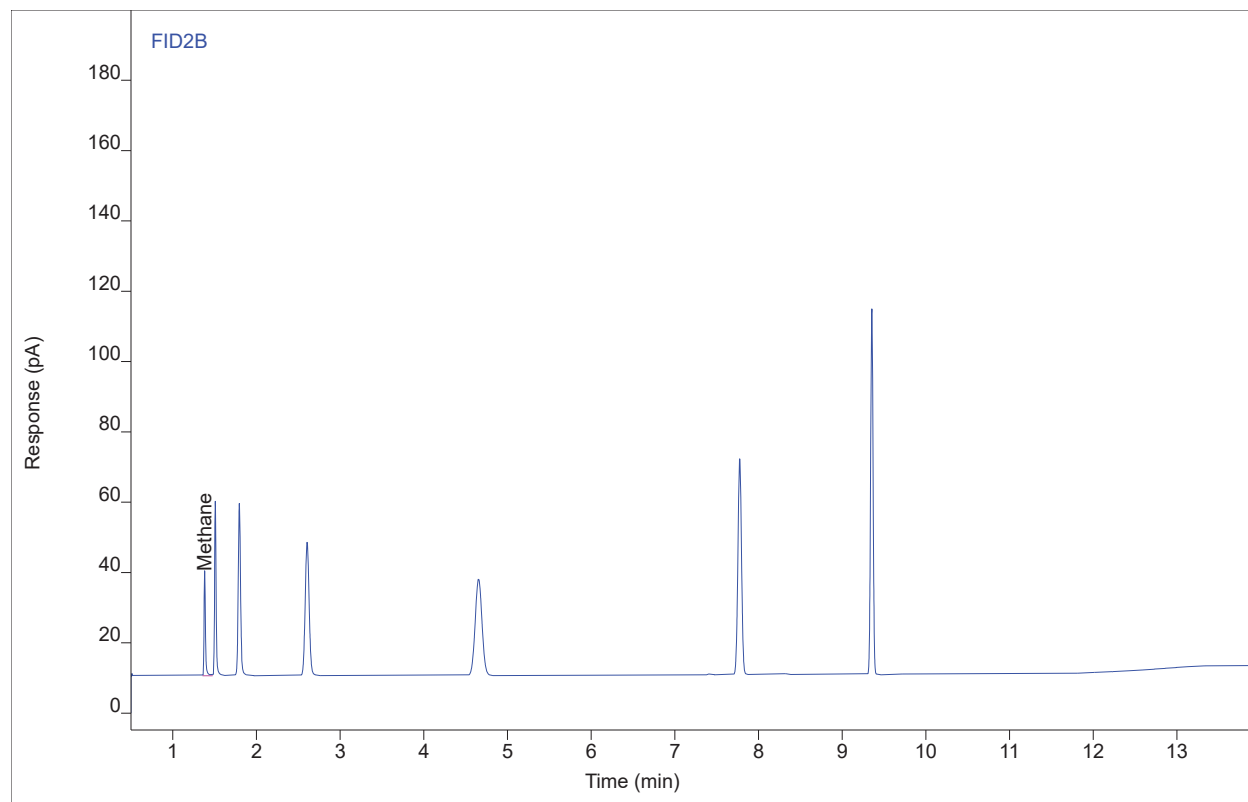
Compound	Type	RT	Area	Height	Amount	DF	SampAmt	Unit
Methane	BB	1.38	4.72264	4.14645	13.1323	1	13.1323	ppm

Chromatogram Report

Sample Name BettyP919 #C4 ENV(1=0,4=400)
Sequence Name BETTYP974 ver.2
Inj Data File 025B0702.D
File Location GC/2018/Betty/Quarter 4
Injection Date 12/9/2018 3:50 PM
File Modified 12/11/2018 10:09 AM
Instrument Betty
Operator Justin Guenzler

Enthalpy Analytical

Sample Type Calibration
Vial Number Vial 25
Injection Volume 250
Injection 2 of 4
Acquisition Method GC142P133_CAL.M
Analysis Method BETTYP773_C1-C6_XAS.M
Method Modified 12/5/2018 7:48 AM
Printed 12/11/2018 3:48 PM



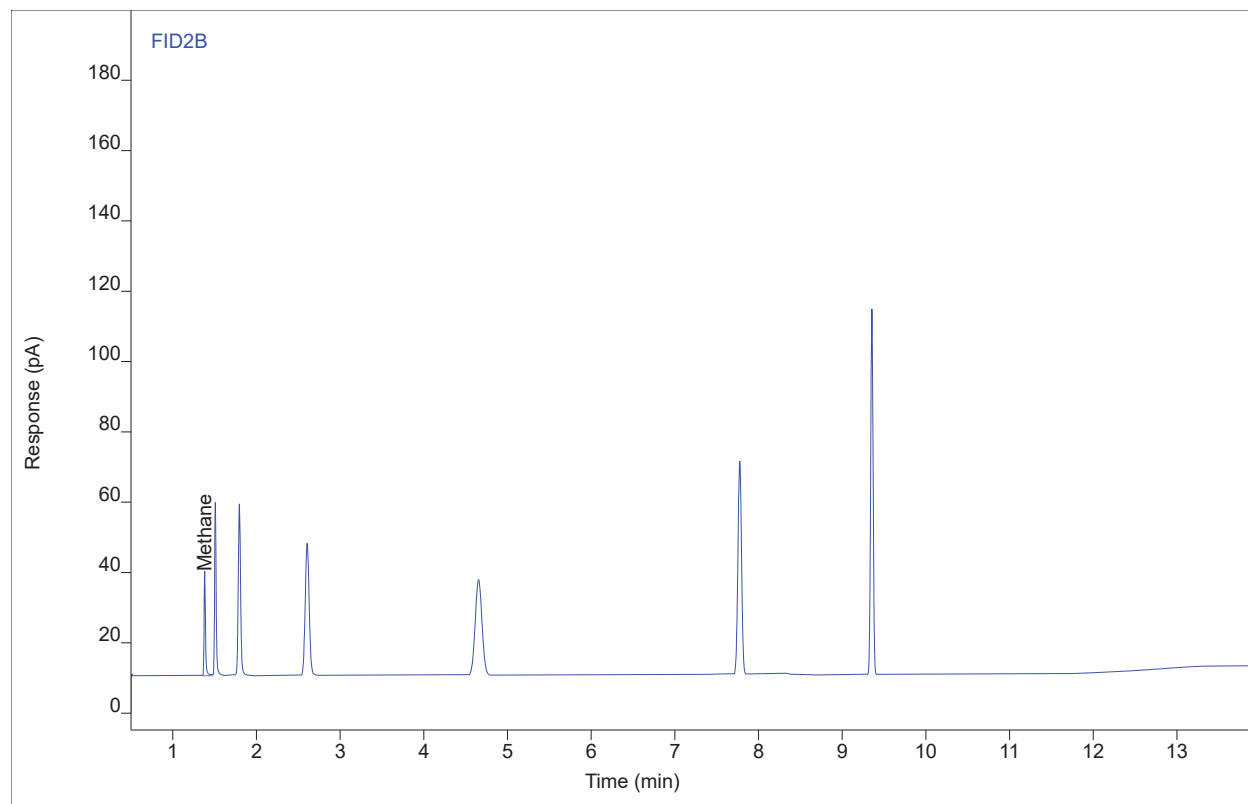
Compound	Type	RT	Area	Height	Amount	DF	SampAmt	Unit
Methane	BV	1.38	34.9088	29.8240	98.8152	1	98.8152	ppm

Chromatogram Report

Sample Name BettyP919 #C4 ENV(1=0,4=400)
Sequence Name BETTYP974 ver.2
Inj Data File 025B0703.D
File Location GC/2018/Betty/Quarter 4
Injection Date 12/9/2018 4:14 PM
File Modified 12/11/2018 10:10 AM
Instrument Betty
Operator Justin Guenzler

Enthalpy Analytical

Sample Type Calibration
Vial Number Vial 25
Injection Volume 250
Injection 3 of 4
Acquisition Method GC142P133_CAL.M
Analysis Method BETTYP773_C1-C6_XAS.M
Method Modified 12/5/2018 7:48 AM
Printed 12/11/2018 3:48 PM



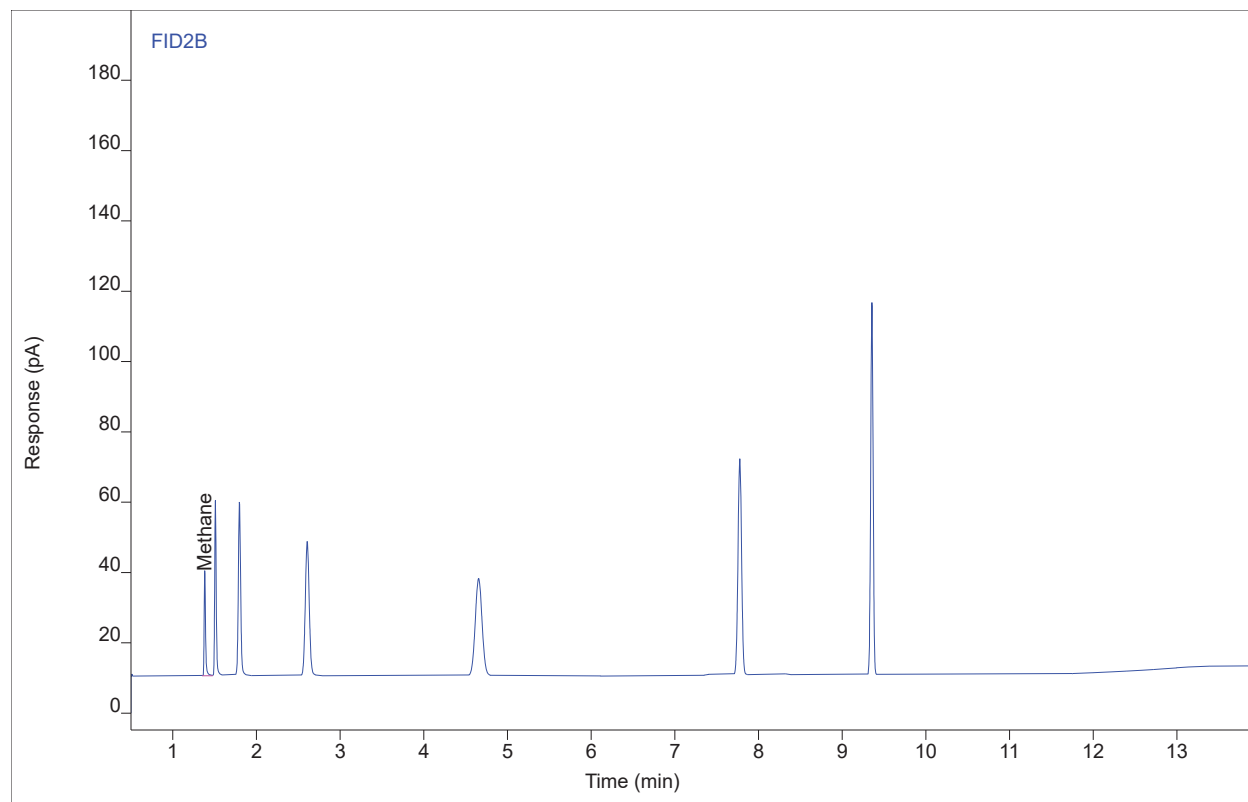
Compound	Type	RT	Area	Height	Amount	DF	SampAmt	Unit
Methane	BV	1.38	34.6003	29.6947	97.9396	1	97.9396	ppm

Chromatogram Report

Sample Name BettyP919 #C4 ENV(1=0,4=400)
Sequence Name BETTYP974 ver.2
Inj Data File 025B0704.D
File Location GC/2018/Betty/Quarter 4
Injection Date 12/9/2018 4:39 PM
File Modified 12/11/2018 10:10 AM
Instrument Betty
Operator Justin Guenzler

Enthalpy Analytical

Sample Type Calibration
Vial Number Vial 25
Injection Volume 250
Injection 4 of 4
Acquisition Method GC142P133_CAL.M
Analysis Method BETTYP773_C1-C6_XAS.M
Method Modified 12/5/2018 7:48 AM
Printed 12/11/2018 3:48 PM



Compound	Type	RT	Area	Height	Amount	DF	SampAmt	Unit
Methane	BV	1.38	35.0022	29.8472	99.0804	1	99.0804	ppm

Enthalpy Analytical

Company: Air Control Techniques PC

Job No.: 1218-052 EPA Method 18 (Bags)

Client No.: 2333

Methane -- Calibration Standards

Sample ID	Filename #1	Filename #2	Filename #3	Analysis Method	Ret Time (min)	Ret Time (min)	Ret Time (min)	%dif RT	Conc # 1	Conc # 2	Conc # 3	%dif conc	Avg Conc ppm	Std Tag ppm	% Tag
BettyP919 #C4 ENV(1=0,4=400)	025B1701.D	025B1702.D	025B1703.D	BETTYP773 _C1-C6_XAS.M	1.38	1.38	1.38	0.0	102	101	101	0.6	101	100	101
BettyP919 #C4 ENV(1=0,4=400)	025B1001.D	025B1002.D	025B1003.D	BETTYP773 _C1-C6_XAS.M	1.38	1.38	1.38	0.0	103	101	100	1.4	101	100	101
BettyP919 #C4 ENV(1=0,4=400)	025B0701.D	025B0702.D	025B0703.D	BETTYP773 _C1-C7.M	1.38	1.38	1.38	0.0	105	101	102	2.2	102	100	102
BettyP374 Method Blank 1 #MB	017B0102.D	017B0103.D	017B0104.D	BETTYP773 _C1-C6_XAS.M	NA	NA	NA	NA	0.816	0.816	0.816	0.0	0.816	NA	NA
BettyP919 #C4 ENV(1=0,4=400)	025B0302.D	025B0303.D	025B0304.D	BETTYP773 _C1-C6_XAS.M	1.38	1.38	1.38	0.0	103	102	101	1.0	102	100	102
BettyP919 #C4 ENV(1=0,4=400)	025B0702.D	025B0703.D	025B0704.D	BETTYP773 _C1-C6_XAS.M	1.38	1.38	1.38	0.0	98.8	97.9	99.1	0.7	98.6	100	98.6

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                        Calibration Table
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Calib. Data Modified : 3/20/2018 2:56:30 PM

Rel. Reference Window : 1.000 %
 Abs. Reference Window : 0.000 min
 Rel. Non-ref. Window : 1.000 %
 Abs. Non-ref. Window : 0.000 min
 Uncalibrated Peaks : using compound Propane
 Partial Calibration : Yes, identified peaks are recalibrated
 Correct All Ret. Times: No, only for identified peaks

Curve Type : Linear
 Origin : Connected
 Weight : Quadratic (Amnt)

Recalibration Settings:
 Average Response : Average all calibrations
 Average Retention Time: Floating Average New 75%

Calibration Report Options :
 Printout of recalibrations within a sequence:
 Calibration Table after Recalibration
 Normal Report after Recalibration
 If the sequence is done with bracketing:
 Results of first cycle (ending previous bracket)

Signal 1: FID2 B,

RetTime [min]	Lvl Sig	Amount [ppm]	Area	Amt/Area	Ref Grp Name
1.381	1 1	5.00000	1.85132	2.70077	Methane
	2	20.00000	7.17869	2.78602	
	3	36.00000	12.91274	2.78794	
	4	100.00000	35.92371	2.78368	
	5	1799.00000	629.92448	2.85590	
	6	5561.00000	1925.11084	2.88866	
	7	4.99200e4	1.74910e4	2.85404	
1.509	1 1	5.00000	3.51143	1.42392	Ethane
	2	20.00000	13.35849	1.49718	
	3	36.00000	24.17391	1.48921	
	4	100.00000	66.80825	1.49682	
	5	1800.00000	1185.36955	1.51851	
	6	5564.00000	3628.16577	1.53356	
	7	4.99500e4	3.27808e4	1.52376	
1.780	1 1	5.00000	5.44360	9.18511e-1	Propane
	2	20.00000	20.32719	9.83904e-1	
	3	36.00000	36.61232	9.83276e-1	
	4	100.00000	100.07090	9.99291e-1	
	5	1800.00000	1781.22225	1.01054	
	6	5566.00000	5436.71436	1.02378	
	7	4.99700e4	4.92738e4	1.01413	
2.609	1 1	5.00000	6.78349	7.37083e-1	Butane
	2	20.00000	26.32429	7.59755e-1	
	3	36.00000	47.11043	7.64162e-1	
	4	100.00000	130.48936	7.66346e-1	
	5	360.00000	474.45438	7.58766e-1	
	6	1113.00000	1449.71183	7.67739e-1	
	7	9991.00000	1.30827e4	7.63680e-1	

154

RetTime [min]	Lvl Sig	Amount [ppm]	Area	Amt/Area	Ref Grp Name
4.663	1 1	5.00000	8.53360	5.85919e-1	Pentane
	2	20.00000	33.10566	6.04126e-1	
	3	36.00000	59.18170	6.08296e-1	
	4	100.00000	163.94296	6.09968e-1	
	5	180.00000	295.46891	6.09201e-1	
	6	556.00000	903.34064	6.15493e-1	
	7	4995.00000	8149.24805	6.12940e-1	
7.782	1 1	5.00000	10.22645	4.88928e-1	Hexane
	2	20.00000	39.45738	5.06876e-1	
	3	36.00000	70.37578	5.11540e-1	
	4	100.00000	194.70184	5.13606e-1	
	5	144.00000	282.76460	5.09258e-1	
	6	446.00000	864.74677	5.15758e-1	
	7	4001.00000	7793.09538	5.13403e-1	

More compound-specific settings:

Compound: Methane

Time Window : From 1.360 min To 1.400 min

Compound: Ethane

Time Window : From 1.471 min To 1.531 min

Compound: Propane

Time Window : From 1.722 min To 1.832 min

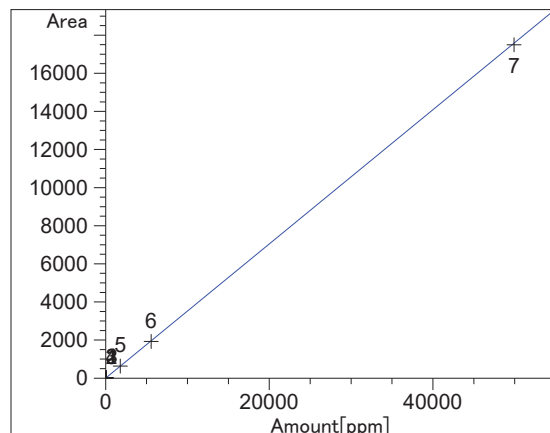
Compound: Butane

Time Window : From 2.563 min To 2.623 min

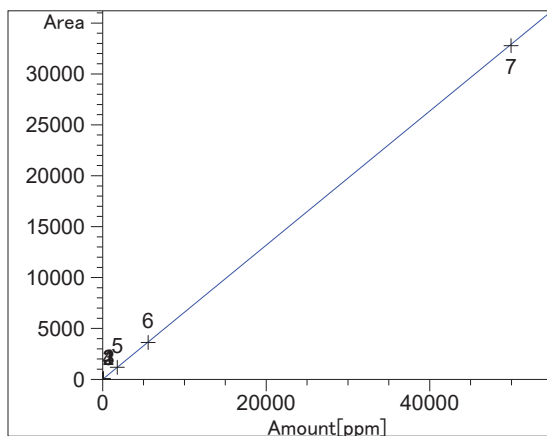
Peak Sum Table

Name	StartTime [min]	EndTime [min]	Use Reference	Response factor	Multiplier	ISTD Peak
as Ethane	1.440	1.657	None	1.4977	1.4977	None
as Propane	1.657	2.211	None	9.9057e-1	0.9906	None
as Butane	2.211	3.652	None	7.5965e-1	0.7596	None
as Pentane	3.652	6.240	None	6.0656e-1	0.6066	None
as Hexane	6.240	14.000	None	5.0848e-1	0.5085	None

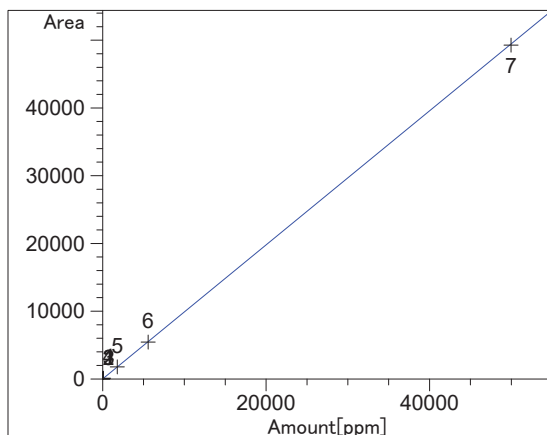
Calibration Curves



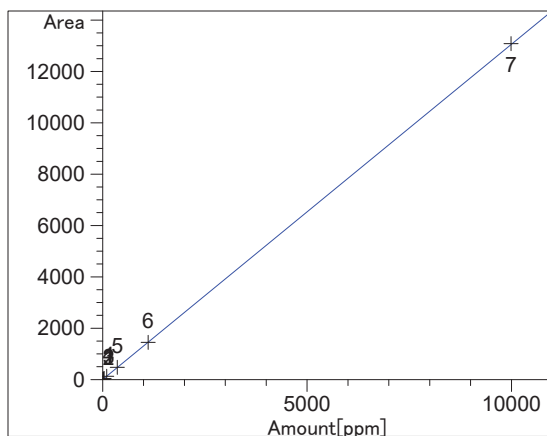
Methane at exp. RT: 1.381
FID2 B,
Correlation: 0.99992
Residual Std. Dev.: 45.57516
Formula: $y = mx + b$
m: 3.52300e-1
b: 9.61218e-2
x: Amount
y: Area
Calibration Level Weights:
Level 1 : 1
Level 2 : 0.0625
Level 3 : 0.01929
Level 4 : 0.0025
Level 5 : 7.72463e-006
Level 6 : 8.08415e-007
Level 7 : 1.00321e-008



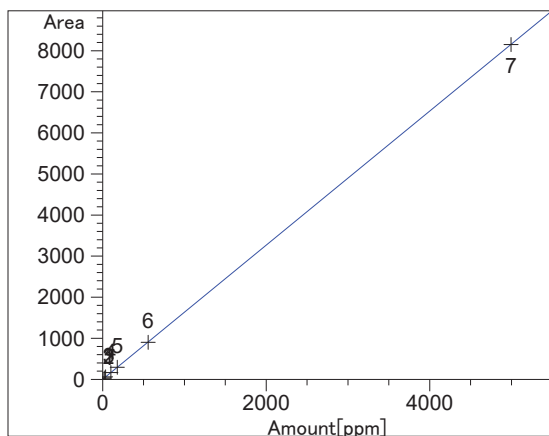
Ethane at exp. RT: 1.509
 FID2 B,
 Correlation: 0.99997
 Residual Std. Dev.: 64.40241
 Formula: $y = mx + b$
 m: 6.59042e-1
 b: 2.19675e-1
 x: Amount
 y: Area
 Calibration Level Weights:
 Level 1 : 1
 Level 2 : 0.0625
 Level 3 : 0.01929
 Level 4 : 0.0025
 Level 5 : 7.71605e-006
 Level 6 : 8.07543e-007
 Level 7 : 1.002e-008



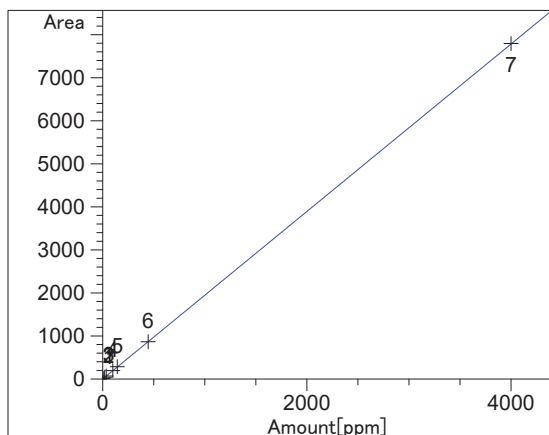
Propane at exp. RT: 1.780
 FID2 B,
 Correlation: 0.99996
 Residual Std. Dev.: 91.59980
 Formula: $y = mx + b$
 m: 9.89883e-1
 b: 5.06094e-1
 x: Amount
 y: Area
 Calibration Level Weights:
 Level 1 : 1
 Level 2 : 0.0625
 Level 3 : 0.01929
 Level 4 : 0.0025
 Level 5 : 7.71605e-006
 Level 6 : 8.06963e-007
 Level 7 : 1.0012e-008



Butane at exp. RT: 2.609
 FID2 B,
 Correlation: 0.99999
 Residual Std. Dev.: 13.67916
 Formula: $y = mx + b$
 m: 1.30642
 b: 2.44793e-1
 x: Amount
 y: Area
 Calibration Level Weights:
 Level 1 : 1
 Level 2 : 0.0625
 Level 3 : 0.01929
 Level 4 : 0.0025
 Level 5 : 0.000193
 Level 6 : 0.00002
 Level 7 : 2.50451e-007



Pentane at exp. RT: 4.663
 FID2 B,
 Correlation: 0.99999
 Residual Std. Dev.: 4.81681
 Formula: $y = mx + b$
 m: 1.63329
 b: 3.72609e-1
 x: Amount
 y: Area
 Calibration Level Weights:
 Level 1 : 1
 Level 2 : 0.0625
 Level 3 : 0.01929
 Level 4 : 0.0025
 Level 5 : 0.000772
 Level 6 : 0.000081
 Level 7 : 1.002e-006



Hexane at exp. RT: 7.782
 FID2 B,
 Correlation: 0.99999
 Residual Std. Dev.: 3.30193
 Formula: $y = mx + b$
 m: 1.94616
 b: 4.95532e-1
 x: Amount
 y: Area
 Calibration Level Weights:
 Level 1 : 1
 Level 2 : 0.0625
 Level 3 : 0.01929
 Level 4 : 0.0025
 Level 5 : 0.001206
 Level 6 : 0.000126
 Level 7 : 1.56172e-006

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Calibration Table

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General Calibration Setting

Calib. Data Modified : 2/22/2018 9:12:06 AM
 Signals calculated separately : No

Rel. Reference Window : 1.000 %
 Abs. Reference Window : 0.000 min
 Rel. Non-ref. Window : 1.000 %
 Abs. Non-ref. Window : 0.000 min
 Uncalibrated Peaks : using compound Propane
 Partial Calibration : Yes, identified peaks are recalibrated
 Correct All Ret. Times: No, only for identified peaks

Curve Type : Linear
 Origin : Connected
 Weight : Quadratic (Amnt)

Recalibration Settings:
 Average Response : Average all calibrations
 Average Retention Time: Floating Average New 75%

Calibration Report Options :
 Printout of recalibrations within a sequence:
 Calibration Table after Recalibration
 Normal Report after Recalibration
 If the sequence is done with bracketing:
 Results of first cycle (ending previous bracket)

Signal Details

Signal 1: FID2 B,

Overview Table

RT	Sig	Lvl	Amount [ppm]	Area	Rsp.Factor	Ref	ISTD #	Compound
1.381	1	1	5.00000	1.85132	2.70077	No	No	Methane
		2	20.00000	7.17869	2.78602			
		3	36.00000	12.91274	2.78794			
		4	100.00000	35.92371	2.78368			
		5	1799.00000	629.92448	2.85590			
		6	5561.00000	1925.11084	2.88866			
		7	4.99200e4	1.74910e4	2.85404			
1.509	1	1	5.00000	3.51143	1.42392	No	No	Ethane
		2	20.00000	13.35849	1.49718			
		3	36.00000	24.17391	1.48921			

158

RT	Sig	Lvl	Amount [ppm]	Area	Rsp.Factor	Ref	ISTD #	Compound
-----		-	----	-----	-----	---	---	-----
			4 100.00000	66.80825	1.49682			
			5 1800.00000	1185.36955	1.51851			
			6 5564.00000	3628.16577	1.53356			
			7 4.99500e4	3.27808e4	1.52376			
1.797	1		1 5.00000	5.44360	9.18511e-1	No	No	Propane
			2 20.00000	20.32719	9.83904e-1			
			3 36.00000	36.61232	9.83276e-1			
			4 100.00000	100.07090	9.99291e-1			
			5 1800.00000	1781.22225	1.01054			
			6 5566.00000	5436.71436	1.02378			
			7 4.99700e4	4.92738e4	1.01413			
2.609	1		1 5.00000	6.78349	7.37083e-1	No	No	Butane
			2 20.00000	26.32429	7.59755e-1			
			3 36.00000	47.11043	7.64162e-1			
			4 100.00000	130.48936	7.66346e-1			
			5 360.00000	474.45438	7.58766e-1			
			6 1113.00000	1449.71183	7.67739e-1			
			7 9991.00000	1.30827e4	7.63680e-1			
4.663	1		1 5.00000	8.53360	5.85919e-1	No	No	Pentane
			2 20.00000	33.10566	6.04126e-1			
			3 36.00000	59.18170	6.08296e-1			
			4 100.00000	163.94296	6.09968e-1			
			5 180.00000	295.46891	6.09201e-1			
			6 556.00000	903.34064	6.15493e-1			
			7 4995.00000	8149.24805	6.12940e-1			
7.782	1		1 5.00000	10.22645	4.88928e-1	No	No	Hexane
			2 20.00000	39.45738	5.06876e-1			
			3 36.00000	70.37578	5.11540e-1			
			4 100.00000	194.70184	5.13606e-1			
			5 144.00000	282.76460	5.09258e-1			
			6 446.00000	864.74677	5.15758e-1			
			7 4001.00000	7793.09538	5.13403e-1			
9.359	1		1 5.00000	11.63456	4.29754e-1	No	No	Heptane
			2 20.00000	45.85759	4.36133e-1			
			3 36.00000	81.79598	4.40119e-1			
			4 100.00000	227.52871	4.39505e-1			
			7 251.20000	576.11442	4.36024e-1			

More compound-specific settings

Compound: Methane

Time Window : From 1.360 min To 1.400 min

Compound: Ethane

Time Window : From 1.471 min To 1.531 min

Compound: Propane

Time Window : From 1.739 min To 1.849 min

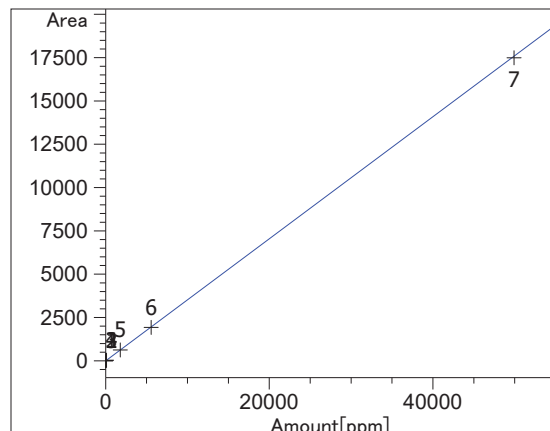
Compound: Butane

Time Window : From 2.563 min To 2.623 min

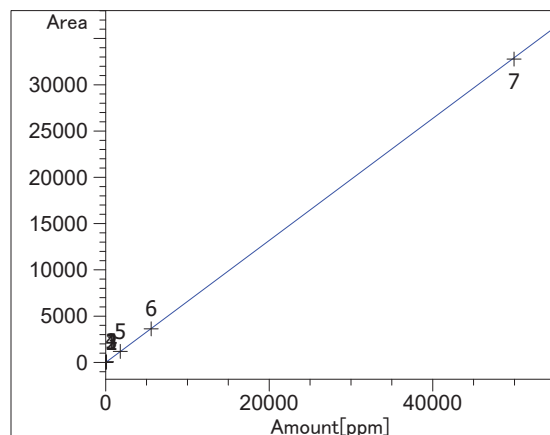
Peak Sum Table

Name	StartTime [min]	EndTime [min]	Use Reference	Response factor	Multiplier	ISTD Peak
as Ethane	1.440	1.657	None	1.4977	1.4977	None
as Propane	1.657	2.211	None	9.9057e-1	0.9906	None
as Butane	2.211	3.652	None	7.5965e-1	0.7596	None
as Pentane	3.652	6.240	None	6.0656e-1	0.6066	None
as Hexane	6.240	8.578	None	5.0848e-1	0.5085	None
as Heptane	8.578	14.000	None	4.3630e-1	0.4363	None

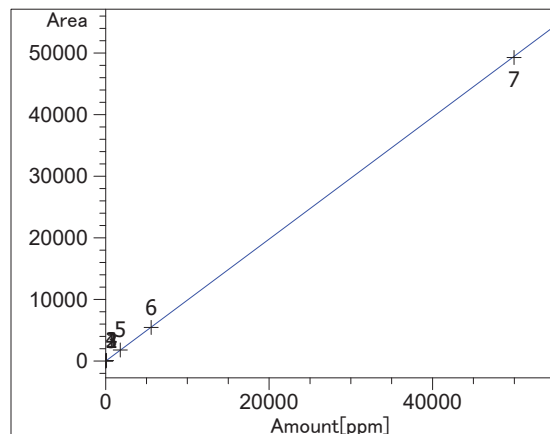
Calibration Curves



Methane at exp. RT: 1.381
 FID2 B,
 Correlation: 0.99992
 Residual Std. Dev.: 45.57516
 Formula: $y = mx + b$
 m: 3.52300e-1
 b: 9.61218e-2
 x: Amount[ppm]
 y: Area
 Calibration Level Weights:
 Level 1 : 1
 Level 2 : 0.0625
 Level 3 : 0.01929
 Level 4 : 0.0025
 Level 5 : 7.72463e-006
 Level 6 : 8.08415e-007
 Level 7 : 1.00321e-008

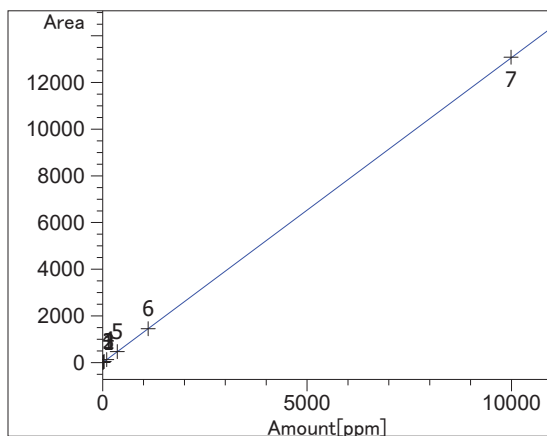


Ethane at exp. RT: 1.509
 FID2 B,
 Correlation: 0.99997
 Residual Std. Dev.: 64.40241
 Formula: $y = mx + b$
 m: 6.59042e-1
 b: 2.19675e-1
 x: Amount[ppm]
 y: Area
 Calibration Level Weights:
 Level 1 : 1
 Level 2 : 0.0625
 Level 3 : 0.01929
 Level 4 : 0.0025
 Level 5 : 7.71605e-006
 Level 6 : 8.07543e-007
 Level 7 : 1.002e-008

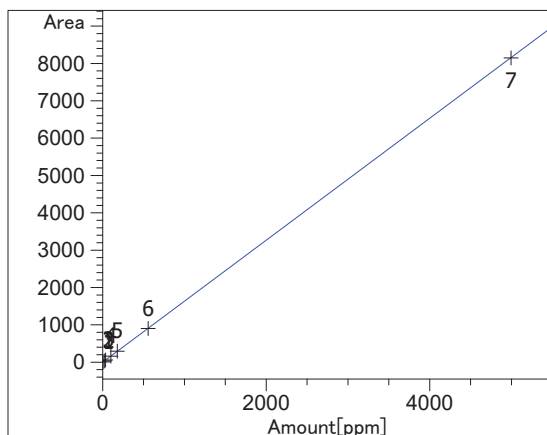


Propane at exp. RT: 1.797
 FID2 B,
 Correlation: 0.99996
 Residual Std. Dev.: 91.59980
 Formula: $y = mx + b$
 m: 9.89883e-1
 b: 5.06094e-1
 x: Amount[ppm]
 y: Area
 Calibration Level Weights:
 Level 1 : 1
 Level 2 : 0.0625
 Level 3 : 0.01929
 Level 4 : 0.0025

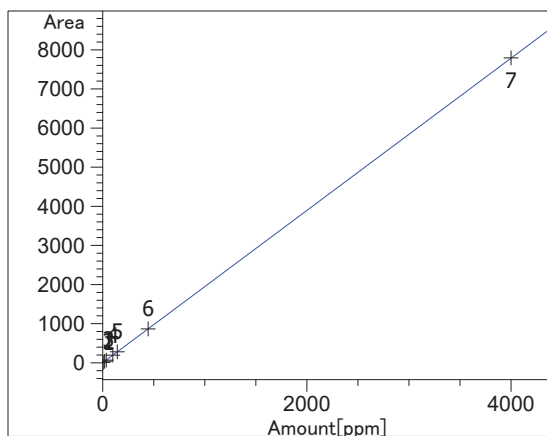
Level 5	:	7.71605e-006
Level 6	:	8.06963e-007
Level 7	:	1.0012e-008



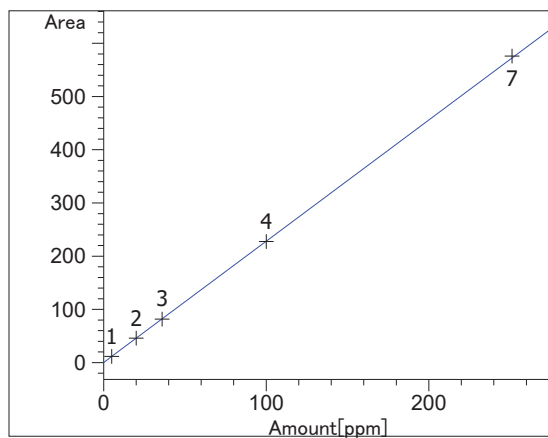
Butane at exp. RT: 2.609
FID2 B,
Correlation: 0.99999
Residual Std. Dev.: 13.67916
Formula: $y = mx + b$
m: 1.30642
b: 2.44793e-1
x: Amount[ppm]
y: Area
Calibration Level Weights:
Level 1 : 1
Level 2 : 0.0625
Level 3 : 0.01929
Level 4 : 0.0025
Level 5 : 0.000193
Level 6 : 0.00002
Level 7 : 2.50451e-007



Pentane at exp. RT: 4.663
FID2 B,
Correlation: 0.99999
Residual Std. Dev.: 4.81681
Formula: $y = mx + b$
m: 1.63329
b: 3.72609e-1
x: Amount[ppm]
y: Area
Calibration Level Weights:
Level 1 : 1
Level 2 : 0.0625
Level 3 : 0.01929
Level 4 : 0.0025
Level 5 : 0.000772
Level 6 : 0.000081
Level 7 : 1.002e-006



Hexane at exp. RT: 7.782
FID2 B,
Correlation: 0.99999
Residual Std. Dev.: 3.30193
Formula: $y = mx + b$
m: 1.94616
b: 4.95532e-1
x: Amount[ppm]
y: Area
Calibration Level Weights:
Level 1 : 1
Level 2 : 0.0625
Level 3 : 0.01929
Level 4 : 0.0025
Level 5 : 0.001206
Level 6 : 0.000126
Level 7 : 1.56172e-006



Heptane at exp. RT: 9.359
FID2 B,
Correlation: 0.99999
Residual Std. Dev.: 2.10837
Formula: $y = mx + b$
m: 2.27824
b: 2.38039e-1
x: Amount[ppm]
y: Area
Calibration Level Weights:
Level 1 : 1
Level 2 : 0.0625
Level 3 : 0.01929
Level 4 : 0.0025
Level 7 : 0.000396

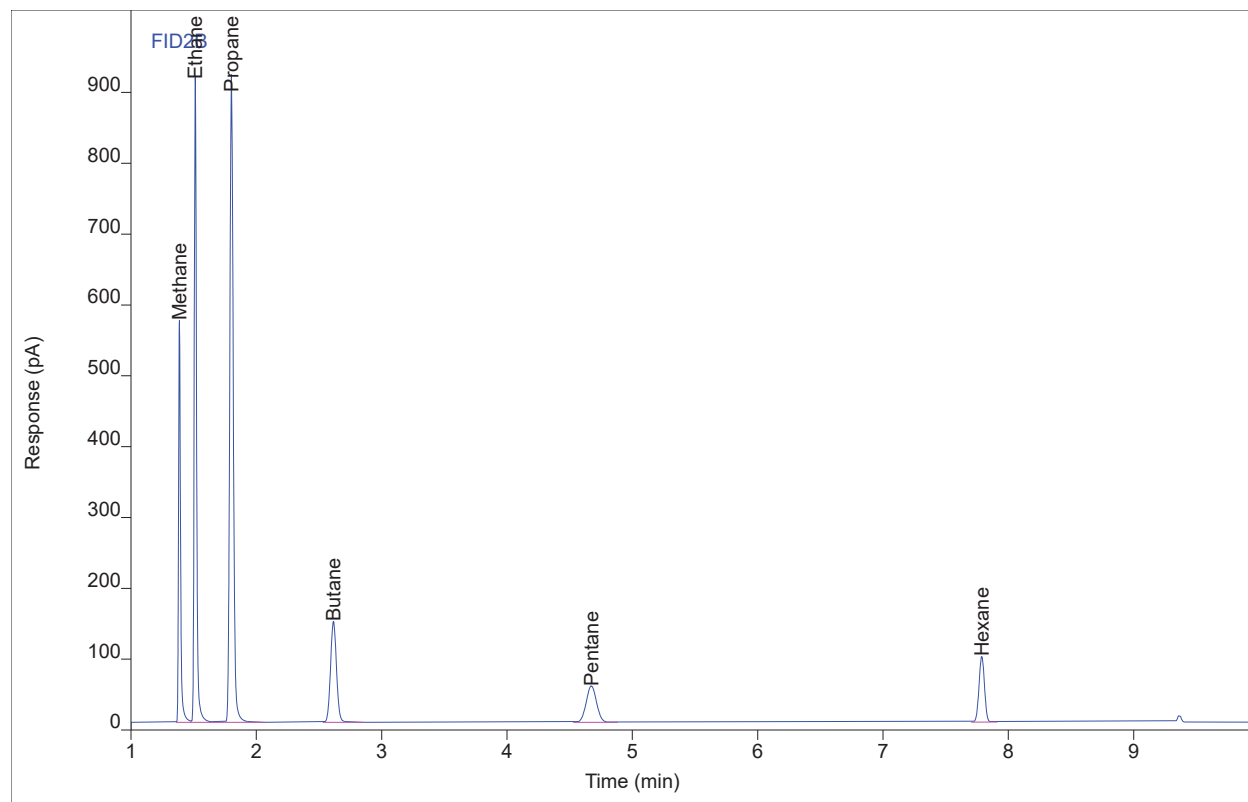
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Chromatogram Report

Sample Name BettyP773 #C5 ENV(1=3800,3=243.32)
 Sequence Name BETTYP773 ver.7
 Inj Data File 025B1002.D
 File Location GC/2018/Betty/Quarter 1
 Injection Date 2/16/2018 1:49 PM
 File Modified 2/22/2018 9:19 AM
 Instrument Betty
 Operator Nicholas Traversa

Enthalpy Analytical

Sample Type Calibration
 Vial Number 25
 Injection Volume 250
 Injection 2 of 4
 Acquisition Method GC142P133_CAL.M
 Analysis Method BETTYP773_C1-C7.M
 Method Modified 1/2/2014 5:30 PM
 Printed 2/22/2018 9:36 AM



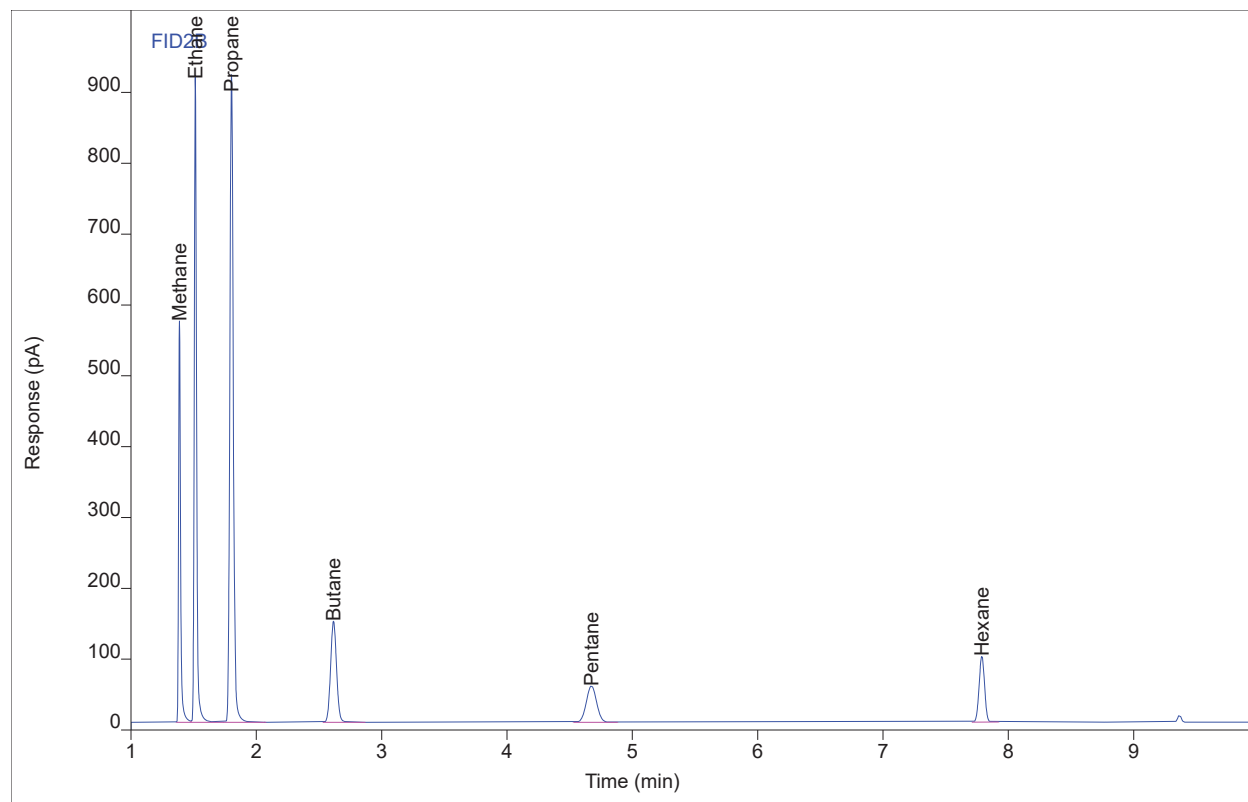
Compound	Type	RT	Area	Height	Amount	DF	SampAmt	Unit
Methane	BV	1.39	629.953	565.341	1787.84	1	1787.84	ppm
Ethane	VV	1.51	1185.28	910.378	1798.15	1	1798.15	ppm
Propane	VB	1.80	1780.92	913.393	1798.61	1	1798.61	ppm
Butane	BB	2.62	474.513	142.555	363.028	1	363.028	ppm
Pentane	BB	4.67	295.371	51.5300	180.616	1	180.616	ppm
Hexane	BB	7.79	282.589	93.0462	144.949	1	144.949	ppm

Chromatogram Report

Sample Name BettyP773 #C5 ENV(1=3800,3=243.32)
 Sequence Name BETTYP773 ver.7
 Inj Data File 025B1003.D
 File Location GC/2018/Betty/Quarter 1
 Injection Date 2/16/2018 2:12 PM
 File Modified 2/22/2018 9:19 AM
 Instrument Betty
 Operator Nicholas Traversa

Enthalpy Analytical

Sample Type Calibration
 Vial Number 25
 Injection Volume 250
 Injection 3 of 4
 Acquisition Method GC142P133_CAL.M
 Analysis Method BETTYP773_C1-C7.M
 Method Modified 1/2/2014 5:30 PM
 Printed 2/22/2018 9:36 AM



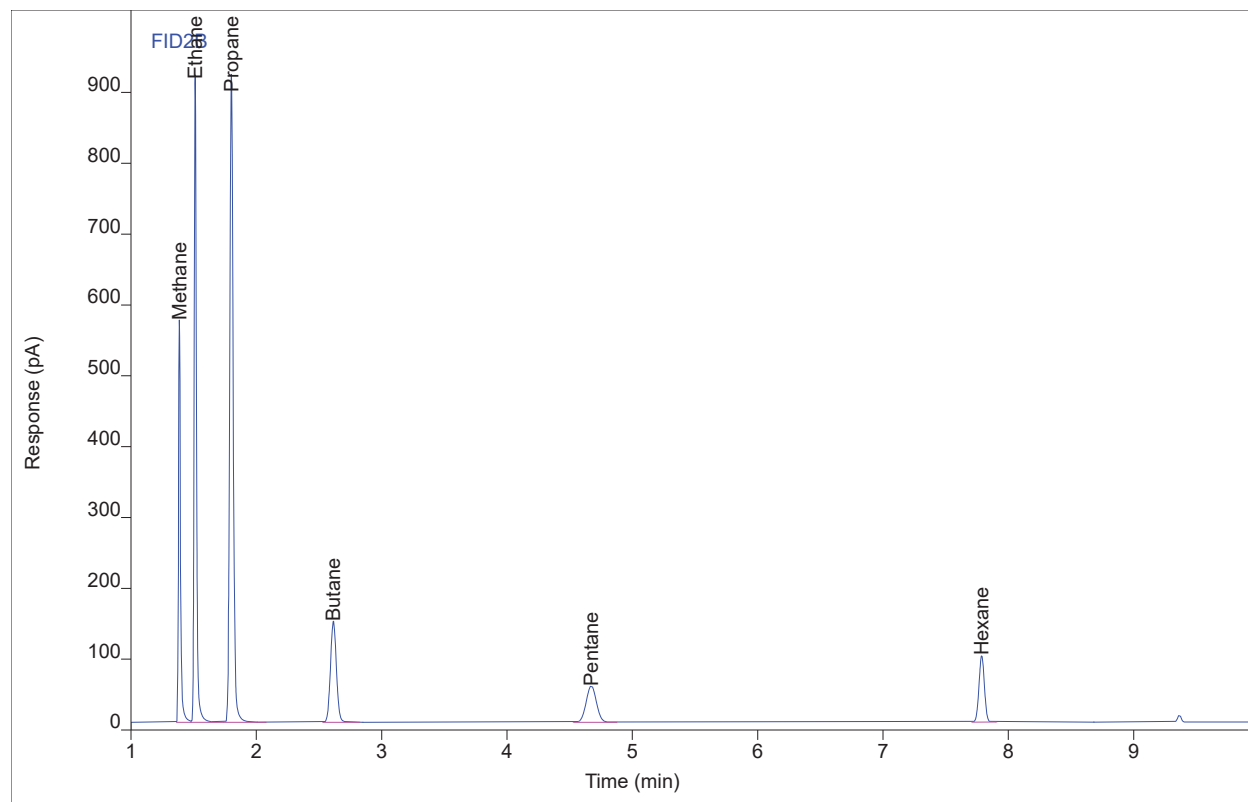
Compound	Type	RT	Area	Height	Amount	DF	SampAmt	Unit
Methane	BV	1.39	630.097	566.306	1788.25	1	1788.25	ppm
Ethane	VV	1.51	1185.76	911.997	1798.88	1	1798.88	ppm
Propane	VB	1.80	1781.99	913.783	1799.69	1	1799.69	ppm
Butane	BB	2.62	474.866	142.900	363.298	1	363.298	ppm
Pentane	BB	4.67	295.593	51.4285	180.752	1	180.752	ppm
Hexane	BB	7.79	282.999	93.2478	145.159	1	145.159	ppm

Chromatogram Report

Sample Name BettyP773 #C5 ENV(1=3800,3=243.32)
 Sequence Name BETTYP773 ver.7
 Inj Data File 025B1004.D
 File Location GC/2018/Betty/Quarter 1
 Injection Date 2/16/2018 2:35 PM
 File Modified 2/22/2018 9:19 AM
 Instrument Betty
 Operator Nicholas Traversa

Enthalpy Analytical

Sample Type Calibration
 Vial Number 25
 Injection Volume 250
 Injection 4 of 4
 Acquisition Method GC142P133_CAL.M
 Analysis Method BETTYP773_C1-C7.M
 Method Modified 1/2/2014 5:30 PM
 Printed 2/22/2018 9:36 AM



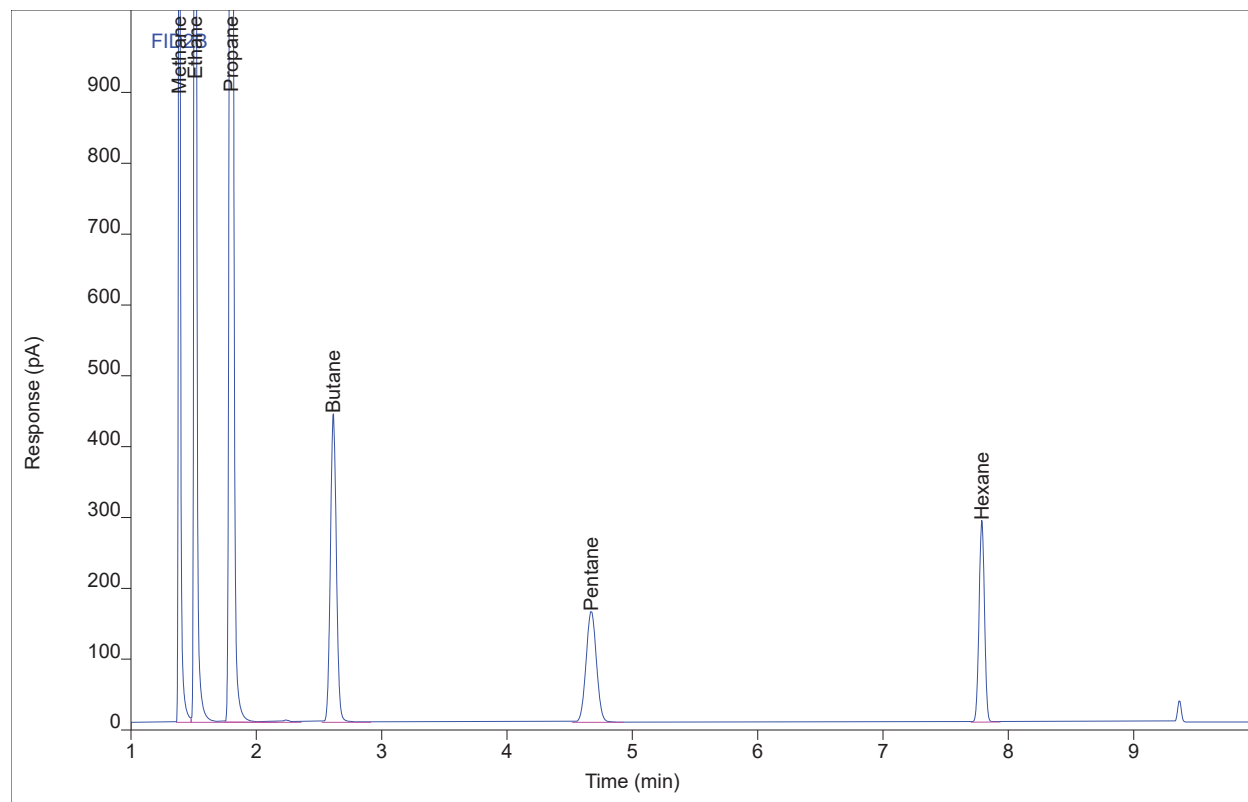
Compound	Type	RT	Area	Height	Amount	DF	SampAmt	Unit
Methane	BV	1.39	629.724	565.749	1787.19	1	1787.19	ppm
Ethane	VV	1.51	1185.07	911.949	1797.84	1	1797.84	ppm
Propane	VB	1.80	1780.76	913.993	1798.45	1	1798.45	ppm
Butane	BB	2.61	473.985	142.712	362.624	1	362.624	ppm
Pentane	BB	4.67	295.443	51.5371	180.660	1	180.660	ppm
Hexane	BB	7.79	282.706	94.1035	145.009	1	145.009	ppm

Chromatogram Report

Sample Name BettyP773 #C6 ENV(1=1700,3=365.09)
 Sequence Name BETTYP773 ver.7
 Inj Data File 025B1102.D
 File Location GC/2018/Betty/Quarter 1
 Injection Date 2/16/2018 3:21 PM
 File Modified 2/22/2018 9:19 AM
 Instrument Betty
 Operator Nicholas Traversa

Enthalpy Analytical

Sample Type Calibration
 Vial Number 25
 Injection Volume 250
 Injection 2 of 4
 Acquisition Method GC142P133_CAL.M
 Analysis Method BETTYP773_C1-C7.M
 Method Modified 1/2/2014 5:30 PM
 Printed 2/22/2018 9:36 AM



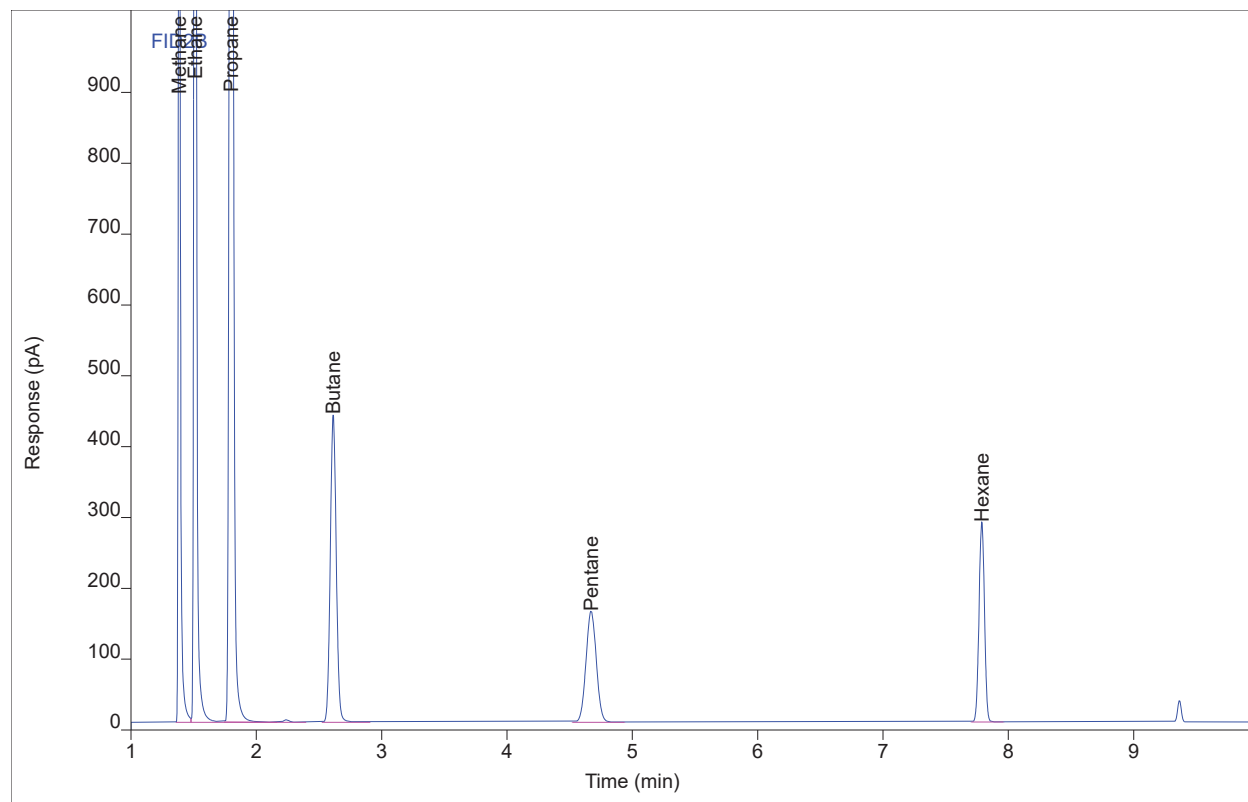
Compound	Type	RT	Area	Height	Amount	DF	SampAmt	Unit
Methane	BV	1.39	1926.40	1742.89	5467.79	1	5467.79	ppm
Ethane	VB S	1.51	3629.94	2796.19	5507.57	1	5507.57	ppm
Propane	BV T	1.80	5439.60	2789.89	5494.68	1	5494.68	ppm
Butane	BB	2.61	1450.56	436.128	1110.14	1	1110.14	ppm
Pentane	BB	4.67	903.786	157.261	553.126	1	553.126	ppm
Hexane	BB	7.79	865.027	284.625	444.225	1	444.225	ppm

Chromatogram Report

Sample Name BettyP773 #C6 ENV(1=1700,3=365.09)
 Sequence Name BETTYP773 ver.7
 Inj Data File 025B1103.D
 File Location GC/2018/Betty/Quarter 1
 Injection Date 2/16/2018 3:44 PM
 File Modified 2/22/2018 9:19 AM
 Instrument Betty
 Operator Nicholas Traversa

Enthalpy Analytical

Sample Type Calibration
 Vial Number 25
 Injection Volume 250
 Injection 3 of 4
 Acquisition Method GC142P133_CAL.M
 Analysis Method BETTYP773_C1-C7.M
 Method Modified 1/2/2014 5:30 PM
 Printed 2/22/2018 9:36 AM



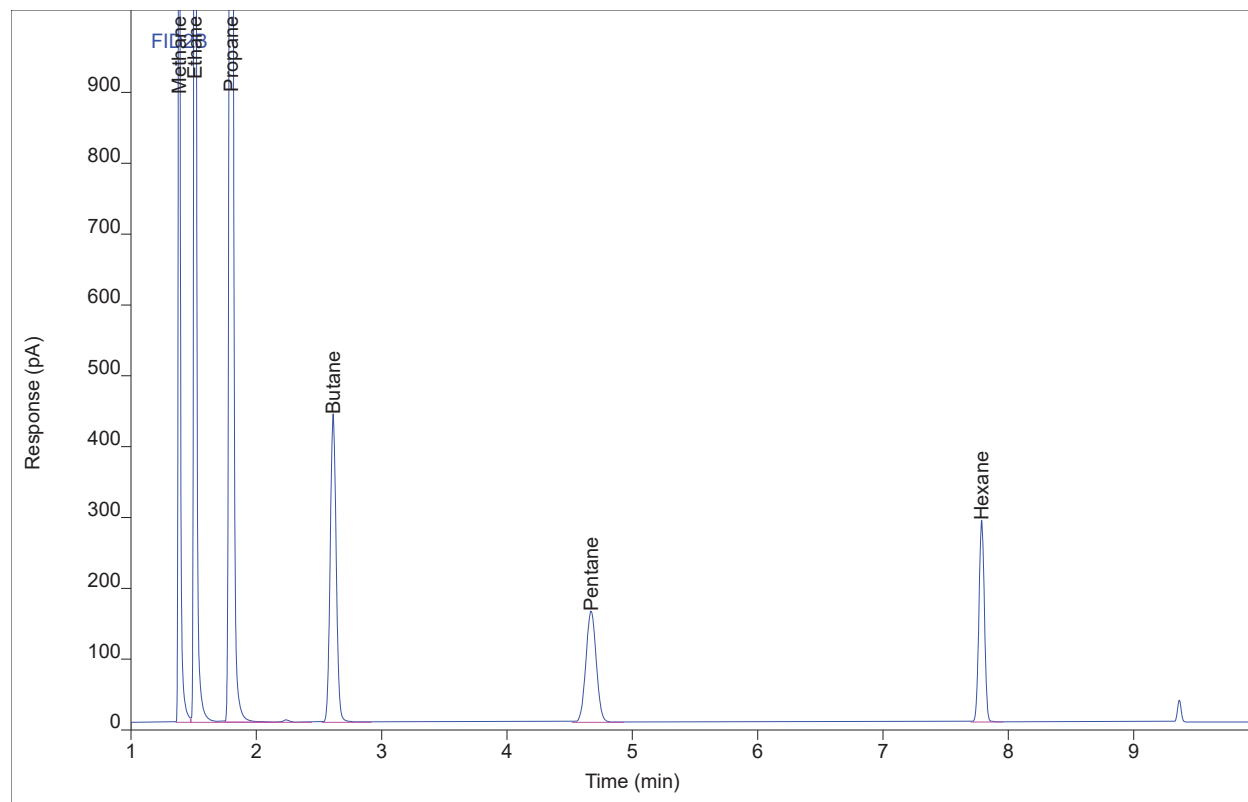
Compound	Type	RT	Area	Height	Amount	DF	SampAmt	Unit
Methane	BV	1.38	1923.59	1738.12	5459.82	1	5459.82	ppm
Ethane	VB S	1.51	3625.31	2787.84	5500.54	1	5500.54	ppm
Propane	BV X	1.80	5432.45	2785.46	5487.46	1	5487.46	ppm
Butane	BB	2.61	1448.46	434.599	1108.54	1	1108.54	ppm
Pentane	BB	4.67	902.542	157.242	552.364	1	552.364	ppm
Hexane	BB	7.79	864.123	282.417	443.760	1	443.760	ppm

Chromatogram Report

Sample Name BettyP773 #C6 ENV(1=1700,3=365.09)
 Sequence Name BETTYP773 ver.7
 Inj Data File 025B1104.D
 File Location GC/2018/Betty/Quarter 1
 Injection Date 2/16/2018 4:07 PM
 File Modified 2/22/2018 9:19 AM
 Instrument Betty
 Operator Nicholas Traversa

Enthalpy Analytical

Sample Type Calibration
 Vial Number 25
 Injection Volume 250
 Injection 4 of 4
 Acquisition Method GC142P133_CAL.M
 Analysis Method BETTYP773_C1-C7.M
 Method Modified 1/2/2014 5:30 PM
 Printed 2/22/2018 9:36 AM



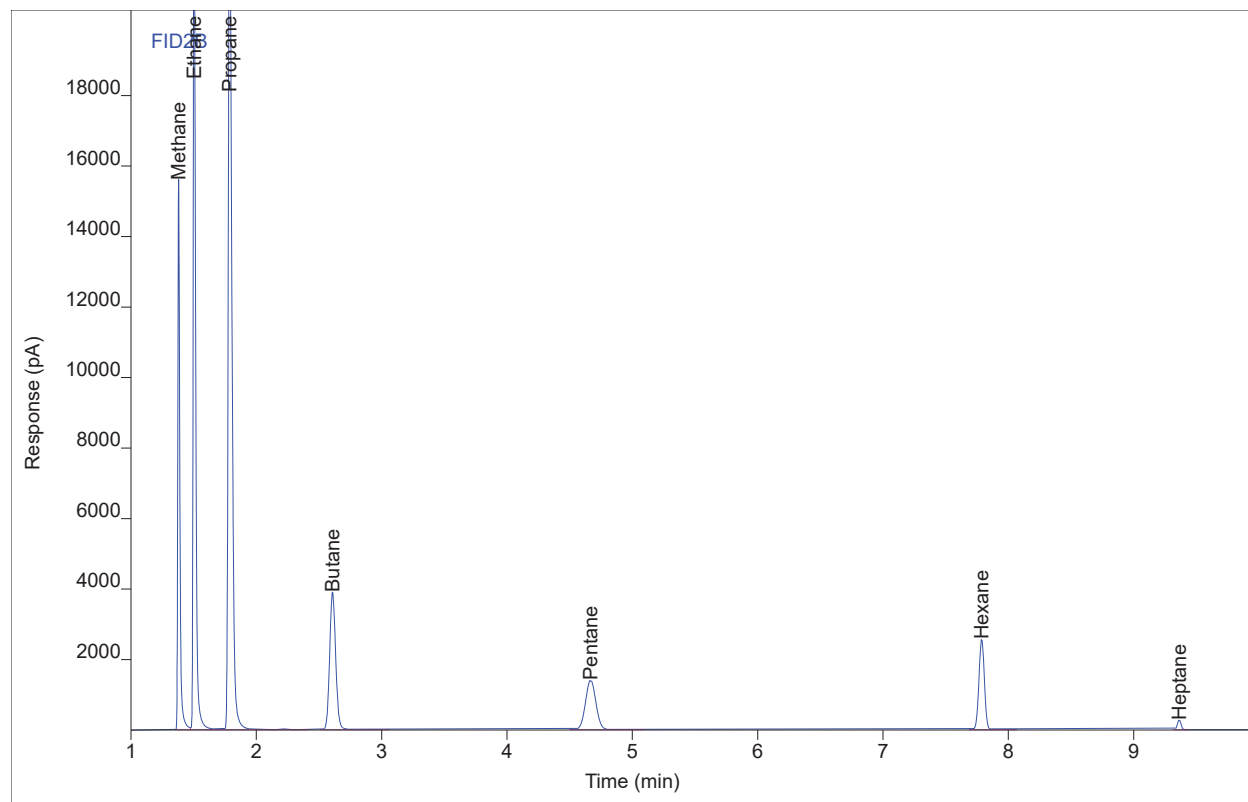
Compound	Type	RT	Area	Height	Amount	DF	SampAmt	Unit
Methane	BV	1.38	1925.34	1738.17	5464.78	1	5464.78	ppm
Ethane	VB S	1.51	3629.25	2800.41	5506.52	1	5506.52	ppm
Propane	BV X	1.80	5438.09	2785.91	5493.16	1	5493.16	ppm
Butane	BB	2.61	1450.11	435.311	1109.80	1	1109.80	ppm
Pentane	BB	4.67	903.693	157.115	553.069	1	553.069	ppm
Hexane	BB	7.79	865.091	284.456	444.257	1	444.257	ppm

Chromatogram Report

Sample Name BettyP773 #C7 ENV(1=0,3=438.21)
 Sequence Name BETTYP773 ver.7
 Inj Data File 025B1202.D
 File Location GC/2018/Betty/Quarter 1
 Injection Date 2/16/2018 4:53 PM
 File Modified 2/22/2018 9:19 AM
 Instrument Betty
 Operator Nicholas Traversa

Enthalpy Analytical

Sample Type Calibration
 Vial Number 25
 Injection Volume 250
 Injection 2 of 4
 Acquisition Method GC142P133_CAL.M
 Analysis Method BETTYP773_C1-C7.M
 Method Modified 1/2/2014 5:30 PM
 Printed 2/22/2018 9:35 AM



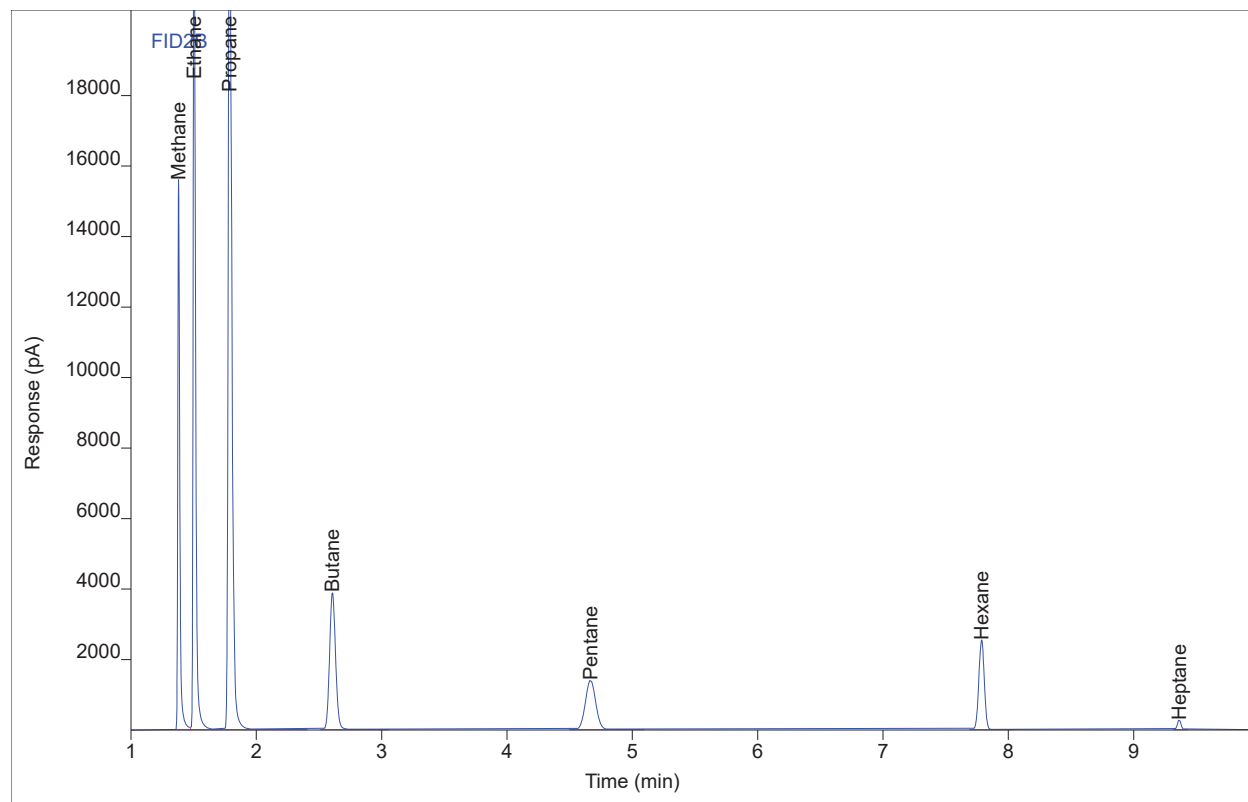
Compound	Type	RT	Area	Height	Amount	DF	SampAmt	Unit
Methane	BV	1.38	17500.4	15592.8	49674.3	1	49674.3	ppm
Ethane	VV S	1.50	32793.8	24862.2	49759.5	1	49759.5	ppm
Propane	VB S	1.79	49288.4	24422.6	49791.6	1	49791.6	ppm
Butane	BB	2.61	13089.8	3909.51	10019.4	1	10019.4	ppm
Pentane	BB	4.67	8153.55	1413.03	4991.88	1	4991.88	ppm
Hexane	BB	7.79	7795.58	2562.81	4005.37	1	4005.37	ppm
Heptane	BB	9.36	576.169	279.292	252.797	1	252.797	ppm

Chromatogram Report

Sample Name BettyP773 #C7 ENV(1=0,3=438.21)
Sequence Name BETTYP773 ver.7
Inj Data File 025B1203.D
File Location GC/2018/Betty/Quarter 1
Injection Date 2/16/2018 5:16 PM
File Modified 2/22/2018 9:19 AM
Instrument Betty
Operator Nicholas Traversa

Enthalpy Analytical

Sample Type Calibration
Vial Number 25
Injection Volume 250
Injection 3 of 4
Acquisition Method GC142P133_CAL.M
Analysis Method BETTYP773_C1-C7.M
Method Modified 1/2/2014 5:30 PM
Printed 2/22/2018 9:35 AM



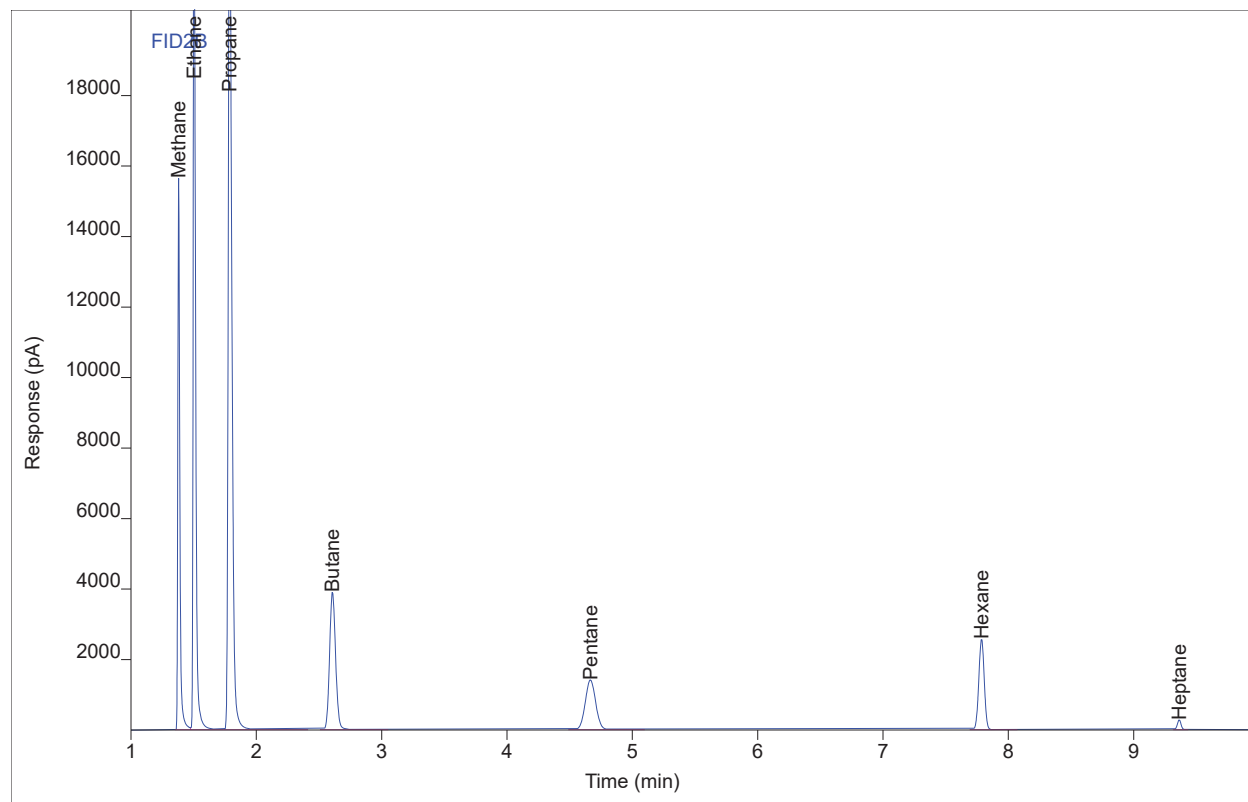
Compound	Type	RT	Area	Height	Amount	DF	SampAmt	Unit
Methane	BV	1.38	17443.8	15537.2	49513.6	1	49513.6	ppm
Ethane	VV S	1.50	32691.5	24747.2	49604.2	1	49604.2	ppm
Propane	VB S	1.79	49137.5	24333.0	49639.2	1	49639.2	ppm
Butane	BB	2.61	13046.0	3893.41	9985.83	1	9985.83	ppm
Pentane	BB	4.67	8126.22	1409.58	4975.15	1	4975.15	ppm
Hexane	BB	7.79	7772.18	2547.73	3993.35	1	3993.35	ppm
Heptane	BB	9.36	574.654	278.420	252.132	1	252.132	ppm

Chromatogram Report

Sample Name BettyP773 #C7 ENV(1=0,3=438.21)
Sequence Name BETTYP773 ver.7
Inj Data File 025B1204.D
File Location GC/2018/Betty/Quarter 1
Injection Date 2/16/2018 5:40 PM
File Modified 2/22/2018 9:19 AM
Instrument Betty
Operator Nicholas Traversa

Enthalpy Analytical

Sample Type Calibration
Vial Number 25
Injection Volume 250
Injection 4 of 4
Acquisition Method GC142P133_CAL.M
Analysis Method BETTYP773_C1-C7.M
Method Modified 1/2/2014 5:30 PM
Printed 2/22/2018 9:35 AM



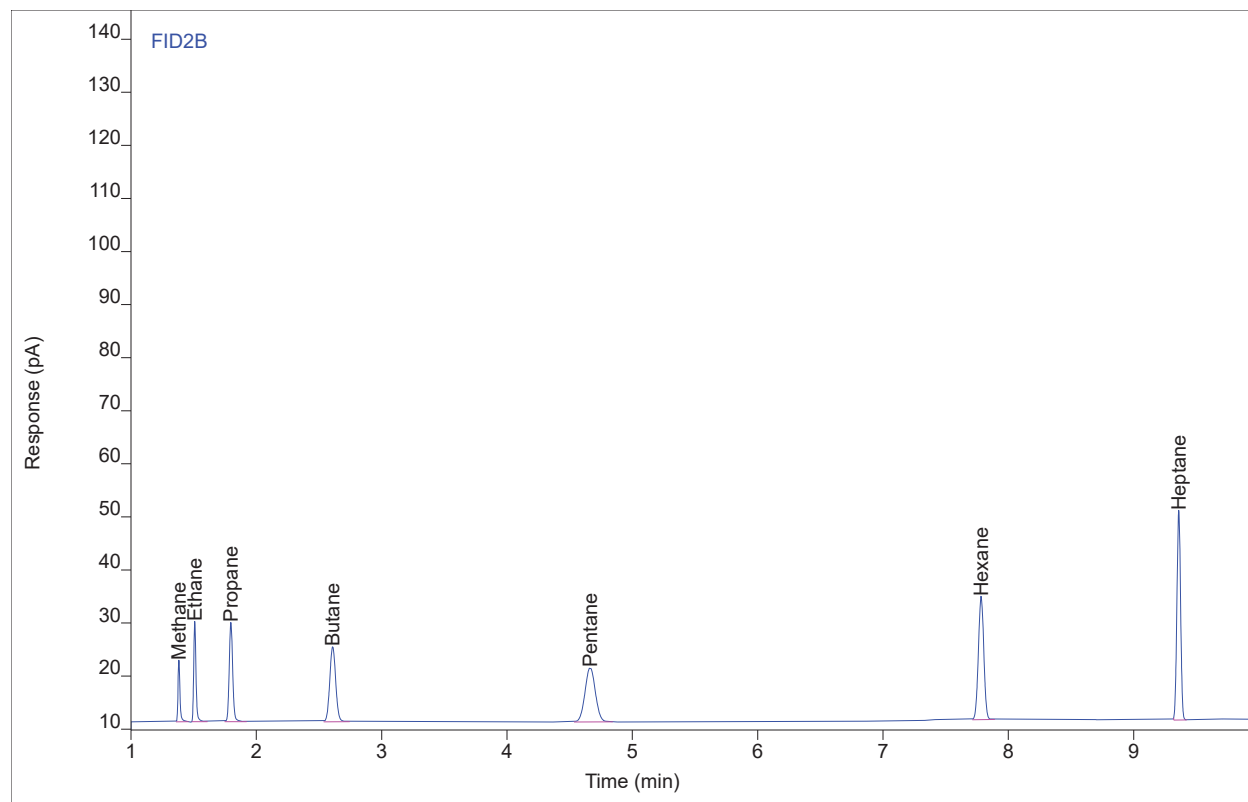
Compound	Type	RT	Area	Height	Amount	DF	SampAmt	Unit
Methane	BV	1.38	17528.9	15649.0	49755.1	1	49755.1	ppm
Ethane	VV S	1.50	32856.9	25027.5	49855.3	1	49855.3	ppm
Propane	VB S	1.79	49395.4	24486.2	49899.8	1	49899.8	ppm
Butane	BB	2.61	13112.4	3909.04	10036.7	1	10036.7	ppm
Pentane	BB	4.67	8167.97	1414.95	5000.71	1	5000.71	ppm
Hexane	BB	7.79	7811.53	2571.84	4013.57	1	4013.57	ppm
Heptane	BB	9.36	577.519	280.040	253.389	1	253.389	ppm

Chromatogram Report

Sample Name BettyP773 #C3 ENV(1=565.33,2=450)
Sequence Name BETTYP773 ver.7
Inj Data File 025B1503.D
File Location GC/2018/Betty/Quarter 1
Injection Date 2/19/2018 5:39 PM
File Modified 2/22/2018 9:20 AM
Instrument Betty
Operator Nicholas Traversa

Enthalpy Analytical

Sample Type Calibration
Vial Number 25
Injection Volume 250
Injection 3 of 5
Acquisition Method GC142P133_CAL.M
Analysis Method BETTYP773_C1-C7.M
Method Modified 1/2/2014 5:30 PM
Printed 2/22/2018 9:37 AM



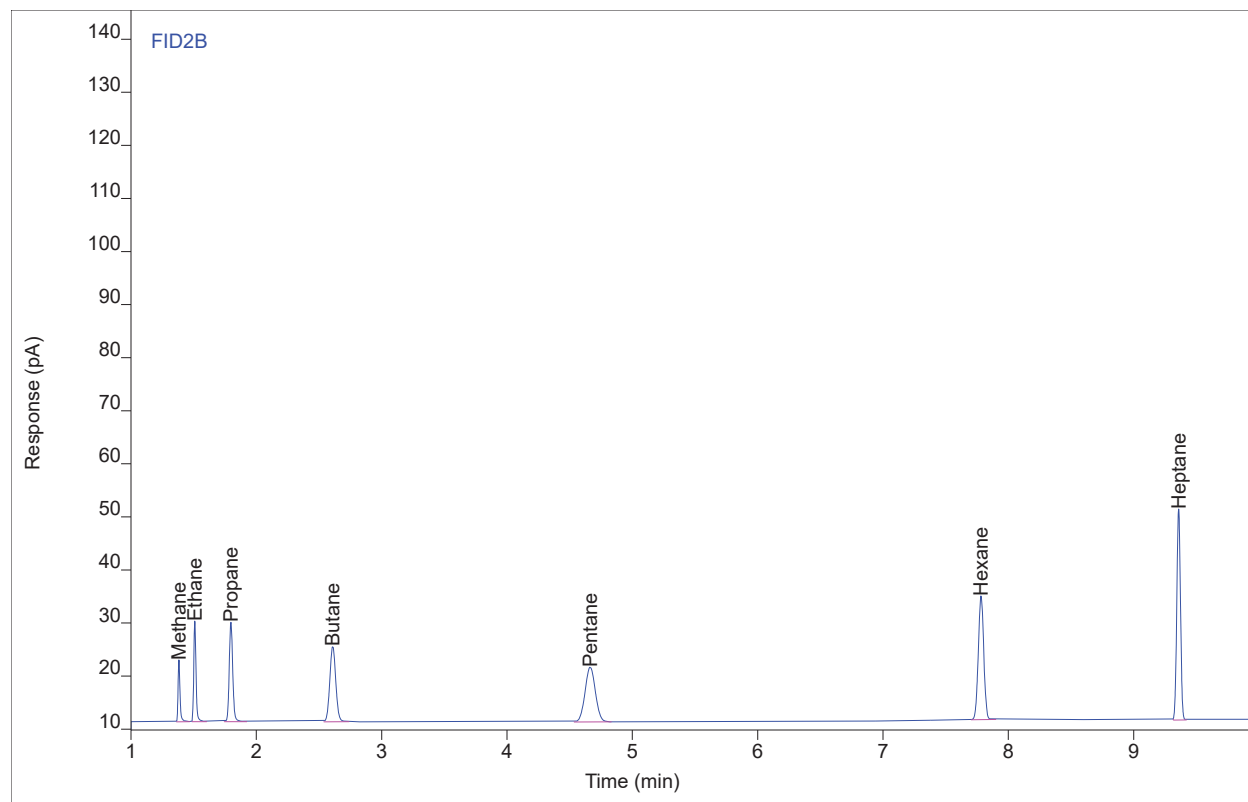
Compound	Type	RT	Area	Height	Amount	DF	SampAmt	Unit
Methane	BB	1.38	12.8807	11.6520	36.2888	1	36.2888	ppm
Ethane	PB	1.51	24.1863	18.9735	36.3659	1	36.3659	ppm
Propane	BB	1.80	36.6051	18.8290	36.4679	1	36.4679	ppm
Butane	BB	2.61	46.9566	14.1925	35.7555	1	35.7555	ppm
Pentane	BB	4.66	58.9851	10.2637	35.8862	1	35.8862	ppm
Hexane	BB	7.78	70.1094	23.2364	35.7699	1	35.7699	ppm
Heptane	BB	9.36	81.4405	39.4616	35.6427	1	35.6427	ppm

Chromatogram Report

Sample Name BettyP773 #C3 ENV(1=565.33,2=450)
Sequence Name BETTYP773 ver.7
Inj Data File 025B1504.D
File Location GC/2018/Betty/Quarter 1
Injection Date 2/19/2018 6:02 PM
File Modified 2/22/2018 9:20 AM
Instrument Betty
Operator Nicholas Traversa

Enthalpy Analytical

Sample Type Calibration
Vial Number 25
Injection Volume 250
Injection 4 of 5
Acquisition Method GC142P133_CAL.M
Analysis Method BETTYP773_C1-C7.M
Method Modified 1/2/2014 5:30 PM
Printed 2/22/2018 9:37 AM



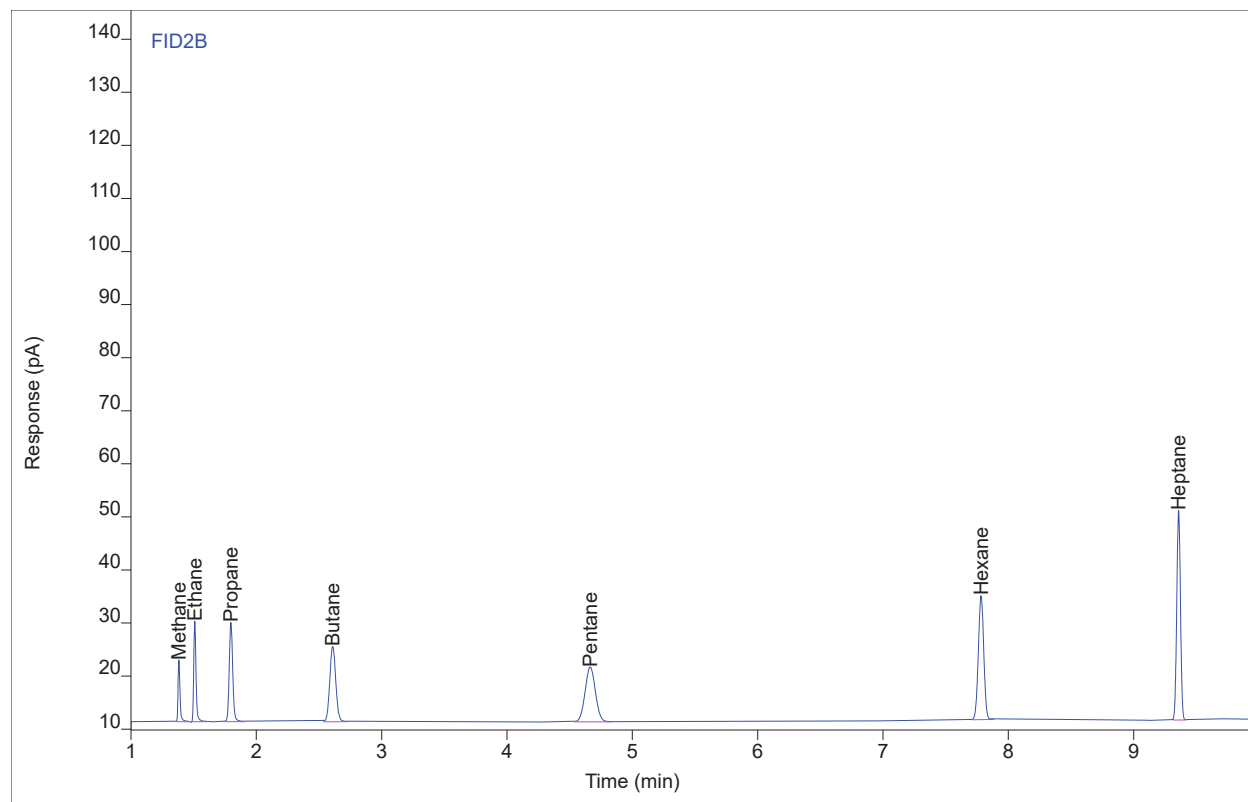
Compound	Type	RT	Area	Height	Amount	DF	SampAmt	Unit
Methane	BP	1.38	12.9393	11.5898	36.4553	1	36.4553	ppm
Ethane	PB	1.51	24.1664	18.9240	36.3356	1	36.3356	ppm
Propane	BB	1.80	36.6536	18.7980	36.5169	1	36.5169	ppm
Butane	BB	2.61	47.1369	14.2418	35.8935	1	35.8935	ppm
Pentane	BB	4.66	59.2716	10.3239	36.0616	1	36.0616	ppm
Hexane	BB	7.78	70.5193	23.3326	35.9805	1	35.9805	ppm
Heptane	BB	9.36	81.9037	39.7309	35.8460	1	35.8460	ppm

Chromatogram Report

Sample Name BettyP773 #C3 ENV(1=565.33,2=450)
Sequence Name BETTYP773 ver.7
Inj Data File 025B1505.D
File Location GC/2018/Betty/Quarter 1
Injection Date 2/19/2018 6:25 PM
File Modified 2/22/2018 9:20 AM
Instrument Betty
Operator Nicholas Traversa

Enthalpy Analytical

Sample Type Calibration
Vial Number 25
Injection Volume 250
Injection 5 of 5
Acquisition Method GC142P133_CAL.M
Analysis Method BETTYP773_C1-C7.M
Method Modified 1/2/2014 5:30 PM
Printed 2/22/2018 9:37 AM



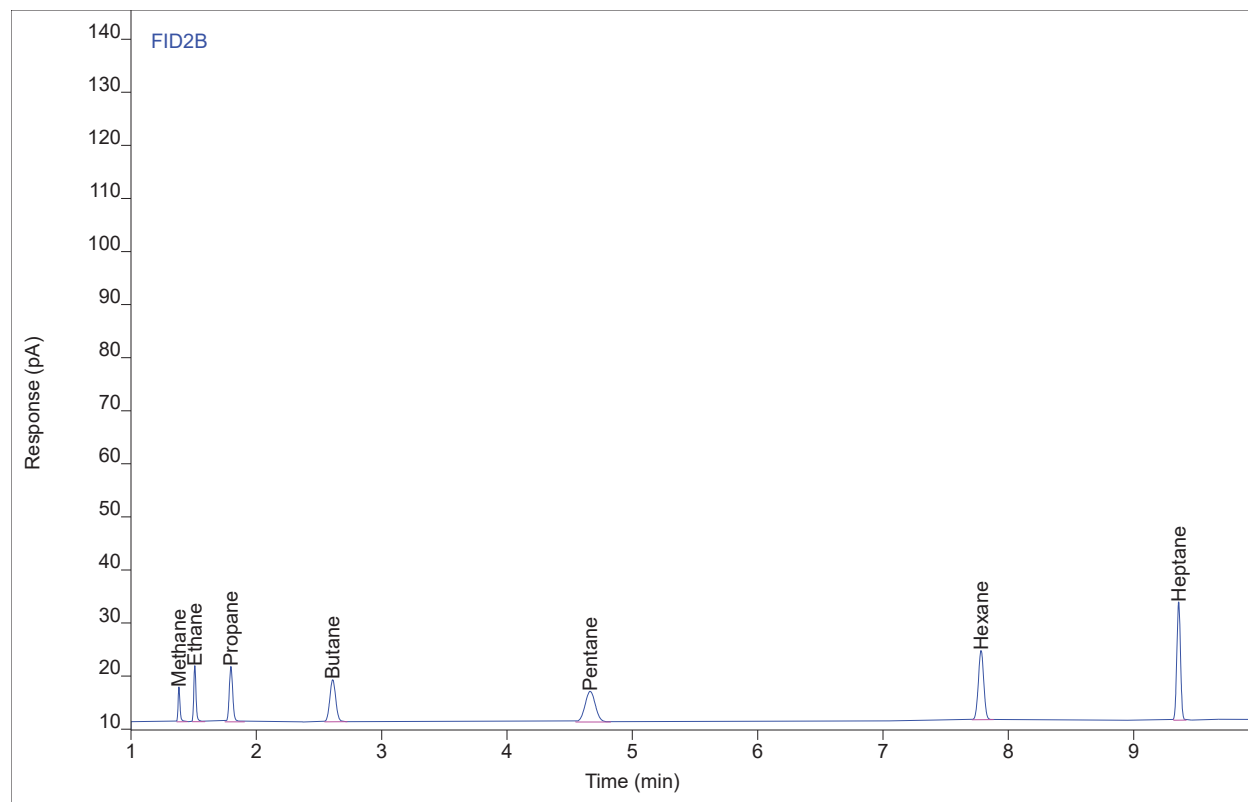
Compound	Type	RT	Area	Height	Amount	DF	SampAmt	Unit
Methane	BP	1.38	12.9182	11.5869	36.3953	1	36.3953	ppm
Ethane	PB	1.51	24.1690	18.8910	36.3396	1	36.3396	ppm
Propane	BB	1.80	36.5783	18.7748	36.4409	1	36.4409	ppm
Butane	BB	2.61	47.2378	14.2835	35.9708	1	35.9708	ppm
Pentane	BB	4.66	59.2884	10.3736	36.0719	1	36.0719	ppm
Hexane	BB	7.78	70.4986	23.4541	35.9699	1	35.9699	ppm
Heptane	BB	9.36	82.0437	39.4855	35.9074	1	35.9074	ppm

Chromatogram Report

Sample Name BettyP773 #C2 ENV(1=1130.66,2=400)
Sequence Name BETTYP773 ver.7
Inj Data File 025B1603.D
File Location GC/2018/Betty/Quarter 1
Injection Date 2/19/2018 7:35 PM
File Modified 2/22/2018 9:20 AM
Instrument Betty
Operator Nicholas Traversa

Enthalpy Analytical

Sample Type Calibration
Vial Number 25
Injection Volume 250
Injection 3 of 5
Acquisition Method GC142P133_CAL.M
Analysis Method BETTYP773_C1-C7.M
Method Modified 1/2/2014 5:30 PM
Printed 2/22/2018 9:37 AM



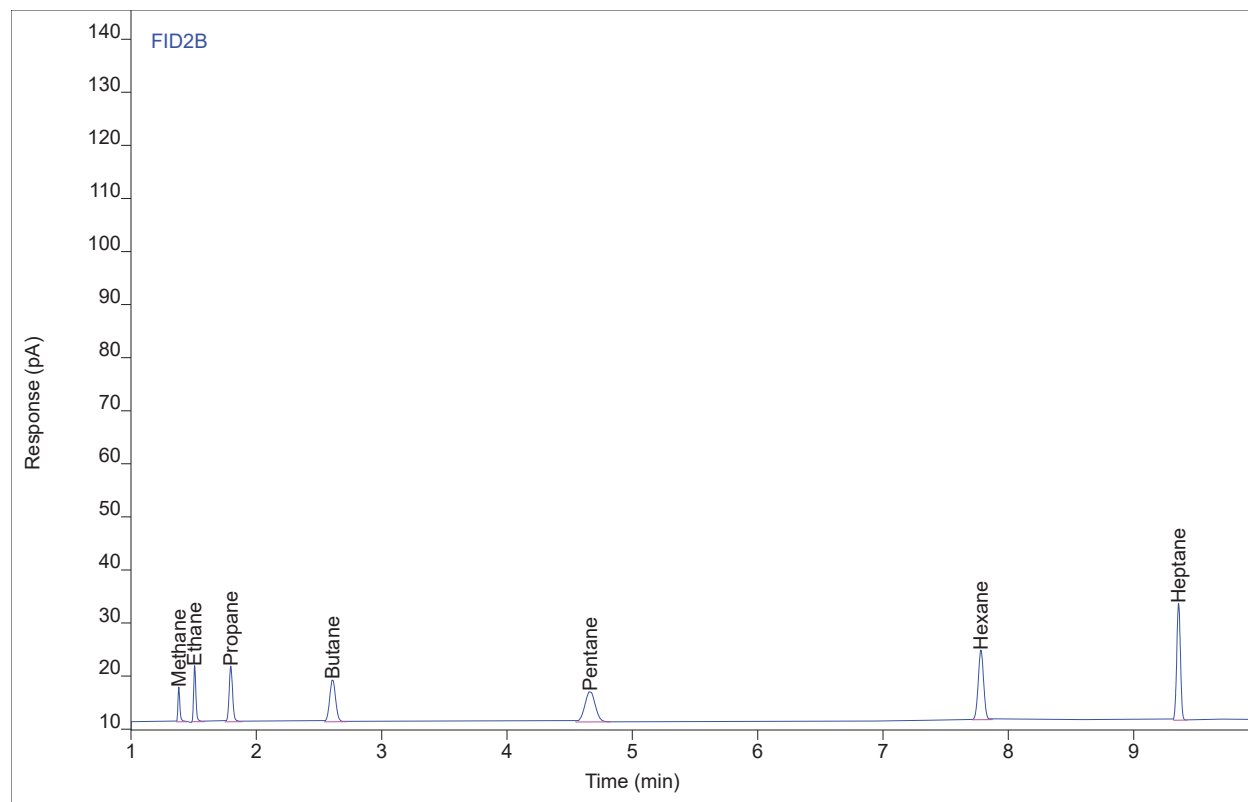
Compound	Type	RT	Area	Height	Amount	DF	SampAmt	Unit
Methane	BB	1.38	7.15522	6.53271	20.0372	1	20.0372	ppm
Ethane	PB	1.51	13.3428	10.5508	19.9123	1	19.9123	ppm
Propane	BB	1.80	20.3396	10.4517	20.0362	1	20.0362	ppm
Butane	BB	2.61	26.2591	7.97768	19.9126	1	19.9126	ppm
Pentane	BB	4.66	33.0174	5.79463	19.9871	1	19.9871	ppm
Hexane	BB	7.78	39.3943	13.1276	19.9875	1	19.9875	ppm
Heptane	BB	9.36	45.7573	22.3524	19.9800	1	19.9800	ppm

Chromatogram Report

Sample Name BettyP773 #C2 ENV(1=1130.66,2=400)
Sequence Name BETTYP773 ver.7
Inj Data File 025B1604.D
File Location GC/2018/Betty/Quarter 1
Injection Date 2/19/2018 7:58 PM
File Modified 2/22/2018 9:20 AM
Instrument Betty
Operator Nicholas Traversa

Enthalpy Analytical

Sample Type Calibration
Vial Number 25
Injection Volume 250
Injection 4 of 5
Acquisition Method GC142P133_CAL.M
Analysis Method BETTYP773_C1-C7.M
Method Modified 1/2/2014 5:30 PM
Printed 2/22/2018 9:37 AM



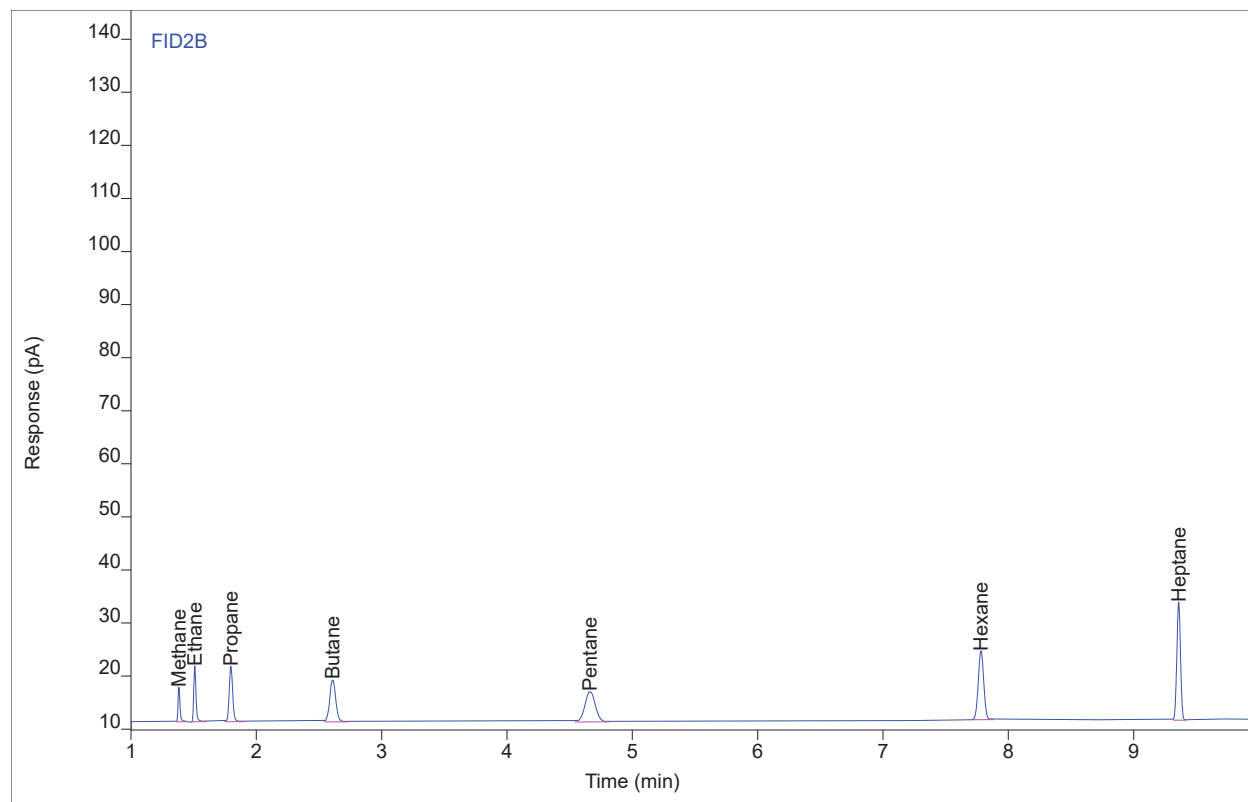
Compound	Type	RT	Area	Height	Amount	DF	SampAmt	Unit
Methane	BB	1.38	7.16378	6.56213	20.0614	1	20.0614	ppm
Ethane	PB	1.51	13.3420	10.5733	19.9112	1	19.9112	ppm
Propane	BB	1.80	20.2921	10.4921	19.9882	1	19.9882	ppm
Butane	BB	2.61	26.3020	7.96534	19.9455	1	19.9455	ppm
Pentane	BB	4.66	33.1046	5.76829	20.0405	1	20.0405	ppm
Hexane	BB	7.78	39.4584	13.1530	20.0204	1	20.0204	ppm
Heptane	BB	9.36	45.8967	21.9972	20.0412	1	20.0412	ppm

Chromatogram Report

Sample Name BettyP773 #C2 ENV(1=1130.66,2=400)
Sequence Name BETTYP773 ver.7
Inj Data File 025B1605.D
File Location GC/2018/Betty/Quarter 1
Injection Date 2/19/2018 8:22 PM
File Modified 2/22/2018 9:20 AM
Instrument Betty
Operator Nicholas Traversa

Enthalpy Analytical

Sample Type Calibration
Vial Number 25
Injection Volume 250
Injection 5 of 5
Acquisition Method GC142P133_CAL.M
Analysis Method BETTYP773_C1-C7.M
Method Modified 1/2/2014 5:30 PM
Printed 2/22/2018 9:37 AM



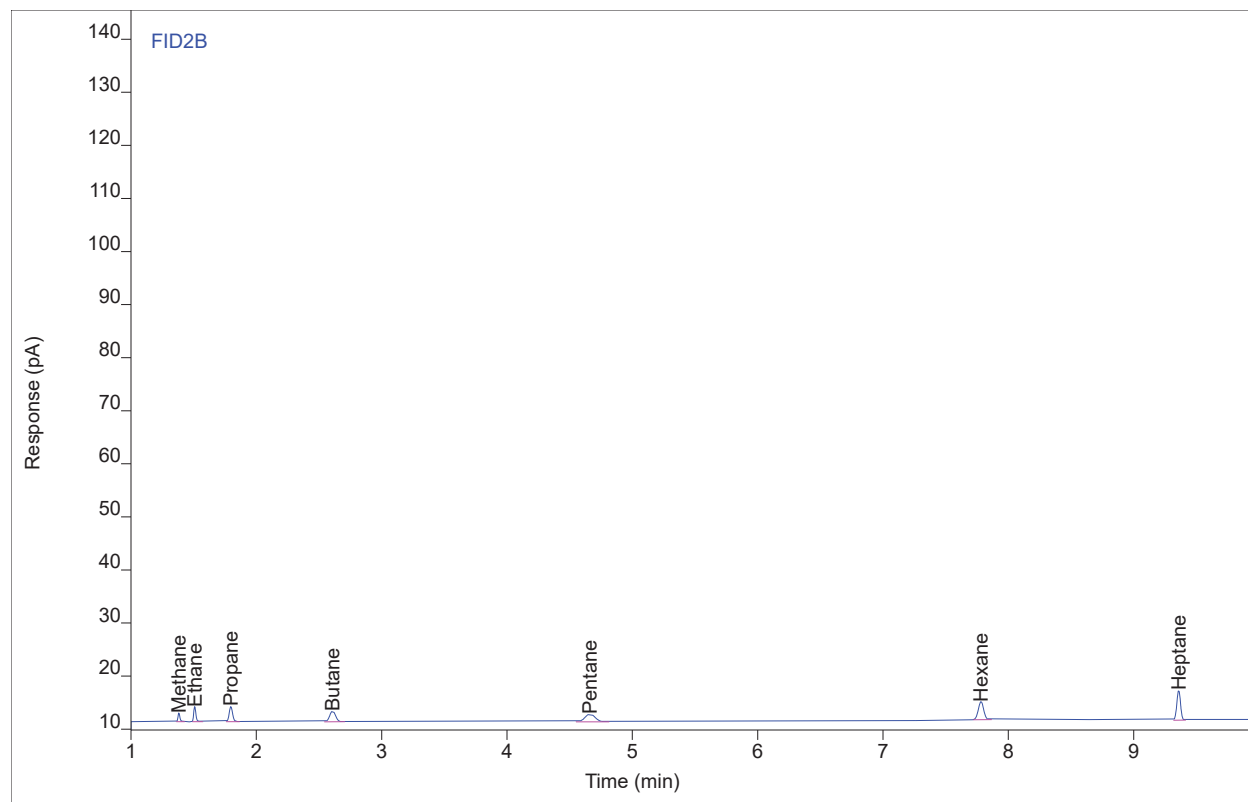
Compound	Type	RT	Area	Height	Amount	DF	SampAmt	Unit
Methane	BB	1.38	7.21708	6.55093	20.2127	1	20.2127	ppm
Ethane	PB	1.51	13.3907	10.5606	19.9851	1	19.9851	ppm
Propane	BB	1.80	20.3499	10.4654	20.0466	1	20.0466	ppm
Butane	BB	2.61	26.4118	7.97175	20.0295	1	20.0295	ppm
Pentane	BB	4.66	33.1951	5.79950	20.0960	1	20.0960	ppm
Hexane	BB	7.78	39.5194	12.9753	20.0518	1	20.0518	ppm
Heptane	BB	9.36	45.9188	22.2410	20.0509	1	20.0509	ppm

Chromatogram Report

Sample Name BettyP773 #C1 ENV(1=1342.66,2=100)
 Sequence Name BETTYP773 ver.7
 Inj Data File 025B1703.D
 File Location GC/2018/Betty/Quarter 1
 Injection Date 2/19/2018 9:31 PM
 File Modified 2/22/2018 9:20 AM
 Instrument Betty
 Operator Nicholas Traversa

Enthalpy Analytical

Sample Type Calibration
 Vial Number 25
 Injection Volume 250
 Injection 3 of 10
 Acquisition Method GC142P133_CAL.M
 Analysis Method BETTYP773_C1-C7.M
 Method Modified 1/2/2014 5:30 PM
 Printed 2/22/2018 9:37 AM



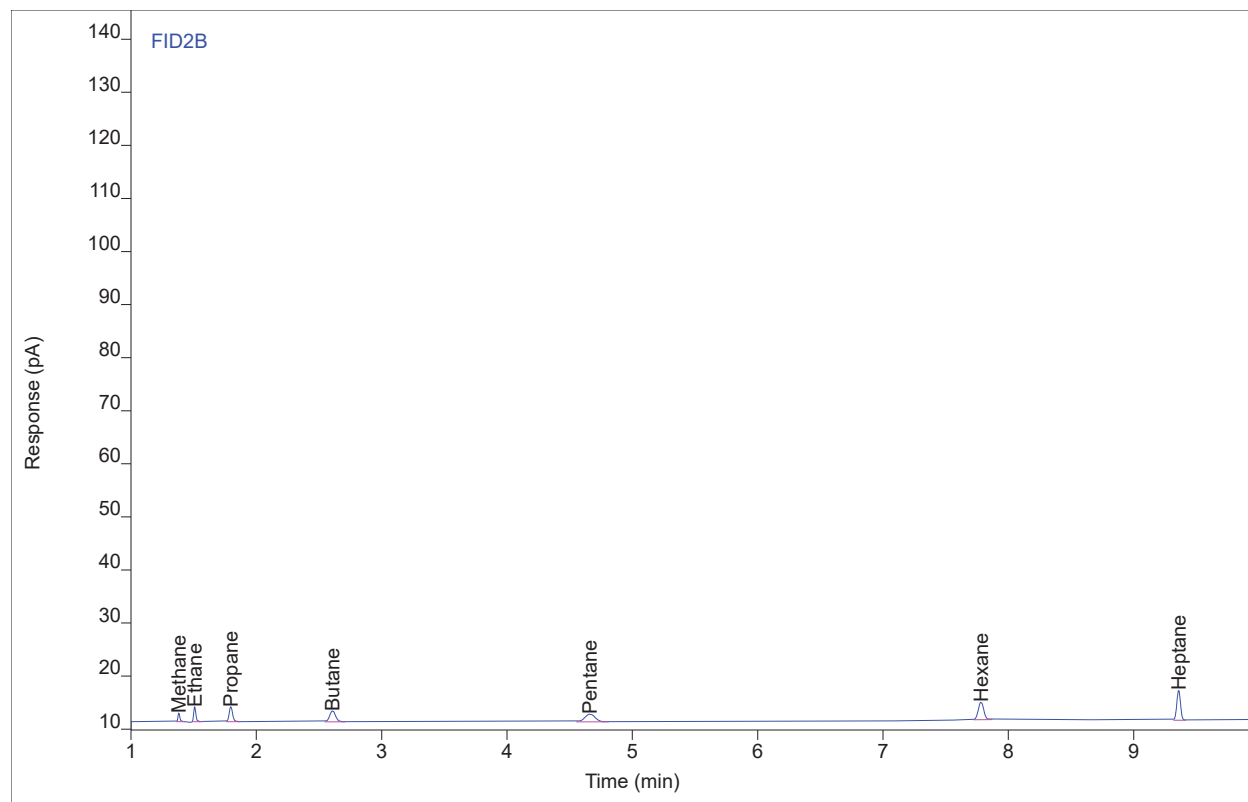
Compound	Type	RT	Area	Height	Amount	DF	SampAmt	Unit
Methane	BB	1.38	1.83410	1.72188	4.93669	1	4.93669	ppm
Ethane	PB	1.51	3.52163	2.83211	5.01023	1	5.01023	ppm
Propane	BB	1.80	5.43305	2.84652	4.97942	1	4.97942	ppm
Butane	BB	2.61	6.79641	2.06000	5.01493	1	5.01493	ppm
Pentane	BB	4.66	8.48314	1.47859	4.96726	1	4.96726	ppm
Hexane	BB	7.78	10.2616	3.40016	5.01813	1	5.01813	ppm
Heptane	BB	9.36	11.6098	5.62992	4.99163	1	4.99163	ppm

Chromatogram Report

Sample Name BettyP773 #C1 ENV(1=1342.66,2=100)
Sequence Name BETTYP773 ver.7
Inj Data File 025B1704.D
File Location GC/2018/Betty/Quarter 1
Injection Date 2/19/2018 9:55 PM
File Modified 2/22/2018 9:20 AM
Instrument Betty
Operator Nicholas Traversa

Enthalpy Analytical

Sample Type Calibration
Vial Number 25
Injection Volume 250
Injection 4 of 10
Acquisition Method GC142P133_CAL.M
Analysis Method BETTYP773_C1-C7.M
Method Modified 1/2/2014 5:30 PM
Printed 2/22/2018 9:37 AM



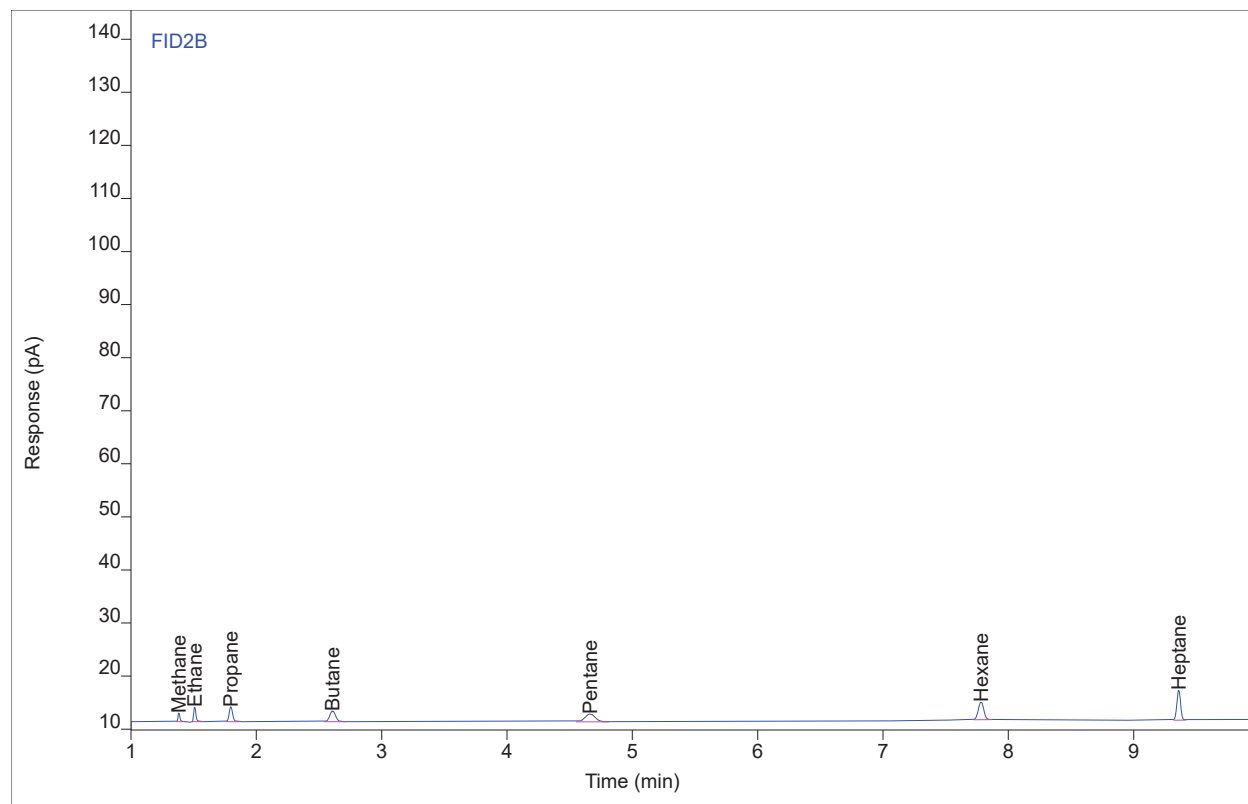
Compound	Type	RT	Area	Height	Amount	DF	SampAmt	Unit
Methane	BB	1.38	1.83776	1.73621	4.94653	1	4.94653	ppm
Ethane	PB	1.51	3.49533	2.84066	4.97218	1	4.97218	ppm
Propane	BB	1.80	5.43602	2.83212	4.98214	1	4.98214	ppm
Butane	BB	2.61	6.81482	2.06645	5.02902	1	5.02902	ppm
Pentane	BB	4.66	8.53314	1.49426	4.99654	1	4.99654	ppm
Hexane	BB	7.78	10.2106	3.37984	4.99229	1	4.99229	ppm
Heptane	BB	9.36	11.6536	5.67422	5.01071	1	5.01071	ppm

Chromatogram Report

Sample Name BettyP773 #C1 ENV(1=1342.66,2=100)
 Sequence Name BETTYP773 ver.7
 Inj Data File 025B1705.D
 File Location GC/2018/Betty/Quarter 1
 Injection Date 2/19/2018 10:18 PM
 File Modified 2/22/2018 9:20 AM
 Instrument Betty
 Operator Nicholas Traversa

Enthalpy Analytical

Sample Type Calibration
 Vial Number 25
 Injection Volume 250
 Injection 5 of 10
 Acquisition Method GC142P133_CAL.M
 Analysis Method BETTYP773_C1-C7.M
 Method Modified 1/2/2014 5:30 PM
 Printed 2/22/2018 9:37 AM



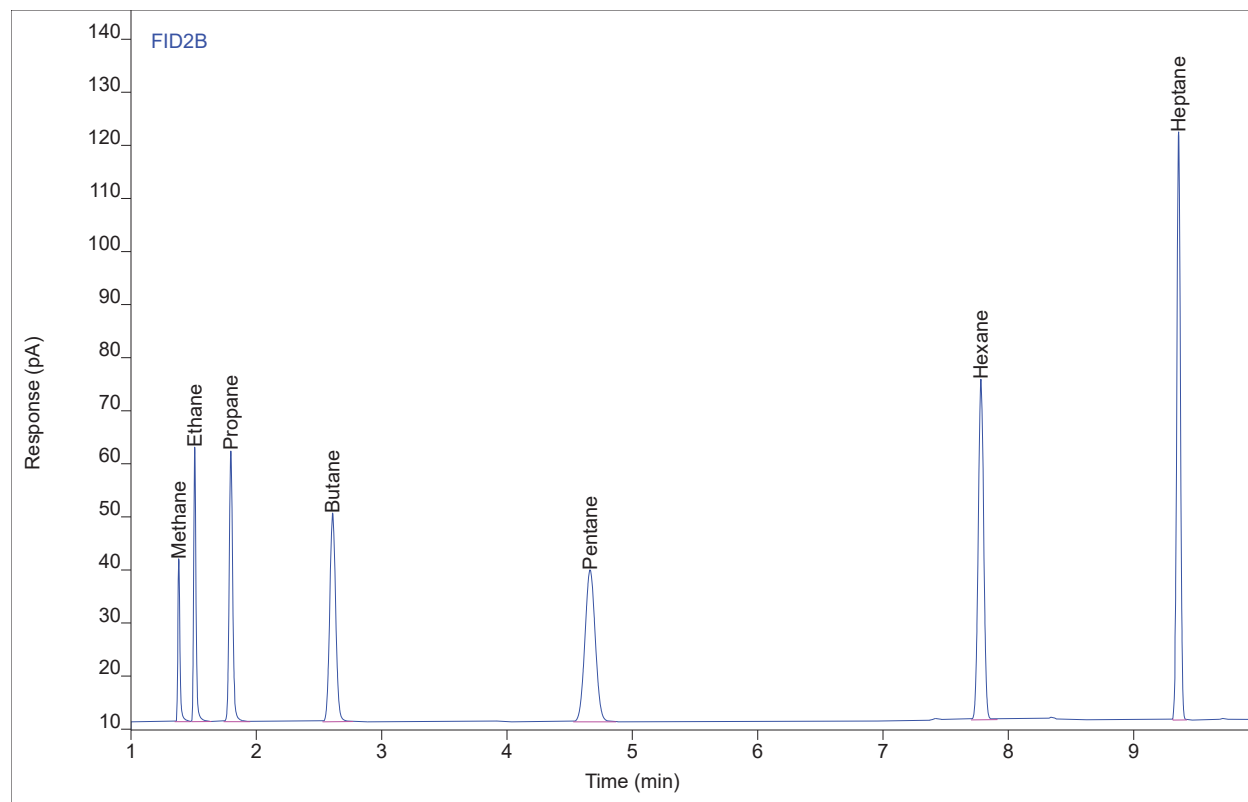
Compound	Type	RT	Area	Height	Amount	DF	SampAmt	Unit
Methane	BB	1.38	1.88211	1.73638	5.06950	1	5.06950	ppm
Ethane	PB	1.51	3.51733	2.84500	5.00371	1	5.00371	ppm
Propane	BB	1.80	5.46172	2.84196	5.00627	1	5.00627	ppm
Butane	BB	2.61	6.73925	2.06294	4.97221	1	4.97221	ppm
Pentane	BB	4.66	8.58453	1.49384	5.02785	1	5.02785	ppm
Hexane	BB	7.78	10.2072	3.39745	4.99065	1	4.99065	ppm
Heptane	BB	9.36	11.6403	5.67769	5.00486	1	5.00486	ppm

Chromatogram Report

Sample Name BettyP773 #C4 ENV(1=0,2=450)
Sequence Name BETTYP773 ver.7
Inj Data File 025B2002.D
File Location GC/2018/Betty/Quarter 1
Injection Date 2/20/2018 2:40 AM
File Modified 2/22/2018 9:20 AM
Instrument Betty
Operator Nicholas Traversa

Enthalpy Analytical

Sample Type Calibration
Vial Number 25
Injection Volume 250
Injection 2 of 4
Acquisition Method GC142P133_CAL.M
Analysis Method BETTYP773_C1-C7.M
Method Modified 1/2/2014 5:30 PM
Printed 2/22/2018 9:37 AM



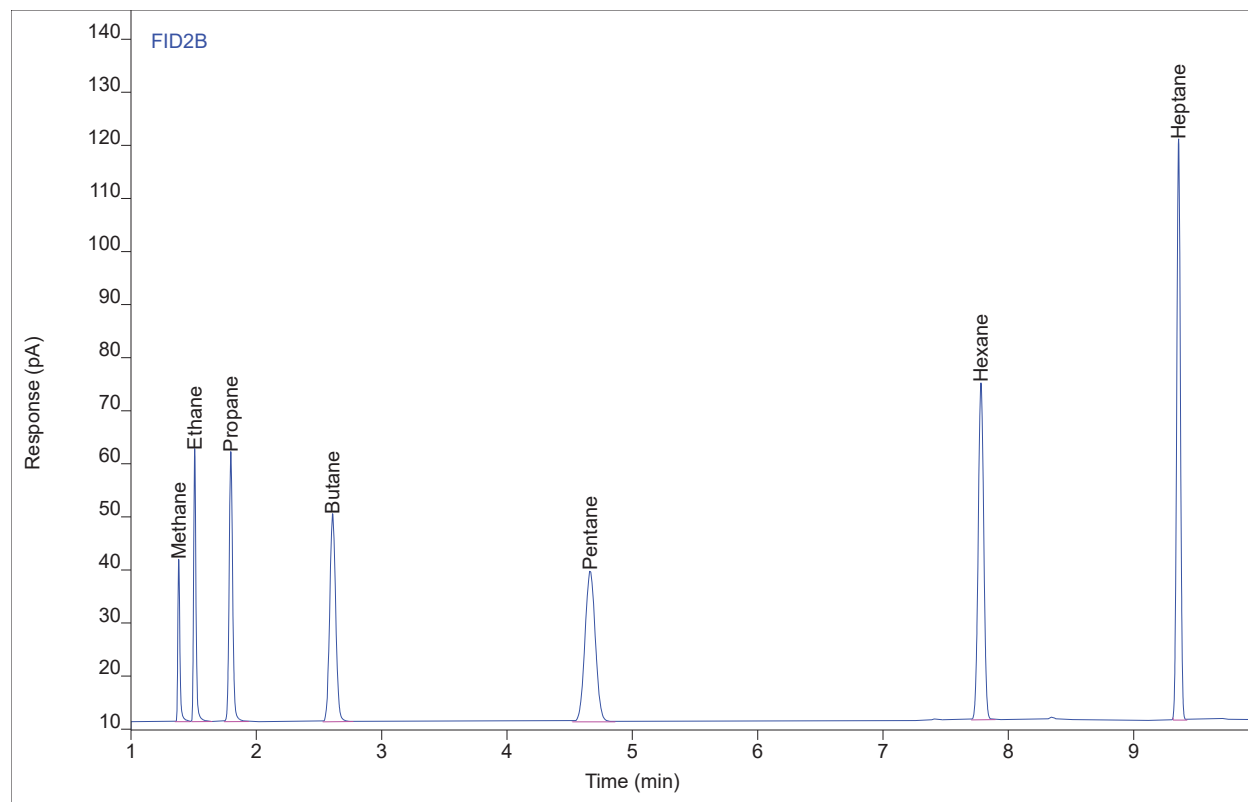
Compound	Type	RT	Area	Height	Amount	DF	SampAmt	Unit
Methane	BP	1.38	36.0835	30.6739	102.150	1	102.150	ppm
Ethane	PB	1.51	67.0489	51.6700	101.404	1	101.404	ppm
Propane	BB	1.80	100.482	51.0999	100.998	1	100.998	ppm
Butane	BB	2.61	130.784	39.3086	99.9209	1	99.9209	ppm
Pentane	BB	4.66	164.374	28.6474	100.412	1	100.412	ppm
Hexane	BB	7.78	195.290	64.1120	100.092	1	100.092	ppm
Heptane	BB	9.36	228.037	110.594	99.9893	1	99.9893	ppm

Chromatogram Report

Sample Name BettyP773 #C4 ENV(1=0,2=450)
Sequence Name BETTYP773 ver.7
Inj Data File 025B2003.D
File Location GC/2018/Betty/Quarter 1
Injection Date 2/20/2018 3:03 AM
File Modified 2/22/2018 9:21 AM
Instrument Betty
Operator Nicholas Traversa

Enthalpy Analytical

Sample Type Calibration
Vial Number 25
Injection Volume 250
Injection 3 of 4
Acquisition Method GC142P133_CAL.M
Analysis Method BETTYP773_C1-C7.M
Method Modified 1/2/2014 5:30 PM
Printed 2/22/2018 9:37 AM



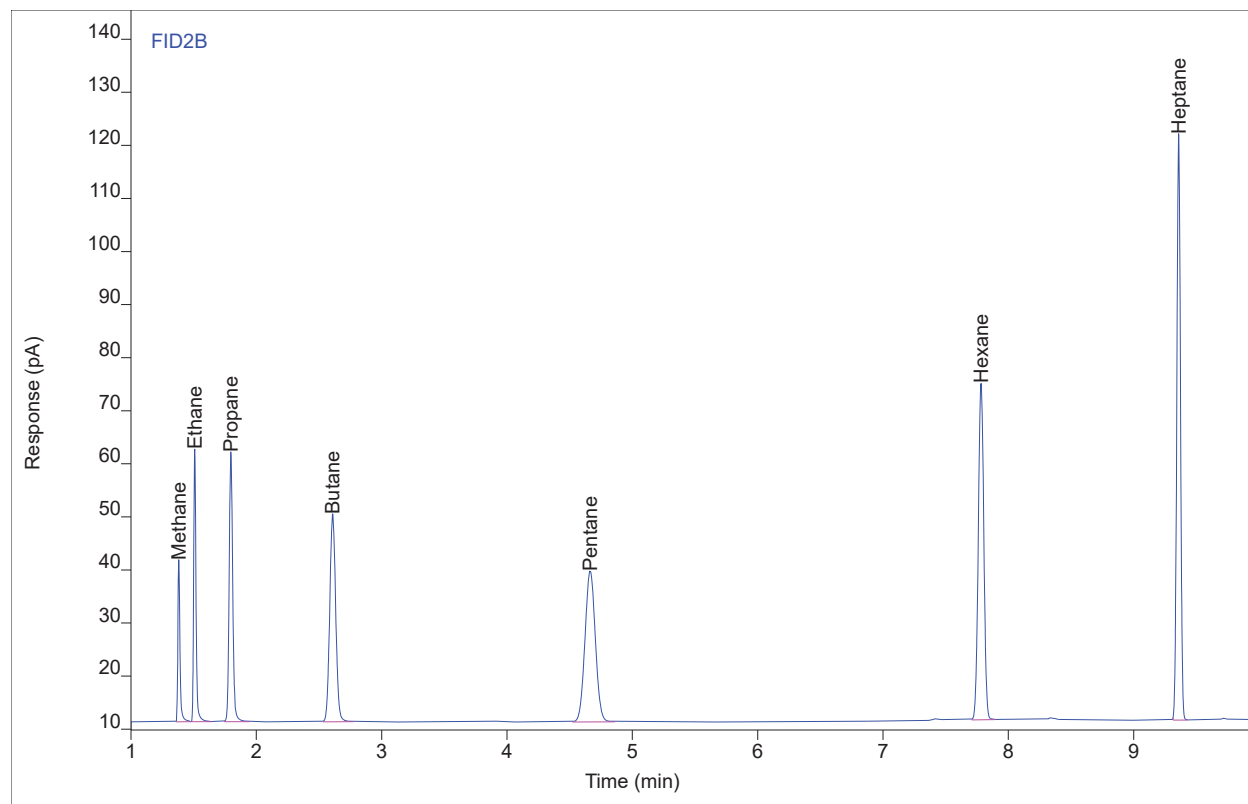
Compound	Type	RT	Area	Height	Amount	DF	SampAmt	Unit
Methane	BP	1.38	35.8568	30.4988	101.506	1	101.506	ppm
Ethane	PB	1.51	66.6901	51.3969	100.859	1	100.859	ppm
Propane	BB	1.80	99.9393	50.8724	100.450	1	100.450	ppm
Butane	BB	2.61	130.367	39.2007	99.6016	1	99.6016	ppm
Pentane	BB	4.66	163.745	28.5079	100.027	1	100.027	ppm
Hexane	BB	7.78	194.455	63.4382	99.6628	1	99.6628	ppm
Heptane	BB	9.36	227.324	109.164	99.6761	1	99.6761	ppm

Chromatogram Report

Sample Name BettyP773 #C4 ENV(1=0,2=450)
 Sequence Name BETTYP773 ver.7
 Inj Data File 025B2004.D
 File Location GC/2018/Betty/Quarter 1
 Injection Date 2/20/2018 3:27 AM
 File Modified 2/22/2018 9:21 AM
 Instrument Betty
 Operator Nicholas Traversa

Enthalpy Analytical

Sample Type Calibration
 Vial Number 25
 Injection Volume 250
 Injection 4 of 4
 Acquisition Method GC142P133_CAL.M
 Analysis Method BETTYP773_C1-C7.M
 Method Modified 1/2/2014 5:30 PM
 Printed 2/22/2018 9:37 AM



Compound	Type	RT	Area	Height	Amount	DF	SampAmt	Unit
Methane	BP	1.38	35.8308	30.4474	101.432	1	101.432	ppm
Ethane	PB	1.51	66.6858	51.3447	100.853	1	100.853	ppm
Propane	BB	1.80	99.7915	50.8573	100.300	1	100.300	ppm
Butane	BB	2.61	130.318	39.1687	99.5642	1	99.5642	ppm
Pentane	BB	4.66	163.710	28.4499	100.005	1	100.005	ppm
Hexane	BB	7.78	194.360	63.4205	99.6141	1	99.6141	ppm
Heptane	BB	9.36	227.225	110.277	99.6326	1	99.6326	ppm

CERTIFICATE OF ANALYSIS

Grade of Product: CERTIFIED STANDARD-SPEC

Part Number:	X08NI99C15A0079	Reference Number:	141-124578026-1
Cylinder Number:	CC72412	Cylinder Volume:	144.4 CF
Laboratory:	124 - Conley Stryker - OH	Cylinder Pressure:	2015 PSIG
Analysis Date:	Sep 19, 2016	Valve Outlet:	350
Lot Number:	141-124578026-1		

Expiration Date: Sep 19, 2019

Product composition verified by direct comparison to calibration standards traceable to N.I.S.T. weights and/or N.I.S.T. Gas Mixture reference materials.

ANALYTICAL RESULTS

Component	Req Conc	Actual Concentration (Mole %)	Analytical Uncertainty
ETHANE	100.0 PPM	100.0 PPM	+/- 2%
HEXANE	100.0 PPM	100.0 PPM	+/- 2%
METHANE	100.0 PPM	100.0 PPM	+/- 2%
N BUTANE	100.0 PPM	100.0 PPM	+/- 2%
N HEPTANE	100.0 PPM	100.0 PPM	+/- 2%
N PENTANE	100.0 PPM	100.0 PPM	+/- 2%
PROPANE	100.0 PPM	100.0 PPM	+/- 2%
NITROGEN	Balance		



Approved for Release

CERTIFICATE OF ANALYSIS

Grade of Product: CERTIFIED HYDROCARBON

Customer: MONTROSE ENVIRONMENTAL GROUP
Part Number: X08NI83C15AC015
Cylinder Number: SG9164133BAL
Laboratory: 124 - LaPorte Mix (SAP) - TX
Analysis Date: Jul 14, 2016
Lot Number: 126-400739490-1

Reference Number: 126-400739490-1
Cylinder Volume: 15.8 CF
Cylinder Pressure: 204 PSIG
Valve Outlet: 350
Expiration Date: Jul 14, 2019

Traceability Statement: Hydrocarbon Process standards are NIST traceable either directly by weight or by comparison to Airgas laboratory standards that are directly NIST traceable by weight.

CERTIFIED CONCENTRATIONS

Component	Requested Concentration	Reported Mole %	Accuracy
N HEPTANE	250.0 PPM	251.2 PPM	+/- 2%
HEXANE	0.4000 %	0.4001 %	+/- 2%
N PENTANE	0.5000 %	0.4995 %	+/- 2%
N BUTANE	1.000 %	0.9991 %	+/- 2%
ETHANE	5.000 %	4.995 %	+/- 2%
METHANE	5.000 %	4.992 %	+/- 2%
PROPANE	5.000 %	4.997 %	+/- 2%
NITROGEN	Balance	Balance	

Notes:

PO# 06201603

Signature on file

Approved for Release

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6890 GC METHOD

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OVEN

Initial temp: 40 C (On)	Maximum temp: 250 C
Initial time: 6.00 min	Equilibration time: 0.50 min
Ramps:	
# Rate Final temp Final time	CRYO (N2)
1 30.00 220 2.00	Cryo: Off
2 0 (Off)	Cryo fault: On
Post temp: 40 C	Cryo timeout: 40.00 min (On)
Post time: 0.00 min	Quick cryo cool: Off
Run time: 14.00 min	Ambient temp: 30 C

FRONT INLET (SPLIT/SPLITLESS)

Mode: Splitless
Initial temp: 200 C (On)
Pressure: 60.0 psi (On)
Purge flow: 0.0 mL/min
Purge time: 0.00 min
Total flow: 12.3 mL/min
Gas saver: Off
Gas type: Helium

BACK INLET (SPLIT/SPLITLESS)

Mode: Split
Initial temp: 200 C (On)
Pressure: 11.6 psi (On)
Split ratio: 5:1
Split flow: 12.3 mL/min
Total flow: 17.6 mL/min
Gas saver: Off
Gas type: Helium

COLUMN 1

Packed Column
Model Number: 19808
Description: Rt-ShinCarbon 2m x 1mm I
Max temperature: 250 C
Mode: constant pressure
Pressure: 60.0 psi
Inlet: Front Inlet
Outlet: Front Detector
Outlet pressure: ambient

COLUMN 2

Capillary Column
Model Number: 10198
Description: Rtx-1 30m x 0.32mm x 4um
Max temperature: 250 C
Nominal length: 30.0 m
Nominal diameter: 320.00 um
Nominal film thickness: 4.00 um
Mode: constant flow
Initial flow: 2.5 mL/min
Nominal init pressure: 11.6 psi
Average velocity: 39 cm/sec
Inlet: Back Inlet
Outlet: (other)
Outlet pressure: ambient

FRONT DETECTOR (TCD)

Temperature: 275 C (On)
Reference flow: 20.0 mL/min (On)
Mode: Constant makeup flow
Makeup flow: 10.0 mL/min (On)
Makeup Gas Type: Helium
Filament: On
Negative polarity: On

BACK DETECTOR (FID)

Temperature: 250 C (On)
Hydrogen flow: 60.0 mL/min (On)
Air flow: 450.0 mL/min (On)
Mode: Constant makeup flow
Makeup flow: 40.0 mL/min (On)
Makeup Gas Type: Nitrogen
Flame: On
Electrometer: On
Lit offset: 2.0

SIGNAL 1

Data rate: 20 Hz
Type: front detector
Save Data: On

SIGNAL 2

Data rate: 20 Hz
Type: back detector
Save Data: On

THERMAL AUX 1

Use: Valve Box Heater
Initial temp: 130 C (On)

VALVES

Valve 1 Gas Sampling
Loop Volume: 0.250 mL

POST RUN

Post Time: 0.00 min

method: C:\GC\2014\BETTY\METHODS\GC142P133_CAL.M
Modified on: 5/5/2014 at 7:51:02 AM
Load Time: 0.10 min
Inject Time: 0.50 min
Inlet: Front Inlet
Valve 2 Gas Sampling
Loop Volume: 0.250 mL
Load Time: 0.10 min
Inject Time: 0.50 min
Inlet: Front Inlet

TIME TABLE

Time(min)	Parameter & Setpoint	
3.00	Front Detector Polarity:	Off

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6890 GC METHOD

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OVEN

Initial temp: 40 C (On)	Maximum temp: 250 C
Initial time: 3.00 min	Equilibration time: 0.50 min
Ramps:	
# Rate Final temp Final time	CRYO (N2)
1 0 (Off)	Cryo: Off
Post temp: 40 C	Cryo fault: On
Post time: 0.00 min	Cryo timeout: 40.00 min (On)
Run time: 3.00 min	Quick cryo cool: Off
	Ambient temp: 30 C

FRONT INLET (SPLIT/SPLITLESS)

Mode: Splitless
Initial temp: 200 C (On)
Pressure: 60.0 psi (On)
Purge flow: 0.0 mL/min
Purge time: 0.00 min
Total flow: 12.3 mL/min
Gas saver: Off
Gas type: Helium

BACK INLET (SPLIT/SPLITLESS)

Mode: Split
Initial temp: 200 C (On)
Pressure: 11.7 psi (On)
Split ratio: 5:1
Split flow: 12.3 mL/min
Total flow: 17.6 mL/min
Gas saver: Off
Gas type: Helium

COLUMN 1

Packed Column
Model Number: 19808
Description: Rt-ShinCarbon 2m x 1mm I
Max temperature: 250 C
Mode: constant pressure
Pressure: 60.0 psi
Inlet: Front Inlet
Outlet: Front Detector
Outlet pressure: ambient

COLUMN 2

Capillary Column
Model Number: 10198
Description: Rtx-1 30m x 0.32mm x 4um
Max temperature: 250 C
Nominal length: 30.0 m
Nominal diameter: 320.00 um
Nominal film thickness: 4.00 um
Mode: constant flow
Initial flow: 2.5 mL/min
Nominal init pressure: 11.7 psi
Average velocity: 39 cm/sec
Inlet: Back Inlet
Outlet: (other)
Outlet pressure: ambient

FRONT DETECTOR (TCD)

Temperature: 275 C (On)
Reference flow: 20.0 mL/min (On)
Mode: Constant makeup flow
Makeup flow: 10.0 mL/min (On)
Makeup Gas Type: Helium
Filament: On
Negative polarity: On

BACK DETECTOR (FID)

Temperature: 250 C (On)
Hydrogen flow: 60.0 mL/min (On)
Air flow: 450.0 mL/min (On)
Mode: Constant makeup flow
Makeup flow: 40.0 mL/min (On)
Makeup Gas Type: Nitrogen
Flame: On
Electrometer: On
Lit offset: 2.0

SIGNAL 1

Data rate: 20 Hz
Type: front detector
Save Data: On

SIGNAL 2

Data rate: 20 Hz
Type: back detector
Save Data: On

THERMAL AUX 1

Use: Valve Box Heater
Initial temp: 130 C (On)

VALVES

Valve 1 Gas Sampling
Loop Volume: 0.250 mL

POST RUN

Post Time: 0.00 min

method: C:\GC\2014\BETTY\METHODS\GC142P133_SHORT.M
Modified on: 2/17/2014 at 5:52:35 PM
Load Time: 0.10 min
Inject Time: 0.50 min
Inlet: Front Inlet
Valve 2 Gas Sampling
Loop Volume: 0.250 mL
Load Time: 0.10 min
Inject Time: 0.50 min
Inlet: Front Inlet

TIME TABLE

Time(min)	Parameter & Setpoint
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**This Is The Last Page
Of This Report.**

APPENDIX I-E
Calibration Gas Cylinder Certification Sheets

CERTIFICATE OF ANALYSIS

Grade of Product: EPA Protocol

Part Number:	E03NI79E15A0088	Reference Number:	122-401268406-1
Cylinder Number:	EB0066823	Cylinder Volume:	151.0 CF
Laboratory:	124 - Durham (SAP) - NC	Cylinder Pressure:	2015 PSIG
PGVP Number:	B22018	Valve Outlet:	590
Gas Code:	CO2,O2,BALN	Certification Date:	Aug 06, 2018

Expiration Date: Aug 06, 2026

Certification performed in accordance with "EPA Traceability Protocol for Assay and Certification of Gaseous Calibration Standards (May 2012)" document EPA 600/R-12/531, using the assay procedures listed. Analytical Methodology does not require correction for analytical interference. This cylinder has a total analytical uncertainty as stated below with a confidence level of 95%. There are no significant impurities which affect the use of this calibration mixture. All concentrations are on a volume/volume basis unless otherwise noted.

Do Not Use This Cylinder below 100 psig, i.e. 0.7 megapascals.

ANALYTICAL RESULTS

Component	Requested Concentration	Actual Concentration	Protocol Method	Total Relative Uncertainty	Assay Dates
CARBON DIOXIDE	10.00 %	9.952 %	G1	+/- 0.6% NIST Traceable	08/06/2018
OXYGEN	11.00 %	11.05 %	G1	+/- 0.4% NIST Traceable	08/06/2018
NITROGEN	Balance				

CALIBRATION STANDARDS

Type	Lot ID	Cylinder No	Concentration	Uncertainty	Expiration Date
NTRM	13060638	CC414571	13.359 % CARBON DIOXIDE/NITROGEN	+/- 0.6%	May 09, 2019
NTRM	09060212	CC262381	9.961 % OXYGEN/NITROGEN	+/- 0.3%	Nov 08, 2018

ANALYTICAL EQUIPMENT

Instrument/Make/Model	Analytical Principle	Last Multipoint Calibration
Horiba VIA510 CO2 2L6YXWY0	Nondispersive Infrared (NDIR)	Jul 25, 2018
Horiba MPA510 O2 41499150042	Paramagnetic	Jul 25, 2018

Triad Data Available Upon Request



CS Williams

Approved for Release

CERTIFICATE OF ANALYSIS

Grade of Product: EPA Protocol

Part Number: E03NI59E15A0014
Cylinder Number: EB0107294
Laboratory: 124 - Durham (SAP) - NC
PGVP Number: B22018

Reference Number: 122-401123521-1
Cylinder Volume: 158.6 CF
Cylinder Pressure: 2015 PSIG
Valve Outlet: 590
Certification Date: Feb 12, 2018

Expiration Date: Feb 12, 2026

Certification performed in accordance with "EPA Traceability Protocol for Assay and Certification of Gaseous Calibration Standards (May 2012)" document EPA 600/R-12/531, using the assay procedures listed. Analytical Methodology does not require correction for analytical interference. This cylinder has a total analytical uncertainty as stated below with a confidence level of 95%. There are no significant impurities which affect the use of this calibration mixture. All concentrations are on a volume/volume basis unless otherwise noted.

Do Not Use This Cylinder below 100 psig, i.e. 0.7 megapascals.

ANALYTICAL RESULTS					
Component	Requested Concentration	Actual Concentration	Protocol Method	Total Relative Uncertainty	Assay Dates
CARBON DIOXIDE	18.50 %	18.22 %	G1	+/- 0.6% NIST Traceable	02/12/2018
OXYGEN	22.00 %	21.99 %	G1	+/- 0.3% NIST Traceable	02/12/2018
NITROGEN	Balance				

CALIBRATION STANDARDS					
Type	Lot ID	Cylinder No	Concentration	Uncertainty	Expiration Date
NTRM	12061508	CC354696	19.87 % CARBON DIOXIDE/NITROGEN	+/- 0.6%	Jan 11, 2024
NTRM	12062009	CC367498	22.883 % OXYGEN/NITROGEN	+/- 0.2%	Apr 24, 2018

ANALYTICAL EQUIPMENT		
Instrument/Make/Model	Analytical Principle	Last Multipoint Calibration
Horiba VIA510 CO2 2L6YXWY0	Nondispersive Infrared (NDIR)	Feb 07, 2018
Horiba MPA510 O2 41499150042	Paramagnetic	Feb 07, 2018

Triad Data Available Upon Request



CS D. [Signature]

Approved for Release



Praxair Distribution Mid-Atlantic
One Steel Road East,
Morrisville, PA 19067
Tel: (800) 638-6360 Fax: (215) 736 5240
PGVP ID: F32017

DocNumber: 000021313

CERTIFICATE OF ANALYSIS / EPA PROTOCOL GAS

Customer & Order Information:

CHEROKEE INSTRUMENTS INC
100 LOGAN COURT
ANGIER NC 27501

Praxair Order Number: 92286180
Customer P. O. Number: 0050001228
Customer Reference Number:

Fill Date: 6/10/2017
Part Number: NI CO225E-AS
Lot Number: 304613161708
Cylinder Style & Outlet: AS CGA 660
Cylinder Pressure & Volume: 2000 psig 140 cu. ft.

Certified Concentration:

Expiration Date:	6/14/2025	NIST Traceable
Cylinder Number:	CC120837	Analytical Uncertainty:
226.4 ppm	CARBON MONOXIDE	± 0.5 %
Balance	NITROGEN	

Certification Information: Certification Date: 6/14/2017 Term: 96 Months Expiration Date: 6/14/2025

This cylinder was certified according to the 2012 EPA Traceability Protocol, Document #EPA-600/R-12/531, using Procedure G1. Do Not Use this Standard if Pressure is less than 100 PSIG.

Analytical Data:

(R=Reference Standard, Z=Zero Gas, C=Gas Candidate)

1. Component: CARBON MONOXIDE

Requested Concentration: 225 ppm
Certified Concentration: 226.4 ppm
Instrument Used: HORIBA VIA-3000 S/N Y9EY78L6
Analytical Method: NDIR
Last Multipoint Calibration: 5/31/2017

First Analysis Data:		Date:		6/14/2017
Z:	0	R:	303	C: 226.3 Conc: 226.5
R:	302.6	Z:	0	C: 226.2 Conc: 226.4
Z:	0	C:	226.2	R: 302.6 Conc: 226.4
UOM:	PPM	Mean Test Assay:	226.4 PPM	

Analyzed by:

Megha Patel

Reference Standard Type: GMIS
Ref Std. Cylinder #: CC308682
Ref Std. Conc: 303 PPM
Ref Std. Traceable to SRM #: 1680b
SRM Sample #: 2-J-49
SRM Cylinder #: CAL018038

Second Analysis Data:		Date:		
Z:	0	R:	0	C: 0 Conc: 0
R:	0	Z:	0	C: 0 Conc: 0
Z:	0	C:	0	R: 0 Conc: 0
UOM:	PPM	Mean Test Assay:	0 PPM	

Certified by:

Jessica Goodman

Information contained herein has been prepared at your request by qualified experts within Praxair Distribution, Inc. While we believe that the information is accurate within the limits of the analytical methods employed and is complete to the extent of the specific analyses performed, we make no warranty or representation as to the suitability of the use of the information for any purpose. The information is offered with the understanding that any use of the information is at the sole discretion and risk of the user. In no event shall the liability of Praxair Distribution, Inc., arising out of the use of the information contained herein exceed the fee established for providing such information.



Praxair Distribution Mid-Atlantic
One Steel Road East,
Morrisville, PA 19067
Tel: (800) 638-6360 Fax: (215) 736 5240
PGVP ID: F32016

DocNumber: 000019323

CERTIFICATE OF ANALYSIS / EPA PROTOCOL GAS

Customer & Order Information:

CHEROKEE INSTRUMENTS INC
100 LOGAN COURT
ANGIER NC 27501

Praxair Order Number: 86501794
Customer P. O. Number: 14848
Customer Reference Number:

Fill Date: 12/16/2016
Part Number: NI CO450E-AS
Lot Number: 304513351805
Cylinder Style & Outlet: AS CGA 350
Cylinder Pressure & Volume: 2000 psig 140 cu. ft.

Certified Concentration:

Expiration Date:	12/21/2024	NIST Traceable
Cylinder Number:	CC109287	Analytical Uncertainty:
450 ppm	CARBON MONOXIDE	± 0.7 %
Balance	NITROGEN	

Certification Information: Certification Date: 12/21/2016 Term: 96 Months Expiration Date: 12/21/2024

This cylinder was certified according to the 2012 EPA Traceability Protocol, Document #EPA-600/R-12/531, using Procedure G1. Do Not Use this Standard if Pressure is less than 100 PSIG.

Analytical Data:

(R=Reference Standard, Z=Zero Gas, C=Gas Candidate)

1. Component: CARBON MONOXIDE

Requested Concentration: 450 ppm
Certified Concentration: 450 ppm
Instrument Used: HORIBA VIA-3000 S/N Y9EY78L6
Analytical Method: NDIR
Last Multipoint Calibration: 12/7/2016

First Analysis Data:		Date:		12/21/2016	
Z:	0	R:	398	C:	451
R:	398	Z:	0	C:	450
Z:	0	C:	450	R:	398
UOM:	PPM	Mean Test Assay:	450 PPM		

Analyzed by:

Jessica Goodman

Reference Standard Type: GMS
Ref. Std. Cylinder #: CC118336
Ref. Std. Conc: 398 PPM
Ref. Std. Traceable to SRM #: 1690b
SRM Sample #: 2-J-49
SRM Cylinder #: CAL018038

Second Analysis Data:		Date:			
Z:	0	R:	0	C:	0
R:	0	Z:	0	C:	0
Z:	0	C:	0	R:	0
UOM:	PPM	Mean Test Assay:	0 PPM		

Certified by:

Megha Patel

Information contained herein has been prepared at your request by qualified experts within Praxair Distribution, Inc. While we believe that the information is accurate within the limits of the analytical methods employed and is complete to the extent of the specific analyses performed, we make no warranty or representation as to the suitability of the use of the information for any purpose. The information is offered with the understanding that any use of the information is at the sole discretion and risk of the user. In no event shall the liability of Praxair Distribution, Inc., arising out of the use of the information contained herein exceed the fee established for providing such information.

CERTIFICATE OF ANALYSIS

Grade of Product: EPA Protocol

Part Number:	E02NI99E15A0930	Reference Number:	122-401180045-1
Cylinder Number:	CC57597	Cylinder Volume:	144.4 CF
Laboratory:	124 - Durham (SAP) - NC	Cylinder Pressure:	2015 PSIG
PGVP Number:	B22018	Valve Outlet:	350
Gas Code:	PPN,BALN	Certification Date:	Apr 17, 2018

Expiration Date: Apr 17, 2026

Certification performed in accordance with "EPA Traceability Protocol for Assay and Certification of Gaseous Calibration Standards (May 2012)" document EPA 800/R-12/531, using the assay procedures listed. Analytical Methodology does not require correction for analytical interference. This cylinder has a total analytical uncertainty as stated below with a confidence level of 95%. There are no significant impurities which affect the use of this calibration mixture. All concentrations are on a volume/volume basis unless otherwise noted.

Do Not Use This Cylinder below 100 psig, i.e. 0.7 megapascals.

ANALYTICAL RESULTS

Component	Requested Concentration	Actual Concentration	Protocol Method	Total Relative Uncertainty	Assay Dates
PROPANE	30.00 PPM	30.07 PPM	G1	+/- 0.7% NIST Traceable	04/17/2018
NITROGEN	Balance				

CALIBRATION STANDARDS

Type	Lot ID	Cylinder No	Concentration	Uncertainty	Expiration Date
NTRM	0010613	AAL18527	49.8 PPM PROPANE/AIR	+/- 0.8%	May 23, 2018

ANALYTICAL EQUIPMENT

Instrument/Make/Model	Analytical Principle	Last Multipoint Calibration
Nicolet 6700 AHR0801333 C3H8	FTIR	Mar 22, 2018

Triad Data Available Upon Request



Chris St...

Approved for Release

CERTIFICATE OF ANALYSIS

Grade of Product: EPA Protocol

Part Number:	E02NI99E15A0931	Reference Number:	122-401180046-1
Cylinder Number:	CC354004	Cylinder Volume:	144.4 CF
Laboratory:	124 - Durham (SAP) - NC	Cylinder Pressure:	2015 PSIG
PGVP Number:	B22018	Valve Outlet:	350
Gas Code:	PPN,BALN	Certification Date:	Apr 17, 2018

Expiration Date: Apr 17, 2026

Certification performed in accordance with "EPA Traceability Protocol for Assay and Certification of Gaseous Calibration Standards (May 2012)" document EPA 600/R-12/531, using the assay procedures listed. Analytical Methodology does not require correction for analytical interference. This cylinder has a total analytical uncertainty as stated below with a confidence level of 95%. There are no significant impurities which affect the use of this calibration mixture. All concentrations are on a volume/volume basis unless otherwise noted.

Do Not Use This Cylinder below 100 psig, i.e. 0.7 megapascals.

ANALYTICAL RESULTS					
Component	Requested Concentration	Actual Concentration	Protocol Method	Total Relative Uncertainty	Assay Dates
PROPANE	50.00 PPM	52.38 PPM	G1	+/- 0.8% NIST Traceable	04/17/2018
NITROGEN	Balance				

CALIBRATION STANDARDS					
Type	Lot ID	Cylinder No	Concentration	Uncertainty	Expiration Date
NTRM	0010613	AAL18527	49.8 PPM PROPANE/AIR	+/- 0.6%	May 23, 2018

ANALYTICAL EQUIPMENT		
Instrument/Make/Model	Analytical Principle	Last Multipoint Calibration
Nicolet 6700 AHR0801333 C3H8	FTIR	Mar 22, 2018

Triad Data Available Upon Request



Chad St...

Approved for Release

DocNumber: 000024404

CERTIFICATE OF ANALYSIS / EPA PROTOCOL GAS

Customer & Order Information:

CHEROKEE INSTRUMENTS INC
100 LOGAN COURT
ANGIER NC 27501

Praxair Order Number: 56678698
Customer P. O. Number: 0050001578
Customer Reference Number:

Fill Date: 3/14/2018
Part Number: NI NO47.5ME-AS
Lot Number: 30461307802
Cylinder Style & Outlet: AS CGA 660
Cylinder Pressure & Volume: 2000 psig 140 cu ft

Certified Concentration:

Expiration Date:	3/26/2021	NIST Traceable
Cylinder Number:	CC352567	Analytical Uncertainty:
48.0 ppm	NITRIC OXIDE	± 0.9 %
Balance	NITROGEN	

NOx = 48.0 ppm

NOx for Reference Only

Certification Information: Certification Date: 3/26/2018 Term: 36 Months Expiration Date: 3/26/2021

This cylinder was certified according to the 2012 EPA Traceability Protocol, Document #EPA-800/R-12/531, using Procedure G1. Do Not Use this Standard if Pressure is less than 100 PSIG.

Analytical Data:

(R=Reference Standard, Z=Zero Gas, C=Gas Candidate)

1. Component: NITRIC OXIDE

Requested Concentration: 47.5 ppm
Certified Concentration: 48.0 ppm
Instrument Used: MKS 2031
Analytical Method: FTIR
Last Multipoint Calibration: 3/15/2018

First Analysis Date:	Date:	3/19/2018
Z: 0.123 R: 49.7 C: 47.1 Conc: 47.7		
R: 49.5 Z: 0.014 C: 47 Conc: 47.6		
Z: 0.014 C: 47.2 R: 49.7 Conc: 47.8		
UOM: PPM	Mean Test Assay:	47.7 PPM

Analyzed by:

Remzy Jermal

Reference Standard Type: GMI5
Ref. Std. Cylinder #: SA4389
Ref. Std. Conc: 50.3 PPM
Ref. Std. Traceable to SRM #: 1663B
SRM Sample #: 45-V-05
SRM Cylinder #: CAL017971

Second Analysis Date:	Date:	3/26/2018
Z: 0.023 R: 49.5 C: 47.7 Conc: 48.3		
R: 49.6 Z: 0.066 C: 47.6 Conc: 48.2		
Z: 0.063 C: 47.8 R: 49.8 Conc: 48.2		
UOM: PPM	Mean Test Assay:	48.3 PPM

Certified by:

Megha Patel



Praxair Distribution Mid-Atlantic
One Steel Road East,
Morrisville, PA 19067
Tel: (800) 638-6360 Fax: (215) 736 5240
PGVP ID: F32017

DocNumber: 000021376

CERTIFICATE OF ANALYSIS / EPA PROTOCOL GAS

Customer & Order Information:

CHEROKEE INSTRUMENTS INC
100 LOGAN COURT
ANGIER NC 27501

Praxair Order Number: 92286180
Customer P. O. Number: 0050001228
Customer Reference Number:

Fill Date: 6/10/2017
Part Number: NI ND90ME-AS
Lot Number: 304513161704
Cylinder Style & Outlet: AS CGA 680
Cylinder Pressure & Volume: 2000 psig 140 cu. ft.

Certified Concentration:

Expiration Date:	6/21/2025	NIST Traceable
Cylinder Number:	CC200174	Analytical Uncertainty:
89.5 ppm	NITRIC OXIDE	± 0.5 %
Balance	NITROGEN	

NOx = 90.0 ppm

NOx for Reference Only

Certification Information: Certification Date: 6/21/2017 Term: 96 Months Expiration Date: 6/21/2025

This cylinder was certified according to the 2012 EPA Traceability Protocol, Document #EPA-600/R-12/531, using Procedure G1. Do Not Use this Standard if Pressure is less than 100 PSIG.

Analytical Data:

(R=Reference Standard, Z=Zero Gas, C=Gas Candidate)

1. Component: NITRIC OXIDE

Requested Concentration: 90 ppm
Certified Concentration: 89.5 ppm
Instrument Used: TECO MODEL 42i S/N: 0820017513
Analytical Method: CHEMILUMINESCENCE
Last Multipoint Calibration: 6/13/2017

First Analysis Data:		Date: 6/14/2017	
Z: 0	R: 95	C: 89.5	Conc: 89.5
R: 85	Z: 0	C: 89.4	Conc: 89.4
Z: 0	C: 89.4	R: 95	Conc: 89.4
UOM: PPM	Mean Test Assay:		89.4 PPM

Reference Standard Type: GMS
Ref. Std. Cylinder #: CC352709
Ref. Std. Conc: 95.0 PPM
Ref. Std. Traceable to SRM #: 16848
SRM Sample #: 44-T-48
SRM Cylinder #: FF9239

Second Analysis Data:		Date: 6/21/2017	
Z: 0	R: 95	C: 90	Conc: 89.7
R: 85.4	Z: 0	C: 90	Conc: 89.7
Z: 0	C: 90	R: 95.4	Conc: 89.7
UOM: PPM	Mean Test Assay:		89.7 PPM

Analyzed by:

Jessica Goodman

Certified by:

Megha Patel

Information contained herein has been prepared at your request by qualified experts within Praxair Distribution, Inc. While we believe that the information is accurate within the limits of the analytical methods employed and is complete to the extent of the specific analyses performed, we make no warranty or representation as to the suitability of the use of the information for any purpose. The information is offered with the understanding that any use of the information is at the sole discretion and risk of the user. In no event shall the liability of Praxair Distribution, Inc., arising out of the use of the information contained herein exceed the fee established for providing such information.

APPENDIX I-F
Sampling Equipment Calibration Sheets

**Type S Pitot Tube Inspection and
Stack Thermocouple Calibration**

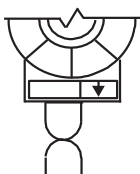
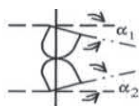
GENERAL INFORMATION

Probe ID **3A**
Date **7/13/2018**

Personnel **JBG**
Coefficient Value **0.84**

PITOT TUBE INSPECTION

Pitot Tube assembly level? (yes/no) **yes**
Pitot Tube obstruction? (yes/no) **no**
Pitot Tube openings damaged? (yes/no) **no**



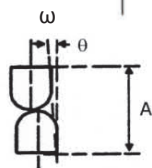
α_1 **1** $\leq \pm 10^\circ$
 α_2 **1** $\leq \pm 10^\circ$



β_1 **-2** $\leq \pm 5^\circ$
 β_2 **2** $\leq \pm 5^\circ$



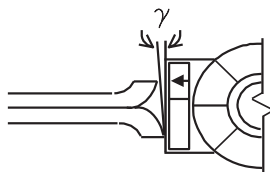
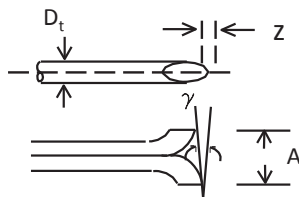
γ **0.017453293** radians
 θ **0.052359878** radians



$z = A \tan(\gamma)$ **0** $\leq \pm \frac{1}{8}"$
 $\omega = A \tan(\theta)$ **0.0469** $\leq \pm \frac{1}{32}"$

D_t **0.375**
($\frac{3}{16}" < D_t < \frac{3}{8}"$ Recommended)

A **0.895**



P_A
 P_B **1.19**
($1.05 < P/D_t < 1.50$ Recommended)

STACK THERMOCOUPLE CALIBRATION

Ref. Type

Hg Thermometer

Ref. ID

Hg-1

Source	Ref., °F	Stack TC, °F	Abs. Diff., °F
Ice bath	32.2	34	1.8
Ambient	78	79	1
Hot Plate	211.2	212	0.8
Maximum Temp. Difference, °F			1.8

Type S Pitot Tube Inspection and Stack Thermocouple Calibration

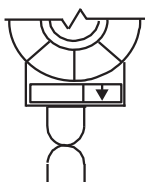
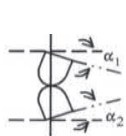
GENERAL INFORMATION

Probe ID 4B
Date 4/30/2018

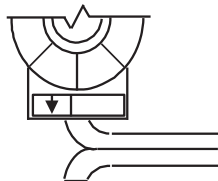
Personnel JBG
Coefficient Value 0.84

PITOT TUBE INSPECTION

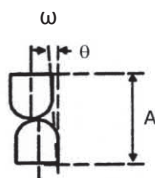
Pitot Tube assembly level? (yes/no) yes
Pitot Tube obstruction? (yes/no) no
Pitot Tube openings damaged? (yes/no) no



α_1 1 $\leq \pm 10^\circ$
 α_2 0 $\leq \pm 10^\circ$



β_1 2 $\leq \pm 5^\circ$
 β_2 1 $\leq \pm 5^\circ$



γ 0
 θ 1

$z = A \tan(\gamma)$ 0.00 $\leq \pm \frac{1}{8}"$
 $\omega = A \tan(\theta)$ 0.016582312 $\leq \pm \frac{1}{32}"$

D_t 0.375
($\frac{3}{16}" < D_t < \frac{3}{8}"$ Recommended)

A 0.95

P_A 1.27
 P_B
($1.05 < P/D_t < 1.50$ Recommended)

STACK THERMOCOUPLE CALIBRATION

Ref. Type Hg Thermometer

Ref. ID Hg-1

Source	Ref., °F	Stack TC, °F	Abs. Diff., °F
Ice bath	32	32	0
Ambient	67	67	0
Hot Plate	232	232	0
Maximum Temp. Difference, °F			0

**Type S Pitot Tube Inspection and
Stack Thermocouple Calibration**

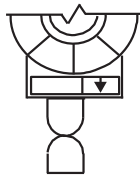
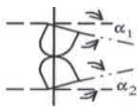
GENERAL INFORMATION

Probe ID **3B**
Date **4/30/2018**

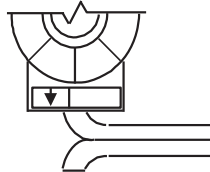
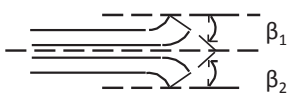
Personnel **JBG**
Coefficient Value **0.84**

PITOT TUBE INSPECTION

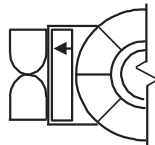
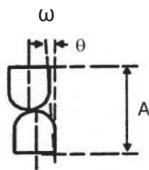
Pitot Tube assembly level? (yes/no) **yes**
Pitot Tube obstruction? (yes/no) **no**
Pitot Tube openings damaged? (yes/no) **no**



α_1 **0** $\leq \pm 10^\circ$
 α_2 **0** $\leq \pm 10^\circ$



β_1 **0** $\leq \pm 5^\circ$
 β_2 **1** $\leq \pm 5^\circ$



γ **0.034906585** radians
 θ **0.017453293** radians

$z = A \tan(\gamma)$ **0.033698543** $\leq \pm \frac{1}{8}"$
 $\omega = A \tan(\theta)$ **0.016844138** $\leq \pm \frac{1}{32}"$

D_t **0.375**
($\frac{3}{16}" < D_t < \frac{3}{8}"$ Recommended)

A **0.965**

P_A
 P_B **1.286666667**
($1.05 < P/D_t < 1.50$ Recommended)

STACK THERMOCOUPLE CALIBRATION

Ref. Type **Hg Thermometer** Ref. ID **Hg-1**

Source	Ref., °F	Stack TC, °F	Abs. Diff., °F
Ice bath	32.1	32.8	0.7
Ambient	78	78	0
Hot Plate	211.4	213.2	1.8
Maximum Temp. Difference, °F			1.8

Type S Pitot Tube Inspection and Stack Thermocouple Calibration

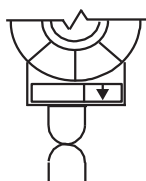
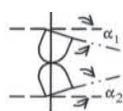
GENERAL INFORMATION

Probe ID **4A**
Date **4/30/2018**

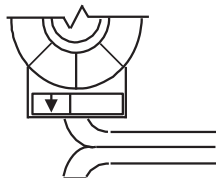
Personnel **JBG**
Coefficient Value **0.84**

PITOT TUBE INSPECTION

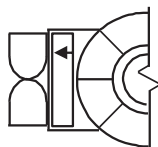
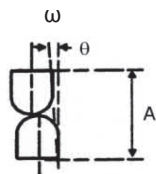
Pitot Tube assembly level? (yes/no) **yes**
Pitot Tube obstruction? (yes/no) **no**
Pitot Tube openings damaged? (yes/no) **no**



α_1 **0** $\leq \pm 10^\circ$
 α_2 **2** $\leq \pm 10^\circ$



β_1 **-1** $\leq \pm 5^\circ$
 β_2 **0** $\leq \pm 5^\circ$



γ **0.0000**
 θ **0.0524**
 $z = A \tan(\gamma)$ **0.0000** $\leq \pm \frac{1}{8}"$
 $\omega = A \tan(\theta)$ **0.0472** $\leq \pm \frac{1}{32}"$

D_t **0.375**
($\frac{3}{16}" < D_t < \frac{3}{8}"$ Recommended)

A **0.9**

P_A **1.2**
 P_B **1.2**
($1.05 < P/D_t < 1.50$ Recommended)

STACK THERMOCOUPLE CALIBRATION

Ref. Type **Hg Thermometer**

Ref. ID **Hg-1**

Source	Ref., °F	Stack TC, °F	Abs. Diff., °F
Ice bath	32	32	0
Ambient	67	67	0
Hot Plate	232	231	1
Maximum Temp. Difference, °F			1

***Stainless Steel Nozzle Calibration and Condition
Air Control Techniques, P.C.***

Nozzle Set ID	Nozzle ID	Average	Measurements			High-Low	Condition	Date Inspected
			1	2	3			
ACT-N-1	1-1	0.124	0.125	0.124	0.124	0.001	OK	12/11/17
ACT-N-1	1-2	0.180	0.180	0.180	0.181	0.001	OK	12/11/17
ACT-N-1	1-3	0.245	0.245	0.245	0.244	0.001	OK	12/11/17
ACT-N-1	1-4	0.302	0.303	0.301	0.301	0.002	OK	12/11/17
ACT-N-1	1-5	0.368	0.367	0.365	0.366	0.002	OK	12/11/17
ACT-N-1	1-6	0.428	0.428	0.428	0.428	0.000	OK	12/11/17
ACT-N-1	1-7	0.492	0.492	0.492	0.492	0.000	OK	12/11/17

Nozzle Set ID	Nozzle ID	Average	Measurements			High-Low	Condition	Date
			1	2	3			
ACT-N-2	2-1	0.126	0.127	0.125	0.127	0.002	OK	12/11/17
ACT-N-2	2-2	0.176	0.176	0.176	0.175	0.001	OK	12/11/17
ACT-N-2	2-3	0.238	0.239	0.237	0.239	0.002	OK	12/11/17
ACT-N-2	2-4	0.286	0.286	0.286	0.284	0.002	OK	12/11/17
ACT-N-2	2-5	0.377	0.377	0.377	0.376	0.001	OK	12/11/17
ACT-N-2	2-6	0.456	0.455	0.455	0.457	0.002	OK	12/11/17
ACT-N-2	2-7	0.497	0.498	0.497	0.497	0.001	OK	12/11/17

Nozzle Set ID	Nozzle ID	Average	Measurements			High-Low	Condition	Date
			1	2	3			
ACT-N-3	3-1	0.118	0.118	0.119	0.117	0.002	OK	12/11/17
ACT-N-3	3-2	0.190	0.189	0.190	0.190	0.001	OK	9/8/16
ACT-N-3	3-3	0.239	0.238	0.238	0.240	0.002	OK	12/11/17
ACT-N-3	3-4	0.254	0.254	0.254	0.255	0.001	OK	9/8/16
ACT-N-3	3-5	0.377	0.377	0.377	0.376	0.001	OK	12/11/17
ACT-N-3	3-8	0.996	0.997	0.997	0.999	0.002	OK	12/11/17
ACT-N-3	3-7	0.496	0.495	0.495	0.497	0.002	OK	12/11/17

Nozzle Set ID	Nozzle ID	Average	Measurements			High-Low	Condition	Date
			1	2	3			
ACT-N-4	4-1	0.303	0.304	0.302	0.302	0.002	OK	12/11/17
ACT-N-4	4-2	0.178	0.178	0.178	0.177	0.001	OK	9/8/16
ACT-N-4	4-3	0.302	0.303	0.301	0.301	0.002	OK	12/11/17
ACT-N-4	4-4	0.247	0.247	0.247	0.247	0.000	OK	12/11/17
ACT-N-4	4-5	0.370	0.371	0.369	0.369	0.002	OK	12/11/17
ACT-N-4	4-6	0.498	0.498	0.498	0.498	0.000	OK	12/11/17
ACT-N-4	4-7	0.501	0.500	0.500	0.502	0.002	OK	12/11/17

Name Jonas Gilbert

Signature 12/11/2017

APEX INSTRUMENTS METHOD 5 PRE-TEST CONSOLE CALIBRATION
USING CALIBRATED CRITICAL ORIFICES
5-POINT ENGLISH UNITS

Meter Console Information	
Console Model Number	522
Console Serial Number	909033
DGM Model Number	RW 110
DGM Serial Number	972787

Calibration Conditions			
Date	Time	11/06/18	9:00
Barometric Pressure	30.14 in Hg		
Theoretical Critical Vacuum ¹	14.23 in Hg		
Calibration Technician	JBG		

Factors/Conversions		
Std Temp	528	°R
Std Press	29.92	in Hg
K ₁	17.647	oR/in Hg

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

²The Critical Orifice Coefficient, K', must be entered in English units, (ft³•R^{1/2})/(in.Hg•min).

Calibration Data										
Run Time	Metering Console				Critical Orifice					
Elapsed	DGM Orifice ΔH	Volume Initial	Volume Final	Outlet Temp Initial	Outlet Temp Final	Serial Number	Coefficient	Amb Temp Initial	Amb Temp Final	Actual Vacuum
(θ)	(P _m)	(V _m)	(V _{net})	(t _m)	(t _{net})		K'	(t _{amb})	(t _{amb})	
min	in H ₂ O	cubic feet	cubic feet	°F	°F		see above ²	°F	°F	in Hg
15.85	0.33	840.100	845.100	66	67	FO 40	0.2380	69	69	23.5
10.86	0.69	845.200	850.200	67	68	FO 48	0.3488	69	71	22.5
8.22	1.20	850.202	855.300	68	69	FO 55	0.4594	71	71	22.5
6.40	2.00	855.300	860.302	69	69	FO 63	0.5906	71	71	19.5
4.68	3.60	860.302	865.303	69	70	FO 73	0.8063	71	71	19.0

Standardized Data				Results				
Dry Gas Meter		Critical Orifice		Calibration Factor		Dry Gas Meter Flowrate		ΔH @
				Value	Variation	Std & Corr	0.75 SCFM	Variation
(V _{m(Std)})	(Q _{m(Std)})	(V _{Cr(Std)})	(Q _{Cr(Std)})	(Y)	(ΔY)	(Q _{m(Std)(Corr)})	(ΔH@)	(ΔΔH@)
cubic feet	cfm	cubic feet	cfm			cfm	in H ₂ O	
5.055	0.319	4.943	0.312	0.9779	0.003	0.312	1.932	0.035
5.050	0.465	4.959	0.457	0.9820	0.008	0.457	1.885	-0.013
5.146	0.626	4.939	0.601	0.9599	-0.015	0.601	1.894	-0.004
5.054	0.790	4.944	0.772	0.9783	0.004	0.772	1.916	0.018
5.068	1.083	4.936	1.055	0.9739	0.000	1.055	1.863	-0.035
				0.9744	Y Average		1.898	ΔH@ Average

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

I certify that the above Dry Gas Meter was calibrated in accordance with USEPA Methods, CFR Title 40, Part 60, Appendix A-3, Method 5, 16.2.3

Signature: Jonas Gilbert

Date: 11/6/18

METHOD 5 POST-TEST CONSOLE CALIBRATION USING CALIBRATED CRITICAL ORIFICES
3-POINT ENGLISH UNITS

Meter Console Information	
Console Model Number	522
Console Serial Number	909033
DGM Model Number	RW 110
DGM Serial Number	328893

Calibration Conditions			
Date	Time	01/04/19	8:30
Barometric Pressure		30.1	in Hg
Theoretical Critical Vacuum ¹		14.2	in Hg
Calibration Technician		JBG	

Factors/Conversions		
Std Temp	528	°R
Std Press	29.92	in Hg
K ₁	17.647	oR/in Hg

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

²The Critical Orifice Coefficient, 'K', must be entered in English units, (ft³•oR^{1/2})/(in.Hg•min).

Calibration Data										
Run Time	Metering Console				Critical Orifice					
Elapsed	DGM Orifice ΔH	Volume Initial	Volume Final	Outlet Temp Initial	Outlet Temp Final	Serial Number	Coefficient	Amb Temp Initial	Amb Temp Final	Actual Vacuum
(θ)	(P _m)	(V _m)	(V _{net})	(t _m)	(t _{net})		K'	(t _{amb})	(t _{amb})	in. Hg
min	in H ₂ O	cubic feet	cubic feet	°F	°F	FO		°F	°F	
10.0	2.00	590.50	598.146	48	51	FO-63	0.5906	68	68	15.50
10.0	2.00	598.146	605.833	51	55	FO-63	0.5906	68	68	15.50
10.0	2.00	605.833	613.549	55	59	FO-63	0.5906	68	68	15.50

Results								
Standardized Data				Dry Gas Meter				
Dry Gas Meter		Critical Orifice		Calibration Factor		Flowrate	0.3488	
(V _{m(std)})	(Q _{cr(std)})	(V _{cr(std)})	(Q _{cr(std)})	Value	Variation	Std & Corr	0.75 SCFM	Variation
(Y)	(ΔY)	(Q _{m(std)(corr)})	(ΔH@)	(ΔΔH@)				
cubic feet	cfm	cubic feet	cfm			cfm	in H ₂ O	
7.995	0.799	7.893	0.789	0.987	-0.002	0.789	1.899	0.014
7.985	0.799	7.893	0.789	0.989	-0.001	0.789	1.886	0.001
7.953	0.795	7.893	0.789	0.992	0.003	0.789	1.872	-0.014
Pretest Gamma	0.9744	% Deviation	1.5	0.989	Y Average		1.886	ΔH@ Average

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

I certify that the above Dry Gas Meter was calibrated in accordance with USEPA Methods, CFR Title 40, Part 60, Appendix A-3, Method 5, 16.2.3

Signature Jonas Gilbert

Date 1/4/2019

APPENDIX I-G

Process Data

December 5, 2018—Pine 75% wt. processed, Runs 1, 2, and 3

Appendix I-G, Table 1. Process Data, Dryer, December 5, 2018, Run 1						
Process Parameter	8:40 a.m.	8:55 a.m.	9:10 a.m.	9:25 a.m.	9:40 a.m.	Average
Run Time 8:40-9:47 a.m.						
Feed Rate, %	97.1	97.0	97.0	96.6	98.0	97.1
Short Tons/Hour	75.5	75.5	75.5	75.0	76.0	75.5
Dryer Outlet Moisture, % wt.	12.4	11.0	11.0	11.0	11.0	11.3
Dryer Inlet Moisture, % wt.	51.6	51.5	52.5	51.5	51.5	51.7
Production Rate, ODT/Hour	66.1	67.2	67.2	66.8	67.6	67.0
RTO Temperature A, F	1597	1606	1598	1600	1605	1601
RTO Temperature B, F	1588	1599	1587	1588	1594	1591
RTO Temperature C, F	1606	1605	1603	1603	1604	1604
RTO Temperature D, F	1604	1603	1599	1600	1603	1602
Temperature Average, F	1599	1603	1597	1598	1602	1600
WESP Grid 1 kilovolts	51	47	49	45	35	45.4
WESP Grid 1 milliamps	562	479	508	278	138	393
WESP Grid 2 kilovolts	47	43	45	42	49	45.2
WESP Grid 2 milliamps	439	250	384	213	525	362
WESP Grid 3 kilovolts	53	53	38	46	50	48
WESP Grid 3 milliamps	311	724	190	447	564	447
WESP Grid 4 kilovolts	57	49	52	59	48	53
WESP Grid 4 milliamps	971	515	616	1059	757	784

Appendix I-G, Table 2. Process Data, Dryer, December 5, 2018, Run 2						
Process Parameter	10:47 a.m.	11:02 a.m.	11:17 a.m.	11:34 a.m.	11:49 a.m.	Average
Run Time 10:47 a.m. – 11:57 a.m.						
Feed Rate, %	96.0	95.6	95.0	95.0	94.0	95.1
Short Tons/Hour	75.0	74.0	73.5	73.5	72.0	73.6
Dryer Outlet Moisture, % wt.	12.8	12.9	12.9	12.9	12.9	12.9
Dryer Inlet Moisture, % wt.	50.1	51.5	51.5	51.5	51.5	51.2
Production Rate, ODT/Hour	65.4	64.5	64.0	64.0	62.7	64.1
RTO Temperature A, F	1611	1604	1602	1611	1611	1608
RTO Temperature B, F	1599	1592	1595	1599	1600	1597
RTO Temperature C, F	1601	1604	1606	1602	1602	1603
RTO Temperature D, F	1600	1603	1604	1599	1599	1601
Temperature Average, F	1603	1601	1602	1603	1603	1602
WESP Grid 1 kilovolts	48	52	49	55	44	50
WESP Grid 1 milliamps	356	682	512	700	402	530
WESP Grid 2 kilovolts	48	49	43	52	55	49
WESP Grid 2 milliamps	448	509	277	640	820	539
WESP Grid 3 kilovolts	43	42	50	52	45	46
WESP Grid 3 milliamps	250	285	570	694	394	439
WESP Grid 4 kilovolts	57	51	52	54	43	51
WESP Grid 4 milliamps	964	584	708	676	278	642

Appendix I-G, Table 3. Process Data, Dryer, December 5, 2018, Run 3						
Process Parameter	12:15 p.m.	12:30 p.m.	12:45 p.m.	13:00 p.m.	13:15 p.m.	Average
Run Time 12:15 p.m. – 13:27 p.m.						
Feed Rate, %	97	94	95	96	94	95.2
Short Tons/Hour	75.5	72	73.5	75.0	72.0	73.6
Dryer Outlet Moisture, % wt.	53.1	53.1	53.1	53.6	53.6	53.3
Dryer Inlet Moisture, % wt.	12.0	12.0	12.0	12.2	12.2	12.1
Production Rate, ODT/Hour	66.4	63.4	64.7	65.9	63.2	64.7
RTO Temperature A, F	1610	1606	1597	1602	1601	1603
RTO Temperature B, F	1597	1594	1588	1595	1595	1594
RTO Temperature C, F	1597	1601	1605	1606	1605	1603
RTO Temperature D, F	1582	1601	1595	1604	1603	1597
Temperature Average, F	1597	1601	1596	1602	1601	1599
WESP Grid 1 kilovolts	45	45	58	61	48	51
WESP Grid 1 milliamps	368	353	900	1129	420	634
WESP Grid 2 kilovolts	38	52	59	62	62	55
WESP Grid 2 milliamps	160	684	991	1129	602	713
WESP Grid 3 kilovolts	45	51	36	53	54	48
WESP Grid 3 milliamps	365	682	181	780	833	568
WESP Grid 4 kilovolts	58	49	46	50	57	52
WESP Grid 4 milliamps	1001	550	550	589	1000	738

Appendix I-G, Table 4. Process Data, Dryer, December 5, 2018 Heat Input Data			
Parameter	Run 1	Run 2	Run 3
Start Time	8:40 a.m.	10:47 a.m.	12:15 p.m.
Fuel Strokes	55	55	46
Pounds per Stroke	558.7	558.7	558.7
MMBTU per ton	9.2	9.2	9.2
MMBTU per hour	143.4	143.4	118.2

Appendix I-G, Table 5. Dry Hammermill Process Data, December 4, 2019, Run 1						
Process Parameter	9:15 a.m.	9:30 a.m.	9:45 a.m.	10:00 a.m.	15:00 a.m.	Average
Run Time 9:15 a.m.-10:23 a.m..						
Throughput, tons/hour, DHM 1-5	74.8	74.9	74.9	74.9	74.9	74.9
Wood Moisture, % wt.	12.5	12.5	12.5	12.5	12.5	12.5
ODT/hour	65.5	65.5	65.5	65.5	65.5	65.5
DHM1 Differential Pressure, in. w.c.	7.5	7.5	7.8	8	8	7.8
DHM2 Differential Pressure, in. w.c.	10	10	11	16	16	12.6
DHM3 Differential Pressure, in. w.c.	8.5	8.5	7.8	8	8	8.2
DHM4 Differential Pressure, in. w.c.	10	12	13	13	13	12.2
DHM5 Differential Pressure, in. w.c.	9.5	11.8	12.8	12	12	11.6
Chute 1 Temperature, °F	52	52	52	56	52	53
Chute 2 Temperature, °F	58	57	47	56	59	55
Chute 3 Temperature, °F	49	47	42	48	51	47
Chute 4 Temperature, °F	56	55	48	60	60	56
Chute 5 Temperature, °F	47	58	43	50	63	52

Appendix I-G, Table 6. Dry Hammermill Process Data, December 4, 2019, Run 2						
Process Parameter	11:18 a.m.	11:33 a.m.	11:48 a.m.	12:03 p.m.	12:18 p.m.	Average
Run Time 11:18 a.m.-12:25 p.m..						
Throughput, tons/hour, DHM 1-5	73.6	74.5	74.6	74.3	74.3	74.3
Wood Moisture, % wt.	12.5	12.5	12.5	12.5	12.5	12.5
ODT/hour	64.4	65.2	65.3	65.0	65.0	65.0
DHM1 Differential Pressure, in. w.c.	5.5	6	6	6	6	6
DHM2 Differential Pressure, in. w.c.	7.2	9	9	10	10	9
DHM3 Differential Pressure, in. w.c.	7	7.5	8	7	7	7
DHM4 Differential Pressure, in. w.c.	17	18	18	18	18	18
DHM5 Differential Pressure, in. w.c.	8	7.5	7.5	10.2	10	9
Chute 1 Temperature, °F	54	57	60	61	61	59
Chute 2 Temperature, °F	47	55	55	53	57	53
Chute 3 Temperature, °F	50	52	53	54	54	53
Chute 4 Temperature, °F	59	61	61	63	66	62
Chute 5 Temperature, °F	50	52	52	54	54	52

Appendix I-G, Table 7. Dry Hammermill Process Data, December 4, 2019, Run 3						
Process Parameter	13:04 p.m.	13:19 p.m.	13:34 p.m.	13:49 p.m.	14:04 p.m.	Average
Run Time 13:04 a.m.-14:12 p.m..						
Throughput, tons/hour, DHM 1-5	73.4	74.3	74.9	74.3	72.9	74.0
Wood Moisture, % wt.	12.5	12.5	12.5	12.5	12.5	12.5
ODT/hour	64.2	65.0	65.5	65.0	63.8	64.7
DHM1 Differential Pressure, in. w.c.	6	6.5	6.5	6.5	6.5	6
DHM2 Differential Pressure, in. w.c.	10	10	11	11	11	11
DHM3 Differential Pressure, in. w.c.	7	7.5	8	8.5	8.5	8
DHM4 Differential Pressure, in. w.c.	17	17	18	18	18	18
DHM5 Differential Pressure, in. w.c.	2.5	5.7	7.5	8.5	8.5	7
Chute 1 Temperature, °F	59	60	55	60	60	59
Chute 2 Temperature, °F	54	56	57	59	58	57
Chute 3 Temperature, °F	50	53	53	54	54	53
Chute 4 Temperature, °F	52	60	61	62	63	60
Chute 5 Temperature, °F	57	50	50	52	52	52

APPENDIX II-A
Method 5-Method 202 Data Sheet

Date 1/16/2019

Client	Enviva	
Job #	2333	
Plant Name	Enviva, Greenwood	
City, State	Greenwood, SC	
Sampling Location	RCO 2	
No. of Ports Available	2	
No. of Ports Used	2	
Port Inside Diameter, Inches	4	
Distance From Far Wall To Outside Of Port, Inches	45	
Nipple Length And/Or Wall Thickness, Inches	3	
Depth Of Stack Or Duct, Inches	42	
Stack Or Duct Width (if rectangular), Inches		
Equiv. Diameter = $2DW/(D+W)$, Inches		
Stack/Duct Area, Square Feet	9.621	
$(\pi R^2 \text{ or } L \times W)$		
	Upstream	Downstream
Distance to Flow Disturbances, feet		
Diameters	0.0	0.0

Diameters			
Velocity	Up	Down	Particulate
12	>7.00	>1.75	12
12	6	1.5	16
16	5	1.25	20
16	2	0.5	24 or 25

Note: If more than 8 and 2 diameters and duct is greater than 12" and less than 24", use 8 or 9 points.

Location of Points in Circular Stacks or Ducts											
	4	6	8	10	12	14	16	18	20	22	24
1	6.7	4.4	3.2	2.6	2.1	1.8	1.6	1.4	1.3	1.1	1.1
2	25.0	14.6	10.5	8.2	6.7	5.7	4.9	4.4	3.9	3.5	3.2
3	75.0	29.6	19.4	14.6	11.8	9.9	8.5	7.5	6.7	6.0	5.5
4	93.3	70.4	32.3	22.6	17.7	14.6	12.5	10.9	9.7	8.7	7.9
5		85.4	67.7	34.2	25.0	20.1	16.9	14.6	12.9	1106	10.5
6		95.6	80.6	65.8	35.6	26.9	22.0	18.8	16.5	14.6	13.2
7			89.5	77.4	64.4	36.6	28.3	23.6	20.4	18.0	16.1
8			96.8	85.4	75.0	63.4	37.5	29.6	25.0	21.8	19.4
9				91.8	82.3	73.1	62.5	38.2	30.6	26.2	23
10				97.4	88.2	79.9	71.7	61.8	38.8	31.5	27.2
11					93.3	85.4	78.0	70.4	61.2	39.3	32.3
12					97.9	90.1	83.1	76.4	69.4	60.7	39.8
13						94.3	87.5	81.2	75	68.5	60.2
14						98.2	91.5	85.4	79.6	73.8	67.7
15							95.1	89.1	83.5	78.2	72.8
16							98.4	92.5	87.1	82.0	77
17								95.6	90.3	85.4	80.6
18								98.6	93.3	88.4	83.9
19									96.1	91.3	86.8
20									98.7	94.0	89.5
21										96.5	92.1
22										98.9	94.5
23											96.8
24											99

[illegible][illegible]

0.0000 - 0.0625 - 0	0.5625 - 0.6875 - 5/8
0.0625 - 0.1875 - 1/8	0.6875 - 0.8125 - 3/4
0.1875 - 0.3125 - 1/4	0.8125 - 0.9375 - 7/8
0.3125 - 0.4375 - 3/8	0.9375 - 1.0000 - 1
0.4375 - 0.5625 - 1/2	

PRELIMINARY INFORMATION						
Plant Name	Enviva, Greenwood		Date	1/16/2019		
City, State	Greenwood, SC		Project #	2333		
Personnel	JG, EG		Pitot Identification	3A		
Test Location	RCO 2		Pitot Coefficient (Cp)	0.84		
Stack Dimensions			Pressures			
Length of Stack (D)	42	in	Barometric Pressure (Pb)	29.9	in Hg	
Width of Stack (W)		in	Static Pressure (Pg)	3.8	in H ₂ O	
Area of Stack (As)	9.621	ft ²	Absolute Stack Pressure (Ps)	30.18	in Hg	
Stack Gas Composition						
Carbon Dioxide (%CO ₂)	0.0		Moisture Content (Bws)	6.00	%	
Oxygen (%O ₂)	20.9		Dry Molecular Weight (Md)	28.84	lb/lb-mole	
Nitrogen Concentration (%N ₂)	79.1		Wet Molecular Weight (Ms)	28.19	lb/lb-mole	
Start	Preliminary Traverse					
	Pitot Tube Leak Checks			A	B	
	Port	Point	Angle, °	Δp, in H ₂ O	Temp. °F	ft/sec
	A	1	0	0.74	155	52.52
		2	0	0.79	160	54.49
		3	0	0.50	164	43.49
		4	0	0.69	163	51.05
		5	-10	0.75	161	53.14
		6	-8	0.94	162	59.53
	B	1	0			
		2	-12			
		3	-8			
		4	0			
		5	0			
		6	-3			
	X	1	0			
		2	-3			
		3	-4			
		4	2			
		5	0			
		6	0			
		7	0			
		8	3			
		9	5			
		10	3			
End		11	-2			
		12	2			
Average Angle, Degrees		2.71				
Average Velocity Pressure		0.7289				
		160.8				
Average Stack Gas Velocity (ft/sec)		52.37				
Actual Cubic Feet per minute (ACFM)		30,234				
Dry Standard Cubic Feet per Minute (DSCFM)		24,380				

Air Control Techniques, P.C.
Isokinetic Sampling Train Field Data Sheet

Job #	Run ID	M5/202-1
2333	Method	5/202

IDENTIFICATION INFORMATION				PRELIMINARY CHECKS AND DATA															
Plant	Enviva, Greenwood			Pre Leak Check, ACFM	Actual	Req'd	Vacuum												
City, State	Greenwood, SC				0.00	<0.02 or 4%	13												
Test Location	RCO 2			Post Leak Check, ACFM	Failed														
Date	1/16/19		Filter ID 1																
Start	0945		Filter ID 2																
Stop	1052		Filter ID 3																
Meterbox ID	909033	JG, EG	Operator*																
ΔH@	1.898	4A	Stack TC ID																
Gamma (Y)	0.9744	NA	Tedlar Bags																
Ideal Nozzle	0.231	NA	Orsat Pump																
Nozzle Dia.	0.238	5 SS	Probe Length/Type																
Nozzle ID	2-3	2.65	K Factor																
Probe ID	4A	60A	Umbilic ID																
				<table border="1"> <thead> <tr> <th colspan="4">ACTUAL MOISTURE & GAS COMPOSITION</th> </tr> </thead> <tbody> <tr> <td>Water Recovered, grams</td> <td>52.7</td> <td>Moisture, %</td> <td>5.06</td> </tr> <tr> <td>CO₂ %</td> <td>0.04</td> <td>O₂ %</td> <td>20.83</td> </tr> </tbody> </table>				ACTUAL MOISTURE & GAS COMPOSITION				Water Recovered, grams	52.7	Moisture, %	5.06	CO ₂ %	0.04	O ₂ %	20.83
ACTUAL MOISTURE & GAS COMPOSITION																			
Water Recovered, grams	52.7	Moisture, %	5.06																
CO ₂ %	0.04	O ₂ %	20.83																

Sampling Information															
Point	Time Per Pt. (Min.)	Elapsed Time (h:m:s)	Dry Gas Meter (cu.ft.)	Velocity ΔP (In H ₂ O)	Meter Temp (°F)	Stack Temp (°F)	Actual ΔH (in H ₂ O)	Probe Temp (°F)	Filter Temp (°F)	Exit Temp (°F)	CPM Temp (°F)	Pump Vac (in. Hg)	Target ΔH (in H ₂ O)	Run ISO % Pt	Lk √ During Run
1	2.5	0	758.113	0.86	41	157	2.3	259	255	37	70	3.75	2.301	104.5	LC 1
2	2.5	2:30	760.25	0.775	41	154	2.1	257	252	38	70	3.5	2.079	104.0	
3	2.5	5:0	762.275	0.88	42	150	2.45	258	253	41	69	4	2.382	101.0	
4	2.5	7:30	764.38	0.75	43	155	2.1	259	254	44	72	3.75	2.016	105.7	LC-2
5	2.5	10:0	766.41	0.64	44	150	1.75	254	251	46	70	3	1.740	103.0	
6	2.5	12:30	768.25	0.675	46	156	1.85	254	259	48	70	3	1.826	100.9	
7	2.5	15:0	770.1	0.575	46	151	1.6	257	254	50	69	3	1.567	105.3	LC-3
8	2.5	17:30	771.89	0.345	48	154	1	259	254	52	70	2.5	0.940	108.3	
9	2.5	20:0	773.32	0.58	49	152	1.6	258	255	53	70	3	1.591	106.1	
10	2.5	22:30	775.14	0.36	19	160	1	258	255	54	70	3	0.916	107.4	LC-4
11	2.5	25:0	776.5	0.29	50	156	0.8	259	255	55	68	2	0.792	100.1	
12	2.5	27:30	777.715	0.78	51	155	2.2	259	255	57	70	3.5	2.139	99.3	
1	2.5	30:0	779.691	0.6	54	155	1.7	260	255	57	72	3	1.649	102.3	LC-5
2	2.5	32:30	781.49	0.67	54	155	1.9	259	255	57	72	3.25	1.844	102.1	
3	2.5	35:0	783.385	0.58	55	157	1.6	259	254	58	70	3	1.593	101.5	
4	2.5	37:30	785.14	0.62	56	155	1.7	259	253	59	71	4	1.713	103.7	LC-6
5	2.5	40:0	787	0.6	57	158	1.7	258	254	60	70	2.75	1.653	107.7	
6	2.5	42:30	788.9	0.85	58	157	2.4	258	256	60	70	4	2.350	104.7	
7	2.5	45:0	791.1	0.8	58	159	2.2	259	255	60	70	3.5	2.201	96.2	LC-7
8	2.5	47:30	793.06	0.63	59	153	1.8	260	256	58	71	3	1.754	102.1	
9	2.5	50:0	794.92	0.87	59	162	2.4	258	259	60	70	4	2.390	102.8	
10	2.5	52:30	797.1	0.77	60	153	2.2	260	255	58	70	3.5	2.147	101.7	LC-8
11	2.5	55:0	799.15	0.98	60	160	2.7	259	254	57	71	4	2.703	104.5	
12	2.5	57:30	801.51	0.78	62	159	2.2	260	255	57	70	3.5	2.161	102.9	
		1:00:0	803.595												

Total	Averages				Maximum and Minimum Values					Run ISO
Vm 45.482	0.665	50.5	155.5	1.885	260	259	60	72	4	102.4
Vmstd 46.631	in. H ₂ O	°F	°F	in H ₂ O	254	251	37	68		%

Run Notes:

Job #	Run ID	M5/202-2
2333	Method	5/202

IDENTIFICATION INFORMATION										PRELIMINARY CHECKS AND DATA							
Plant		Enviva, Greenwood								Actual		Req'd		Vacuum			
City, State		Greenwood, SC								Pre Leak Check, ACFM		0.00		<0.02 or 4%		7	
Test Location		RCO 2								Post Leak Check, ACFM				Failed			
Date	1/16/19			Filter ID 1									A		B		
Start	1144			Filter ID 2									4		4.5		
Stop	1318			Filter ID 3									4		4		
Meterbox ID	909033	JG, EG	Personnel									Pitot Pre Leak Check					
ΔH@	1.898	4A	Stack TC ID									Pitot Post Leak Check					
Gamma (Y)	0.9744	NA	Tedlar Bags									Ambient Temperature		49			
Ideal Nozzle	0.234	NA	Orsat Pump									Static Pressure, In. H ₂ O		0.67			
Nozzle Dia.	0.239	5	Probe Length/Type									Barometric Pressure, In. Hg		30.30			
Nozzle ID	3-3	2.82	K Factor														
Probe ID	4A	60A	Umbilic ID														
ACTUAL MOISTURE & GAS COMPOSITION																	
Water Recovered, grams										60.6		Moisture, %				5.72	
CO ₂ %										0.01		O ₂ %				20.83	
Sampling Information																	
Point	Time Per Pt, (Min.)	Elapsed Time (h:m:s)	Dry Gas Meter (cu.ft.)	Velocity ΔP (In H ₂ O)	Meter Temp (°F)	Stack Temp (°F)	Actual ΔH (in H ₂ O)	Probe Temp (°F)	Filter Temp (°F)	Exit Temp (°F)	CPM Temp (°F)	Pump Vac (in. Hg)	Target ΔH (in H ₂ O)	Run ISO % Pt Cum		Lk √ During Run	
1	2.5	0	810.834	0.6	56	155	1.75	253	244	46	68	3	1.714	101.8	101.8	LC 1	
2	2.5	2:30	812.66	0.65	55	162	1.9	256	252	45	69	3.25	1.832	101.2	101.5		
3	2.5	5:0	814.535	0.91	55	156	2.6	254	252	47	71	4.25	2.588	100.7	101.2		
4	2.5	7:30	816.75	0.65	56	164	1.9	255	254	53	72	4.25	1.825	104.4	102.0	LC-2	
5	2.5	10:0	818.685	0.695	56	157	2	254	256	56	72	3.5	1.977	99.4	101.5		
6	2.5	12:30	820.6	0.63	57	165	1.85	255	255	58	72	3.25	1.772	104.6	102.0		
7	2.5	15:0	822.51	0.64	57	165	1.85	253	253	59	73	3.5	1.801	101.0	101.9	LC-3	
8	2.5	17:30	824.37	0.78	58	156	2.3	256	256	58	73	4.5	2.232	108.8	102.8		
9	2.5	20:0	826.6	0.9	58	165	2.55	252	257	56	73	4.25	2.535	109.9	103.7		
10	2.5	22:30	829	0.75	58	158	2.2	256	256	55	73	3.75	2.135	102.7	103.6	LC-4	
11	2.5	25:0	831.06	0.9	58	166	2.55	254	254	54	73	4	2.532	99.0	103.1		
12	2.5	27:30	833.22	0.92	58	156	2.65	255	255	54	74	4.5	2.628	101.7	103.0		
1	2.5	30:0	835.481	0.76	57	156	2.2	252	256	57	70	4	2.166	100.0	102.8	LC-5	
2	2.5	32:30	837.5	0.73	58	160	2.15	250	255	43	73	4	2.073	105.2	102.9		
3	2.5	35:0	839.58	0.88	58	164	2.5	248	255	43	76	4.5	2.484	102.7	102.9		
4	2.5	37:30	841.8	0.86	59	160	2.5	244	254	46	77	4.25	2.446	100.4	102.7	LC-6	
5	2.5	40:0	843.955	0.75	59	162	2.2	257	255	47	78	3.5	2.126	102.6	102.7		
6	2.5	42:30	846.01	0.75	59	159	2.2	251	251	48	78	3.75	2.138	100.3	102.6		
7	2.5	45:0	848.025	0.63	60	160	1.85	252	254	49	78	3.5	1.796	104.4	102.7	LC-7	
8	2.5	47:30	849.95	0.45	60	162	1.3	255	253	50	79	3.5	1.280				

	Total	Averages				Maximum and Minimum Values					Run ISO
Vm	46.587	0.672	58.0	160.2	1.992	257	257	59	79	5	102.9
Vmstd	47.085	in. H ₂ O	°F	°F	in H ₂ O	244	244	43	68		%

Run Notes:

Job #	Run ID	M5/202-3
2333	Method	5/202

IDENTIFICATION INFORMATION								PRELIMINARY CHECKS AND DATA									
Plant	Enviva, Greenwood							Pre Leak Check, ACFM		Actual		Req'd		Vacuum			
City, State	Greenwood, SC									0.00		<0.02 or 4%		14.5			
Test Location	RCO 2							Post Leak Check, ACFM		0.00		0.020		7			
Date	1/16/19			Filter ID 1	Pitot Pre Leak Check Pitot Post Leak Check Ambient Temperature Static Pressure, In. H ₂ O Barometric Pressure, In. Hg		A			B							
Start	1407			Filter ID 2			4.5		4								
Stop	1523			Filter ID 3			4.25		6.5								
Meterbox ID	909033	JG, EG	Personnel														
ΔH@	1.898	4A	Stack TC ID														
Gamma (Y)	0.9744	NA	Tedlar Bags														
Ideal Nozzle	0.234	NA	Orsat Pump														
Nozzle Dia.	0.238	5	Probe Length/Type														
Nozzle ID	2-3	2.76	K Factor														
Probe ID	4A	60A	Umbilic ID														
								ACTUAL MOISTURE & GAS COMPOSITION									
								Water Recovered, grams		51.3		Moisture, %		5.12			
								CO ₂ %		0.05		O ₂ %		20.84			
Sampling Information																	
Point	Time Per Pt, (Min.)	Elapsed Time (h:m:s)	Dry Gas Meter (cu.ft.)	Velocity ΔP (In H ₂ O)	Meter Temp (°F)	Stack Temp (°F)	Actual ΔH (in H ₂ O)	Probe Temp (°F)	Filter Temp (°F)	Exit Temp (°F)	CPM Temp (°F)	Pump Vac (in. Hg)	Target ΔH (in H ₂ O)	Run ISO % Pt Cum		Lk √ During Run	
1	2.5	0	866.663	0.74	59	162	2.1	256	249	60	68	3.5	2.044	103.8	103.8	LC 1	
2	2.5	2:30	868.7	0.74	60	159	2.1	255	246	57	68	3.5	2.055	101.2	102.5		
3	2.5	5:0	870.695	0.675	60	162	2	260	253	57	70	3.5	1.865	105.4	103.4		
4	2.5	7:30	872.675	0.71	61	156	2	260	254	58	71	3.5	1.986	101.3	102.9	LC-2	
5	2.5	10:0	874.64	0.7	61	166	2	260	253	58	71	3.5	1.926	102.6	102.8		
6	2.5	12:30	876.6	0.64	61	160	1.9	257	254	58	72	3.5	1.778	105.6	103.3		
7	2.5	15:0	878.54	0.42	62	155	1.2	259	254	58	73	2.5	1.179	107.4	103.7	LC-3	
8	2.5	17:30	880.15	0.45	62	165	1.3	259	252	57	72	3.5	1.245	98.1	103.1		
9	2.5	20:0	881.66	0.45	62	157	1.3	259	255	57	72	3.5	1.261	102.0	103.0		
10	2.5	22:30	883.24	0.34	63	166	1.3	260	255	58	73	3.5	0.941	105.3	103.2	LC-4	
11	2.5	25:0	884.65	0.81	63	156	2.3	255	256	58	74	4	2.278	103.4	103.3		
12	2.5	27:30	886.8	0.45	63	164	1.3	259	255	58	75	3	1.246	110.0	103.8		
1	2.5	30:0	888.497	0.52	63	161	1.5	259	254	56	69	3	1.450	106.5	104.0	LC-5	
2	2.5	32:30	890.267	0.65	63	158	1.9	260	254	55	71	3.5	1.821	99.4	103.6		
3	2.5	35:0	892.117	0.63	63	166	1.8	260	255	54	72	3.5	1.741	103.8	103.6		
4	2.5	37:30	894.007	0.7	63	157	1.9	260	254	54	73	3.5	1.963	98.8	103.3	LC-6	
5	2.5	40:0	895.917	0.61	63	159	1.8	261	256	55	75	3.5	1.705	105.5	103.4		
6	2.5	42:30	897.817	0.65	63	157	1.9	261	257	56	75	3.5	1.823	102.3	103.4		
7	2.5	45:0	899.722	0.6	63	160	1.7	258	253	56	75	3.25	1.674	108.9	103.7	LC-7	
8	2.5																

	Total	Averages				Maximum and Minimum Values					Run ISO
Vm	44.731	0.619	62.4	160.5	1.813	262	257	60	75	4	102.5
Vmstd	44.807	in. H ₂ O	°F	°F	in H ₂ O	255	246	54	68		%

Run Notes:

Air Control Techniques, P.C.
Isokinetic Sampling Train Field Data Sheet

Job #	Run ID	M5/202-4
2333	Method	5/202

IDENTIFICATION INFORMATION				PRELIMINARY CHECKS AND DATA															
Plant	Enviva, Greenwood			<table border="1"> <tr> <td></td> <td>Actual</td> <td>Req'd</td> <td>Vacuum</td> </tr> <tr> <td>Pre Leak Check, ACFM</td> <td>0.00</td> <td><0.02 or 4%</td> <td>15</td> </tr> <tr> <td>Post Leak Check, ACFM</td> <td>0.00</td> <td>0.020</td> <td>12</td> </tr> </table>					Actual	Req'd	Vacuum	Pre Leak Check, ACFM	0.00	<0.02 or 4%	15	Post Leak Check, ACFM	0.00	0.020	12
	Actual	Req'd	Vacuum																
Pre Leak Check, ACFM	0.00	<0.02 or 4%	15																
Post Leak Check, ACFM	0.00	0.020	12																
City, State	Greenwood, SC																		
Test Location	RCO 2 (North)																		
Date	1/16/19	14469	Filter ID 1	<table border="1"> <tr> <td></td> <td>A</td> <td>B</td> </tr> <tr> <td>Pitot Pre Leak Check</td> <td>3.5</td> <td>4</td> </tr> <tr> <td>Pitot Post Leak Check</td> <td>4.2</td> <td>5.1</td> </tr> </table>					A	B	Pitot Pre Leak Check	3.5	4	Pitot Post Leak Check	4.2	5.1			
	A	B																	
Pitot Pre Leak Check	3.5	4																	
Pitot Post Leak Check	4.2	5.1																	
Start	1545		Filter ID 2																
Stop	1658		Filter ID 3																
Meterbox ID	909033	JG, EG	Operator*	<table border="1"> <tr> <td>Ambient Temperature</td> <td>55</td> </tr> <tr> <td>Static Pressure, In. H₂O</td> <td>0.67</td> </tr> <tr> <td>Barometric Pressure, In. Hg</td> <td>30.20</td> </tr> </table>				Ambient Temperature	55	Static Pressure, In. H ₂ O	0.67	Barometric Pressure, In. Hg	30.20						
Ambient Temperature	55																		
Static Pressure, In. H ₂ O	0.67																		
Barometric Pressure, In. Hg	30.20																		
ΔH@	1.898	4B	Stack TC ID																
Gamma (Y)	0.9744	NA	Tedlar Bags																
Ideal Nozzle	0.230	NA	Orsat Pump																
Nozzle Dia.	0.239	5	Probe Length/Type																
Nozzle ID	3-3	2.74	K Factor																
Probe ID	4B		Umbilicle ID																

ACTUAL MOISTURE & GAS COMPOSITION

Water Recovered, grams	51.1	Moisture, %	5.02
CO ₂ %	0.02	O ₂ %	20.89

Sampling Information

Point	Time Per Pt, (Min.)	Elapsed Time (h:m:s)	Dry Gas Meter (cu.ft.)	Velocity ΔP (In H ₂ O)	Meter Temp (°F)	Stack Temp (°F)	Actual ΔH (in H ₂ O)	Probe Temp (°F)	Filter Temp (°F)	Exit Temp (°F)	CPM Temp (°F)	Pump Vac (in. Hg)	Target ΔH (in H ₂ O)	Run ISO % Pt	Run ISO % Cum	Lk ✓ During Run
1	2.5	0	911.9	0.9	62	161	2.6	250	251	55	68	4	2.573	100.9	100.9	LC 1
2	2.5	2:30	914.13	0.58	63	163	1.7	257	253	54	69	3.5	1.652	92.8	97.3	
3	2.5	5:0	915.78	0.9	63	159	2.6	256	254	54	69	3.5	2.585	100.1	98.3	
4	2.5	7:30	918	0.55	63	162	1.6	257	254	53	69	3	1.569	98.1	98.3	LC-2
5	2.5	10:0	919.7	0.67	64	165	2	254	254	53	71	4.75	1.910	94.2	97.5	
6	2.5	12:30	921.5	0.6	64	161	1.8	258	256	54	73	3.5	1.720	109.1	99.3	
7	2.5	15:0	923.48	0.58	64	160	1.7	255	256	54	73	3.25	1.666	103.0	99.8	LC-3
8	2.5	17:30	925.32	0.75	65	164	2.2	254	256	54	74	3.75	2.145	101.7	100.0	
9	2.5	20:0	927.38	0.65	65	164	1.95	256	256	54	76	3.5	1.857	103.3	100.4	
10	2.5	22:30	929.33	0.63	65	163	1.9	253	252	54	76	3.5	1.804	104.3	100.8	LC-4
11	2.5	25:0	931.27	0.8	65	170	2.3	251	255	54	76	4	2.266	102.3	100.9	
12	2.5	27:30	933.4	0.75	66	158	2.2	255	255	54	77	10	2.167	106.4	101.4	
1	2.5	30:0	935.57	0.68	64	166	2	254	254	55	73	3.5	1.933	104.4	101.6	LC-5
2	2.5	32:30	937.578	0.84	64	159	2.5	256	256	50	70	4.5	2.416	95.5	101.1	
3	2.5	35:0	939.628	0.74	65	167	2.2	256	255	50	70	4	2.103	104.6	101.4	
4	2.5	37:30	941.728	0.63	65	159	2	255	255	50	69	4	1.815	109.4	101.9	LC-6
5	2.5	40:0	943.768	0.7	66	160	2.1	253	254	50	70	4	2.018	107.2	102.2	
6	2.5	42:30	945.878	0.7	66	160	2.1	250	255	50	70	3.75	2.017	102.7	102.2	
7	2.5	45:0	947.898	0.53	66	159	1.6	252	259	51	70	3	1.530	106.7	102.4	LC-7
8	2.5	47:30	949.728	0.5	66	168	1.5	255	254	50	70	3	1.424	105.8	102.6	
9	2.5	50:0	951.478	0.48	66	162	1.4	255	256	49	70	3	1.381	98.2	102.4	
10	2.5	52:30	953.078	0.37	67	167	1.2	254	255	49	70	3	1.058	108.5	102.6	LC-8
11	2.5	55:0	954.628	0.34	67	162	1	253	255	49	70	2.5	0.981	105.4	102.7	
12	2.5	57:30	956.078	0.48	67	164	1.5	253	256	49	70	3	1.381	101.1	102.6	
		1:00:0	957.725													

	Total	Averages				Maximum and Minimum Values				
Vm	45.825	0.631	64.9	162.6	1.902	258	259	55	77	10
Vmstd	45.544	in. H ₂ O	°F	°F	in H ₂ O	250	251	49	68	

Run ISO
102.5
%

Run Notes:

Air Control Techniques, P.C.
Isokinetic Sampling Train Field Data Sheet

Job #	Run ID	M5/202-5
2333	Method	5/202

IDENTIFICATION INFORMATION				PRELIMINARY CHECKS AND DATA									
Plant	Enviva, Greenwood			Pre Leak Check, ACFM	Actual	Req'd	Vacuum						
City, State	Greenwood, SC				0.00	<0.02 or 4%	14						
Test Location	RCO 2 (North)			Post Leak Check, ACFM	0.00	0.020	8						
Date	1/16/19	14670	Filter ID 1										
Start	1835		Filter ID 2										
Stop	2001		Filter ID 3										
Meterbox ID	909033	JG, EG	Personnel										
ΔH@	1.898	4A	Stack TC ID										
Gamma (Y)	0.9744	NA	Tedlar Bags										
Ideal Nozzle	0.236	NA	Orsat Pump										
Nozzle Dia.	0.238	5	Probe Length/Type										
Nozzle ID	2-3	2.82	K Factor										
Probe ID	4A	0	Umbilicle ID										
				<table border="1"> <tr> <td>Ambient Temperature</td> <td>53</td> </tr> <tr> <td>Static Pressure, In. H₂O</td> <td>0.67</td> </tr> <tr> <td>Barometric Pressure, In. Hg</td> <td>30.20</td> </tr> </table>				Ambient Temperature	53	Static Pressure, In. H ₂ O	0.67	Barometric Pressure, In. Hg	30.20
Ambient Temperature	53												
Static Pressure, In. H ₂ O	0.67												
Barometric Pressure, In. Hg	30.20												
ACTUAL MOISTURE & GAS COMPOSITION													
				Water Recovered, grams	44.4	Moisture, %	4.54						
				CO ₂ %	0.17	O ₂ %	20.86						

Sampling Information																
Point	Time Per Pt. (Min.)	Elapsed Time (h:m:s)	Dry Gas Meter (cu.ft.)	Velocity ΔP (In H ₂ O)	Meter Temp (°F)	Stack Temp (°F)	Actual ΔH (in H ₂ O)	Probe Temp (°F)	Filter Temp (°F)	Exit Temp (°F)	CPM Temp (°F)	Pump Vac (in. Hg)	Target ΔH (in H ₂ O)	Run ISO % Pt Cum		Lk ✓ During Run
1	2.5	0	958.963	0.58	55	159	1.7	259	255	44	68	3	1.617	97.9	97.9	LC 1
2	2.5	2:30	960.67	0.7	55	154	2	259	255	45	71	3	1.966	104.6	101.4	
3	2.5	5:0	962.68	0.5	55	157	1.5	257	255	43	72	3.5	1.397	106.0	102.8	
4	2.5	7:30	964.4	0.5	55	155	1.5	260	255	46	73	3	1.403	106.2	103.6	LC-2
5	2.5	10:0	966.125	0.9	54	158	2.5	260	255	44	73	4	2.508	105.1	104.0	
6	2.5	12:30	968.4	0.65	55	159	2	258	255	46	71	3.5	1.808	106.8	104.4	
7	2.5	15:0	970.37	0.33	55	159	1	259	260	48	72	3	0.919	101.0	104.1	LC-3
8	2.5	17:30	971.7	0.3	55	158	0.9	259	256	45	73	2	0.839	107.4	104.4	
9	2.5	20:0	973.05	0.28	54	156	0.8	257	256	45	74	2	0.784	108.7	104.7	
10	2.5	22:30	974.37	0.48	55	165	1.3	258	255	45	74	2	1.327	94.9	103.8	LC-4
11	2.5	25:0	975.87	0.26	55	165	0.8	258	254	45	74	2	0.718	97.1	103.4	
12	2.5	27:30	977	0.275	55	154	0.8	259	256	46	75	2.5	0.774	107.6	103.6	
1	2.5	30:0	978.3	0.7	53	163	2.1	254	245	45	68	3.5	1.935	103.2	103.6	LC-5
2	2.5	32:30	980.26	0.68	56	160	2	254	254	43	70	3.5	1.893	94.2	102.8	
3	2.5	35:0	982.04	0.71	54	163	2.1	255	255	44	70	3.5	1.960	103.8	102.9	
4	2.5	37:30	984.03	0.9	54	164	2.55	255	255	46	71	4	2.480	101.2	102.7	LC-6
5	2.5	40:0	986.21	0.6	54	165	1.7	257	256	47	72	3	1.649	101.6	102.6	
6	2.5	42:30	988	0.7	54	169	2	256	251	46	71	4	1.916	100.3	102.5	
7	2.5	45:0	989.9	0.58	54	160	1.7	255	254	46	72	3.5	1.609	99.5	102.3	LC-7
8	2.5	47:30	991.63	0.775	54	163	2.2	255	257	47	72	3.75	2.141	107.9	102.6	
9	2.5	50:0	993.79	0.77	54	155	2.2	255	255	47	72	4	2.153	104.3	102.7	
10	2.5	52:30	995.885	0.88	54	164	2.5	257	254	48	73	4.5	2.425	104.0	102.8	LC-8
11	2.5	55:0	998.1	0.7	55	165	2	254	249	48	74	4	1.928	108.7	103.1	
12	2.5	57:30	1000.17	0.815	55	161	2.5	255	252	48	74	4	2.262	105.5	103.2	
		1:00:0	1002.34													

Total	Averages					Maximum and Minimum Values				
Vm	43.38	0.588	54.5	160.5	1.765	260	260	48	75	5
Vmstd	43.969	in. H ₂ O	°F	°F	in H ₂ O	254	245	43	68	

Run ISO
102.8
%

Run Notes: _____

Method 4 - Air Control Techniques, P.C.

Date 1/16/2019

Source Information

Plant Name	Enviva, Greenwood	Job #	2333
City, State	Greenwood, SC	Personnel	JG, TB
Sampling Location	RCO 2 (North)	Balance	

Sampling Information

Run Number	M5/202-1	M5/202-2		
Filter Identification	14666	14667		
Sampling Date	1/16/2019	1/16/2019		

Moisture DataImpinger 1 - Empty

Final Weight, grams	426.0	431.3		
Initial Weight, grams	395.1	398.6		
Condensed Water, grams	30.9	32.7		

Impinger 2 - Empty

Final Weight, grams	594.3	608.7		
Initial Weight, grams	591.2	606.0		
Condensed Water, grams	3.1	2.7		

Impinger 3

Final Weight, grams	728.9	705.5		
Initial Weight, grams	724.6	696.2		
Condensed Water, grams	4.3	9.3		

Silica Gel

Final Weight, grams	820.7	820.4		
Initial Weight, grams	806.3	804.5		
Adsorbed Water, grams	14.4	15.9		

Total Water, grams	52.7	60.6		
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Sampling Train Purge Data

Purge Start	1128	1345		
Purge End	1230	1445		

Method 4 - Air Control Techniques, P.C.

Date 1/16/2019

Source Information

Plant Name	Enviva, Greenwood	Job #	2333
City, State	Greenwood, SC	Personnel	JG, TB
Sampling Location	RCO 2 (North)	Balance	

Sampling Information

Run Number	M5/202-3	M5/202-4	M5/202-5	
Filter Identification	14468	14469	14670	
Sampling Date	1/16/2019	1/16/2019	1/16/2019	

Moisture DataImpinger 1 - Empty

Final Weight, grams	421.3	427.2	414.3	
Initial Weight, grams	396.2	399.4	396.6	
Condensed Water, grams	25.1	27.8	17.7	

Impinger 2 - Empty

Final Weight, grams	595.3	608.4	596.2	
Initial Weight, grams	593.0	607.4	593.7	
Condensed Water, grams	2.3	1.0	2.5	

Impinger 3

Final Weight, grams	738.6	715.8	749.0	
Initial Weight, grams	728.9	705.5	738.6	
Condensed Water, grams	9.7	10.3	10.4	

Silica Gel

Final Weight, grams	834.9	832.4	807.2	
Initial Weight, grams	820.7	820.4	793.4	
Adsorbed Water, grams	14.2	12.0	13.8	

Total Water, grams	51.3	51.1	44.4	
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Sampling Train Purge Data

Purge Start	1540	1712	2007	
Purge End	1640	1816	2107	

Plant Name Enviva, Greenwood
City, State Greenwood, SC

Project # 2333
Test Location RCO 2

Parameter	Nomenclature/ Units	M5/202-1	M5/202-2	M5/202-3	M5/202-4	M5/202-5	Average (Run 3, 4, 5)
Date		1/16/2019	1/16/2019	1/16/2019	1/16/2019	1/16/2019	
Run Time	θ, minutes	60	60	60	60	60	
Nozzle Diameter	inches	0.238	0.239	0.238	0.239	0.238	
Production Rate	ODT/hour	24.3	25.2	25.1	25.2	22.9	24.4
Stack Area	As - sq. ft.	9.62	9.62	9.62	9.62	9.62	
Pitot Tube Coefficient	Cp	0.84	0.84	0.84	0.84	0.84	
Meter Calibration Factor	Y	0.9744	0.9744	0.9744	0.9744	0.9744	
Barometric Pressure, inches Hg	Bp - in Hg	30.30	30.30	30.30	30.20	30.20	
Static Pressure	Pg - in. H2O	0.67	0.67	0.67	0.67	0.67	
Stack Pressure	Ps - in.Hg	30.35	30.35	30.35	30.25	30.25	
Meter Box Pressure Differential	Δ H - in. H2O	1.89	1.99	1.81	1.90	1.76	
Average Velocity Head	Δ P - in. H2O	0.6651	0.6723	0.6185	0.6308	0.5882	
Volume of Gas Sampled	Vm - cu. ft.	45.482	46.587	44.731	45.825	43.38	
Dry Gas Meter Temperature	Tm - °F	50.5	58.0	62.4	64.9	54.5	
Stack Temperature	Ts - °F	155.5	160.2	160.5	162.6	160.5	161.2
Stack Temperature	Ts - °C	68.6	71.2	71.4	72.6	71.4	
Liquid Collected	grams	52.7	60.6	51.3	51.1	44.4	
Oxygen	O2 %	20.83	20.83	20.84	20.89	20.86	20.87
Carbon Dioxide	CO2 %	0.04	0.01	0.05	0.02	0.17	0.080
Carbon Monoxide	%	0	0	0	0	0	
Nitrogen	N2 %	79.13	79.16	79.11	79.09	78.97	
Fuel Factor		1.73	6.733	1.144	0.37	0.214	
Volume of Gas Sampled, Dry	Vm(std) - cu. ft.	46.631	47.085	44.807	45.544	43.969	44.774
Volume of Gas Sampled, Dry	Vm(std) - cu. M	1.320	1.333	1.269	1.290	1.245	1.268
Volume of Gas Sampled, Dry	Vm(std) - N cu. M	1.230	1.242	1.182	1.201	1.159	1.181
Volume of Water Vapor	Vw(std) - cu. ft.	2.485	2.857	2.419	2.409	2.093	2.307
Moisture Content	% H2O	5.06	5.72	5.12	5.02	4.54	4.90
Saturation Moisture	% H2O	28.50	31.88	32.14	33.88	32.18	
Dry Mole Fraction	Mfd	0.949	0.943	0.949	0.950	0.955	
Gas Molecular Weight, Dry	Md	28.84	28.83	28.84	28.84	28.86	
Gas Molecular Weight, Wet	Ms	28.29	28.21	28.29	28.29	28.37	
Gas Velocity	vs - ft./sec.	49.59	50.11	48.02	48.65	46.83	
Gas Velocity	m/sec.	15.11	15.27	14.64	14.83	14.27	14.58
Volumetric Air Flow, Actual	Qaw - ACFM	28,624	28,928	27,718	28,083	27,035	27,612
Volumetric Air Flow, Actual	m³/min	811	819	785	795	766	782
Volumetric Air Flow, Standard	Qsd - DSCFM	23,646	23,551	22,698	22,867	22,202	22,589
Volumetric Air Flow, Standard	Nm³/min	624	621	599	603	585	596
Isokinetic Sampling Rate	I %	102.4	102.9	102.5	102.5	102.8	102.6
FILTERABLE PARTICULATE MATTER EMISSIONS							
Filterable Particulate Catch	mg	2.3	1.2	4.7	3.8	1.2	3.233
Concentration	gr/DSCF	0.0008	0.0004	0.0016	0.0013	0.0004	0.0011
Mass Emission Rate	lb/hr	0.15	0.08	0.31	0.25	0.080	0.22
Mass Emission Rate	lbs./ODT	0.0063	0.0032	0.012	0.010	0.0032	0.0086
CONDENSABLE PARTICULATE MATTER EMISSIONS							
Condensable Particulate Catch	mg	0.5	2.2	2.6	1.0	1.0	1.533
Concentration	gr/DSCF	0.0002	0.0007	0.00090	0.00034	0.00035	0.00053
Mass Emission Rate	lb/hr	0.03	0.15	0.17	0.07	0.07	0.10
Mass Emission Rate	lbs./ODT	0.0014	0.0058	0.0069	0.0026	0.0029	0.0042
TOTAL PARTICULATE MATTER EMISSIONS							
Mass Emission Rate	lb/hr	0.19	0.22	0.49	0.32	0.15	0.32
Mass Emission Rate	lbs./ODT	0.0077	0.0089	0.019	0.013	0.006	0.013

Note: Run 1 and 2 voided due to post test leak check failure

APPENDIX II-B
Method 5-Method 202 Laboratory Report

RESOLUTION ANALYTICS, INC.

Specialists in Air Emissions Analysis

ANALYTICAL REPORT

CLIENT: **AIR CONTROL TECHNIQUES, INC.**

PROJECT: **2333**

ANALYTICAL SERVICES PROVIDED:

- **FILTERABLE & CONDENSIBLE PARTICULATE MATTER
(EPA METHOD 5/202)**

Confirmation of Data Review:

The analytical data and results provided in this report have been checked thoroughly for accuracy, has been performed and validated in accordance with the approved methods, and relate only to the samples provided for this project report.

The results contained herein shall not be reproduced except in full, without written approval of Resolution Analytics.

Date of Review: **January 31, 2019**



J. Bruce Nemet
Quality Assurance Officer

www.resolutionanalytics.com
208 Technology Park Lane, Ste 110, Fuquay-Varina, NC 27526

Report Summary

SAMPLE ID	TOTAL FILTERABLE PARTICULATE
Limit of Detection	0.2 mg
Acetone Blank	0.2 mg (in 196 mls)
S6-M5/202-1	2.3 mg
S6-M5/202-2	1.2 mg
S6-M5/202-3	4.7 mg
S6-M5/202-4	3.8 mg
S6-M5/202-5	1.2 mg

RESOLUTION ANALYTICS, INC.

Specialists in Air Emissions Analysis



Client: Air Control Techniques

RFA #: 2333

Method: M202

Report Summary

SAMPLE ID	Organic CPM	Inorganic CPM	Total CPM ¹
Limit of Detection	0.1 mg	0.1 mg	0.2 mg
Acetone Blank			0.2 mg (in 196 ml)
Hexane Blank			0.5 mg (in 190 ml)
DI H ₂ O Blank			0.6 mg (in 200 ml)
M5/202-PB	1.8 mg	0.0 mg	1.8 mg
M5/202-FB	1.2 mg	0.8 mg	2.0 mg
S6-M5/202-1	1.7 mg	0.8 mg	0.5 mg
S6-M5/202-2	1.7 mg	2.5 mg	2.2 mg
S6-M5/202-3	2.2 mg	2.4 mg	2.6 mg
S6-M5/202-4	1.2 mg	1.8 mg	1.0 mg
S6-M5/202-5	2.4 mg	0.6 mg	1.0 mg

¹ Total Condensable Particulate Matter (CPM) results have been Field Blank corrected up to a maximum of 2.0 mg.



301 East Durham Road
Cary, North Carolina 27513

Office (919) 460-7811
Fax (919) 460-7897

Chain of Custody / Transmittal

JOB #: 2333 **PO# -** 9006-2333

TO: Resolution Analytics, Inc. Attn: Jeff Coppedge (919) 346-5740
208 Technology Park Lane Suite 110
Fuquay Varina, North Carolina 27526

Samples sent by: Todd Brozell Date 1/18/19

SAMPLE NUMBER	COMPONENTS	ANALYSIS
S6-M5/202-1,2,3,4,5 PC6AB	<ul style="list-style-type: none"> M5 Filter F$\frac{1}{2}$ Acetone Rinse B$\frac{1}{2}$ Acetone/Hexane Rinse CPM Filter Impinger Catch and DI Rinse 	Total Particulate by Methods 5/202
M5/202-FB Field Blank	<ul style="list-style-type: none"> B$\frac{1}{2}$ Acetone/Hexane Rinse CPM Filter Impinger Catch and DI Rinse 	Total Particulate by Methods 5/202
M5/202-PB Proof Blank	<ul style="list-style-type: none"> B$\frac{1}{2}$ Acetone/Hexane Rinse CPM Filter Impinger Catch and DI Rinse 	Total Particulate by Methods 5/202
Blanks	<ul style="list-style-type: none"> Acetone Blank M5 Hexane Blank M202 DI H$_2$O Blank M202 	Total Particulate by Methods 5/202

Standard Turnaround

Relinquished by: Todd Brozell Date 1/18/19

Received by: Jeffrey S. Coppedge Date 1/22/19



Client: Air Control Techniques
RFA #: 2333
Date Received: 1/22/19
Date Analyzed: 1/23/19
Analyst: JSC
Analysis: EPA M5
Analyte(s): Filterable PM

Analytical Narrative

Sample Matrix & Components:

Dry Filters, Front¹/₂ Acetone Rinses, Acetone Blank

Summary of Sample Prep:

The acetone rinses were transferred to pre-tared teflon "baggies" in a low humidity environment. The acetone rinses were evaporated then desiccated for 24 hours, after which time they were weighed daily every six hours until consecutive weights agreed within ± 0.5 mg. The filters were baked 2 to 3 hours at 105° C, cooled in a desiccator and weighed.

All weights were recorded to the nearest 0.1 mg and include filterable particulate catch only. The acetone blank catch has been subtracted from sample rinse catches in proportion with their respective volumes.

Summary of Instrumentation:

Denver model Pinnacle Series analytical balance

Analytical Detection Limit(s): 0.1 mg per fraction

Miscellaneous Comments Regarding Sample Analysis: (Note unusual catch weights, interferences, odd sample behavior, and steps taken to confirm unusual results. Also note any deviations from standard analytical procedures, together with justification and possible affect on results. Specify samples when applicable.)

No modifications to EPA Method 5 analytical procedure were made. See data sheets for individual sample descriptions.

PARTICULATE SAMPLING LABORATORY RESULTS

Client: Air Control Techniques										RFA #: 2333	
Method: EPA M5											
Run Number			S6-M5/202-1			S6-M5/202-2			S6-M5/202-3		
Filter Container #											
Date		Init	Date		Date		Date				
1/24/19		JSC	1/24/19		1/24/19		1/24/19				
Baggie Tare Wt., g.			0.4677			0.4665			0.4675		
			0.0000			0.0000			0.0000		
Filter Tare Wt., g.			0.4684			0.4678			0.4682		
83Q-14666			83Q-14667			83Q-14668					
FILTER SAMPLE WT., g.			-0.0007 *			-0.0013 *			-0.0007 *		
*Filter Fragments In Rinse(Yes, No)?			NO			NO			NO		
Front ½ Rinse Container #											
Date		Init	Date		Date		Date				
			2085			1309			1520		
1/28/19		JSC	1/28/19		1/28/19		1/28/19				
1/25/19		JSC F	1/25/19		1/25/19		1/25/19				
Tare Wt., g.			3.5037			3.5136			3.5214		
			3.5034			3.5138			3.5214		
(76 ml)			(80 ml)			(90 ml)					
RINSE SAMPLE WT., g.			3.5010			3.5123			3.5166		
			0.0024			0.0013			0.0048		
Filter Catch, mg.			0.0 **			0.0 **			0.0 **		
Rinse Catch, mg.			2.4			1.3			4.8		
Rinse Blank Residue, mg.			0.1			0.1			0.1		
Net Rinse Catch, mg.			2.3			1.2			4.7		
FILTERABLE PARTICULATE, mg.			2.3			1.2			4.7		
**Negative results adjusted to zero.											

**Negative results adjusted to zero.

Legend: F = Final Weight

Notes & Comments: Light filter fragments present. Filter loss possible. No visible catch on filters.

PARTICULATE SAMPLING LABORATORY RESULTS

Client: Air Control Techniques				RFA #: 2333			
Method: EPA M5							
Run Number		S6-M5/202-4		S6-M5/202-5		Run 6	
Filter Container #							
Date		Init		Date		Date	
1/24/19		JSC		1/24/19			
Baggie Tare Wt., g.		0.4678		0.4605			
		0.0000		0.0000		#N/A	
Filter Tare Wt., g.		0.4686		83Q-14670		0.4614	
FILTER SAMPLE WT., g.		-0.0008 *				-0.0009 *	
*Filter Fragments In Rinse(Yes, No)?		NO		NO		#N/A #N/A	
Front ½ Rinse Container #							
Date		Init		Date		Date	
		1663		302			
1/28/19		JSC		1/28/19		F	
1/25/19		JSC F		1/25/19		F	
Tare Wt., g.		(110 ml)		(100 ml)		(100 ml)	
RINSE SAMPLE WT., g.		0.0039		0.0013		0.0013	
Filter Catch, mg.		0.0 **		0.0 **		#N/A	
Rinse Catch, mg.		3.9		1.3		#N/A	
Rinse Blank Residue, mg.		0.1		0.1		0.0	
Net Rinse Catch, mg.		3.8		1.2		#N/A ####	
FILTERABLE PARTICULATE, mg.		3.8		1.2		#N/A	
**Negative results adjusted to zero.							

Legend: F = Final Weight

Notes & Comments: Light filter fragments present. Filter loss possible. No visible catch on filters.

REAGENT BLANK LABORATORY RESULTS

Client: Air Control Techniques Method: EPA M5	RFA #: 2333
Run Number	Acetone Blank

Sample ID/Container #	Date	Init	3068

	1/28/19	JSC		3.6427
	1/25/19	JSC	F	3.6426
Tare Wt., g.	(196	ml)	3.6424
SAMPLE WT., g.				0.0002

Blank Beaker #	3068
Final wt., mg.	3.6426
Tare wt., mg.	3.6424
Residue, mg.	0.2
Volume, ml.	196
Density, mg/ml	785.0
Conc., mg/mg	1.30E-06 ✓
Upper Limit, mg	1.00E-05

Legend: F = Final Weight

Notes & Comments:



Client: Air Control Techniques
RFA #: 2333
Date Received: 1/22/19
Date Analyzed: 1/23/19
Analyst: JSC
Analysis: M202
Analyte(s): Condensable PM

Analytical Narrative

Sample Matrix & Components:

H₂O liquid impinger samples, organic impinger rinses, CPM filter, reagent blanks

Summary of Sample Prep and Analysis:

The samples were received in the lab at a temperature of less than 85° F, on ice in a cooler, and logged in our custody records. The teflon filters were each sonicated/extracted 3 times with DI H₂O, then 3 times with hexane. The extract was added to the appropriate sample fraction. The impinger contents were extracted 3 times with hexane and the extracts were combined with the organic rinses, then evaporated in pretared teflon baggies. The water fraction was evaporated in pretared teflon baggies to near dryness at 105° C, then at ambient until completely dry. When needed, the water fractions were resuspended in 50 mls DI H₂O, titrated with 0.1 N NH₄OH until acid neutralization, and then evaporated using the same procedure as before. Samples were then desiccated for 24 hours and weighed at a minimum of 6 hour intervals to constant weight. All weights were recorded to the nearest 0.1 mg. Where field blanks have been provided, samples have been blank corrected up to a maximum of 2.0 mg.

Summary of Instrumentation:

Denver model Pinnacle Series analytical balance

Analytical Detection Limit(s): 0.1 mg per fraction

Miscellaneous Comments Regarding Sample Analysis: (Note unusual catch weights, interferences, odd sample behavior, and steps taken to confirm unusual results. Also note any deviations from standard analytical procedures, together with justification and possible affect on results. Specify samples when applicable).

No modifications to M202 analytical procedure were made. See data sheets for individual sample notes and comments.

CONDENSIBLE PARTICULATE MATTER LABORATORY RESULTS

Client: Air Control Techniques Method: M202				RFA #: 2333						
Run Number		S6-M5/202-1		S6-M5/202-2		S6-M5/202-3				
Acetone/Hexane Container #		4012		1039		3794				
Date		Init		Date		Date				
1/30/19		JSC	F	3.6419	1/30/19	F	3.6089	1/30/19	F	3.6110
1/29/19		JSC		3.6422	1/29/19	F	3.6089	1/29/19	F	3.6110
Tare Wt., g.				3.6402			3.6072			3.6088
RINSE SAMPLE WT., g.				0.0017			0.0017			0.0022
DI H ₂ O Container #		3998		4128		2401				
Date		Init		Date		Date				
1/29/19		JSC		3.6275	1/29/19	F	3.7115	1/29/19	F	3.3863
1/28/19		JSC	F	3.6273	1/28/19		3.7117	1/28/19		3.3864
Tare Wt., g.				3.6265			3.7090			3.3839
RINSE SAMPLE WT., g.				0.0008			0.0025			0.0024
Organic CPM Mass, mg.		1.7		1.7		2.2				
Inorganic CPM Mass, mg		0.8		2.5		2.4				
Volume of NH ₄ OH Added (N=0.1), ml										
Correction For NH ₃ Added, mg		0.00		0.00		0.00				
Adjusted Inorganic CPM Mass, mg		0.8		2.5		2.4				
Total CPM Mass, mg *		0.5		2.2		2.6				
* Total CPM Mass results have been Field Train Blank corrected up to a maximum of 2.0 mg.										

Notes & Comments:

CONDENSIBLE PARTICULATE MATTER LABORATORY RESULTS

Client: Air Control Techniques Method: M202				RFA #: 2333			
Run Number		S6-M5/202-4		S6-M5/202-5		Run 6	

Acetone/Hexane Container #		3071		3281			
Date	Init	Date		Date			

1/30/19	JSC	F	3.8338	1/30/19	F	3.9860	
1/29/19	JSC		3.8341	1/29/19		3.9864	##
Tare Wt., g.			3.8326			3.9836	#N/A
RINSE SAMPLE WT., g.			0.0012			0.0024	#N/A

DI H ₂ O Container #		52		1695			
Date	Init	Date		Date			

1/29/19	JSC	F	3.7273	1/29/19	F	3.7354	
1/28/19	JSC		3.7274	1/28/19		3.7356	##
Tare Wt., g.			3.7255			3.7348	#N/A
RINSE SAMPLE WT., g.			0.0018			0.0006	#N/A

Organic CPM Mass, mg.	1.2	2.4	#N/A
Inorganic CPM Mass, mg	1.8	0.6	#N/A
Volume of NH ₄ OH Added (N=0.1), ml			
Correction For NH ₃ Added, mg	0.00	0.00	0.00
Adjusted Inorganic CPM Mass, mg	1.8	0.6	#N/A
Total CPM Mass, mg *	1.0	1.0	#N/A

* Total CPM Mass results have been Field Train Blank corrected up to a maximum of 2.0 mg.

Notes & Comments:

FIELD TRAIN BLANK LABORATORY RESULTS

Client: Air Control Techniques Method: M202		RFA #: 2333
Run Number	M5/202-PB	

Acetone/Hexane Container # 3458

Date	Init
------	------

	1/30/19	JSC	F	3.7009
	1/29/19	JSC		3.7012
Tare Wt., g.				3.6991
RINSE SAMPLE WT., g.				0.0018

DI H₂O Container # 2808

Date	Init
------	------

	1/29/19	JSC	F	3.5998
	1/28/19	JSC	F	3.5998
Tare Wt., g.				3.5998
RINSE SAMPLE WT., g.				0.0000

Organic CPM Mass, mg.	1.8
Inorganic CPM Mass, mg	0.0
Volume of NH ₄ OH Added (N=0.1), ml	
Correction For NH ₃ Added, mg	0.00
Adjusted Inorganic CPM Mass, mg	0.0
Total Proof Blank CPM Mass, mg	1.8

Notes & Comments:

FIELD TRAIN BLANK LABORATORY RESULTS

Client: Air Control Techniques Method: M202		RFA #: 2333
Run Number	M5/202-FB	

Acetone/Hexane Container # 3164

Date	Init
------	------

	1/30/19	JSC		3.8673
	1/29/19	JSC	F	3.8671
Tare Wt., g.				3.8659
RINSE SAMPLE WT., g.				0.0012

DI H₂O Container # 3906

Date	Init
------	------

	1/29/19	JSC	F	3.5187
	1/28/19	JSC	F	3.5187
Tare Wt., g.				3.5179
RINSE SAMPLE WT., g.				0.0008

Organic CPM Mass, mg.	1.2
Inorganic CPM Mass, mg	0.8
Volume of NH ₄ OH Added (N=0.1), ml	
Correction For NH ₃ Added, mg	0.00
Adjusted Inorganic CPM Mass, mg	0.8
Total Field Train Blank CPM Mass, mg	2.0

Notes & Comments:

FIELD REAGENT BLANK LABORATORY RESULTS

Client: Air Control Techniques Method: M202		RFA #: 2333	
Run Number	Acetone	Hexane	DI H ₂ O

Container #	Date	Init	3068	Date	3405	Date	2814
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	1/28/19	JSC	3.6427	1/30/19	F	3.6617	1/29/19	F	3.7947
	1/25/19	JSC F	3.6426	1/29/19		3.6622	1/28/19		3.7948
Tare Wt., g.	(196	ml)	3.6424	(190	ml)	3.6612	(200	ml)	3.7941
SAMPLE WT., g.			0.0002			0.0005			0.0006

Field Reagent Blank Mass, mg	0.2	0.5		0.6
Field Reagent Blank Concentration, mg/mg	1.30E-06	4.02E-06		3.00E-06

Notes & Comments:

✓

Date Received: 1/22/19
Date Analyzed: 1/23/19

[illegible]

✓

Date Received: 1/22/19
Date Analyzed: 1/23/19

[illegible]

APPENDIX II-C
CEMs Data Sheets

Enviva		RCO 2 (North)	
Parameters	Units	Run 1	Run 2
Date		16-Jan-19	16-Jan-19
Run Time		0945-1052	1229-1329
Oxygen	%	20.83	20.83
Moisture	%	5.06	5.72
Volumetric Flow Rate, Std	DSCFM	28624	28928
Process Rate	ODT/hr	24.3	25.2
VOC Emissions	Units	Run 1	Run 2
Concentration (actual)	ppmv _w as C ₃	8.24	7.32
Concentration (dry)	ppmv _d as C ₃	8.68	7.76
Emission Rate (propane)	lb/hr as C ₃ H ₈	1.71	1.54
Emission Factor (propane)	lb/ODT as C ₃ H ₈	0.070	0.061
NOx Emissions	Units	Run 1	Run 2
Concentration (dry)	ppm _{vd}	1.0	0.8
Emission Rate	lb/hr	0.205	0.168
Emission Factor	lb/ODT	0.008	0.007
CO Emissions	Units	Run 1	Run 2
Concentration (dry)	ppm _{vd}	13.2	12.1
Emission Rate	lb/hr	1.65	1.53
Emission Factor	lb/ODT	0.068	0.061

Facility: Enviva
Date: 1/16/19

Source: RCO 2 (North)

HAP		Methanol	Acetaldehyde	Formaldehyde	HCl	Sampling Data
Formula		CH ₄ O	CH ₃ CHO	CH ₂ O	C ₆ H ₆	
Mol Weight	lb/lb mole	32.04	44.05	30.31	36.46	
Response Factor		0.65	1.00	0.00	0.00	
Run 1						
Conc	ppm wet	0.00	0.00	0.86	0.00	
Conc	ppm dry	0.00	0.00	0.91	0.00	5.06 % Moisture
Mass Emissions	lb/hr	0.00	0.00	0.12	0.00	28,624 DSCFM
Emission Factor	lb/ODT	0.0000	0.0000	0.0051	0.00	24.3 ODT/hr
Run 2						
Conc	ppm wet	0.00	0.00	0.64	0.00	
Conc	ppm dry	0.00	0.00	0.68	0.00	5.72 % Moisture
Mass Emissions	lb/hr	0.00	0.00	0.09	0.00	28,928 DSCFM
Emission Factor	lb/ODT	0.0000	0.00	0.0037	0.00	25.2 ODT/hr
ND values						

Enviva
RCO 2 (North)

Date: 16-Jan-19
Run Time: 0945-1052

Run 1

Parameter	Symbol	O ₂ %	CO ₂ %	CO ppm	NOx ppm	THC ppm (as C ₃ H ₈)
Analyzer Calibration Error - Calibration Standards						
Zero Gas	$C_{v, zero}$	0.0	0.0	0.0	0.0	0.0
Low-Level Gas	$C_{v, low}$	N/A	N/A	N/A	N/A	25.25
Mid-Level Gas	$C_{v, mid}$	11.05	9.952	125.6	48.0	52.38
High-Level Gas	$C_{v, high}$	21.99	18.22	227.0	89.5	85.84
Calibration Span	CS	21.99	18.22	227.0	89.5	100
Analyzer Calibration Error - Instrument Response						
Zero Gas	$C_{Dir, zero}$	0.00	-0.06	-0.07	0.0	0.1
Low-Level Gas	$C_{Dir, low}$	N/A	N/A	N/A	N/A	26.1
Mid-Level Gas	$C_{Dir, mid}$	11.075	9.989	127.7	47.96	52.35
High-Level Gas	$C_{Dir, high}$	22.04	18.20	227.4	89.6	85.8
Analyzer Calibration Error - Results (Percent of Span)						
Zero Gas	ACE_{zero}	0.0	-0.3	0.0	0.0	0.1
Low-Level Gas	ACE_{low}	N/A	N/A	N/A	N/A	3.4
Mid-Level Gas	ACE_{mid}	0.1	0.2	0.9	0.0	-0.1
High-Level Gas	ACE_{high}	0.2	-0.1	0.2	0.1	0.0
Specification	ACE_{spec}	±2	±2	±2	±2	±5
System Calibrations - Instrument Response						
Initial Zero	$C_{s, zero (pre)}$	0.05	-0.06	-0.1	0.7	0.1
Final Zero	$C_{s, zero (post)}$	0.02	0.01	0.77	0.6	-0.05
Upscale Gas Standard	C_{MA}	21.99	18.22	125.6	48.0	52.4
Initial Upscale	$C_{v, up (pre)}$	21.99	18.10	126.2	47.7	52.35
Final Upscale	$C_{v, up (post)}$	22	18.12	127.09	47.6	52.11
System Bias - Results (Percent)						
Zero (pre)	$SB_{i (zero)}$	0.2	0.0	0.0	0.7	0.0
Zero (post)	$SB_{final (zero)}$	0.1	0.4	0.4	0.6	-0.2
Upscale (pre)	$SB_{i (upscale)}$	-0.2	-0.5	-0.7	-0.3	0.0
Upscale (post)	$SB_{final (upscale)}$	-0.2	-0.4	-0.3	-0.4	-0.2
Specification	SB_{spec}	±5	±5	±5	±5	NA
System Drift - Results (Percent)						
Zero	D_{zero}	0.1	0.4	0.4	0.1	-0.2
Upscale	$D_{upscale}$	0.0	0.1	0.4	0.1	-0.2
Specification	D_{spec}	±3	3.0	3.0	3.0	±3
Response Test - Results (seconds)						
Upscale Test		35	30	35	30	NA
Zero Test		35	30	35	30	NA
Response Time		35	30	35	30	25
Calibration Correction						
Raw Average	C_{ave}	20.84	0.01	13.6	1.6	8.2
Bias Average - Zero	C_0	0.03	-0.03	0.34	0.65	N/A
Bias Average - Upscale	C_M	22.00	18.11	126.65	47.65	N/A
Corrected Run Average	C_{Gas}	20.83	0.04	13.20	1.00	8.2

Enviva
RCO 2 (North)

Date: 16-Jan-19
Run Time: 1229-1329

Run 2

Parameter	Symbol	O ₂ %	CO ₂ %	CO ppm	NOx ppm	THC ppm (as C ₃ H ₈)
Analyzer Calibration Error - Calibration Standards						
Zero Gas	$C_{v, zero}$	0.0	0.0	0.0	0.0	0.0
Low-Level Gas	$C_{v, low}$	N/A	N/A	N/A	N/A	25.3
Mid-Level Gas	$C_{v, mid}$	11.1	10.0	125.6	48.0	52.4
High-Level Gas	$C_{v, high}$	22.0	18.2	227.0	89.5	85.8
Calibration Span	CS	22.0	18.2	227.0	89.5	100
Analyzer Calibration Error - Instrument Response						
Zero Gas	$C_{Dir, zero}$	0.0	-0.1	-0.1	0.0	0.1
Low-Level Gas	$C_{Dir, low}$	N/A	N/A	N/A	N/A	26.1
Mid-Level Gas	$C_{Dir, mid}$	11.1	10.0	127.7	48.0	52.4
High-Level Gas	$C_{Dir, high}$	22.0	18.2	227.4	89.6	85.8
Analyzer Calibration Error - Results (Percent of Span)						
Zero Gas	ACE_{zero}	0.0	-0.3	0.0	0.0	0.1
Low-Level Gas	ACE_{low}	N/A	N/A	N/A	N/A	3.4
Mid-Level Gas	ACE_{mid}	0.1	0.2	0.9	0.0	-0.1
High-Level Gas	ACE_{high}	0.2	-0.1	0.2	0.1	0.0
Specification	ACE_{spec}	±2	±2	±2	±2	±5
System Calibrations - Instrument Response						
Initial Zero	$C_{s, zero (pre)}$	0.02	0.01	0.77	0.60	-0.05
Final Zero	$C_{s, zero (post)}$	0.013	0.02	0.5	0.43	-0.3
Upscale Gas Standard	C_{MA}	21.99	18.22	125.6	48.0	52.4
Initial Upscale	$C_{v, up (pre)}$	22	18.12	127.09	47.6	52.11
Final Upscale	$C_{v, up (post)}$	22.01	18.14	126.9	47.75	52.3
System Bias - Results (Percent)						
Zero (pre)	$SB_{i (zero)}$	0.1	0.4	0.4	0.6	-0.2
Zero (post)	$SB_{final (zero)}$	0.1	0.4	0.3	0.4	-0.4
Upscale (pre)	$SB_{i (upscale)}$	-0.2	-0.4	-0.3	-0.4	-0.2
Upscale (post)	$SB_{final (upscale)}$	-0.1	-0.3	-0.4	-0.2	-0.1
Specification	SB_{spec}	±5	±5	±5	±5	NA
System Drift - Results (Percent)						
Zero	D_{zero}	0.0	0.1	0.1	0.2	-0.3
Upscale	$D_{upscale}$	0.0	0.1	0.1	0.2	0.2
Specification	D_{spec}	±3	3.0	3.0	3.0	±3
Response Test - Results (seconds)						
Upscale Test		35	30	35	30	NA
Zero Test		35	30	35	30	NA
Response Time		35	30	35	30	25
Calibration Correction						
Raw Average	C_{ave}	20.84	0.03	12.9	1.31	7.32
Bias Average - Zero	C_0	0.02	0.01	0.64	0.52	N/A
Bias Average - Upscale	C_M	22.01	18.13	127.00	47.68	N/A
Corrected Run Average	C_{Gas}	20.83	0.01	12.14	0.81	7.3

THC analyzer lost power at 1144. Powered on at 1156. Cal check 1212: zero std = 0.2; 52.38 std = 5

Test Run 1 Begin. STRATA Version 3.2.112**Operator: David Goshaw****Plant Name: Enviva Greenwood****Location: PC North Exhaust (RCO2)**

Start Averaging		O2 %	CO2 ppm	THC ppm	NOx ppm	CO ppm
1/16/2019	9:45:37	20.845	0.013	9.89	1.62	12.89
1/16/2019	9:46:37	20.818	0.013	9.87	1.57	13.2
1/16/2019	9:47:38	20.819	0.013	8.27	1.64	13.48
1/16/2019	9:48:38	20.83	0.012	7.67	1.71	13.52
1/16/2019	9:49:38	20.833	0.013	7.46	1.66	13.43
1/16/2019	9:50:38	20.828	0.013	9.09	1.6	12.71
1/16/2019	9:51:38	20.82	0.012	9.94	1.6	13.41
1/16/2019	9:52:38	20.822	0.012	7.23	1.66	13.31
1/16/2019	9:53:38	20.838	0.012	7.71	1.68	12.61
1/16/2019	9:54:37	20.845	0.012	9.56	1.64	12.82
1/16/2019	9:55:37	20.825	0.012	9.65	1.58	12.8
1/16/2019	9:56:37	20.83	0.011	8.83	1.61	13.21
1/16/2019	9:57:38	20.831	0.012	7.71	1.67	13.29
1/16/2019	9:58:38	20.834	0.012	7.23	1.65	13.1
1/16/2019	9:59:38	20.839	0.011	9.53	1.6	12.53
1/16/2019	10:00:38	20.829	0.011	9.98	1.56	13.27
1/16/2019	10:01:38	20.83	0.012	7.48	1.62	13.23
1/16/2019	10:02:38	20.84	0.011	8.48	1.67	12.69
1/16/2019	10:03:38	20.85	0.011	9.61	1.62	12.96
1/16/2019	10:04:38	20.836	0.011	10.06	1.56	12.84
1/16/2019	10:05:38	20.84	0.012	9.98	1.6	13.5
1/16/2019	10:06:38	20.836	0.011	8.13	1.66	13.7
1/16/2019	10:07:38	20.842	0.012	7.16	1.65	13.31
1/16/2019	10:08:38	20.846	0.012	10.51	1.6	12.99
1/16/2019	10:09:37	20.83	0.011	10.65	1.56	13.69
1/16/2019	10:10:37	20.805	0.012	7.64	1.62	13.55
1/16/2019	10:11:37	20.84	0.012	9.25	1.72	13.06
1/16/2019	10:12:37	20.853	0.012	9.41	1.67	13.22
1/16/2019	10:13:37	20.843	0.012	9.87	1.61	12.75
1/16/2019	10:14:37	20.835	0.012	10.48	1.6	13.53
1/16/2019	10:15:37	20.835	0.012	7.99	1.66	13.78
1/16/2019	10:16:38	20.843	0.012	7.15	1.68	13.11
1/16/2019	10:17:38	20.852	0.011	10.63	1.61	12.93
1/16/2019	10:18:37	20.833	0.011	10.32	1.57	13.39
1/16/2019	10:19:37	20.812	0.012	7.94	1.64	13.36
1/16/2019	10:20:38	20.844	0.012	8.98	1.71	13
Pause						
1/16/2019	10:21:38	20.895	0.012	6.43	1.63	12.78
1/16/2019	10:22:38	20.863	0.012	8.61	1.22	9.32
End Pause						
1/16/2019	10:23:38	20.847	0.012	10.43	1.59	12.71
1/16/2019	10:24:38	20.843	0.012	7.74	1.66	13.49
1/16/2019	10:25:37	20.851	0.011	7.34	1.67	12.72

Test Run 1 Begin. STRATA Version 3.2.112**Operator: David Goshaw****Plant Name: Enviva Greenwood****Location: PC North Exhaust (RCO2)**

		O2	CO2	THC	NOx	CO
1/16/2019	10:26:37	20.854	0.012	9.85	1.64	12.97
1/16/2019	10:27:37	20.845	0.011	9.8	1.58	13.64
1/16/2019	10:28:37	20.839	0.011	8.07	1.63	14.04
1/16/2019	10:29:37	20.848	0.012	7.54	1.69	14.17
1/16/2019	10:30:38	20.853	0.012	7.53	1.66	14.37
1/16/2019	10:31:38	20.843	0.012	8.56	1.61	14.24
1/16/2019	10:32:37	20.838	0.01	9.07	1.59	15.36
1/16/2019	10:33:38	20.842	0.012	6.72	1.67	15.31
1/16/2019	10:34:38	20.849	0.012	6.48	1.7	14.43
1/16/2019	10:35:38	20.858	0.011	8.11	1.63	14.57
1/16/2019	10:36:38	20.84	0.011	8.19	1.58	14.95
1/16/2019	10:37:38	20.823	0.011	7.25	1.64	15.14
1/16/2019	10:38:38	20.843	0.011	6.6	1.71	14.69
1/16/2019	10:39:38	20.86	0.011	6.42	1.67	14.2
1/16/2019	10:40:38	20.856	0.012	7.99	1.6	13.78
1/16/2019	10:41:37	20.853	0.012	8.2	1.57	14.75
1/16/2019	10:42:37	20.852	0.011	6.01	1.62	14.67
1/16/2019	10:43:37	20.862	0.011	6.08	1.65	13.7
1/16/2019	10:44:37	20.868	0.011	7.18	1.6	13.88
1/16/2019	10:45:38	20.85	0.012	7.39	1.56	14.08
1/16/2019	10:46:38	20.854	0.011	6.98	1.6	14.6
1/16/2019	10:47:38	20.856	0.011	5.66	1.66	14.33
1/16/2019	10:48:38	20.862	0.012	5.58	1.65	13.65
1/16/2019	10:49:38	20.864	0.012	7.82	1.6	13.38
1/16/2019	10:50:38	20.86	0.012	7.86	1.56	14.31
1/16/2019	10:51:38	20.855	0.012	5.94	1.63	14.33
1/16/2019	10:52:38	20.862	0.013	5.83	1.66	13.64
Average	2963 sam	20.842	0.012	8.24	1.63	13.61

Test Run 1 End

Test Run 12 Begin. STRATA Version 3.2.112**Operator: David Goshaw****Plant Nam Enviva Greenwood****Location: PC North Exhaust (S6)**

Start Averaging		O2 %	CO2 ppm	THC ppm	NOx ppm	CO ppm
1/16/2019	12:30:07	20.827	0.009	7.31	1.26	12.41
1/16/2019	12:31:07	20.836	0.014	8.17	1.32	13.32
1/16/2019	12:32:06	20.831	-0.018	6.38	1.37	13.09
1/16/2019	12:33:06	20.838	0.002	5.91	1.37	12.7
1/16/2019	12:34:07	20.846	-0.005	8.96	1.32	12.63
1/16/2019	12:35:07	20.835	0.004	8.95	1.31	13.27
1/16/2019	12:36:07	20.838	-0.001	6.32	1.37	13.01
1/16/2019	12:37:07	20.842	0.006	7.1	1.4	13.15
1/16/2019	12:38:07	20.846	-0.016	6.86	1.35	12.95
1/16/2019	12:39:07	20.835	-0.013	7.61	1.32	12.7
1/16/2019	12:40:06	20.836	-0.012	8.53	1.33	13.32
1/16/2019	12:41:08	20.834	-0.001	6.11	1.39	13.21
1/16/2019	12:42:07	20.847	0.041	5.84	1.41	12.65
1/16/2019	12:43:07	20.853	0	8.69	1.35	12.38
1/16/2019	12:44:07	20.844	0.01	8.85	1.33	12.97
1/16/2019	12:45:07	20.837	0.02	6.81	1.39	12.93
1/16/2019	12:46:07	20.842	0.004	6.93	1.43	12.83
1/16/2019	12:47:07	20.853	0.013	6.44	1.39	12.83
1/16/2019	12:48:07	20.842	-0.016	7.76	1.34	12.38
1/16/2019	12:49:07	20.842	0.018	8.62	1.35	13.24
1/16/2019	12:50:07	20.838	0.035	6.21	1.38	12.91
1/16/2019	12:51:07	20.847	-0.015	6.39	1.38	11.95
1/16/2019	12:52:07	20.861	0.027	8.49	1.33	12.6
1/16/2019	12:53:07	20.847	0.034	8.7	1.3	12.54
1/16/2019	12:54:07	20.853	0.011	7.47	1.34	12.86
1/16/2019	12:55:07	20.851	0.035	6.86	1.36	13.12
1/16/2019	12:56:07	20.848	0.021	6.25	1.32	12.98
1/16/2019	12:57:07	20.851	0.018	8.26	1.3	12.52
1/16/2019	12:58:07	20.85	0.02	8.91	1.28	13.56
1/16/2019	12:59:07	20.836	0.019	5.94	1.32	13.26
1/16/2019	13:00:07	20.847	0.016	6.47	1.33	12.78
1/16/2019	13:01:07	20.858	0.026	8.2	1.28	13.11
1/16/2019	13:02:07	20.846	0.042	8.49	1.24	12.97
1/16/2019	13:03:07	20.848	0.048	8.15	1.27	13.54
1/16/2019	13:04:06	20.839	0.046	6.65	1.31	13.56
1/16/2019	13:05:08	20.845	0.045	5.81	1.29	13.3
1/16/2019	13:06:07	20.847	0.025	8.62	1.25	12.8
1/16/2019	13:07:07	20.847	0.045	8.81	1.23	13.74
1/16/2019	13:08:07	20.829	0.017	6.01	1.28	13.33
1/16/2019	13:09:07	20.848	0.036	7.15	1.32	12.87
1/16/2019	13:10:07	20.857	0.049	7.41	1.28	13
1/16/2019	13:11:07	20.845	0.028	7.69	1.23	11.99
1/16/2019	13:12:07	20.848	0.01	8.28	1.24	12.43

Test Run 12 Begin. STRATA Version 3.2.112**Operator: David Goshaw****Plant Nam Enviva Greenwood****Location: PC North Exhaust (S6)**

		O2	CO2	THC	NOx	CO
1/16/2019	13:13:07	20.842	0.033	6.02	1.29	12.8
1/16/2019	13:14:07	20.845	0.032	5.2	1.28	12.36
1/16/2019	13:15:07	20.853	0.031	8.63	1.23	12.45
1/16/2019	13:16:07	20.846	0.035	8.68	1.22	13.16
1/16/2019	13:17:07	20.846	0.042	5.97	1.27	13.13
1/16/2019	13:18:08	20.847	0.045	6.58	1.32	12.45
1/16/2019	13:19:07	20.852	0.043	6.58	1.28	12.62
1/16/2019	13:20:07	20.847	0.039	7.5	1.23	11.92
1/16/2019	13:21:07	20.84	0.046	8.64	1.25	13.02
1/16/2019	13:22:07	20.833	0.047	5.92	1.31	13.31
1/16/2019	13:23:07	20.843	0.056	5.32	1.34	12.62
1/16/2019	13:24:07	20.851	0.038	8.19	1.29	12.5
1/16/2019	13:25:07	20.845	0.036	8.23	1.25	12.69
1/16/2019	13:26:07	20.847	0.061	6.4	1.3	12.78
1/16/2019	13:27:07	20.848	0.036	7.08	1.32	12.32
1/16/2019	13:28:07	20.849	0.07	6.79	1.31	12.94
1/16/2019	13:29:07	20.843	0.072	7.94	1.28	12.07
Pause						
Average	2651 sam	20.844	0.025	7.32	1.31	12.85
Test Run 12 End						

Date	Form- aldehyde (ppm)	SEC (ppm)	HCI (ppm)	SEC (ppm)	Methan ol (ppm)	SEC (ppm)	acetaldeh yde (ppm)	SEC (ppm)
12/6/2018 8:26	0.582	0.055	0.216	0.068	0.002	0.194	0.597	0.224
12/6/2018 8:27	0.499	0.054	0.221	0.066	-0.005	0.193	0.628	0.222
12/6/2018 8:28	0.388	0.056	0.21	0.069	0.001	0.191	0.403	0.222
12/6/2018 8:29	0.613	0.052	0.134	0.063	0.031	0.193	0.523	0.219
12/6/2018 8:30	0.602	0.055	0.217	0.067	0.052	0.191	0.229	0.223
12/6/2018 8:31	0.449	0.055	0.201	0.069	-0.019	0.192	0.262	0.225
12/6/2018 8:32	0.479	0.053	0.197	0.065	0.028	0.189	0.357	0.225
12/6/2018 8:33	0.487	0.053	0.214	0.065	0.071	0.191	0.422	0.221
12/6/2018 8:34	0.584	0.056	0.236	0.07	0.043	0.192	0.143	0.228
12/6/2018 8:35	0.61	0.052	0.214	0.064	0.021	0.192	0.032	0.218
12/6/2018 8:36	0.513	0.057	0.175	0.069	-0.002	0.193	-0.098	0.229
12/6/2018 8:37	0.448	0.053	0.247	0.065	0.018	0.193	-0.054	0.221
12/6/2018 8:38	0.71	0.055	0.288	0.068	0.059	0.192	-0.373	0.23
12/6/2018 8:39	0.648	0.055	0.23	0.067	0.018	0.193	-0.164	0.221
12/6/2018 8:40	0.421	0.056	0.214	0.07	0.026	0.192	0.433	0.225
12/6/2018 8:41	0.482	0.056	0.181	0.068	0.001	0.192	0.563	0.222
12/6/2018 8:42	0.478	0.052	0.237	0.065	0.035	0.19	0.128	0.22
12/6/2018 8:43	0.616	0.055	0.198	0.064	0.017	0.193	0.076	0.221
12/6/2018 8:44	0.652	0.056	0.209	0.065	0.08	0.192	0.222	0.224
12/6/2018 8:45	0.444	0.054	0.156	0.069	0.028	0.192	0.118	0.223
12/6/2018 8:46	0.508	0.055	0.203	0.067	0.007	0.192	0.037	0.229
12/6/2018 8:47	0.596	0.057	0.243	0.065	0.029	0.191	-0.588	0.235
12/6/2018 8:48	0.663	0.058	0.279	0.071	0.013	0.194	-0.71	0.241
12/6/2018 8:49	0.537	0.057	0.254	0.068	0.016	0.194	-0.62	0.238
12/6/2018 8:50	0.525	0.058	0.157	0.071	0.048	0.194	-0.528	0.238
12/6/2018 8:51	0.492	0.056	0.274	0.063	0.016	0.194	-0.493	0.231
12/6/2018 8:52	0.639	0.057	0.239	0.066	0.026	0.193	-0.711	0.232
12/6/2018 8:53	0.666	0.057	0.23	0.07	0.057	0.191	0.579	0.23
12/6/2018 8:54	0.497	0.052	0.095	0.064	0.045	0.194	0.456	0.216
12/6/2018 8:55	0.471	0.053	0.112	0.065	0.03	0.192	0.493	0.222
12/6/2018 8:56	0.583	0.054	0.161	0.067	0.06	0.193	0.045	0.219
12/6/2018 8:57	0.656	0.054	0.197	0.064	0.068	0.195	-0.021	0.223
12/6/2018 8:58	0.527	0.055	0.196	0.069	0.084	0.196	0.026	0.228
12/6/2018 8:59	0.51	0.055	0.159	0.066	0.023	0.195	-0.06	0.225
12/6/2018 9:00	0.451	0.054	0.235	0.066	0.027	0.194	-0.11	0.225
12/6/2018 9:01	0.632	0.054	0.185	0.065	0.063	0.196	-0.285	0.228
12/6/2018 9:02	0.714	0.055	0.187	0.065	0.1	0.198	-0.272	0.226
12/6/2018 9:03	0.571	0.057	0.197	0.067	0.028	0.196	-0.743	0.233
12/6/2018 9:04	0.549	0.057	0.228	0.064	0.012	0.198	-0.303	0.23
12/6/2018 9:05	0.664	0.058	0.179	0.071	0.07	0.196	-0.691	0.237
12/6/2018 9:06	0.68	0.058	0.172	0.068	0.025	0.194	-0.542	0.241
12/6/2018 9:07	0.566	0.058	0.24	0.07	0.044	0.19	-0.544	0.238
12/6/2018 9:08	0.402	0.056	0.185	0.065	0.035	0.187	-0.389	0.228
12/6/2018 9:09	0.464	0.057	0.234	0.067	0.022	0.185	-0.411	0.233
12/6/2018 9:10	0.647	0.057	0.182	0.069	0.046	0.186	-0.587	0.239
12/6/2018 9:11	0.56	0.059	0.192	0.069	0.05	0.185	-0.414	0.235
12/6/2018 9:12	0.461	0.058	0.216	0.068	0.028	0.186	-0.699	0.233
12/6/2018 9:13	0.53	0.058	0.157	0.067	0.019	0.185	-0.851	0.238
12/6/2018 9:14	0.62	0.059	0.214	0.07	0.045	0.183	-0.501	0.243
12/6/2018 9:15	0.525	0.057	0.256	0.07	0.056	0.186	-0.525	0.23
12/6/2018 9:16	0.576	0.057	0.252	0.066	0.052	0.187	-0.646	0.241
12/6/2018 9:17	0.487	0.058	0.234	0.07	0.06	0.186	-0.775	0.241

Date	Form- aldehyde (ppm)	SEC (ppm)	HCl (ppm)	SEC (ppm)	Methan ol (ppm)	SEC (ppm)	acetaldeh yde (ppm)	SEC (ppm)
12/6/2018 9:18	0.362	0.059	0.188	0.068	0.007	0.187	-0.724	0.244
12/6/2018 9:19	0.605	0.057	0.166	0.065	0.063	0.187	-0.49	0.245
12/6/2018 9:20	0.668	0.058	0.194	0.069	0.058	0.186	-0.978	0.242
12/6/2018 9:21	0.496	0.059	0.086	0.07	-0.008	0.186	-0.643	0.251
12/6/2018 9:22	0.547	0.06	0.233	0.071	0.005	0.186	-0.515	0.251
12/6/2018 9:23	0.571	0.056	0.137	0.066	0.026	0.179	-0.167	0.225
12/6/2018 9:24	0.555	0.056	0.107	0.07	0.057	0.178	0.24	0.224
12/6/2018 9:25	0.503	0.055	0.142	0.066	0.075	0.176	0.27	0.219
12/6/2018 9:26	0.404	0.056	0.127	0.068	0.073	0.178	0.353	0.221
12/6/2018 9:27	0.388	0.054	0.186	0.067	-0.006	0.176	0.402	0.218
12/6/2018 9:28	0.532	0.054	0.179	0.066	0.021	0.174	0.14	0.215
12/6/2018 9:29	0.57	0.055	0.171	0.07	0.052	0.173	0.226	0.219
12/6/2018 9:30	0.545	0.054	0.193	0.066	0.026	0.175	-0.021	0.221
12/6/2018 9:31	0.513	0.056	0.116	0.07	0.054	0.173	0.24	0.227
12/6/2018 9:32	0.441	0.054	0.215	0.067	0.052	0.172	0.28	0.215
12/6/2018 9:33	0.516	0.057	0.114	0.07	0.056	0.173	0.342	0.232
12/6/2018 9:34	0.543	0.056	0.237	0.069	0.084	0.172	0.198	0.23
12/6/2018 9:35	0.429	0.056	0.173	0.07	0.056	0.175	0.276	0.225
12/6/2018 9:36	0.417	0.054	0.205	0.067	0.053	0.173	0.149	0.224
12/6/2018 9:37	0.603	0.054	0.203	0.069	0.044	0.173	0.381	0.219
12/6/2018 9:38	0.534	0.058	0.22	0.068	0.08	0.172	-0.002	0.227
12/6/2018 9:39	0.49	0.056	0.25	0.071	0.066	0.173	0.21	0.228
12/6/2018 9:40	0.434	0.055	0.172	0.07	0.079	0.172	0.153	0.225
12/6/2018 9:41	0.44	0.055	0.219	0.068	0.041	0.171	0.108	0.222
12/6/2018 9:42	0.532	0.054	0.183	0.067	0.045	0.173	0.247	0.22
12/6/2018 9:43	0.512	0.056	0.214	0.067	0.107	0.17	0.058	0.224
12/6/2018 9:44	0.356	0.055	0.184	0.066	0.031	0.17	0.148	0.223
12/6/2018 9:45	0.332	0.055	0.2	0.069	0.063	0.171	0.114	0.22
12/6/2018 9:46	0.502	0.056	0.241	0.067	0.062	0.17	0.364	0.227
12/6/2018 9:47	0.549	0.057	0.202	0.07	0.057	0.17	0.274	0.233
12/6/2018 9:48	0.428	0.054	0.231	0.068	0.005	0.171	0.484	0.224
12/6/2018 9:49	0.464	0.052	0.2	0.065	0.022	0.175	0.09	0.217
12/6/2018 9:50	0.437	0.058	0.167	0.072	0.056	0.176	0.287	0.23
12/6/2018 9:51	0.569	0.055	0.155	0.069	0.086	0.178	0.426	0.227
12/6/2018 9:52	0.559	0.054	0.18	0.066	0.07	0.179	0.631	0.22
12/6/2018 9:53	0.407	0.058	0.205	0.072	0.059	0.181	0.416	0.231
12/6/2018 9:54	0.434	0.056	0.093	0.067	0.084	0.18	0.49	0.226
12/6/2018 9:55	0.58	0.058	0.197	0.071	0.109	0.179	0.383	0.227
12/6/2018 9:56	0.621	0.054	0.156	0.068	0.094	0.193	0.589	0.228
12/6/2018 9:57	0.694	0.055	0.146	0.067	0.053	0.202	0.453	0.225
12/6/2018 9:58	0.644	0.054	0.144	0.067	0.079	0.202	0.346	0.231
12/6/2018 9:59	0.456	0.053	0.155	0.068	0.033	0.675	0.025	0.217
12/6/2018 10:00	-0.013	0.039	0.127	0.049	-0.347	3.241	-0.66	0.153
12/6/2018 10:01	-0.048	0.032	-0.01	0.041	-0.4	3.352	-0.441	0.133
12/6/2018 10:02	-0.105	0.032	0.014	0.039	-0.416	3.358	-0.536	0.13
12/6/2018 10:03	-0.07	0.032	0.03	0.041	-0.422	3.348	-0.582	0.132
12/6/2018 10:04	-0.029	0.03	0.012	0.039	-0.262	1.194	-0.201	0.118
12/6/2018 10:05	-0.043	0.027	-0.01	0.035	0.007	0.054	-0.022	0.104
12/6/2018 10:06	-0.064	0.026	-0.02	0.035	-0.042	0.04	-0.177	0.115
12/6/2018 10:07	-0.026	0.027	0.01	0.036	-0.003	0.037	-0.358	0.114
12/6/2018 10:08	0.109	0.033	0.088	0.044	0.043	0.059	-0.157	0.133
12/6/2018 10:09	0.509	0.051	0.303	0.061	0.069	0.109	0.208	0.198

Date	Form- aldehyde (ppm)	SEC (ppm)	HCI (ppm)	SEC (ppm)	Methan ol (ppm)	SEC (ppm)	acetaldeh yde (ppm)	SEC (ppm)
12/6/2018 10:10	0.074	0.034	0.151	0.043	0.008	0.036	-0.238	0.135
12/6/2018 10:11	0.008	0.03	-0.05	0.039	0.002	0.034	-0.229	0.123
12/6/2018 10:12	-0.179	0.034	-0.03	0.038	0.022	0.039	-0.098	0.138
12/6/2018 10:13	-0.246	0.05	-0.06	0.046	0.034	0.045	0.381	0.178
12/6/2018 10:14	0.192	0.05	0.089	0.055	0.062	0.089	0.376	0.182
12/6/2018 10:15	0.74	0.056	0.204	0.07	0.082	0.183	0.408	0.222
12/6/2018 10:16	0.4	0.056	0.138	0.067	0.065	0.18	0.705	0.224
12/6/2018 10:17	0.352	0.057	0.2	0.071	0.061	0.178	0.375	0.227
12/6/2018 10:19	0.574	0.055	0.185	0.068	0.061	0.179	0.125	0.224
12/6/2018 10:20	0.513	0.056	0.181	0.069	0.122	0.176	0.045	0.225
12/6/2018 10:21	0.39	0.056	0.241	0.07	0.131	0.177	0.378	0.227
12/6/2018 10:22	0.437	0.057	0.206	0.07	0.113	0.178	0.141	0.231
12/6/2018 10:23	0.452	0.058	0.182	0.072	0.029	0.176	0.153	0.227
12/6/2018 10:24	0.534	0.055	0.235	0.067	0.087	0.176	0.316	0.223
12/6/2018 10:25	0.574	0.056	0.138	0.068	0.104	0.178	0.262	0.225
12/6/2018 10:26	0.48	0.055	0.236	0.068	0.081	0.179	-0.072	0.228
12/6/2018 10:27	0.473	0.057	0.235	0.069	0.045	0.178	0.017	0.235
12/6/2018 10:28	0.556	0.056	0.229	0.068	0.113	0.176	0.199	0.233
12/6/2018 10:29	0.577	0.057	0.218	0.068	0.096	0.176	-0.213	0.235
12/6/2018 10:30	0.469	0.059	0.165	0.072	0.045	0.177	-0.223	0.231
12/6/2018 10:31	0.522	0.056	0.23	0.068	0.062	0.176	0.025	0.229
12/6/2018 10:32	0.453	0.055	0.174	0.067	0.064	0.177	-0.16	0.223
12/6/2018 10:33	0.639	0.056	0.239	0.07	0.085	0.178	0.057	0.227
12/6/2018 10:34	0.61	0.055	0.216	0.067	0.119	0.176	-0.053	0.222
12/6/2018 10:35	0.473	0.056	0.257	0.068	0.069	0.176	-0.049	0.231
12/6/2018 10:36	0.433	0.057	0.205	0.071	0.08	0.177	0.021	0.229
12/6/2018 10:37	0.565	0.057	0.179	0.071	0.103	0.176	0.27	0.239
12/6/2018 10:38	0.605	0.059	0.202	0.072	0.108	0.177	0.022	0.24
12/6/2018 10:39	0.536	0.056	0.19	0.068	0.085	0.177	0.213	0.229
12/6/2018 10:40	0.524	0.058	0.229	0.07	0.077	0.177	0.077	0.23
12/6/2018 10:41	0.522	0.057	0.225	0.071	0.063	0.177	0.129	0.226
12/6/2018 10:42	0.582	0.057	0.219	0.069	0.109	0.174	0.211	0.231
12/6/2018 10:43	0.566	0.057	0.132	0.068	0.111	0.176	0.257	0.231
12/6/2018 10:44	0.402	0.057	0.255	0.069	0.063	0.178	0.106	0.229
12/6/2018 10:45	0.502	0.056	0.194	0.071	0.07	0.176	0.083	0.229
12/6/2018 10:46	0.527	0.056	0.181	0.072	0.08	0.175	0.323	0.227
12/6/2018 10:47	0.552	0.056	0.202	0.069	0.159	0.176	0.277	0.23
12/6/2018 10:48	0.555	0.058	0.257	0.075	0.098	0.177	0.349	0.228
12/6/2018 10:49	0.498	0.06	0.211	0.073	0.092	0.178	0.34	0.237
12/6/2018 10:50	0.418	0.056	0.156	0.068	0.059	0.171	0.251	0.222
12/6/2018 10:51	0.572	0.057	0.209	0.07	0.095	0.165	0.423	0.23
12/6/2018 10:52	0.609	0.055	0.158	0.068	0.112	0.165	0.205	0.224
12/6/2018 10:53	0.422	0.055	0.124	0.068	0.063	0.178	0.532	0.221
12/6/2018 10:54	0.461	0.058	0.176	0.072	0.077	0.185	1.098	0.235
12/6/2018 10:55	0.563	0.057	0.09	0.07	0.114	0.191	1.069	0.232
12/6/2018 10:56	0.626	0.057	0.095	0.072	0.132	0.195	1.147	0.232
12/6/2018 10:57	0.623	0.055	0.112	0.07	0.134	0.195	1.033	0.234
12/6/2018 10:58	0.539	0.056	0.113	0.067	0.125	0.197	1.015	0.235
12/6/2018 10:59	0.467	0.057	0.116	0.072	0.094	0.197	0.982	0.235
12/6/2018 11:00	0.642	0.059	0.091	0.069	0.149	0.198	1.049	0.239
12/6/2018 11:01	0.75	0.055	0.115	0.067	0.174	0.198	0.853	0.232
12/6/2018 11:02	0.479	0.057	0.12	0.07	0.102	0.2	0.992	0.237

Date	Form- aldehyde (ppm)	SEC (ppm)	HCI (ppm)	SEC (ppm)	Methan ol (ppm)	SEC (ppm)	acetaldeh yde (ppm)	SEC (ppm)
12/6/2018 11:03	0.609	0.058	0.164	0.073	0.111	0.2	1.167	0.242
12/6/2018 11:04	0.644	0.057	0.058	0.071	0.146	0.2	1.148	0.238
12/6/2018 11:05	0.663	0.057	0.056	0.07	0.121	0.2	1.137	0.234
12/6/2018 11:06	0.708	0.056	0.079	0.07	0.158	0.198	0.996	0.232
12/6/2018 11:07	0.516	0.058	0.11	0.07	0.091	0.2	0.986	0.238
12/6/2018 11:08	0.504	0.056	0.045	0.069	0.087	0.198	0.999	0.232
12/6/2018 11:09	0.693	0.056	0.083	0.069	0.15	0.191	0.781	0.229
12/6/2018 11:10	0.654	0.057	0.121	0.068	0.156	0.188	0.827	0.233
12/6/2018 11:11	0.568	0.057	0.174	0.069	0.113	0.192	0.815	0.232
12/6/2018 11:12	0.648	0.058	0.173	0.071	0.09	0.191	0.972	0.235
12/6/2018 11:13	0.584	0.057	0.144	0.071	0.077	0.187	1.033	0.239
12/6/2018 11:14	0.674	0.054	0.097	0.066	0.117	0.188	0.816	0.224
12/6/2018 11:15	0.616	0.056	0.129	0.067	0.113	0.188	0.874	0.231
12/6/2018 11:16	0.477	0.057	0.162	0.07	0.109	0.188	0.802	0.233
12/6/2018 11:17	0.463	0.057	0.116	0.07	0.143	0.188	0.728	0.231
12/6/2018 11:18	0.657	0.058	0.158	0.071	0.164	0.188	0.711	0.238
12/6/2018 11:19	0.678	0.058	0.128	0.072	0.14	0.19	0.79	0.242
12/6/2018 11:20	0.49	0.056	0.117	0.073	0.062	0.189	1.053	0.232
12/6/2018 11:21	0.565	0.056	0.146	0.067	0.095	0.187	0.728	0.231
12/6/2018 11:22	0.52	0.056	0.186	0.071	0.092	0.188	0.753	0.229
12/6/2018 11:23	0.63	0.057	0.098	0.073	0.155	0.189	1.055	0.231
12/6/2018 11:24	0.647	0.057	0.158	0.071	0.13	0.191	1.11	0.23
12/6/2018 11:25	0.418	0.057	0.22	0.07	0.106	0.191	1.143	0.233
12/6/2018 11:26	0.461	0.055	0.147	0.067	0.105	0.189	1.355	0.23
12/6/2018 11:27	0.521	0.056	0.204	0.067	0.128	0.183	1.125	0.228
12/6/2018 11:28	0.517	0.056	0.172	0.068	0.125	0.173	1.434	0.231
12/6/2018 11:29	0.5	0.055	0.207	0.067	0.122	0.171	1.195	0.229
12/6/2018 11:30	0.411	0.057	0.26	0.072	0.109	0.168	1.539	0.23
12/6/2018 11:31	0.493	0.058	0.197	0.071	0.127	0.167	1.157	0.231
12/6/2018 11:32	0.549	0.058	0.2	0.072	0.113	0.169	1.241	0.23
12/6/2018 11:33	0.522	0.058	0.177	0.068	0.113	0.165	1.344	0.226
12/6/2018 11:34	0.365	0.058	0.26	0.072	0.095	0.165	1.397	0.227
12/6/2018 11:35	0.398	0.056	0.251	0.068	0.101	0.167	1.396	0.226
12/6/2018 11:36	0.465	0.057	0.212	0.07	0.119	0.164	1.239	0.226
12/6/2018 11:37	0.488	0.057	0.168	0.069	0.136	0.167	1.191	0.229
12/6/2018 11:38	0.524	0.058	0.166	0.069	0.125	0.166	1.347	0.235
12/6/2018 11:39	0.383	0.056	0.232	0.069	0.185	0.166	1.414	0.23
12/6/2018 11:40	0.327	0.058	0.206	0.071	0.124	0.166	1.236	0.232
12/6/2018 11:41	0.523	0.058	0.281	0.069	0.154	0.168	1.396	0.23
12/6/2018 11:42	0.525	0.059	0.263	0.074	0.152	0.165	1.26	0.235
12/6/2018 11:43	0.424	0.058	0.246	0.069	0.105	0.166	1.447	0.234
12/6/2018 11:44	0.482	0.059	0.282	0.071	0.155	0.166	1.251	0.234
12/6/2018 11:45	0.507	0.059	0.222	0.072	0.17	0.166	1.309	0.235
12/6/2018 11:46	0.481	0.06	0.214	0.075	0.122	0.166	1.506	0.237
12/6/2018 11:47	0.378	0.059	0.215	0.073	0.124	0.166	1.518	0.239
12/6/2018 11:48	0.386	0.056	0.255	0.066	0.13	0.166	1.388	0.227
12/6/2018 11:49	0.325	0.059	0.203	0.072	0.151	0.167	1.565	0.234
12/6/2018 11:50	0.511	0.058	0.214	0.067	0.17	0.167	1.348	0.234
12/6/2018 11:51	0.498	0.056	0.211	0.072	0.15	0.167	1.327	0.23
12/6/2018 11:52	0.339	0.057	0.242	0.07	0.131	0.168	1.641	0.228
12/6/2018 11:53	0.427	0.059	0.25	0.071	0.144	0.168	1.502	0.238
12/6/2018 11:54	0.462	0.057	0.207	0.069	0.146	0.168	1.372	0.232

Date	Form- aldehyde (ppm)	SEC (ppm)	HCl (ppm)	SEC (ppm)	Methan ol (ppm)	SEC (ppm)	acetaldeh yde (ppm)	SEC (ppm)
12/6/2018 11:55	0.518	0.059	0.178	0.072	0.129	0.168	1.379	0.241
12/6/2018 11:56	0.532	0.06	0.211	0.074	0.17	0.167	1.448	0.242
12/6/2018 11:57	0.42	0.059	0.212	0.073	0.157	0.168	1.431	0.243
12/6/2018 11:58	0.382	0.059	0.167	0.072	0.148	0.166	1.611	0.236
12/6/2018 11:59	0.533	0.059	0.321	0.072	0.198	0.165	1.53	0.236

Date	Time	CTS Scan (pathlength)	SEC (ppm)	Cell Pressure (psi)	Cell Temp (deg C)	Deviation from Previous	Deviation from Average
5-Dec	730	7.98	0.111	14.7	181	NA	0.0%
						100.0%	100.0%
Average		7.980	0.111				

Date	Time	Direct Spike Results, Spike _{dir}		System Spiked Result		Native Concentrations, Unspike		Dilution, DF	Expected Spike Concentration, CS	Recovery
		(ppm HCl)	(ppm SF6)	(ppm HCl)	(ppm SF6)	(ppm HCl)	(ppm SF6)			
15-Jan	1530/ 1633	45.63	2.21	3.391	0.198	0.153	-0.001	9.0%	4.2	79.8%

Enviva - Greenwood		RCO2 (North)			
Parameters	Units	Run 3	Run 4	Run 5	Average
Date		16-Jan-19	16-Jan-19	16-Jan-19	
Run Time		1407-1523	1545-1657	1837-2001	
Oxygen	%	20.84	20.89	20.86	20.87
Moisture	%	5.12	5.02	4.54	4.90
Volumetric Flow Rate, Std	DSCFM	22,698	22,867	22,202	22,589
Process Rate	ODT/hr	25.1	25.2	22.9	24.4
VOC Emissions	Units	Run 1	Run 2	Run 3	Average
Concentration (actual)	ppmv _w as C ₃	6.93	7.53	6.71	7.06
Concentration (dry)	ppmv _d as C ₃	7.30	7.93	7.03	7.42
Emission Rate (propane)	lb/hr as C ₃ H ₈	1.1	1.2	1.1	1.2
Emission Factor (propane)	lb/ODT as C ₃ H ₈	0.045	0.049	0.047	0.047
NOx Emissions	Units	Run 1	Run 2	Run 3	Average
Concentration (dry)	ppm _{vd}	0.87	0.95	1.01	0.94
Emission Rate	lb/hr	0.14	0.16	0.16	0.15
Emission Factor	lb/ODT	0.0056	0.0062	0.0070	0.0063
CO Emissions	Units	Run 1	Run 2	Run 3	Average
Concentration (dry)	ppm _{vd}	11.36	10.26	9.52	10.38
Emission Rate	lb/hr	1.1	1.0	0.92	1.0
Emission Factor	lb/ODT	0.045	0.041	0.040	0.042

Facility: Enviva - Greenwood
Date: 1/16/19

Source: RCO2 (North)

HAP		Methanol	Ace- taldehyde	Form- aldehyde	HCl	
Formula		CH ₄ O	CH ₃ CHO	CH ₂ O	C ₆ H ₆	
Mol Weight	lb/lb mole	32.04	44.05	30.31	36.46	
Response Factor		0.65	1.00	0.00	0.00	
Run 3						
Conc	ppm wet	0.00	0.00	0.44	0.00	5.12 % Moisture 22,698 DSCFM 25.10 ODT/hr
Conc	ppm dry	0.00	0.00	0.46	0.00	
Mass Emissions	lb/hr	0.00	0.00	0.049	0.00	
Emission Factor	lb/ODT	0.00	0.00	0.0020	0.00	
Run 4						
Conc	ppm wet	0.00	0.00	0.44	0.00	5.02 % Moisture 22,867 DSCFM 25.20 ODT/hr
Conc	ppm dry	0.00	0.00	0.46	0.00	
Mass Emissions	lb/hr	0.00	0.00	0.050	0.00	
Emission Factor	lb/ODT	0.00	0.00	0.0020	0.00	
Run 5						
Conc	ppm wet	0.00	0.00	0.72	0.00	4.54 % Moisture 22,202 DSCFM 22.90 ODT/hr
Conc	ppm dry	0.00	0.00	0.76	0.00	
Mass Emissions	lb/hr	0.00	0.00	0.080	0.00	
Emission Factor	lb/ODT	0.00	0.00	0.0035	0.00	
Averages						
Conc	ppm wet	0.00	0.00	0.53	0.00	4.90 % Moisture 22,589 DSCFM
Conc	ppm dry	0.00	0.00	0.56	0.00	
Mass Emissions	lb/hr	0.00	0.00	0.059	0.00	
Emission Factor	lb/ODT	0.00	0.00	0.0025	0.00	
ND values						

Enviva - Greenwood
RCO2 (North)

Date: 16-Jan-19
Run Time: 1407-1523

Run 3

Parameter	Symbol	O ₂ %	CO ₂ %	CO ppm	NOx ppm	THC ppm (as C ₃ H ₈)
Analyzer Calibration Error - Calibration Standards						
Zero Gas	$C_{v, zero}$	0.0	0.0	0.0	0.0	0.0
Low-Level Gas	$C_{v, low}$	N/A	N/A	N/A	N/A	25.25
Mid-Level Gas	$C_{v, mid}$	11.05	9.952	125.6	48.0	52.38
High-Level Gas	$C_{v, high}$	21.99	18.22	226.4	89.5	85.84
Calibration Span	CS	21.99	18.22	226.4	89.5	100
Analyzer Calibration Error - Instrument Response						
Zero Gas	$C_{Dir, zero}$	0.00	-0.06	-0.07	0.0	0.1
Low-Level Gas	$C_{Dir, low}$	N/A	N/A	N/A	N/A	26.1
Mid-Level Gas	$C_{Dir, mid}$	11.075	9.989	127.7	47.96	52.35
High-Level Gas	$C_{Dir, high}$	22.04	18.20	227.35	89.6	85.8
Analyzer Calibration Error - Results (Percent of Span)						
Zero Gas	ACE_{zero}	0.0	-0.3	0.0	0.0	0.1
Low-Level Gas	ACE_{low}	N/A	N/A	N/A	N/A	3.4
Mid-Level Gas	ACE_{mid}	0.1	0.2	0.9	0.0	-0.1
High-Level Gas	ACE_{high}	0.2	-0.1	0.4	0.1	0.0
Specification	ACE_{spec}	±2	±2	±2	±2	±5
System Calibrations - Instrument Response						
Initial Zero	$C_{s, zero (pre)}$	0.01	0.02	0.5	0.4	-0.3
Final Zero	$C_{s, zero (post)}$	0.00	-0.04	0.36	0.3	-0.15
Upscale Gas Standard	C_{MA}	21.99	18.22	125.6	48.0	52.4
Initial Upscale	$C_{v, up (pre)}$	22.01	18.14	126.9	47.75	52.3
Final Upscale	$C_{v, up (post)}$	21.98	18.18	126.5	47.71	51.83
System Bias - Results (Percent)						
Zero (pre)	$SB_{i (zero)}$	0.1	0.4	0.3	0.4	-0.4
Zero (post)	$SB_{final (zero)}$	0.0	0.1	0.2	0.3	-0.3
Upscale (pre)	$SB_{i (upscale)}$	-0.1	-0.3	-0.4	-0.2	-0.1
Upscale (post)	$SB_{final (upscale)}$	-0.3	-0.1	-0.5	-0.3	-0.5
Specification	SB_{spec}	±5	±5	±5	±5	NA
System Drift - Results (Percent)						
Zero	D_{zero}	0.0	0.3	0.1	0.2	0.2
Upscale	$D_{upscale}$	0.1	0.2	0.2	0.0	-0.5
Specification	D_{spec}	±3	3.0	3.0	3.0	±3
Response Test - Results (seconds)						
Upscale Test		35	30	35	30	NA
Zero Test		35	30	35	30	NA
Response Time		35	30	35	30	25
Calibration Correction						
Raw Average	C_{ave}	20.84	0.04	11.85	1.21	6.93
Bias Average - Zero	C_0	0.01	-0.01	0.43	0.35	N/A
Bias Average - Upscale	C_M	22.00	18.16	126.70	47.73	N/A
Corrected Run Average	C_{Gas}	20.84	0.054	11.36	0.87	6.93

Enviva - Greenwood
RCO2 (North)

Date: 16-Jan-19
Run Time: 1545-1657

Run 4

Parameter	Symbol	O ₂ %	CO ₂ %	CO ppm	NOx ppm	THC ppm (as C ₃ H ₈)
Analyzer Calibration Error - Calibration Standards						
Zero Gas	$C_{v, zero}$	0.0	0.0	0.0	0.0	0.0
Low-Level Gas	$C_{v, low}$	N/A	N/A	N/A	N/A	25.3
Mid-Level Gas	$C_{v, mid}$	11.1	10.0	125.6	48.0	52.4
High-Level Gas	$C_{v, high}$	22.0	18.2	226.4	89.5	85.8
Calibration Span	CS	22.0	18.2	226.4	89.5	100
Analyzer Calibration Error - Instrument Response						
Zero Gas	$C_{Dir, zero}$	0.0	-0.1	-0.1	0.0	0.1
Low-Level Gas	$C_{Dir, low}$	N/A	N/A	N/A	N/A	26.1
Mid-Level Gas	$C_{Dir, mid}$	11.1	10.0	127.7	48.0	52.4
High-Level Gas	$C_{Dir, high}$	22.0	18.2	227.4	89.6	85.8
Analyzer Calibration Error - Results (Percent of Span)						
Zero Gas	ACE_{zero}	0.0	-0.3	0.0	0.0	0.1
Low-Level Gas	ACE_{low}	N/A	N/A	N/A	N/A	3.4
Mid-Level Gas	ACE_{mid}	0.1	0.2	0.9	0.0	-0.1
High-Level Gas	ACE_{high}	0.2	-0.1	0.4	0.1	0.0
Specification	ACE_{spec}	±2	±2	±2	±2	±5
System Calibrations - Instrument Response						
Initial Zero	$C_{s, zero (pre)}$	0.00	-0.04	0.36	0.27	-0.15
Final Zero	$C_{s, zero (post)}$	0.007	-0.15	0.9	0.1	0.29
Upscale Gas Standard	C_{MA}	21.99	18.22	125.6	48.0	52.4
Initial Upscale	$C_{v, up (pre)}$	21.98	18.18	126.5	47.71	51.83
Final Upscale	$C_{v, up (post)}$	21.89	18.17	126.5	47.44	52.18
System Bias - Results (Percent)						
Zero (pre)	$SB_i (zero)$	0.0	0.1	0.2	0.3	-0.3
Zero (post)	$SB_{final} (zero)$	0.0	-0.5	0.4	0.1	0.2
Upscale (pre)	$SB_i (upscale)$	-0.3	-0.1	-0.5	-0.3	-0.5
Upscale (post)	$SB_{final} (upscale)$	-0.7	-0.2	-0.5	-0.6	-0.2
Specification	SB_{spec}	±5	±5	±5	±5	NA
System Drift - Results (Percent)						
Zero	D_{zero}	0.0	0.6	0.2	0.2	0.4
Upscale	$D_{upscale}$	0.4	0.1	0.0	0.3	0.4
Specification	D_{spec}	±3	3.0	3.0	3.0	±3
Response Test - Results (seconds)						
Upscale Test		35	30	35	30	NA
Zero Test		35	30	35	30	NA
Response Time		35	30	35	30	25
Calibration Correction						
Raw Average	C_{ave}	20.84	-0.08	10.9	1.12	7.53
Bias Average - Zero	C_0	0.01	-0.10	0.61	0.19	N/A
Bias Average - Upscale	C_M	21.94	18.18	126.50	47.58	N/A
Corrected Run Average	C_{Gas}	20.89	0.019	10.26	0.95	7.53

Enviva - Greenwood
RCO2 (North)

Date: 16-Jan-19
Run Time: 1837-2001

Run 5

Parameter	Symbol	O ₂ %	CO ₂ %	CO ppm	NOx ppm	THC ppm (as C ₃ H ₈)
Analyzer Calibration Error - Calibration Standards						
Zero Gas	$C_{v, zero}$	0.0	0.0	0.0	0.0	0.0
Low-Level Gas	$C_{v, low}$	N/A	N/A	N/A	N/A	25.3
Mid-Level Gas	$C_{v, mid}$	11.1	10.0	125.6	48.0	52.4
High-Level Gas	$C_{v, high}$	22.0	18.2	226.4	89.5	85.8
Calibration Span	CS	21.99	18.22	226.4	89.5	100.0
Analyzer Calibration Error - Instrument Response						
Zero Gas	$C_{Dir, zero}$	0.0	-0.1	-0.1	0.0	0.10
Low-Level Gas	$C_{Dir, low}$	N/A	N/A	N/A	N/A	26.1
Mid-Level Gas	$C_{Dir, mid}$	11.1	10.0	127.7	48.0	52.4
High-Level Gas	$C_{Dir, high}$	22.0	18.2	227.4	89.6	85.8
Analyzer Calibration Error - Results (Percent of Span)						
Zero Gas	ACE_{zero}	0.0	-0.3	0.0	0.0	0.1
Low-Level Gas	ACE_{low}	N/A	N/A	N/A	N/A	3.4
Mid-Level Gas	ACE_{mid}	0.1	0.2	0.9	0.0	-0.1
High-Level Gas	ACE_{high}	0.2	-0.1	0.4	0.1	0.0
Specification	ACE_{spec}	±2	±2	±2	±2	±5
System Calibrations - Instrument Response						
Initial Zero	$C_{s, zero (pre)}$	0.01	-0.15	0.85	0.10	0.29
Final Zero	$C_{s, zero (post)}$	-0.012	0.14	0.1	0.01	0.19
Upscale Gas Standard	C_{MA}	21.99	18.22	125.6	48.0	52.4
Initial Upscale	$C_{v, up (pre)}$	21.89	18.17	126.5	47.44	52.18
Final Upscale	$C_{v, up (post)}$	22	18.2	128.11	47.84	52.48
System Bias - Results (Percent)						
Zero (pre)	$SB_i (zero)$	0.0	-0.5	0.4	0.1	0.2
Zero (post)	$SB_{final} (zero)$	0.0	1.1	0.1	0.0	0.1
Upscale (pre)	$SB_i (upscale)$	-0.7	-0.2	-0.5	-0.6	-0.2
Upscale (post)	$SB_{final} (upscale)$	-0.2	0.0	0.2	-0.1	0.1
Specification	SB_{spec}	±5	±5	±5	±5	NA
System Drift - Results (Percent)						
Zero	D_{zero}	0.1	1.6	0.3	0.1	-0.1
Upscale	$D_{upscale}$	0.5	0.2	0.7	0.4	0.3
Specification	D_{spec}	±3	3.0	3.0	3.0	±3
Response Test - Results (seconds)						
Upscale Test		35	30	35	30	NA
Zero Test		35	30	35	30	NA
Response Time		35	30	35	30	25
Calibration Correction						
Raw Average	C_{ave}	20.86	0.17	10.1	1.06	6.71
Bias Average - Zero	C_0	0.00	0.00	0.49	0.06	N/A
Bias Average - Upscale	C_M	21.95	18.19	127.31	47.64	N/A
Corrected Run Average	C_{Gas}	20.86	0.17	9.52	1.01	6.71

Test Run 3 Begin. STRATA Version 3.2.112**Operator: David Goshaw****Plant Name: Enviva Greenwood****Location: PC North Exhaust (RCO2)**

Start Averaging		O2 %	CO2 %	THC ppm	NOx ppm	CO ppm
1/16/2019	14:08:25	20.835	0.056	5.18	1.17	12.26
1/16/2019	14:09:25	20.845	0.049	6.32	1.13	12.52
1/16/2019	14:10:24	20.835	0.085	6.86	1.1	12.61
1/16/2019	14:11:24	20.839	0.086	6.91	1.14	12.58
1/16/2019	14:12:24	20.836	0.098	6.17	1.19	12.56
1/16/2019	14:13:24	20.844	0.056	5.48	1.17	11.94
1/16/2019	14:14:24	20.846	0.073	8.21	1.14	11.59
1/16/2019	14:15:25	20.845	0.037	8.45	1.1	12.28
1/16/2019	14:16:25	20.838	0.01	5.66	1.14	12.24
1/16/2019	14:17:24	20.845	0.027	6.76	1.18	11.61
1/16/2019	14:18:24	20.856	0.038	7.67	1.15	12.03
1/16/2019	14:19:24	20.843	0.07	8.07	1.13	11.86
1/16/2019	14:20:24	20.852	0.061	8.21	1.15	12.06
1/16/2019	14:21:25	20.838	0.078	6.14	1.22	12.57
1/16/2019	14:22:25	20.835	0.045	4.7	1.21	11.86
1/16/2019	14:23:25	20.845	0.047	7.77	1.18	11.72
1/16/2019	14:24:25	20.843	0.063	8.12	1.15	12.52
1/16/2019	14:25:24	20.828	0.075	5.29	1.2	12.6
1/16/2019	14:26:24	20.842	0.069	6.6	1.24	11.89
1/16/2019	14:27:24	20.853	0.057	6.9	1.21	12.23
1/16/2019	14:28:24	20.842	0.087	7.56	1.17	12.18
1/16/2019	14:29:24	20.843	0.094	8.68	1.2	12.55
1/16/2019	14:30:24	20.836	0.071	6.83	1.25	12.46
1/16/2019	14:31:24	20.843	0.066	5.92	1.25	12.15
1/16/2019	14:32:24	20.845	0.07	8.17	1.22	11.9
1/16/2019	14:33:24	20.838	0.047	7.74	1.19	12.3
1/16/2019	14:34:24	20.842	0.073	5.79	1.25	12.49
1/16/2019	14:35:25	20.843	0.066	6.69	1.27	11.76
1/16/2019	14:36:25	20.85	0.054	6.57	1.22	11.81
1/16/2019	14:37:25	20.841	0.058	7.46	1.19	11.21
Pause						
End Pause						
1/16/2019	14:49:25	20.847	0.036	5.65	1.24	11.09
1/16/2019	14:50:25	20.856	0.025	8.17	1.23	11.21
1/16/2019	14:51:24	20.844	0.03	8.41	1.2	11.26
1/16/2019	14:52:24	20.844	-0.004	7.19	1.24	11.66
1/16/2019	14:53:24	20.842	0.008	5.93	1.27	11.86
1/16/2019	14:54:25	20.849	0.036	6.03	1.25	11.76
1/16/2019	14:55:24	20.846	0.028	8.3	1.2	11.48
1/16/2019	14:56:24	20.851	0.044	8.45	1.19	12.25
1/16/2019	14:57:24	20.84	0.062	5.46	1.21	12.27
1/16/2019	14:58:25	20.847	0.037	6.3	1.23	11.21
1/16/2019	14:59:24	20.856	0.068	7.84	1.23	11.72

Test Run 3 Begin. STRATA Version 3.2.112

Operator: David Goshaw

Plant Name: Enviva Greenwood

Location: PC North Exhaust (RCO2)

		O2	CO2	THC	NOx	CO
1/16/2019	15:00:24	20.846	0.041	8.27	1.19	11.59
1/16/2019	15:01:24	20.856	0.044	7.76	1.21	12.04
1/16/2019	15:02:24	20.836	0.005	5.51	1.22	12.08
1/16/2019	15:03:24	20.843	0.016	5.2	1.24	11.74
1/16/2019	15:04:24	20.852	0.022	8.55	1.23	11.35
1/16/2019	15:05:24	20.85	0.025	8.83	1.19	12.01
1/16/2019	15:06:24	20.847	0.007	5.96	1.23	11.67
1/16/2019	15:07:24	20.842	0.024	6.14	1.26	11.53
1/16/2019	15:08:24	20.855	0.032	7.01	1.25	11.65
1/16/2019	15:09:24	20.843	0.033	7.63	1.23	11.39
1/16/2019	15:10:24	20.848	0.023	8.42	1.24	12.01
1/16/2019	15:11:24	20.837	0.011	5.84	1.29	11.83
1/16/2019	15:12:24	20.841	-0.001	4.71	1.3	11.43
1/16/2019	15:13:25	20.841	-0.004	7.47	1.25	11.15
1/16/2019	15:14:25	20.844	0.007	7.93	1.21	11.54
1/16/2019	15:15:25	20.837	0.005	5.51	1.25	11.39
1/16/2019	15:16:25	20.845	0.028	6.12	1.28	11.09
1/16/2019	15:17:24	20.846	0.017	6.68	1.28	10.66
1/16/2019	15:18:24	20.837	0.035	7.51	1.24	10.5

Test Run 3 End

15:19:24

O2	CO2	THC	NOx	CO
%	%	ppm	ppm	ppm
20.84	0.04	6.93	1.21	11.846

Test Run 4 Begin. STRATA Version 3.2.112**Operator: David Goshaw****Plant Nam Enviva Greenwood****Location: PC North Exhaust (RCO2)**

Start Averaging		O2 %	CO2 %	THC ppm	NOx ppm	CO ppm
1/16/2019	15:46:07	20.837	-0.014	9.01	1.2	11.16
1/16/2019	15:47:07	20.836	-0.038	7.19	1.23	10.94
1/16/2019	15:48:07	20.839	-0.035	6.62	1.27	10.78
1/16/2019	15:49:07	20.837	-0.033	6.31	1.23	10.86
1/16/2019	15:50:07	20.835	-0.004	7.88	1.19	10.45
1/16/2019	15:51:07	20.84	0.018	9.21	1.15	11.1
1/16/2019	15:52:07	20.833	0.021	6.46	1.2	10.99
1/16/2019	15:53:07	20.844	0.009	6.38	1.23	10.21
1/16/2019	15:54:06	20.847	-0.007	8.71	1.2	10.43
1/16/2019	15:55:06	20.842	0.005	9.21	1.14	10.58
1/16/2019	15:56:06	20.85	-0.003	7.98	1.13	10.91
1/16/2019	15:57:06	20.836	-0.016	6.47	1.17	10.81
1/16/2019	15:58:06	20.838	-0.008	6.08	1.18	10.75
1/16/2019	15:59:06	20.839	-0.021	8.74	1.18	10.35
1/16/2019	16:00:07	20.849	-0.025	9.32	1.13	11.15
1/16/2019	16:01:07	20.837	-0.032	6.41	1.16	11.09
1/16/2019	16:02:07	20.842	-0.018	6.66	1.19	10.51
1/16/2019	16:03:07	20.843	-0.02	8.08	1.15	10.78
1/16/2019	16:04:06	20.832	-0.045	8.45	1.09	10.47
1/16/2019	16:05:07	20.845	-0.06	8.5	1.09	11.32
1/16/2019	16:06:07	20.838	-0.066	7.33	1.11	11.32
1/16/2019	16:07:07	20.846	-0.076	6.83	1.13	10.67
1/16/2019	16:08:07	20.842	-0.054	9.69	1.12	10.5
1/16/2019	16:09:07	20.848	-0.051	9.62	1.1	11.48
1/16/2019	16:10:07	20.841	-0.027	6.43	1.1	11.3
1/16/2019	16:11:07	20.844	-0.048	6.82	1.13	10.96
1/16/2019	16:12:06	20.846	-0.021	7.59	1.11	11.07
1/16/2019	16:13:07	20.836	-0.03	8.15	1.07	10.74
1/16/2019	16:14:07	20.847	-0.035	8.8	1.07	11.43
1/16/2019	16:15:07	20.836	-0.033	6.88	1.09	11.47
Pause						
End Pause						
1/16/2019	16:28:07	20.836	-0.256	7.04	1.09	10.25
1/16/2019	16:29:07	20.845	-0.256	7.53	1.15	10.19
1/16/2019	16:30:07	20.847	-0.256	7.3	1.11	10.45
1/16/2019	16:31:07	20.843	-0.255	8.38	1.08	10.32
1/16/2019	16:32:07	20.845	-0.257	8.9	1.08	11.27
1/16/2019	16:33:07	20.833	-0.247	6.42	1.14	11.42
1/16/2019	16:34:07	20.839	-0.157	6.03	1.14	10.73
1/16/2019	16:35:07	20.845	-0.157	8.13	1.09	10.72
1/16/2019	16:36:07	20.83	-0.156	8.26	1.06	10.65
1/16/2019	16:37:07	20.836	-0.157	6.81	1.09	10.7
1/16/2019	16:38:07	20.831	-0.157	6.73	1.11	10.73

Test Run 4 Begin. STRATA Version 3.2.112**Operator: David Goshaw****Plant Nam Enviva Greenwood****Location: PC North Exhaust (RCO2)**

		O2	CO2	THC	NOx	CO
1/16/2019	16:39:06	20.844	-0.157	6.44	1.09	10.62
1/16/2019	16:40:06	20.842	-0.157	8.26	1.06	10.34
1/16/2019	16:41:07	20.848	-0.157	8.52	1.05	11.24
1/16/2019	16:42:07	20.843	-0.156	6.11	1.07	11.17
1/16/2019	16:43:08	20.84	-0.157	5.99	1.09	10.42
1/16/2019	16:44:06	20.85	-0.157	7.5	1.05	10.55
1/16/2019	16:45:07	20.837	-0.158	8.01	1.03	10.41
1/16/2019	16:46:07	20.843	-0.157	7.71	1.06	10.72
1/16/2019	16:47:07	20.838	-0.157	7.01	1.09	10.8
1/16/2019	16:48:07	20.843	-0.158	6.35	1.09	10.64
1/16/2019	16:49:07	20.843	-0.157	8.36	1.05	10.49
1/16/2019	16:50:07	20.838	-0.157	8.16	1.05	11.4
1/16/2019	16:51:07	20.827	-0.157	5.49	1.09	11.27
1/16/2019	16:52:07	20.841	0.008	6.63	1.14	12.05
1/16/2019	16:53:07	20.854	0.172	7.89	1.13	11.65
1/16/2019	16:54:07	20.845	0.149	8.33	1.09	11.25
1/16/2019	16:55:07	20.848	0.155	8.09	1.12	11.8
1/16/2019	16:56:07	20.835	0.158	6.08	1.16	11.82

Test Run 4 End

16:57:16

O2	CO2	THC	NOx	CO
%	%	ppm	ppm	ppm
20.8	-0.1	7.53	1.12	10.9

Test Run 5 Begin. STRATA Version 3.2.112**Operator: David Goshaw****Plant Name: Enviva Greenwood****Location: PC North Exhaust (RCO2)**

Start Averaging		O2 %	CO2 %	THC ppm	NOx ppm	CO ppm
1/16/2019	18:38:16	20.863	0.187	8.23	1	11.06
1/16/2019	18:39:16	20.853	0.178	8.63	1	11.35
1/16/2019	18:40:15	20.853	0.129	6.1	1.06	11.35
1/16/2019	18:41:15	20.862	0.176	6.99	1.1	10.95
1/16/2019	18:42:15	20.863	0.155	7.32	1.05	11.25
1/16/2019	18:43:15	20.855	0.133	7.55	1.03	10.89
1/16/2019	18:44:15	20.857	0.125	7.88	1.06	11.48
1/16/2019	18:45:15	20.854	0.15	5.83	1.1	12.01
1/16/2019	18:46:15	20.859	0.137	5.12	1.09	11.16
Pause						
End Pause						
1/16/2019	18:50:16	20.868	0.149	7.08	1.07	10.56
1/16/2019	18:51:15	20.867	0.156	7.16	1.05	10.74
1/16/2019	18:52:16	20.844	0.147	7.74	1.03	10.66
Pause						
End Pause						
1/16/2019	18:54:16	20.84	0.157	6.25	1.13	11.17
1/16/2019	18:55:16	20.847	0.104	5.77	1.14	10.48
1/16/2019	18:56:16	20.865	0.079	7.95	1.09	10.48
1/16/2019	18:57:16	20.854	0.135	8.44	1.05	10.4
1/16/2019	18:58:16	20.853	0.169	6.83	1.1	10.68
1/16/2019	18:59:16	20.857	0.227	7.22	1.15	11.41
1/16/2019	19:00:16	20.87	0.224	6.35	1.12	10.58
1/16/2019	19:01:16	20.867	0.126	6.92	1.06	9.03
Pause						
End Pause						
1/16/2019	19:08:16	20.866	0.156	6.2	1.03	8.4
1/16/2019	19:09:16	20.86	0.203	6.02	1.05	10
1/16/2019	19:10:15	20.862	0.18	6.78	1.04	9.87
1/16/2019	19:11:15	20.878	0.201	6.52	1.04	9.55
1/16/2019	19:12:15	20.869	0.179	5.1	1.05	8.28
1/16/2019	19:13:16	20.88	0.192	5.54	1.04	7.82
1/16/2019	19:14:16	20.884	0.198	7.05	0.97	7.96
1/16/2019	19:15:15	20.862	0.141	7.49	0.95	8.71
1/16/2019	19:16:15	20.863	0.155	6.98	1.02	9.92
1/16/2019	19:17:15	20.869	0.153	5.56	1.08	9.92
1/16/2019	19:18:16	20.875	0.147	4.88	1.06	9.21
1/16/2019	19:19:16	20.876	0.153	6.49	0.99	8.27
1/16/2019	19:20:16	20.868	0.156	7.46	0.96	8.9
1/16/2019	19:21:16	20.859	0.176	5.59	1.01	9.2
Pause						
End Pause						
1/16/2019	19:32:16	20.875	0.179	7.25	0.89	9.22

Test Run 5 Begin. STRATA Version 3.2.112

Operator: David Goshaw

Plant Name: Enviva Greenwood

Location: PC North Exhaust (RCO2)

		O2	CO2	THC	NOx	CO
1/16/2019	19:33:16	20.86	0.166	7.81	0.97	9.59
1/16/2019	19:34:16	20.874	0.163	8.47	1.03	10.32
1/16/2019	19:35:16	20.86	0.157	6.17	1.06	10.25
1/16/2019	19:36:15	20.868	0.16	5.69	1.08	9.61
1/16/2019	19:37:15	20.875	0.18	7.98	1.07	9.63
1/16/2019	19:38:15	20.87	0.21	7.56	1.03	9.78
1/16/2019	19:39:16	20.857	0.192	5.96	1.04	9.48
1/16/2019	19:40:15	20.864	0.158	6.18	1.07	9.83
1/16/2019	19:41:15	20.878	0.185	5.85	1.09	10.04
1/16/2019	19:42:15	20.869	0.154	6.5	1.04	8.84
1/16/2019	19:43:15	20.864	0.173	7.65	1.01	9.89
1/16/2019	19:44:15	20.855	0.144	5.71	1.06	10.46
1/16/2019	19:45:15	20.864	0.167	5.39	1.13	10.39
1/16/2019	19:46:15	20.869	0.141	7.06	1.11	10.32
1/16/2019	19:47:15	20.856	0.195	7.6	1.07	10.79
1/16/2019	19:48:15	20.861	0.173	6.45	1.06	10.52
1/16/2019	19:49:16	20.868	0.224	5.62	1.11	11.17
1/16/2019	19:50:15	20.876	0.169	5.72	1.09	9.41
1/16/2019	19:51:15	20.864	0.23	7.12	1.07	10.4
1/16/2019	19:52:15	20.852	0.204	8.01	1.05	11.01
1/16/2019	19:53:15	20.861	0.185	5.57	1.11	11.01
1/16/2019	19:54:15	20.872	0.238	5.52	1.14	10.12
1/16/2019	19:55:15	20.873	0.18	7.48	1.1	9.9

Test Run 5 End

1956:15:00

O2	CO2	THC	NOx	CO
%	%	ppm	ppm	ppm
20.86	0.17	6.71	1.06	10.10

RCO 2	Date/Time	Form- aldehyde (ppm)	MDL (ppm)	HCl (ppm)	MDL (ppm)	Methanol (ppm)	MDL (ppm)	Acetaldehyde (ppm)	MDL (ppm)
Run 1	0945-1052	0.864	0.086	0.048	0.107	0.053	0.412	0.202	0.354
Run 2	1229-1329	0.639	0.084	0.002	0.104	0.075	0.410	0.166	0.353
Run 3	1407-1519	0.436	0.080	0.008	0.099	0.080	0.378	0.095	0.332
Run 4	1545-1657	0.436	0.080	0.006	0.099	0.075	0.380	0.147	0.335
Run 5	1835-2000	0.814	0.086	0.038	0.107	0.056	0.413	0.195	0.3350

	Date	Form- aldehyde (ppm)	SEC (ppm)	HCl (ppm)	SEC (ppm)	Methanol (ppm)	SEC (ppm)	Acet-aldehyde (ppm)	SEC (ppm)
Run 1	1/16/2019 9:45	0.861	0.041	0.100	0.050	0.089	0.200	0.000	0.169
Run 1	1/16/2019 9:46	0.747	0.040	0.148	0.049	0.057	0.199	0.219	0.168
Run 1	1/16/2019 9:47	0.851	0.040	0.133	0.047	0.098	0.199	0.152	0.164
Run 1	1/16/2019 9:48	0.732	0.040	0.018	0.050	0.115	0.200	0.279	0.167
Run 1	1/16/2019 9:49	0.623	0.040	0.167	0.054	0.046	0.200	0.145	0.171
Run 1	1/16/2019 9:50	0.620	0.040	0.076	0.049	0.068	0.199	0.308	0.168
Run 1	1/16/2019 9:51	0.594	0.037	0.061	0.048	0.127	0.197	0.293	0.171
Run 1	1/16/2019 9:52	0.761	0.038	0.100	0.048	0.089	0.199	0.335	0.160
Run 1	1/16/2019 9:53	0.887	0.040	0.026	0.051	0.108	0.201	0.260	0.169
Run 1	1/16/2019 9:54	0.792	0.040	0.093	0.049	0.094	0.200	0.000	0.167
Run 1	1/16/2019 9:55	0.691	0.040	0.119	0.046	0.040	0.200	0.140	0.165
Run 1	1/16/2019 9:56	0.845	0.041	0.052	0.050	0.086	0.200	0.098	0.165
Run 1	1/16/2019 9:57	0.727	0.041	0.062	0.051	0.117	0.203	0.108	0.167
Run 1	1/16/2019 9:58	0.602	0.039	0.127	0.050	0.034	0.202	0.253	0.169
Run 1	1/16/2019 9:59	0.643	0.041	0.050	0.049	0.084	0.202	0.226	0.169
Run 1	1/16/2019 10:00	0.551	0.040	0.096	0.050	0.085	0.201	0.210	0.167
Run 1	1/16/2019 10:01	0.758	0.039	0.057	0.045	0.080	0.204	0.256	0.167
Run 1	1/16/2019 10:02	0.935	0.043	0.054	0.050	0.126	0.205	0.281	0.169
Run 1	1/16/2019 10:03	0.866	0.042	0.107	0.052	0.064	0.204	0.140	0.172
Run 1	1/16/2019 10:04	0.745	0.041	0.063	0.049	0.046	0.204	0.083	0.170
Run 1	1/16/2019 10:05	0.854	0.042	0.065	0.052	0.116	0.202	0.128	0.169
Run 1	1/16/2019 10:06	0.793	0.040	0.029	0.051	0.085	0.204	0.244	0.171
Run 1	1/16/2019 10:07	0.678	0.042	0.062	0.053	0.067	0.208	0.272	0.177
Run 1	1/16/2019 10:08	0.653	0.044	0.036	0.051	0.104	0.206	0.239	0.180
Run 1	1/16/2019 10:09	0.572	0.041	0.016	0.050	0.064	0.207	0.400	0.169
Run 1	1/16/2019 10:10	0.900	0.043	0.011	0.053	0.072	0.207	0.244	0.175
Run 1	1/16/2019 10:11	0.976	0.044	0.020	0.053	0.072	0.206	0.195	0.180
Run 1	1/16/2019 10:12	0.806	0.042	0.051	0.052	0.054	0.207	0.386	0.177
Run 1	1/16/2019 10:13	0.787	0.042	0.049	0.051	0.045	0.207	0.105	0.176
Run 1	1/16/2019 10:14	0.768	0.044	0.064	0.054	0.091	0.207	0.366	0.180
Run 1	1/16/2019 10:15	0.699	0.043	0.014	0.053	0.108	0.211	0.257	0.173
Run 1	1/16/2019 10:16	0.657	0.044	0.015	0.057	0.069	0.211	0.201	0.182
Run 1	1/16/2019 10:17	0.640	0.043	0.115	0.051	0.070	0.211	0.306	0.177
Run 1	1/16/2019 10:18	0.452	0.042	0.062	0.052	0.019	0.177	0.016	0.179
Run 1	1/16/2019 10:19	0.735	0.044	0.067	0.056	0.047	0.195	0.262	0.182
Run 1	1/16/2019 10:20	0.784	0.044	0.032	0.054	0.080	0.213	0.227	0.185
Run 1	1/16/2019 10:21								
Run 1	1/16/2019 10:22								
Run 1	1/16/2019 10:23	1.121	0.046	0.058	0.057	0.081	0.214	0.317	0.188
Run 1	1/16/2019 10:24	1.405	0.046	0.082	0.059	0.049	0.214	0.369	0.190
Run 1	1/16/2019 10:25	1.594	0.044	0.063	0.055	0.046	0.215	0.269	0.182
Run 1	1/16/2019 10:26	1.556	0.044	0.031	0.057	0.014	0.214	0.368	0.184

	Date	Form- aldehyde (ppm)	SEC (ppm)	HCl (ppm)	SEC (ppm)	Methanol (ppm)	SEC (ppm)	Acet-aldehyde (ppm)	SEC (ppm)
Run 1	1/16/2019 10:28	1.567	0.048	0.027	0.059	0.000	0.213	0.162	0.195
Run 1	1/16/2019 10:29	1.695	0.046	0.001	0.059	0.059	0.214	0.037	0.190
Run 1	1/16/2019 10:30	1.525	0.046	0.023	0.056	0.039	0.217	0.245	0.186
Run 1	1/16/2019 10:31	1.159	0.045	0.049	0.056	0.056	0.216	0.261	0.187
Run 1	1/16/2019 10:32	1.103	0.046	0.000	0.060	0.016	0.216	0.268	0.191
Run 1	1/16/2019 10:33	1.040	0.046	0.047	0.057	0.000	0.212	0.254	0.186
Run 1	1/16/2019 10:34	1.128	0.045	0.049	0.055	0.027	0.217	0.074	0.188
Run 1	1/16/2019 10:35	1.072	0.046	0.020	0.058	0.009	0.216	0.387	0.185
Run 1	1/16/2019 10:36	0.869	0.045	0.032	0.058	0.000	0.214	0.049	0.184
Run 1	1/16/2019 10:37	0.735	0.046	0.000	0.056	0.000	0.212	0.245	0.185
Run 1	1/16/2019 10:38	0.986	0.045	0.002	0.055	0.005	0.212	0.164	0.181
Run 1	1/16/2019 10:39	1.021	0.046	0.043	0.056	0.023	0.209	0.039	0.183
Run 1	1/16/2019 10:40	0.782	0.046	0.017	0.059	0.000	0.212	0.138	0.190
Run 1	1/16/2019 10:41	0.789	0.044	0.000	0.056	0.029	0.211	0.156	0.180
Run 1	1/16/2019 10:42	0.766	0.044	0.014	0.056	0.000	0.208	0.032	0.183
Run 1	1/16/2019 10:43	0.839	0.042	0.045	0.053	0.000	0.210	0.219	0.177
Run 1	1/16/2019 10:44	0.875	0.045	0.004	0.059	0.023	0.209	0.328	0.189
Run 1	1/16/2019 10:45	0.613	0.044	0.058	0.056	0.012	0.209	0.233	0.181
Run 1	1/16/2019 10:46	0.616	0.043	0.000	0.054	0.000	0.208	0.104	0.181
Run 1	1/16/2019 10:47	0.920	0.044	0.000	0.057	0.038	0.207	0.057	0.179
Run 1	1/16/2019 10:48	0.901	0.044	0.025	0.057	0.014	0.208	0.132	0.182
Run 1	1/16/2019 10:49	0.754	0.043	0.001	0.052	0.040	0.208	0.156	0.175
Run 1	1/16/2019 10:50	0.725	0.044	0.000	0.055	0.000	0.206	0.274	0.179
Run 1	1/16/2019 10:51	0.698	0.043	0.000	0.055	0.030	0.205	0.115	0.180
Run 1	1/16/2019 10:52	0.753	0.041	0.043	0.050	0.003	0.171	0.044	0.164
Run 2	1/16/2019 12:28	0.725	0.044	0.000	0.054	0.041	0.209	0.000	0.180
Run 2	1/16/2019 12:29	0.583	0.042	0.000	0.051	0.055	0.211	0.000	0.178
Run 2	1/16/2019 12:30	0.550	0.044	0.000	0.055	0.057	0.210	0.077	0.178
Run 2	1/16/2019 12:31	0.457	0.043	0.000	0.054	0.067	0.208	0.232	0.185
Run 2	1/16/2019 12:32	0.603	0.044	0.000	0.052	0.082	0.208	0.166	0.181
Run 2	1/16/2019 12:33	0.700	0.044	0.000	0.055	0.113	0.208	0.149	0.183
Run 2	1/16/2019 12:34	0.556	0.044	0.000	0.052	0.044	0.208	0.163	0.185
Run 2	1/16/2019 12:35	0.627	0.042	0.000	0.052	0.039	0.208	0.193	0.179
Run 2	1/16/2019 12:36	0.771	0.044	0.000	0.053	0.085	0.207	0.348	0.182
Run 2	1/16/2019 12:37	0.733	0.043	0.000	0.054	0.116	0.209	0.071	0.179
Run 2	1/16/2019 12:38	0.659	0.043	0.000	0.054	0.032	0.209	0.105	0.181
Run 2	1/16/2019 12:39	0.582	0.044	0.000	0.057	0.080	0.208	0.106	0.183
Run 2	1/16/2019 12:40	0.484	0.043	0.000	0.051	0.058	0.206	0.284	0.178
Run 2	1/16/2019 12:41	0.662	0.043	0.000	0.054	0.092	0.207	0.233	0.179
Run 2	1/16/2019 12:42	0.678	0.043	0.000	0.053	0.100	0.209	0.313	0.179
Run 2	1/16/2019 12:43	0.584	0.043	0.000	0.052	0.055	0.209	0.143	0.178
Run 2	1/16/2019 12:44	0.642	0.042	0.000	0.054	0.030	0.206	0.172	0.173
Run 2	1/16/2019 12:45	0.802	0.043	0.000	0.055	0.065	0.207	0.333	0.177
Run 2	1/16/2019 12:46	0.751	0.042	0.000	0.052	0.098	0.208	0.207	0.177
Run 2	1/16/2019 12:47	0.600	0.042	0.000	0.052	0.045	0.209	0.089	0.177
Run 2	1/16/2019 12:48	0.521	0.041	0.001	0.050	0.090	0.209	0.211	0.174
Run 2	1/16/2019 12:49	0.449	0.042	0.000	0.053	0.083	0.207	0.018	0.175
Run 2	1/16/2019 12:50	0.597	0.041	0.000	0.053	0.065	0.208	0.059	0.176
Run 2	1/16/2019 12:51	0.690	0.042	0.000	0.051	0.097	0.208	0.083	0.173
Run 2	1/16/2019 12:52	0.648	0.043	0.000	0.052	0.042	0.208	0.221	0.176
Run 2	1/16/2019 12:53	0.758	0.042	0.000	0.050	0.059	0.207	0.101	0.176

	Date	Form- aldehyde (ppm)	SEC (ppm)	HCl (ppm)	SEC (ppm)	Methanol (ppm)	SEC (ppm)	Acet-aldehyde (ppm)	SEC (ppm)
Run 2	1/16/2019 12:54	0.764	0.042	0.000	0.053	0.077	0.206	0.181	0.175
Run 2	1/16/2019 12:55	0.776	0.043	0.024	0.055	0.072	0.208	0.080	0.180
Run 2	1/16/2019 12:56	0.669	0.046	0.000	0.055	0.083	0.209	0.123	0.181
Run 2	1/16/2019 12:57	0.523	0.042	0.000	0.052	0.061	0.208	0.239	0.174
Run 2	1/16/2019 12:58								
Run 2	1/16/2019 12:59	0.679	0.042	0.000	0.049	0.120	0.208	0.465	0.173
Run 2	1/16/2019 13:00	0.719	0.041	0.000	0.051	0.102	0.208	0.127	0.173
Run 2	1/16/2019 13:01	0.626	0.040	0.000	0.050	0.053	0.209	0.141	0.176
Run 2	1/16/2019 13:02	0.772	0.040	0.000	0.051	0.050	0.208	0.128	0.174
Run 2	1/16/2019 13:03	0.685	0.042	0.000	0.051	0.093	0.208	0.137	0.170
Run 2	1/16/2019 13:04	0.716	0.042	0.000	0.053	0.098	0.207	0.296	0.174
Run 2	1/16/2019 13:05	0.669	0.044	0.000	0.054	0.092	0.208	0.145	0.179
Run 2	1/16/2019 13:06	0.494	0.040	0.000	0.050	0.072	0.207	0.094	0.171
Run 2	1/16/2019 13:07	0.492	0.040	0.000	0.049	0.046	0.205	0.133	0.171
Run 2	1/16/2019 13:08	0.673	0.042	0.000	0.053	0.117	0.200	0.231	0.177
Run 2	1/16/2019 13:09	0.752	0.041	0.000	0.051	0.098	0.199	0.186	0.170
Run 2	1/16/2019 13:10	0.661	0.041	0.000	0.052	0.077	0.198	0.000	0.173
Run 2	1/16/2019 13:11	0.718	0.042	0.000	0.048	0.034	0.200	0.300	0.173
Run 2	1/16/2019 13:12	0.621	0.042	0.000	0.052	0.058	0.199	0.310	0.177
Run 2	1/16/2019 13:13	0.632	0.041	0.000	0.052	0.069	0.204	0.068	0.175
Run 2	1/16/2019 13:14	0.574	0.041	0.000	0.050	0.101	0.205	0.396	0.174
Run 2	1/16/2019 13:15	0.427	0.041	0.000	0.050	0.061	0.202	0.118	0.175
Run 2	1/16/2019 13:16	0.456	0.041	0.000	0.047	0.042	0.202	0.150	0.170
Run 2	1/16/2019 13:17	0.759	0.042	0.000	0.050	0.127	0.200	0.309	0.174
Run 2	1/16/2019 13:18	0.816	0.041	0.000	0.051	0.112	0.202	0.145	0.175
Run 2	1/16/2019 13:19	0.783	0.041	0.020	0.049	0.028	0.207	0.260	0.167
Run 2	1/16/2019 13:20	0.753	0.042	0.000	0.050	0.104	0.207	0.056	0.175
Run 2	1/16/2019 13:21	0.580	0.039	0.043	0.050	0.059	0.206	0.113	0.173
Run 2	1/16/2019 13:22	0.670	0.042	0.000	0.050	0.091	0.207	0.092	0.177
Run 2	1/16/2019 13:23	0.576	0.042	0.000	0.051	0.105	0.208	0.231	0.175
Run 2	1/16/2019 13:24	0.512	0.043	0.000	0.052	0.059	0.209	0.000	0.179
Run 2	1/16/2019 13:25	0.553	0.042	0.000	0.053	0.070	0.208	0.146	0.175
Run 2	1/16/2019 13:26	0.717	0.041	0.018	0.051	0.136	0.207	0.000	0.177
Run 2	1/16/2019 13:27	0.767	0.042	0.000	0.053	0.105	0.208	0.189	0.181
Run 2	1/16/2019 13:28	0.315	0.044	0.000	0.051	0.064	0.105	0.323	0.172
Run 2	1/16/2019 13:29								
Run 3	1/16/2019 14:07	0.606	0.040	0.000	0.048	0.075	0.204	0.136	0.167
Run 3	1/16/2019 14:08	0.520	0.041	0.000	0.050	0.094	0.204	0.182	0.170
Run 3	1/16/2019 14:09	0.460	0.040	0.015	0.048	0.040	0.206	0.000	0.170
Run 3	1/16/2019 14:10	0.446	0.041	0.000	0.053	0.088	0.204	0.023	0.173
Run 3	1/16/2019 14:11	0.311	0.042	0.000	0.053	0.083	0.204	0.168	0.170
Run 3	1/16/2019 14:12	0.461	0.043	0.000	0.051	0.096	0.205	0.203	0.174
Run 3	1/16/2019 14:13	0.465	0.043	0.000	0.052	0.129	0.205	0.134	0.181
Run 3	1/16/2019 14:14	0.293	0.040	0.000	0.051	0.032	0.205	0.003	0.168
Run 3	1/16/2019 14:15	0.323	0.042	0.000	0.052	0.074	0.205	0.154	0.170
Run 3	1/16/2019 14:16	0.394	0.041	0.000	0.052	0.115	0.205	0.038	0.174
Run 3	1/16/2019 14:17	0.427	0.042	0.000	0.055	0.101	0.204	0.204	0.170
Run 3	1/16/2019 14:18	0.396	0.041	0.000	0.049	0.062	0.205	0.336	0.166
Run 3	1/16/2019 14:19	0.493	0.041	0.000	0.049	0.082	0.204	0.045	0.165
Run 3	1/16/2019 14:20	0.391	0.041	0.000	0.051	0.060	0.204	0.204	0.168
Run 3	1/16/2019 14:21	0.484	0.040	0.000	0.048	0.084	0.203	0.085	0.167

	Date	Form- aldehyde (ppm)	SEC (ppm)	HCl (ppm)	SEC (ppm)	Methanol (ppm)	SEC (ppm)	Acet-aldehyde (ppm)	SEC (ppm)
Run 3	1/16/2019 14:22	0.470	0.041	0.000	0.048	0.100	0.204	0.122	0.170
Run 3	1/16/2019 14:23	0.297	0.041	0.000	0.051	0.051	0.206	0.178	0.171
Run 3	1/16/2019 14:24	0.376	0.041	0.000	0.053	0.084	0.204	0.000	0.171
Run 3	1/16/2019 14:25	0.394	0.042	0.000	0.052	0.053	0.205	0.098	0.173
Run 3	1/16/2019 14:26	0.424	0.041	0.000	0.049	0.093	0.205	0.024	0.169
Run 3	1/16/2019 14:27	0.388	0.042	0.000	0.051	0.097	0.206	0.180	0.173
Run 3	1/16/2019 14:28	0.371	0.043	0.000	0.053	0.094	0.206	0.000	0.180
Run 3	1/16/2019 14:29	0.299	0.041	0.000	0.049	0.037	0.204	0.078	0.172
Run 3	1/16/2019 14:30	0.592	0.040	0.000	0.047	0.097	0.203	0.164	0.165
Run 3	1/16/2019 14:31	0.489	0.042	0.000	0.053	0.127	0.205	0.286	0.171
Run 3	1/16/2019 14:32	0.322	0.041	0.000	0.053	0.052	0.205	0.108	0.173
Run 3	1/16/2019 14:33	0.347	0.041	0.000	0.050	0.072	0.203	0.227	0.171
Run 3	1/16/2019 14:34	0.355	0.039	0.000	0.049	0.114	0.200	0.000	0.167
Run 3	1/16/2019 14:35	0.320	0.039	0.000	0.049	0.126	0.202	0.000	0.165
Run 3	1/16/2019 14:36	0.392	0.038	0.000	0.048	0.097	0.201	0.147	0.163
Run 3	1/16/2019 14:37	0.288	0.041	0.000	0.051	0.061	0.202	0.074	0.170
Run 3	1/16/2019 14:38	0.209	0.038	0.006	0.052	0.061	0.172	0.000	0.160
Run 3	1/16/2019 14:39								
Run 3	1/16/2019 14:49	0.634	0.043	0.000	0.050	0.120	0.201	0.202	0.169
Run 3	1/16/2019 14:50	0.659	0.040	0.000	0.049	0.036	0.204	0.050	0.170
Run 3	1/16/2019 14:51	0.733	0.041	0.000	0.048	0.084	0.202	0.199	0.169
Run 3	1/16/2019 14:52	0.734	0.041	0.000	0.053	0.100	0.200	0.286	0.171
Run 3	1/16/2019 14:53	0.729	0.039	0.000	0.046	0.077	0.203	0.000	0.169
Run 3	1/16/2019 14:54	0.588	0.040	0.000	0.047	0.117	0.203	0.217	0.162
Run 3	1/16/2019 14:55	0.397	0.041	0.000	0.050	0.095	0.203	0.000	0.172
Run 3	1/16/2019 14:56	0.398	0.040	0.000	0.050	0.035	0.202	0.000	0.167
Run 3	1/16/2019 14:57	0.592	0.040	0.000	0.046	0.128	0.199	0.072	0.162
Run 3	1/16/2019 14:58	0.832	0.041	0.000	0.051	0.081	0.202	0.156	0.168
Run 3	1/16/2019 14:59	0.772	0.042	0.000	0.049	0.079	0.203	0.203	0.170
Run 3	1/16/2019 15:00	0.686	0.040	0.000	0.049	0.058	0.203	0.019	0.168
Run 3	1/16/2019 15:01	0.525	0.040	0.000	0.048	0.086	0.202	0.000	0.166
Run 3	1/16/2019 15:02	0.570	0.040	0.000	0.049	0.097	0.203	0.000	0.167
Run 3	1/16/2019 15:03	0.501	0.039	0.000	0.050	0.128	0.201	0.000	0.167
Run 3	1/16/2019 15:04	0.387	0.040	0.000	0.048	0.080	0.203	0.024	0.168
Run 3	1/16/2019 15:05	0.492	0.040	0.000	0.049	0.065	0.202	0.000	0.165
Run 3	1/16/2019 15:06	0.660	0.042	0.000	0.052	0.103	0.201	0.067	0.170
Run 3	1/16/2019 15:07	0.758	0.041	0.000	0.051	0.091	0.202	0.127	0.173
Run 3	1/16/2019 15:08	0.816	0.039	0.000	0.048	0.084	0.202	0.000	0.166
Run 3	1/16/2019 15:09	0.890	0.041	0.000	0.050	0.061	0.200	0.000	0.172
Run 3	1/16/2019 15:10	0.696	0.041	0.001	0.048	0.082	0.200	0.100	0.167
Run 3	1/16/2019 15:11	0.704	0.040	0.000	0.048	0.099	0.200	0.000	0.165
Run 3	1/16/2019 15:12	0.515	0.038	0.000	0.050	0.108	0.200	0.317	0.163
Run 3	1/16/2019 15:13	0.338	0.040	0.000	0.047	0.075	0.200	0.241	0.162
Run 3	1/16/2019 15:14	0.346	0.040	0.000	0.051	0.064	0.202	0.174	0.167
Run 3	1/16/2019 15:15	0.317	0.041	0.000	0.050	0.134	0.199	0.222	0.170
Run 3	1/16/2019 15:16	0.395	0.039	0.000	0.048	0.124	0.200	0.021	0.163
Run 3	1/16/2019 15:17	0.380	0.040	0.000	0.054	0.097	0.203	0.187	0.170
Run 3	1/16/2019 15:18	0.297	0.038	0.000	0.047	0.112	0.201	0.000	0.161
Run 3	1/16/2019 15:19	0.281	0.040	0.000	0.051	0.072	0.201	0.055	0.170
Average		0.454	0.040	0.006	0.050	0.083	0.195	0.100	0.167

	Date	Form- aldehyde (ppm)	SEC (ppm)	HCl (ppm)	SEC (ppm)	Methanol (ppm)	SEC (ppm)	Acet-aldehyde (ppm)	SEC (ppm)
Run 4	1/16/2019 15:45	0.358	0.039	0.000	0.048	0.065	0.203	0.000	0.168
Run 4	1/16/2019 15:46	0.284	0.041	0.000	0.049	0.056	0.200	0.092	0.174
Run 4	1/16/2019 15:47	0.395	0.041	0.000	0.049	0.110	0.199	0.240	0.166
Run 4	1/16/2019 15:48	0.389	0.040	0.000	0.047	0.114	0.200	0.145	0.165
Run 4	1/16/2019 15:49	0.300	0.040	0.000	0.050	0.103	0.200	0.278	0.167
Run 4	1/16/2019 15:50	0.255	0.038	0.000	0.049	0.013	0.201	0.025	0.165
Run 4	1/16/2019 15:51	0.261	0.043	0.000	0.051	0.081	0.199	0.131	0.175
Run 4	1/16/2019 15:52	0.377	0.040	0.000	0.046	0.109	0.200	0.192	0.164
Run 4	1/16/2019 15:53	0.402	0.040	0.000	0.051	0.170	0.201	0.195	0.170
Run 4	1/16/2019 15:54	0.289	0.041	0.000	0.049	0.054	0.201	0.081	0.169
Run 4	1/16/2019 15:55	0.393	0.042	0.000	0.055	0.068	0.200	0.384	0.169
Run 4	1/16/2019 15:56	0.422	0.039	0.000	0.047	0.123	0.201	0.157	0.162
Run 4	1/16/2019 15:57	0.414	0.040	0.000	0.048	0.114	0.202	0.182	0.162
Run 4	1/16/2019 15:58	0.359	0.040	0.000	0.049	0.081	0.202	0.106	0.162
Run 4	1/16/2019 15:59	0.282	0.040	0.000	0.048	0.049	0.202	0.056	0.169
Run 4	1/16/2019 16:00	0.243	0.039	0.000	0.047	0.069	0.203	0.109	0.163
Run 4	1/16/2019 16:01	0.321	0.040	0.000	0.050	0.106	0.201	0.180	0.164
Run 4	1/16/2019 16:02	0.324	0.041	0.000	0.051	0.104	0.202	0.194	0.165
Run 4	1/16/2019 16:03	0.274	0.039	0.000	0.049	0.035	0.206	0.140	0.166
Run 4	1/16/2019 16:04	0.287	0.041	0.005	0.050	0.065	0.205	0.209	0.168
Run 4	1/16/2019 16:05	0.403	0.041	0.000	0.050	0.124	0.202	0.045	0.169
Run 4	1/16/2019 16:06	0.451	0.039	0.000	0.053	0.121	0.203	0.322	0.163
Run 4	1/16/2019 16:07	0.470	0.041	0.000	0.052	0.101	0.205	0.111	0.171
Run 4	1/16/2019 16:08	0.334	0.039	0.000	0.048	0.065	0.205	0.071	0.165
Run 4	1/16/2019 16:09	0.221	0.040	0.000	0.048	0.071	0.202	0.103	0.167
Run 4	1/16/2019 16:10	0.372	0.040	0.000	0.048	0.131	0.203	0.328	0.171
Run 4	1/16/2019 16:11	0.351	0.040	0.000	0.051	0.124	0.205	0.063	0.165
Run 4	1/16/2019 16:12	0.266	0.041	0.000	0.052	0.048	0.203	0.183	0.174
Run 4	1/16/2019 16:13	0.282	0.040	0.000	0.048	0.072	0.203	0.244	0.168
Run 4	1/16/2019 16:14	0.251	0.041	0.000	0.049	0.056	0.189	0.182	0.167
Run 4	1/16/2019 16:15								
Run 4	1/16/2019 16:28	0.838	0.041	0.000	0.053	0.111	0.203	0.266	0.167
Run 4	1/16/2019 16:29	0.960	0.042	0.000	0.051	0.112	0.204	0.318	0.178
Run 4	1/16/2019 16:30	0.884	0.040	0.000	0.053	0.051	0.205	0.172	0.169
Run 4	1/16/2019 16:31	0.866	0.040	0.000	0.051	0.073	0.204	0.303	0.171
Run 4	1/16/2019 16:32	0.633	0.042	0.000	0.053	0.066	0.204	0.316	0.176
Run 4	1/16/2019 16:33	0.645	0.040	0.000	0.050	0.099	0.205	0.014	0.172
Run 4	1/16/2019 16:34	0.583	0.041	0.000	0.050	0.102	0.206	0.188	0.167
Run 4	1/16/2019 16:35	0.534	0.040	0.000	0.051	0.047	0.207	0.018	0.170
Run 4	1/16/2019 16:36	0.501	0.040	0.000	0.049	0.043	0.205	0.018	0.168
Run 4	1/16/2019 16:37	0.673	0.041	0.000	0.051	0.124	0.204	0.248	0.165
Run 4	1/16/2019 16:38	0.764	0.042	0.000	0.050	0.062	0.203	0.232	0.167
Run 4	1/16/2019 16:39	0.682	0.041	0.000	0.052	0.058	0.205	0.292	0.173
Run 4	1/16/2019 16:40	0.607	0.042	0.000	0.052	0.042	0.205	0.242	0.173
Run 4	1/16/2019 16:41	0.460	0.041	0.000	0.049	0.049	0.204	0.117	0.171
Run 4	1/16/2019 16:42	0.551	0.039	0.000	0.050	0.085	0.204	0.000	0.168
Run 4	1/16/2019 16:43	0.566	0.040	0.000	0.049	0.077	0.205	0.129	0.169
Run 4	1/16/2019 16:44	0.483	0.042	0.000	0.053	0.047	0.204	0.000	0.176
Run 4	1/16/2019 16:45	0.561	0.041	0.000	0.052	0.051	0.204	0.131	0.169
Run 4	1/16/2019 16:46	0.717	0.040	0.000	0.050	0.087	0.204	0.000	0.174

	Date	Form- aldehyde (ppm)	SEC (ppm)	HCl (ppm)	SEC (ppm)	Methanol (ppm)	SEC (ppm)	Acet-aldehyde (ppm)	SEC (ppm)
Run 4	1/16/2019 16:47	0.685	0.042	0.000	0.051	0.107	0.204	0.000	0.172
Run 4	1/16/2019 16:48	0.702	0.041	0.000	0.050	0.034	0.203	0.086	0.170
Run 4	1/16/2019 16:49	0.516	0.042	0.000	0.050	0.042	0.205	0.014	0.178
Run 4	1/16/2019 16:50	0.373	0.040	0.000	0.050	0.059	0.203	0.000	0.175
Run 4	1/16/2019 16:51	0.584	0.042	0.000	0.051	0.130	0.205	0.128	0.177
Run 4	1/16/2019 16:52	0.604	0.041	0.000	0.049	0.069	0.203	0.095	0.174
Run 4	1/16/2019 16:53	0.461	0.041	0.000	0.049	0.045	0.203	0.144	0.175
Run 4	1/16/2019 16:54	0.499	0.039	0.000	0.047	0.056	0.202	0.344	0.164
Run 4	1/16/2019 16:55	0.422	0.039	0.000	0.049	0.129	0.201	0.158	0.168
Run 4	1/16/2019 16:56	0.389	0.038	0.000	0.050	0.072	0.185	0.000	0.172
Run 4	1/16/2019 16:57	0.000	0.051	0.014	0.049	0.020	0.039	0.436	0.189
Average		0.436	0.040	0.006	0.050	0.075	0.190	0.147	0.168
Run 5	1/16/2019 18:35	0.681	0.04	0	0.052	0.112	0.196	0.371	0.172
Run 5	1/16/2019 18:36	0.678	0.041	0	0.051	0.125	0.198	0.174	0.174
Run 5	1/16/2019 18:37	0.748	0.041	0	0.05	0.128	0.201	0.334	0.168
Run 5	1/16/2019 18:38	0.561	0.04	0	0.051	0.09	0.201	0.193	0.168
Run 5	1/16/2019 18:39	0.605	0.041	0	0.049	0.078	0.2	0.213	0.169
Run 5	1/16/2019 18:40	0.751	0.042	0	0.05	0.148	0.2	0.333	0.173
Run 5	1/16/2019 18:41	0.832	0.042	0	0.051	0.123	0.202	0.193	0.176
Run 5	1/16/2019 18:42	0.71	0.041	0	0.053	0.084	0.203	0.34	0.175
Run 5	1/16/2019 18:43	0.759	0.042	0	0.05	0.084	0.201	0.303	0.174
Run 5	1/16/2019 18:44	0.672	0.04	0	0.052	0.095	0.201	0	0.17
Run 5	1/16/2019 18:45	0.721	0.042	0	0.054	0.062	0.196	0.219	0.171
Run 5	1/16/2019 18:46								
Run 5	1/16/2019 18:47								
Run 5	1/16/2019 18:48								
Run 5	1/16/2019 18:49								
Run 5	1/16/2019 18:50								
Run 5	1/16/2019 18:51	0.797	0.04	0	0.049	0.115	0.201	0.401	0.169
Run 5	1/16/2019 18:52								
Run 5	1/16/2019 18:53								
Run 5	1/16/2019 18:54								
Run 5	1/16/2019 18:55	0.747	0.04	0	0.051	0.155	0.2	0.368	0.169
Run 5	1/16/2019 18:56	0.65	0.041	0	0.051	0.113	0.202	0.192	0.176
Run 5	1/16/2019 18:57	0.759	0.043	0	0.052	0.073	0.198	0.271	0.178
Run 5	1/16/2019 18:58	0.781	0.042	0	0.054	0.114	0.189	0.282	0.172
Run 5	1/16/2019 18:59	0.755	0.041	0	0.051	0.106	0.186	0.465	0.167
Run 5	1/16/2019 19:00	0.671	0.04	0	0.049	0.103	0.174	0.325	0.165
Run 5	1/16/2019 19:01								
Run 5	1/16/2019 19:02								
Run 5	1/16/2019 19:03								
Run 5	1/16/2019 19:04								
Run 5	1/16/2019 19:05								
Run 5	1/16/2019 19:06								
Run 5	1/16/2019 19:07								
Run 5	1/16/2019 19:08	0.684	0.041	0	0.052	0.133	0.18	0.292	0.165
Run 5	1/16/2019 19:09	0.655	0.042	0	0.053	0.112	0.172	0.168	0.168
Run 5	1/16/2019 19:10	0.513	0.042	0	0.053	0.077	0.171	0.233	0.169
Run 5	1/16/2019 19:11	0.479	0.04	0	0.052	0.077	0.176	0.137	0.165

	Date	Form- aldehyde (ppm)	SEC (ppm)	HCl (ppm)	SEC (ppm)	Methanol (ppm)	SEC (ppm)	Acet-aldehyde (ppm)	SEC (ppm)
Run 5	1/16/2019 19:12	0.588	0.042	0	0.053	0.124	0.185	0.251	0.172
Run 5	1/16/2019 19:13	0.679	0.041	0	0.05	0.122	0.193	0.315	0.168
Run 5	1/16/2019 19:14	0.633	0.042	0	0.052	0.096	0.19	0.148	0.168
Run 5	1/16/2019 19:15	0.747	0.043	0	0.054	0.072	0.18	0.313	0.176
Run 5	1/16/2019 19:16	0.603	0.041	0	0.05	0.148	0.177	0.046	0.17
Run 5	1/16/2019 19:17	0.664	0.039	0	0.049	0.114	0.176	0.216	0.167
Run 5	1/16/2019 19:18	0.627	0.039	0	0.051	0.108	0.184	0.246	0.167
Run 5	1/16/2019 19:19	0.51	0.041	0	0.051	0.086	0.19	0.238	0.169
Run 5	1/16/2019 19:20	0.419	0.041	0	0.052	0.067	0.135	0.185	0.162
Run 5	1/16/2019 19:21	0.231	0.038	0.009	0.05	0.04	0.057	0.083	0.15
Run 5	1/16/2019 19:22								
Run 5	1/16/2019 19:23								
Run 5	1/16/2019 19:24								
Run 5	1/16/2019 19:25								
Run 5	1/16/2019 19:26								
Run 5	1/16/2019 19:27								
Run 5	1/16/2019 19:28								
Run 5	1/16/2019 19:29								
Run 5	1/16/2019 19:30								
Run 5	1/16/2019 19:31								
Run 5	1/16/2019 19:32	0.547	0.041	0	0.052	0.107	0.19	0.258	0.168
Run 5	1/16/2019 19:33	0.567	0.042	0	0.053	0.073	0.189	0.103	0.167
Run 5	1/16/2019 19:34	0.575	0.042	0	0.055	0.091	0.187	0.372	0.175
Run 5	1/16/2019 19:35	0.741	0.044	0	0.056	0.117	0.186	0.492	0.175
Run 5	1/16/2019 19:36	0.893	0.042	0	0.054	0.132	0.187	0.301	0.166
Run 5	1/16/2019 19:37	0.886	0.042	0	0.054	0.037	0.19	0.369	0.171
Run 5	1/16/2019 19:38	0.97	0.042	0	0.053	0.046	0.187	0.426	0.171
Run 5	1/16/2019 19:39	1.047	0.042	0	0.054	0.074	0.174	0.206	0.173
Run 5	1/16/2019 19:40	0.982	0.041	0	0.053	0.114	0.184	0.498	0.166
Run 5	1/16/2019 19:41	0.873	0.042	0	0.052	0.105	0.191	0.46	0.171
Run 5	1/16/2019 19:42	0.788	0.039	0	0.05	0.074	0.195	0.271	0.167
Run 5	1/16/2019 19:43	0.783	0.042	0	0.054	0.07	0.191	0.319	0.174
Run 5	1/16/2019 19:44	0.862	0.042	0	0.051	0.116	0.191	0.268	0.168
Run 5	1/16/2019 19:45	0.936	0.043	0	0.056	0.144	0.195	0.388	0.174
Run 5	1/16/2019 19:46	0.783	0.041	0	0.051	0.063	0.193	0.409	0.176
Run 5	1/16/2019 19:47	0.768	0.042	0	0.054	0.038	0.183	0.159	0.173
Run 5	1/16/2019 19:48	0.826	0.042	0	0.053	0.087	0.191	0.234	0.169
Run 5	1/16/2019 19:49	0.852	0.039	0	0.049	0.12	0.2	0.345	0.169
Run 5	1/16/2019 19:50	0.814	0.04	0	0.049	0.092	0.198	0.48	0.172
Run 5	1/16/2019 19:51	0.673	0.041	0	0.053	0.055	0.191	0.148	0.17
Run 5	1/16/2019 19:52	0.587	0.041	0	0.052	0.082	0.196	0.204	0.166
Run 5	1/16/2019 19:53	0.861	0.042	0	0.053	0.123	0.199	0.328	0.177
Run 5	1/16/2019 19:54	0.9	0.041	0	0.051	0.148	0.201	0.484	0.166
Run 5	1/16/2019 19:55	0.868	0.042	0	0.051	0.057	0.205	0.404	0.173
Run 5	1/16/2019 19:56	0.861	0.042	0	0.051	0.073	0.206	0.617	0.176
Run 5	1/16/2019 19:57	0.921	0.043	0	0.053	0.118	0.204	0.346	0.177
Run 5	1/16/2019 19:58	0.906	0.042	0	0.054	0.143	0.207	0.544	0.171
Run 5	1/16/2019 19:59	0.872	0.042	0	0.052	0.124	0.209	0.419	0.173
Run 5	1/16/2019 20:00	0.346	0.038	0	0.049	0.052	0.107	0.246	0.155

Date	Time	CTS Scan (pathlength)	SEC (ppm)	Cell Pressure (psi)	Cell Temp (deg C)	Deviation from Previous	Deviation from Average
5-Dec	730	7.98	0.111	14.7	181	NA	0.0%
						100.0%	100.0%
Average		7.980	0.111				

Date	Time	Direct Spike Results, Spike _{dir}		System Spiked Result		Native Concentrations, Unspike		Dilution, DF	Expected Spike Conc., CS	Recovery
		(ppm HCl)	(ppm SF6)	(ppm HCl)	(ppm SF6)	(ppm HCl)	(ppm SF6)			
15-Jan	1530/ 1633	45.63	2.21	3.391	0.198	0.153	-0.001	9.0%	4.2	79.8%

APPENDIX II-D
Methane Laboratory Report

Air Control Techniques, P.C.

301 East Durham Rd.
Cary, NC 27513

Enviva - GRE
Client Project # 2333

Analytical Report
(0119-087)

EPA Method 18(Bags)
Methane



Enthalpy Analytical, LLC

Phone: (919) 850 - 4392 / Fax: (919) 850 - 9012 / www.enthalpy.com
800-1 Capitola Drive Durham, NC 27713-4385

I certify that to the best of my knowledge all analytical data presented in this report:

- Have been checked for completeness
- Are accurate, error-free, and legible
- Have been conducted in accordance with approved protocol, and that all deviations and analytical problems are summarized in the appropriate narrative(s)

This analytical report was prepared in Portable Document Format (.PDF) and contains 78 pages.



QA Review Performed by – Quentisha L. Forrester

Report Issued: 02/05/2019



Summary of Results



Enthalpy Analytical

Company: Air Control Techniques PC

Job No.: 0119-087 EPA Method 18 Tedlar Bag

Project No.: 2333 Enviva - GRE

Summary Table

Sample ID / Concentration (ppm)

Compound	<i>Run 1</i>	<i>Run 2</i>	<i>Run 3</i>	<i>Run 4</i>	<i>Run 5</i>
Methane	3.85 J	3.75 J	3.78 J	2.98 J	3.68 J

Results



Enthalpy Analytical

Company: Air Control Techniques PC

Job No.: 0119-087 EPA Method 18 Tedlar Bag

Project No.: 2333 Enviva - GRE

ROSIEP082_C1-C7.M

Analysis Method Used:

Methane

Sample ID	Filename #1	Filename #2	Filename #3	MDL	Curve Min	Curve Max	Ret Time (min)	Ret Time (min)	Ret Time (min)	%dif RT	Conc #1 (ppm)	Conc #2 (ppm)	Conc #3 (ppm)	%dif conc	DF	Conc (ppm)	Spike Recovery	Adj. Conc (ppm)	Flag
S6-M18-1	020B0201.D	020B0202.D	020B0203.D	0.524	5.00	49,920	1.43	1.43	1.43	0.0	3.02	3.08	3.26	4.6	1	3.12	81.1%	3.85	J
S6-M18-2	021B0301.D	021B0302.D	021B0303.D	0.524	5.00	49,920	1.43	1.43	1.43	0.0	3.04	2.93	3.17	4.0	1	3.04	81.1%	3.75	J
S6-M18-3	022B0101.D	022B0102.D	022B0103.D	0.524	5.00	49,920	1.43	1.43	1.43	0.0	3.12	3.02	3.07	1.6	1	3.07	81.1%	3.78	J
S6-M18-4	019B0201.D	019B0202.D	019B0203.D	0.524	5.00	49,920	1.43	1.43	1.43	0.1	2.50	2.36	2.38	3.5	1	2.42	81.1%	2.98	J
S6-M18-5	019B0101.D	019B0102.D	019B0103.D	0.524	5.00	49,920	1.43	1.43	1.43	0.0	3.10	2.99	2.88	3.8	1	2.99	81.1%	3.68	J
S6-M18-1 SP	019B0301.D	019B0302.D	019B0303.D	0.524	5.00	49,920	1.43	1.43	1.43	0.0	10.4	10.7	10.3	2.0	1	10.4	81.1%		

Enthalpy Analytical

Company: Air Control Techniques PC

Job No.: 0119-087 EPA Method 18 Tedlar Bag

Project No.: 2333 Enviva - GRE

Spiked Bag

Run 1 Spike		Methane
Before Spiking	Inj1 (ppmv)	3.02
	Inj2 (ppmv)	3.08
	Inj3 (ppmv)	3.26
	Avg ppmv	3.12
	Bag vol L NTP	3.44
Gas Spike	Cylinder	EB0091522
	Expires	9/26/21
	Press/Temp	773.2 / 67.5
	Vol (mL)	350
	Cyl Dil Factor	1
	Cyl Conc (ppmv)	100
	Vol (mL NTP)	356
		0.0356
Totals	Sp Bag Vol L NTP	3.80
	Corrected Initial (ppmv)	2.83
	Spike Amount (mL NTP)	0.0356
	Spike Amount (ppmv)	9.39
	Expected (ppmv)	12.2
Result	Inj1 (ppmv)	10.4
	Inj2 (ppmv)	10.7
	Inj3 (ppmv)	10.3
	Avg (ppmv)	10.4
Recovery		81.1%

Enthalpy Analytical

Company: Air Control Techniques PC

Job No.: 0119-087 EPA Method 18 Tedlar Bag

Project No.: 2333 Enviva - GRE

Spike Hold Times

Spiked Bag	Time Spiked	Spike Analyzed	Hold Time (Hours)	Related Bag	Related Bag Sampled Date	Bag Analyzed	Hold Time (Hours)
Run 1 SP	01-22-2019 09:25	01-27-2019 15:43	126.3	Run 1	01-16-2019 10:00	01-21-2019 13:01	123.0
				Run 2	01-16-2019 13:00	01-21-2019 14:06	121.1
				Run 3	01-16-2019 15:00	01-21-2019 15:30	120.5
				Run 4	01-16-2019 16:00	01-21-2019 16:35	120.6
				Run 5	01-16-2019 19:00	01-21-2019 11:56	112.9

Narrative Summary



Enthalpy Analytical Narrative Summary

Company	Air Control Techniques, P.C.
Analyst	NBT
Parameters	EPA Method 18 Bags

Client #	2333
Job #	0119-087
# Samples	5, 1 S&R

Custody

David Myers received the samples on 1/21/19 after being relinquished by Air Control Techniques, P.C. The samples were received at ambient temperature and in good condition though sample **S6-M18-5** was received with a the valve open. Prior to, during, and after analysis, the samples were kept under lock with access only to authorized personnel by Enthalpy Analytical, LLC.

Analysis

The samples were analyzed for methane using the analytical procedures in EPA Method 18, Measurement of Gaseous Organic Compound Emissions by Gas Chromatography (40 CFR Part 60, Appendix A).

All samples and standards were introduced directly to the column using an automated multi-port Valco gas sampling valve equipped with a stainless steel loop. Methane was referenced to certified gas phase standards.

The Gas Chromatograph "Rosie" was equipped with a Flame Ionization Detector for this analysis.

Calibration

The calibration curve is included in the Raw Data section of this report. The data analysis method is referenced in the Analysis Method column on the Detailed Results page.

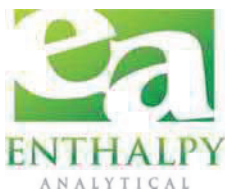
The first page of the curve contains all method specific parameters (i.e., curve type, origin, weight, etc.) used to quantify the samples. The calibration curve section also includes a table with the Retention Time (RetTime), Level (Lvl), Amount (corresponding units), Area, Response Factor (Amt/Area) and the analyte Name. The calibration table is used to identify (by retention time) and quantify each target compound.

Chromatographic Conditions

The acquisition method (AQM_ROSIEP080.M) is included in the Raw Data section of this report.

QC Notes

As required by the method, a recovery study was performed. The bag sample **S6-M18-1** was spiked at 9:25AM on 1/22/19. The recovery efficiency values met the method-required limits of 70 to 130%. The recovery efficiency values were used to adjust the associated sample results following equation 18-7 of Method 18.



Enthalpy Analytical Narrative Summary (continued)

QC Notes (continued)

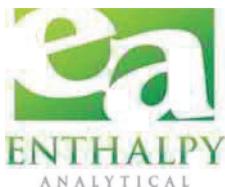
The analytes of interest were not identified in the analysis of the laboratory blank at concentrations greater than the detection limit.

Reporting Notes

These analytical results are reported on a wet basis. The user of this report should determine the percent moisture in the sample and correct the reported value to ppmvd as appropriate.

The results presented in this report are representative of the samples as provided to the laboratory.

These analyses met the requirements of the TNI Standard. Any deviations from the requirements of the reference method or TNI Standard have been stated above.



General Reporting Notes

The following are general reporting notes that are applicable to all Enthalpy Analytical, LLC data reports, unless specifically noted otherwise.

- Any analysis which refers to the method as “**Type**” represents a planned deviation from the reference method. For instance a Hydrogen Sulfide assay from a Tedlar bag would be labeled as “EPA Method 16-Type” because Tedlar bags are not mentioned as one of the collection options in EPA Method 16.
- The acronym **MDL** represents the Minimum Detection Limit. Below this value the laboratory cannot determine the presence of the analyte of interest reliably.
- The acronym **LOQ** represents the Limit of Quantification. Below this value the laboratory cannot quantitate the analyte of interest within the criteria of the method.
- The acronym **ND** following a value indicates a non-detect or analytical result below the MDL.
- The letter **J** in the Qualifier or Flag column in the results indicates that the value is between the MDL and the LOQ. The laboratory can positively identify the analyte of interest as present, but the value should be considered an estimate.
- The letter **E** in the Qualifier or Flag column indicates an analytical result exceeding 100% of the highest calibration point. The associated value should be considered as an estimate.
- Sample results are presented ‘as measured’ for single injection methodologies, or an average value if multiple injections are made. If all injections are below the MDL, the sample is considered non-detect and the ND value is presented. If one, but not all, are below the MDL, the MDL value is used for any injections that are below the MDL. For example, if the MDL is 0.500 and LOQ is 1.00, and the instrument measures 0.355, 0.620, and 0.442 - the result reported is the average of 0.500, 0.620, and 0.500 - - - i.e. 0.540 with a J flag.
- When a spike recovery (Bag Spike, Collocated Spike Train, or liquid matrix spike) is being calculated, the native (unspiked) sample result is used in the calculations, as long as the value is above the MDL. If a sample is ND, then 0 is used as the native amount (not the MDL value).
- The acronym **DF** represents Dilution Factor. This number represents dilution of the sample during the preparation and/or analysis process. The analytical result taken from a laboratory instrument is multiplied by the DF to determine the final undiluted sample results.
- The addition of **MS** to the Sample ID represents a Matrix Spike. An aliquot of an actual sample is spiked with a known amount of analyte so that a percent recovery value can be determined. The MS analysis indicates what effect the sample matrix may have on the target analyte, i.e. whether or not anything in the sample matrix interferes with the analysis of the analyte(s).



General Reporting Notes

(continued)

- The addition of **MSD** to the Sample ID represents a Matrix Spike Duplicate. Prepared in the same manner as a MS, the use of duplicate matrix spikes allows further confirmation of laboratory quality by showing the consistency of results gained by performing the same steps multiple times.
- The addition of **LD** to the Sample ID represents a Laboratory Duplicate. The analyst prepares an additional aliquot of sample for testing and the results of the duplicate analysis are compared to the initial result. The result should have a difference value of within 10% of the initial result (if the results of the original analysis are greater than the LOQ).
- The addition of **AD** to the Sample ID represents an Alternate Dilution. The analyst prepares an additional aliquot at a different dilution factor (usually double the initial factor). This analysis helps confirm that no additional compound is present and coeluting or sharing absorbance with the analyte of interest, as they would have a different response/absorbance than the analyte of interest.
- The Sample ID **LCS** represents a Laboratory Control Sample. Clean matrix, similar to the client sample matrix, prepared and analyzed by the laboratory using the same reagents, spiking standards and procedures used for the client samples. The LCS is used to assess the control of the laboratory's analytical system. Whenever spikes are prepared for our client projects, two spikes are retained as LCSs. The LCSs are labeled with the associated project number and kept in-house at the appropriate temperature conditions. When the project samples are received for analysis, the LCSs are analyzed to confirm that the analyte could be recovered from the media, separate from the samples which were used on the project and which may have been affected by source matrix, sample collection, and/or sample transport.
- **Significant Figures:** Where the reported value is much greater than unity (1.00) in the units expressed, the number is rounded to a whole number of units, rather than to 3 significant figures. For example, a value of 10,456.45 ug catch is rounded to 10,456 ug. There are five significant digits displayed, but no confidence should be placed on more than two significant digits. In the case of small numbers, generally 3 significant figures are presented, but still only 2 should be used with confidence. Many neat materials are only certified to 3 digits, and as the mathematically correct final result is always 1 digit less than all its pre-cursors - 2 significant figures are what are most defensible.
- **Manual Integration:** The data systems used for processing will flag manually integrated peaks with an "M". There are several reasons a peak may be manually integrated. These reasons will be identified by the following two letter designations on sample chromatograms, if provided in the report. The peak was *not integrated* by the software "**NI**", the peak was *integrated incorrectly* by the software "**II**" or the *wrong peak* was integrated by the software "**WP**". These codes will accompany the analyst's manual integration stamp placed next to the compound name on the chromatogram.



Sample Custody



Raw Data

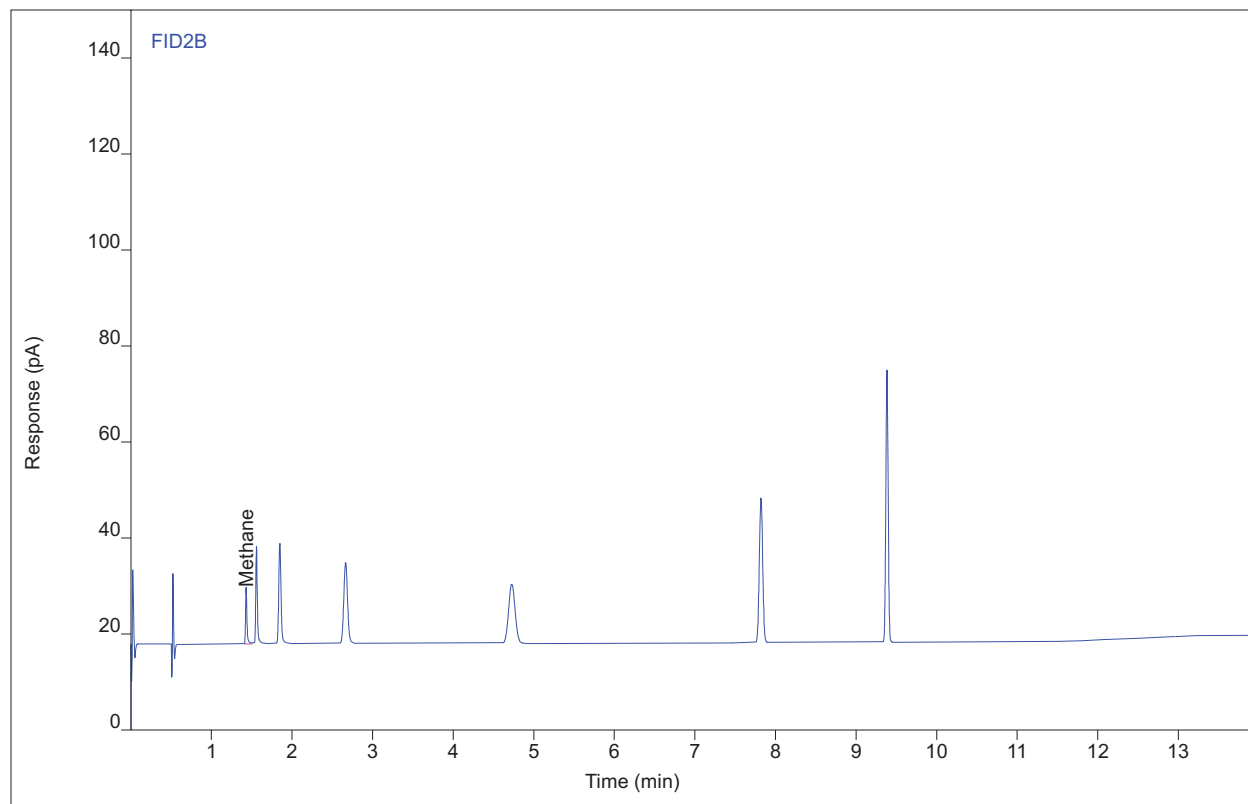


Chromatogram Report

Enthalpy Analytical

Sample Name ROSIEP115 #C4 ENV(1=424,4=400)
Sequence Name ROSIEP138 ver.1
Inj Data File 026B2102.D
File Location GC/2019/Rosie/Quarter 1
Injection Date 1/21/2019 10:29 AM
File Modified 1/21/2019 11:42 AM
Instrument
Operator disconnected

Sample Type
Vial Number Vial 26
Injection Volume NA
Injection 2 of 4
Acquisition Method AQM_ROSIEP080.M
Analysis Method ROSIEP082_C1-C7.M
Method Modified 12/13/2018 1:28 PM
Printed 1/28/2019 8:24 AM



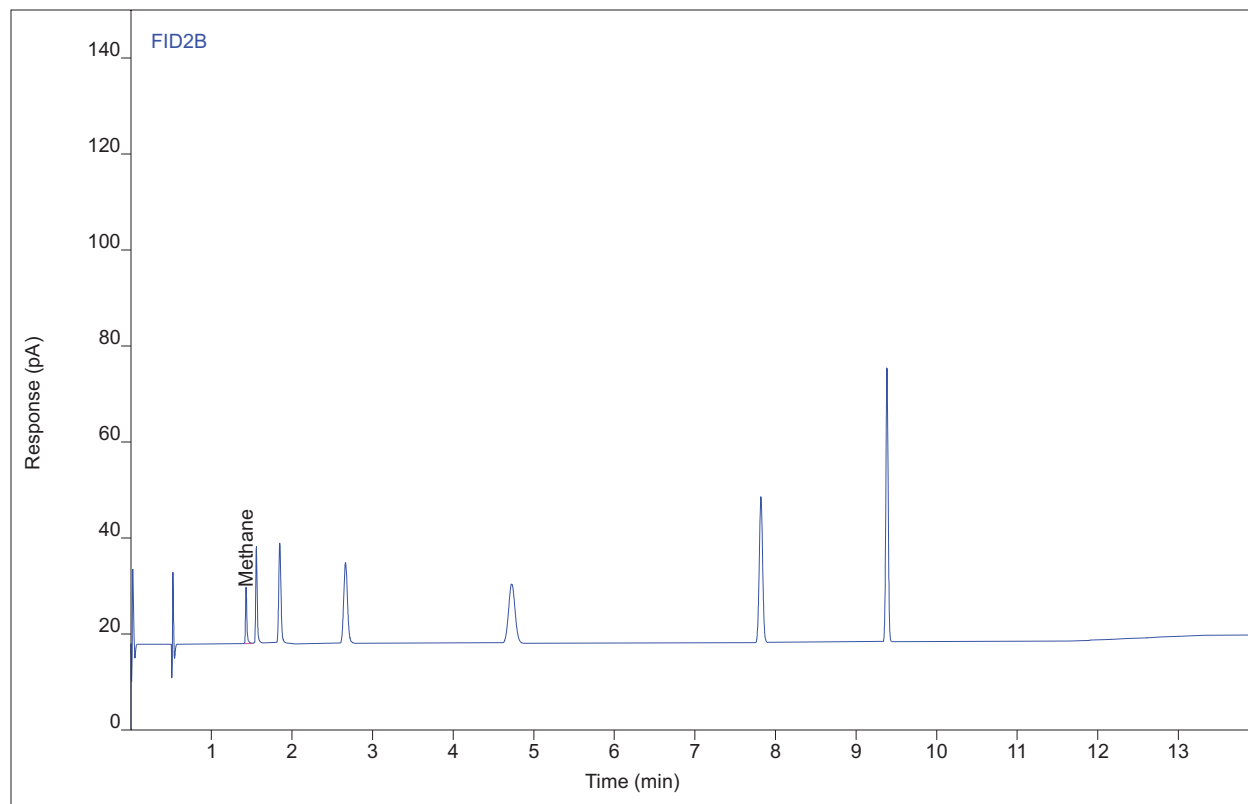
Compound	Type	RT	Area	Height	Amount	DF	SampAmt	Unit
Methane	BB	1.43	14.4138	11.7034	40.7348	1	40.7348	ppm

Chromatogram Report

Enthalpy Analytical

Sample Name ROSIEP115 #C4 ENV(1=424,4=400)
Sequence Name ROSIEP138 ver.1
Inj Data File 026B2103.D
File Location GC/2019/Rosie/Quarter 1
Injection Date 1/21/2019 10:54 AM
File Modified 1/21/2019 11:42 AM
Instrument
Operator disconnected

Sample Type
Vial Number Vial 26
Injection Volume NA
Injection 3 of 4
Acquisition Method AQM_ROSIEP080.M
Analysis Method ROSIEP082_C1-C7.M
Method Modified 12/13/2018 1:28 PM
Printed 1/28/2019 8:24 AM



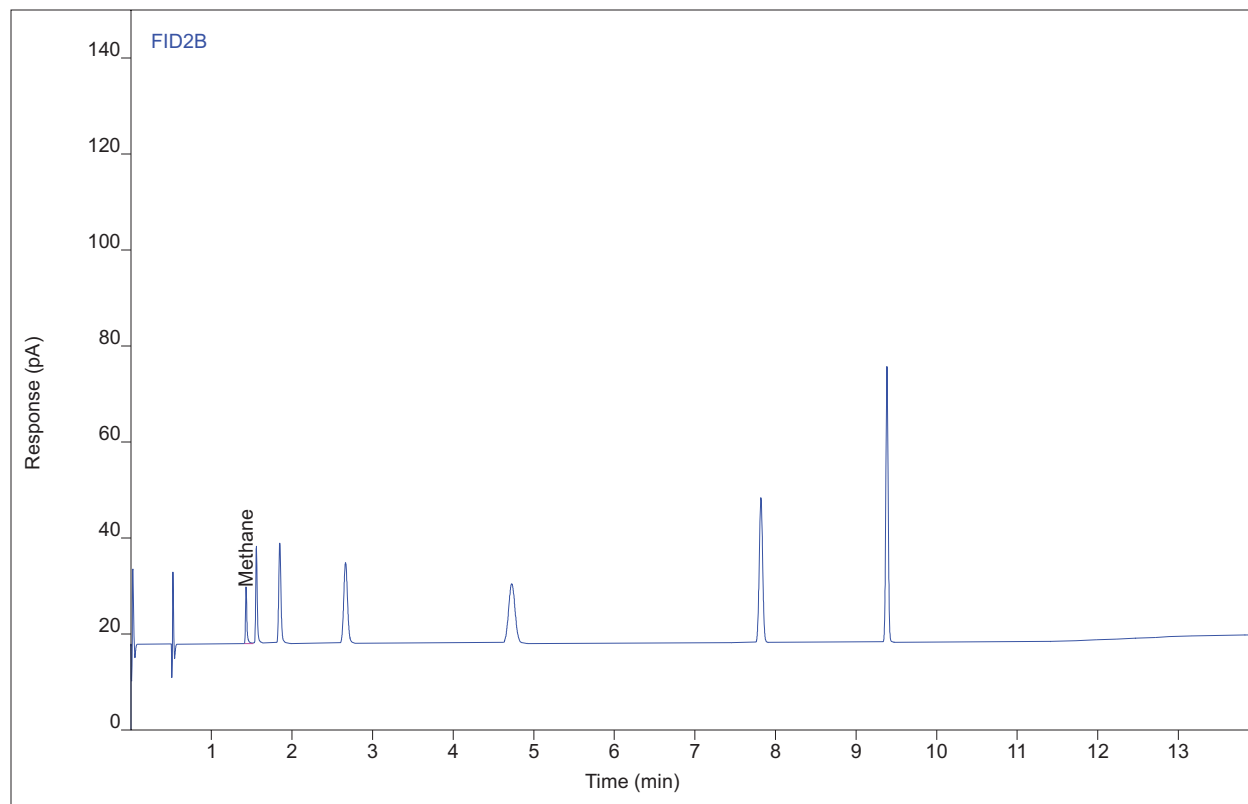
Compound	Type	RT	Area	Height	Amount	DF	SampAmt	Unit
Methane	BV	1.43	14.2796	11.6805	40.3554	1	40.3554	ppm

Chromatogram Report

Enthalpy Analytical

Sample Name ROSIEP115 #C4 ENV(1=424,4=400)
Sequence Name ROSIEP138 ver.1
Inj Data File 026B2104.D
File Location GC/2019/Rosie/Quarter 1
Injection Date 1/21/2019 11:19 AM
File Modified 1/21/2019 11:42 AM
Instrument
Operator disconnected

Sample Type
Vial Number Vial 26
Injection Volume NA
Injection 4 of 4
Acquisition Method AQM_ROSIEP080.M
Analysis Method ROSIEP082_C1-C7.M
Method Modified 12/13/2018 1:28 PM
Printed 1/28/2019 8:24 AM



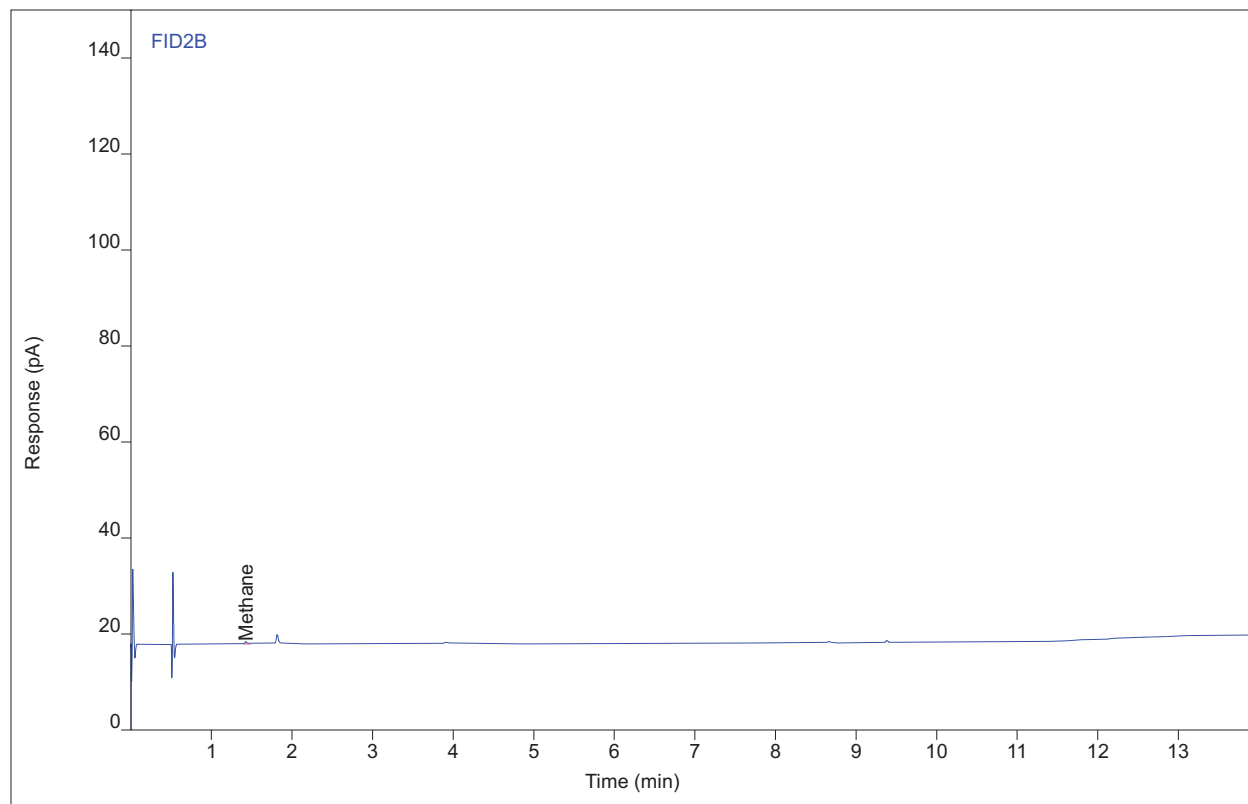
Compound	Type	RT	Area	Height	Amount	DF	SampAmt	Unit
Methane	BV	1.43	14.2736	11.7475	40.3384	1	40.3384	ppm

Chromatogram Report

Sample Name 0119-087.Run 5.Bag
Sequence Name ROSIEP141 ver.2
Inj Data File 019B0101.D
File Location GC/2019/Rosie/Quarter 1
Injection Date 1/21/2019 11:56 AM
File Modified 1/22/2019 9:35 AM
Instrument
Operator disconnected

Enthalpy Analytical

Sample Type Sample
Vial Number Vial 19
Injection Volume NA
Injection 1 of 3
Acquisition Method AQM_ROSIEP080.M
Analysis Method ROSIEP082_C1-C7.M
Method Modified 1/22/2019 5:22 AM
Printed 1/28/2019 8:24 AM



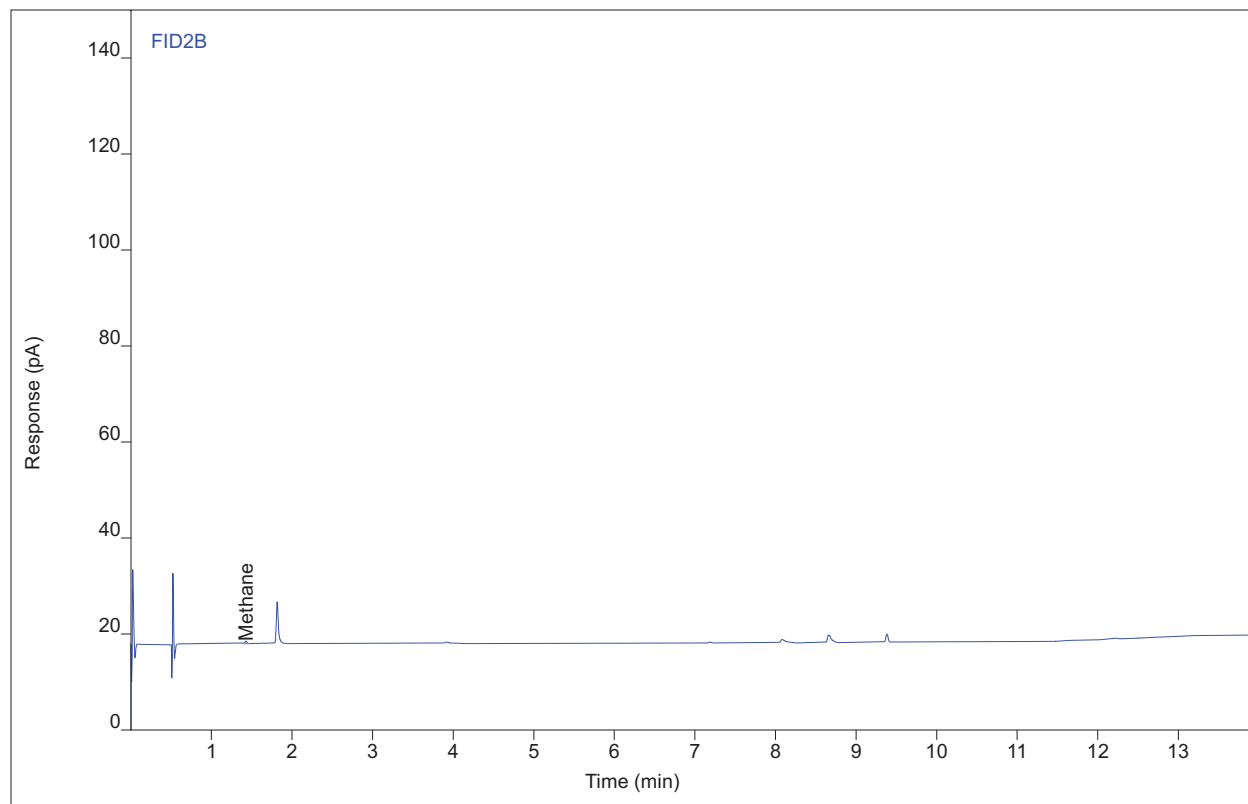
Compound	Type	RT	Area	Height	Amount	DF	SampAmt	Unit
Methane	MM	1.43	1.10009	0.61085	3.10133	1	3.10133	ppm

Chromatogram Report

Sample Name 0119-087.Run 5.Bag
Sequence Name ROSIEP141 ver.2
Inj Data File 019B0102.D
File Location GC/2019/Rosie/Quarter 1
Injection Date 1/21/2019 12:18 PM
File Modified 1/22/2019 9:35 AM
Instrument
Operator disconnected

Enthalpy Analytical

Sample Type Sample
Vial Number Vial 19
Injection Volume NA
Injection 2 of 3
Acquisition Method AQM_ROSIEP080.M
Analysis Method ROSIEP082_C1-C7.M
Method Modified 1/22/2019 5:22 AM
Printed 1/28/2019 8:24 AM



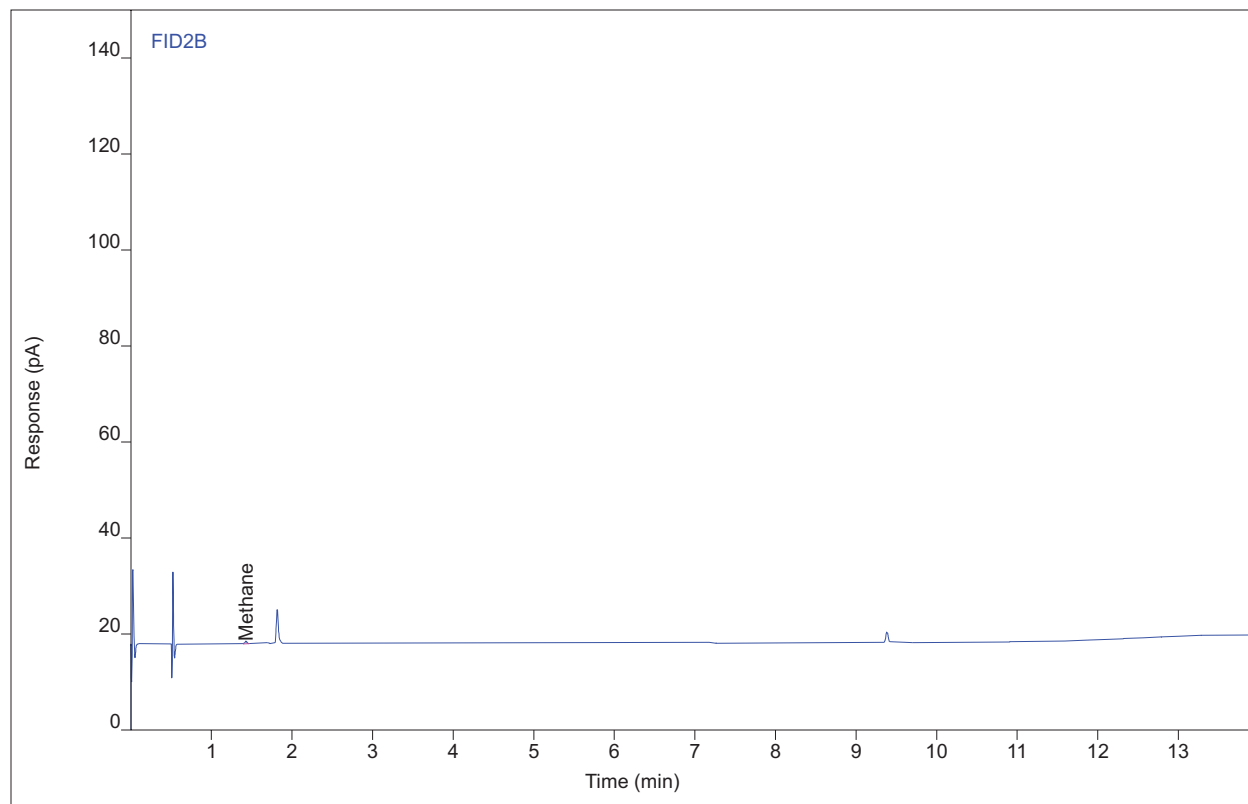
Compound	Type	RT	Area	Height	Amount	DF	SampAmt	Unit
Methane	MM	1.43	1.05911	0.64719	2.98581	1	2.98581	ppm

Chromatogram Report

Sample Name 0119-087.Run 5.Bag
Sequence Name ROSIEP141 ver.2
Inj Data File 019B0103.D
File Location GC/2019/Rosie/Quarter 1
Injection Date 1/21/2019 12:39 PM
File Modified 1/22/2019 9:35 AM
Instrument
Operator disconnected

Enthalpy Analytical

Sample Type Sample
Vial Number Vial 19
Injection Volume NA
Injection 3 of 3
Acquisition Method AQM_ROSIEP080.M
Analysis Method ROSIEP082_C1-C7.M
Method Modified 1/22/2019 5:22 AM
Printed 1/28/2019 8:24 AM



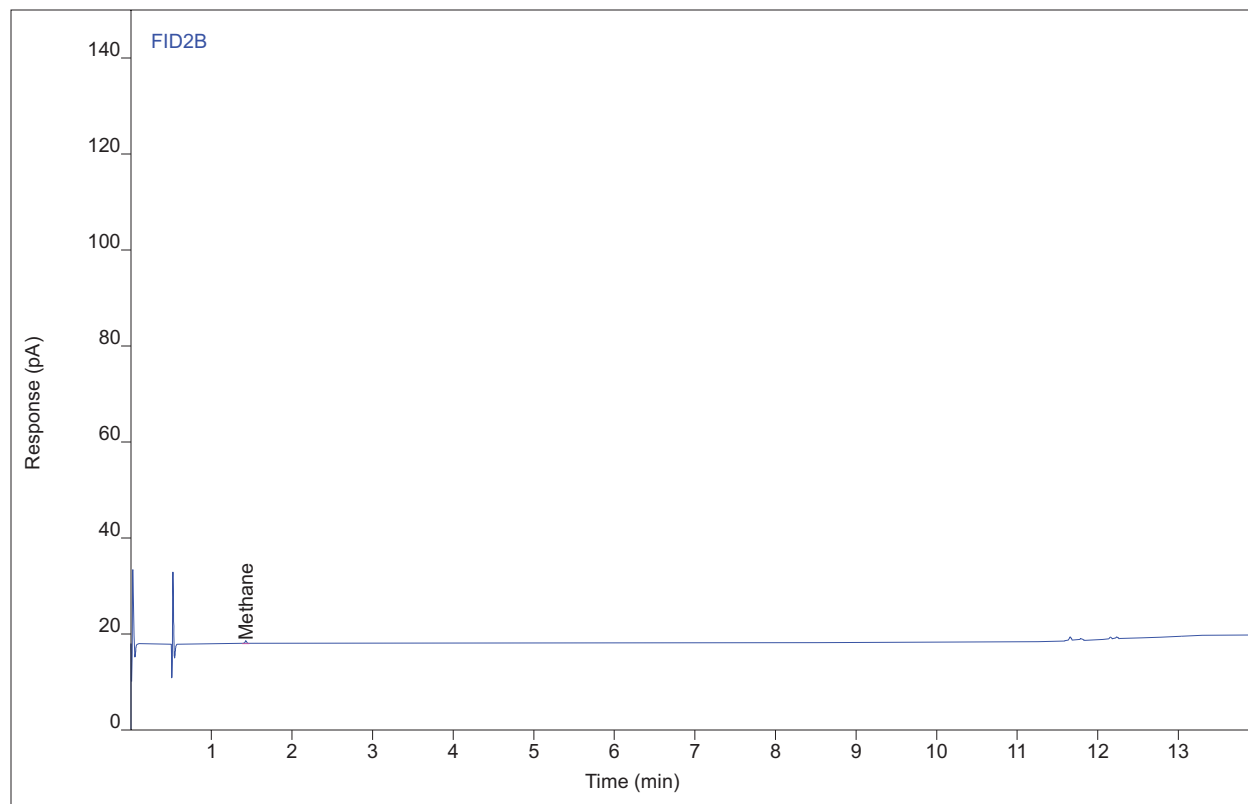
Compound	Type	RT	Area	Height	Amount	DF	SampAmt	Unit
Methane	MM	1.43	1.02139	0.62931	2.87946	1	2.87946	ppm

Chromatogram Report

Sample Name 0119-087.Run 1.Bag
Sequence Name ROSIEP141 ver.2
Inj Data File 020B0201.D
File Location GC/2019/Rosie/Quarter 1
Injection Date 1/21/2019 1:01 PM
File Modified 1/22/2019 9:35 AM
Instrument
Operator disconnected

Enthalpy Analytical

Sample Type Sample
Vial Number Vial 20
Injection Volume NA
Injection 1 of 3
Acquisition Method AQM_ROSIEP080.M
Analysis Method ROSIEP082_C1-C7.M
Method Modified 1/22/2019 5:22 AM
Printed 1/28/2019 8:24 AM



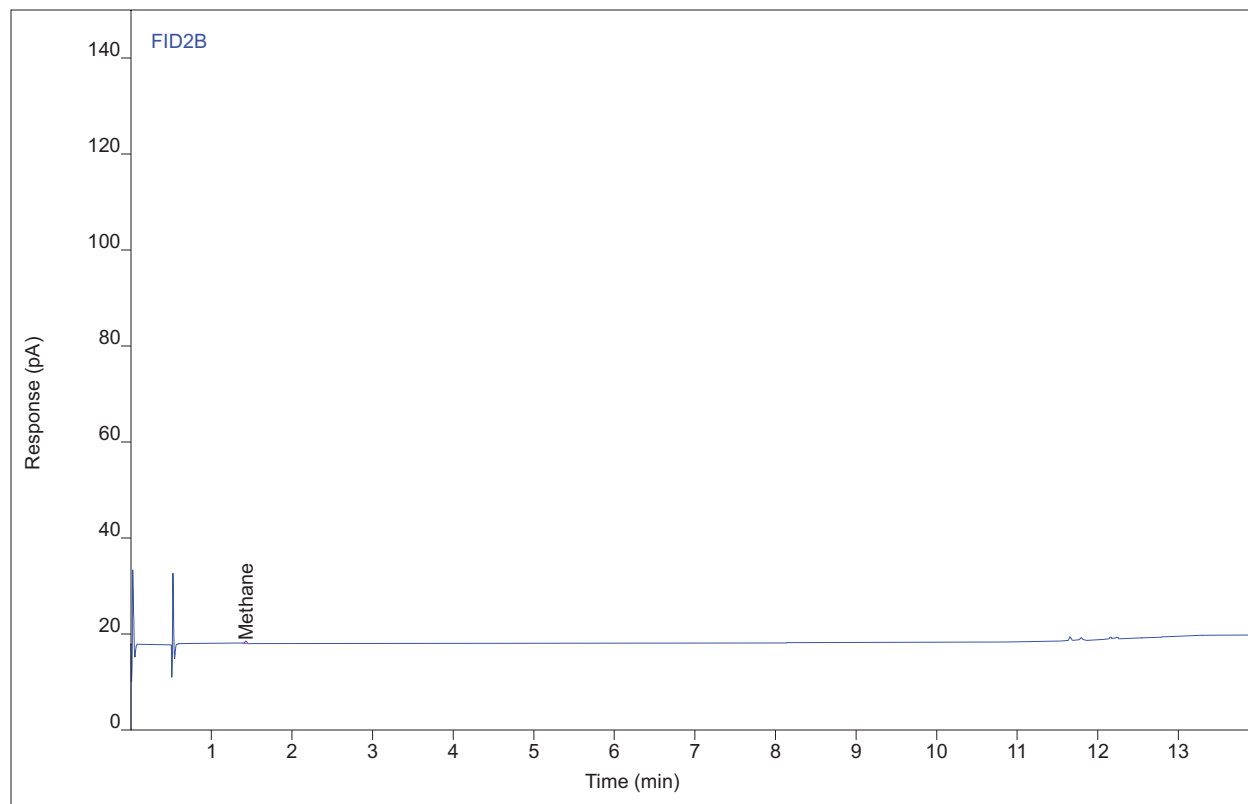
Compound	Type	RT	Area	Height	Amount	DF	SampAmt	Unit
Methane	MM	1.43	1.07291	0.69014	3.02472	1	3.02472	ppm

Chromatogram Report

Sample Name 0119-087.Run 1.Bag
Sequence Name ROSIEP141 ver.2
Inj Data File 020B0202.D
File Location GC/2019/Rosie/Quarter 1
Injection Date 1/21/2019 1:23 PM
File Modified 1/22/2019 9:35 AM
Instrument
Operator disconnected

Enthalpy Analytical

Sample Type Sample
Vial Number Vial 20
Injection Volume NA
Injection 2 of 3
Acquisition Method AQM_ROSIEP080.M
Analysis Method ROSIEP082_C1-C7.M
Method Modified 1/22/2019 5:22 AM
Printed 1/28/2019 8:24 AM



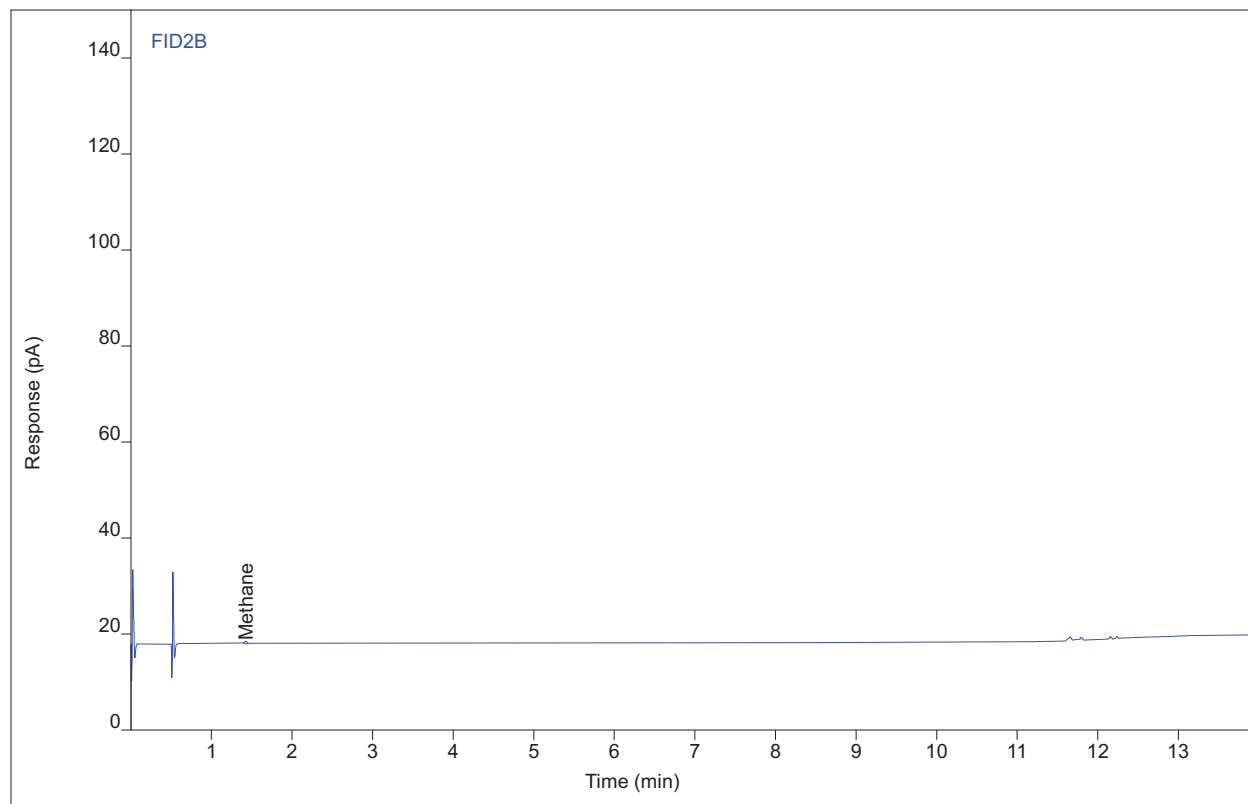
Compound	Type	RT	Area	Height	Amount	DF	SampAmt	Unit
Methane	MM	1.43	1.09149	0.69355	3.07710	1	3.07710	ppm

Chromatogram Report

Sample Name 0119-087.Run 1.Bag
Sequence Name ROSIEP141 ver.2
Inj Data File 020B0203.D
File Location GC/2019/Rosie/Quarter 1
Injection Date 1/21/2019 1:44 PM
File Modified 1/22/2019 9:35 AM
Instrument
Operator disconnected

Enthalpy Analytical

Sample Type Sample
Vial Number Vial 20
Injection Volume NA
Injection 3 of 3
Acquisition Method AQM_ROSIEP080.M
Analysis Method ROSIEP082_C1-C7.M
Method Modified 1/22/2019 5:22 AM
Printed 1/28/2019 8:24 AM



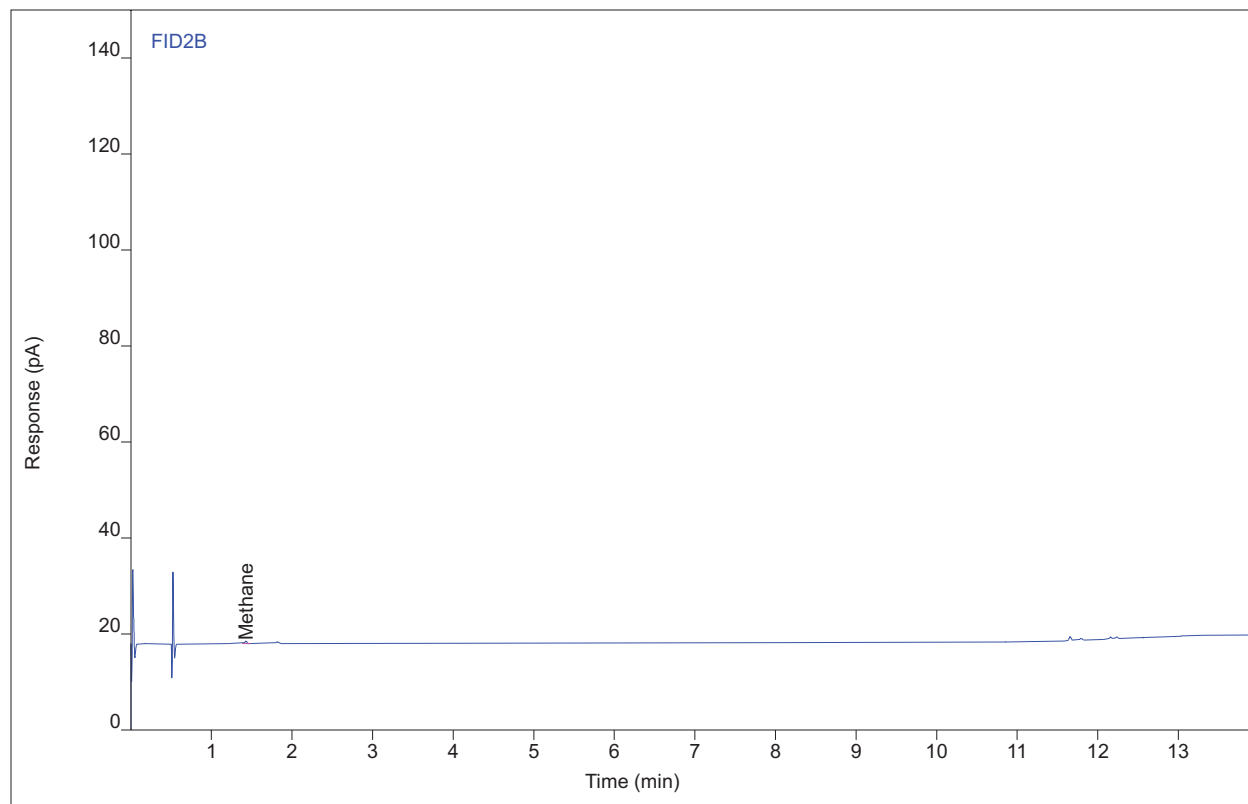
Compound	Type	RT	Area	Height	Amount	DF	SampAmt	Unit
Methane	MM	1.43	1.15781	0.69517	3.26405	1	3.26405	ppm

Chromatogram Report

Sample Name 0119-087.Run 2.Bag
Sequence Name ROSIEP141 ver.2
Inj Data File 021B0301.D
File Location GC/2019/Rosie/Quarter 1
Injection Date 1/21/2019 2:06 PM
File Modified 1/22/2019 9:35 AM
Instrument
Operator disconnected

Enthalpy Analytical

Sample Type Sample
Vial Number Vial 21
Injection Volume NA
Injection 1 of 3
Acquisition Method AQM_ROSIEP080.M
Analysis Method ROSIEP082_C1-C7.M
Method Modified 1/22/2019 5:22 AM
Printed 1/28/2019 8:24 AM



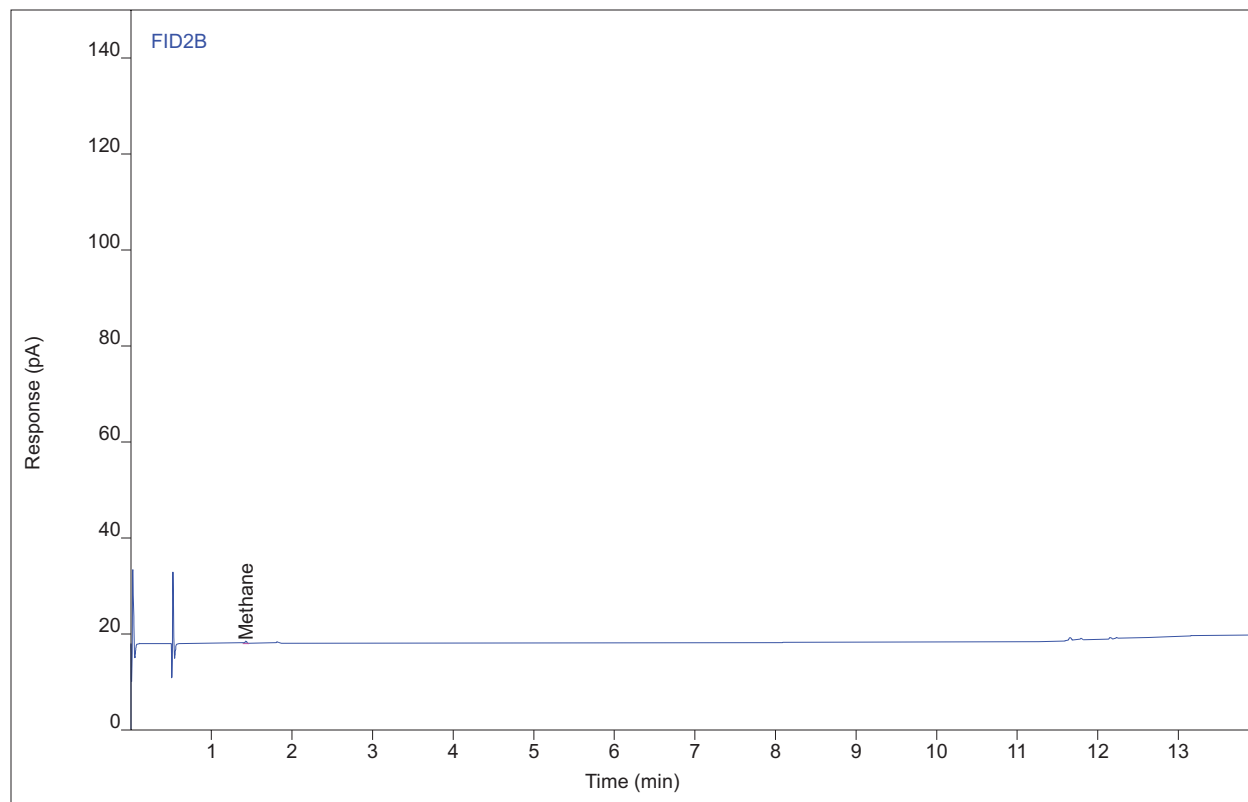
Compound	Type	RT	Area	Height	Amount	DF	SampAmt	Unit
Methane	MM	1.43	1.07704	0.67330	3.03637	1	3.03637	ppm

Chromatogram Report

Sample Name 0119-087.Run 2.Bag
Sequence Name ROSIEP141 ver.2
Inj Data File 021B0302.D
File Location GC/2019/Rosie/Quarter 1
Injection Date 1/21/2019 2:28 PM
File Modified 1/22/2019 9:35 AM
Instrument
Operator disconnected

Enthalpy Analytical

Sample Type Sample
Vial Number Vial 21
Injection Volume NA
Injection 2 of 3
Acquisition Method AQM_ROSIEP080.M
Analysis Method ROSIEP082_C1-C7.M
Method Modified 1/22/2019 5:22 AM
Printed 1/28/2019 8:24 AM



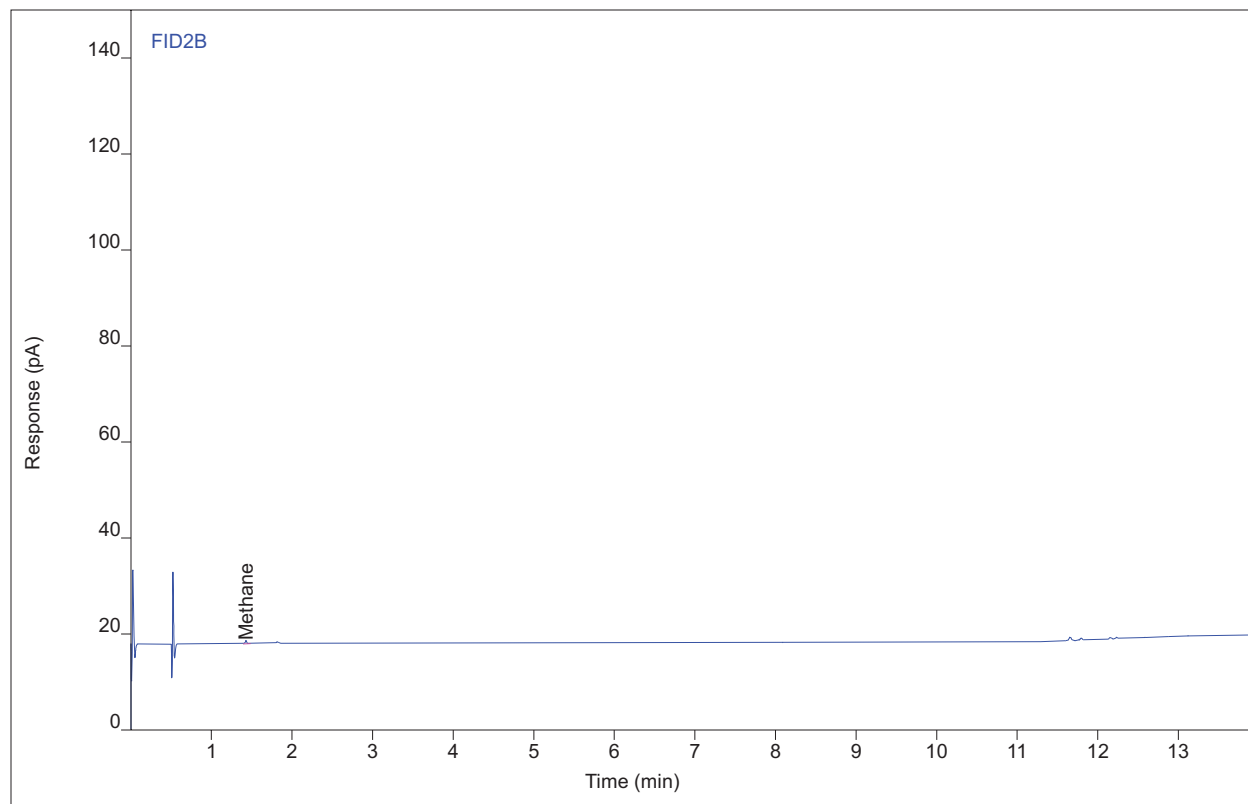
Compound	Type	RT	Area	Height	Amount	DF	SampAmt	Unit
Methane	MM	1.43	1.03869	0.66506	2.92824	1	2.92824	ppm

Chromatogram Report

Sample Name 0119-087.Run 2.Bag
Sequence Name ROSIEP141 ver.2
Inj Data File 021B0303.D
File Location GC/2019/Rosie/Quarter 1
Injection Date 1/21/2019 2:49 PM
File Modified 1/22/2019 9:35 AM
Instrument
Operator disconnected

Enthalpy Analytical

Sample Type Sample
Vial Number Vial 21
Injection Volume NA
Injection 3 of 3
Acquisition Method AQM_ROSIEP080.M
Analysis Method ROSIEP082_C1-C7.M
Method Modified 1/22/2019 5:22 AM
Printed 1/28/2019 8:24 AM



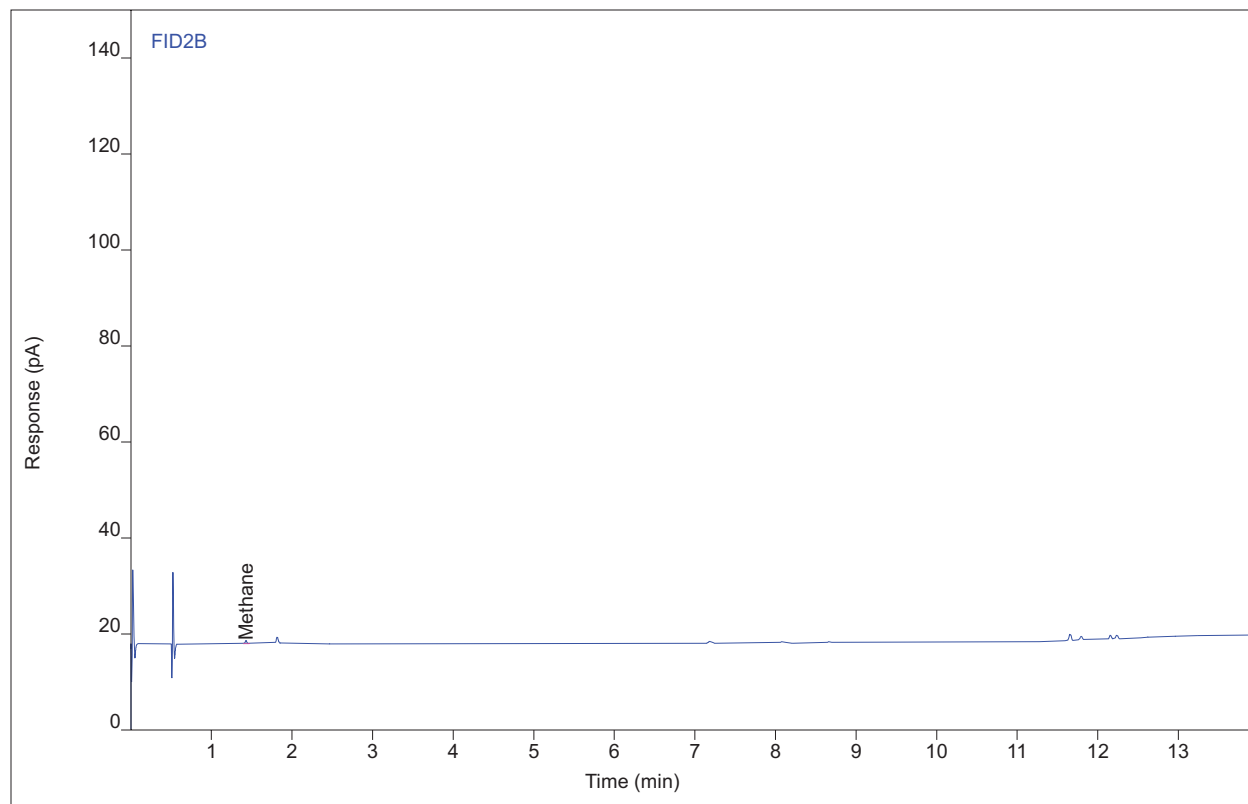
Compound	Type	RT	Area	Height	Amount	DF	SampAmt	Unit
Methane	MM	1.43	1.12298	0.67683	3.16587	1	3.16587	ppm

Chromatogram Report

Sample Name 0119-087.Run 3.Bag
Sequence Name ROSIEP141A ver.2
Inj Data File 022B0101.D
File Location GC/2019/Rosie/Quarter 1
Injection Date 1/21/2019 3:30 PM
File Modified 1/22/2019 9:38 AM
Instrument Rosie
Operator Nicole West

Enthalpy Analytical

Sample Type Sample
Vial Number Vial 22
Injection Volume NA
Injection 1 of 3
Acquisition Method AQM_ROSIEP080.M
Analysis Method ROSIEP082_C1-C7.M
Method Modified 1/22/2019 5:22 AM
Printed 1/28/2019 8:24 AM



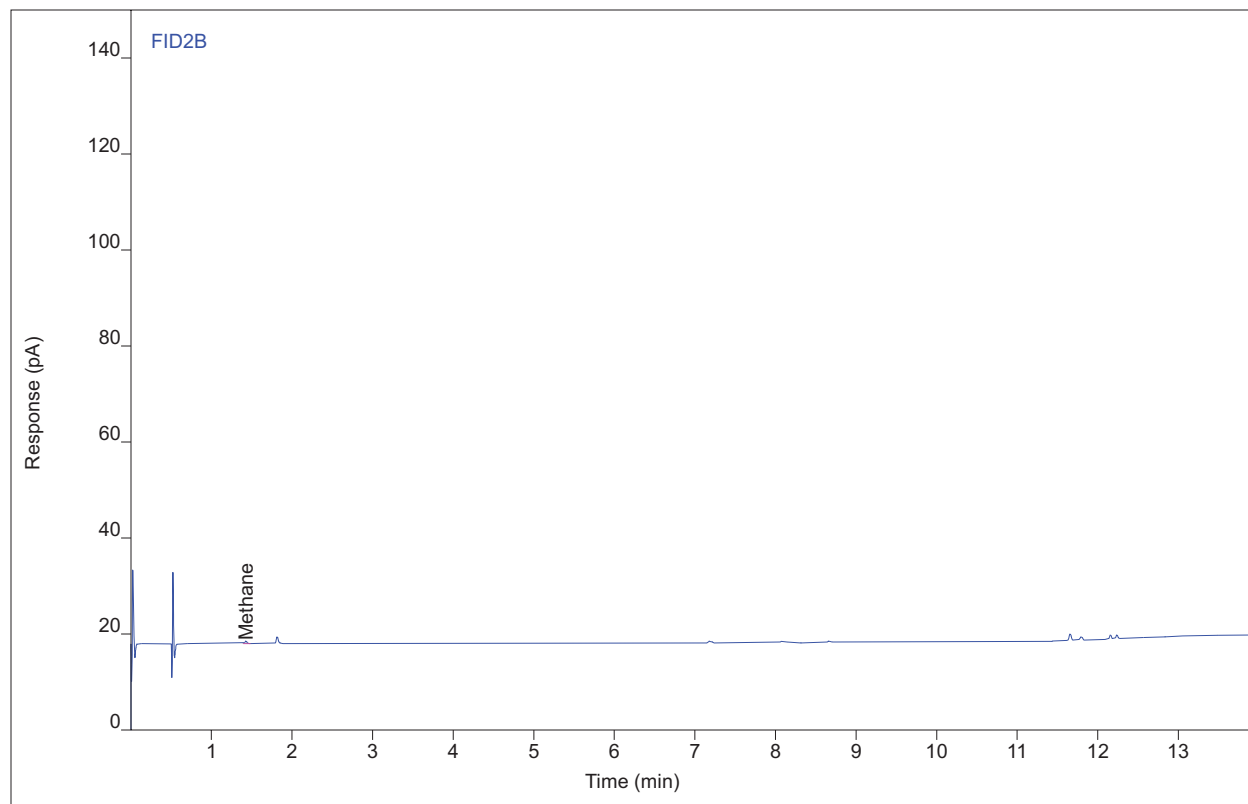
Compound	Type	RT	Area	Height	Amount	DF	SampAmt	Unit
Methane	MM	1.43	1.10502	0.71978	3.11523	1	3.11523	ppm

Chromatogram Report

Sample Name 0119-087.Run 3.Bag
Sequence Name ROSIEP141A ver.2
Inj Data File 022B0102.D
File Location GC/2019/Rosie/Quarter 1
Injection Date 1/21/2019 3:51 PM
File Modified 1/22/2019 9:38 AM
Instrument Rosie
Operator Nicole West

Enthalpy Analytical

Sample Type Sample
Vial Number Vial 22
Injection Volume NA
Injection 2 of 3
Acquisition Method AQM_ROSIEP080.M
Analysis Method ROSIEP082_C1-C7.M
Method Modified 1/22/2019 5:22 AM
Printed 1/28/2019 8:24 AM



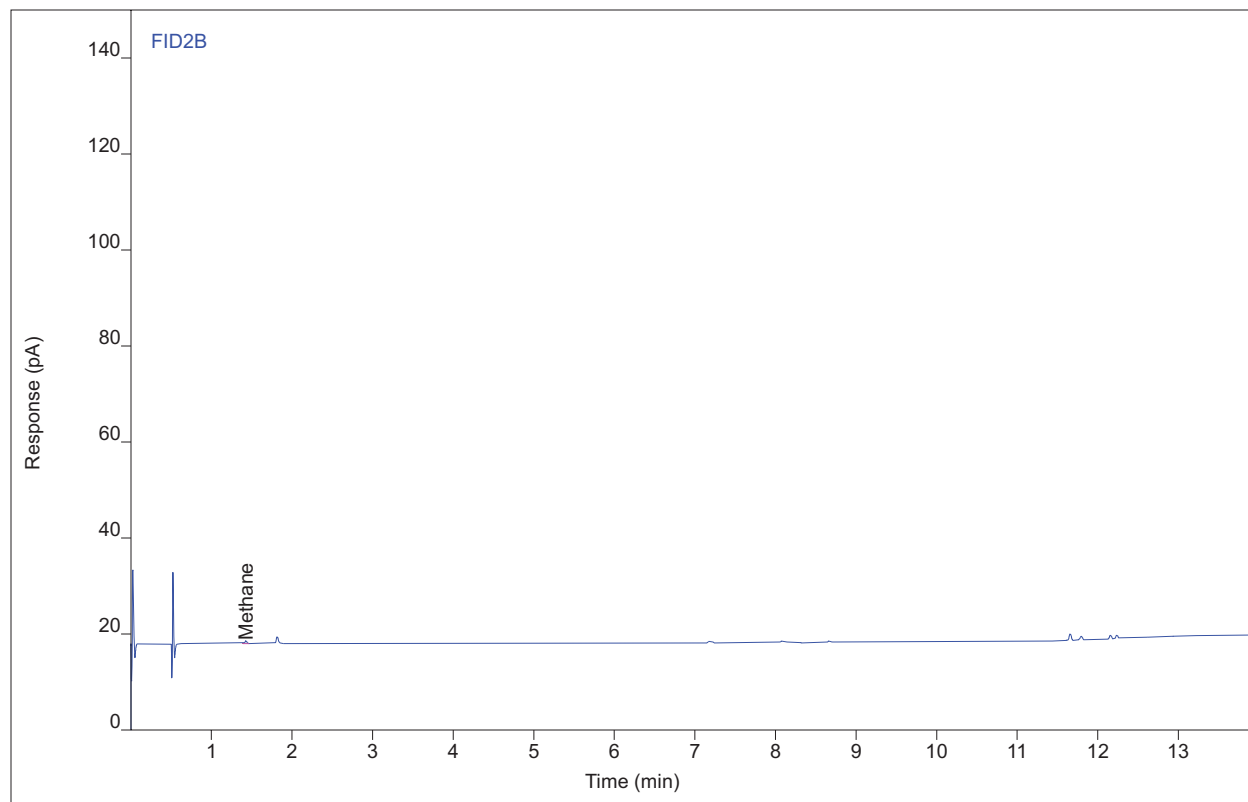
Compound	Type	RT	Area	Height	Amount	DF	SampAmt	Unit
Methane	MM	1.43	1.07024	0.70528	3.01717	1	3.01717	ppm

Chromatogram Report

Sample Name 0119-087.Run 3.Bag
Sequence Name ROSIEP141A ver.2
Inj Data File 022B0103.D
File Location GC/2019/Rosie/Quarter 1
Injection Date 1/21/2019 4:13 PM
File Modified 1/22/2019 9:38 AM
Instrument Rosie
Operator Nicole West

Enthalpy Analytical

Sample Type Sample
Vial Number Vial 22
Injection Volume NA
Injection 3 of 3
Acquisition Method AQM_ROSIEP080.M
Analysis Method ROSIEP082_C1-C7.M
Method Modified 1/22/2019 5:22 AM
Printed 1/28/2019 8:24 AM



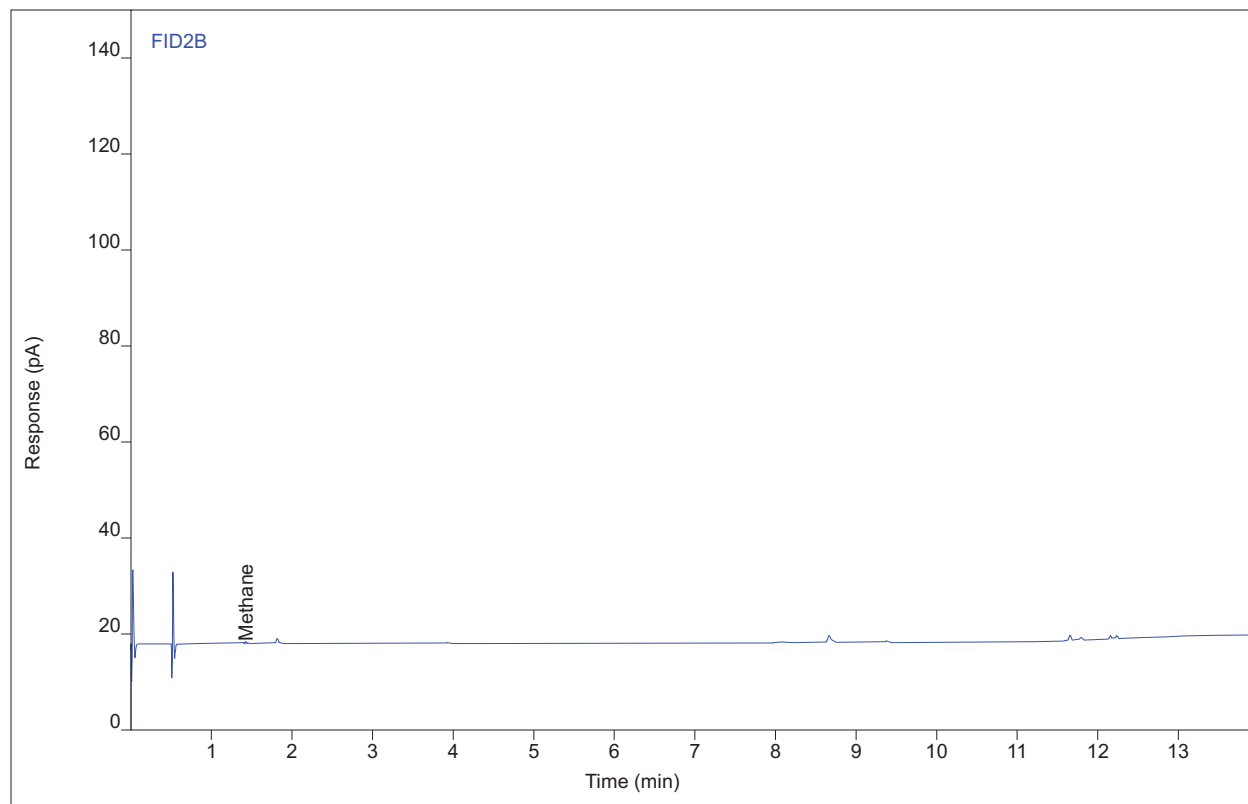
Compound	Type	RT	Area	Height	Amount	DF	SampAmt	Unit
Methane	MM	1.43	1.08887	0.71310	3.06970	1	3.06970	ppm

Chromatogram Report

Sample Name 0119-087.Run 4.Bag
Sequence Name ROSIEP141A ver.2
Inj Data File 019B0201.D
File Location GC/2019/Rosie/Quarter 1
Injection Date 1/21/2019 4:35 PM
File Modified 1/22/2019 9:38 AM
Instrument Rosie
Operator Nicole West

Enthalpy Analytical

Sample Type Sample
Vial Number Vial 19
Injection Volume NA
Injection 1 of 3
Acquisition Method AQM_ROSIEP080.M
Analysis Method ROSIEP082_C1-C7.M
Method Modified 1/22/2019 5:22 AM
Printed 1/28/2019 8:24 AM



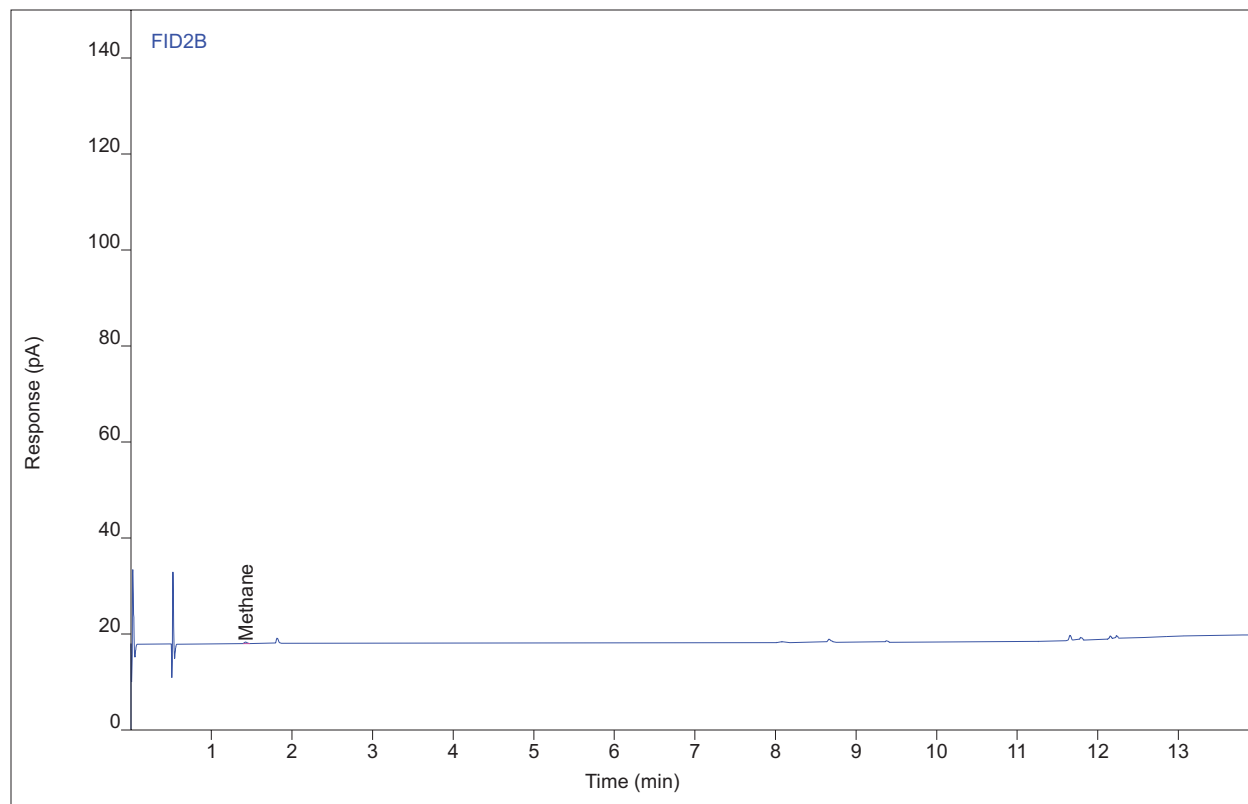
Compound	Type	RT	Area	Height	Amount	DF	SampAmt	Unit
Methane	MM	1.43	0.88661	0.52665	2.49952	1	2.49952	ppm

Chromatogram Report

Sample Name 0119-087.Run 4.Bag
Sequence Name ROSIEP141A ver.2
Inj Data File 019B0202.D
File Location GC/2019/Rosie/Quarter 1
Injection Date 1/21/2019 4:56 PM
File Modified 1/22/2019 9:38 AM
Instrument Rosie
Operator Justin Guenzler

Enthalpy Analytical

Sample Type Sample
Vial Number Vial 19
Injection Volume NA
Injection 2 of 3
Acquisition Method AQM_ROSIEP080.M
Analysis Method ROSIEP082_C1-C7.M
Method Modified 1/22/2019 5:22 AM
Printed 1/28/2019 8:24 AM



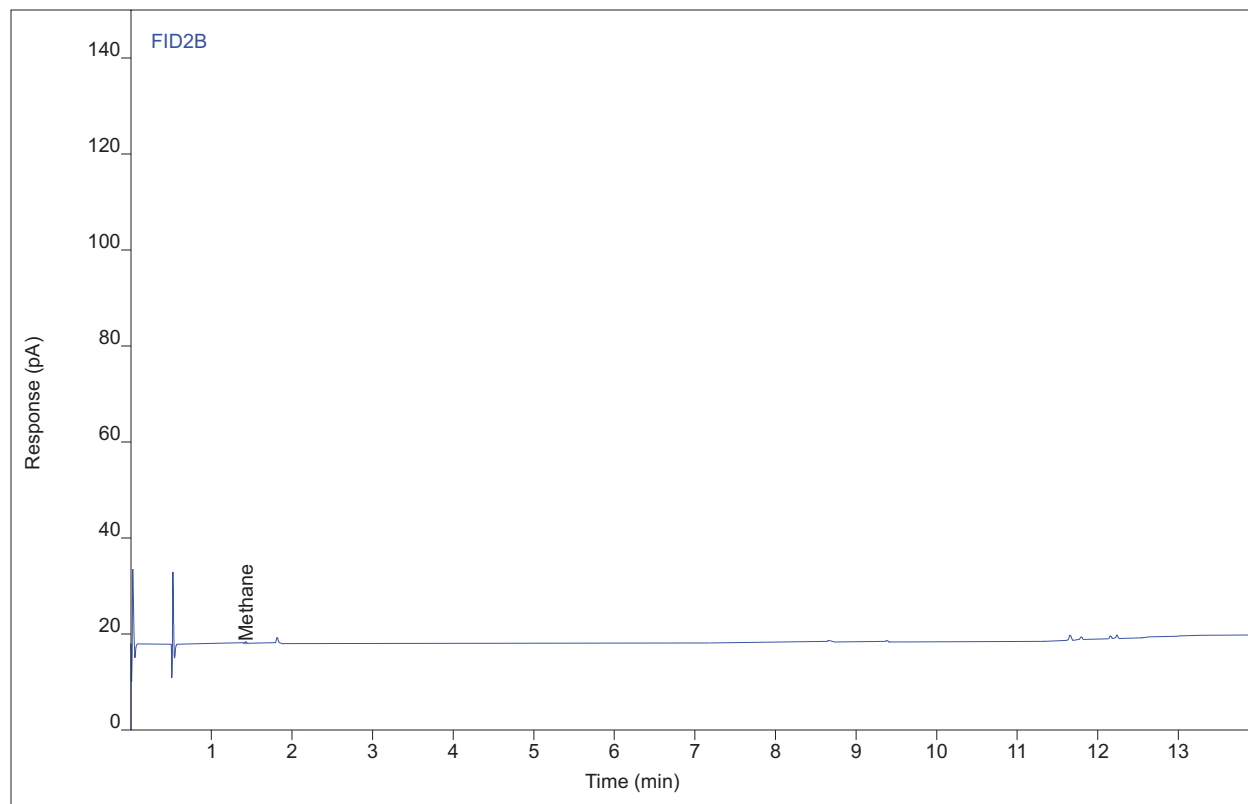
Compound	Type	RT	Area	Height	Amount	DF	SampAmt	Unit
Methane	MM	1.43	0.83820	0.50906	2.36303	1	2.36303	ppm

Chromatogram Report

Sample Name 0119-087.Run 4.Bag
Sequence Name ROSIEP141A ver.2
Inj Data File 019B0203.D
File Location GC/2019/Rosie/Quarter 1
Injection Date 1/21/2019 5:18 PM
File Modified 1/22/2019 9:38 AM
Instrument Rosie
Operator Justin Guenzler

Enthalpy Analytical

Sample Type Sample
Vial Number Vial 19
Injection Volume NA
Injection 3 of 3
Acquisition Method AQM_ROSIEP080.M
Analysis Method ROSIEP082_C1-C7.M
Method Modified 1/22/2019 5:22 AM
Printed 1/28/2019 8:24 AM



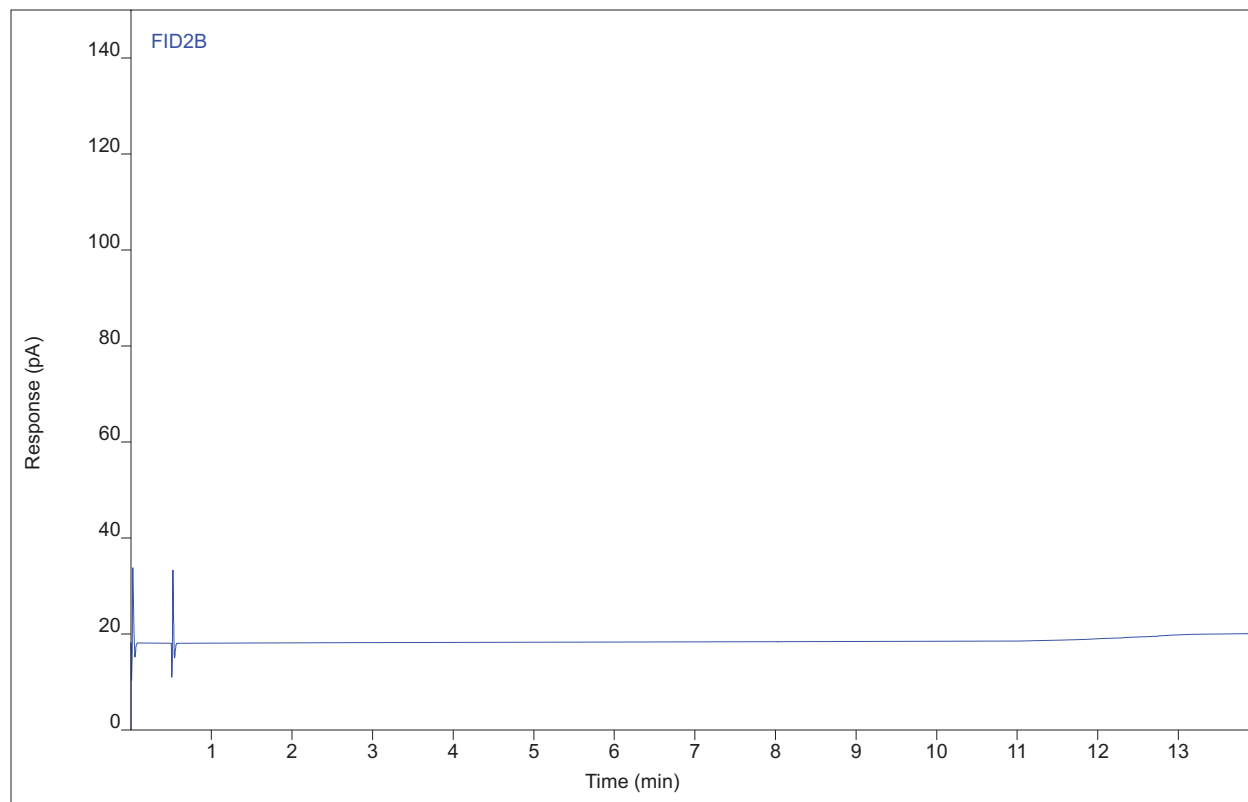
Compound	Type	RT	Area	Height	Amount	DF	SampAmt	Unit
Methane	MM	1.43	0.84591	0.51933	2.38477	1	2.38477	ppm

Chromatogram Report

Sample Name He Blank #LB
Sequence Name ROSIEP141A ver.2
Inj Data File 017B1101.D
File Location GC/2019/Rosie/Quarter 1
Injection Date 1/22/2019 3:02 AM
File Modified 1/22/2019 9:39 AM
Instrument Rosie
Operator Justin Guenzler

Enthalpy Analytical

Sample Type Sample
Vial Number Vial 17
Injection Volume NA
Injection 1 of 3
Acquisition Method AQM_ROSIEP080.M
Analysis Method ROSIEP082_C1-C7.M
Method Modified 1/22/2019 5:22 AM
Printed 1/28/2019 8:24 AM



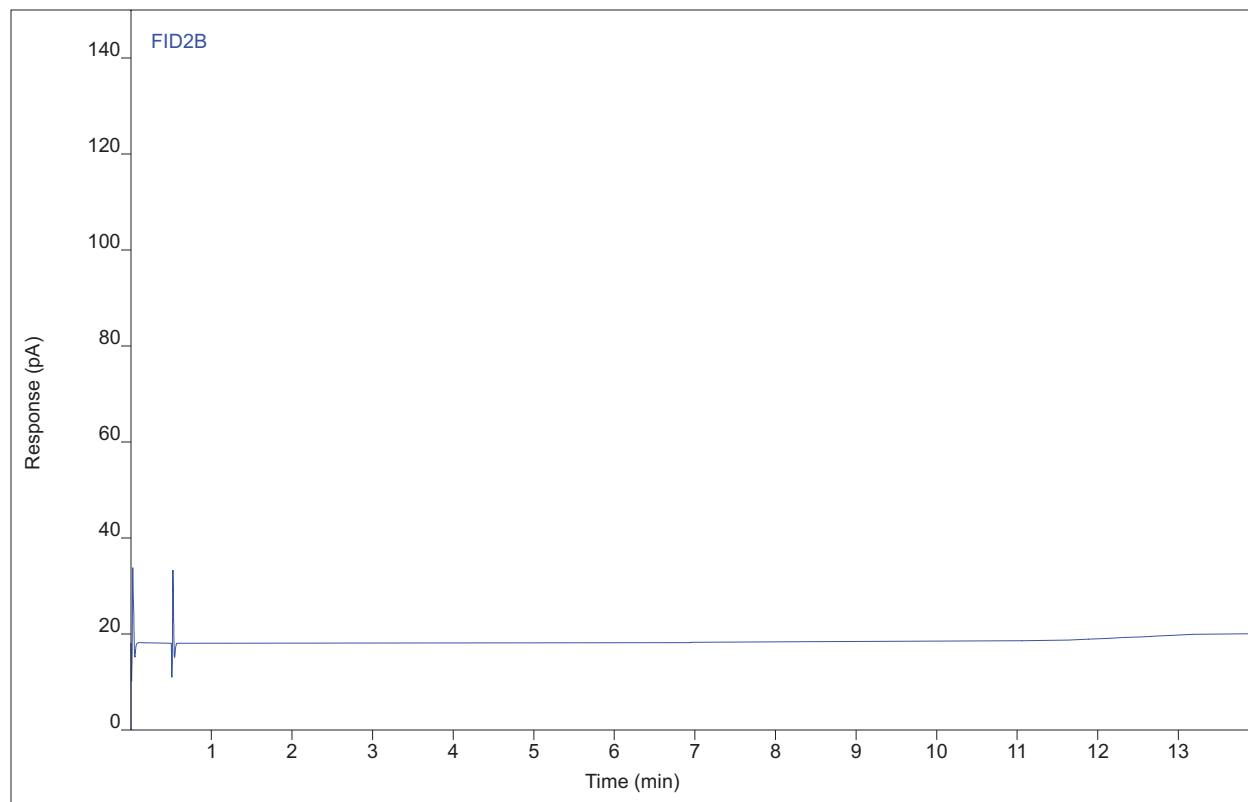
Compound	Type	RT	Area	Height	Amount	DF	SampAmt	Unit
Methane		(1.43)				1		

Chromatogram Report

Sample Name He Blank #LB
Sequence Name ROSIEP141A ver.2
Inj Data File 017B1102.D
File Location GC/2019/Rosie/Quarter 1
Injection Date 1/22/2019 3:23 AM
File Modified 1/22/2019 9:39 AM
Instrument Rosie
Operator Justin Guenzler

Enthalpy Analytical

Sample Type Sample
Vial Number Vial 17
Injection Volume NA
Injection 2 of 3
Acquisition Method AQM_ROSIEP080.M
Analysis Method ROSIEP082_C1-C7.M
Method Modified 1/22/2019 5:22 AM
Printed 1/28/2019 8:24 AM



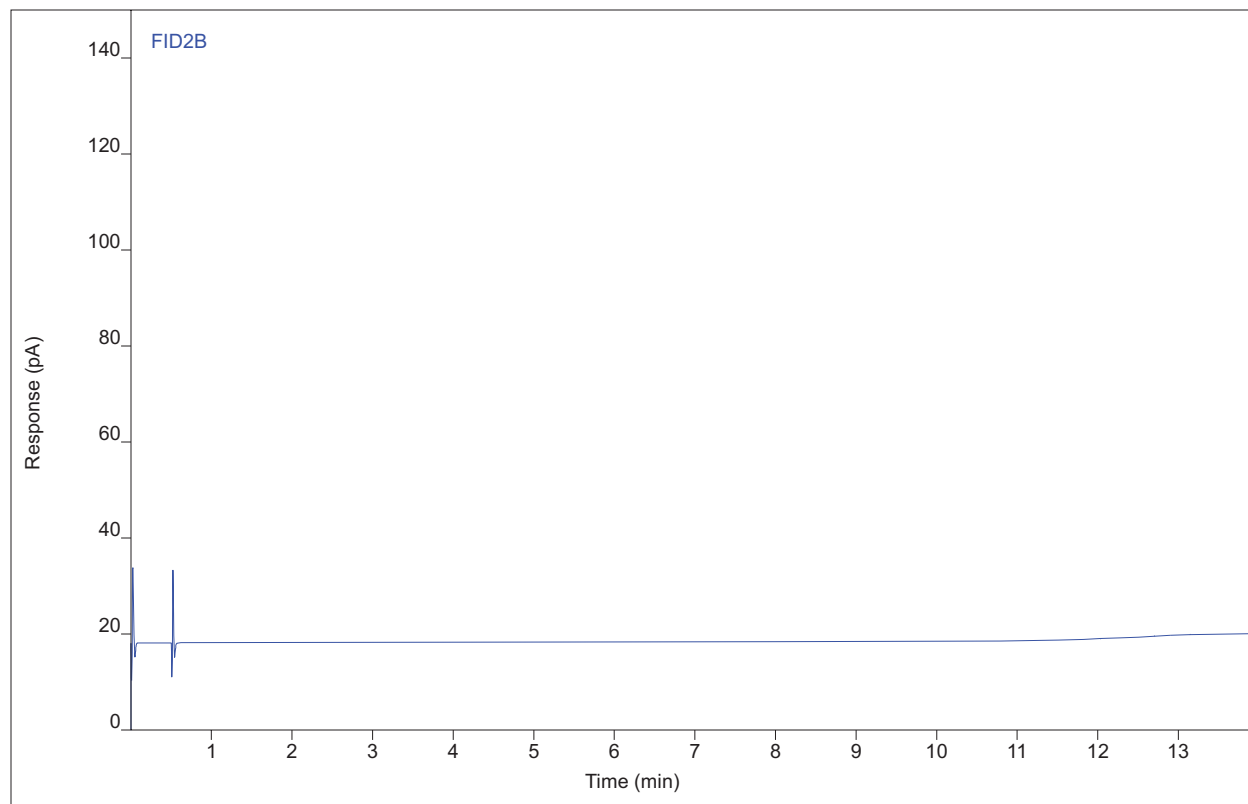
Compound	Type	RT	Area	Height	Amount	DF	SampAmt	Unit
Methane		(1.43)				1		

Chromatogram Report

Sample Name He Blank #LB
Sequence Name ROSIEP141A ver.2
Inj Data File 017B1103.D
File Location GC/2019/Rosie/Quarter 1
Injection Date 1/22/2019 3:45 AM
File Modified 1/22/2019 9:39 AM
Instrument Rosie
Operator Justin Guenzler

Enthalpy Analytical

Sample Type Sample
Vial Number Vial 17
Injection Volume NA
Injection 3 of 3
Acquisition Method AQM_ROSIEP080.M
Analysis Method ROSIEP082_C1-C7.M
Method Modified 1/22/2019 5:22 AM
Printed 1/28/2019 8:24 AM



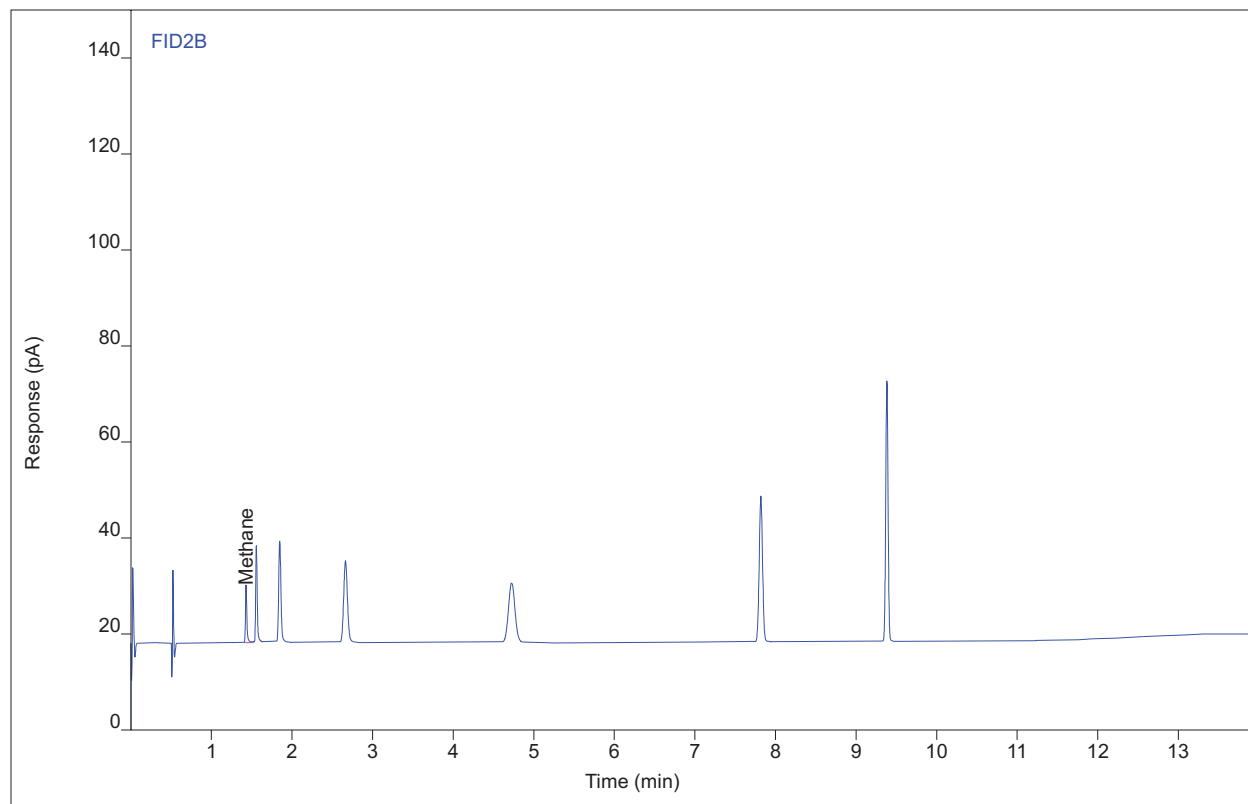
Compound	Type	RT	Area	Height	Amount	DF	SampAmt	Unit
Methane		(1.43)				1		

Chromatogram Report

Sample Name ROSIEP115 #C4 ENV(1=424,4=400)
Sequence Name ROSIEP141A ver.2
Inj Data File 026B1202.D
File Location GC/2019/Rosie/Quarter 1
Injection Date 1/22/2019 4:33 AM
File Modified 1/22/2019 9:39 AM
Instrument Rosie
Operator Justin Guenzler

Enthalpy Analytical

Sample Type Calibration
Vial Number Vial 26
Injection Volume NA
Injection 2 of 4
Acquisition Method AQM_ROSIEP080.M
Analysis Method ROSIEP082_C1-C7.M
Method Modified 1/22/2019 5:22 AM
Printed 1/28/2019 8:24 AM



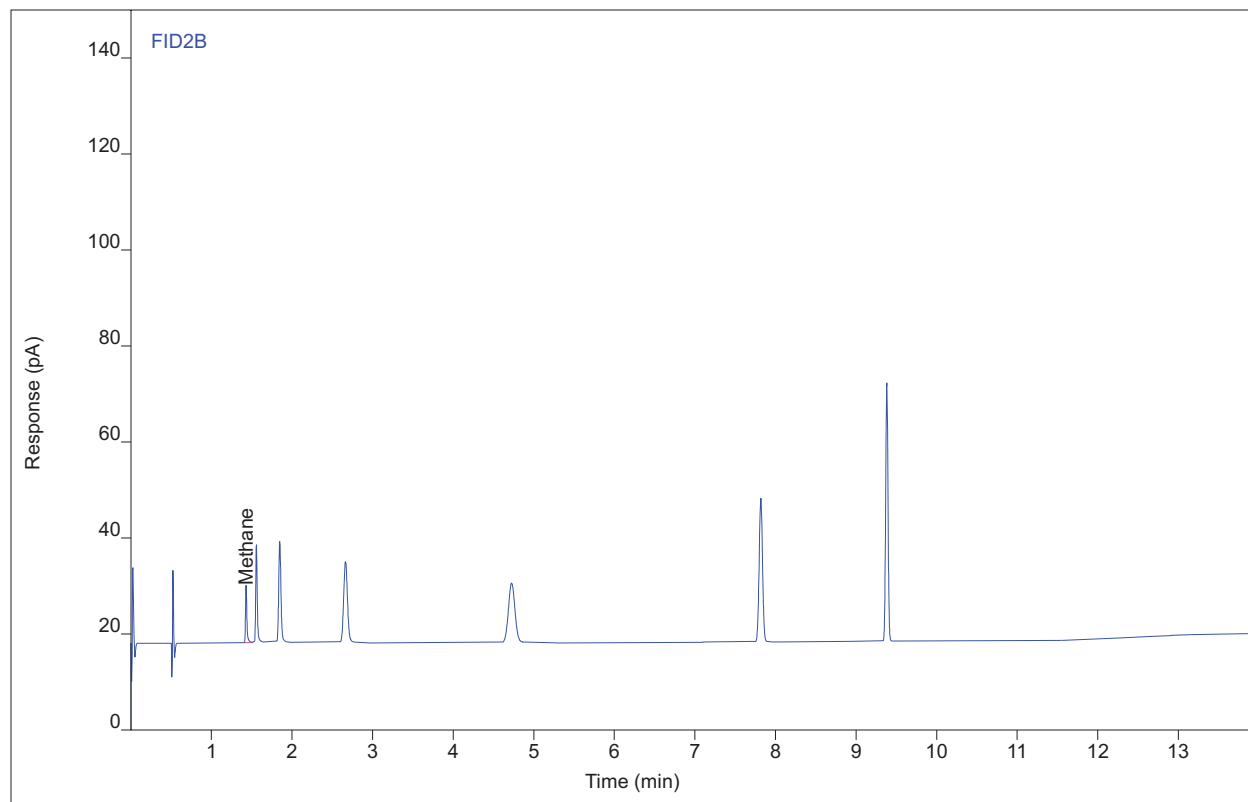
Compound	Type	RT	Area	Height	Amount	DF	SampAmt	Unit
Methane	BV	1.43	14.5798	11.9397	41.2041	1	41.2041	ppm

Chromatogram Report

Sample Name ROSIEP115 #C4 ENV(1=424,4=400)
Sequence Name ROSIEP141A ver.2
Inj Data File 026B1203.D
File Location GC/2019/Rosie/Quarter 1
Injection Date 1/22/2019 4:58 AM
File Modified 1/22/2019 9:39 AM
Instrument Rosie
Operator Justin Guenzler

Enthalpy Analytical

Sample Type Calibration
Vial Number Vial 26
Injection Volume NA
Injection 3 of 4
Acquisition Method AQM_ROSIEP080.M
Analysis Method ROSIEP082_C1-C7.M
Method Modified 1/22/2019 5:22 AM
Printed 1/28/2019 8:24 AM



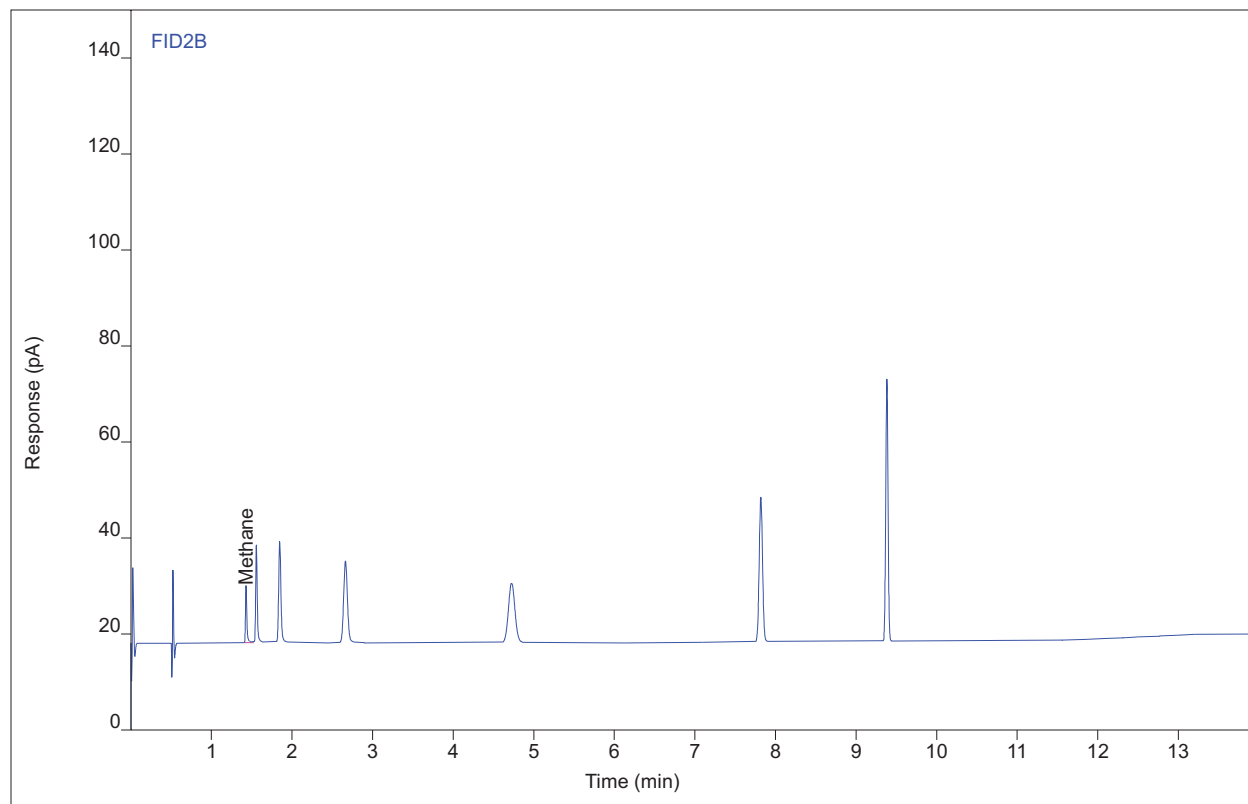
Compound	Type	RT	Area	Height	Amount	DF	SampAmt	Unit
Methane	BB	1.43	14.5420	11.9249	41.0971	1	41.0971	ppm

Chromatogram Report

Sample Name ROSIEP115 #C4 ENV(1=424,4=400)
Sequence Name ROSIEP141A ver.2
Inj Data File 026B1204.D
File Location GC/2019/Rosie/Quarter 1
Injection Date 1/22/2019 5:22 AM
File Modified 1/22/2019 9:39 AM
Instrument Rosie
Operator Justin Guenzler

Enthalpy Analytical

Sample Type Calibration
Vial Number Vial 26
Injection Volume NA
Injection 4 of 4
Acquisition Method AQM_ROSIEP080.M
Analysis Method ROSIEP082_C1-C7.M
Method Modified 1/22/2019 5:22 AM
Printed 1/28/2019 8:24 AM



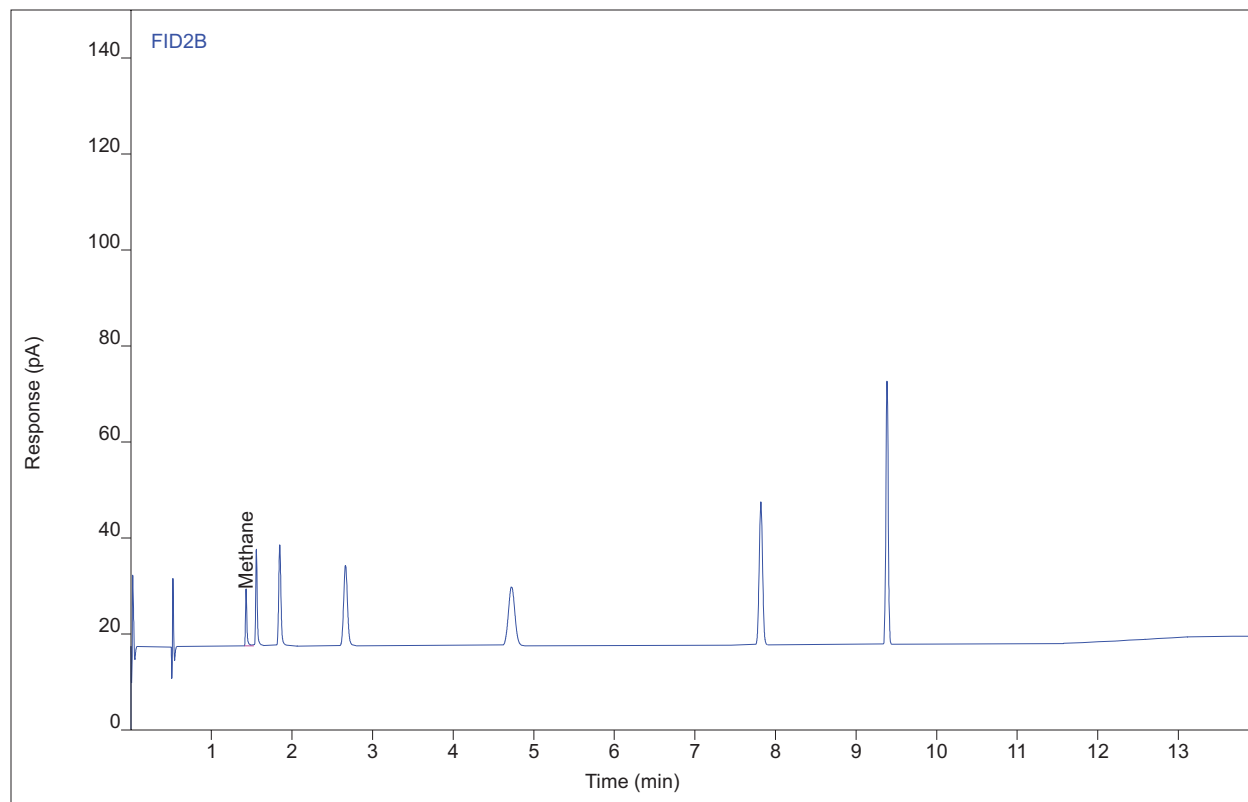
Compound	Type	RT	Area	Height	Amount	DF	SampAmt	Unit
Methane	BV	1.43	14.6701	11.8508	41.4594	1	41.4594	ppm

Chromatogram Report

Sample Name ROSIEP115 #C4 ENV(1=424,4=400)
Sequence Name ROSIEP145 ver.1
Inj Data File 026B0202.D
File Location GC/2019/Rosie/Quarter 1
Injection Date 1/27/2019 2:32 PM
File Modified 1/28/2019 8:19 AM
Instrument Rosie
Operator Nicholas Traversa

Enthalpy Analytical

Sample Type Calibration
Vial Number Vial 26
Injection Volume NA
Injection 2 of 4
Acquisition Method AQM_ROSIEP080.M
Analysis Method ROSIEP082_C1-C7.M
Method Modified 1/22/2019 5:22 AM
Printed 1/28/2019 8:25 AM



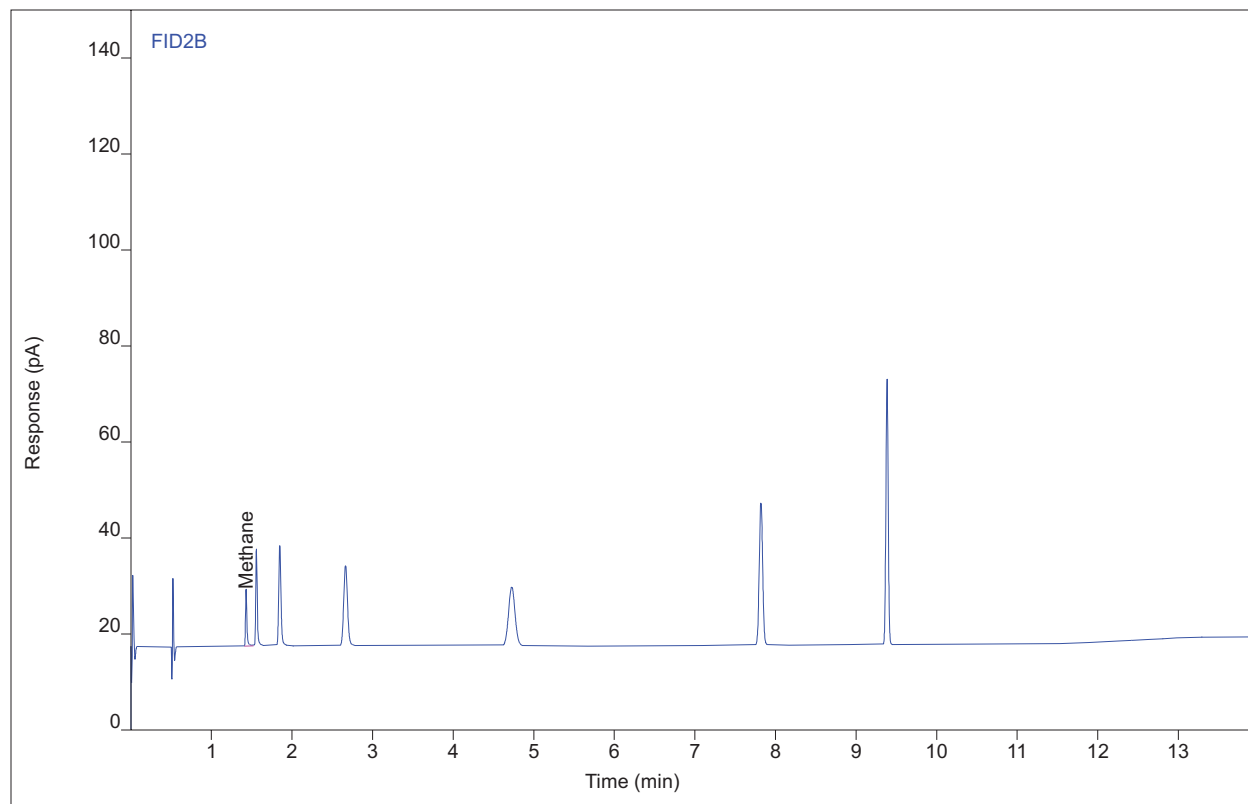
Compound	Type	RT	Area	Height	Amount	DF	SampAmt	Unit
Methane	BV	1.43	14.4798	11.7532	40.9214	1	40.9214	ppm

Chromatogram Report

Sample Name ROSIEP115 #C4 ENV(1=424,4=400)
Sequence Name ROSIEP145 ver.1
Inj Data File 026B0203.D
File Location GC/2019/Rosie/Quarter 1
Injection Date 1/27/2019 2:57 PM
File Modified 1/28/2019 8:19 AM
Instrument Rosie
Operator Nicholas Traversa

Enthalpy Analytical

Sample Type Calibration
Vial Number Vial 26
Injection Volume NA
Injection 3 of 4
Acquisition Method AQM_ROSIEP080.M
Analysis Method ROSIEP082_C1-C7.M
Method Modified 1/22/2019 5:22 AM
Printed 1/28/2019 8:25 AM



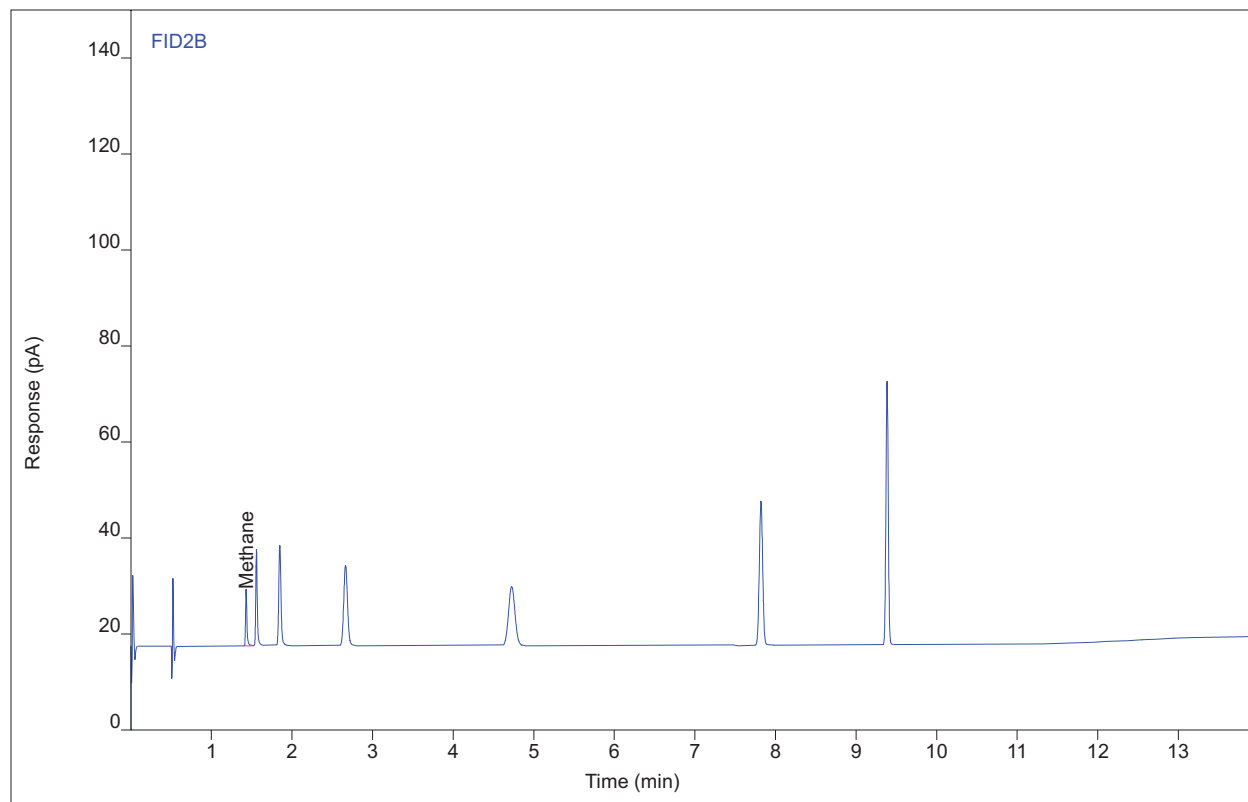
Compound	Type	RT	Area	Height	Amount	DF	SampAmt	Unit
Methane	BV	1.43	14.4822	11.7200	40.9282	1	40.9282	ppm

Chromatogram Report

Sample Name ROSIEP115 #C4 ENV(1=424,4=400)
Sequence Name ROSIEP145 ver.1
Inj Data File 026B0204.D
File Location GC/2019/Rosie/Quarter 1
Injection Date 1/27/2019 3:22 PM
File Modified 1/28/2019 8:19 AM
Instrument Rosie
Operator Nicholas Traversa

Enthalpy Analytical

Sample Type Calibration
Vial Number Vial 26
Injection Volume NA
Injection 4 of 4
Acquisition Method AQM_ROSIEP080.M
Analysis Method ROSIEP082_C1-C7.M
Method Modified 1/22/2019 5:22 AM
Printed 1/28/2019 8:25 AM



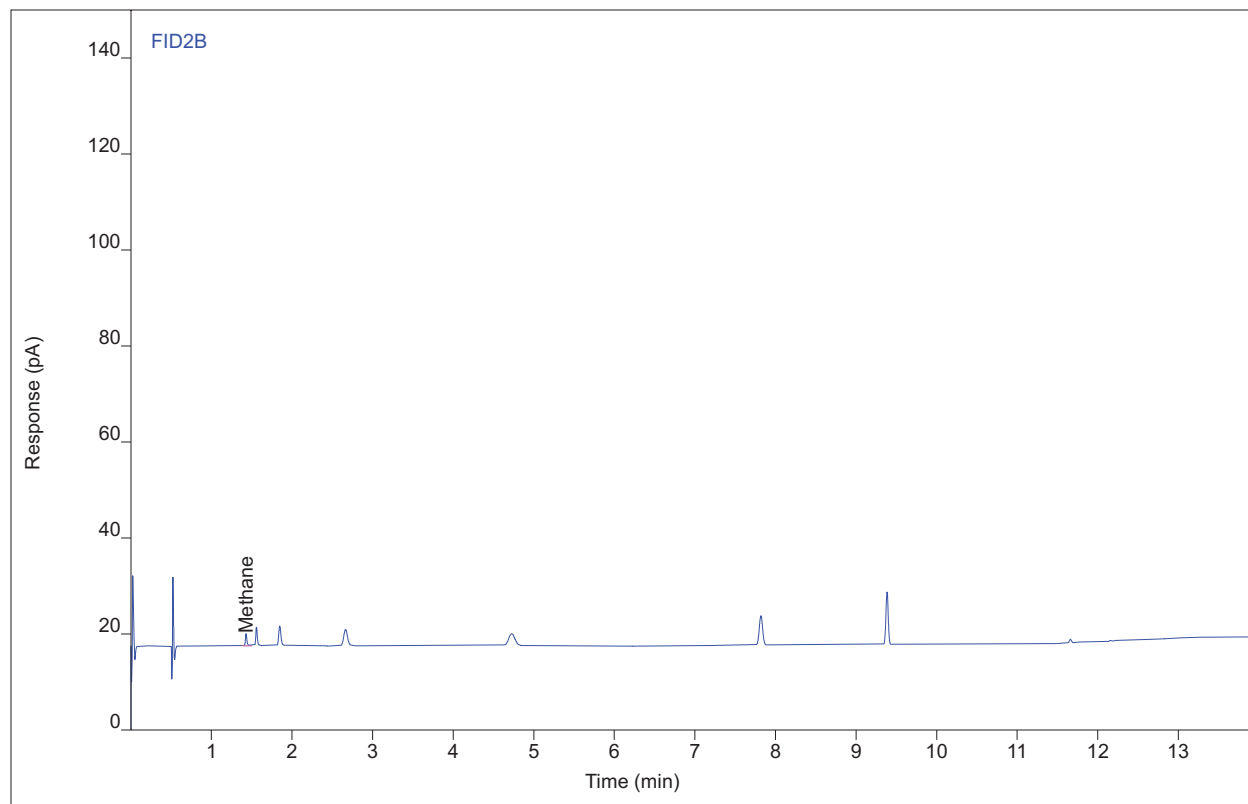
Compound	Type	RT	Area	Height	Amount	DF	SampAmt	Unit
Methane	BV	1.43	14.2313	11.6635	40.2189	1	40.2189	ppm

Chromatogram Report

Sample Name 0119-087.Run 1 SP.Bag
Sequence Name ROSIEP145 ver.1
Inj Data File 019B0301.D
File Location GC/2019/Rosie/Quarter 1
Injection Date 1/27/2019 3:43 PM
File Modified 1/28/2019 8:19 AM
Instrument Rosie
Operator Nicholas Traversa

Enthalpy Analytical

Sample Type Sample
Vial Number Vial 19
Injection Volume NA
Injection 1 of 3
Acquisition Method AQM_ROSIEP080.M
Analysis Method ROSIEP082_C1-C7.M
Method Modified 1/22/2019 5:22 AM
Printed 1/28/2019 8:25 AM



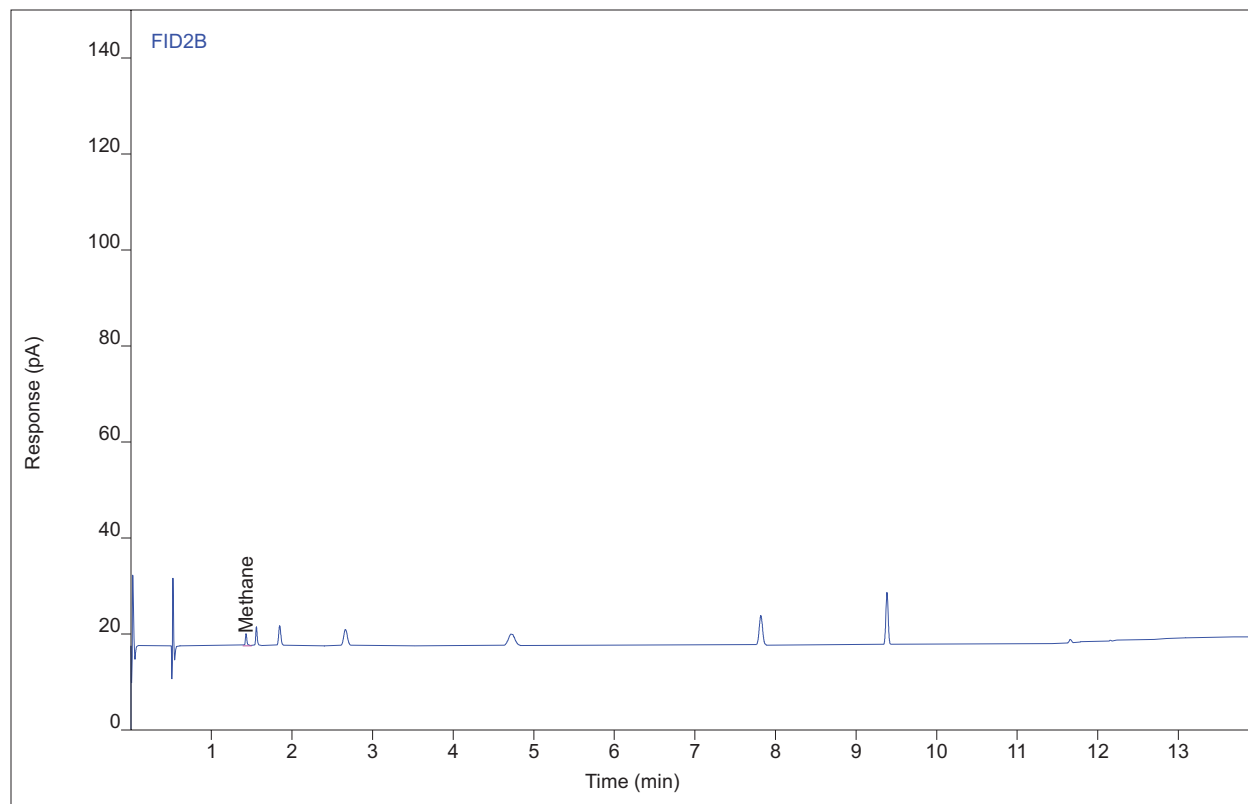
Compound	Type	RT	Area	Height	Amount	DF	SampAmt	Unit
Methane	MF	1.43	3.67199	2.64948	10.3670	1	10.3670	ppm

Chromatogram Report

Sample Name 0119-087.Run 1 SP.Bag
Sequence Name ROSIEP145 ver.1
Inj Data File 019B0302.D
File Location GC/2019/Rosie/Quarter 1
Injection Date 1/27/2019 4:05 PM
File Modified 1/28/2019 8:19 AM
Instrument Rosie
Operator Nicholas Traversa

Enthalpy Analytical

Sample Type Sample
Vial Number Vial 19
Injection Volume NA
Injection 2 of 3
Acquisition Method AQM_ROSIEP080.M
Analysis Method ROSIEP082_C1-C7.M
Method Modified 1/22/2019 5:22 AM
Printed 1/28/2019 8:25 AM



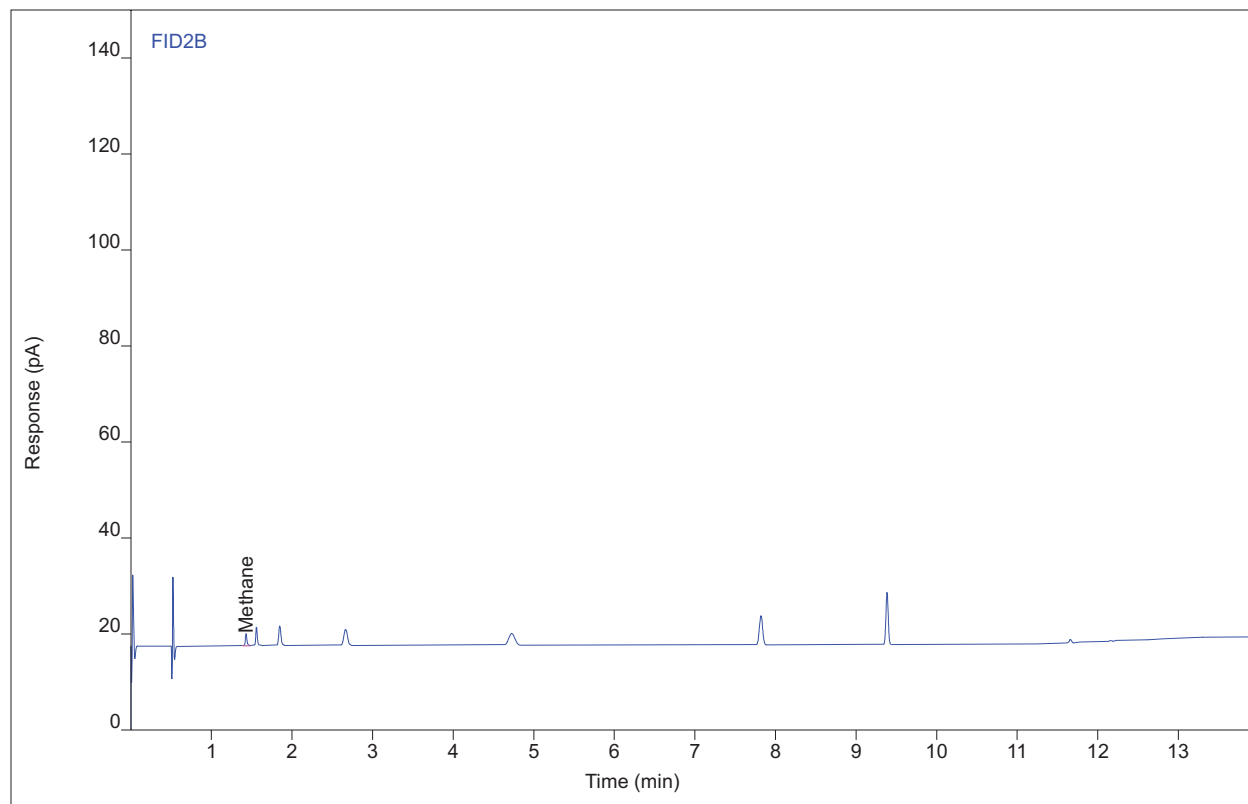
Compound	Type	RT	Area	Height	Amount	DF	SampAmt	Unit
Methane	MF	1.43	3.77406	2.66107	10.6555	1	10.6555	ppm

Chromatogram Report

Sample Name 0119-087.Run 1 SP.Bag
Sequence Name ROSIEP145 ver.1
Inj Data File 019B0303.D
File Location GC/2019/Rosie/Quarter 1
Injection Date 1/27/2019 4:26 PM
File Modified 1/28/2019 8:20 AM
Instrument Rosie
Operator Nicholas Traversa

Enthalpy Analytical

Sample Type Sample
Vial Number Vial 19
Injection Volume NA
Injection 3 of 3
Acquisition Method AQM_ROSIEP080.M
Analysis Method ROSIEP082_C1-C7.M
Method Modified 1/22/2019 5:22 AM
Printed 1/28/2019 8:25 AM



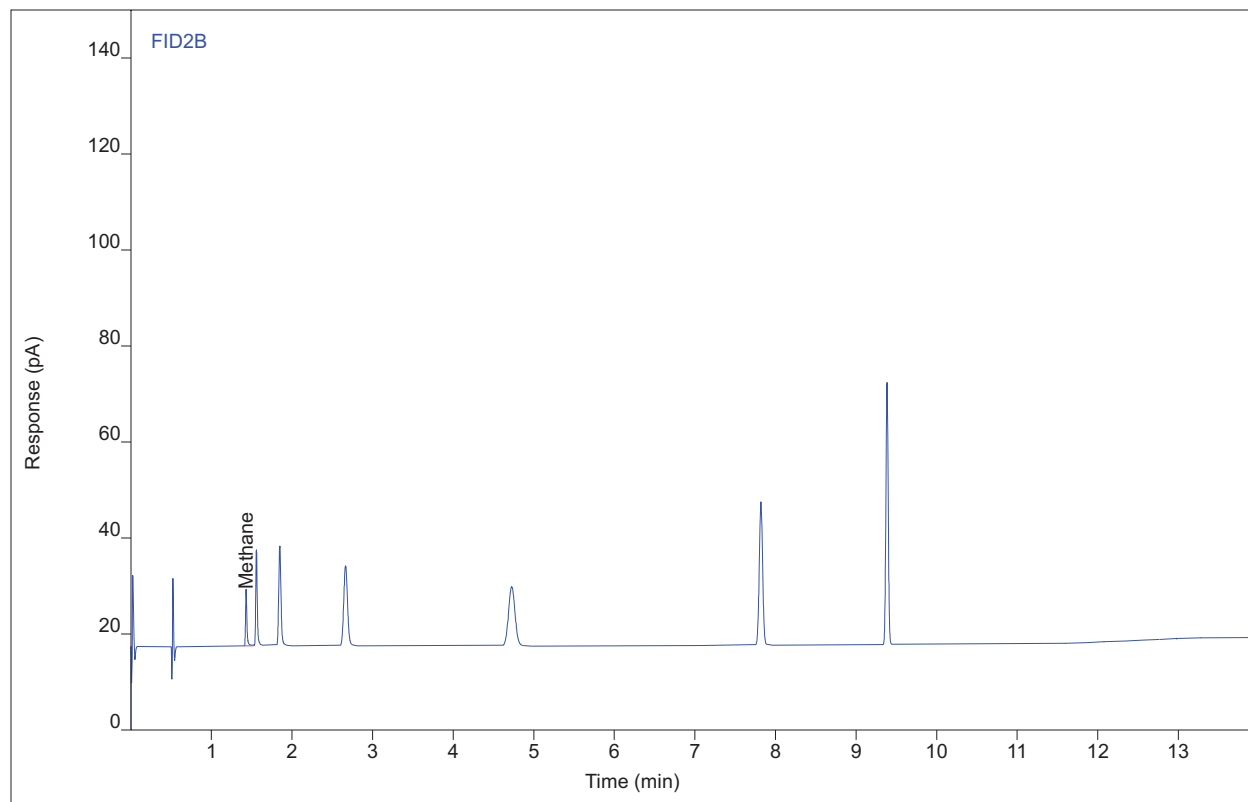
Compound	Type	RT	Area	Height	Amount	DF	SampAmt	Unit
Methane	MF	1.43	3.65428	2.64023	10.3169	1	10.3169	ppm

Chromatogram Report

Sample Name ROSIEP115 #C4 ENV(1=424,4=400)
Sequence Name ROSIEP145 ver.1
Inj Data File 026B0402.D
File Location GC/2019/Rosie/Quarter 1
Injection Date 1/27/2019 5:15 PM
File Modified 1/28/2019 8:20 AM
Instrument Rosie
Operator Nicholas Traversa

Enthalpy Analytical

Sample Type Calibration
Vial Number Vial 26
Injection Volume NA
Injection 2 of 4
Acquisition Method AQM_ROSIEP080.M
Analysis Method ROSIEP082_C1-C7.M
Method Modified 1/22/2019 5:22 AM
Printed 1/28/2019 8:25 AM



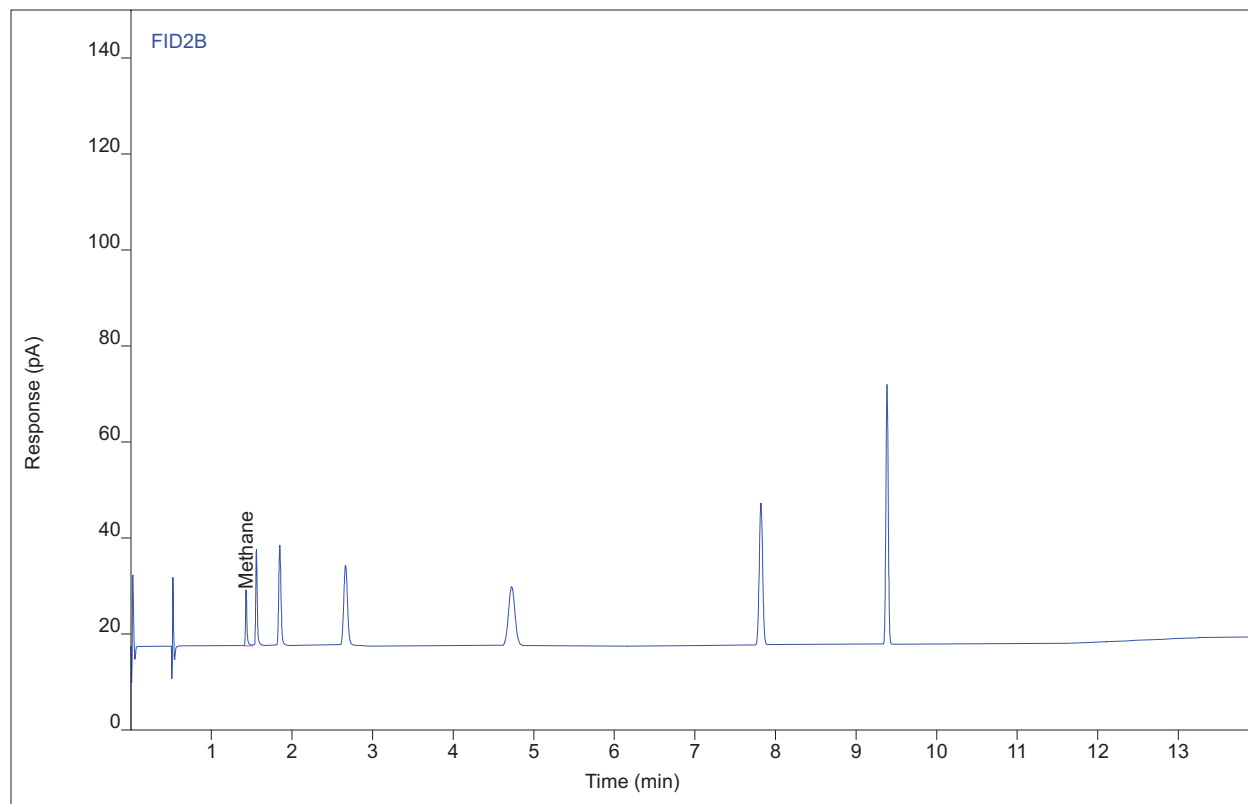
Compound	Type	RT	Area	Height	Amount	DF	SampAmt	Unit
Methane	BV	1.43	14.3706	11.6653	40.6128	1	40.6128	ppm

Chromatogram Report

Sample Name ROSIEP115 #C4 ENV(1=424,4=400)
Sequence Name ROSIEP145 ver.1
Inj Data File 026B0403.D
File Location GC/2019/Rosie/Quarter 1
Injection Date 1/27/2019 5:39 PM
File Modified 1/28/2019 8:20 AM
Instrument Rosie
Operator Nicholas Traversa

Enthalpy Analytical

Sample Type Calibration
Vial Number Vial 26
Injection Volume NA
Injection 3 of 4
Acquisition Method AQM_ROSIEP080.M
Analysis Method ROSIEP082_C1-C7.M
Method Modified 1/22/2019 5:22 AM
Printed 1/28/2019 8:25 AM



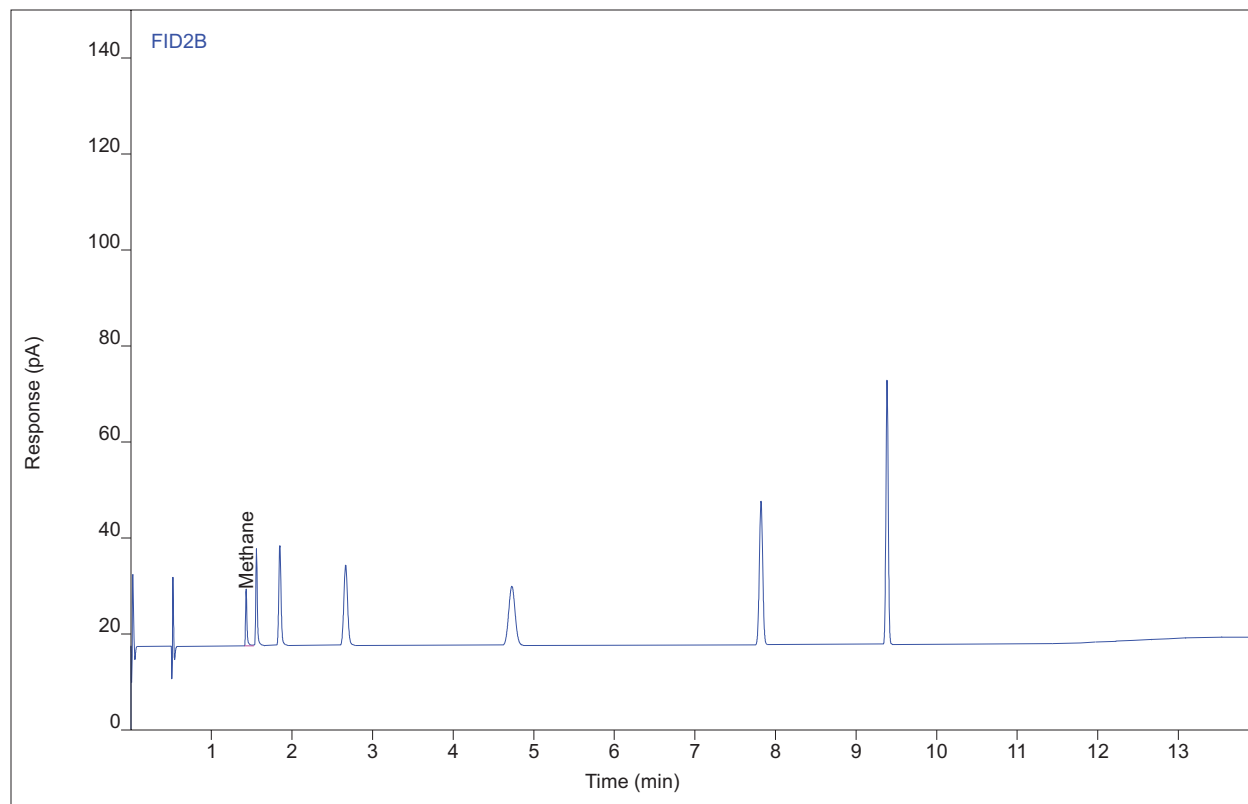
Compound	Type	RT	Area	Height	Amount	DF	SampAmt	Unit
Methane	BB	1.43	14.3778	11.6373	40.6330	1	40.6330	ppm

Chromatogram Report

Sample Name ROSIEP115 #C4 ENV(1=424,4=400)
Sequence Name ROSIEP145 ver.1
Inj Data File 026B0404.D
File Location GC/2019/Rosie/Quarter 1
Injection Date 1/27/2019 6:04 PM
File Modified 1/28/2019 8:20 AM
Instrument Rosie
Operator Nicholas Traversa

Enthalpy Analytical

Sample Type Calibration
Vial Number Vial 26
Injection Volume NA
Injection 4 of 4
Acquisition Method AQM_ROSIEP080.M
Analysis Method ROSIEP082_C1-C7.M
Method Modified 1/22/2019 5:22 AM
Printed 1/28/2019 8:25 AM



Compound	Type	RT	Area	Height	Amount	DF	SampAmt	Unit
Methane	BV	1.43	14.4553	11.7552	40.8520	1	40.8520	ppm

Enthalpy Analytical

Company: Air Control Techniques PC
Job No.: 0119-087 EPA Method 18 Tedlar Bag
Project No.: 2333 Enviva - GRE

ROSIEP082_C1-C7.M
Analysis Method Used:

Methane -- Calibration Standards

Sample ID	Filename #1	Filename #2	Filename #3	Ret Time (min)	Ret Time (min)	Ret Time (min)	%dif RT	Conc #1 (ppm)	Conc #2 (ppm)	Conc #3 (ppm)	%dif conc	Avg Conc (ppm)	Standard Tag	% Tag
ROSIEP115 #C4 ENV(1=424,4=400)	026B2102.D	026B2103.D	026B2104.D	1.43	1.43	1.43	0.0	40.7	40.4	40.3	0.6	40.5	40.0	101
He Blank #LB	017B1101.D	017B1102.D	017B1103.D	NA	NA	NA	NA	0.524	0.524	0.524	0.0	0.524	ND	
ROSIEP115 #C4 ENV(1=424,4=400)	026B1202.D	026B1203.D	026B1204.D	1.43	1.43	1.43	0.0	41.2	41.1	41.5	0.5	41.3	40.0	103
ROSIEP115 #C4 ENV(1=424,4=400)	026B0202.D	026B0203.D	026B0204.D	1.43	1.43	1.43	0.0	40.9	40.9	40.2	1.2	40.7	40.0	102
ROSIEP115 #C4 ENV(1=424,4=400)	026B0402.D	026B0403.D	026B0404.D	1.43	1.43	1.43	0.0	40.6	40.6	40.9	0.4	40.7	40.0	102

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Calibration Table

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Calib. Data Modified : Wednesday, November 14, 2018 8:02:51 AM

Rel. Reference Window : 1.000 %
 Abs. Reference Window : 0.000 min
 Rel. Non-ref. Window : 1.000 %
 Abs. Non-ref. Window : 0.000 min
 Uncalibrated Peaks : not reported
 Partial Calibration : Yes, identified peaks are recalibrated
 Correct All Ret. Times: No, only for identified peaks

Curve Type : Linear
 Origin : Connected
 Weight : Quadratic (Amnt)

Recalibration Settings:
 Average Response : Average all calibrations
 Average Retention Time: Floating Average New 75%

Calibration Report Options :
 Printout of recalibrations within a sequence:
 Calibration Table after Recalibration
 Normal Report after Recalibration
 If the sequence is done with bracketing:
 Results of first cycle (ending previous bracket)

Signal 1: FID2 B,

RetTime [min]	Lvl Sig	Amount [ppm]	Area	Amt/Area	Ref Grp Name
1.430	1 2	5.00000	1.75817	2.84387	Methane
	3	20.00000	7.22710	2.76736	
	4	40.00000	14.61188	2.73750	
	5	100.00000	34.98189	2.85862	
	6	5561.00000	1987.41703	2.79810	
	7	4.99200e4	1.68861e4	2.95628	
1.558	1 2	5.00000	3.42997	1.45774	Ethane
	3	20.00000	14.01885	1.42665	
	4	40.00000	28.24833	1.41601	
	5	100.00000	66.51178	1.50349	
	6	5564.00000	3908.44775	1.42358	
	7	4.99500e4	3.28573e4	1.52021	
1.848	1 2	5.00000	5.36286	9.32338e-1	Propane
	3	20.00000	21.25991	9.40738e-1	
	4	40.00000	42.96450	9.31001e-1	
	5	100.00000	100.36798	9.96334e-1	
	6	5566.00000	5815.71908	9.57061e-1	
	7	4.99700e4	4.95481e4	1.00851	
2.665	1 2	5.00000	7.15856	6.98465e-1	Butane
	3	20.00000	28.37661	7.04806e-1	
	4	40.00000	56.87943	7.03242e-1	
	5	100.00000	133.08791	7.51383e-1	
	6	1113.00000	1573.80908	7.07201e-1	
	7	9991.00000	1.33395e4	7.48977e-1	
4.729	1 2	5.00000	9.28642	5.38420e-1	Pentane
	3	20.00000	36.48395	5.48186e-1	
	4	40.00000	73.19273	5.46502e-1	
	5	100.00000	170.43754	5.86725e-1	

RetTime [min]	Lvl Sig	Amount [ppm]	Area	Amt/Area	Ref Grp Name
----- --- --- ----- ----- ----- --- --- -----					
		6 556.00000	1000.59776	5.55668e-1	
		7 4995.00000	8457.50391	5.90600e-1	
7.822	1	2 5.00000	11.42911	4.37479e-1	Hexane
		3 20.00000	45.69358	4.37698e-1	
		4 40.00000	91.82283	4.35622e-1	
		5 100.00000	212.44948	4.70700e-1	
		6 446.00000	1008.85931	4.42083e-1	
		7 4001.00000	8344.50651	4.79477e-1	
9.386	1	2 5.00000	15.56155	3.21305e-1	Heptane
		3 20.00000	61.72245	3.24031e-1	
		4 40.00000	122.89329	3.25486e-1	
		5 100.00000	280.55623	3.56435e-1	

More compound-specific settings:

Compound: Methane

Time Window : From 1.409 min To 1.449 min

Compound: Ethane

Time Window : From 1.520 min To 1.580 min

Compound: Propane

Time Window : From 1.790 min To 1.900 min

Compound: Butane

Time Window : From 2.619 min To 2.679 min

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Peak Sum Table

=====

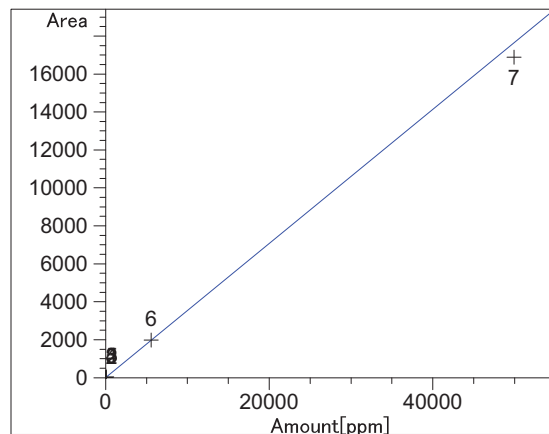
Name	StartTime [min]	EndTime [min]	Use Reference	Response factor	Multiplier	ISTD Peak
----- ----- ----- ----- ----- ----- -----						
as Ethane	2.000	2.265	None	1.4937	1.4937	None
as Propane	2.265	2.839	None	9.8901e-1	0.9890	None
as Butane	2.839	4.332	None	7.3667e-1	0.7367	None
as Pentane	4.332	6.736	None	5.6498e-1	0.5650	None
as Hexane	6.736	8.796	None	4.2535e-1	0.4253	None
as Heptane	8.796	14.000	None	2.7188e-1	0.2719	None

=====

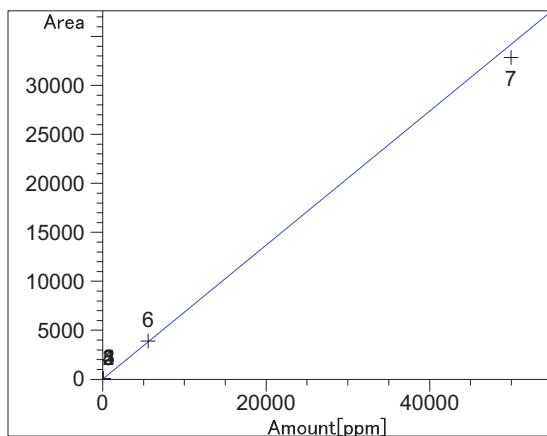
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Calibration Curves

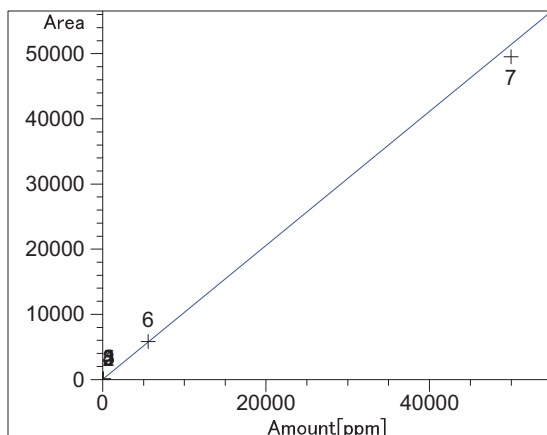
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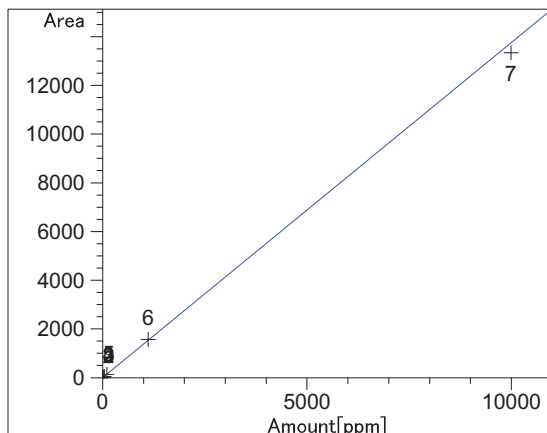
Methane at exp. RT: 1.430
 FID2 B,
 Correlation: 0.99955
 Residual Std. Dev.: 386.02480
 Formula: $y = mx + b$
 m: 3.53723e-1
 b: 4.95789e-3
 x: Amount
 y: Area
 Calibration Level Weights:
 Level 2 : 1
 Level 3 : 0.0625
 Level 4 : 0.015625
 Level 5 : 0.0025
 Level 6 : 8.08415e-007
 Level 7 : 1.00321e-008



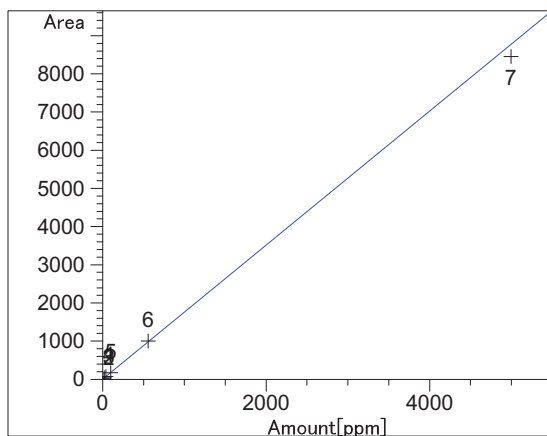
Ethane at exp. RT: 1.558
FID2 B,
Correlation: 0.99946
Residual Std. Dev.: 679.43864
Formula: $y = mx + b$
m: 6.84938e-1
b: 3.11796e-2
x: Amount
y: Area
Calibration Level Weights:
Level 2 : 1
Level 3 : 0.0625
Level 4 : 0.015625
Level 5 : 0.0025
Level 6 : 8.07543e-007
Level 7 : 1.002e-008



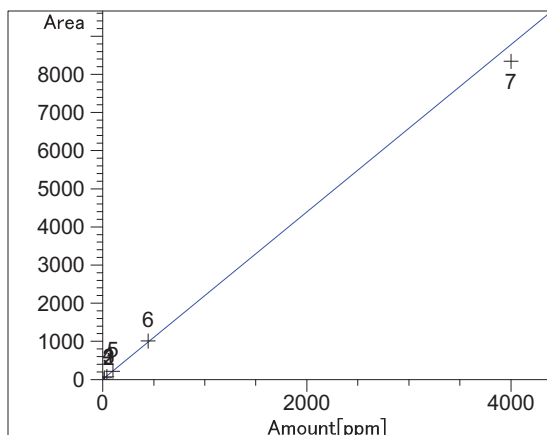
Propane at exp. RT: 1.848
FID2 B,
Correlation: 0.99949
Residual Std. Dev.: 944.41574
Formula: $y = mx + b$
m: 1.02931
b: 2.59154e-1
x: Amount
y: Area
Calibration Level Weights:
Level 2 : 1
Level 3 : 0.0625
Level 4 : 0.015625
Level 5 : 0.0025
Level 6 : 8.06963e-007
Level 7 : 1.0012e-008



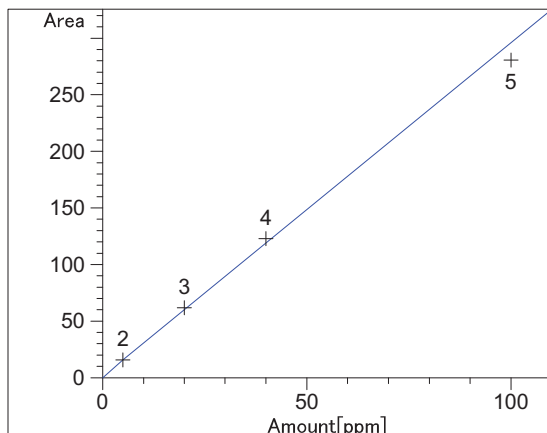
Butane at exp. RT: 2.665
FID2 B,
Correlation: 0.99951
Residual Std. Dev.: 209.93292
Formula: $y = mx + b$
m: 1.37694
b: 3.17925e-1
x: Amount
y: Area
Calibration Level Weights:
Level 2 : 1
Level 3 : 0.0625
Level 4 : 0.015625
Level 5 : 0.0025
Level 6 : 0.00002
Level 7 : 2.50451e-007



Pentane at exp. RT: 4.729
FID2 B,
Correlation: 0.99943
Residual Std. Dev.: 161.31053
Formula: $y = mx + b$
m: 1.75749
b: 5.69840e-1
x: Amount
y: Area
Calibration Level Weights:
Level 2 : 1
Level 3 : 0.0625
Level 4 : 0.015625
Level 5 : 0.0025
Level 6 : 0.000081
Level 7 : 1.002e-006



Hexane at exp. RT: 7.822
FID2 B,
Correlation: 0.99914
Residual Std. Dev.: 221.94403
Formula: $y = mx + b$
m: 2.19615
b: 5.60918e-1
x: Amount
y: Area
Calibration Level Weights:
Level 2 : 1
Level 3 : 0.0625
Level 4 : 0.015625
Level 5 : 0.0025
Level 6 : 0.000126
Level 7 : 1.56172e-006



Heptane at exp. RT: 9.386
FID2 B,
Correlation: 0.99887
Residual Std. Dev.: 11.48665
Formula: $y = mx + b$
m: 2.95319
b: 9.24731e-1
x: Amount
y: Area
Calibration Level Weights:
Level 2 : 1
Level 3 : 0.0625
Level 4 : 0.015625
Level 5 : 0.0025

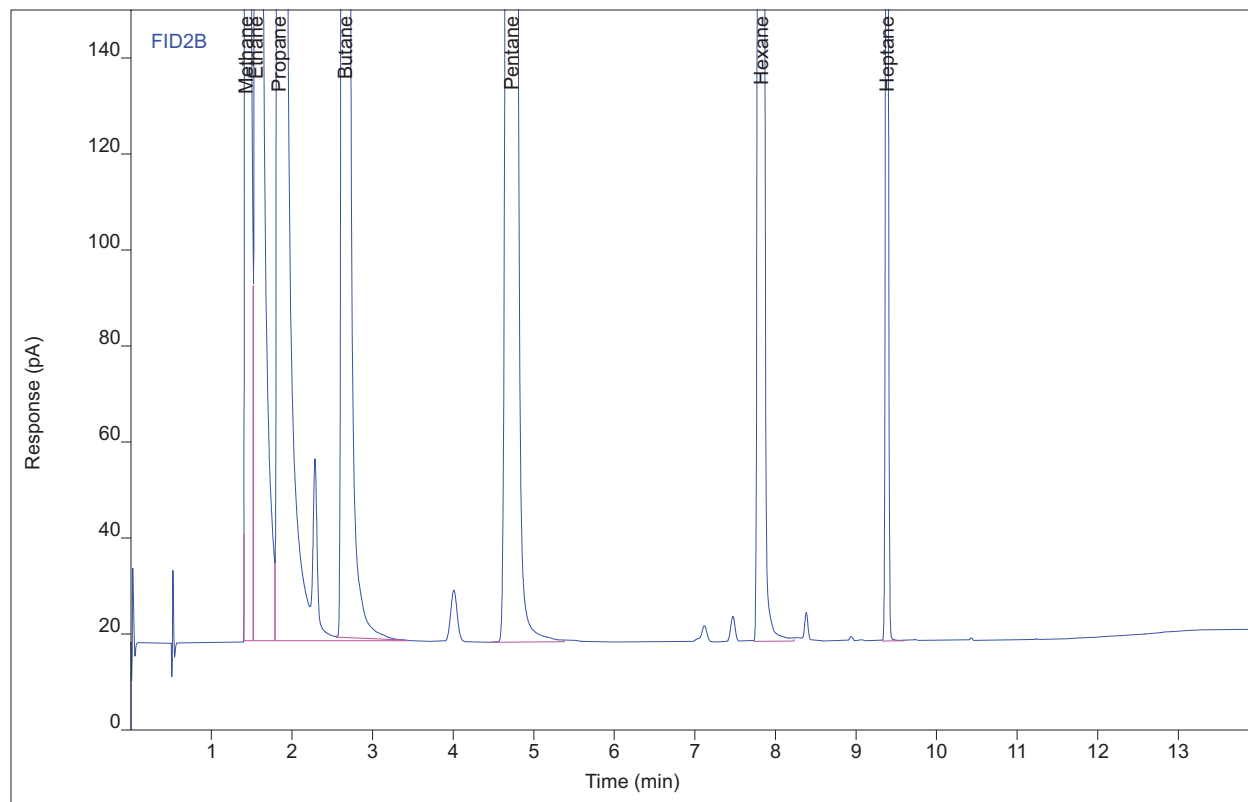
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Chromatogram Report

Enthalpy Analytical

Sample Name ROSIEP082 #C7 ENV(1=0,6=438.21)
Sequence Name ROSIEP082A ver.2
Inj Data File 026B0102.D
File Location GC/2018/Rosie/Quarter 1
Injection Date 11/12/2018 9:41 AM
File Modified 11/27/2018 10:47 AM
Instrument
Operator Jennie Parrish

Sample Type
Vial Number Vial 26
Injection Volume NA
Injection 2 of 4
Acquisition Method AQM_ROSIEP080.M
Analysis Method ROSIEP082_C1-C7.M
Method Modified 11/14/2018 8:03 AM
Printed 11/27/2018 11:01 AM



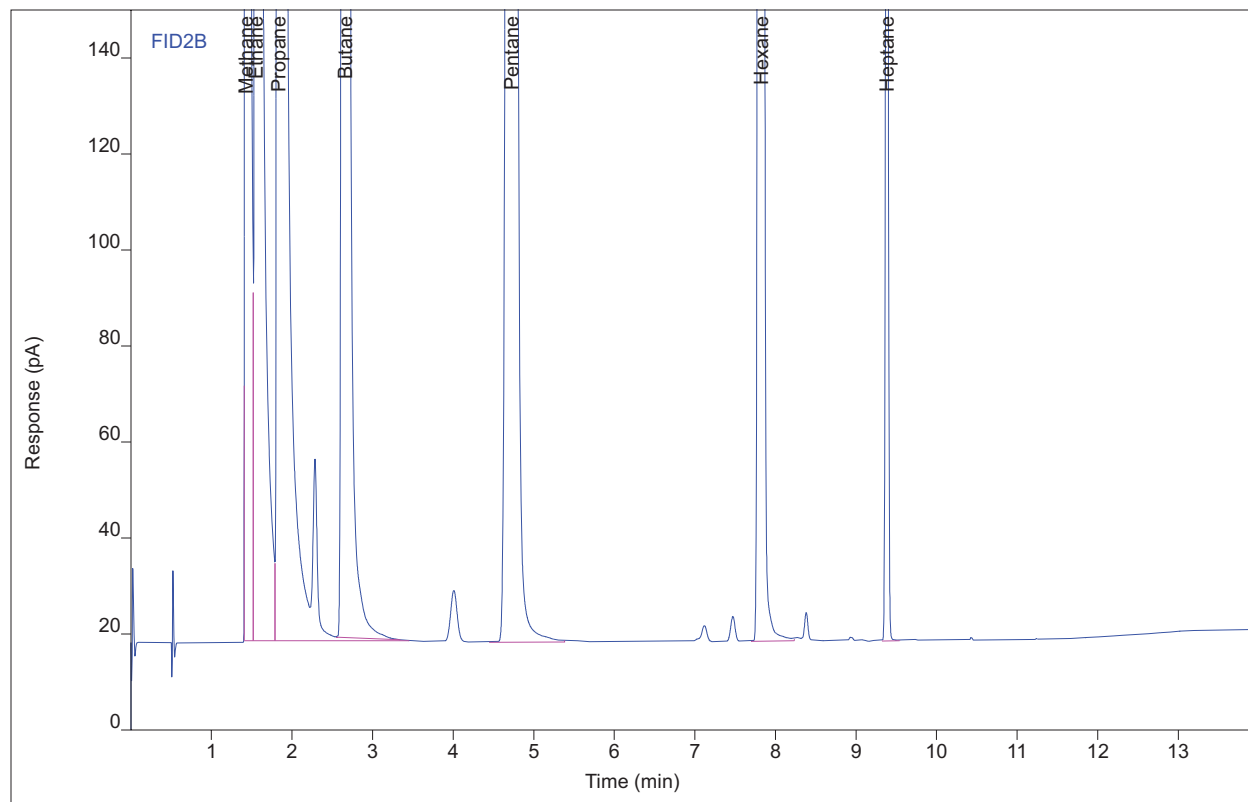
Compound	Type	RT	Area	Height	Amount	DF	SampAmt	Unit
Methane	BV S	1.43	16896.3	13737.3	47767.0	1	47767.0	ppm
Ethane	VV S	1.55	32872.8	23382.5	47993.8	1	47993.8	ppm
Propane	VB S	1.83	49570.3	23443.4	48158.4	1	48158.4	ppm
Butane	BB T	2.66	13348.3	3940.06	9693.95	1	9693.95	ppm
Pentane	VB	4.72	8462.03	1473.14	4814.51	1	4814.51	ppm
Hexane	BV	7.82	8350.11	2796.23	3801.90	1	3801.90	ppm
Heptane	VB	9.38	671.570	330.259	227.091	1	227.091	ppm

Chromatogram Report

Enthalpy Analytical

Sample Name ROSIEP082 #C7 ENV(1=0,6=438.21)
 Sequence Name ROSIEP082A ver.2
 Inj Data File 026B0103.D
 File Location GC/2018/Rosie/Quarter 1
 Injection Date 11/12/2018 10:05 AM
 File Modified 11/27/2018 10:48 AM
 Instrument
 Operator Jennie Parrish

Sample Type
 Vial Number Vial 26
 Injection Volume NA
 Injection 3 of 4
 Acquisition Method AQM_ROSIEP080.M
 Analysis Method ROSIEP082_C1-C7.M
 Method Modified 11/14/2018 8:03 AM
 Printed 11/27/2018 11:01 AM



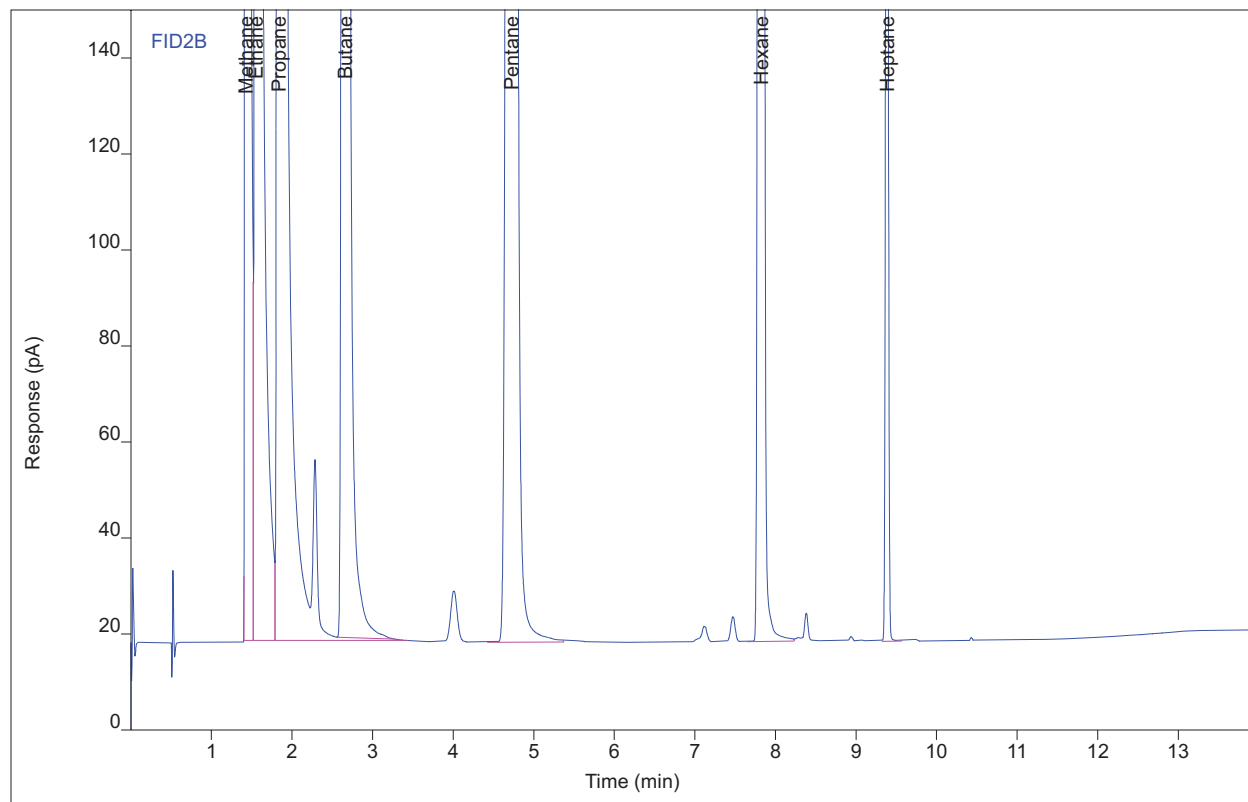
Compound	Type	RT	Area	Height	Amount	DF	SampAmt	Unit
Methane	BV S	1.43	16860.5	13637.1	47665.8	1	47665.8	ppm
Ethane	VV S	1.55	32810.9	23185.9	47903.4	1	47903.4	ppm
Propane	VB S	1.83	49482.9	23628.5	48073.5	1	48073.5	ppm
Butane	BB T	2.66	13322.0	3929.24	9674.79	1	9674.79	ppm
Pentane	VB	4.72	8446.69	1464.59	4805.77	1	4805.77	ppm
Hexane	BV	7.82	8333.25	2809.08	3794.22	1	3794.22	ppm
Heptane	VB	9.38	669.165	328.779	226.277	1	226.277	ppm

Chromatogram Report

Enthalpy Analytical

Sample Name ROSIEP082 #C7 ENV(1=0,6=438.21)
Sequence Name ROSIEP082A ver.2
Inj Data File 026B0104.D
File Location GC/2018/Rosie/Quarter 1
Injection Date 11/12/2018 10:30 AM
File Modified 11/27/2018 10:48 AM
Instrument
Operator Jennie Parrish

Sample Type
Vial Number Vial 26
Injection Volume NA
Injection 4 of 4
Acquisition Method AQM_ROSIEP080.M
Analysis Method ROSIEP082_C1-C7.M
Method Modified 11/14/2018 8:03 AM
Printed 11/27/2018 11:01 AM



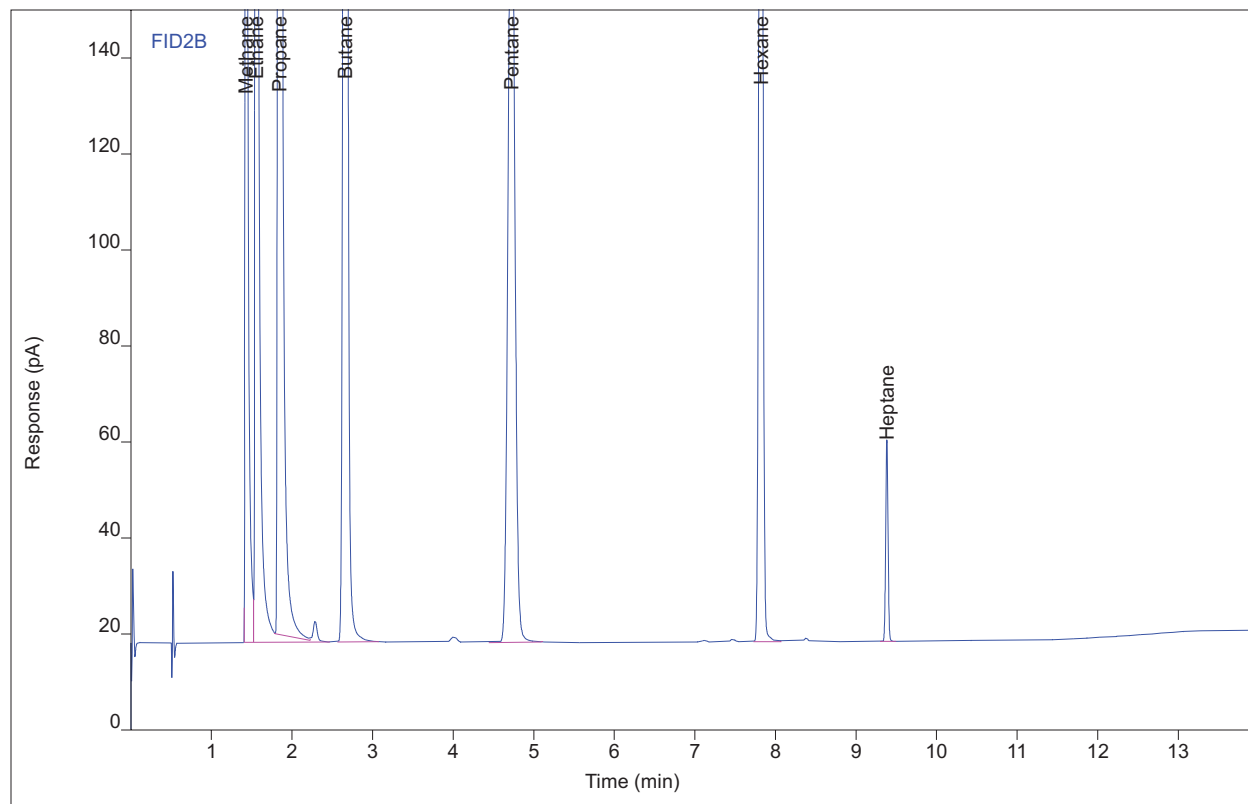
Compound	Type	RT	Area	Height	Amount	DF	SampAmt	Unit
Methane	BV S	1.43	16901.4	13729.4	47781.6	1	47781.6	ppm
Ethane	VV S	1.55	32888.2	23413.4	48016.2	1	48016.2	ppm
Propane	VB S	1.83	49591.2	23498.8	48178.7	1	48178.7	ppm
Butane	BB T	2.66	13348.3	3942.26	9693.91	1	9693.91	ppm
Pentane	VB	4.72	8463.79	1471.57	4815.51	1	4815.51	ppm
Hexane	BV	7.82	8350.16	2796.48	3801.92	1	3801.92	ppm
Heptane	VB	9.38	670.864	330.563	226.853	1	226.853	ppm

Chromatogram Report

Enthalpy Analytical

Sample Name ROSIEP082 #C6 ENV(1=1700.23,6=365.09)
Sequence Name ROSIEP082A ver.2
Inj Data File 026B0202.D
File Location GC/2018/Rosie/Quarter 1
Injection Date 11/12/2018 11:19 AM
File Modified 11/27/2018 10:48 AM
Instrument
Operator Jennie Parrish

Sample Type
Vial Number
Injection Volume
Injection
Acquisition Method AQM_ROSIEP080.M
Analysis Method ROSIEP082_C1-C7.M
Method Modified 11/14/2018 8:03 AM
Printed 11/27/2018 11:01 AM



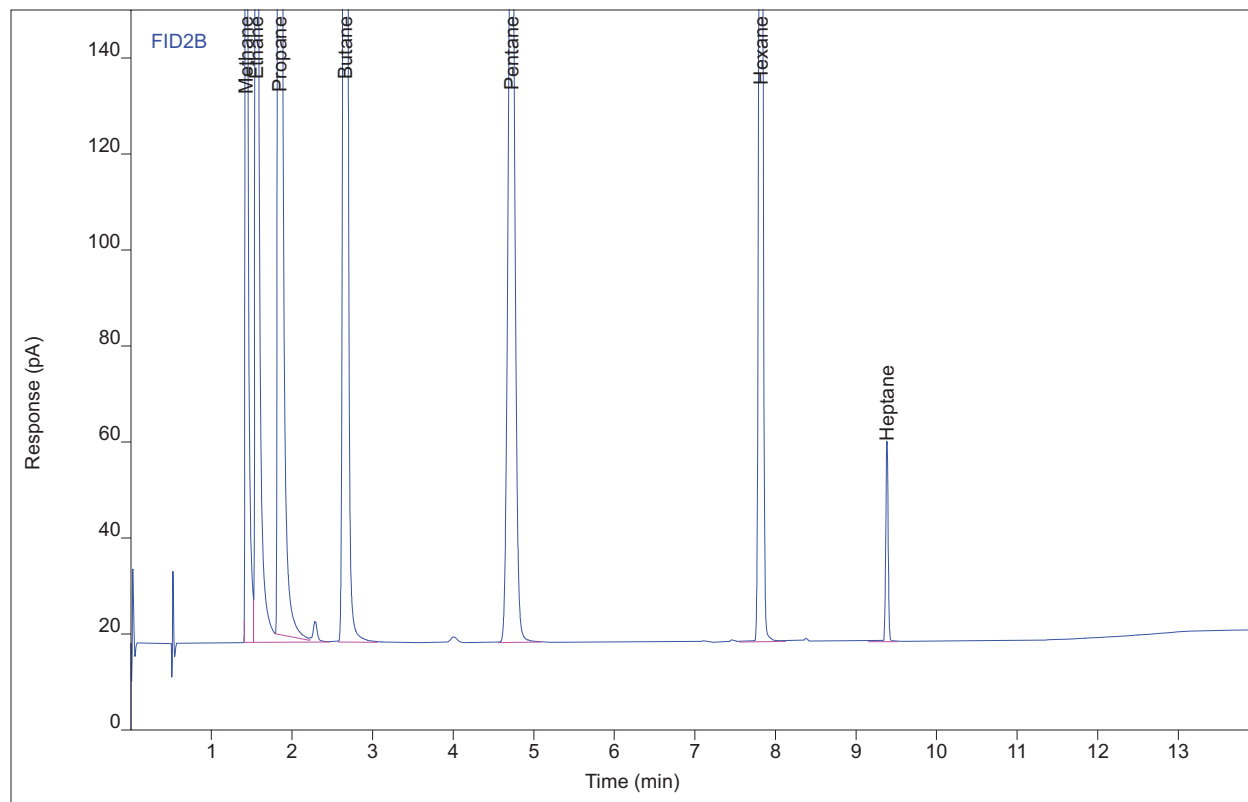
Compound	Type	RT	Area	Height	Amount	DF	SampAmt	Unit
Methane	BV	1.43	1986.70	1641.12	5616.53	1	5616.53	ppm
Ethane	VB S	1.56	3906.93	2795.13	5704.02	1	5704.02	ppm
Propane	BV T	1.84	5813.57	2903.62	5647.76	1	5647.76	ppm
Butane	BB	2.66	1572.34	470.117	1141.68	1	1141.68	ppm
Pentane	BB	4.72	999.712	175.216	568.504	1	568.504	ppm
Hexane	BV	7.82	1009.66	337.920	459.486	1	459.486	ppm
Heptane	VB	9.38	85.0527	41.8904	28.4871	1	28.4871	ppm

Chromatogram Report

Enthalpy Analytical

Sample Name ROSIEP082 #C6 ENV(1=1700.23,6=365.09)
Sequence Name ROSIEP082A ver.2
Inj Data File 026B0203.D
File Location GC/2018/Rosie/Quarter 1
Injection Date 11/12/2018 11:44 AM
File Modified 11/27/2018 10:48 AM
Instrument
Operator Jennie Parrish

Sample Type
Vial Number
Injection Volume
Injection
Acquisition Method AQM_ROSIEP080.M
Analysis Method ROSIEP082_C1-C7.M
Method Modified 11/14/2018 8:03 AM
Printed 11/27/2018 11:01 AM



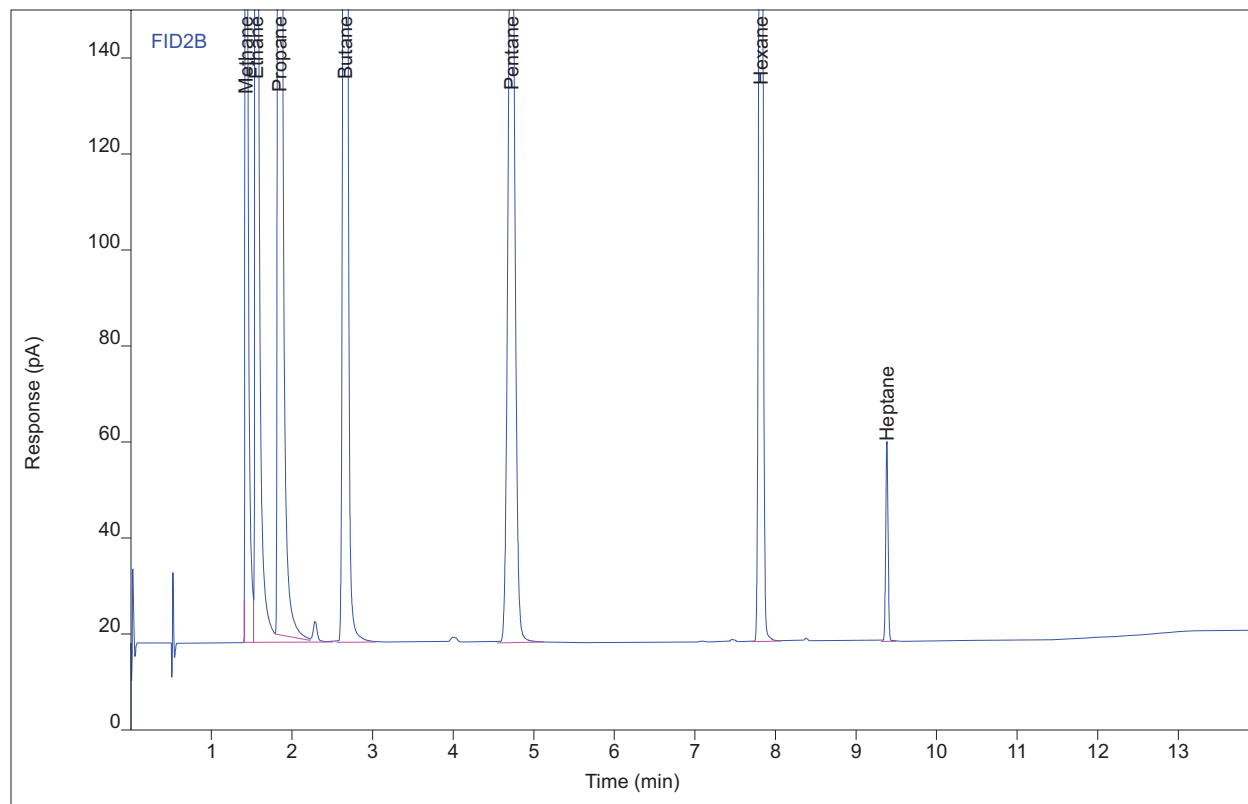
Compound	Type	RT	Area	Height	Amount	DF	SampAmt	Unit
Methane	BV	1.43	1986.79	1641.43	5616.77	1	5616.77	ppm
Ethane	VB S	1.56	3905.69	2792.95	5702.21	1	5702.21	ppm
Propane	BV T	1.84	5812.54	2905.82	5646.77	1	5646.77	ppm
Butane	BB	2.66	1573.61	470.257	1142.60	1	1142.60	ppm
Pentane	BB	4.72	999.995	175.533	568.665	1	568.665	ppm
Hexane	VB	7.82	1007.94	339.865	458.700	1	458.700	ppm
Heptane	VB	9.38	85.6645	41.7210	28.6943	1	28.6943	ppm

Chromatogram Report

Enthalpy Analytical

Sample Name ROSIEP082 #C6 ENV(1=1700.23,6=365.09)
Sequence Name ROSIEP082A ver.2
Inj Data File 026B0204.D
File Location GC/2018/Rosie/Quarter 1
Injection Date 11/12/2018 12:08 PM
File Modified 11/27/2018 10:48 AM
Instrument
Operator Jennie Parrish

Sample Type
Vial Number
Injection Volume
Injection
Acquisition Method AQM_ROSIEP080.M
Analysis Method ROSIEP082_C1-C7.M
Method Modified 11/14/2018 8:03 AM
Printed 11/27/2018 11:01 AM



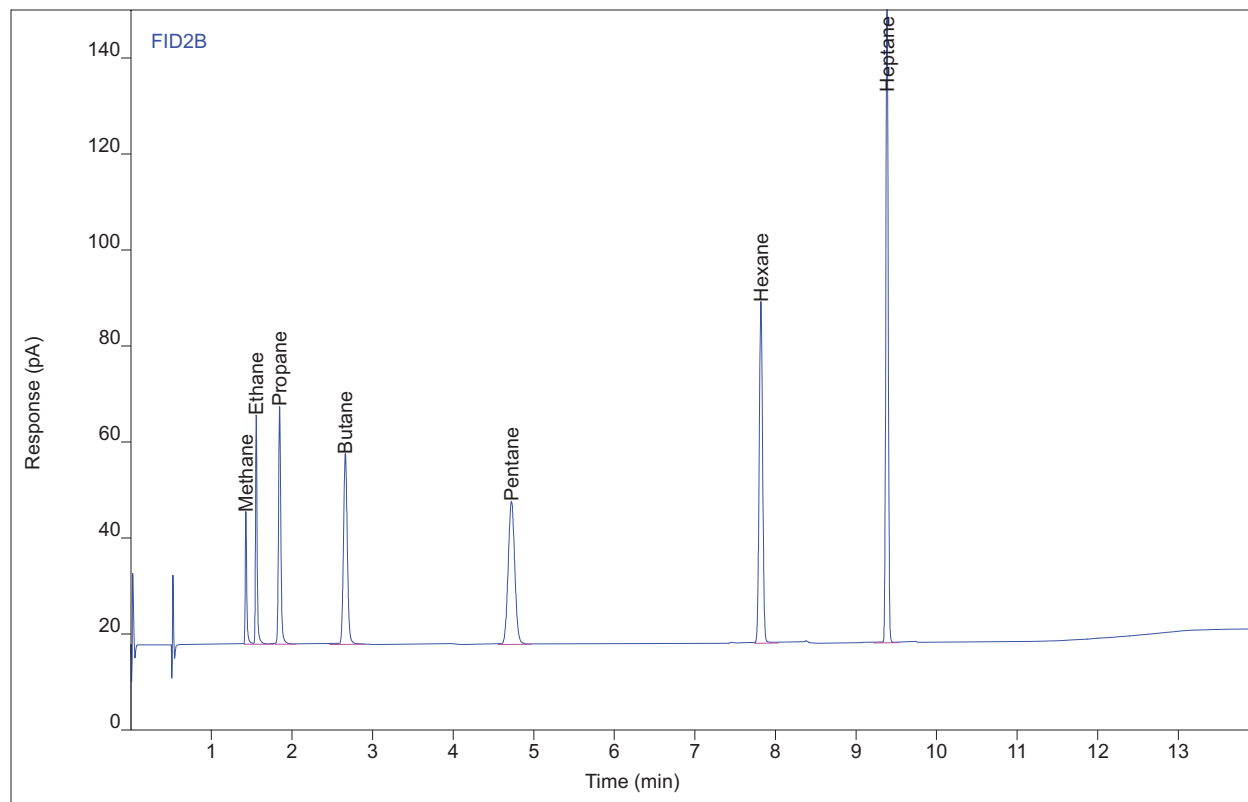
Compound	Type	RT	Area	Height	Amount	DF	SampAmt	Unit
Methane	BV	1.43	1988.76	1642.79	5622.36	1	5622.36	ppm
Ethane	VB S	1.56	3912.72	2798.13	5712.47	1	5712.47	ppm
Propane	BV T	1.84	5821.05	2906.87	5655.03	1	5655.03	ppm
Butane	BV	2.66	1575.47	471.001	1143.95	1	1143.95	ppm
Pentane	VB	4.72	1002.09	175.648	569.855	1	569.855	ppm
Hexane	VB	7.82	1008.98	341.100	459.174	1	459.174	ppm
Heptane	VB	9.38	84.9782	41.7746	28.4619	1	28.4619	ppm

Chromatogram Report

Enthalpy Analytical

Sample Name ROSIEP082 #C5 ENV(1=0,4=400)
Sequence Name ROSIEP082 ver.2
Inj Data File 026B0202.D
File Location GC/2018/Rosie/Quarter 1
Injection Date 11/10/2018 1:33 AM
File Modified 11/27/2018 10:42 AM
Instrument Rosie
Operator Jennie Parrish

Sample Type
Vial Number
Injection Volume
Injection
Acquisition Method
Analysis Method
Method Modified
Printed
Calibration
Vial 26
NA
2 of 4
AQM_ROSIEP080.M
ROSIEP082_C1-C7.M
11/14/2018 8:03 AM
12/13/2018 1:02 PM



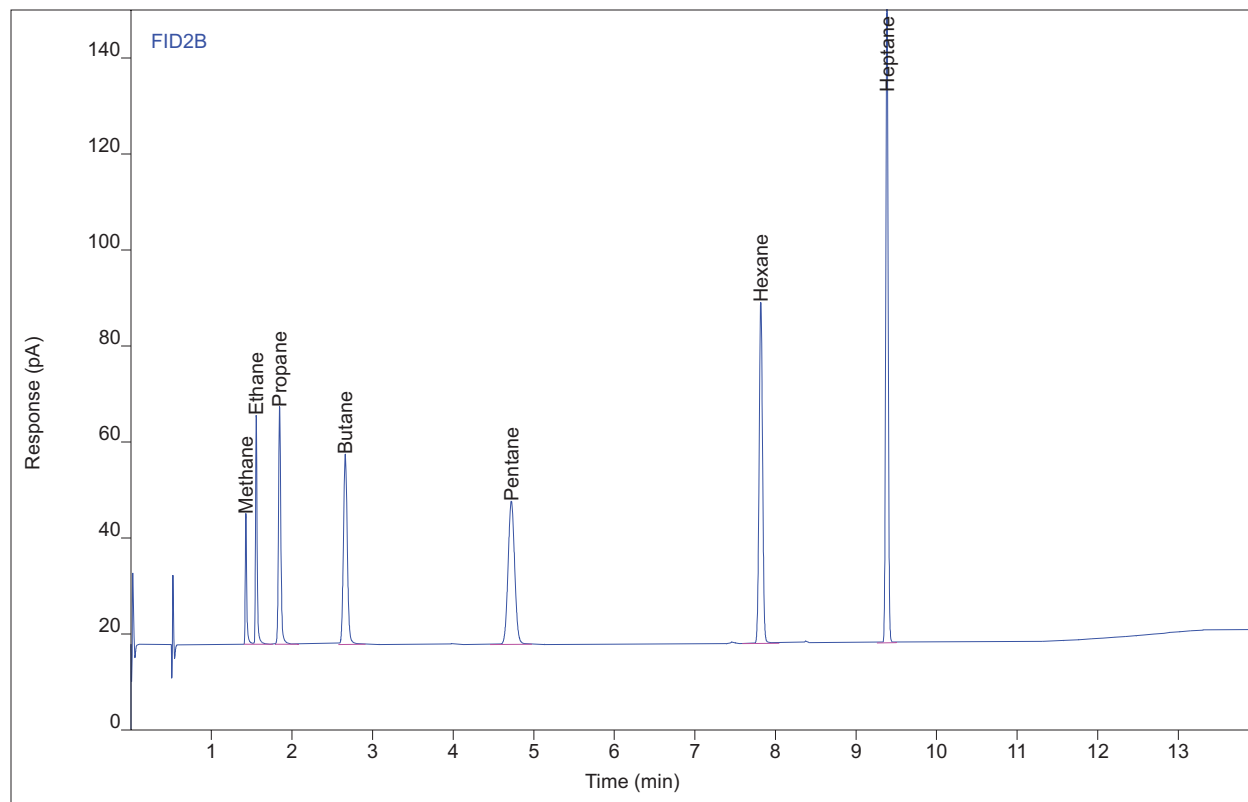
Compound	Type	RT	Area	Height	Amount	DF	SampAmt	Unit
Methane	BV	1.43	35.4224	27.4133	100.128	1	100.128	ppm
Ethane	VB	1.56	66.6021	47.4095	97.1927	1	97.1927	ppm
Propane	BB	1.85	100.182	49.4171	97.0772	1	97.0772	ppm
Butane	VB	2.66	132.998	39.7009	96.3584	1	96.3584	ppm
Pentane	BB	4.72	169.873	29.8588	96.3321	1	96.3321	ppm
Hexane	BB	7.82	212.464	71.2231	96.4880	1	96.4880	ppm
Heptane	BB	9.38	280.859	137.683	94.7904	1	94.7904	ppm

Chromatogram Report

Enthalpy Analytical

Sample Name ROSIEP082 #C5 ENV(1=0,4=400)
Sequence Name ROSIEP082 ver.2
Inj Data File 026B0203.D
File Location GC/2018/Rosie/Quarter 1
Injection Date 11/10/2018 1:58 AM
File Modified 11/27/2018 10:43 AM
Instrument Rosie
Operator Jennie Parrish

Sample Type
Vial Number
Injection Volume
Injection
Acquisition Method AQM_ROSIEP080.M
Analysis Method ROSIEP082_C1-C7.M
Method Modified 11/14/2018 8:03 AM
Printed 12/13/2018 1:02 PM



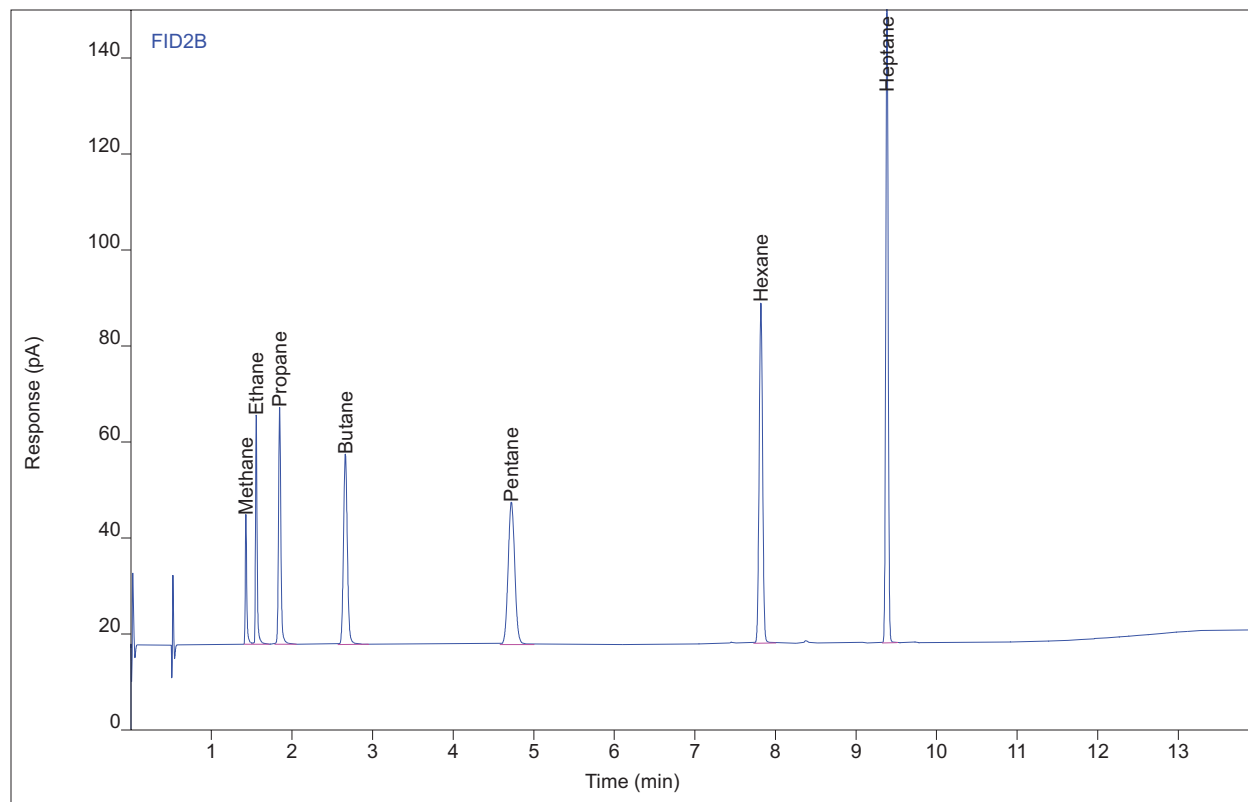
Compound	Type	RT	Area	Height	Amount	DF	SampAmt	Unit
Methane	BV	1.43	35.0460	27.0188	99.0634	1	99.0634	ppm
Ethane	VB	1.56	66.6993	47.4974	97.3345	1	97.3345	ppm
Propane	BV	1.85	100.737	49.4290	97.6164	1	97.6164	ppm
Butane	BB	2.66	133.041	39.6367	96.3897	1	96.3897	ppm
Pentane	VB	4.72	170.360	29.8895	96.6090	1	96.6090	ppm
Hexane	VB	7.82	212.638	71.0156	96.5675	1	96.5675	ppm
Heptane	VB	9.38	280.847	137.798	94.7863	1	94.7863	ppm

Chromatogram Report

Enthalpy Analytical

Sample Name ROSIEP082 #C5 ENV(1=0,4=400)
Sequence Name ROSIEP082 ver.2
Inj Data File 026B0204.D
File Location GC/2018/Rosie/Quarter 1
Injection Date 11/10/2018 2:22 AM
File Modified 11/27/2018 10:43 AM
Instrument Rosie
Operator Jennie Parrish

Sample Type
Vial Number
Injection Volume
Injection
Acquisition Method
Analysis Method
Method Modified
Printed
Calibration
Vial 26
NA
4 of 4
AQM_ROSIEP080.M
ROSIEP082_C1-C7.M
11/14/2018 8:03 AM
12/13/2018 1:02 PM



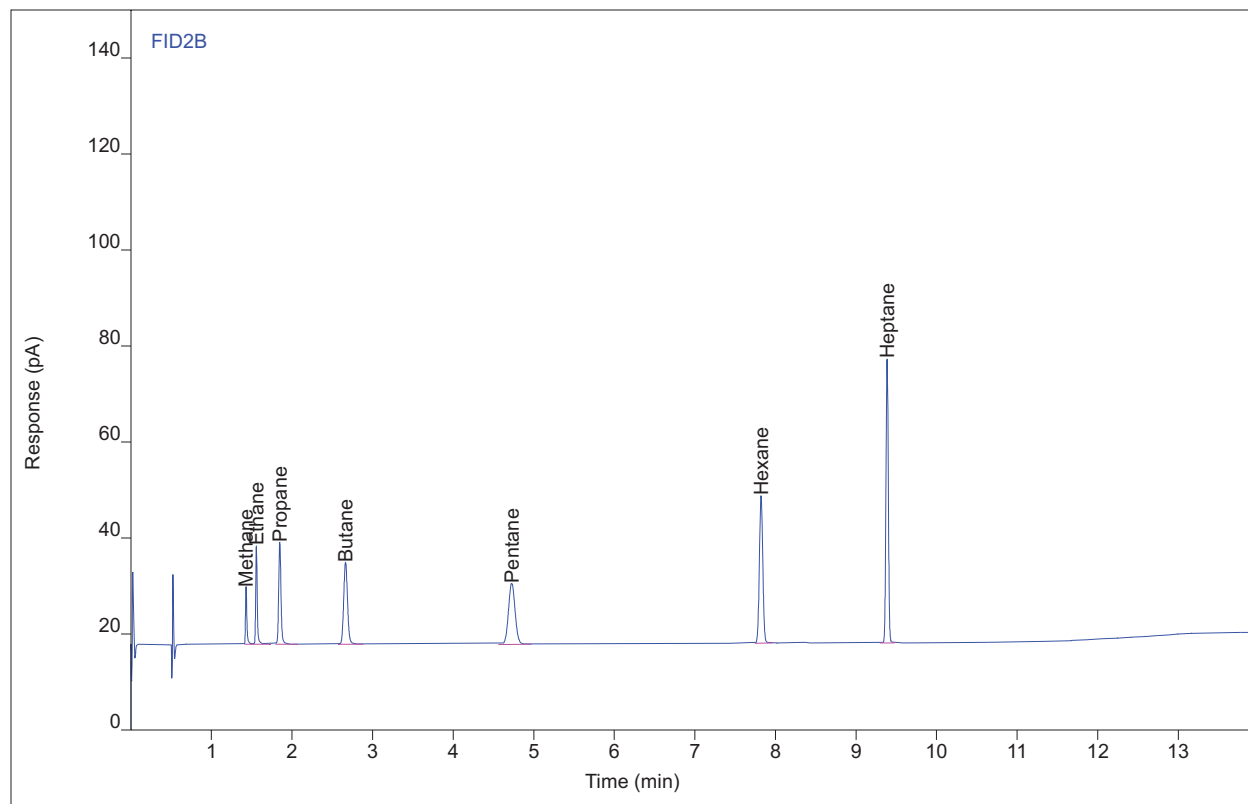
Compound	Type	RT	Area	Height	Amount	DF	SampAmt	Unit
Methane	BV	1.43	34.4773	26.7914	97.4557	1	97.4557	ppm
Ethane	VB	1.56	66.2339	47.4142	96.6551	1	96.6551	ppm
Propane	BB	1.85	100.185	49.3369	97.0804	1	97.0804	ppm
Butane	VB	2.66	133.225	39.6708	96.5231	1	96.5231	ppm
Pentane	BB	4.72	171.080	29.7498	97.0191	1	97.0191	ppm
Hexane	BB	7.82	212.247	70.9457	96.3893	1	96.3893	ppm
Heptane	VB	9.38	280.287	137.523	94.5966	1	94.5966	ppm

Chromatogram Report

Enthalpy Analytical

Sample Name ROSIEP082 #C4 ENV(1=424,4=400)
Sequence Name ROSIEP084 ver.2
Inj Data File 026B1002.D
File Location GC/2018/Rosie/Quarter 1
Injection Date 11/13/2018 9:51 AM
File Modified 11/27/2018 10:53 AM
Instrument
Operator Jennie Parrish

Sample Type
Vial Number
Injection Volume
Injection
Acquisition Method AQM_ROSIEP080.M
Analysis Method ROSIEP082_C1-C7.M
Method Modified 11/14/2018 8:03 AM
Printed 11/27/2018 11:01 AM



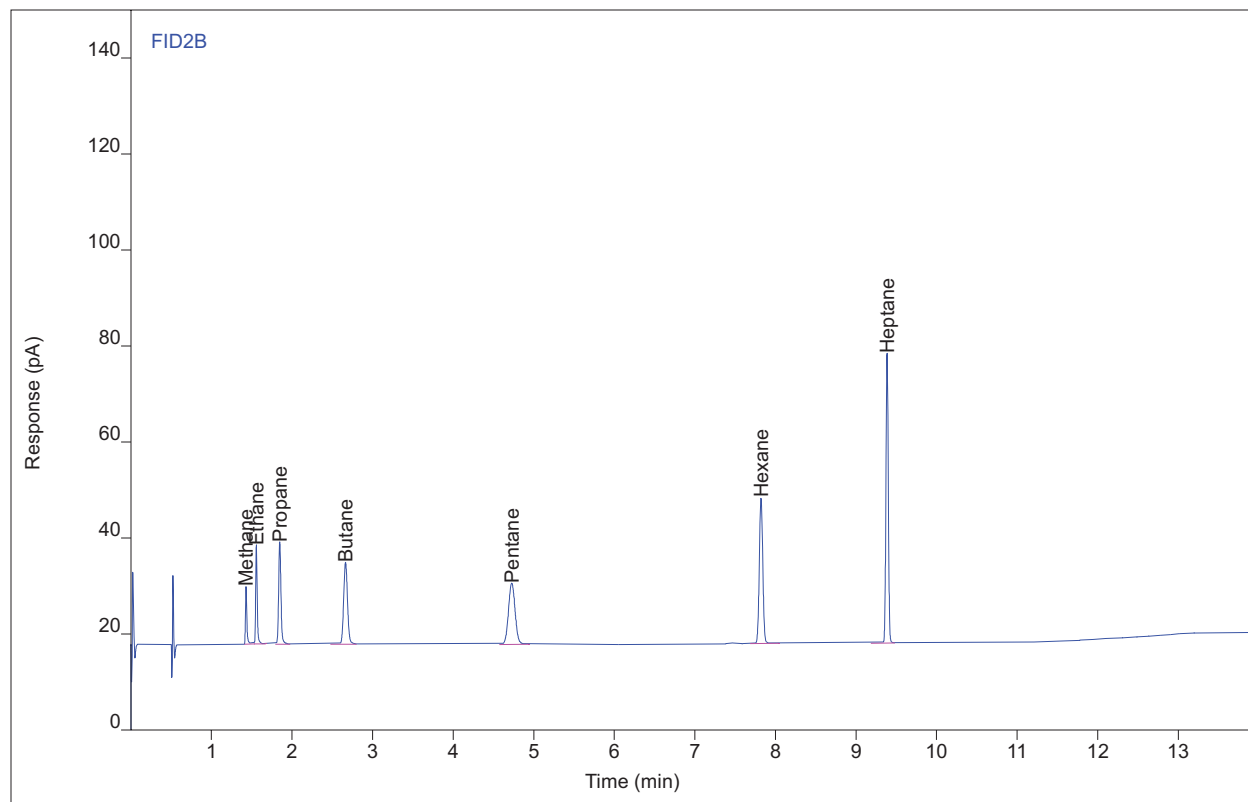
Compound	Type	RT	Area	Height	Amount	DF	SampAmt	Unit
Methane	BV	1.43	14.6585	11.8297	41.4267	1	41.4267	ppm
Ethane	VB	1.56	28.2549	20.4514	41.2062	1	41.2062	ppm
Propane	BB	1.85	43.1505	21.2846	41.6699	1	41.6699	ppm
Butane	BB	2.66	56.8532	17.0466	41.0585	1	41.0585	ppm
Pentane	VB	4.73	73.0329	12.8144	41.2309	1	41.2309	ppm
Hexane	BB	7.82	91.4246	30.7716	41.3740	1	41.3740	ppm
Heptane	BV	9.39	122.765	59.1071	41.2570	1	41.2570	ppm

Chromatogram Report

Enthalpy Analytical

Sample Name ROSIEP082 #C4 ENV(1=424,4=400)
Sequence Name ROSIEP084 ver.2
Inj Data File 026B1003.D
File Location GC/2018/Rosie/Quarter 1
Injection Date 11/13/2018 10:16 AM
File Modified 11/27/2018 10:53 AM
Instrument
Operator Jennie Parrish

Sample Type
Vial Number
Injection Volume
Injection
Acquisition Method AQM_ROSIEP080.M
Analysis Method ROSIEP082_C1-C7.M
Method Modified 11/14/2018 8:03 AM
Printed 11/27/2018 11:01 AM



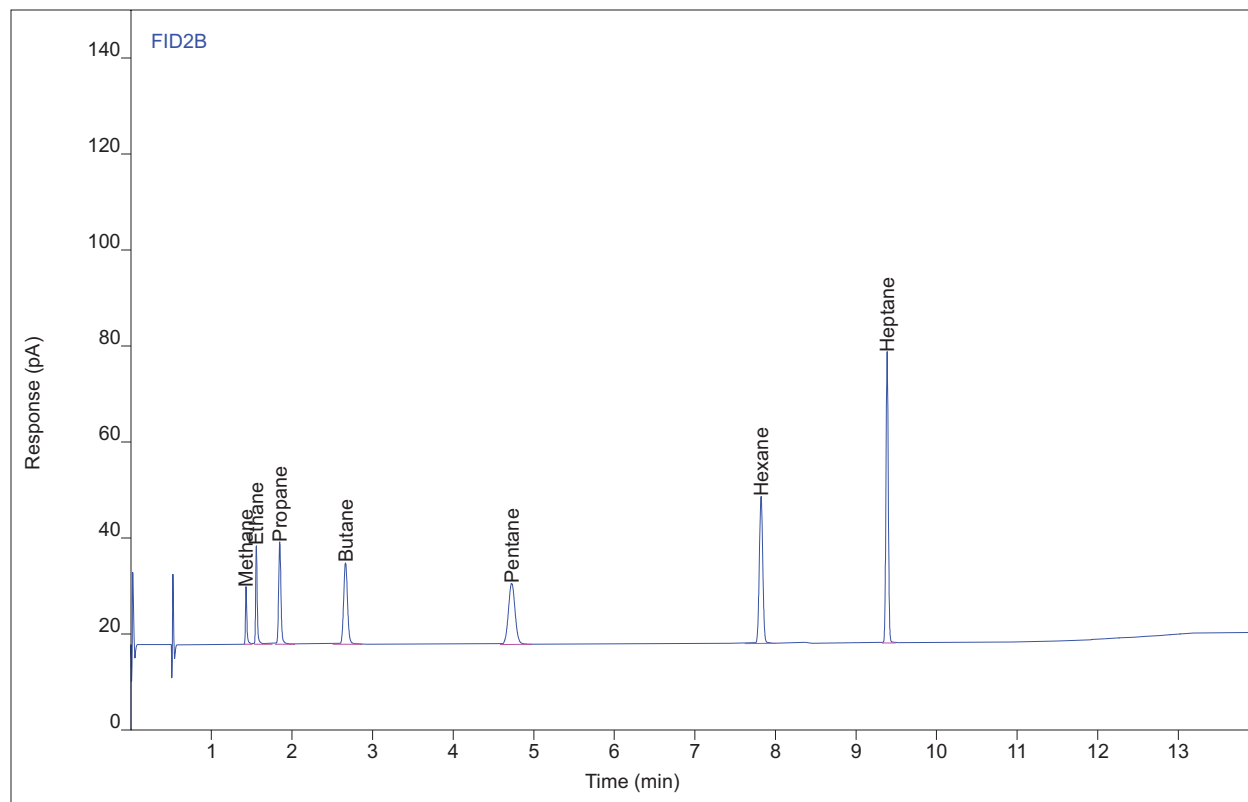
Compound	Type	RT	Area	Height	Amount	DF	SampAmt	Unit
Methane	BV	1.43	14.5349	11.9417	41.0772	1	41.0772	ppm
Ethane	VB	1.56	27.9790	20.4552	40.8035	1	40.8035	ppm
Propane	BV	1.85	42.7910	21.3216	41.3207	1	41.3207	ppm
Butane	BV	2.66	56.8867	17.0754	41.0829	1	41.0829	ppm
Pentane	VB	4.73	72.9691	12.7965	41.1946	1	41.1946	ppm
Hexane	VB	7.82	92.1227	30.4459	41.6919	1	41.6919	ppm
Heptane	VB	9.39	123.072	60.3312	41.3610	1	41.3610	ppm

Chromatogram Report

Enthalpy Analytical

Sample Name ROSIEP082 #C4 ENV(1=424,4=400)
Sequence Name ROSIEP084 ver.2
Inj Data File 026B1004.D
File Location GC/2018/Rosie/Quarter 1
Injection Date 11/13/2018 10:40 AM
File Modified 11/27/2018 10:53 AM
Instrument
Operator Jennie Parrish

Sample Type
Vial Number Vial 26
Injection Volume NA
Injection 4 of 4
Acquisition Method AQM_ROSIEP080.M
Analysis Method ROSIEP082_C1-C7.M
Method Modified 11/14/2018 8:03 AM
Printed 11/27/2018 11:01 AM



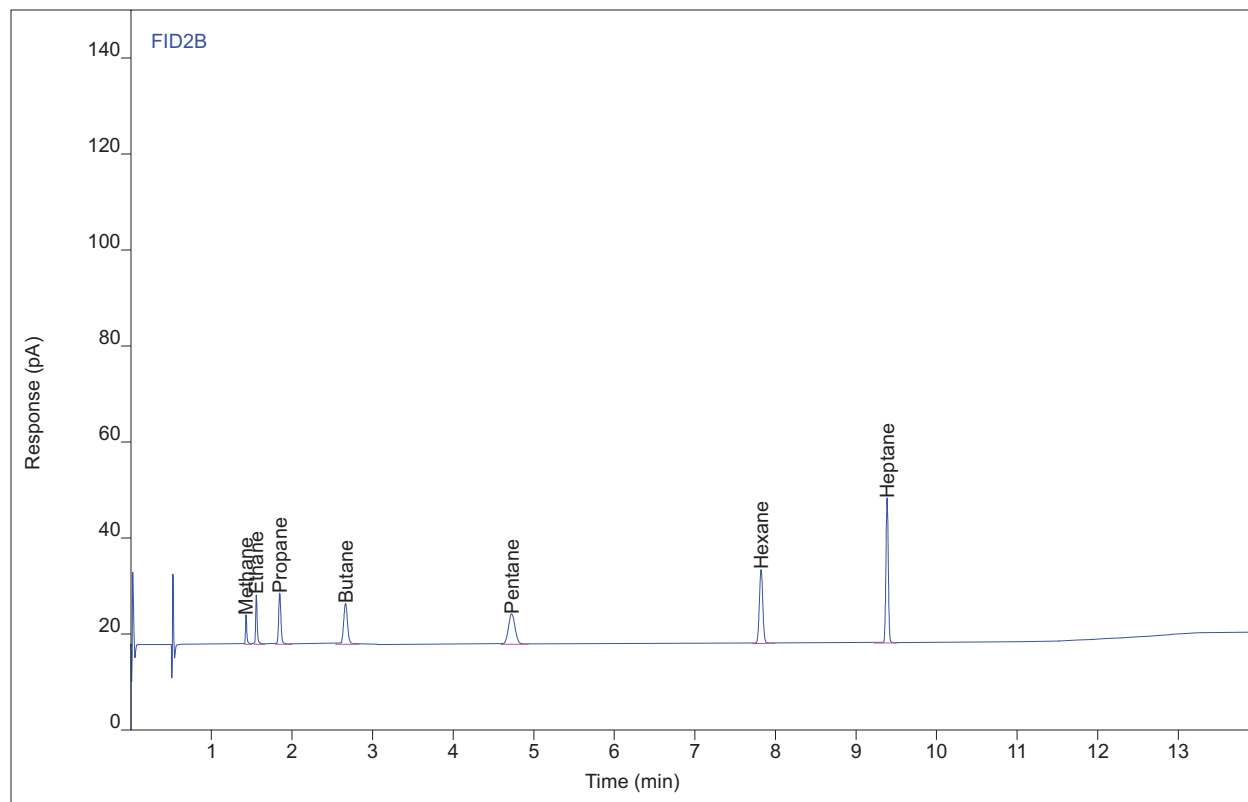
Compound	Type	RT	Area	Height	Amount	DF	SampAmt	Unit
Methane	BB	1.43	14.6422	11.9358	41.3806	1	41.3806	ppm
Ethane	BB	1.56	28.5111	20.4968	41.5803	1	41.5803	ppm
Propane	BB	1.85	42.9520	21.3178	41.4771	1	41.4771	ppm
Butane	VB	2.66	56.8984	17.0630	41.0913	1	41.0913	ppm
Pentane	VB	4.73	73.5761	12.8171	41.5400	1	41.5400	ppm
Hexane	BB	7.82	91.9212	30.6665	41.6001	1	41.6001	ppm
Heptane	VB	9.39	122.843	60.3471	41.2836	1	41.2836	ppm

Chromatogram Report

Enthalpy Analytical

Sample Name ROSIEP082 #C3 ENV(1=565.33,4=200)
Sequence Name ROSIEP084 ver.2
Inj Data File 026B1102.D
File Location GC/2018/Rosie/Quarter 1
Injection Date 11/13/2018 11:30 AM
File Modified 11/27/2018 10:53 AM
Instrument
Operator Jennie Parrish

Sample Type
Vial Number
Injection Volume
Injection 2 of 4
Acquisition Method AQM_ROSIEP080.M
Analysis Method ROSIEP082_C1-C7.M
Method Modified 11/14/2018 8:03 AM
Printed 11/27/2018 11:01 AM



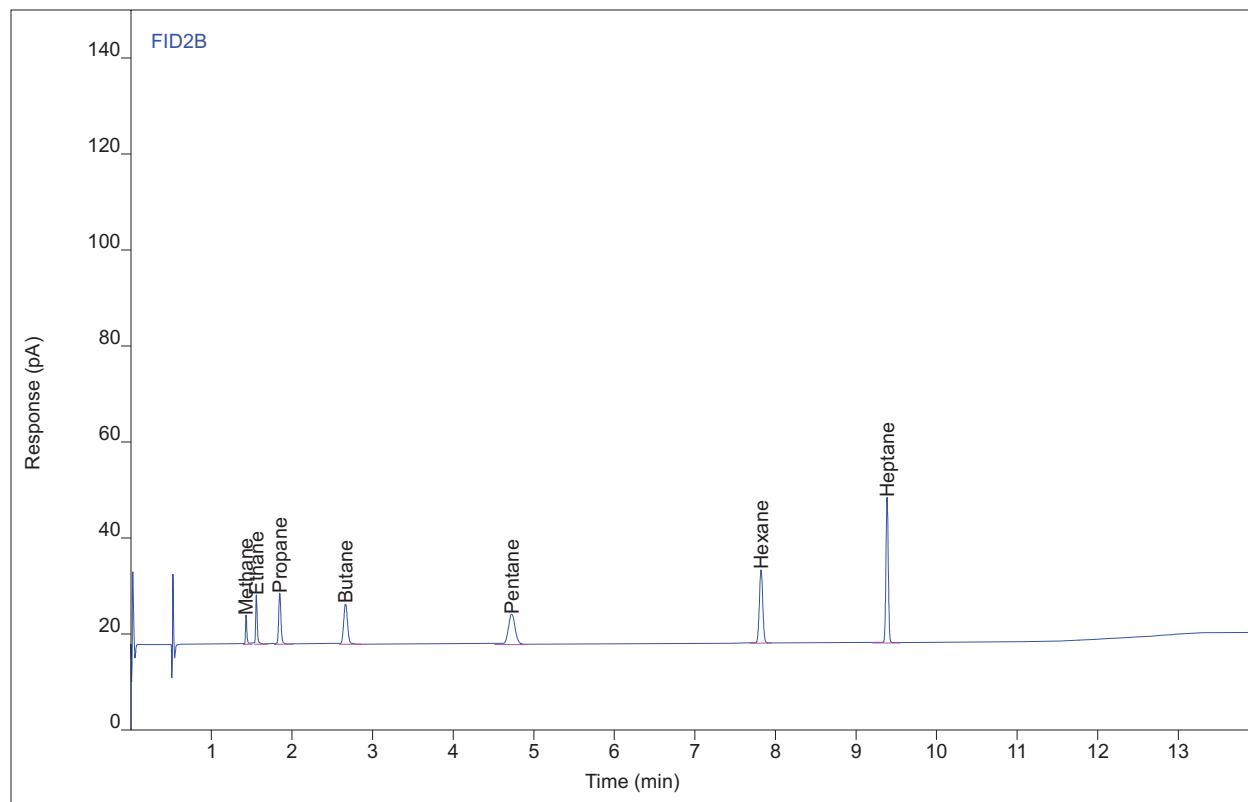
Compound	Type	RT	Area	Height	Amount	DF	SampAmt	Unit
Methane	BB	1.43	7.13819	6.02462	20.1662	1	20.1662	ppm
Ethane	BB	1.56	13.8926	10.2509	20.2375	1	20.2375	ppm
Propane	BB	1.85	21.2701	10.6660	20.4126	1	20.4126	ppm
Butane	BB	2.66	28.3705	8.51824	20.3730	1	20.3730	ppm
Pentane	BB	4.73	36.3249	6.37608	20.3443	1	20.3443	ppm
Hexane	VB	7.82	45.8091	15.4109	20.6034	1	20.6034	ppm
Heptane	BB	9.39	62.0428	30.0893	20.6956	1	20.6956	ppm

Chromatogram Report

Enthalpy Analytical

Sample Name ROSIEP082 #C3 ENV(1=565.33,4=200)
Sequence Name ROSIEP084 ver.2
Inj Data File 026B1103.D
File Location GC/2018/Rosie/Quarter 1
Injection Date 11/13/2018 11:54 AM
File Modified 11/27/2018 10:53 AM
Instrument
Operator Jennie Parrish

Sample Type
Vial Number Vial 26
Injection Volume NA
Injection 3 of 4
Acquisition Method AQM_ROSIEP080.M
Analysis Method ROSIEP082_C1-C7.M
Method Modified 11/14/2018 8:03 AM
Printed 11/27/2018 11:01 AM



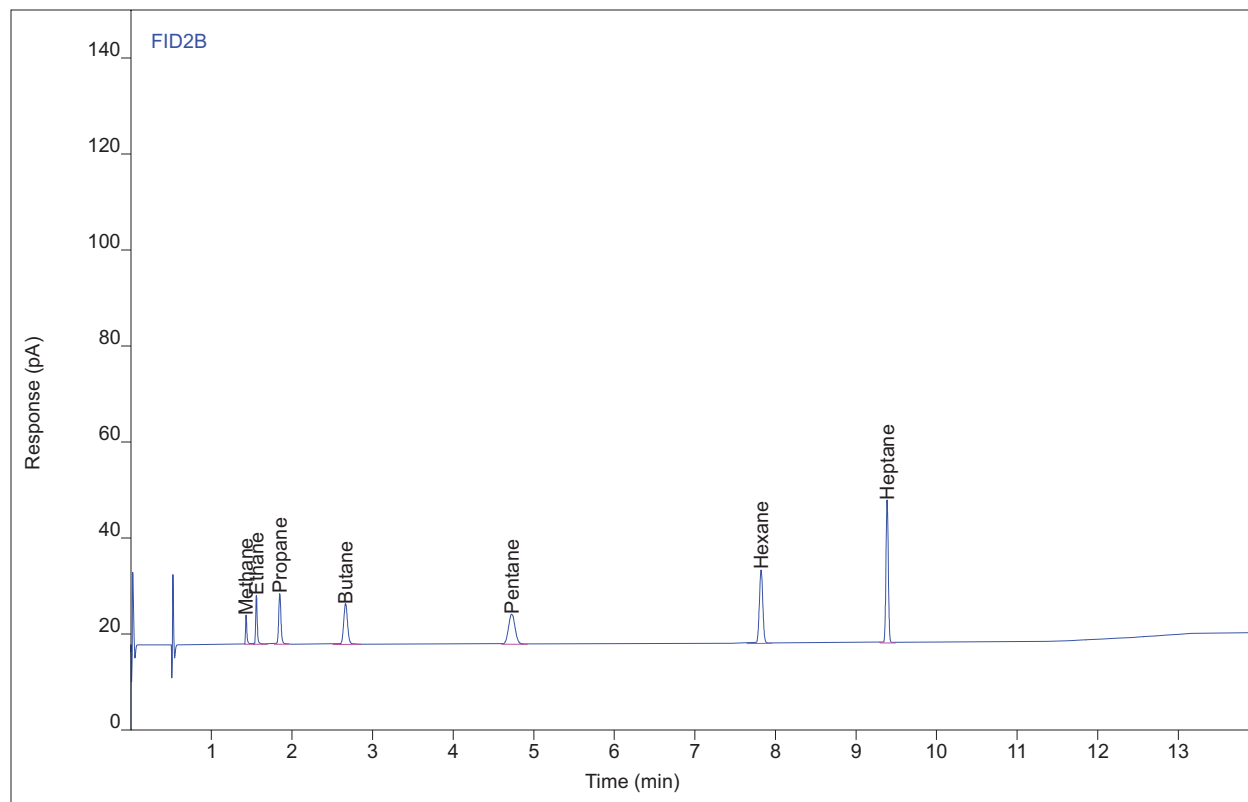
Compound	Type	RT	Area	Height	Amount	DF	SampAmt	Unit
Methane	BB	1.43	7.26946	6.00915	20.5373	1	20.5373	ppm
Ethane	BB	1.56	14.0987	10.2966	20.5384	1	20.5384	ppm
Propane	BB	1.85	21.3746	10.6937	20.5141	1	20.5141	ppm
Butane	BB	2.66	28.4466	8.51116	20.4284	1	20.4284	ppm
Pentane	BV	4.73	36.7338	6.37650	20.5770	1	20.5770	ppm
Hexane	BB	7.82	45.5395	15.4286	20.4806	1	20.4806	ppm
Heptane	BB	9.39	61.7406	30.2741	20.5932	1	20.5932	ppm

Chromatogram Report

Enthalpy Analytical

Sample Name ROSIEP082 #C3 ENV(1=565.33,4=200)
Sequence Name ROSIEP084 ver.2
Inj Data File 026B1104.D
File Location GC/2018/Rosie/Quarter 1
Injection Date 11/13/2018 12:19 PM
File Modified 11/27/2018 10:53 AM
Instrument
Operator Jennie Parrish

Sample Type
Vial Number
Injection Volume
Injection
Acquisition Method AQM_ROSIEP080.M
Analysis Method ROSIEP082_C1-C7.M
Method Modified 11/14/2018 8:03 AM
Printed 11/27/2018 11:01 AM



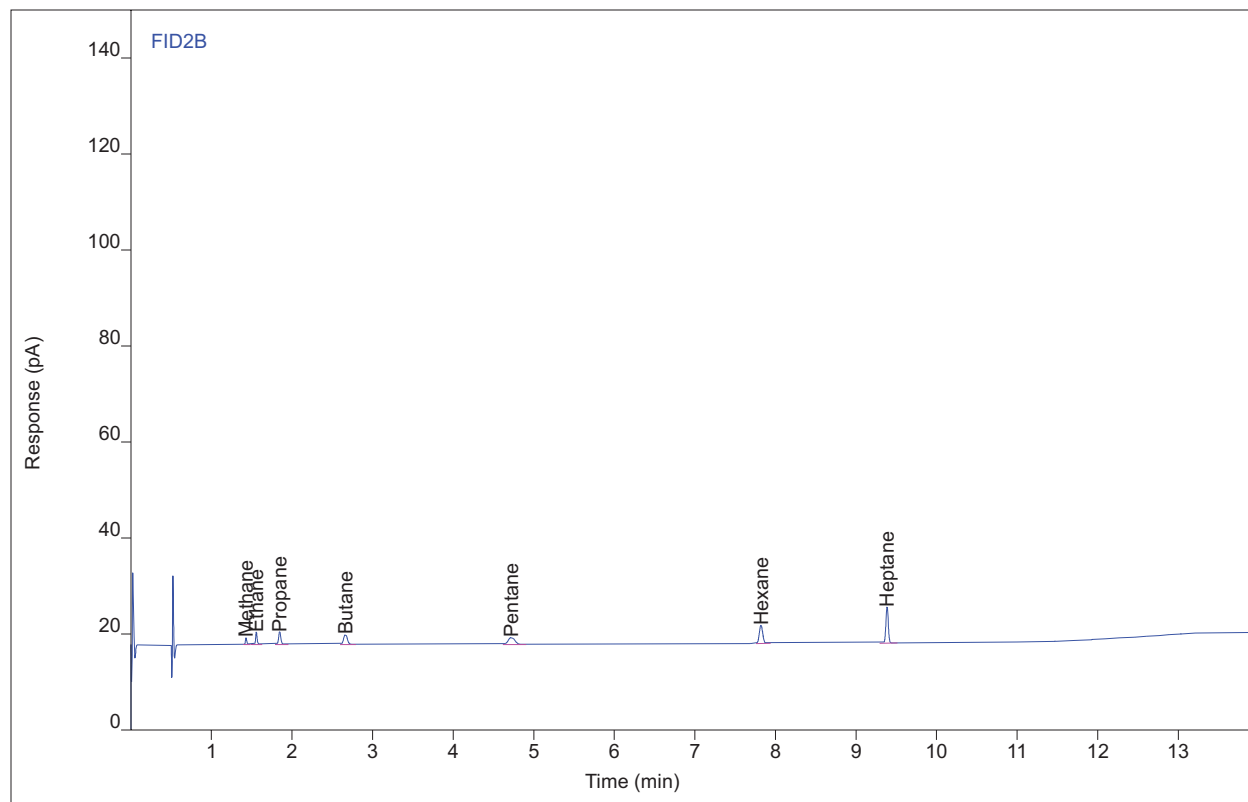
Compound	Type	RT	Area	Height	Amount	DF	SampAmt	Unit
Methane	BV	1.43	7.27366	5.94380	20.5491	1	20.5491	ppm
Ethane	VB	1.56	14.0653	10.2404	20.4896	1	20.4896	ppm
Propane	BB	1.85	21.1351	10.6369	20.2814	1	20.2814	ppm
Butane	VB	2.66	28.3127	8.50836	20.3311	1	20.3311	ppm
Pentane	BV	4.73	36.3931	6.39648	20.3831	1	20.3831	ppm
Hexane	VB	7.82	45.7321	15.4246	20.5683	1	20.5683	ppm
Heptane	BV	9.39	61.3840	29.8497	20.4725	1	20.4725	ppm

Chromatogram Report

Enthalpy Analytical

Sample Name ROSIEP082 #C2 ENV(1=2685.32,4=200)
Sequence Name ROSIEP084 ver.2
Inj Data File 026B1202.D
File Location GC/2018/Rosie/Quarter 1
Injection Date 11/13/2018 1:08 PM
File Modified 11/27/2018 10:53 AM
Instrument
Operator Jennie Parrish

Sample Type
Vial Number Vial 26
Injection Volume NA
Injection 2 of 4
Acquisition Method AQM_ROSIEP080.M
Analysis Method ROSIEP082_C1-C7.M
Method Modified 11/14/2018 8:03 AM
Printed 11/27/2018 11:01 AM



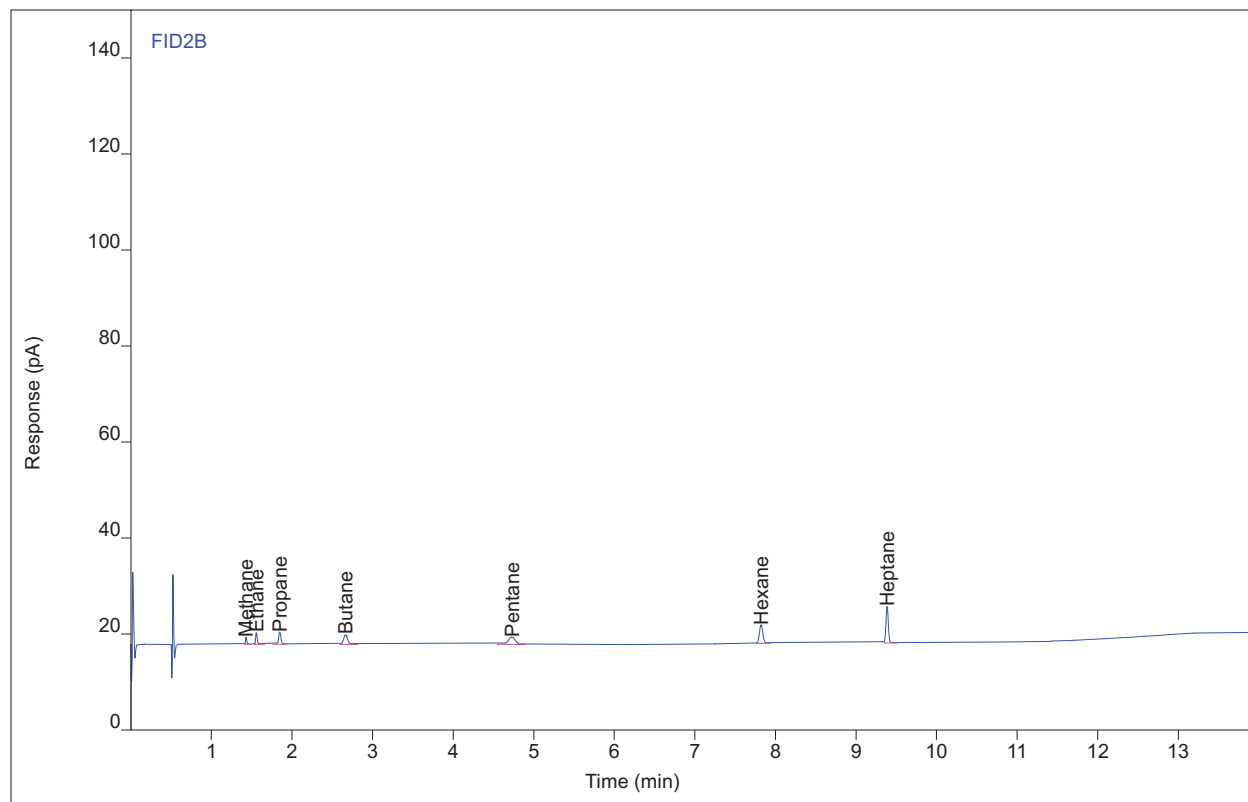
Compound	Type	RT	Area	Height	Amount	DF	SampAmt	Unit
Methane	BB	1.43	1.71699	1.49252	4.84048	1	4.84048	ppm
Ethane	BB	1.56	3.42487	2.55082	4.95515	1	4.95515	ppm
Propane	BV	1.85	5.37806	2.66524	4.97442	1	4.97442	ppm
Butane	BB	2.66	7.08012	2.16606	4.91495	1	4.91495	ppm
Pentane	BV	4.72	9.28425	1.62423	4.96096	1	4.96096	ppm
Hexane	BB	7.82	11.3842	3.80375	4.93178	1	4.93178	ppm
Heptane	BB	9.39	15.5713	7.54648	4.96195	1	4.96195	ppm

Chromatogram Report

Enthalpy Analytical

Sample Name ROSIEP082 #C2 ENV(1=2685.32,4=200)
Sequence Name ROSIEP084 ver.2
Inj Data File 026B1203.D
File Location GC/2018/Rosie/Quarter 1
Injection Date 11/13/2018 1:33 PM
File Modified 11/27/2018 10:53 AM
Instrument
Operator Jennie Parrish

Sample Type
Vial Number Vial 26
Injection Volume NA
Injection 3 of 4
Acquisition Method AQM_ROSIEP080.M
Analysis Method ROSIEP082_C1-C7.M
Method Modified 11/14/2018 8:03 AM
Printed 11/27/2018 11:01 AM



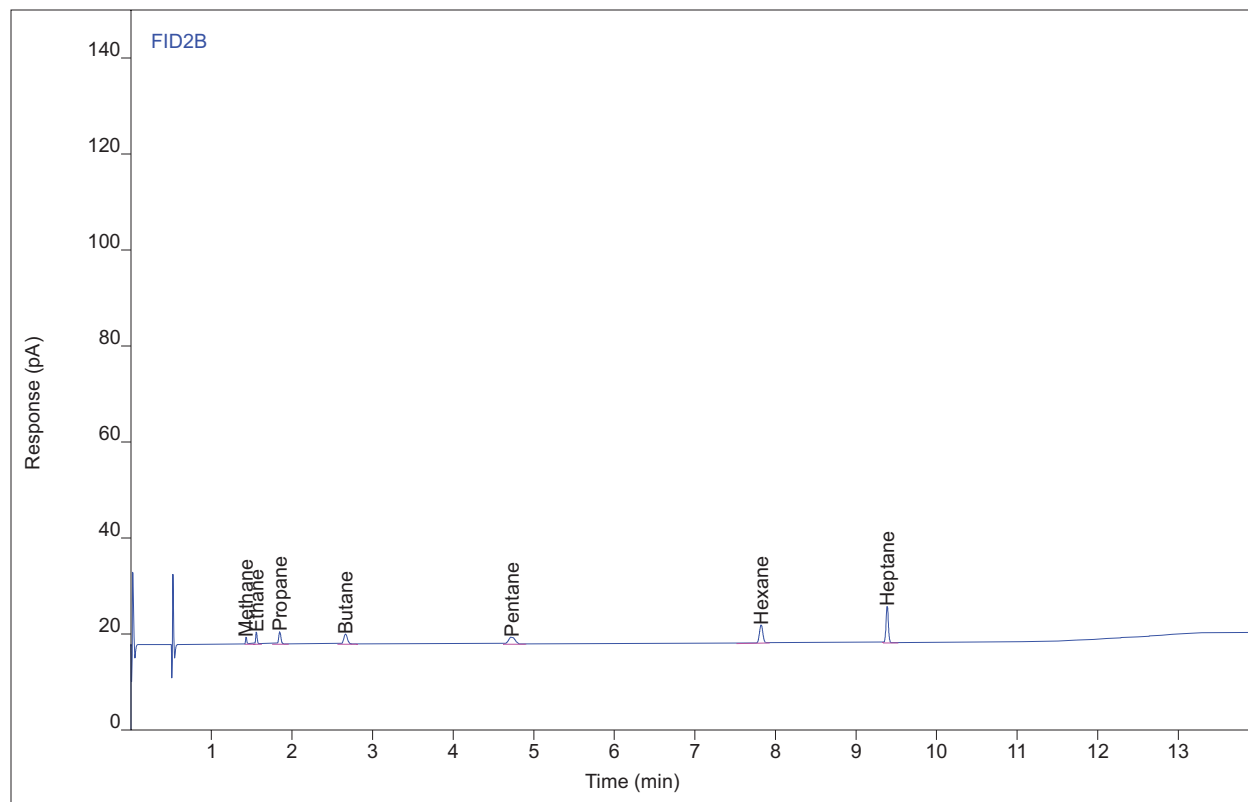
Compound	Type	RT	Area	Height	Amount	DF	SampAmt	Unit
Methane	BB	1.43	1.75824	1.49851	4.95678	1	4.95678	ppm
Ethane	BB	1.56	3.39306	2.52292	4.90913	1	4.90913	ppm
Propane	BB	1.85	5.30697	2.67176	4.90867	1	4.90867	ppm
Butane	BB	2.66	7.26584	2.13648	5.04590	1	5.04590	ppm
Pentane	BB	4.73	9.32038	1.62147	4.98027	1	4.98027	ppm
Hexane	BB	7.82	11.4795	3.85250	4.97306	1	4.97306	ppm
Heptane	BB	9.39	15.5537	7.61731	4.95635	1	4.95635	ppm

Chromatogram Report

Enthalpy Analytical

Sample Name ROSIEP082 #C2 ENV(1=2685.32,4=200)
Sequence Name ROSIEP084 ver.2
Inj Data File 026B1204.D
File Location GC/2018/Rosie/Quarter 1
Injection Date 11/13/2018 1:57 PM
File Modified 11/27/2018 10:53 AM
Instrument
Operator Jennie Parrish

Sample Type
Vial Number Vial 26
Injection Volume NA
Injection 4 of 4
Acquisition Method AQM_ROSIEP080.M
Analysis Method ROSIEP082_C1-C7.M
Method Modified 11/14/2018 8:03 AM
Printed 11/27/2018 11:01 AM



Compound	Type	RT	Area	Height	Amount	DF	SampAmt	Unit
Methane	BB	1.43	1.79927	1.50518	5.07264	1	5.07264	ppm
Ethane	BB	1.56	3.47199	2.58465	5.02354	1	5.02354	ppm
Propane	BV	1.85	5.40355	2.66159	4.99800	1	4.99800	ppm
Butane	VB	2.67	7.12971	2.14548	4.94937	1	4.94937	ppm
Pentane	BB	4.73	9.25463	1.61267	4.94514	1	4.94514	ppm
Hexane	VB	7.82	11.4236	3.84068	4.94885	1	4.94885	ppm
Heptane	BB	9.39	15.5596	7.62864	4.95823	1	4.95823	ppm

CERTIFICATE OF ANALYSIS

Grade of Product: CERTIFIED STANDARD-SPEC

Part Number:	X08NI99C15A0079	Reference Number:	141-124578026-1
Cylinder Number:	CC72412	Cylinder Volume:	144.4 CF
Laboratory:	124 - Conley Stryker - OH	Cylinder Pressure:	2015 PSIG
Analysis Date:	Sep 19, 2016	Valve Outlet:	350
Lot Number:	141-124578026-1		

Expiration Date: Sep 19, 2019

Product composition verified by direct comparison to calibration standards traceable to N.I.S.T. weights and/or N.I.S.T. Gas Mixture reference materials.

ANALYTICAL RESULTS

Component	Req Conc	Actual Concentration (Mole %)	Analytical Uncertainty
ETHANE	100.0 PPM	100.0 PPM	+/- 2%
HEXANE	100.0 PPM	100.0 PPM	+/- 2%
METHANE	100.0 PPM	100.0 PPM	+/- 2%
N BUTANE	100.0 PPM	100.0 PPM	+/- 2%
N HEPTANE	100.0 PPM	100.0 PPM	+/- 2%
N PENTANE	100.0 PPM	100.0 PPM	+/- 2%
PROPANE	100.0 PPM	100.0 PPM	+/- 2%
NITROGEN	Balance		



Approved for Release

CERTIFICATE OF ANALYSIS

Grade of Product: CERTIFIED HYDROCARBON

Customer: MONTROSE ENVIRONMENTAL GROUP
Part Number: X08NI83C15AC015
Cylinder Number: SG9164133BAL
Laboratory: 124 - LaPorte Mix (SAP) - TX
Analysis Date: Jul 14, 2016
Lot Number: 126-400739490-1

Reference Number: 126-400739490-1
Cylinder Volume: 15.8 CF
Cylinder Pressure: 204 PSIG
Valve Outlet: 350
Expiration Date: Jul 14, 2019

Traceability Statement: Hydrocarbon Process standards are NIST traceable either directly by weight or by comparison to Airgas laboratory standards that are directly NIST traceable by weight.

CERTIFIED CONCENTRATIONS

Component	Requested Concentration	Reported Mole %	Accuracy
N HEPTANE	250.0 PPM	251.2 PPM	+/- 2%
HEXANE	0.4000 %	0.4001 %	+/- 2%
N PENTANE	0.5000 %	0.4995 %	+/- 2%
N BUTANE	1.000 %	0.9991 %	+/- 2%
ETHANE	5.000 %	4.995 %	+/- 2%
METHANE	5.000 %	4.992 %	+/- 2%
PROPANE	5.000 %	4.997 %	+/- 2%
NITROGEN	Balance	Balance	

Notes:

PO# 06201603

Signature on file

Approved for Release

Method Information

Method: C:\GC\ROSIE\2018\METHODS\AQM_ROSIEP080.M
Modified: 11/6/2018 at 9:32:59 AM

Method Audit Trail

Operator : Justin Guenzler
Date : 11/6/2018 9:32:58 AM
Change Info: This method was created at 11/6/2018 9:32:58 AM and based on
method C:\GC\ROSIE\2018\METHODS\ROSIEP001_CAL.M

Operator : Justin Guenzler
Date : 11/6/2018 9:32:59 AM
Change Info: Method saved. User comment: ""

Run Time Checklist

Pre-Run Cmd/Macro: on
Name: VC_ENV

Data Acquisition: on

Standard Data Analysis: on

Customized Data Analysis: off

Save GLP Data: off

Post-Run Cmd/Macro: off

Save Method with Data: off

Injection Source and Location

Injection Source: 6890 GC Valve

Injection Location: Dual

6890 GC METHOD

OVEN

Initial temp:	40 'C (On)	Maximum temp:	260 'C
Initial time:	6.00 min	Equilibration time:	1.50 min
Ramps:			
#	Rate	Final temp	Final time
1	30.00	220	2.00
2	0.0 (Off)		
Post temp:	40 'C		
Post time:	0.00 min		
Run time:	14.00 min		

FRONT INLET (SPLIT/SPLITLESS)

BACK INLET (SPLIT/SPLITLESS)

Modified on: 11/6/2018 at 9:32:59 AM

Mode: Splitless
Initial temp: 200 'C (On)
Pressure: 60.00 psi (On)
Purge flow: 0.0 mL/min
Purge time: 0.00 min
Total flow: 12.3 mL/min
Gas saver: Off
Gas type: Helium

Mode: Split
Initial temp: 200 'C (On)
Pressure: 11.99 psi (On)
Split ratio: 5:1
Split flow: 12.8 mL/min
Total flow: 18.5 mL/min
Gas saver: Off
Gas type: Helium

COLUMN 1

Packed Column
Model Number: Restek Shincarbon
2x 2mx1/16inch
Max temperature: 280 'C
Mode: constant pressure
Pressure: 60.00 psi
Inlet: Front Inlet
Outlet: Front Detector
Outlet pressure: ambient

COLUMN 2

Capillary Column
Model Number: Restek 10198
RTX-1 s/n - 1452469
Max temperature: 300 'C
Nominal length: 30.0 m
Nominal diameter: 320.00 um
Nominal film thickness: 4.00 um
Mode: constant flow
Initial flow: 2.6 mL/min
Nominal init pressure: 12.00 psi
Average velocity: 41 cm/sec
Inlet: Back Inlet
Outlet: Back Detector
Outlet pressure: ambient

FRONT DETECTOR (TCD)

Temperature: 275 'C (On)
Reference flow: On
Makeup flow: On
Makeup Gas Type: Helium
Filament: On
Negative polarity: On

BACK DETECTOR (FID)

Temperature: 250 'C (On)
Hydrogen flow: 60.0 mL/min (On)
Air flow: 450.0 mL/min (On)
Mode: Constant makeup flow
Makeup flow: 40.0 mL/min (On)
Makeup Gas Type: Helium
Flame: On
Electrometer: On
Lit offset: 2.0

SIGNAL 1

Data rate: 20 Hz
Type: front detector
Save Data: On
Zero: 0.0 (Off)
Range: 0
Fast Peaks: Off
Attenuation: 0

SIGNAL 2

Data rate: 20 Hz
Type: back detector
Save Data: On
Zero: 0.0 (Off)
Range: 0
Fast Peaks: Off
Attenuation: 0

COLUMN COMP 1

Derive from front detector

COLUMN COMP 2

Derive from front detector

THERMAL AUX 1

Use: Valve Box Heater
Description:
Initial temp: 130 'C (On)
Initial time: 11.00 min
Rate Final temp Final time
1 0.0(Off)

VALVES

Valve 1 Gas Sampling
Description:
Loop Volume: 0.250 mL
Load Time: 0.10 min
Inject Time: 0.50 min
Inlet: Front Inlet
Valve 2 Gas Sampling
Description:

POST RUN

Post Time: 0.00 min

Modified on: 11/6/2018 at 9:32:59 AM

Loop Volume: 0.250 mL

Load Time: 0.10 min

Inject Time: 0.50 min

Inlet: Back Inlet

TIME TABLE

Time	Specifier	Parameter & Setpoint	
3.00		Front Detector Polarity:	Off

**This Is The Last Page
Of This Report.**



APPENDIX II-E
Calibration Gas Cylinder Certification Sheets

CERTIFICATE OF ANALYSIS

Grade of Product: EPA Protocol

Part Number:	E03NI79E15A0088	Reference Number:	122-401268406-1
Cylinder Number:	EB0066823	Cylinder Volume:	151.0 CF
Laboratory:	124 - Durham (SAP) - NC	Cylinder Pressure:	2015 PSIG
PGVP Number:	B22018	Valve Outlet:	590
Gas Code:	CO2,O2,BALN	Certification Date:	Aug 06, 2018

Expiration Date: Aug 06, 2026

Certification performed in accordance with "EPA Traceability Protocol for Assay and Certification of Gaseous Calibration Standards (May 2012)" document EPA 600/R-12/531, using the assay procedures listed. Analytical Methodology does not require correction for analytical interference. This cylinder has a total analytical uncertainty as stated below with a confidence level of 95%. There are no significant impurities which affect the use of this calibration mixture. All concentrations are on a volume/volume basis unless otherwise noted.

Do Not Use This Cylinder below 100 psig, i.e. 0.7 megapascals.

ANALYTICAL RESULTS

Component	Requested Concentration	Actual Concentration	Protocol Method	Total Relative Uncertainty	Assay Dates
CARBON DIOXIDE	10.00 %	9.952 %	G1	+/- 0.6% NIST Traceable	08/06/2018
OXYGEN	11.00 %	11.05 %	G1	+/- 0.4% NIST Traceable	08/06/2018
NITROGEN	Balance				

CALIBRATION STANDARDS

Type	Lot ID	Cylinder No	Concentration	Uncertainty	Expiration Date
NTRM	13060638	CC414571	13.359 % CARBON DIOXIDE/NITROGEN	+/- 0.6%	May 09, 2019
NTRM	09060212	CC262381	9.961 % OXYGEN/NITROGEN	+/- 0.3%	Nov 08, 2018

ANALYTICAL EQUIPMENT

Instrument/Make/Model	Analytical Principle	Last Multipoint Calibration
Horiba VIA510 CO2 2L6YXWY0	Nondispersive Infrared (NDIR)	Jul 25, 2018
Horiba MPA510 O2 41499150042	Paramagnetic	Jul 25, 2018

Triad Data Available Upon Request



CS Williams

Approved for Release

CERTIFICATE OF ANALYSIS

Grade of Product: EPA Protocol

Part Number: E03NI59E15A0014
Cylinder Number: EB0107294
Laboratory: 124 - Durham (SAP) - NC
PGVP Number: B22018

Reference Number: 122-401123521-1
Cylinder Volume: 158.6 CF
Cylinder Pressure: 2015 PSIG
Valve Outlet: 590
Certification Date: Feb 12, 2018

Expiration Date: Feb 12, 2026

Certification performed in accordance with "EPA Traceability Protocol for Assay and Certification of Gaseous Calibration Standards (May 2012)" document EPA 600/R-12/531, using the assay procedures listed. Analytical Methodology does not require correction for analytical interference. This cylinder has a total analytical uncertainty as stated below with a confidence level of 95%. There are no significant impurities which affect the use of this calibration mixture. All concentrations are on a volume/volume basis unless otherwise noted.

Do Not Use This Cylinder below 100 psig, i.e. 0.7 megapascals.

ANALYTICAL RESULTS					
Component	Requested Concentration	Actual Concentration	Protocol Method	Total Relative Uncertainty	Assay Dates
CARBON DIOXIDE	18.50 %	18.22 %	G1	+/- 0.6% NIST Traceable	02/12/2018
OXYGEN	22.00 %	21.99 %	G1	+/- 0.3% NIST Traceable	02/12/2018
NITROGEN	Balance				

CALIBRATION STANDARDS					
Type	Lot ID	Cylinder No	Concentration	Uncertainty	Expiration Date
NTRM	12061508	CC354696	19.87 % CARBON DIOXIDE/NITROGEN	+/- 0.6%	Jan 11, 2024
NTRM	12062009	CC367498	22.883 % OXYGEN/NITROGEN	+/- 0.2%	Apr 24, 2018

ANALYTICAL EQUIPMENT		
Instrument/Make/Model	Analytical Principle	Last Multipoint Calibration
Horiba VIA510 CO2 2L6YXWY0	Nondispersive Infrared (NDIR)	Feb 07, 2018
Horiba MPA510 O2 41499150042	Paramagnetic	Feb 07, 2018

Triad Data Available Upon Request



CS D. [Signature]

Approved for Release



Praxair Distribution Mid-Atlantic
One Steel Road East,
Morrisville, PA 19067
Tel: (800) 638-6360 Fax: (215) 736 5240
PGVP ID: F32017

DocNumber: 000021313

CERTIFICATE OF ANALYSIS / EPA PROTOCOL GAS

Customer & Order Information:

CHEROKEE INSTRUMENTS INC
100 LOGAN COURT
ANGIER NC 27501

Praxair Order Number: 92286180
Customer P. O. Number: 0050001228
Customer Reference Number:

Fill Date: 6/10/2017
Part Number: NI CO225E-AS
Lot Number: 304613161708
Cylinder Style & Outlet: AS CGA 660
Cylinder Pressure & Volume: 2000 psig 140 cu. ft.

Certified Concentration:

Expiration Date:	6/14/2025	NIST Traceable
Cylinder Number:	CC120837	Analytical Uncertainty:
226.4 ppm	CARBON MONOXIDE	± 0.5 %
Balance	NITROGEN	

Certification Information: Certification Date: 6/14/2017 Term: 96 Months Expiration Date: 6/14/2025

This cylinder was certified according to the 2012 EPA Traceability Protocol, Document #EPA-600/R-12/531, using Procedure G1. Do Not Use this Standard if Pressure is less than 100 PSIG.

Analytical Data:

(R=Reference Standard, Z=Zero Gas, C=Gas Candidate)

1. Component: CARBON MONOXIDE

Requested Concentration: 225 ppm
Certified Concentration: 226.4 ppm
Instrument Used: HORIBA VIA-3000 S/N Y9EY78L6
Analytical Method: NDIR
Last Multipoint Calibration: 5/31/2017

First Analysis Data:		Date:		6/14/2017	
Z:	0	R:	303	C:	226.3
Conc:					226.5
R:	302.6	Z:	0	C:	226.2
Conc:					226.4
Z:	0	C:	226.2	R:	302.6
Conc:					226.4
UOM:	PPM	Mean Test Assay:	226.4 PPM		

Analyzed by:

Megha Patel

Reference Standard Type: GMIS
Ref Std. Cylinder #: CC308682
Ref Std. Conc: 303 PPM
Ref Std. Traceable to SRM #: 1680b
SRM Sample #: 2-J-49
SRM Cylinder #: CAL018038

Second Analysis Data:		Date:			
Z:	0	R:	0	C:	0
Conc:					0
R:	0	Z:	0	C:	0
Conc:					0
Z:	0	C:	0	R:	0
Conc:					0
UOM:	PPM	Mean Test Assay:	0 PPM		

Certified by:

Jessica Goodman

Information contained herein has been prepared at your request by qualified experts within Praxair Distribution, Inc. While we believe that the information is accurate within the limits of the analytical methods employed and is complete to the extent of the specific analyses performed, we make no warranty or representation as to the suitability of the use of the information for any purpose. The information is offered with the understanding that any use of the information is at the sole discretion and risk of the user. In no event shall the liability of Praxair Distribution, Inc., arising out of the use of the information contained herein exceed the fee established for providing such information.

DocNumber: 000022170

CERTIFICATE OF ANALYSIS / EPA PROTOCOL GAS

Customer & Order Information:

CHEROKEE INSTRUMENTS INC
100 LOGAN COURT
ANGIER NC 27501

Praxair Order Number: 41969933
Customer P. O. Number: 0050001358
Customer Reference Number:

Fill Date: 9/6/2017
Part Number: NI CO125E-AS
Lot Number: 304613249708
Cylinder Style & Outlet: AS CGA 350
Cylinder Pressure & Volume: 2000 psig 140 cu. ft.

Certified Concentration:

Expiration Date:	9/11/2025	NIST Traceable
Cylinder Number:	CC247564	Analytical Uncertainty:
125.6 ppm	CARBON MONOXIDE	± 0.3 %
Balance	NITROGEN	

Certification Information: Certification Date: 9/11/2017 Term: 96 Months Expiration Date: 9/11/2025

This cylinder was certified according to the 2012 EPA Traceability Protocol, Document #EPA-800/R-12/531, using Procedure G1. Do Not Use this Standard if Pressure is less than 100 PSIG.

Analytical Data:

(R=Reference Standard, Z=Zero Gas, C=Gas Candidate)

1. Component: CARBON MONOXIDE

Requested Concentration: 125 ppm
Certified Concentration: 125.6 ppm
Instrument Used: HORIBA VIA-510, S/N: 577172041
Analytical Method: NON-DISPERSIVE INFRARED
Last Multipoint Calibration: 8/15/2017

First Analysis Data:		Date:	9/11/2017
Z: 0	R: 100.5	C: 125.3	Conc: 125.1
R: 100.6	Z: 0	C: 126.1	Conc: 125.9
Z: 0	C: 125.9	R: 100.8	Conc: 125.7
UOM: PPM	Mean Test Assay:		125.6 PPM

Analyzed by:


Megha Patel

Reference Standard Type: GMS
Ref. Std. Cylinder #: CC215583
Ref. Std. Conc: 100.5 PPM
Ref. Std. Traceable to SRM #: 1679c
SRM Sample #: 3-K-04
SRM Cylinder #: FI25419

Second Analysis Data:		Date:	
Z: 0	R: 0	C: 0	Conc: 0
R: 0	Z: 0	C: 0	Conc: 0
Z: 0	C: 0	R: 0	Conc: 0
UOM: PPM	Mean Test Assay:		0 PPM

Certified by:


Jessica Goodman



Praxair Distribution Mid-Atlantic
One Steel Road East,
Morrisville, PA 19067
Tel: (800) 638-6360 Fax: (215) 736 5240
PGVP ID: F32012

DocNumber: 000005550

CERTIFICATE OF ANALYSIS / EPA PROTOCOL GAS

Customer & Order Information:

PDI WHSE RALEIGH
2807 GRESHAM LAKE RD
RALEIGH NC 27610

Praxair Order Number: 04430644
Customer P. O. Number: 12395 99
Customer Reference Number:

Fill Date: 8/9/2013
Part Number: EV AIPR25.5MEAS
Lot Number: 302541221301
Cylinder Style & Outlet: AS CGA 590
Cylinder Pressure & Volume: 2000 psig 140 cu. ft.

Certified Concentration:

Expiration Date:	8/16/2021	NIST Traceable
Cylinder Number:	CC145705	Analytical Uncertainty:
25.25 ppm PROPANE	± 1 %	
Balance AIR		

Certification Information: Certification Date: 8/16/2013 Term: 96 Months Expiration Date: 8/16/2021

This cylinder was certified according to the 2012 EPA Traceability Protocol, Document #EPA-600/R-12/531, using Procedure G1. Do Not Use this Standard if Pressure is less than 100 PSIG.

Analytical Data:

(R=Reference Standard, Z=Zero Gas, C=Gas Candidate)

1. Component: PROPANE

Requested Concentration: 25.5 ppm
Certified Concentration: 25.25 ppm
Instrument Used: GOW MAC 580
Analytical Method:
Last Multipoint Calibration: 8/14/2013

First Analysis Data:		Date:	8/16/2013
Z: 0	R: 20.9	C: 25.5	Conc: 25.51
R: 20.82	Z: 0	C: 25.14	Conc: 25.15
Z: 0	C: 25.1	R: 21.02	Conc: 25.11
UOM: PPM	Mean Test Assay:		25.25 PPM

Analyzed by:

Jeff Gosner

Reference Standard Type: GMIS
Ref. Std. Cylinder #: SA7942
Ref. Std. Conc: 20.92 PPM
Ref. Std. Traceable to SRM #: 1667b
SRM Sample #:
SRM Cylinder #:

Second Analysis Data:		Date:	
Z: 0	R: 0	C: 0	Conc: 0
R: 0	Z: 0	C: 0	Conc: 0
Z: 0	C: 0	R: 0	Conc: 0
UOM: PPM	Mean Test Assay:		0 PPM

Certified by:

Matthew Wilhelm for

CERTIFICATE OF ANALYSIS

Grade of Product: EPA Protocol

Part Number:	E02NI99E15A0581	Reference Number:	122-401180044-1
Cylinder Number:	CC341990	Cylinder Volume:	144.4 CF
Laboratory:	124 - Durham (SAP) - NC	Cylinder Pressure:	2015 PSIG
PGVP Number:	B22018	Valve Outlet:	350
Gas Code:	PPN,BALN	Certification Date:	Apr 17, 2018

Expiration Date: Apr 17, 2026

Certification performed in accordance with "EPA Traceability Protocol for Assay and Certification of Gaseous Calibration Standards (May 2012)" document EPA 600/R-12/531, using the assay procedures listed. Analytical Methodology does not require correction for analytical interference. This cylinder has a total analytical uncertainty as stated below with a confidence level of 95%. There are no significant impurities which affect the use of this calibration mixture. All concentrations are on a volume/volume basis unless otherwise noted.

Do Not Use This Cylinder below 100 psig, i.e. 0.7 megapascals.

ANALYTICAL RESULTS

Component	Requested Concentration	Actual Concentration	Protocol Method	Total Relative Uncertainty	Assay Dates
PROPANE	85.00 PPM	85.84 PPM	G1	+/- 0.8% NIST Traceable	04/17/2018
NITROGEN	Balance				

CALIBRATION STANDARDS

Type	Lot ID	Cylinder No	Concentration	Uncertainty	Expiration Date
NTRM	0010613	AAL18527	49.8 PPM PROPANE/AIR	+/- 0.6%	May 23, 2018

ANALYTICAL EQUIPMENT

Instrument/Make/Model	Analytical Principle	Last Multipoint Calibration
Nicolet 6700 AHR0801333 C3H8	FTIR	Mar 22, 2018

Triad Data Available Upon Request



Phil St...
Approved for Release

DocNumber: 000024404

CERTIFICATE OF ANALYSIS / EPA PROTOCOL GAS

Customer & Order Information:

CHEROKEE INSTRUMENTS INC
100 LOGAN COURT
ANGIER NC 27501

Praxair Order Number: 56678698
Customer P. O. Number: 0050001578
Customer Reference Number:

Fill Date: 3/14/2018
Part Number: NI NO47.5ME-AS
Lot Number: 30461307802
Cylinder Style & Outlet: AS CGA 660
Cylinder Pressure & Volume: 2000 psig 140 cu ft

Certified Concentration:

Expiration Date:	3/26/2021	NIST Traceable
Cylinder Number:	CC352567	Analytical Uncertainty:
48.0 ppm	NITRIC OXIDE	± 0.9 %
Balance	NITROGEN	

NOx = 48.0 ppm

NOx for Reference Only

Certification Information: Certification Date: 3/26/2018 Term: 36 Months Expiration Date: 3/26/2021

This cylinder was certified according to the 2012 EPA Traceability Protocol, Document #EPA-800/R-12/531, using Procedure G1. Do Not Use this Standard if Pressure is less than 100 PSIG.

Analytical Data:

(R=Reference Standard, Z=Zero Gas, C=Gas Candidate)

1. Component: NITRIC OXIDE

Requested Concentration: 47.5 ppm
Certified Concentration: 48.0 ppm
Instrument Used: MKS 2031
Analytical Method: FTIR
Last Multipoint Calibration: 3/15/2018

First Analysis Date:	Date:	3/19/2018
Z: 0.123 R: 49.7 C: 47.1 Conc:	47.7	
R: 49.5 Z: 0.014 C: 47 Conc:	47.6	
Z: 0.014 C: 47.2 R: 49.7 Conc:	47.8	
UOM: PPM	Mean Test Assay:	47.7 PPM

Analyzed by:

Remzy Jermal

Reference Standard Type: GMI5
Ref. Std. Cylinder #: SA4389
Ref. Std. Conc: 50.3 PPM
Ref. Std. Traceable to SRM #: 1663B
SRM Sample #: 45-V-05
SRM Cylinder #: CAL017971

Second Analysis Date:	Date:	3/26/2018
Z: 0.023 R: 49.5 C: 47.7 Conc:	48.3	
R: 49.6 Z: 0.066 C: 47.6 Conc:	48.2	
Z: 0.063 C: 47.6 R: 49.6 Conc:	48.2	
UOM: PPM	Mean Test Assay:	48.3 PPM

Certified by:

Megha Patel



Praxair Distribution Mid-Atlantic
One Steel Road East,
Morrisville, PA 19067
Tel: (800) 638-6360 Fax: (215) 736 5240
PGVP ID: F32017

DocNumber: 000021376

CERTIFICATE OF ANALYSIS / EPA PROTOCOL GAS

Customer & Order Information:

CHEROKEE INSTRUMENTS INC
100 LOGAN COURT
ANGIER NC 27501

Praxair Order Number: 92286180
Customer P. O. Number: 0050001228
Customer Reference Number:

Fill Date: 6/10/2017
Part Number: NI NO90ME-AS
Lot Number: 304513161704
Cylinder Style & Outlet: AS CGA 680
Cylinder Pressure & Volume: 2000 psig 140 cu. ft.

Certified Concentration:

Expiration Date:	6/21/2025	NIST Traceable
Cylinder Number:	CC200174	Analytical Uncertainty:
89.5 ppm	NITRIC OXIDE	± 0.5 %
Balance	NITROGEN	

NOx = 90.0 ppm

NOx for Reference Only

Certification Information: Certification Date: 6/21/2017 Term: 96 Months Expiration Date: 6/21/2025

This cylinder was certified according to the 2012 EPA Traceability Protocol, Document #EPA-600/R-12/531, using Procedure G1. Do Not Use this Standard if Pressure is less than 100 PSIG.

Analytical Data:

(R=Reference Standard, Z=Zero Gas, C=Gas Candidate)

1. Component: NITRIC OXIDE

Requested Concentration: 90 ppm
Certified Concentration: 89.5 ppm
Instrument Used: TECO MODEL 42i S/N: 0820017513
Analytical Method: CHEMILUMINESCENCE
Last Multipoint Calibration: 6/13/2017

First Analysis Data:		Date: 6/14/2017	
Z: 0	R: 95	C: 89.5	Conc: 89.5
R: 85	Z: 0	C: 89.4	Conc: 89.4
Z: 0	C: 89.4	R: 95	Conc: 89.4
UOM: PPM	Mean Test Assay:		89.4 PPM

Reference Standard Type: GMS
Ref. Std. Cylinder #: CC352709
Ref. Std. Conc: 95.0 PPM
Ref. Std. Traceable to SRM #: 16848
SRM Sample #: 44-T-48
SRM Cylinder #: FF9239

Second Analysis Data:		Date: 6/21/2017	
Z: 0	R: 95	C: 90	Conc: 89.7
R: 85.4	Z: 0	C: 90	Conc: 89.7
Z: 0	C: 90	R: 95.4	Conc: 89.7
UOM: PPM	Mean Test Assay:		89.7 PPM

Analyzed by:

Jessica Goodman

Certified by:

Megha Patel

Information contained herein has been prepared at your request by qualified experts within Praxair Distribution, Inc. While we believe that the information is accurate within the limits of the analytical methods employed and is complete to the extent of the specific analyses performed, we make no warranty or representation as to the suitability of the use of the information for any purpose. The information is offered with the understanding that any use of the information is at the sole discretion and risk of the user. In no event shall the liability of Praxair Distribution, Inc., arising out of the use of the information contained herein exceed the fee established for providing such information.

APPENDIX II-F
Sampling Equipment Calibration Sheets

METHOD 5 POST-TEST CONSOLE CALIBRATION USING CALIBRATED CRITICAL ORIFICES
3-POINT ENGLISH UNITS

Meter Console Information	
Console Model Number	522
Console Serial Number	909033
DGM Model Number	RW 110
DGM Serial Number	328893

Calibration Conditions			
Date	Time	01/21/19	10:30
Barometric Pressure		30.4	in Hg
Theoretical Critical Vacuum ¹		14.3	in Hg
Calibration Technician		JBG	

Factors/Conversions		
Std Temp	528	°R
Std Press	29.92	in Hg
K ₁	17.647	oR/in Hg

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

²The Critical Orifice Coefficient, K', must be entered in English units, (ft³•oR^{1/2})/(in.Hg•min).

Calibration Data										
Run Time	Metering Console				Critical Orifice					
Elapsed	DGM Orifice ΔH	Volume Initial	Volume Final	Outlet Temp Initial	Outlet Temp Final	Serial Number	Coefficient	Amb Temp Initial	Amb Temp Final	Actual Vacuum
(θ)	(P _m)	(V _m)	(V _{net})	(t _m)	(t _{net})		K'	(t _{amb})	(t _{amb})	in. Hg
min	in H ₂ O	cubic feet	cubic feet	°F	°F	FO		°F	°F	
9.5	2.00	10.00	17.429	63	63	FO-63	0.5906	66	66	15.00
8.0	2.00	17.429	23.687	63	64	FO-63	0.5906	66	66	15.00
8.0	2.00	23.687	29.957	64	64	FO-63	0.5906	66	66	15.00

Results								
Standardized Data				Dry Gas Meter				
Dry Gas Meter		Critical Orifice		Calibration Factor		Flowrate	0.3488	
(V _{m(std)})	(Q _{cr(std)})	(V _{cr(std)})	(Q _{cr(std)})	Value	Variation	Std & Corr	0.75 SCFM	Variation
(Y)	(ΔY)	(Q _{m(std)(corr)})	(ΔH@)	(ΔH@)				
cubic feet	cfm	cubic feet	cfm			cfm	in H ₂ O	
7.657	0.806	7.596	0.800	0.992	0.000	0.800	1.824	0.002
6.444	0.806	6.397	0.800	0.993	0.001	0.800	1.822	0.000
6.450	0.806	6.397	0.800	0.992	0.000	0.800	1.820	-0.002
Pretest Gamma	0.9744	% Deviation	1.8	0.992	Y Average		1.822	ΔH@ Average

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

I certify that the above Dry Gas Meter was calibrated in accordance with USEPA Methods, CFR Title 40, Part 60, Appendix A-3, Method 5, 16.2.3

Signature Jonas Gilbert

Date 1/21/2019

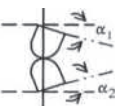
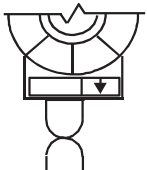
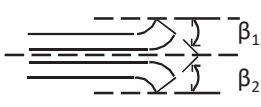

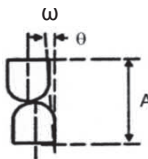
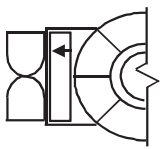
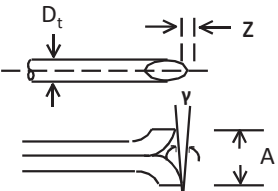
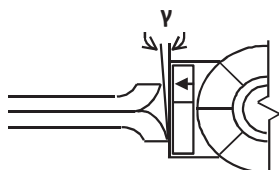
Type S Pitot Tube Inspection

GENERAL INFORMATION

Probe ID	4A	Personnel	EBG
Date	3/19/2019	Coefficient Value	0.84

PITOT TUBE INSPECTION

Pitot Tube assembly level? (yes/no)	yes
Pitot Tube obstruction? (yes/no)	no
Pitot Tube openings damaged? (yes/no)	no

		α_1	0	$\leq \pm 10^\circ$
		α_2	2	$\leq \pm 10^\circ$
		β_1	-1	$\leq \pm 5^\circ$
		β_2	0	$\leq \pm 5^\circ$
		γ	0.0087	
		θ	0.0524	
		$z = A \tan (\gamma)$	0.0200	$\leq \pm \frac{1}{8}"$
		$\omega = A \tan (\theta)$	0.0475	$\leq \pm \frac{1}{32}"$
		D_t	0.375	
		$(\frac{3}{16}" < D_t < \frac{3}{8}" \text{ Recommended})$		
		A	0.906	
		P_A	1.208	
		P_B		$(1.05 < P/D_t < 1.50 \text{ Recommended})$

STACK THERMOCOUPLE CALIBRATION

Ref. Type	Hg Thermometer	Ref. ID	Hg-1
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Source	Ref., °F	Stack TC, °F	Abs. Diff., °F
Ice bath	32	32	0
Ambient	67	67	0
Hot Plate	232	231	1
Maximum Temp. Difference, °F			1

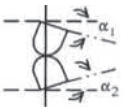
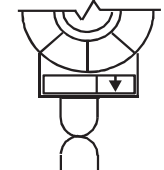
Type S Pitot Tube Inspection

GENERAL INFORMATION

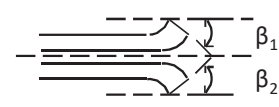
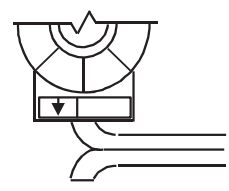
Probe ID	4B	Personnel	EJG
Date	3/19/2019	Coefficient Value	0.84

PITOT TUBE INSPECTION

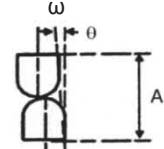
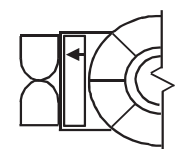
Pitot Tube assembly level? (yes/no)	yes
Pitot Tube obstruction? (yes/no)	no
Pitot Tube openings damaged? (yes/no)	no

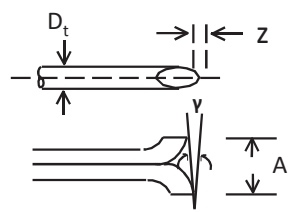
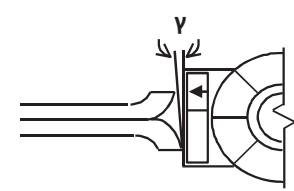
α_1	1	$\leq \pm 10^\circ$
α_2	0	$\leq \pm 10^\circ$

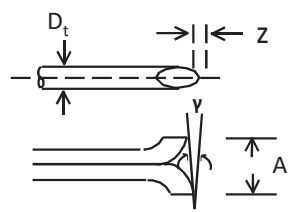
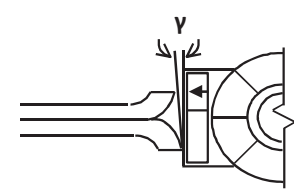
β_1	1	$\leq \pm 5^\circ$
β_2	2	$\leq \pm 5^\circ$

γ	0	
θ	3	

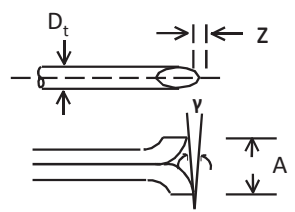
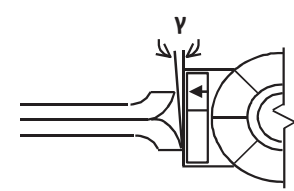



$z = A \tan (\gamma)$	0.00	$\leq \pm \frac{1}{8}''$
$\omega = A \tan (\theta)$	0.049970818	$\leq \pm \frac{1}{32}''$

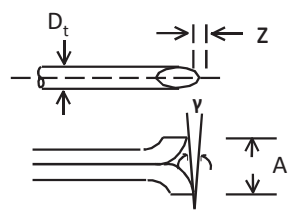
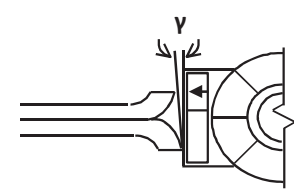



D_t	0.3735	
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$(\frac{3}{16}'' < D_t < \frac{3}{8}'' \text{ Recommended})$

A	0.9535	
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P_A	1.28	
P_B		

$(1.05 < P/D_t < 1.50 \text{ Recommended})$

APPENDIX II-G
Process Data

Pine Content, January 16, 2019: 80% by weight

Appendix II-G, Table 1. Process Data, RCO 2, January 16, 2019, Run 1						
Process Parameter	9:45 AM	10:00 AM	10:15 AM	10:30 AM	10:45 AM	Average
Run Time 9:45-10:52 a.m.						
Short Tons/hour (wet basis)	25.8	25.8	25.8	25.8	25.8	25.8
Production, ODT/hour	24.3	24.3	24.3	24.3	24.3	24.3
Pellet Moisture Content, % weight	5.93	5.93	5.93	5.93	5.93	5.93
RCO 2 Diff. Pressure, in w.c.	1.8	1.3	0.53	1.2	1.9	1.3
RCO 2 Burner SP, °F	750	750	750	750	750	750
RCO 2 Burner Temps, PV, ° F	782	789	745	785	782	777
Cyclofilter 1 Diff. Pressure., in w.c.	0.8	0.8	0.8	0.9	0.8	0.82
Cyclofilter 2 Diff. Pressure, in w.c.	0.5	0.5	0.6	0.6	0.6	0.56

Notes

No run for PM, VOC, CO, NO_x, HCl,
Methane, Ethane, Methanol,
Formaldehyde, and Acetaldehyde

Failed leak test for PM results

Moisture was consistent with Runs 3 thru
5.

Appendix II-G, Table 2. Process Data, RCO 2, January 16, 2019, Run 2									
Process Parameter	11:43 a.m.	11:58 a.m.	12:13 p.m.	12:32 p.m.	12:47 p.m.	13:02 p.m.	13:17 p.m.	13:27 p.m.	Average
Run Time 11:44 a.m.-13:18 p.m..									
Short Tons/hour (wet basis)	26.6	26.6	26.6	26.6	26.6	26.6	26.6	26.6	26.6
Production, ODT/hour	25.2	25.2	25.2	25.2	25.2	25.2	25.2	25.2	25.2
Pellet Moisture Content, % weight	5.13	5.13	5.13	5.13	5.13	5.45	5.45	5.45	5.45
RCO 2 Diff. Pressure, in w.c.	1.8	1.2	1.3	1.2	1.3	1.3	1.5	0.5	1.3
RCO 2 Burner SP, °F	750	750	750	750	750	750	750	750	750
RCO 2 Burner Temps, PV, °F	741	796	771	754	763	781	736	758	763
Cyclofilter 1 Diff. Pressure., in w.c.	0.6	0.6	0.7	0.6	0.6	0.7	0.6	0.6	0.6
Cyclofilter 2 Diff. Pressure, in w.c.	0.5	0.5	0.4	0.4	0.4	0.4	0.4	0.4	0.4

Notes

1. Paused test, 12:24pm to 12:28pm, 2.2 vibration, but during a port change, so did not affect testing.

Had power issue with analyzer, does not affect the emissions, extended the run

No run for PM, VOC, CO, NOx, HCl, Methane, Ethane, Methanol, Formaldehyde, and Acetaldehyde

failed leak test for PM results

Moisture was consistent with Runs 3 thru 5.

Appendix II-G, Table 3. Process Data, RCO 2, January 16, 2019, Run 3							
Process Parameter	14:07 p.m.	14:22 p.m.	14:37 p.m.	14:52 p.m.	15:07 p.m.	15:22 p.m.	Average
Run Time 14:07 p.m.-15:23 p.m.							
Short Tons/hour (wet basis)	26.6	26.6	26.6	26.6	26.6	26.6	26.6
Production, ODT/hour	25.1	25.1	25.1	25.1	25.1	25.1	25.1
Pellet Moisture Content, % wt.t	5.78	5.78	5.78	5.78	5.78	5.78	5.78
RCO 2 Diff. Pressure, in w.c.	1.2	1.4	0.53	1.7	1.3	0.70	1.1
RCO 2 Burner SP, °F	750	750	750	750	750	750	750
RCO 2 Burner Temps, PV, ° F	748	766	745	784	774	743	760
Cyclofilter 1 Diff. Press. in w.c.	0.6	0.7	0.6	0.6	0.7	0.6	0.6
Cyclofilter 2 Diff. Press., in w.c.	0.4	0.4	0.4	0.4	0.4	0.4	0.4

Passed the post-test leak check. First accepted run for PM, run 3 for VOC, CO, NOx, HCl, Methane, Ethane, Methanol, Formaldehyde, and Acetaldehyde

Appendix II-G, Table 4. Process Data, RCO 2, January 16, 2019, Run 4							
Process Parameter	3:45 p.m.	4:00 p.m.	4:15 p.m.	4:30 p.m.	4:45 p.m.	4:58 p.m.	Average
Run Time 15:45 p.m.-16:58 p.m.							
Short Tons/hour (wet basis)	26.6	26.6	26.6	26.6	26.6	26.6	26.6
Production, ODT/hour	25.2	25.2	25.2	25.2	25.2	25	25.2
Pellet Moisture Content, % wt.t	5.24	5.24	5.24	5.24	5.24	5.41	5.27
RCO 2 Diff. Pressure, in w.c.	1.3	1.3	1.7	1.6	1.3	1.2	1.4
RCO 2 Burner SP, °F	750	750	750	750	750	750	750
RCO 2 Burner Temps, PV, ° F	698	786	769	747	765	769	756
Cyclofilter 1 Diff. Press. in w.c.	0.6	0.6	0.6	0.6	0.6	0.6	0.6
Cyclofilter 2 Diff. Press., in w.c.	0.4	0.4	0.4	0.4	0.4	0.4	0.4

Notes

Passed the post-test leak check. Run included PM, VOC, CO, NOx, HCl, Methane, Ethane, Methanol, Formaldehyde, and Acetaldehyde

Appendix II-G, Table 5. Process Data, RCO 2, January 16, 2019, Run 5								
Process Parameter	18:38 p.m.	18:53 p.m.	19:08 p.m.	19:23 p.m.	7:38 p.m.	19:49 p.m.	20:01 p.m.	Average
Run Time 18:35 p.m.-20:01 p.m.								
Short Tons/hour (wet basis)	25.1	25.1	25.1	22.6	21.3	24.1	25.1	24.1
Production, ODT/hour	23.9	23.9	23.9	21.5	20.3	22.9	23.9	22.9
Pellet Moisture Content, % wt.t	4.81	4.81	4.81	4.81	4.81	4.81	4.81	4.81
RCO 2 Diff. Pressure, in w.c.	1.2	1.8	1.6	1.3	1.6	1.2	1.5	1.5
RCO 2 Burner SP, °F	750	750	750	750	750.0	750	750	750
RCO 2 Burner Temps, PV, °F	762	726	782	783	782	767	768	767
Cyclofilter 1 Diff. Press. in w.c.	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7
Cyclofilter 2 Diff. Press., in w.c.	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4

Notes

Passed post-test leak check. Run included PM,
VOC, CO, NOx, HCl, Methane, Ethane,
Methanol, Formaldehyde, and Acetaldehyde

Paused sampling due to presses going offline
due to high vibration or high temp roller
bearings

Feed screw on two of the presses amped out
causing loss of feed.

Appendix II-G, Table 2. Process Data, RCO 2, January 16, 2019, Run 2									
Process Parameter	11:43 a.m.	11:58 a.m.	12:13 p.m.	12:32 p.m.	12:47 p.m.	13:02 p.m.	13:17 p.m.	13:27 p.m.	Average
Run Time 11:44 a.m.-13:18 p.m..									
Short Tons/hour (wet basis)	26.6	26.6	26.6	26.6	26.6	26.6	26.6	26.6	26.6
Production, ODT/hour	25.2	25.2	25.2	25.2	25.2	25.2	25.2	25.2	25.2
Pellet Moisture Content, % weight	5.13	5.13	5.13	5.13	5.13	5.45	5.45	5.45	5.45
RCO 2 Diff. Pressure, in w.c.	1.8	1.2	1.3	1.2	1.3	1.3	1.5	0.5	1.3
RCO 2 Burner SP, °F	750	750	750	750	750	750	750	750	750
RCO 2 Burner Temps, PV, °F	741	796	771	754	763	781	736	758	763
Cyclofilter 1 Diff. Pressure, in w.c.	0.6	0.6	0.7	0.6	0.6	0.7	0.6	0.6	0.6
Cyclofilter 2 Diff. Pressure, in w.c.	0.5	0.5	0.4	0.4	0.4	0.4	0.4	0.4	0.4

Notes

1. Paused test, 12:24pm to 12:28pm, 2.2 vibration, but during a port change, so did not affect testing.

Had power issue with analyzer, does not affect the emissions, extended the run

No run for PM, VOC, CO, NOx, HCl, Methane, Ethane, Methanol, Formaldehyde, and Acetaldehyde

failed leak test for PM results

Moisture was consistent with Runs 3 thru 5.

Appendix II-G, Table 3. Process Data, RCO 2, January 16, 2019, Run 3							
Process Parameter	14:07 p.m.	14:22 p.m.	14:37 p.m.	14:52 p.m.	15:07 p.m.	15:22 p.m.	Average
Run Time 14:07 p.m.-15:23 p.m.							
Short Tons/hour (wet basis)	26.6	26.6	26.6	26.6	26.6	26.6	26.6
Production, ODT/hour	25.1	25.1	25.1	25.1	25.1	25.1	25.1
Pellet Moisture Content, % wt.t	5.78	5.78	5.78	5.78	5.78	5.78	5.78
RCO 2 Diff. Pressure, in w.c.	1.2	1.4	0.53	1.7	1.3	0.70	1.1
RCO 2 Burner SP, °F	750	750	750	750	750	750	750
RCO 2 Burner Temps, PV, ° F	748	766	745	784	774	743	760
Cyclofilter 1 Diff. Press. in w.c.	0.6	0.7	0.6	0.6	0.7	0.6	0.6
Cyclofilter 2 Diff. Press., in w.c.	0.4	0.4	0.4	0.4	0.4	0.4	0.4

Passed the post-test leak check. First accepted run for PM, run 3 for VOC, CO, NOx, HCl, Methane, Ethane, Methanol, Formaldehyde, and Acetaldehyde

Appendix II-G, Table 4. Process Data, RCO 2, January 16, 2019, Run 4							
Process Parameter	3:45 p.m.	4:00 p.m.	4:15 p.m.	4:30 p.m.	4:45 p.m.	4:58 p.m.	Average
Run Time 15:45 p.m.-16:58 p.m.							
Short Tons/hour (wet basis)	26.6	26.6	26.6	26.6	26.6	26.6	26.6
Production, ODT/hour	25.2	25.2	25.2	25.2	25.2	25	25.2
Pellet Moisture Content, % wt.t	5.24	5.24	5.24	5.24	5.24	5.41	5.27
RCO 2 Diff. Pressure, in w.c.	1.3	1.3	1.7	1.6	1.3	1.2	1.4
RCO 2 Burner SP, °F	750	750	750	750	750	750	750
RCO 2 Burner Temps, PV, ° F	698	786	769	747	765	769	756
Cyclofilter 1 Diff. Press. in w.c.	0.6	0.6	0.6	0.6	0.6	0.6	0.6
Cyclofilter 2 Diff. Press., in w.c.	0.4	0.4	0.4	0.4	0.4	0.4	0.4

Notes

Passed the post-test leak check. Run included PM, VOC, CO, NOx, HCl, Methane, Ethane, Methanol, Formaldehyde, and Acetaldehyde

Appendix II-G, Table 5. Process Data, RCO 2, January 16, 2019, Run 5								
Process Parameter	18:38 p.m.	18:53 p.m.	19:08 p.m.	19:23 p.m.	7:38 p.m.	19:49 p.m.	20:01 p.m.	Average
Run Time 18:35 p.m.-20:01 p.m.								
Short Tons/hour (wet basis)	25.1	25.1	25.1	22.6	21.3	24.1	25.1	24.1
Production, ODT/hour	23.9	23.9	23.9	21.5	20.3	22.9	23.9	22.9
Pellet Moisture Content, % wt.t	4.81	4.81	4.81	4.81	4.81	4.81	4.81	4.81
RCO 2 Diff. Pressure, in w.c.	1.2	1.8	1.6	1.3	1.6	1.2	1.5	1.5
RCO 2 Burner SP, °F	750	750	750	750	750.0	750	750	750
RCO 2 Burner Temps, PV, °F	762	726	782	783	782	767	768	767
Cyclofilter 1 Diff. Press. in w.c.	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7
Cyclofilter 2 Diff. Press., in w.c.	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4

Notes

Passed post-test leak check. Run included PM,
VOC, CO, NOx, HCl, Methane, Ethane,
Methanol, Formaldehyde, and Acetaldehyde

Paused sampling due to presses going offline
due to high vibration or high temp roller
bearings

Feed screw on two of the presses amped out
causing loss of feed.

APPENDIX III-A
Method 5-Method 202 Data Sheets

Date 3/7/2019

Client	Enviva	
Job #	2333	
Plant Name	Enviva, Greenwood	
City, State	Greenwood, SC	
Sampling Location	RCO 1 - Pellet Cooler South	
No. of Ports Available	2	
No. of Ports Used	2	
Port Inside Diameter, Inches	4	
Distance From Far Wall To Outside Of Port, Inches	45	
Nipple Length And/Or Wall Thickness, Inches	3	
Depth Of Stack Or Duct, Inches	42	
Stack Or Duct Width (if rectangular), Inches		
Equiv. Diameter = $2DW/(D+W)$, Inches		
Stack/Duct Area, Square Feet	9.621	
$(\pi R^2 \text{ or } L \times W)$		
	Upstream	Downstream
Distance to Flow Disturbances, feet	6	5
Diameters	1.7	1.4

Diameters			
Velocity	Up	Down	Particulate
12	>7.00	>1.75	
12	6	1.5	
16	5	1.25	
16	2	0.5	

Note: If more than 8 and 2 diameters and duct is greater than 12" and less than 24", use 8 or 9 points.

Location of Points in Circular Stacks or Ducts											
	4	6	8	10	12	14	16	18	20	22	24
1	6.7	4.4	3.2	2.6	2.1	1.8	1.6	1.4	1.3	1.1	1.1
2	25.0	14.6	10.5	8.2	6.7	5.7	4.9	4.4	3.9	3.5	3.2
3	75.0	29.6	19.4	14.6	11.8	9.9	8.5	7.5	6.7	6.0	5.5
4	93.3	70.4	32.3	22.6	17.7	14.6	12.5	10.9	9.7	8.7	7.9
5		85.4	67.7	34.2	25.0	20.1	16.9	14.6	12.9	1106	10.5
6		95.6	80.6	65.8	35.6	26.9	22.0	18.8	16.5	14.6	13.2
7			89.5	77.4	64.4	36.6	28.3	23.6	20.4	18.0	16.1
8			96.8	85.4	75.0	63.4	37.5	29.6	25.0	21.8	19.4
9				91.8	82.3	73.1	62.5	38.2	30.6	26.2	23
10				97.4	88.2	79.9	71.7	61.8	38.8	31.5	27.2
11					93.3	85.4	78.0	70.4	61.2	39.3	32.3
12					97.9	90.1	83.1	76.4	69.4	60.7	39.8
13						94.3	87.5	81.2	75	68.5	60.2
14						98.2	91.5	85.4	79.6	73.8	67.7
15							95.1	89.1	83.5	78.2	72.8
16							98.4	92.5	87.1	82.0	77
17								95.6	90.3	85.4	80.6
18								98.6	93.3	88.4	83.9
19									96.1	91.3	86.8
20									98.7	94.0	89.5
21										96.5	92.1
22										98.9	94.5
23											96.8
24											99.

[illegible][illegible]

0.0000 - 0.0625 - 0	0.5625 - 0.6875 - 5/8
0.0625 - 0.1875 - 1/8	0.6875 - 0.8125 - 3/4
0.1875 - 0.3125 - 1/4	0.8125 - 0.9375 - 7/8
0.3125 - 0.4375 - 3/8	0.9375 - 1.0000 - 1
0.4375 - 0.5625 - 1/2	

PRELIMINARY INFORMATION						
Plant Name	Enviva, Greenwood		Date	3/6/2019		
City, State	Greenwood, SC		Project #	2333		
Personnel	EJG, WS		Pitot Identification	4A		
Test Location	Pellet Cooler RCO1		Pitot Coefficient (Cp)	0.84		
Stack Dimensions			Pressures			
Length of Stack (D)	42	in	Barometric Pressure (Pb)	30.1	in Hg	
Width of Stack (W)		in	Static Pressure (Pg)	3.8	in H ₂ O	
Area of Stack (As)	9.621	ft ²	Absolute Stack Pressure (Ps)	30.38	in Hg	
Stack Gas Composition						
Carbon Dioxide (%CO ₂)	0.0		Moisture Content (Bws)	5.35	%	
Oxygen (%O ₂)	20.9		Dry Molecular Weight (Md)	28.84	lb/lb-mole	
Nitrogen Concentration (%N ₂)	79.1		Wet Molecular Weight (Ms)	28.26	lb/lb-mole	
Start	Preliminary Traverse					
	Pitot Tube Leak Checks			A	B	
	Port	Point	Angle, °	Δp, in H ₂ O	Temp. °F	ft/sec
	A	1	0	1.25	156	68.01
		2	-1	1.20	157	66.69
		3	-2	1.20	160	66.85
		4	1	1.25	163	68.40
		5	-8	1.20	160	66.85
		6	-5	1.30	156	69.36
	B	1	-3	1.10	160	64.01
		2	-4	1.05	164	62.86
		3	-3	1.10	170	64.52
		4	5	1.45	160	73.49
		5	8	1.50	159	74.68
		6	8	1.50	168	75.22
	X	1	-2	1.4	159	72.15
		2	-5	1.3		59.94
		3	2	1.35		61.08
		4	3	1.45	137	72.11
		5	0	1.1		55.13
		6	0	1.2		57.58
		7	0	1.2		57.58
		8	3	1.2		57.58
		9	5	1.3	172	70.25
		10	0	1.35	177	71.87
		11	0	1.55	176	76.95
		12	5	1.65	176	79.40
	End					
Average Angle, Degrees		3.04				
Average Velocity Pressure			1.2936			
				162.8		
Average Stack Gas Velocity (ft/sec)				69.57		
Actual Cubic Feet per minute (ACFM)				40,159		
Dry Standard Cubic Feet per Minute (DSCFM)				32,720		

Air Control Techniques, P.C.
Isokinetic Sampling Train Field Data Sheet

Job #	Run ID	M5/202-1
2333	Method	5/202

IDENTIFICATION INFORMATION				PRELIMINARY CHECKS AND DATA																	
Plant	Enviva, Greenwood			<table border="1"> <tr> <td>Actual</td> <td>Req'd</td> <td>Vacuum</td> </tr> <tr> <td>Pre Leak Check, ACFM</td> <td>0.00</td> <td><0.02 or 4%</td> <td>10</td> </tr> <tr> <td>Post Leak Check, ACFM</td> <td>0.00</td> <td>0.020</td> <td>11</td> </tr> </table>				Actual	Req'd	Vacuum	Pre Leak Check, ACFM	0.00	<0.02 or 4%	10	Post Leak Check, ACFM	0.00	0.020	11			
Actual	Req'd	Vacuum																			
Pre Leak Check, ACFM	0.00	<0.02 or 4%	10																		
Post Leak Check, ACFM	0.00	0.020	11																		
City, State	Greenwood, SC																				
Test Location	Pellet Cooler RCO1																				
Date	3/7/19	14973	Filter ID 1	<table border="1"> <tr> <td>A</td> <td>B</td> </tr> <tr> <td>Pitot Pre Leak Check</td> <td>4</td> <td>6</td> </tr> <tr> <td>Pitot Post Leak Check</td> <td>4</td> <td>5</td> </tr> <tr> <td>Ambient Temperature</td> <td>31</td> </tr> <tr> <td>Static Pressure, In. H₂O</td> <td>0.25</td> </tr> <tr> <td>Barometric Pressure, In. Hg</td> <td>30.10</td> </tr> </table>				A	B	Pitot Pre Leak Check	4	6	Pitot Post Leak Check	4	5	Ambient Temperature	31	Static Pressure, In. H ₂ O	0.25	Barometric Pressure, In. Hg	30.10
A	B																				
Pitot Pre Leak Check	4	6																			
Pitot Post Leak Check	4	5																			
Ambient Temperature	31																				
Static Pressure, In. H ₂ O	0.25																				
Barometric Pressure, In. Hg	30.10																				
Start	9:10		Filter ID 2																		
Stop	10:15		Filter ID 3																		
Meterbox ID	909033	EJG, WS	Operator*																		
ΔH@	1.928	4A	Stack TC ID	ACTUAL MOISTURE & GAS COMPOSITION <table border="1"> <tr> <td>Water Recovered, grams</td> <td>64.3</td> <td>Moisture, %</td> <td>5.97</td> </tr> <tr> <td>CO₂ %</td> <td>0.00</td> <td>O₂ %</td> <td>20.61</td> </tr> </table>				Water Recovered, grams	64.3	Moisture, %	5.97	CO ₂ %	0.00	O ₂ %	20.61						
Water Recovered, grams	64.3	Moisture, %	5.97																		
CO ₂ %	0.00	O ₂ %	20.61																		
Gamma (Y)	0.9760	NA	Tedlar Bags																		
Ideal Nozzle	0.200	NA	Orsat Pump																		
Nozzle Dia.	0.206	4ft	Probe Length/Type																		
Nozzle ID	M12	1.51	K Factor																		
Probe ID	4A	60A	Umbilic ID																		

Sampling Information															
Point	Time Per Pt. (Min.)	Elapsed Time (h:m:s)	Dry Gas Meter (cu.ft.)	Velocity ΔP (In H ₂ O)	Meter Temp (°F)	Stack Temp (°F)	Actual ΔH (in H ₂ O)	Probe Temp (°F)	Filter Temp (°F)	Exit Temp (°F)	CPM Temp (°F)	Pump Vac (in. Hg)	Target ΔH (in H ₂ O)	Run ISO % Pt	Lk √ During Run
1	2.5	0	743	1.45	37	161	2.3	248	256	41	69	4.5	2.202	101.5	LC 1
2	2.5	2:30	745.01	1.55	46	143	2.5	250	236	36	68	5.5	2.463	98.8	
3	2.5	5:0	747.1	1.4	46	158	2.25	253	243	35	69	5.5	2.170	102.7	
4	2.5	7:30	749.14	1.3	47	159	1.6	250	232	38	69	4	2.017	94.3	LC-2
5	2.5	10:0	750.95	1.2	47	157	1.95	251	229	39	69	4.5	1.871	103.0	
6	2.5	12:30	752.85	1.3	48	148	2	252	234	40	69	5	2.059	98.0	
7	2.5	15:0	754.75	1.2	48	132	2.1	257	244	40	70	4.75	1.952	103.9	LC-3
8	2.5	17:30	756.71	1.25	49	167	2.1	256	244	41	69	5	1.923	106.1	
9	2.5	20:0	758.7	1.15	50	153	1.9	257	248	43	70	4.5	1.813	109.7	
10	2.5	22:30	760.7	1.1	50	163	1.6	255	246	43	69	4.5	1.707	101.7	LC-4
11	2.5	25:0	762.5	1.1	50	165	1.7	256	244	43	69	4	1.703	96.8	
12	2.5	27:30	764.21	1.4	51	158	2.2	255	247	43	69	5	2.196	96.2	
1	2.5	30:0	766.14	1.5	51	167	2.35	245	227	41	68	5.5	2.316	109.7	LC-5
2	2.5	32:30	768.4	1.2	51	135	1.6	252	233	41	68	5	1.952	91.8	766.14
3	2.5	35:0	770.14	1.2	52	163	2	257	244	41	68	5	1.871	102.5	766.28
4	2.5	37:30	772.04	1.45	52	185	2.25	255	247	41	68	5	2.181	101.9	LC-6
5	2.5	40:0	774.08	1.25	53	175	2.1	256	246	42	68	5	1.913	107.6	
6	2.5	42:30	776.1	1.25	53	148	2.1	247	231	43	69	5	1.998	104.2	
7	2.5	45:0	778.1	1.1	53	130	2	248	232	44	69	5	1.812	103.9	LC-7
8	2.5	47:30	780	1.05	53	132	1.9	252	233	44	69	4.5	1.724	110.5	
9	2.5	50:0	781.97	1.1	55	178	1.75	255	238	45	68	4.5	1.683	103.6	
10	2.5	52:30	783.8	1.3	55	167	2.1	251	232	45	69	5	2.025	100.8	LC-8
11	2.5	55:0	785.75	1.15	55	146	2	247	227	45	68	5	1.852	106.4	
12	2.5	57:30	787.72	1.5	56	147	2.5	251	232	46	68	6	2.417	103.1	
		1:00:0	789.9												

Total	Averages				Maximum and Minimum Values					Run ISO
Vm	46.76	1.265	50.3	155.7	2.035	257	256	46	70	6
Vmstd	47.738	in. H ₂ O	°F	°F	in H ₂ O	245	227	35	68	%

Run Notes:

Air Control Techniques, P.C.
Isokinetic Sampling Train Field Data Sheet

Job #	Run ID	M5/202-2
2333	Method	5/202

IDENTIFICATION INFORMATION				PRELIMINARY CHECKS AND DATA			
Plant	Enviva, Greenwood			Pre Leak Check, ACFM	Actual	Req'd	Vacuum
City, State	Greenwood, SC				0.00	<0.02 or 4%	11
Test Location	Pellet Cooler RCO1				Post Leak Check, ACFM	0.00	0.020
Date	3/7/19	14974	Filter ID 1				
Start	11:08		Filter ID 2				
Stop	12:22		Filter ID 3				
Meterbox ID	909033	EJG, WS	Personnel				
ΔH@	1.928	4B	Stack TC ID				
Gamma (Y)	0.9760	NA	Tedlar Bags				
Ideal Nozzle	0.199	NA	Orsat Pump				
Nozzle Dia.	0.206	4b	Probe Length/Type				
Nozzle ID	M11	1.56	K Factor				
Probe ID	4B	60A	Umbilicle ID				
				ACTUAL MOISTURE & GAS COMPOSITION			
				Water Recovered, grams	68.2	Moisture, %	6.34
				CO ₂ %	0.00	O ₂ %	20.60

Sampling Information															
Point	Time Per Pt. (Min.)	Elapsed Time (h:m:s)	Dry Gas Meter (cu.ft.)	Velocity ΔP (in H ₂ O)	Meter Temp (°F)	Stack Temp (°F)	Actual ΔH (in H ₂ O)	Probe Temp (°F)	Filter Temp (°F)	Exit Temp (°F)	CPM Temp (°F)	Pump Vac (in. Hg)	Target ΔH (in H ₂ O)	Run ISO % Pt	Lk √ During Run
1	2.5	0	790.178	1.45	56	160	2.4	250	225	50	68	4.5	2.265	108.6	LC 1
2	2.5	2:30	792.4	1.5	58	158	2.4	250	225	41	68	4.75	2.355	99.4	
3	2.5	5:0	794.48	1.25	58	162	2.5	252	228	41	68	4.75	1.950	106.1	
4	2.5	7:30	796.5	1.4	58	203	2.2	250	228	43	68	5	2.048	97.3	LC-2
5	2.5	10:0	798.4	1.1	60	180	1.8	245	235	49	68	3.5	1.675	109.6	
6	2.5	12:30	800.34	1.2	58	212	1.8	245	249	44	69	4	1.735	103.5	
7	2.5	15:0	802.2	1.3	59	205	1.8	246	242	44	68	3.5	1.903	106.1	LC-3
8	2.5	17:30	804.2	1.2	59	188	1.8	245	244	45	68	4	1.803	107.9	
9	2.5	20:0	806.18	1.15	59	180	1.8	247	248	46	68	3.5	1.749	106.3	
10	2.5	22:30	808.1	1.2	59	211	1.8	248	254	46	68	3.5	1.741	94.3	LC-4
11	2.5	25:0	809.8	1.3	59	205	1.9	251	251	46	68	4	1.903	99.0	
12	2.5	27:30	811.665	1.3	59	186	2.1	251	242	46	69	4.5	1.959	106.8	
1	2.5	30:0	813.705	1.5	59	160	2.1	258	256	45	75	4.5	2.354	100.0	LC-5
2	2.5	32:30	815.8	1.2	58	155	2	255	255	44	75	4.5	1.895	100.1	813.657
3	2.5	35:0	817.68	1.4	59	160	2.3	255	253	45	77	5	2.197	103.8	813.705
4	2.5	37:30	819.78	1.4	58	162	2.3	256	252	46	78	5	2.184	105.2	LC-6
5	2.5	40:0	821.9	1.25	59	188	2	256	251	48	80	4.5	1.876	106.9	
6	2.5	42:30	823.9	1.2	59	189	1.85	256	253	49	80	4	1.799	109.1	
7	2.5	45:0	825.9	1.2	59	184	1.825	253	253	49	74	4	1.814	92.4	LC-7
8	2.5	47:30	827.6	1.15	59	185	1.8	255	253	50	68	4	1.736	108.3	
9	2.5	50:0	829.55	1.2	59	180	1.8	256	254	50	68	4	1.825	100.2	
10	2.5	52:30	831.4	1.35	60	212	2	255	255	50	68	4	1.960	101.9	LC-8
11	2.5	55:0	833.35	1.4	60	200	2.1	255	254	51	68	4.5	2.068	100.7	
12	2.5	57:30	835.33	1.65	60	204	2.5	253	251	53	68	5	2.422	103.2	
		1:00:0	837.524												

	Total	Averages					Maximum and Minimum Values					Run ISO
V _m	47.298	1.299	58.8	184.5	2.036	258	256	53	80	5		103.4
V _{mstd}	47.500	in. H ₂ O	°F	°F	in H ₂ O	245	225	41	68			%

Run Notes:

Air Control Techniques, P.C.
Isokinetic Sampling Train Field Data Sheet

Job #	Run ID	M5/202-3
2333	Method	5/202

IDENTIFICATION INFORMATION				PRELIMINARY CHECKS AND DATA			
Plant	Enviva, Greenwood			Actual Req'd Vacuum Pre Leak Check, ACFM 0.00 <0.02 or 4% 9 Post Leak Check, ACFM 0.00 0.020 9.5			
City, State	Greenwood, SC						
Test Location	Pellet Cooler RCO1						
Date	3/7/19	14977	Filter ID 1			A	B
Start	13:04		Filter ID 2			Pitot Pre Leak Check	4 3
Stop	14:18		Filter ID 3			Pitot Post Leak Check	5 6
Meterbox ID	909033	EJG, WS	Personnel			Ambient Temperature	60
ΔH@	1.928	4A	Stack TC ID			Static Pressure, In. H ₂ O	0.25
Gamma (Y)	0.9760	NA	Tedlar Bags			Barometric Pressure, In. Hg	30.10
Ideal Nozzle	0.200	NA	Orsat Pump				
Nozzle Dia.	0.206	4a	Probe Length/Type				
Nozzle ID	M12	1.50	K Factor				
Probe ID	4A	60A	Umbilicle ID				
ACTUAL MOISTURE & GAS COMPOSITION							
Water Recovered, grams				74.4	Moisture, %		7.02
CO ₂ %				0.01	O ₂ %		20.53

		Sampling Information														
Point	Time Per Pt. (Min.)	Elapsed Time (h:m:s)	Dry Gas Meter (cu.ft.)	Velocity ΔP (In H ₂ O)	Meter Temp (°F)	Stack Temp (°F)	Actual ΔH (in H ₂ O)	Probe Temp (°F)	Filter Temp (°F)	Exit Temp (°F)	CPM Temp (°F)	Pump Vac (in. Hg)	Target ΔH (in H ₂ O)	Run ISO % Pt Cum		Lk √ During Run
1	2.5	0	838.421	1.4	60	189	2.2	225	238	58	77	5	2.092	108.3	101.5	LC 1
2	2.5	2:30	840.56	1.2	61	202	1.9	225	238	46	72	5	1.758	105.2	103.3	
3	2.5	5:0	842.47	1.4	61	186	1.95	230	240	48	72	4.5	2.104	95.2	100.5	
4	2.5	7:30	844.36	1.15	62	183	1.8	249	238	50	70	4.5	1.739	107.3	102.1	LC-2
5	2.5	10:0	846.3	1.05	62	220	1.5	256	255	51	69	4	1.502	105.6	102.9	
6	2.5	12:30	848.075	1.35	62	197	2.1	255	250	52	70	4.75	2.001	102.0	102.7	
7	2.5	15:0	850.05	1.15	63	191	1.8	254	250	52	70	1.8	1.721	105.6	103.1	LC-3
8	2.5	17:30	851.95	1.2	63	189	1.9	257	256	53	73	4.5	1.802	103.2	103.1	
9	2.5	20:0	853.85	1.1	63	218	1.75	256	254	53	73	4.5	1.581	107.2	103.6	
10	2.5	22:30	855.7	1.1	64	218	1.7	256	250	53	77	4	1.585	107.3	103.9	LC-4
11	2.5	25:0	857.555	1.15	63	212	1.8	256	260	54	79	4.5	1.669	104.7	104.0	
12	2.5	27:30	859.41	1.4	64	210	2.15	255	253	54	75	5	2.041	109.2	104.5	
1	2.5	30:0	861.55	1.45	64	197	2.2	251	245	54	80	5	2.154	102.8	104.3	LC-5
2	2.5	32:30	863.62	1.3	64	222	2	254	251	48	78	4.5	1.860	105.8	104.4	861.415
3	2.5	35:0	865.6	1.5	64	213	2.3	254	256	48	68	5	2.176	103.8	104.4	861.55
4	2.5	37:30	867.7	1.3	65	205	2	254	253	49	73	4.5	1.910	106.9	104.5	LC-6
5	2.5	40:0	869.73	1.35	65	195	2.15	258	252	48	68	4.75	2.016	101.6	104.4	
6	2.5	42:30	871.71	1.2	65	188	2	256	250	48	68	4.75	1.810	107.6	104.5	
7	2.5	45:0	873.7	1.2	66	188	2.1	257	256	49	69	4.75	1.815	108.0	104.7	LC-7
8	2.5	47:30	875.7	1.05	67	193	1.75	253	252	49	69	4	1.578	104.0	104.7	
9	2.5	50:0	877.5	1.2	67	210	1.8	251	255	49	72	4	1.759	106.8	104.8	
10	2.5	52:30	879.45	1.05	67	195	1.65	256	256	49	72	4	1.575	102.4	104.7	LC-8
11	2.5	55:0	881.22	1.4	67	216	2.1	255	255	49	73	4	2.035	106.0	104.7	
12	2.5	57:30	883.3	1.5	67	200	2.3	254	256	49	72	5	2.231	98.7	104.5	
	2.5	1:00:0	885.327													

	Total	Averages					Maximum and Minimum Values					Run ISO
V _m	46.771	1.252	64.0	201.5	1.954	258	260	58	80	5		105.1
V _{mstd}	46.495	in. H ₂ O	°F	°F	in H ₂ O	225	238	46	68			%

Run Notes:

Method 4 - Air Control Techniques, P.C.

Date 3/7/2019

Source Information

Plant Name	Enviva, Greenwood	Job #	2333
City, State	Greenwood, SC	Personnel	TH, WS
Sampling Location	Pellet Cooler RCO1	Balance	

Sampling Information

Run Number	M5/202-1	M5/202-2	M5/202-3	
Filter Identification	14973	14974	14977	
Sampling Date	3/7/2019	3/7/2019	3/7/2019	

Moisture DataImpinger 1 - Empty

Final Weight, grams	406.8	429.2	426.2	
Initial Weight, grams	368.2	396.5	368.8	
Condensed Water, grams	38.6	32.7	57.4	

Impinger 2 - Empty

Final Weight, grams	606.4	618.3	603.6	
Initial Weight, grams	601.4	606.0	603.5	
Condensed Water, grams	5.0	12.3	0.1	

Impinger 3

Final Weight, grams	595.3	658.7	591.3	
Initial Weight, grams	585.1	647.7	586.6	
Condensed Water, grams	10.2	11.0	4.7	

Silica Gel

Final Weight, grams	802.2	891.7	814.4	
Initial Weight, grams	791.7	879.5	802.2	
Adsorbed Water, grams	10.5	12.2	12.2	

Total Water, grams	64.3	68.2	74.4	
--------------------	------	------	------	--

Sampling Train Purge Data

Purge Start	1030	1250	1430	
Purge End	1130	1350	1530	

Plant Name Enviva, Greenwood
City, State Greenwood, SC

Project # 2333
Test Location Pellet Cooler RCO1

Parameter	Nomenclature/ Units	M5/202-1	M5/202-2	M5/202-3	Averages
Date		3/7/2019	3/7/2019	3/7/2019	
Run Time	θ , minutes	60	60	60	
Production Rate	ODT/hour	39.5	40.3	40.5	40.1
Nozzle Diameter	inches	0.206	0.206	0.206	
Stack Area	As - sq. ft.	9.62	9.62	9.62	
Pitot Tube Coefficient	Cp	0.84	0.84	0.84	
Meter Calibration Factor	Y	0.9760	0.9760	0.9760	
Barometric Pressure, inches Hg	Bp - in. Hg	30.10	30.10	30.10	
Static Pressure	Pg - in. H ₂ O	0.25	0.25	0.25	
Stack Pressure	Ps - in. Hg	30.12	30.12	30.12	
Meter Box Pressure Differential	ΔH - in. H ₂ O	2.04	2.04	1.95	
Average Velocity Head	ΔP - in. H ₂ O	1.2647	1.2988	1.2522	
Volume of Gas Sampled	V _m - cu. ft.	46.76	47.298	46.771	
Dry Gas Meter Temperature	T _m - °F	50.3	58.8	64.0	
Stack Temperature	T _s - °F	155.7	184.5	201.5	180.6
Stack Temperature	T _s - °C	68.7	84.7	94.2	
Liquid Collected	grams	64.3	68.2	74.4	
Oxygen	O ₂ %	20.70	20.70	20.53	20.6
Carbon Dioxide	CO ₂ %	0.004	0.000	0.010	0.0045
Nitrogen	N ₂ %	79.30	79.30	79.46	
Volume of Gas Sampled, Dry	V _{m(std)} - cu. ft.	47.738	47.500	46.495	47.2
Volume of Gas Sampled, Dry	V _{m(std)} - cu. M	1.352	1.345	1.317	
Volume of Gas Sampled, Dry	V _{m(std)} - N cu. M	1.259	1.253	1.226	
Volume of Water Vapor	V _{w(std)} - cu. ft.	3.032	3.216	3.508	
Moisture Content	% H ₂ O	5.97	6.34	7.02	6.44
Saturation Moisture	% H ₂ O	28.83	56.00	80.34	
Dry Mole Fraction	M _{fd}	0.940	0.937	0.930	
Gas Molecular Weight, Dry	M _d	28.83	28.83	28.82	
Gas Molecular Weight, Wet	M _s	28.18	28.14	28.06	
Gas Velocity	vs - ft./sec.	68.78	71.37	71.09	70.4
Gas Velocity	m/sec.	20.96	21.75	21.67	
Volumetric Air Flow, Actual	Q _{aw} - ACFM	39,706	41,198	41,040	40,648
Volumetric Air Flow, Actual	m ³ /min	1,124	1,167	1,162	
Volumetric Air Flow, Standard	Q _{sd} - DSCFM	32,229	31,818	30,659	31,569
Volumetric Air Flow, Standard	Nm ³ /min	850	839	808	
Isokinetic Sampling Rate	I %	102.6	103.4	105.1	
FILTERABLE PARTICULATE MATTER EMISSIONS					
Filterable Particulate Catch	mg	1.9	1.9	1.1	
Concentration	gr/DSCF	0.00061	0.00062	0.00037	0.00053
Mass Emission Rate	lb/hr	0.17	0.17	0.10	0.14
Mass Emission Rate	lbs./ODT	0.0043	0.0042	0.0024	0.0036
CONDENSABLE PARTICULATE MATTER EMISSIONS					
Condensable Particulate Catch	mg	2.1	1.6	2.5	
Concentration	gr/DSCF	0.0007	0.0005	0.0008	0.0007
Mass Emission Rate	lb/hr	0.19	0.14	0.22	0.18
Mass Emission Rate	lbs./ODT	0.0047	0.0035	0.0054	0.0046
TOTAL PARTICULATE MATTER EMISSIONS					
Mass Emission Rate	lb/hr	0.36	0.31	0.31	0.32
Mass Emission Rate	lbs./ODT	0.0090	0.0077	0.0078	0.0082

APPENDIX III-B
Method 5-Method 202 Laboratory Report

RESOLUTION ANALYTICS, INC.

Specialists in Air Emissions Analysis

ANALYTICAL REPORT

CLIENT: **AIR CONTROL TECHNIQUES, INC.**

PROJECT: **2333**

ANALYTICAL SERVICES PROVIDED:

- **FILTERABLE & CONDENSIBLE PARTICULATE MATTER**
(EPA METHOD 5/202)

Confirmation of Data Review:

The analytical data and results provided in this report have been checked thoroughly for accuracy, has been performed and validated in accordance with the approved methods, and relate only to the samples provided for this project report.

The results contained herein shall not be reproduced except in full, without written approval of Resolution Analytics.

Date of Review: **March 12, 2019**



J. Bruce Nemet
Quality Assurance Officer

www.resolutionanalytics.com
208 Technology Park Lane, Ste 110, Fuquay-Varina, NC 27526



Client: Air Control Techniques
RFA #: 2333
Method: EPA M5

Report Summary

SAMPLE ID	TOTAL FILTERABLE PARTICULATE
Limit of Detection	0.2 mg
Acetone Blank	0.0 mg (in 144 mls)
S5-M5/202-1	1.9 mg
S5-M5/202-2	1.9 mg
S5-M5/202-3	1.1 mg

RESOLUTION ANALYTICS, INC.

Specialists in Air Emissions Analysis

Client: Air Control Techniques
RFA #: 2333
Method: M202

Report Summary

SAMPLE ID	Organic CPM	Inorganic CPM	Total CPM ¹
Limit of Detection	0.1 mg	0.1 mg	0.2 mg
Acetone Blank			0.0 mg (in 144 ml)
Hexane Blank			0.0 mg (in 70 ml)
DI H ₂ O Blank			0.0 mg (in 146 ml)
M5/202-PB	1.2 mg	0.0 mg	1.2 mg
M5/202-FB	1.1 mg	0.0 mg	1.1 mg
S5-M5/202-1	1.9 mg	1.3 mg	2.1 mg
S5-M5/202-2	1.9 mg	0.8 mg	1.6 mg
S5-M5/202-3	2.6 mg	1.0 mg	2.5 mg

¹ Total Condensible Particulate Matter (CPM) results have been Field Blank corrected up to a maximum of 2.0 mg.



Control Techniques, P.C.

301 East Durham Road
Cary, North Carolina 27513

Office (919) 460-7811
Fax (919) 460-7857

2333: M5/202 S5
Page 4 of 14

Chain of Custody / Transmittal

JOB #: 2333 **PO# -** 9034-2333

TO: Resolution Analytics, Inc. Attn: Jeff Coppedge (919) 346-5740

208 Technology Park Lane Suite 110

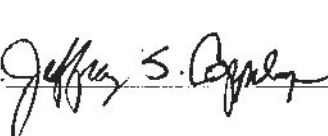
Fuquay Varina, North Carolina 27526

Samples sent by: Todd Brozell Date 3/8/19

SAMPLE NUMBER	COMPONENTS	ANALYSIS
S5-M5/202-1,2,3 PC5ABC	<ul style="list-style-type: none">• M5 Filter• F$\frac{1}{2}$ Acetone Rinse• B$\frac{1}{2}$ Acetone/Hexane Rinse• CPM Filter• Impinger Catch and DI Rinse	Total Particulate by Methods 5/202
M5/202-FB Field Blank	<ul style="list-style-type: none">• B$\frac{1}{2}$ Acetone/Hexane Rinse• CPM Filter• Impinger Catch and DI Rinse	Total Particulate by Methods 5/202
M5/202-PB Proof Blank	<ul style="list-style-type: none">• B$\frac{1}{2}$ Acetone/Hexane Rinse• CPM Filter• Impinger Catch and DI Rinse	Total Particulate by Methods 5/202
Blanks	<ul style="list-style-type: none">• Acetone Blank M5• Hexane Blank M202• DI H₂O Blank M202	Total Particulate by Methods 5/202

Five Day Turnaround
Results by 3/15/19

Relinquished by:  Date 3/8/19

Received by:  Date 3/8/19

send results to David & John



Client: Air Control Techniques
RFA #: 2333
Date Received: 3/8/19
Date Analyzed: 3/8/19
Analyst: JSC
Analysis: EPA M5
Analyte(s): Filterable PM

Analytical Narrative

Sample Matrix & Components:

Dry Filters, Front¹/₂ Acetone Rinses, Acetone Blank

Summary of Sample Prep:

The acetone rinses were transferred to pre-tared teflon "baggies" in a low humidity environment. The acetone rinses were evaporated then desiccated for 24 hours, after which time they were weighed daily every six hours until consecutive weights agreed within ± 0.5 mg. The filters were baked 2 to 3 hours at 105° C, cooled in a desiccator and weighed.

All weights were recorded to the nearest 0.1 mg and include filterable particulate catch only. The acetone blank catch has been subtracted from sample rinse catches in proportion with their respective volumes.

Summary of Instrumentation:

Denver model Pinnacle Series analytical balance

Analytical Detection Limit(s): 0.1 mg per fraction

Miscellaneous Comments Regarding Sample Analysis: (Note unusual catch weights, interferences, odd sample behavior, and steps taken to confirm unusual results. Also note any deviations from standard analytical procedures, together with justification and possible affect on results. Specify samples when applicable.)

No modifications to EPA Method 5 analytical procedure were made. See data sheets for individual sample descriptions.

PARTICULATE SAMPLING LABORATORY RESULTS

Client: Air Control Techniques				RFA #: 2333			
Method: EPA M5							
Run Number		S5-M5/202-1		S5-M5/202-2		S5-M5/202-3	
Filter Container #							
<u>Date</u>		<u>Init</u>		<u>Date</u>			<u>Date</u>
3/11/19		JSC	0.4410	3/11/19		0.4562	3/11/19
Baggie Tare Wt., g.			0.0000			0.0000	0.4498
Filter Tare Wt., g.			0.0000			0.0000	0.0000
83Q-14973			0.4413	83Q-14974		0.4565	83Q-14977
FILTER SAMPLE WT., g.			0.4413			0.4565	0.4499
*Filter Fragments In Rinse(Yes, No)?			-0.0003 *			-0.0003 *	-0.0001 *
			NO			NO	NO
Front ½ Rinse Container #							
<u>Date</u>		<u>Init</u>	182	<u>Date</u>		2380	<u>Date</u>
							3820
3/12/19		JSC F	3.6050	3/12/19 F		3.2566	3/12/19 F
3/11/19		JSC	3.6055	3/11/19		3.2570	3/11/19
Tare Wt., g.		(160 ml)	3.6031	(110 ml)		3.2547	(110 ml)
RINSE SAMPLE WT., g.			0.0019			0.0019	0.0011
Filter Catch, mg.			0.0 **			0.0 **	0.0 **
Rinse Catch, mg.			1.9			1.9	1.1
Rinse Blank Residue, mg.			0.0			0.0	0.0
Net Rinse Catch, mg.			1.9			1.9	1.1
FILTERABLE PARTICULATE, mg.			1.9			1.9	1.1
**Negative results adjusted to zero.							

Legend: F = Final Weight

Notes & Comments: No visible catch on filters.

REAGENT BLANK LABORATORY RESULTS**Client: Air Control Techniques**
Method: EPA M5**RFA #: 2333****Run Number**

Acetone Blank

Sample ID/Container #

2313

Date

Init

3/12/19

JSC

F

3.4515

3/11/19

JSC

3.4518

Tare Wt., g.

(

144

ml)

3.4515

SAMPLE WT., g.

0.0000

Blank Beaker # 2313

Final wt., mg. 3.4515

Tare wt., mg. 3.4515

Residue, mg. 0.0

Volume, ml. 144

Density, mg/ml 785.0

Conc., mg/mg 0.00E+00 ✓

Upper Limit, mg 1.00E-05

Legend: F = Final Weight

Notes & Comments:



Client: Air Control Techniques
RFA #: 2333
Date Received: 3/8/19
Date Analyzed: 3/8/19
Analyst: JSC
Analysis: M202
Analyte(s): Condensible PM

Analytical Narrative

Sample Matrix & Components:

H₂O liquid impinger samples, organic impinger rinses, CPM filter, reagent blanks

Summary of Sample Prep and Analysis:

The samples were received in the lab at a temperature of less than 85° F, and logged in our custody records. The teflon filters were each sonicated/extracted 3 times with DI H₂O, then 3 times with hexane. The extract was added to the appropriate sample fraction. The impinger contents were extracted 3 times with hexane and the extracts were combined with the organic rinses, then evaporated in pretared teflon baggies. The water fraction was evaporated in pretared teflon baggies to near dryness at 105° C, then at ambient until completely dry. When needed, the water fractions were resuspended in 50 mls DI H₂O, titrated with 0.1 N NH₄OH until acid neutralization, and then evaporated using the same procedure as before. Samples were then desiccated for 24 hours and weighed at a minimum of 6 hour intervals to constant weight. All weights were recorded to the nearest 0.1 mg. Where field blanks have been provided, samples have been blank corrected up to a maximum of 2.0 mg.

Summary of Instrumentation:

Denver model Pinnacle Series analytical balance

Analytical Detection Limit(s): 0.1 mg per fraction

Miscellaneous Comments Regarding Sample Analysis: (Note unusual catch weights, interferences, odd sample behavior, and steps taken to confirm unusual results. Also note any deviations from standard analytical procedures, together with justification and possible affect on results. Specify samples when applicable).

No modifications to M202 analytical procedure were made. See data sheets for individual sample notes and comments.

CONDENSIBLE PARTICULATE MATTER LABORATORY RESULTS

Client: Air Control Techniques Method: M202				RFA #: 2333			
Run Number		S5-M5/202-1		S5-M5/202-2		S5-M5/202-3	

Acetone/Hexane Container #			3129			2573		2324
	Date	Init		Date		Date		

	3/12/19	JSC	F	3.6569	3/12/19	F	3.6121	3/12/19	F	3.5819
	3/11/19	JSC		3.6572	3/11/19		3.6124	3/11/19		3.5820
Tare Wt., g.				3.6550			3.6102			3.5793
RINSE SAMPLE WT., g.				0.0019			0.0019			0.0026

DI H ₂ O Container #			853			2744		3359
	Date	Init		Date		Date		

	3/12/19	JSC	F	3.6692	3/12/19	F	3.6850	3/12/19	F	3.7220
	3/11/19	JSC		3.6696	3/11/19		3.6851	3/11/19		3.7224
Tare Wt., g.				3.6679			3.6842			3.7210
RINSE SAMPLE WT., g.				0.0013			0.0008			0.0010

Organic CPM Mass, mg.	1.9	1.9	2.6
Inorganic CPM Mass, mg	1.3	0.8	1.0
Volume of NH ₄ OH Added (N=0.1), ml			
Correction For NH ₃ Added, mg	0.00	0.00	0.00
Adjusted Inorganic CPM Mass, mg	1.3	0.8	1.0
Total CPM Mass, mg *	2.1	1.6	2.5

* Total CPM Mass results have been Field Train Blank corrected up to a maximum of 2.0 mg.

Notes & Comments:

FIELD TRAIN BLANK LABORATORY RESULTS

Client: Air Control Techniques Method: M202		RFA #: 2333
Run Number	M5/202-PB	

Acetone/Hexane Container # 2393

Date	Init
------	------

	3/12/19	JSC	F	3.3950
	3/11/19	JSC		3.3953
Tare Wt., g.				3.3938
RINSE SAMPLE WT., g.				0.0012

DI H₂O Container # 3565

Date	Init
------	------

	3/12/19	JSC	F	3.6196
	3/11/19	JSC	F	3.6196
Tare Wt., g.				3.6196
RINSE SAMPLE WT., g.				0.0000

Organic CPM Mass, mg.	1.2
Inorganic CPM Mass, mg	0.0
Volume of NH ₄ OH Added (N=0.1), ml	
Correction For NH ₃ Added, mg	0.00
Adjusted Inorganic CPM Mass, mg	0.0
Total Proof Blank CPM Mass, mg	1.2

Notes & Comments:

FIELD TRAIN BLANK LABORATORY RESULTS

Client: Air Control Techniques Method: M202		RFA #: 2333
Run Number	M5/202-FB	

Acetone/Hexane Container # 2140

Date	Init
------	------

	3/12/19	JSC	F	3.7691
	3/11/19	JSC		3.7694
Tare Wt., g.				3.7680
RINSE SAMPLE WT., g.				0.0011

DI H₂O Container # 3017

Date	Init
------	------

	3/12/19	JSC	F	3.5917
	3/11/19	JSC	F	3.5917
Tare Wt., g.				3.5917
RINSE SAMPLE WT., g.				0.0000

Organic CPM Mass, mg.	1.1
Inorganic CPM Mass, mg	0.0
Volume of NH ₄ OH Added (N=0.1), ml	
Correction For NH ₃ Added, mg	0.00
Adjusted Inorganic CPM Mass, mg	0.0
Total Field Train Blank CPM Mass, mg	1.1

Notes & Comments:

FIELD REAGENT BLANK LABORATORY RESULTS

Client: Air Control Techniques Method: M202		RFA #: 2333	
Run Number	Acetone	Hexane	DI H ₂ O

Container #	<div style="display: flex; justify-content: space-between;"> <div style="border-bottom: 1px solid black; width: 45%;"></div> <div style="border-bottom: 1px solid black; width: 45%;"></div> </div>	<div style="display: flex; justify-content: space-between;"> <div style="border-bottom: 1px solid black; width: 45%;"></div> <div style="border-bottom: 1px solid black; width: 45%;"></div> </div>	<div style="display: flex; justify-content: space-between;"> <div style="border-bottom: 1px solid black; width: 45%;"></div> <div style="border-bottom: 1px solid black; width: 45%;"></div> </div>
	Date	Init	Date

	2313	4014	2848
--	------	------	------

	3/12/19	JSC	F	3.4515	3/12/19	F	3.6513	3/12/19	3.6479
	3/11/19	JSC		3.4518	3/11/19	F	3.6513	3/11/19	F
Tare Wt., g.		(144	ml)	3.4515	(70	ml)	3.6513	(146	ml)
SAMPLE WT., g.				0.0000			0.0000		0.0000

Field Reagent Blank Mass, mg	0.0	0.0	0.0
Field Reagent Blank Concentration, mg/mg	0.00E+00	0.00E+00	0.00E+00

Notes & Comments:

✓

RFA #: 2333
Method: 5

Date Received: 3/8/19
Date Analyzed: 3/8/19

[illegible]

QT ✓

Date Received: 3/8/19
Date Analyzed: 3/8/19

[illegible]

APPENDIX III-C
CEMs Data Sheets

Enviva - Greenwood		RCO 1 (South)			
Parameters	Units	Run 1	Run 2	Run 3	Average
Date		7-Mar-19	7-Mar-19	7-Mar-19	
Run Time		0910-1015	1108-1222	1304-1418	
Oxygen	%	20.70	20.70	20.53	20.64
Moisture	%	5.97	6.34	7.02	6.44
Volumetric Flow Rate, Std	DSCFM	32,231	31,820	30,659	31,570
Pellet Moisture Content	%	5.16	4.69	4.14	4.66
Process Rate	ODT/hr	39.5	40.3	40.5	40.1
VOC Emissions	Units	Run 1	Run 2	Run 3	Average
Concentration (actual)	ppmv _w as C ₃	5.19	4.48	8.85	6.17
Concentration (dry)	ppmv _d as C ₃	5.52	4.78	9.52	6.61
Emission Factor (propane)	lb/ODT as C ₃ H ₈	0.031	0.026	0.049	0.035
Emission Rate (propane)	lb/hr as C₃H₈	1.2	1.0	2.0	1.4
NOx Emissions	Units	Run 1	Run 2	Run 3	Average
Concentration (dry)	ppm _{vd}	1.03	1.21	1.16	1.13
Emission Factor	lb/ODT	0.0060	0.0069	0.0063	0.0064
Emission Rate	lb/hr	0.24	0.28	0.26	0.26
CO Emissions	Units	Run 1	Run 2	Run 3	Average
Concentration (dry)	ppm _{vd}	16.68	17.93	16.73	17.11
Emission Factor	lb/ODT	0.059	0.062	0.055	0.059
Emission Rate	lb/hr	2.3	2.5	2.2	2.4

Facility: Enviva - Greenwood
Date: 3/7/19

Source: RCO 1 (South)

HAP		Methanol	Acetaldehyde	Formaldehyde	HCl	
Formula		CH ₄ O	CH ₃ CHO	CH ₂ O	C ₆ H ₆	
Mol Weight	lb/lb mole	32.04	44.05	30.31	36.46	
Response Factor		0.65	1.00	0.00	0.00	
Run 1						
Conc	ppm wet	0.00	0.00	0.00	0.00	
Conc	ppm dry	0.00	0.00	0.00	0.00	5.97 % Moisture
Mass Emissions	lb/hr	0.00	0.00	0.00	0.00	32,231 DSCFM
Emission Factor	lb/ton material	0.00	0.00	0.00	0.00	39.5 ODT/hr
Run 2						
Conc	ppm wet	0.00	0.00	0.00	0.00	
Conc	ppm dry	0.00	0.00	0.00	0.00	6.34 % Moisture
Mass Emissions	lb/hr	0.00	0.00	0.00	0.00	31,820 DSCFM
Emission Factor	lb/ton material	0.00	0.00	0.00	0.00	40.3 ODT/hr
Run 3						
Conc	ppm wet	0.19	0.00	0.00	0.00	
Conc	ppm dry	0.20	0.00	0.00	0.00	7.02 % Moisture
Mass Emissions	lb/hr	0.031	0.00	0.00	0.00	30,659 DSCFM
Emission Factor	lb/ton material	0.00077	0.00	0.00	0.00	40.5 ODT/hr
Averages						
Conc	ppm wet	0.06	0.00	0.00	0.00	
Conc	ppm dry	0.07	0.00	0.00	0.00	6.44 % Moisture
Mass Emissions	lb/hr	0.010	0.00	0.00	0.00	31,570 DSCFM
Emission Factor	lb/ton material	0.00026	0.00	0.00	0.00	
ND values						

Enviva - Greenwood
RCO 1 (South)

Date: 7-Mar-19
Run Time: 0910-1015

Run 1

Parameter	Symbol	O ₂ %	CO ₂ %	CO ppm	NOx ppm	THC ppm (as C ₃ H ₈)
Analyzer Calibration Error - Calibration Standards						
Zero Gas	$C_{v, zero}$	0.0	0.0	0.0	0.0	0.0
Low-Level Gas	$C_{v, low}$	N/A	N/A	N/A	N/A	25.74
Mid-Level Gas	$C_{v, mid}$	11.05	9.952	46.1	49.8	50.18
High-Level Gas	$C_{v, high}$	21.80	18.20	89.5	89.5	85.84
Calibration Span	CS	21.80	18.20	89.5	89.5	100
Analyzer Calibration Error - Instrument Response						
Zero Gas	$C_{Dir, zero}$	-0.01	0.00	-0.03	0.1	0.1
Low-Level Gas	$C_{Dir, low}$	N/A	N/A	N/A	N/A	27.3
Mid-Level Gas	$C_{Dir, mid}$	11.005	10.058	45.6	49.5	49.85
High-Level Gas	$C_{Dir, high}$	21.73	18.12	89.5	89.5	85.75
Analyzer Calibration Error - Results (Percent of Span)						
Zero Gas	ACE_{zero}	-0.1	0.0	0.0	0.1	0.1
Low-Level Gas	ACE_{low}	N/A	N/A	N/A	N/A	6.1
Mid-Level Gas	ACE_{mid}	-0.2	0.6	-0.6	-0.3	-0.7
High-Level Gas	ACE_{high}	-0.3	-0.4	0.0	0.0	-0.1
Specification	ACE_{spec}	±2	±2	±2	±2	±5
System Calibrations - Instrument Response						
Initial Zero	$C_{s, zero (pre)}$	0.02	-0.01	0.01	-0.1	-0.3
Final Zero	$C_{s, zero (post)}$	0.06	0.00	0.9	-0.4	-0.6
Upscale Gas Standard	C_{MA}	21.80	18.20	46.1	49.8	50.2
Initial Upscale	$C_{v, up (pre)}$	21.66	17.82	47.8	49.7	50
Final Upscale	$C_{v, up (post)}$	21.722	17.99	47.23	47.8	50.14
System Bias - Results (Percent)						
Zero (pre)	$SB_{i (zero)}$	0.1	0.0	0.0	-0.1	-0.4
Zero (post)	$SB_{final (zero)}$	0.3	0.0	1.0	-0.5	-0.7
Upscale (pre)	$SB_{i (upscale)}$	-0.3	-1.6	2.5	0.2	0.1
Upscale (post)	$SB_{final (upscale)}$	-0.1	-0.7	1.8	-1.9	0.3
Specification	SB_{spec}	±5	±5	±5	±5	NA
System Drift - Results (Percent)						
Zero	D_{zero}	0.2	0.0	1.0	0.4	-0.3
Upscale	$D_{upscale}$	0.3	0.9	0.6	2.1	0.1
Specification	D_{spec}	±3	3.0	3.0	3.0	±3
Response Test - Results (seconds)						
Upscale Test		35	40	30	35	NA
Zero Test		35	35	30	35	NA
Response Time		35	40	30	35	25
Calibration Correction						
Raw Average	C_{ave}	20.60	0.00	17.48	0.79	5.19
Bias Average - Zero	C_0	0.04	0.00	0.46	-0.22	N/A
Bias Average - Upscale	C_M	21.69	17.90	47.52	48.75	N/A
Corrected Run Average	C_{Gas}	20.70	0.00	16.68	1.03	5.19

Enviva - Greenwood
RCO 1 (South)

Date: 7-Mar-19
Run Time: 1108-1222

Run 2

Parameter	Symbol	O ₂ %	CO ₂ %	CO ppm	NOx ppm	THC ppm (as C ₃ H ₈)
Analyzer Calibration Error - Calibration Standards						
Zero Gas	$C_{v, zero}$	0.0	0.0	0.0	0.0	0.0
Low-Level Gas	$C_{v, low}$	N/A	N/A	N/A	N/A	25.7
Mid-Level Gas	$C_{v, mid}$	11.1	10.0	46.1	49.8	50.2
High-Level Gas	$C_{v, high}$	21.8	18.2	89.5	89.5	85.8
Calibration Span	CS	21.8	18.2	89.5	89.5	100
Analyzer Calibration Error - Instrument Response						
Zero Gas	$C_{Dir, zero}$	0.0	0.0	0.0	0.1	0.1
Low-Level Gas	$C_{Dir, low}$	N/A	N/A	N/A	N/A	27.3
Mid-Level Gas	$C_{Dir, mid}$	11.0	10.1	45.6	49.5	49.9
High-Level Gas	$C_{Dir, high}$	21.7	18.1	89.5	89.5	85.8
Analyzer Calibration Error - Results (Percent of Span)						
Zero Gas	ACE_{zero}	-0.1	0.0	0.0	0.1	0.1
Low-Level Gas	ACE_{low}	N/A	N/A	N/A	N/A	6.1
Mid-Level Gas	ACE_{mid}	-0.2	0.6	-0.6	-0.3	-0.7
High-Level Gas	ACE_{high}	-0.3	-0.4	0.0	0.0	-0.1
Specification	ACE_{spec}	±2	±2	±2	±2	±5
System Calibrations - Instrument Response						
Initial Zero	$C_{s, zero (pre)}$	0.06	0.00	0.90	-0.39	-0.60
Final Zero	$C_{s, zero (post)}$	0.129	0.00	0.5	0.02	-0.2
Upscale Gas Standard	C_{MA}	21.80	18.20	46.1	49.8	50.2
Initial Upscale	$C_{v, up (pre)}$	21.722	17.985	47.23	47.8	50.14
Final Upscale	$C_{v, up (post)}$	21.651	17.7	47.94	48.98	50.6
System Bias - Results (Percent)						
Zero (pre)	$SB_i (zero)$	0.3	0.0	1.0	-0.5	-0.7
Zero (post)	$SB_{final} (zero)$	0.6	0.0	0.6	0.0	-0.3
Upscale (pre)	$SB_i (upscale)$	-0.1	-0.7	1.8	-1.9	0.3
Upscale (post)	$SB_{final} (upscale)$	-0.4	-2.3	2.6	-0.6	0.8
Specification	SB_{spec}	±5	±5	±5	±5	NA
System Drift - Results (Percent)						
Zero	D_{zero}	0.3	0.0	0.4	0.5	0.4
Upscale	$D_{upscale}$	0.3	1.6	0.8	1.3	0.5
Specification	D_{spec}	±3	3.0	3.0	3.0	±3
Response Test - Results (seconds)						
Upscale Test		35	40	30	35	NA
Zero Test		35	35	30	35	NA
Response Time		35	40	30	35	25
Calibration Correction						
Raw Average	C_{ave}	20.60	0.00	18.94	1.00	4.48
Bias Average - Zero	C_0	0.09	0.00	0.70	-0.19	N/A
Bias Average - Upscale	C_M	21.69	17.84	47.59	48.39	N/A
Corrected Run Average	C_{Gas}	20.70	0.00	17.93	1.21	4.48

Enviva - Greenwood
RCO 1 (South)

Date: 7-Mar-19
Run Time: 1304-1418

Run 3

Parameter	Symbol	O ₂ %	CO ₂ %	CO ppm	NOx ppm	THC ppm (as C ₃ H ₈)
Analyzer Calibration Error - Calibration Standards						
Zero Gas	$C_{v, zero}$	0.0	0.0	0.0	0.0	0.0
Low-Level Gas	$C_{v, low}$	N/A	N/A	N/A	N/A	25.7
Mid-Level Gas	$C_{v, mid}$	11.1	10.0	46.1	49.8	50.2
High-Level Gas	$C_{v, high}$	21.8	18.2	89.5	89.5	85.8
Calibration Span	CS	21.80	18.20	89.5	89.5	100.0
Analyzer Calibration Error - Instrument Response						
Zero Gas	$C_{Dir, zero}$	0.0	0.0	0.0	0.1	0.10
Low-Level Gas	$C_{Dir, low}$	N/A	N/A	N/A	N/A	27.3
Mid-Level Gas	$C_{Dir, mid}$	11.0	10.1	45.6	49.5	49.9
High-Level Gas	$C_{Dir, high}$	21.7	18.1	89.5	89.5	85.8
Analyzer Calibration Error - Results (Percent of Span)						
Zero Gas	ACE_{zero}	-0.1	0.0	0.0	0.1	0.1
Low-Level Gas	ACE_{low}	N/A	N/A	N/A	N/A	6.1
Mid-Level Gas	ACE_{mid}	-0.2	0.6	-0.6	-0.3	-0.7
High-Level Gas	ACE_{high}	-0.3	-0.4	0.0	0.0	-0.1
Specification	ACE_{spec}	±2	±2	±2	±2	±5
System Calibrations - Instrument Response						
Initial Zero	$C_{s, zero (pre)}$	0.13	0.00	0.50	0.02	-0.20
Final Zero	$C_{s, zero (post)}$	0.025	0.00	0.37	-0.09	-0.45
Upscale Gas Standard	C_{MA}	21.80	18.20	46.1	49.8	50.2
Initial Upscale	$C_{v, up (pre)}$	21.651	17.7	47.94	48.98	50.6
Final Upscale	$C_{v, up (post)}$	21.755	17.94	47.31	49.16	49.1
System Bias - Results (Percent)						
Zero (pre)	$SB_i (zero)$	0.6	0.0	0.6	0.0	-0.3
Zero (post)	$SB_{final} (zero)$	0.2	0.0	0.4	-0.2	-0.6
Upscale (pre)	$SB_i (upscale)$	-0.4	-2.3	2.6	-0.6	0.8
Upscale (post)	$SB_{final} (upscale)$	0.1	-1.0	1.9	-0.4	-0.8
Specification	SB_{spec}	±5	±5	±5	±5	NA
System Drift - Results (Percent)						
Zero	D_{zero}	0.5	0.0	0.1	0.1	-0.3
Upscale	$D_{upscale}$	0.5	1.3	0.7	0.2	-1.5
Specification	D_{spec}	±3	3.0	3.0	3.0	±3
Response Test - Results (seconds)						
Upscale Test		35	40	30	35	NA
Zero Test		35	35	30	35	NA
Response Time		35	40	30	35	25
Calibration Correction						
Raw Average	C_{ave}	20.53	0.01	17.56	1.11	8.85
Bias Average - Zero	C_0	0.08	0.00	0.44	-0.04	N/A
Bias Average - Upscale	C_M	21.70	17.82	47.63	49.07	N/A
Corrected Run Average	C_{Gas}	20.53	0.01	16.73	1.16	8.85

Test Run 1 Begin. STRATA Version 3.2.112

Operator: ACTPC

Plant Name Enviva Greenwood

Location: RCO 1 - Exhaust

Start Averaging		O2 % dry	CO2 % dry	THC ppm	NOx ppm	CO ppm
3/7/2019	9:10:31	20.569	0.008	10.97	1.11	18.92
3/7/2019	9:11:31	20.573	0.01	3.97	1.06	19.22
3/7/2019	9:12:32	20.579	0.007	3.63	1.08	18.35
3/7/2019	9:13:32	20.585	0.004	11.71	1.05	17.97
3/7/2019	9:14:31	20.586	0.003	3.7	1.03	18.25
3/7/2019	9:15:32	20.584	0.002	2.19	1.08	17.39
3/7/2019	9:16:32	20.583	-0.003	9.01	1.02	17.19
3/7/2019	9:17:31	20.581	-0.002	2.66	1.02	17.47
3/7/2019	9:18:31	20.58	-0.002	2.05	1.02	16.76
3/7/2019	9:19:32	20.59	-0.001	9.43	1	16.72
3/7/2019	9:20:31	20.594	0	3.02	0.97	17.26
3/7/2019	9:21:31	20.597	-0.003	2.68	0.97	16.75
3/7/2019	9:22:32	20.607	0	10.49	0.95	16.76
3/7/2019	9:23:32	20.601	-0.002	4.42	0.9	17.23
3/7/2019	9:24:31	20.601	0	2.98	0.96	16.61
3/7/2019	9:25:32	20.588	-0.002	9.44	0.97	16.6
3/7/2019	9:26:31	20.586	0.002	2.34	0.98	17.29
3/7/2019	9:27:31	20.585	-0.003	1.66	0.99	17.13
3/7/2019	9:28:31	20.591	0	9.02	0.97	17.59
3/7/2019	9:29:32	20.58	0.005	2.76	0.94	18.35
3/7/2019	9:30:31	20.584	0.003	2.25	0.97	18.05
3/7/2019	9:31:31	20.59	0.003	10.75	0.93	18.12
3/7/2019	9:32:31	20.592	0.004	3.63	0.92	18.67
3/7/2019	9:33:31	20.601	0.003	3.28	0.97	18.22
3/7/2019	9:34:32	20.603	0.003	10.88	0.97	18.05
3/7/2019	9:35:31	20.586	-0.001	3.22	0.97	18.51
3/7/2019	9:36:31	20.586	0.002	1.93	0.95	17.95
3/7/2019	9:37:31	20.585	-0.001	9.87	0.9	17.9
3/7/2019	9:38:32	20.583	0.001	2.42	0.9	18.52
3/7/2019	9:39:31	20.586	0.002	1.65	0.9	18.11
3/7/2019	9:40:32	20.594	-0.002	9.46	0.89	17.89
3/7/2019	9:41:31	20.593	0.004	3.24	0.88	18.02
3/7/2019	9:42:31	20.603	-0.001	2.62	0.9	17.04
3/7/2019	9:43:31	20.615	-0.003	10.15	0.85	16.45
3/7/2019	9:44:32	20.622	-0.001	3.81	0.83	16.71
3/7/2019	9:45:31	20.613	-0.003	3.06	0.81	16.23
3/7/2019	9:46:32	20.614	-0.002	9.44	0.76	16.36
3/7/2019	9:47:31	20.605	-0.002	2.76	0.75	16.99
3/7/2019	9:48:31	20.6	-0.003	2	0.78	16.55
3/7/2019	9:49:31	20.605	-0.001	9.23	0.72	16.58
3/7/2019	9:50:32	20.601	-0.001	2.43	0.66	17.28
3/7/2019	9:51:31	20.604	-0.002	1.93	0.66	17.11
3/7/2019	9:52:31	20.607	0.002	9.59	0.66	17.38

Test Run 1 Begin. STRATA Version 3.2.112

Operator: ACTPC

Plant Name Enviva Greenwood

Location: RCO 1 - Exhaust

		O2	CO2	THC	NOx	CO
3/7/2019	9:53:32	20.615	-0.002	3.92	0.64	17.88
3/7/2019	9:54:31	20.616	-0.002	3.49	0.62	17.28
3/7/2019	9:55:31	20.619	0.002	10.76	0.61	17.1
3/7/2019	9:56:31	20.611	-0.001	3.11	0.55	17.62
3/7/2019	9:57:32	20.604	-0.001	1.79	0.59	17.28
3/7/2019	9:58:32	20.607	-0.002	9.22	0.57	17.43
3/7/2019	9:59:31	20.601	-0.002	2.85	0.55	17.89
3/7/2019	10:00:32	20.604	-0.002	2	0.5	17.18
3/7/2019	10:01:31	20.609	-0.003	9.85	0.36	17.01
3/7/2019	10:02:32	20.616	-0.002	2.88	0.25	17.53
3/7/2019	10:03:31	20.619	-0.002	2.52	0.25	17.18
3/7/2019	10:04:31	20.63	-0.003	10.09	0.3	17.14
3/7/2019	10:05:32	20.629	-0.002	4.26	0.41	17.37
3/7/2019	10:06:31	20.624	-0.003	3.44	0.5	16.77
3/7/2019	10:07:31	20.616	-0.002	9.79	0.55	16.9
3/7/2019	10:08:32	20.606	-0.002	2.39	0.6	17.7
3/7/2019	10:09:31	20.608	-0.001	1.65	0.64	17.55
3/7/2019	10:10:32	20.613	-0.003	9.07	0.66	17.63

Test Run 2 Begin. STRATA Version 3.2.112**Operator: ACTPC****Plant Nam Enviva Greenwood****Location: RCO 1 - Exhaust**

Start Averaging		O2 % dry	CO2 % dry	THC ppm	NOx ppm
3/7/2019	11:12:20	20.608	-0.002	2.07	1.09
3/7/2019	11:13:19	20.602	0.001	7.96	1.03
3/7/2019	11:14:20	20.601	-0.002	1.89	1.04
3/7/2019	11:15:20	20.603	-0.001	1.12	1.03
3/7/2019	11:16:20	20.61	-0.002	8.23	1.03
3/7/2019	11:17:20	20.602	-0.003	2.59	1
3/7/2019	11:18:20	20.619	-0.001	3.59	1.03
3/7/2019	11:19:20	20.616	-0.002	9.89	1.07
3/7/2019	11:20:19	20.607	-0.001	3.41	1.06
3/7/2019	11:21:20	20.601	0.001	2.13	1.03
3/7/2019	11:22:20	20.598	-0.001	8.36	1.03
3/7/2019	11:23:19	20.594	-0.001	2.28	1
3/7/2019	11:24:20	20.59	0.002	1.14	1.06
3/7/2019	11:25:19	20.601	-0.002	8.2	1.05
3/7/2019	11:26:20	20.605	-0.002	3.18	1.03
3/7/2019	11:27:20	20.622	-0.002	3.58	1.01
3/7/2019	11:28:20	20.636	-0.001	10.37	0.97
3/7/2019	11:29:19	20.622	-0.002	4.95	0.97
3/7/2019	11:30:20	20.6	-0.001	1.99	1.02
3/7/2019	11:31:20	20.594	0	7.65	1.04
3/7/2019	11:32:20	20.589	-0.002	1.33	1.03
3/7/2019	11:33:19	20.585	-0.001	0.26	1.03
3/7/2019	11:34:20	20.593	-0.001	6.99	1.01
3/7/2019	11:35:20	20.59	-0.002	2.28	0.97
3/7/2019	11:36:20	20.592	0.001	1.46	1.02
3/7/2019	11:37:20	20.609	-0.002	9.51	1.01
3/7/2019	11:38:19	20.623	-0.002	5.04	0.97
3/7/2019	11:39:20	20.626	-0.001	4.23	0.97
3/7/2019	11:40:20	20.627	-0.002	10.23	0.93
3/7/2019	11:41:20	20.605	-0.002	4.21	0.93
3/7/2019	11:42:20	20.594	0	1.76	1.02
3/7/2019	11:43:19	20.592	-0.003	8	1.03
3/7/2019	11:44:20	20.585	0	1.85	1.03
3/7/2019	11:45:19	20.587	-0.002	0.86	1.03
3/7/2019	11:46:20	20.606	-0.003	9.42	0.98
3/7/2019	11:47:20	20.612	-0.001	4.35	0.96
3/7/2019	11:48:19	20.607	0	3.37	0.97
3/7/2019	11:49:20	20.598	-0.002	10.05	0.97
3/7/2019	11:50:20	20.591	-0.002	3.46	0.97
3/7/2019	11:51:20	20.593	0	1.45	1.02
3/7/2019	11:52:19	20.582	-0.002	7.5	1.02
3/7/2019	11:53:20	20.584	-0.002	2.62	0.99
3/7/2019	11:54:20	20.595	0.004	2.09	1.03

Test Run 2 Begin. STRATA Version 3.2.112**Operator: ACTPC****Plant Nam Enviva Greenwood****Location: RCO 1 - Exhaust**

		O2	CO2	THC	NOx
3/7/2019	11:55:20	20.592	0.001	9.23	0.98
3/7/2019	11:56:20	20.584	0	1.85	0.98
3/7/2019	11:57:20	20.587	0.002	0.81	1.01
3/7/2019	11:58:20	20.592	-0.003	8.07	0.97
3/7/2019	11:59:19	20.586	-0.002	2.88	0.94
3/7/2019	12:00:20	20.591	0.001	2.1	0.97
3/7/2019	12:01:19	20.597	0.002	9.5	0.97
3/7/2019	12:02:20	20.601	0.004	3.93	0.97
3/7/2019	12:03:20	20.594	-0.001	2.17	0.97
3/7/2019	12:04:20	20.6	-0.001	9.21	0.97
3/7/2019	12:05:20	20.578	-0.001	2.24	0.98
3/7/2019	12:06:20	20.585	-0.002	0.66	1.03
3/7/2019	12:07:20	20.583	-0.003	8.04	1
3/7/2019	12:08:20	20.584	-0.001	2.22	0.97
3/7/2019	12:09:20	20.595	0.002	1.83	1.01
3/7/2019	12:10:19	20.616	-0.002	10.02	0.96
3/7/2019	12:11:20	20.604	-0.002	4.65	0.94
3/7/2019	12:12:20	20.59	-0.002	2.14	1.01
3/7/2019	12:13:20	20.583	-0.001	8.02	1.03
3/7/2019	12:14:19	20.577	-0.001	1.65	1.03
3/7/2019	12:15:20	20.576	-0.002	0.24	1.03
3/7/2019	12:16:20	20.578	-0.003	7.39	1.03

Test Run 3 Begin. STRATA Version 3.2.112**Operator: ACTPC****Plant Nam Enviva Greenwood****Location: RCO 1 - Exhaust**

Start Averaging		O2 % dry	CO2 % dry	THC ppm	NOx ppm	CO ppm
3/7/2019	13:05:07	20.563	-0.001	8.85	1.09	16.51
3/7/2019	13:06:07	20.565	0.005	7.52	1.09	16.35
3/7/2019	13:07:06	20.563	0.003	13.73	1.09	16
3/7/2019	13:08:07	20.548	0.004	8.34	1.09	16.75
3/7/2019	13:09:07	20.546	0.002	5.81	1.11	16.9
3/7/2019	13:10:07	20.548	0.003	10.96	1.14	16.75
3/7/2019	13:11:06	20.542	0.001	7.38	1.09	17.68
3/7/2019	13:12:07	20.536	0.005	5.52	1.13	17.33
3/7/2019	13:13:07	20.541	0.003	11.84	1.14	16.89
3/7/2019	13:14:07	20.538	0.014	7.68	1.09	17.69
3/7/2019	13:15:07	20.543	0.006	6.34	1.14	17.66
3/7/2019	13:16:07	20.553	0.004	12.59	1.12	17.25
3/7/2019	13:17:07	20.548	0.003	9.02	1.09	17.9
3/7/2019	13:18:07	20.543	0.003	6.58	1.17	17.48
3/7/2019	13:19:06	20.531	0.004	11.99	1.22	17.07
3/7/2019	13:20:07	20.533	0.002	7.56	1.19	17.73
3/7/2019	13:21:07	20.527	0.006	5.62	1.16	17.55
3/7/2019	13:22:07	20.543	0.004	11.29	1.17	17
3/7/2019	13:23:07	20.538	0.003	8.31	1.11	17.44
3/7/2019	13:24:06	20.542	0.003	6.65	1.15	16.9
3/7/2019	13:25:07	20.546	-0.001	12.76	1.1	16.25
3/7/2019	13:26:07	20.549	0.004	9.03	1.09	16.68
3/7/2019	13:27:07	20.548	0.002	7.3	1.09	16.44
3/7/2019	13:28:07	20.547	0.003	12.35	1.09	16.1
3/7/2019	13:29:07	20.542	0.001	8.34	1.09	16.78
3/7/2019	13:30:07	20.537	0.001	6.13	1.09	16.56
3/7/2019	13:31:06	20.535	0	12.03	1.14	16.18
3/7/2019	13:32:07	20.537	0.004	8.01	1.07	16.81
3/7/2019	13:33:07	20.539	0.001	6.36	1.03	16.79
3/7/2019	13:34:07	20.537	0.003	12.28	1.03	16.74
3/7/2019	13:35:06	20.54	0.001	9	1.03	17.74
3/7/2019	13:36:07	20.54	0.004	7.42	1.03	17.54
3/7/2019	13:37:07	20.534	0.002	13.95	1.03	17.31
3/7/2019	13:38:07	20.53	0.009	9.17	1.03	18.15
3/7/2019	13:39:07	20.518	0.007	6.28	1.06	18.47
3/7/2019	13:40:06	20.515	0.008	12.16	1.09	18.5
3/7/2019	13:41:07	20.514	0.006	8.08	1.05	19.22
3/7/2019	13:42:07	20.517	0.008	6.1	1.09	18.71
3/7/2019	13:43:07	20.515	0.002	12.9	1.09	18.19
3/7/2019	13:44:07	20.516	0.007	8.74	1.08	18.87
3/7/2019	13:45:06	20.52	0.01	6.62	1.08	18.79
3/7/2019	13:46:07	20.526	0.009	12.98	1.09	18.47
3/7/2019	13:47:07	20.527	0.008	9.87	1.04	19.04

Test Run 3 Begin. STRATA Version 3.2.112

Operator: ACTPC

Plant Nam Enviva Greenwood

Location: RCO 1 - Exhaust

		O2	CO2	THC	NOx	CO
3/7/2019	13:48:06	20.53	0.006	7.82	1.09	18.46
3/7/2019	13:49:07	20.524	0.004	13.48	1.09	17.82
3/7/2019	13:50:07	20.513	0.009	8.24	1.09	18.39
3/7/2019	13:51:06	20.514	0.004	6.06	1.14	18.2
3/7/2019	13:52:07	20.523	0.006	11.68	1.14	17.76
3/7/2019	13:53:07	20.514	0.003	7.96	1.09	18.25
3/7/2019	13:54:06	20.523	0.008	6.22	1.1	17.58
3/7/2019	13:55:07	20.527	0.005	12.71	1.1	16.86
3/7/2019	13:56:06	20.526	0.002	8.53	1.06	17.31
3/7/2019	13:57:07	20.534	0.006	6.97	1.09	17.2
3/7/2019	13:58:07	20.531	0.007	12.59	1.11	16.85
3/7/2019	13:59:06	20.523	0.003	8.58	1.09	17.42
3/7/2019	14:00:07	20.509	0.005	5.42	1.13	17.12
3/7/2019	14:01:07	20.507	0.005	11.53	1.15	16.84
3/7/2019	14:02:07	20.506	0.009	7.27	1.15	17.6
3/7/2019	14:03:07	20.508	0.009	5.01	1.15	17.68
3/7/2019	14:04:07	20.508	0.004	10.92	1.15	17.49

Date	Form- aldehyde (ppm)	SEC (ppm)	HCl (ppm)	SEC (ppm)	Methanol (ppm)	SEC (ppm)	acet- aldehyde (ppm)	SEC (ppm)
3/7/2019 8:57	0.061	0.041	0.000	0.051	0.024	0.092	0.000	0.163
3/7/2019 8:58	0.056	0.040	0.000	0.052	0.095	0.090	0.000	0.159
3/7/2019 8:59	0.114	0.040	0.000	0.050	0.065	0.088	0.000	0.158
3/7/2019 9:00	0.198	0.041	0.000	0.053	0.042	0.089	0.000	0.165
3/7/2019 9:01	0.234	0.040	0.000	0.050	0.061	0.088	0.000	0.164
3/7/2019 9:02	0.193	0.039	0.000	0.050	0.099	0.089	0.000	0.157
3/7/2019 9:03	0.079	0.041	0.000	0.051	0.058	0.091	0.000	0.164
3/7/2019 9:04	0.104	0.040	0.000	0.053	0.048	0.087	0.000	0.159
3/7/2019 9:05	0.089	0.041	0.000	0.052	0.056	0.091	0.000	0.164
3/7/2019 9:06	0.049	0.042	0.000	0.052	0.002	0.092	0.000	0.163
3/7/2019 9:07	0.063	0.040	0.000	0.053	0.051	0.088	0.000	0.160
3/7/2019 9:08	0.070	0.040	0.000	0.052	0.035	0.089	0.000	0.161
3/7/2019 9:09	0.035	0.041	0.000	0.051	0.037	0.089	0.000	0.157
3/7/2019 9:10	0.045	0.041	0.000	0.054	0.098	0.085	0.000	0.164
3/7/2019 9:11	0.094	0.040	0.000	0.052	0.070	0.087	0.000	0.165
3/7/2019 9:14	0.046	0.044	0.000	0.055	0.070	0.084	0.000	0.173
3/7/2019 9:16	0.072	0.038	0.000	0.050	0.065	0.086	0.000	0.157
3/7/2019 9:17	0.056	0.041	0.000	0.050	0.063	0.081	0.000	0.158
3/7/2019 9:18	0.072	0.042	0.000	0.049	0.095	0.080	0.000	0.165
3/7/2019 9:19	0.070	0.038	0.000	0.046	0.113	0.077	0.000	0.158
3/7/2019 9:20	0.068	0.038	0.000	0.047	0.068	0.077	0.000	0.154
3/7/2019 9:21	0.104	0.040	0.000	0.051	0.101	0.077	0.000	0.161
3/7/2019 9:22	0.147	0.038	0.000	0.046	0.152	0.079	0.000	0.153
3/7/2019 9:23	0.148	0.037	0.000	0.045	0.086	0.078	0.000	0.149
3/7/2019 9:24	0.047	0.040	0.000	0.051	0.078	0.079	0.000	0.161
3/7/2019 9:25	0.103	0.039	0.000	0.049	0.160	0.078	0.000	0.157
3/7/2019 9:26	0.094	0.040	0.000	0.048	0.086	0.079	0.000	0.162
3/7/2019 9:27	0.032	0.039	0.000	0.049	0.069	0.079	0.000	0.161
3/7/2019 9:28	0.133	0.037	0.000	0.045	0.125	0.081	0.000	0.155
3/7/2019 9:29	0.058	0.039	0.000	0.050	0.098	0.080	0.000	0.161
3/7/2019 9:30	0.073	0.039	0.000	0.047	0.062	0.079	0.000	0.160
3/7/2019 9:31	0.084	0.039	0.000	0.047	0.119	0.079	0.000	0.159
3/7/2019 9:32	0.058	0.039	0.000	0.049	0.094	0.080	0.000	0.158
3/7/2019 9:33	0.127	0.038	0.000	0.049	0.111	0.079	0.000	0.159
3/7/2019 9:34	0.142	0.038	0.000	0.047	0.176	0.078	0.000	0.158
3/7/2019 9:35	0.047	0.040	0.000	0.047	0.093	0.078	0.000	0.162
3/7/2019 9:36	0.095	0.039	0.000	0.050	0.092	0.077	0.000	0.161
3/7/2019 9:37	0.039	0.040	0.000	0.048	0.124	0.078	0.000	0.162
3/7/2019 9:38	0.021	0.039	0.000	0.045	0.081	0.075	0.000	0.159
3/7/2019 9:39	0.090	0.040	0.000	0.051	0.113	0.077	0.000	0.161
3/7/2019 9:40	0.047	0.037	0.000	0.044	0.109	0.076	0.000	0.151
3/7/2019 9:41	0.012	0.038	0.000	0.048	0.061	0.076	0.000	0.155
3/7/2019 9:42	0.084	0.040	0.000	0.052	0.127	0.074	0.000	0.159
3/7/2019 9:43	0.130	0.037	0.000	0.046	0.154	0.075	0.000	0.151
3/7/2019 9:44	0.040	0.040	0.000	0.049	0.051	0.077	0.000	0.151
3/7/2019 9:45	0.022	0.039	0.000	0.049	0.109	0.075	0.000	0.155
3/7/2019 9:46	0.064	0.037	0.000	0.047	0.136	0.074	0.000	0.149
3/7/2019 9:47	0.000	0.038	0.000	0.047	0.121	0.074	0.000	0.155
3/7/2019 9:48	0.021	0.040	0.000	0.049	0.131	0.071	0.000	0.151
3/7/2019 9:49	0.084	0.037	0.000	0.049	0.170	0.074	0.000	0.150

Date	Form- aldehyde (ppm)	SEC (ppm)	HCl (ppm)	SEC (ppm)	Methanol (ppm)	SEC (ppm)	acet- aldehyde (ppm)	SEC (ppm)
3/7/2019 9:50	0.002	0.038	0.000	0.049	0.096	0.074	0.000	0.156
3/7/2019 9:51	0.017	0.039	0.000	0.051	0.116	0.073	0.000	0.159
3/7/2019 9:52	0.079	0.037	0.000	0.048	0.172	0.073	0.000	0.150
3/7/2019 9:53	0.056	0.039	0.000	0.047	0.087	0.072	0.000	0.154
3/7/2019 9:54	0.083	0.039	0.000	0.048	0.095	0.072	0.000	0.158
3/7/2019 9:55	0.078	0.038	0.000	0.047	0.132	0.072	0.000	0.155
3/7/2019 9:56	0.060	0.040	0.000	0.049	0.135	0.074	0.000	0.158
3/7/2019 9:57	0.064	0.040	0.000	0.049	0.092	0.073	0.000	0.159
3/7/2019 9:58	0.109	0.038	0.000	0.046	0.164	0.071	0.000	0.158
3/7/2019 9:59	0.048	0.037	0.000	0.045	0.079	0.071	0.000	0.154
3/7/2019 10:00	0.016	0.038	0.000	0.046	0.110	0.070	0.000	0.154
3/7/2019 10:01	0.043	0.039	0.000	0.048	0.151	0.071	0.000	0.155
3/7/2019 10:02	0.000	0.037	0.000	0.044	0.109	0.071	0.000	0.150
3/7/2019 10:03	0.094	0.038	0.000	0.046	0.124	0.071	0.000	0.155
3/7/2019 10:04	0.100	0.038	0.000	0.050	0.163	0.073	0.000	0.157
3/7/2019 10:05	0.016	0.040	0.000	0.049	0.110	0.073	0.000	0.163
3/7/2019 10:06	0.040	0.040	0.000	0.050	0.124	0.073	0.000	0.159
3/7/2019 10:07	0.084	0.038	0.000	0.049	0.174	0.073	0.000	0.155
3/7/2019 10:08	0.002	0.040	0.000	0.049	0.100	0.074	0.000	0.158
3/7/2019 10:09	0.000	0.039	0.000	0.048	0.144	0.076	0.000	0.157
3/7/2019 10:10	0.057	0.038	0.000	0.045	0.178	0.073	0.000	0.155
3/7/2019 10:11	0.032	0.040	0.000	0.047	0.144	0.072	0.000	0.159
3/7/2019 10:12	0.043	0.038	0.000	0.046	0.124	0.070	0.000	0.161
3/7/2019 10:13	0.000	0.038	0.000	0.047	0.237	0.057	0.000	0.148
3/7/2019 10:14	0.000	0.052	0.099	0.058	0.096	0.042	0.000	0.189
3/7/2019 10:15	0.000	0.049	0.057	0.053	0.092	0.039	0.000	0.183
3/7/2019 10:16	0.000	0.039	0.024	0.044	0.060	0.035	0.000	0.146
3/7/2019 10:17	0.000	0.027	0.000	0.036	0.058	0.027	0.000	0.109
3/7/2019 10:18	0.000	0.028	0.067	0.035	0.030	0.027	0.000	0.106
3/7/2019 10:19	0.000	0.028	0.053	0.035	0.007	0.028	0.000	0.104
3/7/2019 10:20	0.000	0.029	0.053	0.038	0.020	0.026	0.000	0.111
3/7/2019 10:21	0.000	0.026	0.056	0.032	0.042	0.028	0.000	0.102
3/7/2019 10:22	0.000	0.028	0.003	0.035	0.059	0.092	0.000	0.105
3/7/2019 10:23	0.000	0.031	0.017	0.037	-0.238	2.515	0.000	0.130
3/7/2019 10:24	0.000	0.030	0.015	0.035	-0.324	3.047	0.000	0.133
3/7/2019 10:25	0.000	0.031	0.036	0.034	-0.359	3.071	0.000	0.136
3/7/2019 10:26	0.116	0.035	0.080	0.044	0.121	1.301	0.000	0.160
3/7/2019 10:27	0.087	0.038	0.000	0.045	0.135	0.156	0.000	0.155
3/7/2019 10:28	0.098	0.040	0.000	0.051	0.166	0.077	0.000	0.160
3/7/2019 10:29	0.000	0.040	0.000	0.047	0.109	0.072	0.000	0.159
3/7/2019 10:30	0.000	0.039	0.000	0.048	0.107	0.073	0.000	0.157
3/7/2019 10:31	0.016	0.039	0.000	0.050	0.192	0.074	0.000	0.160
3/7/2019 10:32	0.023	0.040	0.000	0.046	0.138	0.073	0.000	0.160
3/7/2019 10:33	0.074	0.040	0.000	0.049	0.127	0.073	0.000	0.157
3/7/2019 10:34	0.185	0.040	0.000	0.050	0.178	0.075	0.000	0.158
3/7/2019 10:35	0.131	0.040	0.000	0.049	0.094	0.073	0.000	0.161
3/7/2019 10:36	0.056	0.038	0.000	0.048	0.138	0.071	0.000	0.157
3/7/2019 10:37	0.054	0.038	0.000	0.047	0.181	0.071	0.000	0.155
3/7/2019 10:38	0.031	0.038	0.000	0.048	0.119	0.074	0.000	0.158
3/7/2019 10:39	0.051	0.039	0.000	0.047	0.107	0.071	0.000	0.157
3/7/2019 10:40	0.092	0.039	0.000	0.048	0.212	0.072	0.000	0.154
3/7/2019 10:41	0.002	0.039	0.000	0.052	0.137	0.072	0.000	0.163

Date	Form- aldehyde (ppm)	SEC (ppm)	HCl (ppm)	SEC (ppm)	Methanol (ppm)	SEC (ppm)	acet- aldehyde (ppm)	SEC (ppm)
3/7/2019 10:42	0.013	0.040	0.000	0.049	0.114	0.070	0.000	0.158
3/7/2019 10:43	0.077	0.037	0.000	0.048	0.161	0.074	0.000	0.151
3/7/2019 10:44	0.045	0.040	0.000	0.050	0.143	0.074	0.000	0.156
3/7/2019 10:45	0.044	0.038	0.000	0.048	0.095	0.075	0.000	0.151
3/7/2019 10:46	0.144	0.038	0.000	0.049	0.177	0.075	0.000	0.152
3/7/2019 10:47	0.011	0.040	0.000	0.049	0.115	0.073	0.000	0.156
3/7/2019 10:48	0.000	0.037	0.000	0.045	0.130	0.073	0.000	0.147
3/7/2019 10:49	0.103	0.038	0.000	0.048	0.195	0.072	0.000	0.147
3/7/2019 10:50	0.011	0.038	0.000	0.045	0.099	0.073	0.000	0.151
3/7/2019 10:51	0.032	0.040	0.000	0.049	0.126	0.073	0.000	0.158
3/7/2019 10:52	0.101	0.037	0.000	0.046	0.159	0.075	0.000	0.147
3/7/2019 10:53	0.042	0.039	0.000	0.049	0.100	0.075	0.000	0.147
3/7/2019 10:54	0.065	0.038	0.000	0.048	0.122	0.072	0.000	0.157
3/7/2019 10:55	0.035	0.037	0.000	0.046	0.158	0.072	0.000	0.145
3/7/2019 10:56	0.053	0.040	0.000	0.050	0.138	0.074	0.000	0.153
3/7/2019 10:57	0.059	0.038	0.000	0.046	0.119	0.073	0.000	0.151
3/7/2019 10:58	0.089	0.037	0.000	0.046	0.194	0.074	0.000	0.149
3/7/2019 10:59	0.098	0.039	0.000	0.049	0.100	0.072	0.000	0.152
3/7/2019 11:00	0.020	0.038	0.000	0.046	0.160	0.071	0.000	0.147
3/7/2019 11:01	0.071	0.037	0.000	0.044	0.173	0.071	0.000	0.144
3/7/2019 11:02	0.037	0.038	0.000	0.046	0.162	0.069	0.000	0.150
3/7/2019 11:03	0.033	0.038	0.000	0.046	0.152	0.068	0.000	0.151
3/7/2019 11:04	0.078	0.037	0.000	0.045	0.154	0.069	0.000	0.142
3/7/2019 11:05	0.041	0.039	0.000	0.048	0.112	0.069	0.000	0.150
3/7/2019 11:06	0.006	0.039	0.000	0.046	0.144	0.071	0.000	0.148
3/7/2019 11:07	0.051	0.038	0.000	0.050	0.204	0.069	0.000	0.146
3/7/2019 11:08	0.057	0.039	0.000	0.047	0.135	0.070	0.000	0.145
3/7/2019 11:09	0.040	0.039	0.000	0.050	0.115	0.072	0.000	0.153
3/7/2019 11:10	0.057	0.039	0.000	0.053	0.166	0.069	0.000	0.150
3/7/2019 11:11	0.000	0.038	0.000	0.047	0.106	0.073	0.000	0.144
3/7/2019 11:12	0.077	0.037	0.000	0.046	0.103	0.072	0.000	0.144
3/7/2019 11:13	0.040	0.037	0.000	0.046	0.159	0.071	0.000	0.144
3/7/2019 11:14	0.030	0.039	0.000	0.049	0.155	0.073	0.000	0.142
3/7/2019 11:15	0.000	0.039	0.000	0.048	0.148	0.073	0.000	0.148
3/7/2019 11:16	0.086	0.036	0.000	0.046	0.159	0.074	0.000	0.142
3/7/2019 11:17	0.056	0.040	0.000	0.047	0.133	0.074	0.000	0.149
3/7/2019 11:18	0.044	0.040	0.000	0.047	0.154	0.073	0.000	0.150
3/7/2019 11:19	0.026	0.037	0.000	0.046	0.155	0.076	0.000	0.144
3/7/2019 11:20	0.026	0.039	0.000	0.047	0.116	0.076	0.000	0.144
3/7/2019 11:21	0.000	0.037	0.000	0.046	0.105	0.073	0.000	0.142
3/7/2019 11:22	0.052	0.037	0.000	0.046	0.189	0.070	0.000	0.142
3/7/2019 11:23	0.002	0.040	0.000	0.047	0.120	0.071	0.000	0.149
3/7/2019 11:24	0.000	0.040	0.000	0.047	0.145	0.068	0.000	0.149
3/7/2019 11:25	0.036	0.039	0.000	0.051	0.157	0.069	0.000	0.146
3/7/2019 11:26	0.010	0.039	0.000	0.046	0.129	0.071	0.000	0.144
3/7/2019 11:27	0.037	0.039	0.000	0.047	0.107	0.070	0.000	0.143
3/7/2019 11:28	0.112	0.038	0.000	0.045	0.186	0.071	0.000	0.149
3/7/2019 11:29	0.056	0.039	0.000	0.045	0.127	0.072	0.000	0.146
3/7/2019 11:30	0.004	0.040	0.000	0.047	0.153	0.069	0.000	0.148
3/7/2019 11:31	0.000	0.036	0.000	0.043	0.140	0.072	0.000	0.145
3/7/2019 11:32	0.000	0.040	0.000	0.047	0.108	0.072	0.000	0.150
3/7/2019 11:33	0.000	0.040	0.000	0.048	0.124	0.071	0.000	0.149

Date	Form- aldehyde (ppm)	SEC (ppm)	HCl (ppm)	SEC (ppm)	Methanol (ppm)	SEC (ppm)	acet- aldehyde (ppm)	SEC (ppm)
3/7/2019 11:34	0.029	0.039	0.000	0.049	0.197	0.071	0.000	0.149
3/7/2019 11:35	0.040	0.041	0.000	0.047	0.098	0.070	0.000	0.153
3/7/2019 11:36	0.000	0.041	0.000	0.051	0.119	0.068	0.000	0.153
3/7/2019 11:37	0.000	0.039	0.000	0.047	0.159	0.071	0.000	0.149
3/7/2019 11:38	0.018	0.040	0.000	0.049	0.125	0.069	0.000	0.150
3/7/2019 11:39	0.049	0.039	0.000	0.048	0.147	0.070	0.000	0.147
3/7/2019 11:40	0.096	0.039	0.000	0.048	0.205	0.071	0.000	0.150
3/7/2019 11:41	0.005	0.042	0.000	0.048	0.121	0.071	0.000	0.151
3/7/2019 11:42	0.007	0.041	0.000	0.044	0.149	0.069	0.000	0.149
3/7/2019 11:43	0.000	0.040	0.000	0.049	0.165	0.069	0.000	0.152
3/7/2019 11:44	0.001	0.040	0.000	0.046	0.079	0.071	0.000	0.149
3/7/2019 11:45	0.000	0.041	0.000	0.046	0.098	0.071	0.000	0.150
3/7/2019 11:46	0.032	0.040	0.000	0.045	0.172	0.072	0.000	0.149
3/7/2019 11:47	0.010	0.043	0.000	0.051	0.098	0.074	0.000	0.160
3/7/2019 11:48	0.000	0.041	0.000	0.048	0.156	0.071	0.000	0.154
3/7/2019 11:49	0.058	0.039	0.000	0.045	0.184	0.072	0.000	0.151
3/7/2019 11:50	0.023	0.039	0.000	0.046	0.093	0.073	0.000	0.147
3/7/2019 11:51	0.000	0.041	0.000	0.050	0.124	0.069	0.000	0.156
3/7/2019 11:52	0.029	0.039	0.000	0.047	0.204	0.072	0.000	0.147
3/7/2019 11:53	0.001	0.040	0.000	0.047	0.111	0.072	0.000	0.148
3/7/2019 11:54	0.000	0.042	0.000	0.050	0.140	0.070	0.000	0.156
3/7/2019 11:55	0.035	0.041	0.000	0.051	0.154	0.070	0.000	0.154
3/7/2019 11:56	0.000	0.039	0.000	0.046	0.122	0.073	0.000	0.148
3/7/2019 11:57	0.011	0.039	0.000	0.047	0.112	0.071	0.000	0.147
3/7/2019 11:58	0.030	0.039	0.000	0.049	0.118	0.072	0.000	0.148
3/7/2019 11:59	0.026	0.040	0.000	0.046	0.096	0.071	0.000	0.147
3/7/2019 12:00	0.017	0.040	0.000	0.050	0.146	0.069	0.000	0.151
3/7/2019 12:01	0.073	0.039	0.000	0.048	0.168	0.071	0.000	0.157
3/7/2019 12:02	0.040	0.041	0.000	0.050	0.102	0.072	0.000	0.153
3/7/2019 12:03	0.000	0.041	0.000	0.047	0.122	0.069	0.000	0.149
3/7/2019 12:04	0.055	0.041	0.000	0.049	0.152	0.068	0.000	0.157
3/7/2019 12:05	0.000	0.044	0.000	0.048	0.084	0.070	0.000	0.157
3/7/2019 12:06	0.013	0.041	0.000	0.048	0.118	0.068	0.000	0.154
3/7/2019 12:07	0.014	0.040	0.000	0.049	0.211	0.069	0.000	0.153
3/7/2019 12:08	0.000	0.042	0.000	0.045	0.083	0.071	0.000	0.155
3/7/2019 12:09	0.005	0.042	0.000	0.047	0.122	0.069	0.000	0.153
3/7/2019 12:10	0.039	0.038	0.000	0.050	0.208	0.071	0.000	0.147
3/7/2019 12:11	0.020	0.040	0.000	0.047	0.108	0.069	0.000	0.149
3/7/2019 12:12	0.017	0.039	0.000	0.046	0.134	0.070	0.000	0.144
3/7/2019 12:13	0.000	0.038	0.000	0.045	0.196	0.069	0.000	0.145
3/7/2019 12:14	0.000	0.038	0.000	0.048	0.102	0.068	0.000	0.147
3/7/2019 12:15	0.000	0.039	0.000	0.045	0.110	0.070	0.000	0.142
3/7/2019 12:16	0.043	0.039	0.000	0.048	0.181	0.069	0.000	0.150
3/7/2019 12:17	0.000	0.043	0.000	0.050	0.103	0.069	0.000	0.151
3/7/2019 12:18	0.000	0.041	0.000	0.051	0.123	0.068	0.000	0.151
3/7/2019 12:19	0.000	0.039	0.000	0.048	0.169	0.070	0.000	0.149
3/7/2019 12:20	0.000	0.041	0.000	0.049	0.158	0.069	0.000	0.154
3/7/2019 12:21	0.021	0.037	0.000	0.044	0.194	0.079	0.000	0.140
3/7/2019 12:22	0.026	0.046	0.123	0.059	0.150	0.040	0.000	0.171
3/7/2019 12:23	0.000	0.041	0.174	0.053	0.113	0.034	0.000	0.158
3/7/2019 12:24	0.000	0.035	0.072	0.045	-0.045	0.876	0.000	0.141
3/7/2019 12:25	0.000	0.030	0.009	0.039	-0.276	2.879	0.000	0.138

Date	Time	Direct Spike Results, Spike _{dir}		System Spiked Result		Native Concentrations, Unspike		Dilution, DF	Expected Spike Conc., CS	Recovery
		(ppm HCl)	(ppm SF6)	(ppm HCl)	(ppm SF6)	(ppm HCl)	(ppm SF6)			
6-Mar	1730	46.82	2.15	5.132	0.213	-0.071	-0.001	10.0%	4.6	111.6%
6-Mar	1730	46.82	2.15	4.288	0.182	-0.071	-0.001	8.5%	3.9	109.3%
6-Mar	1730	46.82	2.15	3.770	0.182	-0.071	-0.001	8.5%	3.9	96.1%
6-Mar	1730	46.82	2.15	3.449	0.182	-0.071	-0.001	8.5%	3.9	87.9%
6-Mar	1730	46.82	2.15	3.143	0.181	-0.071	-0.001	8.5%	3.9	80.6%

Date	Time	CTS Scan (pathlength)	SEC (ppm)	Cell Pressure (psi)	Cell Temp (deg C)	Deviation from Previous	Deviation from Average
7-Mar	746	8.12	0.114	14.86	181	NA	0.0%
Average		8.116	0.114				

Stratification Test

Point	Average Reading		Variation from Mean	
	NOx	CO	NOx	CO
1	1.12	29.94	0.00	0.3
2	1.09	29.86	0.03	0.4
3	1.14	30.56	0.02	0.3
4	1.12	31.65	0.00	1.4
5	1.11	30.95	0.01	0.7
6	1.14	30.49	0.02	0.2
7	1.13	29.88	0.01	0.4
8	1.11	28.90	0.01	1.4
9				
10				
11				
12				
Mean	1.12	30.28		
Maximum Variation From Mean			0.0	1.4
Percent of Mean			2.46	4.56
Result			Unstratified	Unstratified

Specifications (%)

≤5
>5 and ≤10
>10

APPENDIX III-D
Methane Laboratory Report

Report is not due from the lab until Friday, March 22.

Air Control Techniques, P.C.

301 East Durham Rd.
Cary, NC 27513

ENV – Green
Client Project # 2333

Analytical Report
(0319-054)

EPA Method 18 (Bags)
Methane



Enthalpy Analytical, LLC

Phone: (919) 850 - 4392 / Fax: (919) 850 - 9012 / www.enthalpy.com
800-1 Capitola Drive Durham, NC 27713-4385

I certify that to the best of my knowledge all analytical data presented in this report:

- Have been checked for completeness
- Are accurate, error-free, and legible
- Have been conducted in accordance with approved protocol, and that all deviations and analytical problems are summarized in the appropriate narrative(s)

This analytical report was prepared in Portable Document Format (.PDF) and contains 96 pages.

Report Issued: 03/21/2019



Summary of Results

Enthalpy Analytical

Company: Air Control Techniques PC

Job No.: 0319-054 EPA Method 18 (Bags)

Client No.: 2333

Summary Table - Methane

Results Adjusted Using Recovery Efficiencies

<u>Sample ID</u>	<i>RCO1-1</i>	<i>RCO1-2</i>	<i>RCO1-3</i>
<u>Adjusted Concentration ppm</u>	1.65 J	1.68 J	1.58 J

Results

Enthalpy Analytical

Company: Air Control Techniques PC
Job No.: 0319-054 EPA Method 18 (Bags)
Client No.: 2333

Analysis Method: EDITHP1576F_C1-C7.M

Methane

Sample ID	Filename #1	Filename #2	Filename #3	MDL	Curve Min	Curve Max	Ret Time (min)	Ret Time (min)	Ret Time (min)	%dif RT	Conc #1	Conc #2	Conc #3	%dif conc	DF	Avg Conc (ppm)	Spike Rec %	Adj. Conc (ppm)	Flag
RCO1-1	003F0101.D	003F0102.D	003F0103.D	0.510	5.10	49,960	1.51	1.51	1.51	0.0	1.38	2.18	1.60	26.4	1	1.72	105%	1.65	J
RCO1-2	004F0201.D	004F0202.D	004F0203.D	0.510	5.10	49,960	1.51	1.51	1.51	0.0	1.91	1.68	1.69	8.7	1	1.76	105%	1.68	J
RCO1-3	005F0301.D	005F0302.D	005F0303.D	0.510	5.10	49,960	1.51	1.51	1.51	0.0	1.56	1.71	1.70	5.8	1	1.66	105%	1.58	J
RCO1-1 SP	003F0702.D	003F0703.D	003F0704.D	0.510	5.10	49,960	1.51	1.51	1.51	0.0	20.9	20.3	20.4	1.9	1	20.5	105%		

Enthalpy Analytical

Company: Air Control Techniques PC

Job No.: 0319-054 EPA Method 18 (Bags)

Client No.: 2333

Spike Hold Times

Spiked Bag	Time Spiked	Spike Analyzed	Hold Time (Hours)	Related Bag	Related Bag Sampled Date	Bag Analyzed	Hold Time (Hours)
RCO1-1 SP	03-08-2019 11:11	03-09-2019 12:35	25.4	RCO1-1	03-07-2019 09:30	03-08-2019 09:37	24.1
				RCO1-2	03-07-2019 11:30	03-08-2019 10:19	22.8
				RCO1-3	03-07-2019 13:30	03-08-2019 11:03	21.6

Enthalpy Analytical

Company: Air Control Techniques PC
 Job No.: 0319-054 EPA Method 18 (Bags)
 Client No.: 2333

Spiked Bag

<i>RCO1-1 SP</i>		Methane
Before Spiking	Inj1 (ppmv)	1.38
	Inj2 (ppmv)	2.18
	Inj3 (ppmv)	1.60
	Avg ppmv	1.72
	Bag vol L NTP	2.67
Gas Spike	Cylinder	CC100532
	Expires	1/31/22
	Press/Temp	762.5 / 72.0
	Vol (mL)	600
	Cyl Dil Factor	1
	Cyl Conc (ppmv)	100
	Vol (mL NTP)	597
		0.0597
Totals	Sp Bag Vol L NTP	3.27
	Corrected Initial (ppmv)	1.41
	Spike Amount (mL NTP)	0.0597
	Spike Amount (ppmv)	18.3
	Expected (ppmv)	19.7
Result	Inj1 (ppmv)	20.9
	Inj2 (ppmv)	20.3
	Inj3 (ppmv)	20.4
	Avg (ppmv)	20.5
Recovery		105%

Narrative Summary

Enthalpy Analytical Narrative Summary

Company	Air Control Techniques PC
Job #	0319-054 EPA Method 18 (Bags)
Client #	2333

Custody

David Myers of Enthalpy Analytical, LLC received the samples on 3/8/2019 at ambient temperature after being relinquished by Air Control Techniques PC. The samples were received in good condition.

Prior to, during, and after analysis, the samples were kept under lock with access only to authorized personnel by Enthalpy Analytical, LLC.

Analysis

The samples were analyzed for methane using the analytical procedures in EPA Method 18, Measurement of Gaseous Organic Compound Emissions by Gas Chromatography (40 CFR Part 60, Appendix A).

The standards and samples were analyzed following the procedures specified in section 8.2.1, Integrated Bag Sampling and Analysis.

All samples and standards were introduced directly to the column using an automated multi-port Valco gas sampling valve equipped with a stainless steel loop. Methane was referenced to certified gas phase standards.

The analyses were performed using an Agilent Technologies Model 7890A, Gas Chromatograph ("Edith" CN10722006) equipped with a Flame Ionization Detector.

Calibration

The calibration curves are located in the Raw Data section of this report and referenced in the Analysis Method column on the Detailed Results page.

For each calibration curve used, the first page of the curve contains all method specific parameters (i.e., curve type, origin, weight, etc.) used to quantify the samples. The calibration curve section also includes a table with the Retention Time (RetTime), Level (Lvl), Amount (corresponding units), Area, Response Factor (Amt/Area) and the analyte Name. The calibration table is used to identify (by retention time) and quantify each target compound.



Enthalpy Analytical Narrative Summary

(continued)

Chromatographic Conditions

The acquisition methods *AQ_EDITHP503_HRVOC_LONG* and *AQ_EDITHP503_HRVOC* are included in the Raw Data section of this report.

QC Notes

As required by the method, a recovery study was performed on a bag sample. The bag sample *RCOI-1* was spiked on 3/8/2019 at 11:11 AM. The recovery efficiency value met the method-required limits of 70 to 130%. The recovery efficiency value was used to adjust the results following equation 18-7 of Method 18.

The analysis of the laboratory method blank exhibited no methane at concentrations greater than the MDL.

Reporting Notes

These analytical results are reported on a wet basis. The user of this report should determine the percent moisture in the sample and correct the reported value to ppmvd as appropriate.

These analyses met the requirements of the TNI Standard. Any deviations from the requirements of the reference method or TNI Standard have been stated above.

The results presented in this report are representative of the samples as provided to the laboratory.

General Reporting Notes

The following are general reporting notes that are applicable to all Enthalpy Analytical, LLC data reports, unless specifically noted otherwise.

- Any analysis which refers to the method as “**Type**” represents a planned deviation from the reference method. For instance a Hydrogen Sulfide assay from a Tedlar bag would be labeled as “EPA Method 16-Type” because Tedlar bags are not mentioned as one of the collection options in EPA Method 16.
- The acronym **MDL** represents the Minimum Detection Limit. Below this value the laboratory cannot determine the presence of the analyte of interest reliably.
- The acronym **LOQ** represents the Limit of Quantification. Below this value the laboratory cannot quantitate the analyte of interest within the criteria of the method.
- The acronym **ND** following a value indicates a non-detect or analytical result below the MDL.
- The letter **J** in the Qualifier or Flag column in the results indicates that the value is between the MDL and the LOQ. The laboratory can positively identify the analyte of interest as present, but the value should be considered an estimate.
- The letter **E** in the Qualifier or Flag column indicates an analytical result exceeding 100% of the highest calibration point. The associated value should be considered as an estimate.
- Sample results are presented ‘as measured’ for single injection methodologies, or an average value if multiple injections are made. If all injections are below the MDL, the sample is considered non-detect and the ND value is presented. If one, but not all, are below the MDL, the MDL value is used for any injections that are below the MDL. For example, if the MDL is 0.500 and LOQ is 1.00, and the instrument measures 0.355, 0.620, and 0.442 - the result reported is the average of 0.500, 0.620, and 0.500 - - - i.e. 0.540 with a J flag.
- When a spike recovery (Bag Spike, Collocated Spike Train, or liquid matrix spike) is being calculated, the native (unspiked) sample result is used in the calculations, as long as the value is above the MDL. If a sample is ND, then 0 is used as the native amount (not the MDL value).
- The acronym **DF** represents Dilution Factor. This number represents dilution of the sample during the preparation and/or analysis process. The analytical result taken from a laboratory instrument is multiplied by the DF to determine the final undiluted sample results.
- The addition of **MS** to the Sample ID represents a Matrix Spike. An aliquot of an actual sample is spiked with a known amount of analyte so that a percent recovery value can be determined. The MS analysis indicates what effect the sample matrix may have on the target analyte, i.e. whether or not anything in the sample matrix interferes with the analysis of the analyte(s).



General Reporting Notes

(continued)

- The addition of **MSD** to the Sample ID represents a Matrix Spike Duplicate. Prepared in the same manner as a MS, the use of duplicate matrix spikes allows further confirmation of laboratory quality by showing the consistency of results gained by performing the same steps multiple times.
- The addition of **LD** to the Sample ID represents a Laboratory Duplicate. The analyst prepares an additional aliquot of sample for testing and the results of the duplicate analysis are compared to the initial result. The result should have a difference value of within 10% of the initial result (if the results of the original analysis are greater than the LOQ).
- The addition of **AD** to the Sample ID represents an Alternate Dilution. The analyst prepares an additional aliquot at a different dilution factor (usually double the initial factor). This analysis helps confirm that no additional compound is present and coeluting or sharing absorbance with the analyte of interest, as they would have a different response/absorbance than the analyte of interest.
- The Sample ID **LCS** represents a Laboratory Control Sample. Clean matrix, similar to the client sample matrix, prepared and analyzed by the laboratory using the same reagents, spiking standards and procedures used for the client samples. The LCS is used to assess the control of the laboratory's analytical system. Whenever spikes are prepared for our client projects, two spikes are retained as LCSs. The LCSs are labeled with the associated project number and kept in-house at the appropriate temperature conditions. When the project samples are received for analysis, the LCSs are analyzed to confirm that the analyte could be recovered from the media, separate from the samples which were used on the project and which may have been affected by source matrix, sample collection, and/or sample transport.
- **Significant Figures:** Where the reported value is much greater than unity (1.00) in the units expressed, the number is rounded to a whole number of units, rather than to 3 significant figures. For example, a value of 10,456.45 ug catch is rounded to 10,456 ug. There are five significant digits displayed, but no confidence should be placed on more than two significant digits. In the case of small numbers, generally 3 significant figures are presented, but still only 2 should be used with confidence. Many neat materials are only certified to 3 digits, and as the mathematically correct final result is always 1 digit less than all its pre-cursors - 2 significant figures are what are most defensible.
- **Manual Integration:** The data systems used for processing will flag manually integrated peaks with an "M". There are several reasons a peak may be manually integrated. These reasons will be identified by the following two letter designations on sample chromatograms, if provided in the report. The peak was *not integrated* by the software "**NI**", the peak was *integrated incorrectly* by the software "**II**" or the *wrong peak* was integrated by the software "**WP**". These codes will accompany the analyst's manual integration stamp placed next to the compound name on the chromatogram.

Sample Custody

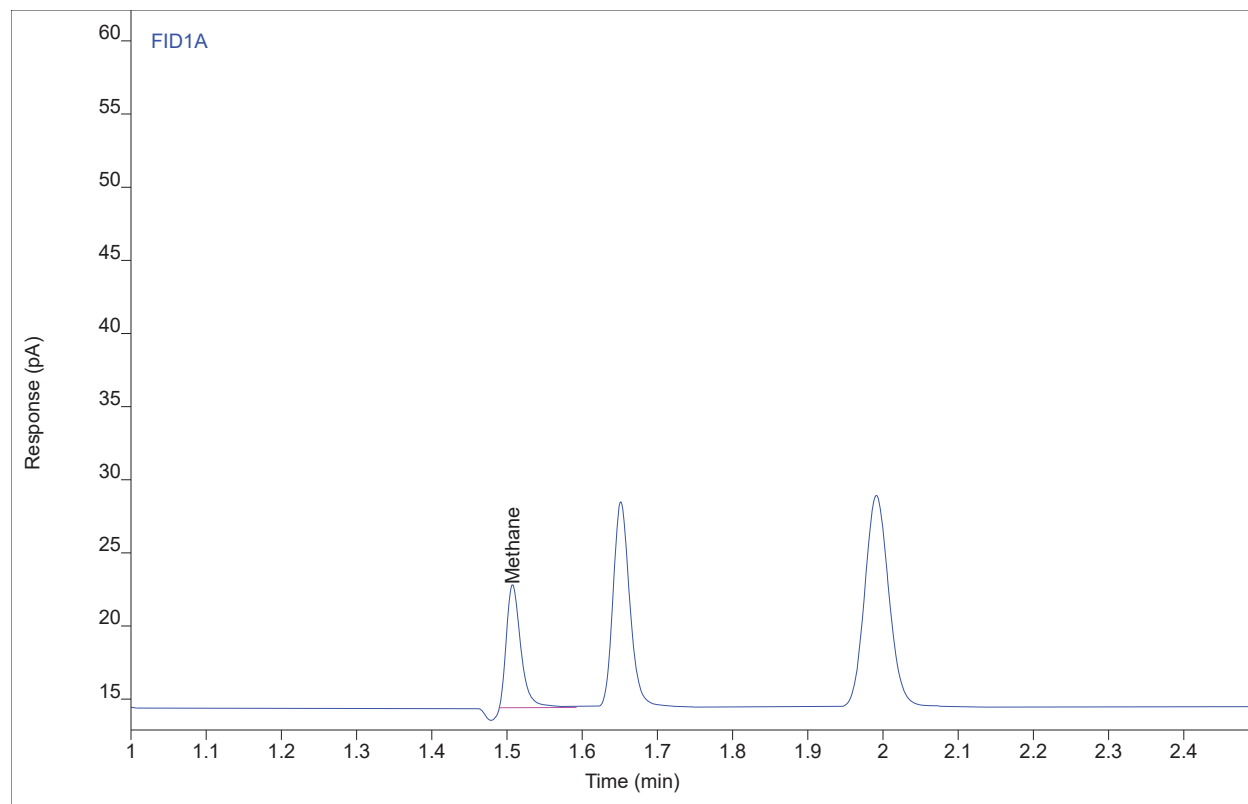
Raw Data

Chromatogram Report

Sample Name Edithp1686 #C4 ENV(1=600,2=400)
Sequence Name EDITHP1711 ver.4
Inj Data File 002F0302.D
File Location GC/2019/Edith/Quarter 1
Injection Date 3/8/2019 1:18 AM
File Modified 3/8/2019 9:30 AM
Instrument
Operator Justin Guenzler

Enthalpy Analytical

Sample Type Calibration
Vial Number Vial 2
Injection Volume 250
Injection 2 of 4
Acquisition Method AQ_EDITHP503_HRVOC.M
Analysis Method EDITHP1576F_C1-C7.M
Method Modified 2/20/2019 3:54 PM
Printed 3/11/2019 9:56 AM



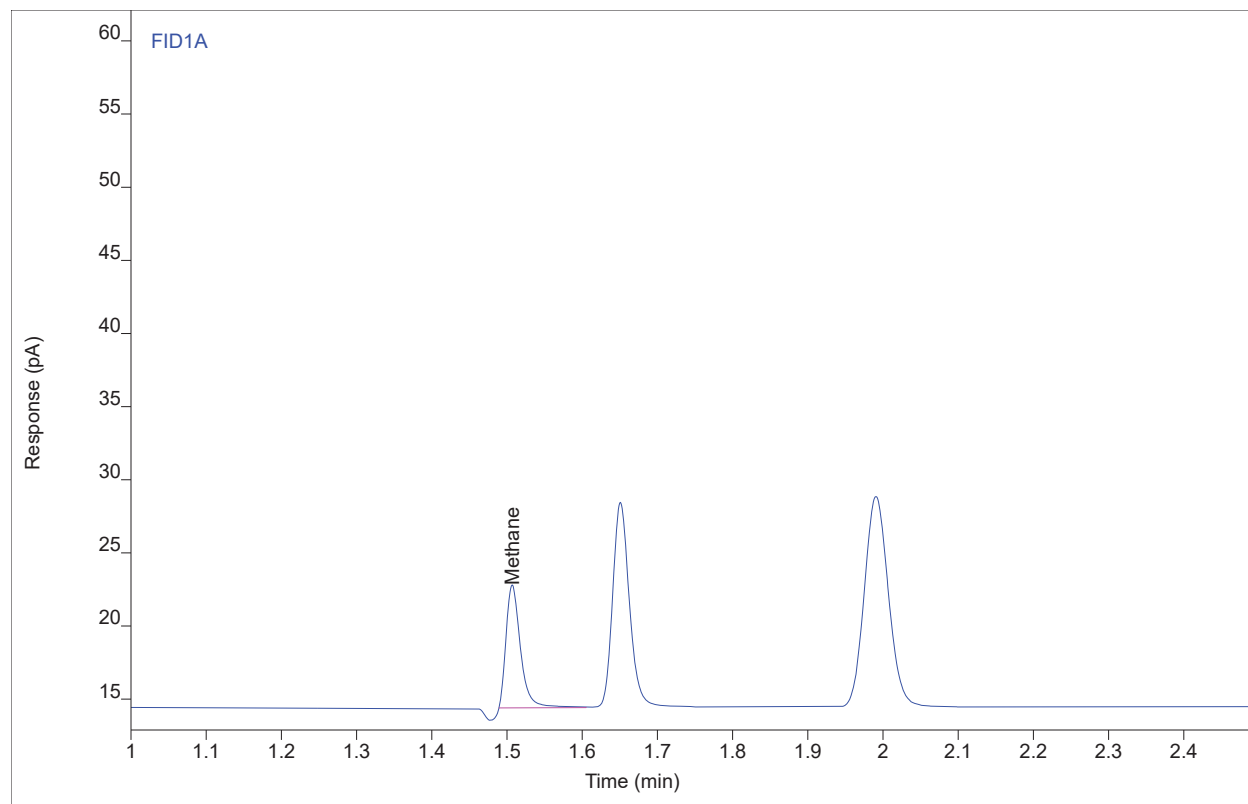
Compound	Type	RT	Area	Height	Amount	DF	SampAmt	Unit
Methane	PB	1.51	11.2721	8.33229	41.3771	1	41.3771	ppm

Chromatogram Report

Sample Name Edithp1686 #C4 ENV(1=600,2=400)
Sequence Name EDITHP1711 ver.4
Inj Data File 002F0303.D
File Location GC/2019/Edith/Quarter 1
Injection Date 3/8/2019 1:34 AM
File Modified 3/8/2019 9:30 AM
Instrument
Operator Justin Guenzler

Enthalpy Analytical

Sample Type Calibration
Vial Number Vial 2
Injection Volume 250
Injection 3 of 4
Acquisition Method AQ_EDITHP503_HRVOC.M
Analysis Method EDITHP1576F_C1-C7.M
Method Modified 2/20/2019 3:54 PM
Printed 3/11/2019 9:56 AM



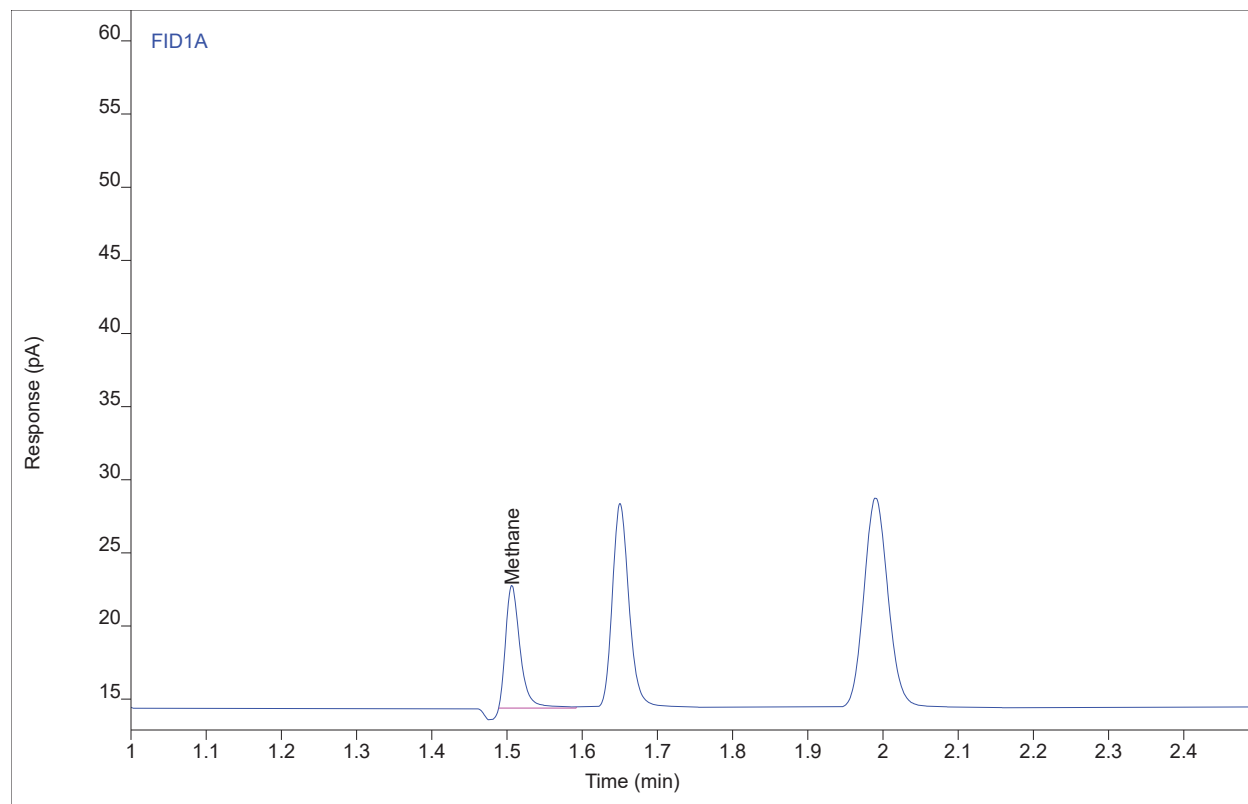
Compound	Type	RT	Area	Height	Amount	DF	SampAmt	Unit
Methane	PB	1.51	11.3013	8.28440	41.4833	1	41.4833	ppm

Chromatogram Report

Sample Name Edithp1686 #C4 ENV(1=600,2=400)
Sequence Name EDITHP1711 ver.4
Inj Data File 002F0304.D
File Location GC/2019/Edith/Quarter 1
Injection Date 3/8/2019 1:49 AM
File Modified 3/8/2019 9:30 AM
Instrument
Operator Justin Guenzler

Enthalpy Analytical

Sample Type Calibration
Vial Number Vial 2
Injection Volume 250
Injection 4 of 4
Acquisition Method AQ_EDITHP503_HRVOC.M
Analysis Method EDITHP1576F_C1-C7.M
Method Modified 2/20/2019 3:54 PM
Printed 3/11/2019 9:56 AM



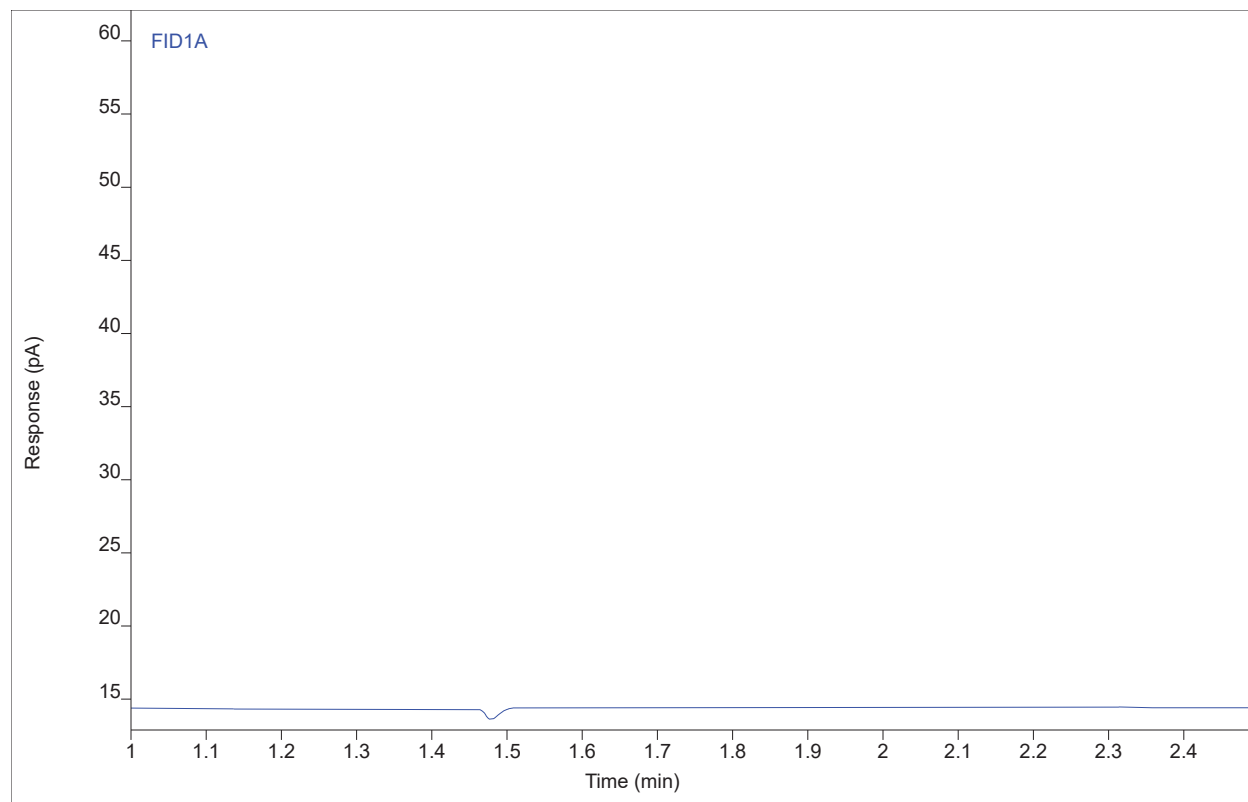
Compound	Type	RT	Area	Height	Amount	DF	SampAmt	Unit
Methane	PB	1.51	11.2745	8.35602	41.3859	1	41.3859	ppm

Chromatogram Report

Sample Name Zero Air Blank
Sequence Name EDITHP1711 ver.4
Inj Data File 016F0501.D
File Location GC/2019/Edith/Quarter 1
Injection Date 3/8/2019 3:15 AM
File Modified 3/8/2019 9:30 AM
Instrument
Operator Justin Guenzler

Enthalpy Analytical

Sample Type Sample
Vial Number Vial 16
Injection Volume 250
Injection 1 of 3
Acquisition Method AQ_EDITHP503_HRVOC_LONG.M
Analysis Method EDITHP1576F_C1-C7.M
Method Modified 2/20/2019 3:54 PM
Printed 3/11/2019 9:56 AM



Compound	Type	RT	Area	Height	Amount	DF	SampAmt	Unit
Methane		(1.50)				1		

Analyst Peak Integration Comments

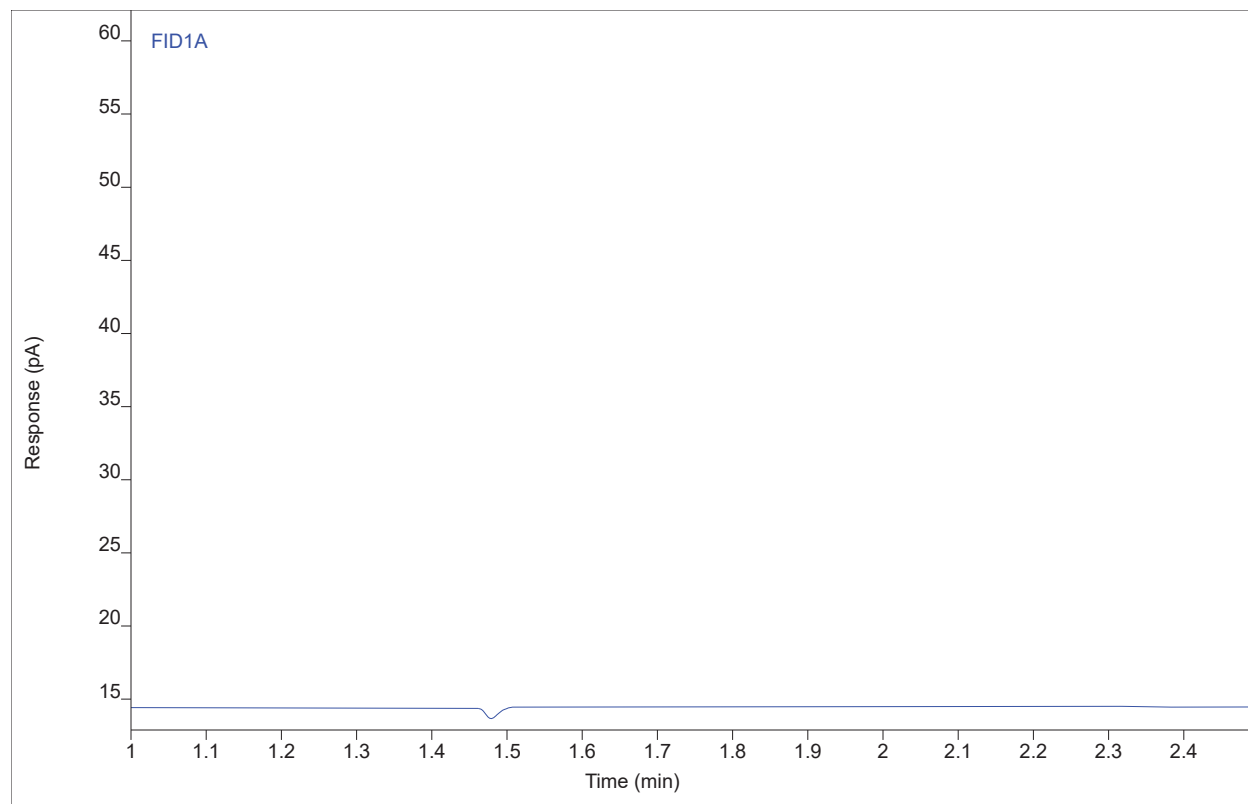
09:29:44 03/08/19 Jennie Parrish NI-Negative peak

Chromatogram Report

Sample Name Zero Air Blank
Sequence Name EDITHP1711 ver.4
Inj Data File 016F0502.D
File Location GC/2019/Edith/Quarter 1
Injection Date 3/8/2019 3:39 AM
File Modified 3/8/2019 9:30 AM
Instrument
Operator Justin Guenzler

Enthalpy Analytical

Sample Type Sample
Vial Number Vial 16
Injection Volume 250
Injection 2 of 3
Acquisition Method AQ_EDITHP503_HRVOC_LONG.M
Analysis Method EDITHP1576F_C1-C7.M
Method Modified 2/20/2019 3:54 PM
Printed 3/11/2019 9:56 AM



Compound	Type	RT	Area	Height	Amount	DF	SampAmt	Unit
Methane		(1.50)				1		

Analyst Peak Integration Comments

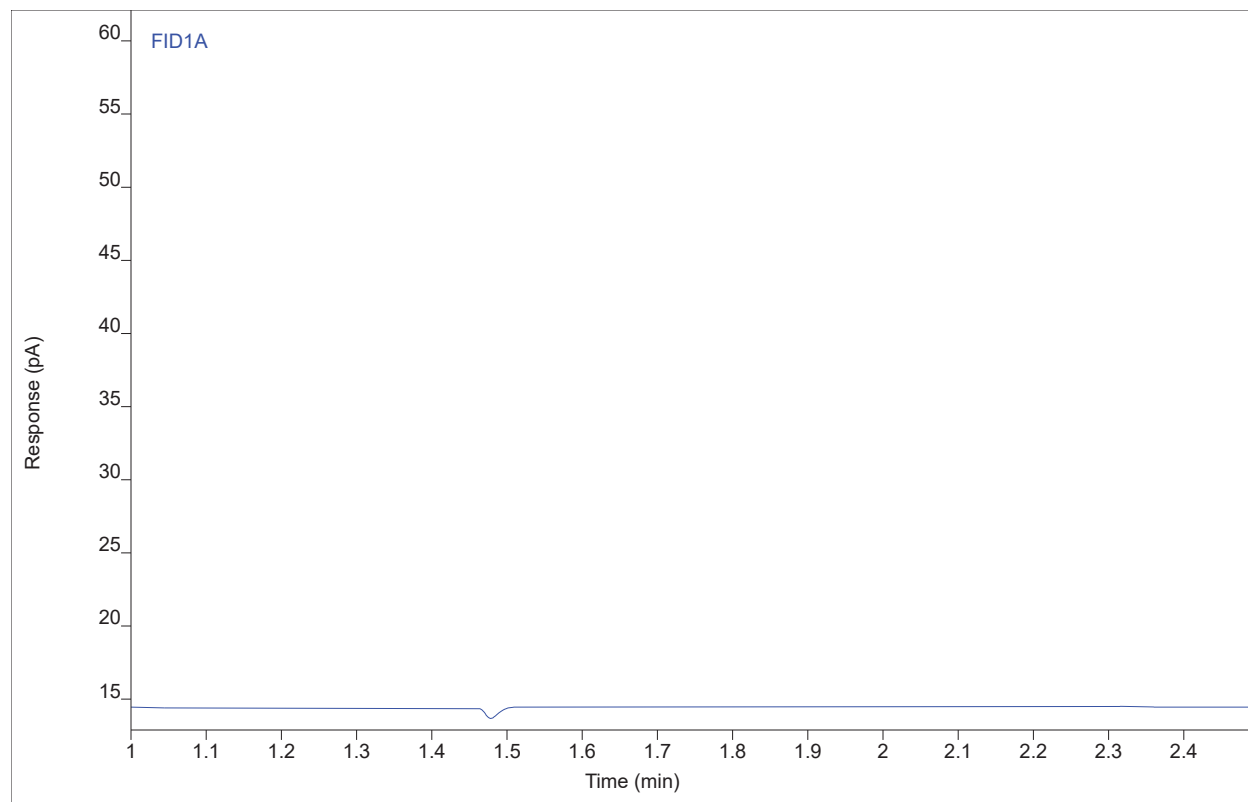
09:29:12 03/08/19 Jennie Parrish NI-Negative Peak

Chromatogram Report

Sample Name Zero Air Blank
Sequence Name EDITHP1711 ver.4
Inj Data File 016F0503.D
File Location GC/2019/Edith/Quarter 1
Injection Date 3/8/2019 4:02 AM
File Modified 3/8/2019 9:30 AM
Instrument
Operator Justin Guenzler

Enthalpy Analytical

Sample Type Sample
Vial Number Vial 16
Injection Volume 250
Injection 3 of 3
Acquisition Method AQ_EDITHP503_HRVOC_LONG.M
Analysis Method EDITHP1576F_C1-C7.M
Method Modified 2/20/2019 3:54 PM
Printed 3/11/2019 9:56 AM



Compound	Type	RT	Area	Height	Amount	DF	SampAmt	Unit
Methane		(1.50)				1		

Analyst Peak Integration Comments

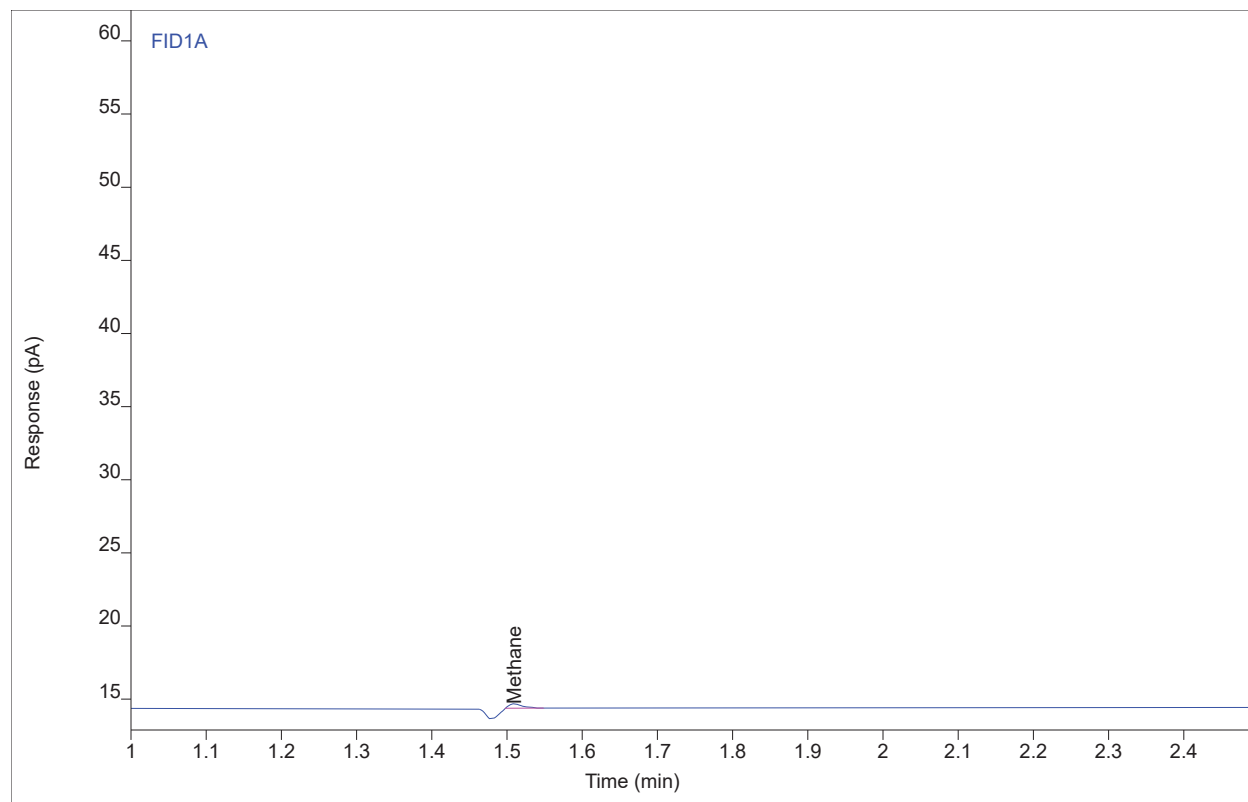
09:28:58 03/08/19 Jennie Parrish NI-Negative peak

Chromatogram Report

Sample Name 0319-054.RCO1-1.Bag
Sequence Name EDITHP1712 ver.2
Inj Data File 003F0101.D
File Location GC/2019/Edith/Quarter 1
Injection Date 3/8/2019 9:37 AM
File Modified 3/11/2019 8:05 AM
Instrument
Operator Justin Guenzler

Enthalpy Analytical

Sample Type Sample
Vial Number Vial 3
Injection Volume 250
Injection 1 of 3
Acquisition Method AQ_EDITHP503_HRVOC.M
Analysis Method EDITHP1576F_C1-C7.M
Method Modified 3/8/2019 7:56 AM
Printed 3/11/2019 9:56 AM



Compound	Type	RT	Area	Height	Amount	DF	SampAmt	Unit
Methane	PB	1.51	0.35005	0.29787	1.38264	1	1.38264	ppm

Analyst Peak Integration Comments

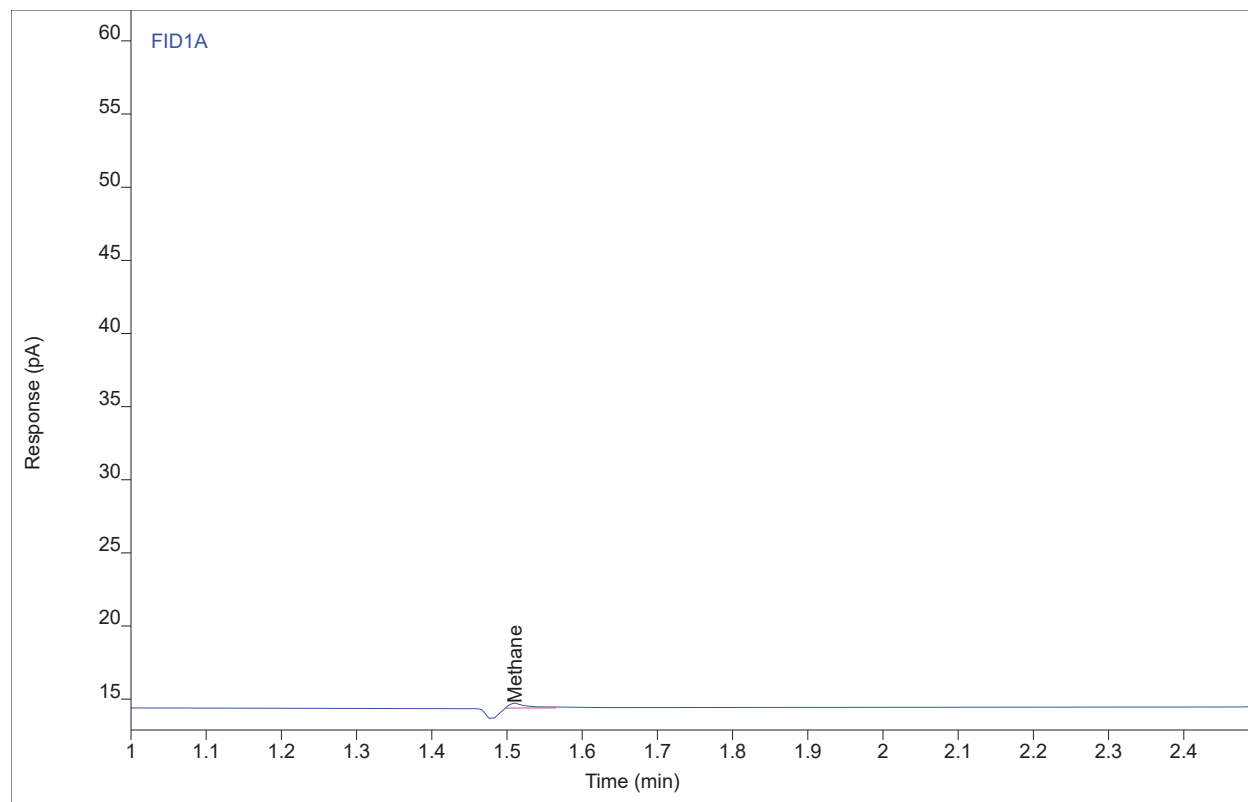
09:47:17 03/08/19 Jennie Parrish II-C1

Chromatogram Report

Sample Name 0319-054.RCO1-1.Bag
Sequence Name EDITHP1712 ver.2
Inj Data File 003F0102.D
File Location GC/2019/Edith/Quarter 1
Injection Date 3/8/2019 9:51 AM
File Modified 3/11/2019 8:05 AM
Instrument
Operator Justin Guenzler

Enthalpy Analytical

Sample Type Sample
Vial Number Vial 3
Injection Volume 250
Injection 2 of 3
Acquisition Method AQ_EDITHP503_HRVOC.M
Analysis Method EDITHP1576F_C1-C7.M
Method Modified 3/8/2019 7:56 AM
Printed 3/11/2019 9:56 AM



Compound	Type	RT	Area	Height	Amount	DF	SampAmt	Unit
Methane	PB	1.51	0.55075	0.32622	2.17539	1	2.17539	ppm

Analyst Peak Integration Comments

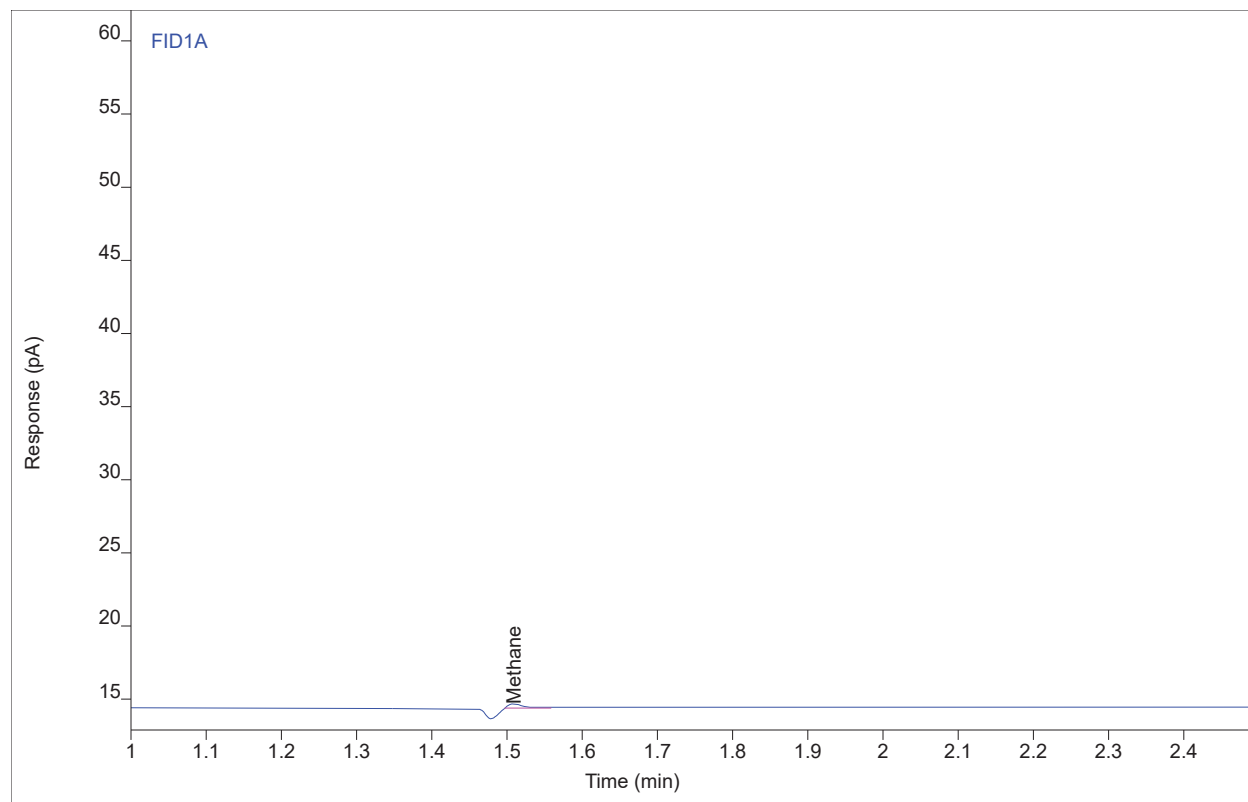
10:01:55 03/08/19 Jennie Parrish II-C1

Chromatogram Report

Sample Name 0319-054.RCO1-1.Bag
Sequence Name EDITHP1712 ver.2
Inj Data File 003F0103.D
File Location GC/2019/Edith/Quarter 1
Injection Date 3/8/2019 10:05 AM
File Modified 3/11/2019 8:05 AM
Instrument
Operator Justin Guenzler

Enthalpy Analytical

Sample Type Sample
Vial Number Vial 3
Injection Volume 250
Injection 3 of 3
Acquisition Method AQ_EDITHP503_HRVOC.M
Analysis Method EDITHP1576F_C1-C7.M
Method Modified 3/8/2019 7:56 AM
Printed 3/11/2019 9:56 AM



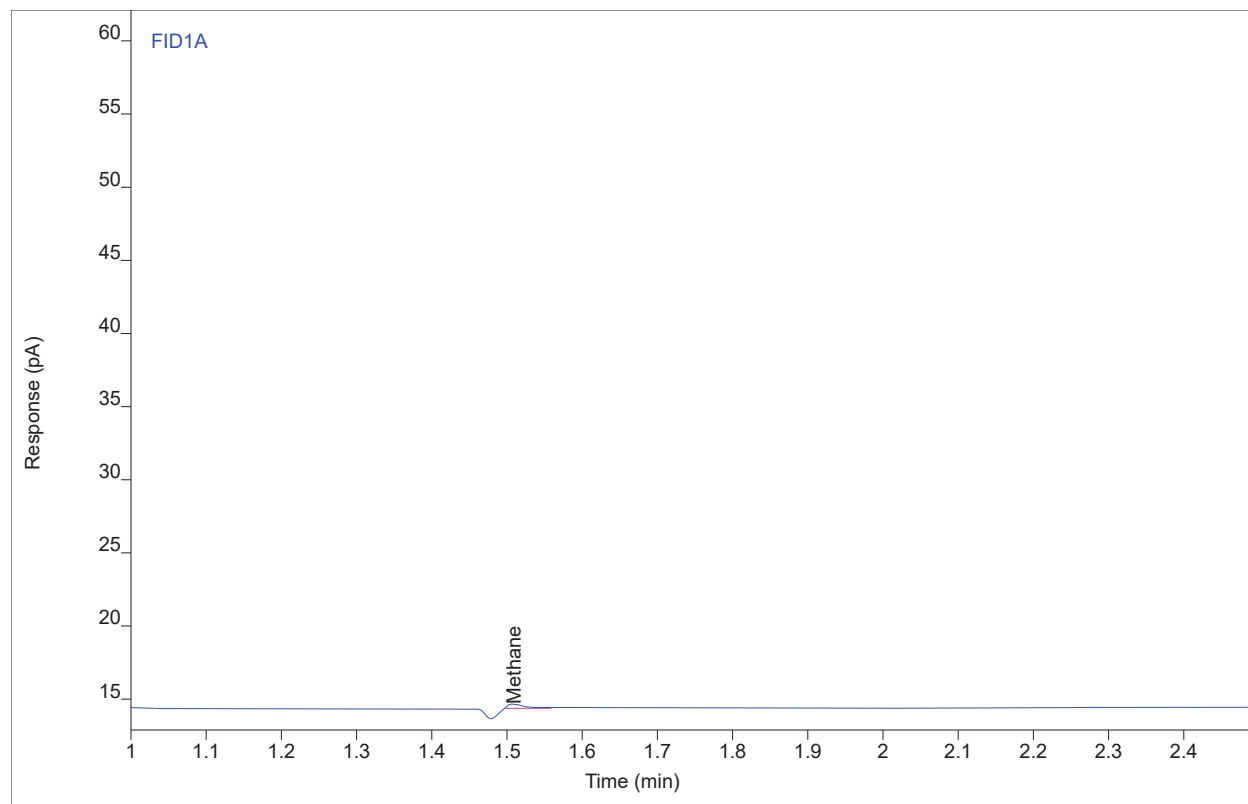
Compound	Type	RT	Area	Height	Amount	DF	SampAmt	Unit
Methane	PB	1.51	0.40607	0.30269	1.60394	1	1.60394	ppm

Chromatogram Report

Sample Name 0319-054.RCO1-2.Bag
Sequence Name EDITHP1712 ver.2
Inj Data File 004F0201.D
File Location GC/2019/Edith/Quarter 1
Injection Date 3/8/2019 10:19 AM
File Modified 3/11/2019 8:05 AM
Instrument
Operator Justin Guenzler

Enthalpy Analytical

Sample Type Sample
Vial Number Vial 4
Injection Volume 250
Injection 1 of 3
Acquisition Method AQ_EDITHP503_HRVOC.M
Analysis Method EDITHP1576F_C1-C7.M
Method Modified 3/8/2019 7:56 AM
Printed 3/11/2019 9:56 AM



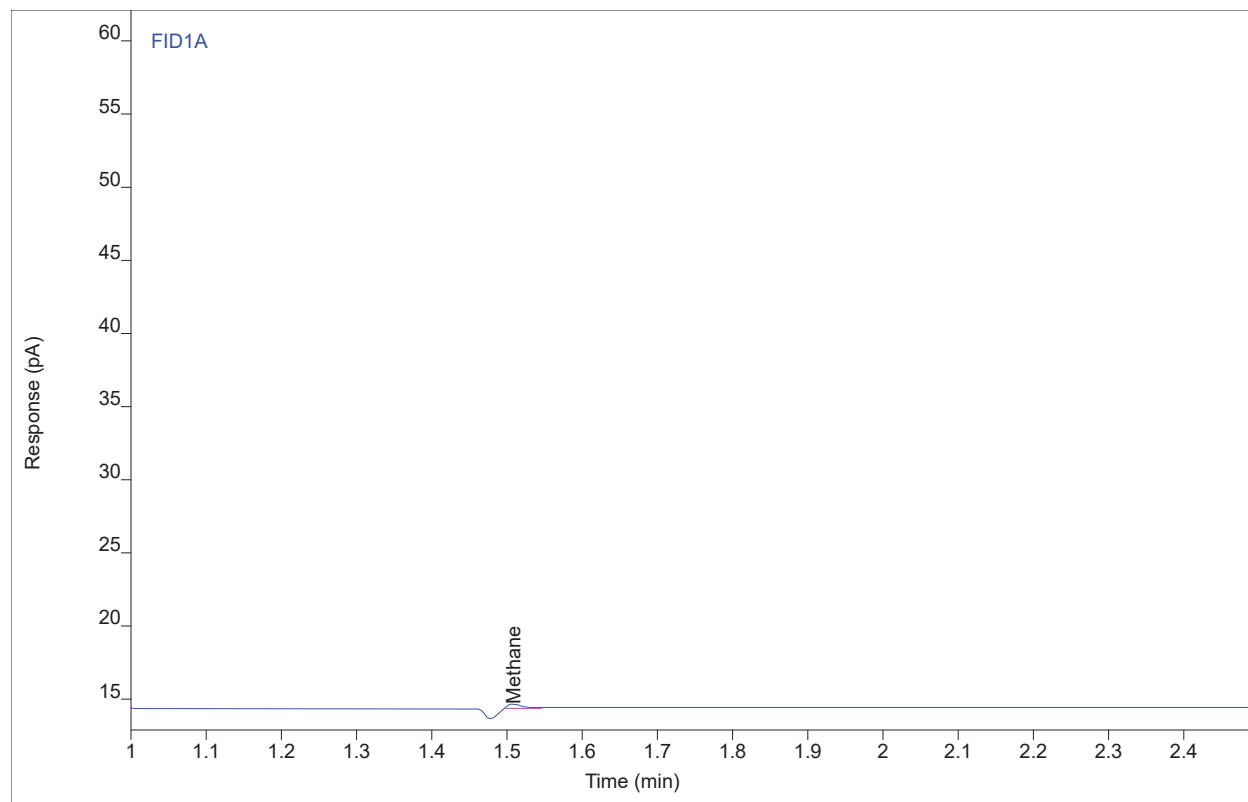
Compound	Type	RT	Area	Height	Amount	DF	SampAmt	Unit
Methane	PB	1.51	0.48378	0.31472	1.91086	1	1.91086	ppm

Chromatogram Report

Sample Name 0319-054.RCO1-2.Bag
Sequence Name EDITHP1712 ver.2
Inj Data File 004F0202.D
File Location GC/2019/Edith/Quarter 1
Injection Date 3/8/2019 10:34 AM
File Modified 3/11/2019 8:06 AM
Instrument
Operator Justin Guenzler

Enthalpy Analytical

Sample Type Sample
Vial Number Vial 4
Injection Volume 250
Injection 2 of 3
Acquisition Method AQ_EDITHP503_HRVOC.M
Analysis Method EDITHP1576F_C1-C7.M
Method Modified 3/8/2019 7:56 AM
Printed 3/11/2019 9:56 AM



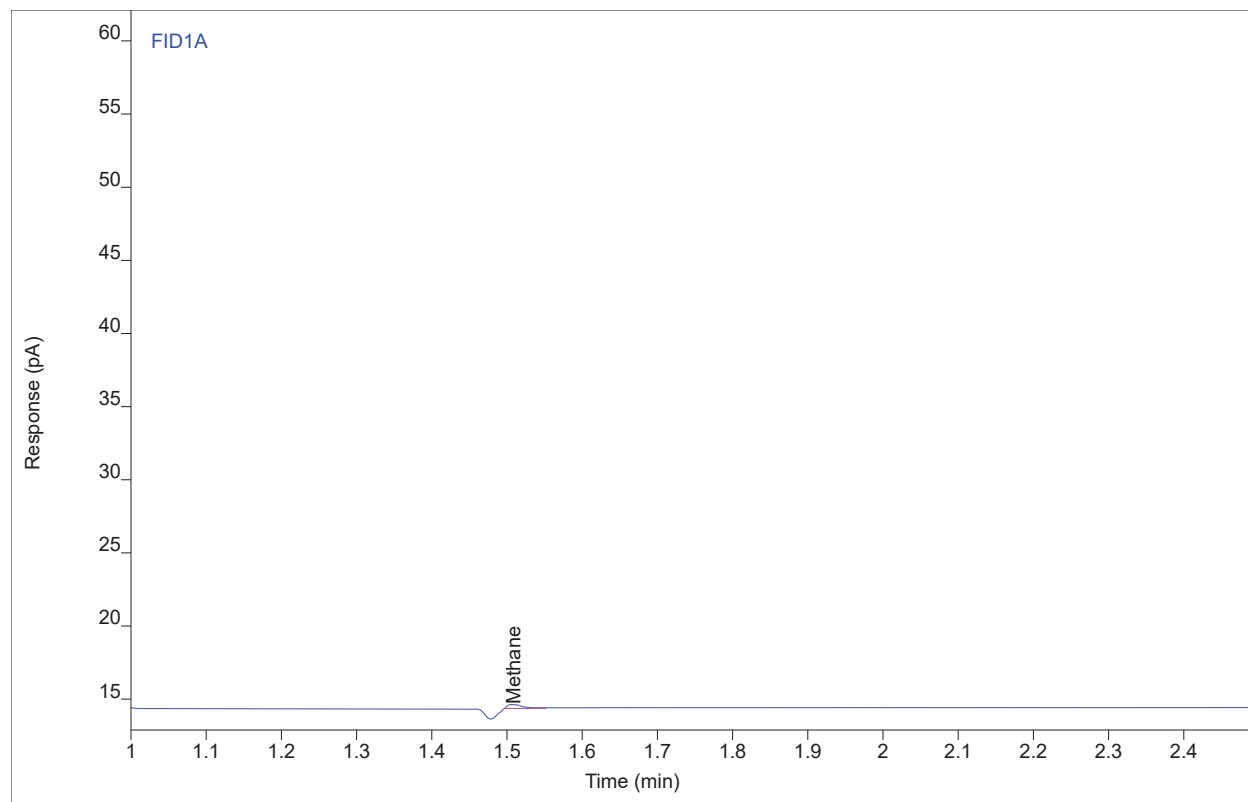
Compound	Type	RT	Area	Height	Amount	DF	SampAmt	Unit
Methane	PV	1.51	0.42493	0.31375	1.67843	1	1.67843	ppm

Chromatogram Report

Sample Name 0319-054.RCO1-2.Bag
Sequence Name EDITHP1712 ver.2
Inj Data File 004F0203.D
File Location GC/2019/Edith/Quarter 1
Injection Date 3/8/2019 10:48 AM
File Modified 3/11/2019 8:06 AM
Instrument
Operator Justin Guenzler

Enthalpy Analytical

Sample Type Sample
Vial Number Vial 4
Injection Volume 250
Injection 3 of 3
Acquisition Method AQ_EDITHP503_HRVOC.M
Analysis Method EDITHP1576F_C1-C7.M
Method Modified 3/8/2019 7:56 AM
Printed 3/11/2019 9:56 AM



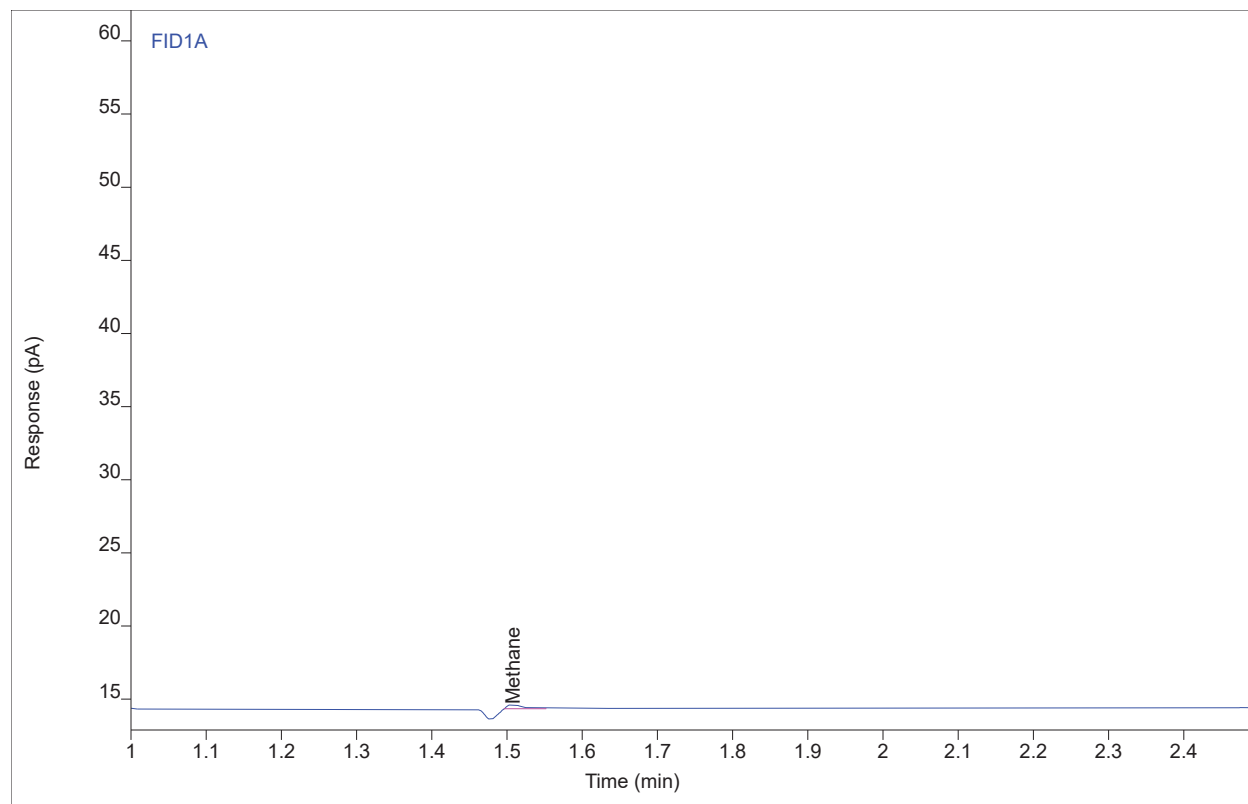
Compound	Type	RT	Area	Height	Amount	DF	SampAmt	Unit
Methane	PB	1.51	0.42693	0.30645	1.68633	1	1.68633	ppm

Chromatogram Report

Sample Name 0319-054.RCO1-3.Bag
Sequence Name EDITHP1712 ver.2
Inj Data File 005F0301.D
File Location GC/2019/Edith/Quarter 1
Injection Date 3/8/2019 11:03 AM
File Modified 3/11/2019 8:06 AM
Instrument
Operator Justin Guenzler

Enthalpy Analytical

Sample Type Sample
Vial Number Vial 5
Injection Volume 250
Injection 1 of 3
Acquisition Method AQ_EDITHP503_HRVOC.M
Analysis Method EDITHP1576F_C1-C7.M
Method Modified 3/8/2019 7:56 AM
Printed 3/11/2019 9:56 AM



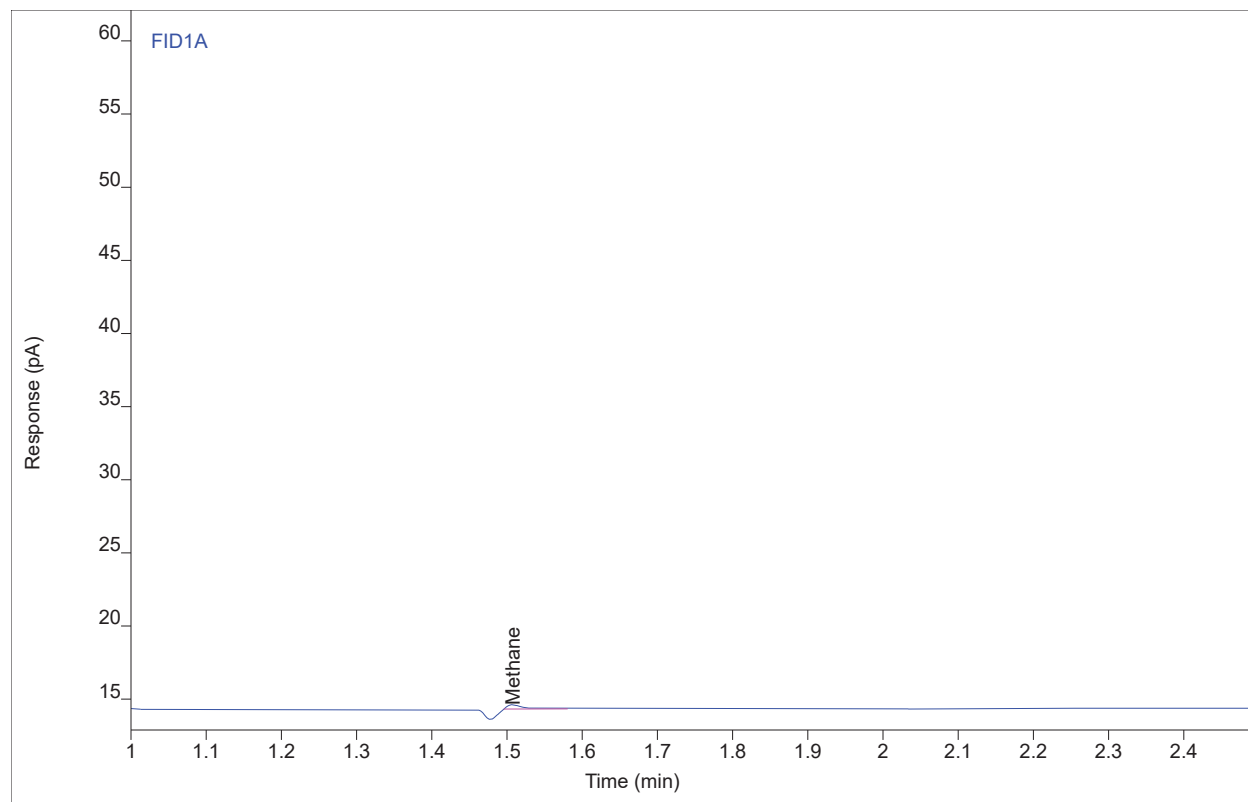
Compound	Type	RT	Area	Height	Amount	DF	SampAmt	Unit
Methane	PB	1.51	0.39515	0.29787	1.56077	1	1.56077	ppm

Chromatogram Report

Sample Name 0319-054.RCO1-3.Bag
Sequence Name EDITHP1712 ver.2
Inj Data File 005F0302.D
File Location GC/2019/Edith/Quarter 1
Injection Date 3/8/2019 11:17 AM
File Modified 3/11/2019 8:06 AM
Instrument
Operator Justin Guenzler

Enthalpy Analytical

Sample Type Sample
Vial Number Vial 5
Injection Volume 250
Injection 2 of 3
Acquisition Method AQ_EDITHP503_HRVOC.M
Analysis Method EDITHP1576F_C1-C7.M
Method Modified 3/8/2019 7:56 AM
Printed 3/11/2019 9:56 AM



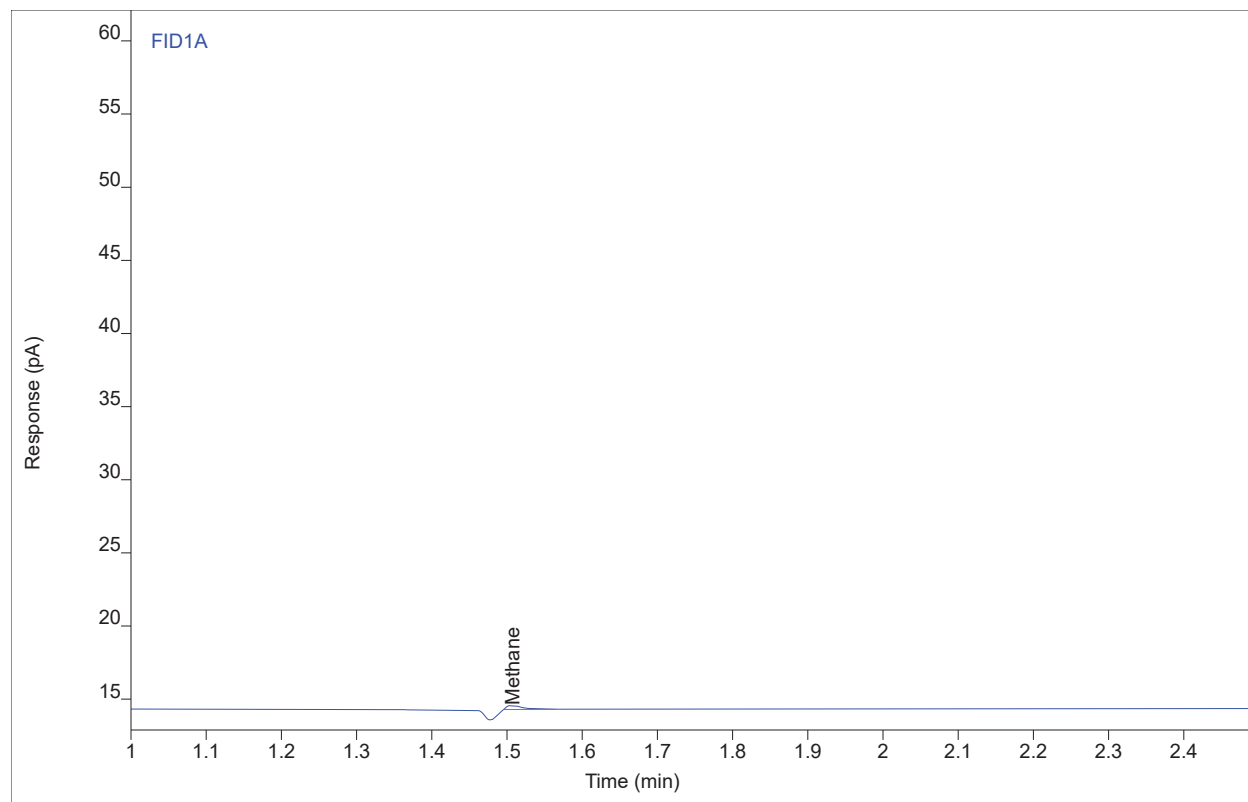
Compound	Type	RT	Area	Height	Amount	DF	SampAmt	Unit
Methane	PV	1.51	0.43205	0.29912	1.70655	1	1.70655	ppm

Chromatogram Report

Sample Name 0319-054.RCO1-3.Bag
Sequence Name EDITHP1712 ver.2
Inj Data File 005F0303.D
File Location GC/2019/Edith/Quarter 1
Injection Date 3/8/2019 11:32 AM
File Modified 3/11/2019 8:06 AM
Instrument
Operator Justin Guenzler

Enthalpy Analytical

Sample Type Sample
Vial Number Vial 5
Injection Volume 250
Injection 3 of 3
Acquisition Method AQ_EDITHP503_HRVOC.M
Analysis Method EDITHP1576F_C1-C7.M
Method Modified 3/8/2019 7:56 AM
Printed 3/11/2019 9:56 AM



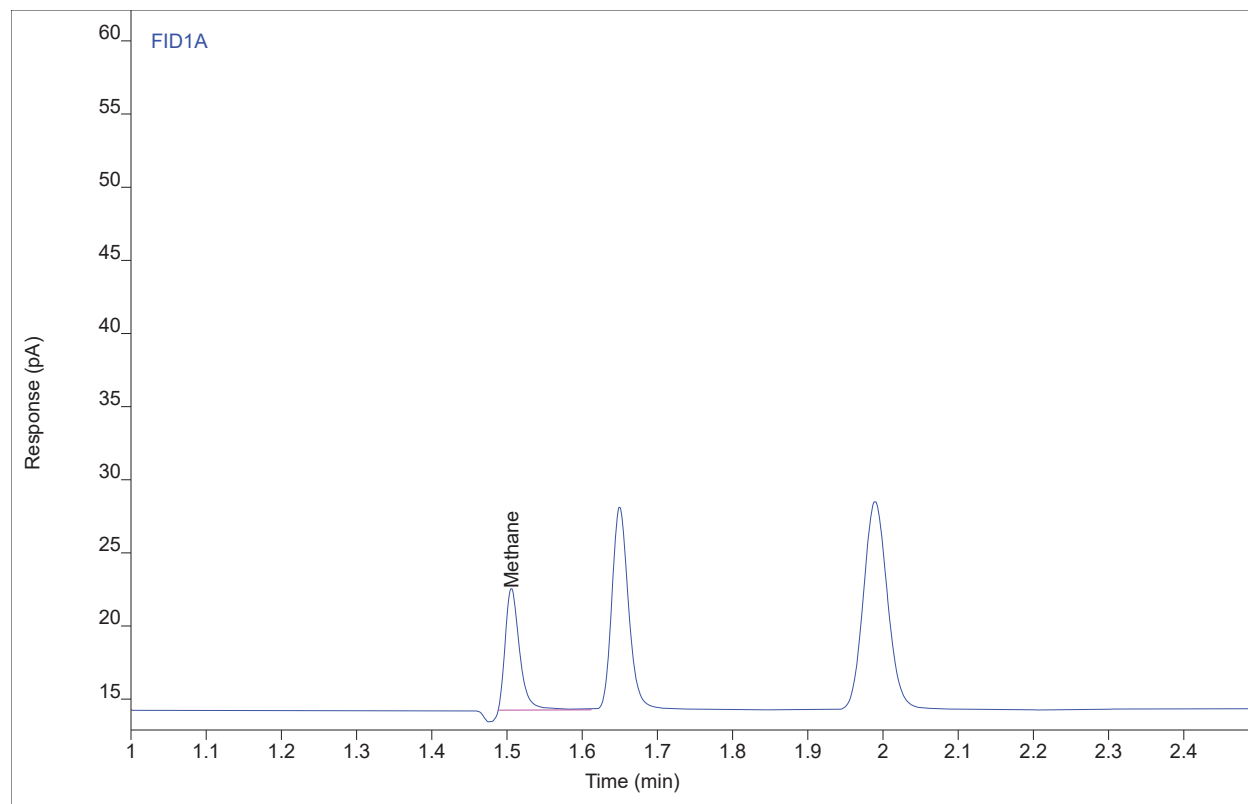
Compound	Type	RT	Area	Height	Amount	DF	SampAmt	Unit
Methane	PB	1.51	0.43097	0.29850	1.70226	1	1.70226	ppm

Chromatogram Report

Sample Name Edithp1686 #C4 ENV(1=600,2=400)
Sequence Name EDITHP1712 ver.2
Inj Data File 002F0502.D
File Location GC/2019/Edith/Quarter 1
Injection Date 3/8/2019 12:41 PM
File Modified 3/11/2019 8:06 AM
Instrument
Operator Justin Guenzler

Enthalpy Analytical

Sample Type Calibration
Vial Number Vial 2
Injection Volume 250
Injection 2 of 4
Acquisition Method AQ_EDITHP503_HRVOC.M
Analysis Method EDITHP1576F_C1-C7.M
Method Modified 3/8/2019 7:56 AM
Printed 3/11/2019 9:56 AM



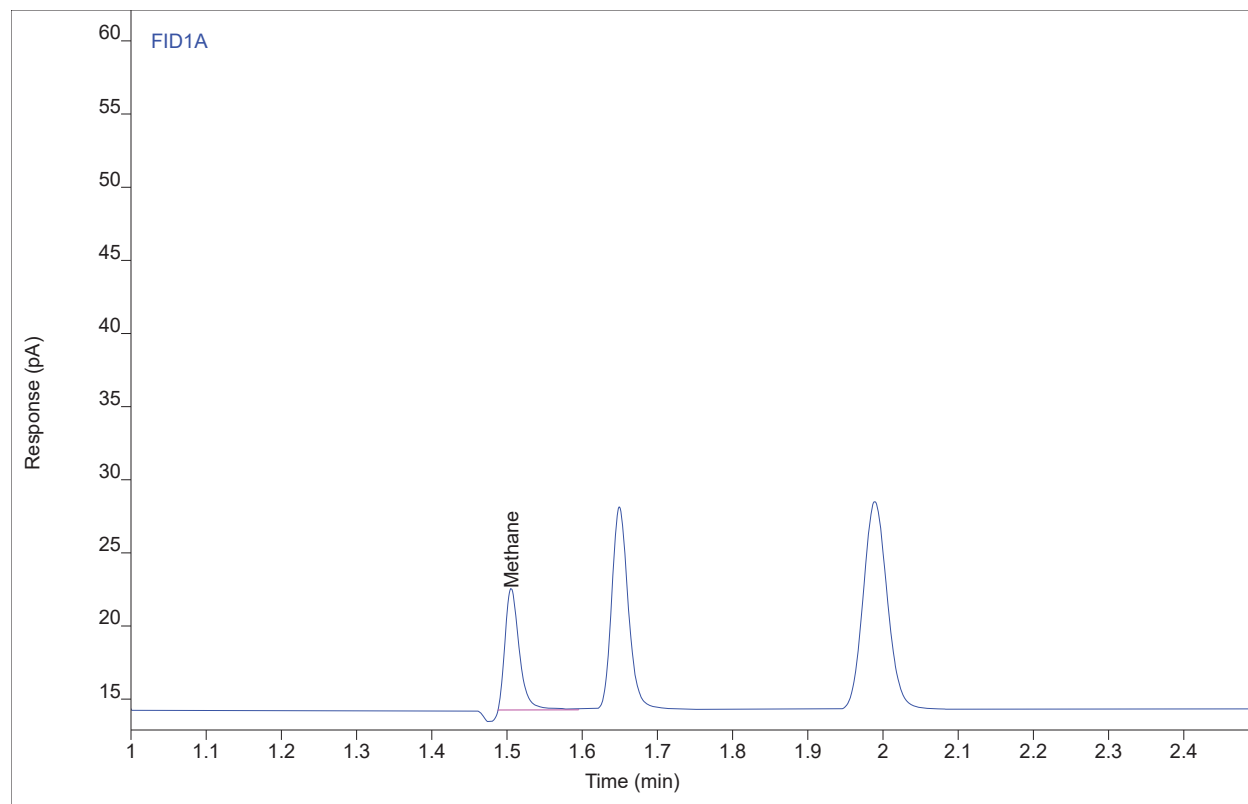
Compound	Type	RT	Area	Height	Amount	DF	SampAmt	Unit
Methane	PB	1.51	11.1258	8.29219	40.8455	1	40.8455	ppm

Chromatogram Report

Sample Name Edithp1686 #C4 ENV(1=600,2=400)
Sequence Name EDITHP1712 ver.2
Inj Data File 002F0503.D
File Location GC/2019/Edith/Quarter 1
Injection Date 3/8/2019 12:57 PM
File Modified 3/11/2019 8:06 AM
Instrument
Operator Justin Guenzler

Enthalpy Analytical

Sample Type Calibration
Vial Number Vial 2
Injection Volume 250
Injection 3 of 4
Acquisition Method AQ_EDITHP503_HRVOC.M
Analysis Method EDITHP1576F_C1-C7.M
Method Modified 3/8/2019 7:56 AM
Printed 3/11/2019 9:56 AM



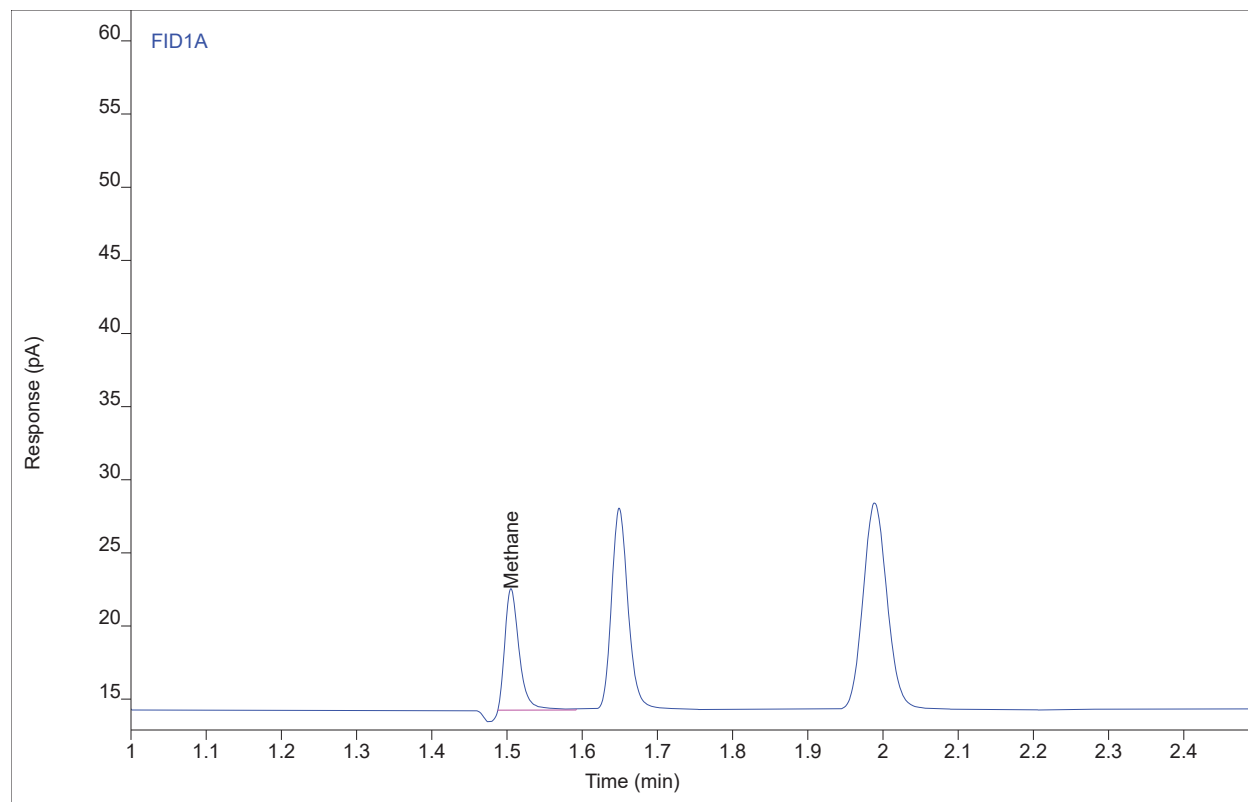
Compound	Type	RT	Area	Height	Amount	DF	SampAmt	Unit
Methane	PB	1.51	11.0637	8.27260	40.6196	1	40.6196	ppm

Chromatogram Report

Sample Name Edithp1686 #C4 ENV(1=600,2=400)
Sequence Name EDITHP1712 ver.2
Inj Data File 002F0504.D
File Location GC/2019/Edith/Quarter 1
Injection Date 3/8/2019 1:13 PM
File Modified 3/11/2019 8:06 AM
Instrument
Operator Justin Guenzler

Enthalpy Analytical

Sample Type Calibration
Vial Number Vial 2
Injection Volume 250
Injection 4 of 4
Acquisition Method AQ_EDITHP503_HRVOC.M
Analysis Method EDITHP1576F_C1-C7.M
Method Modified 3/8/2019 7:56 AM
Printed 3/11/2019 9:56 AM



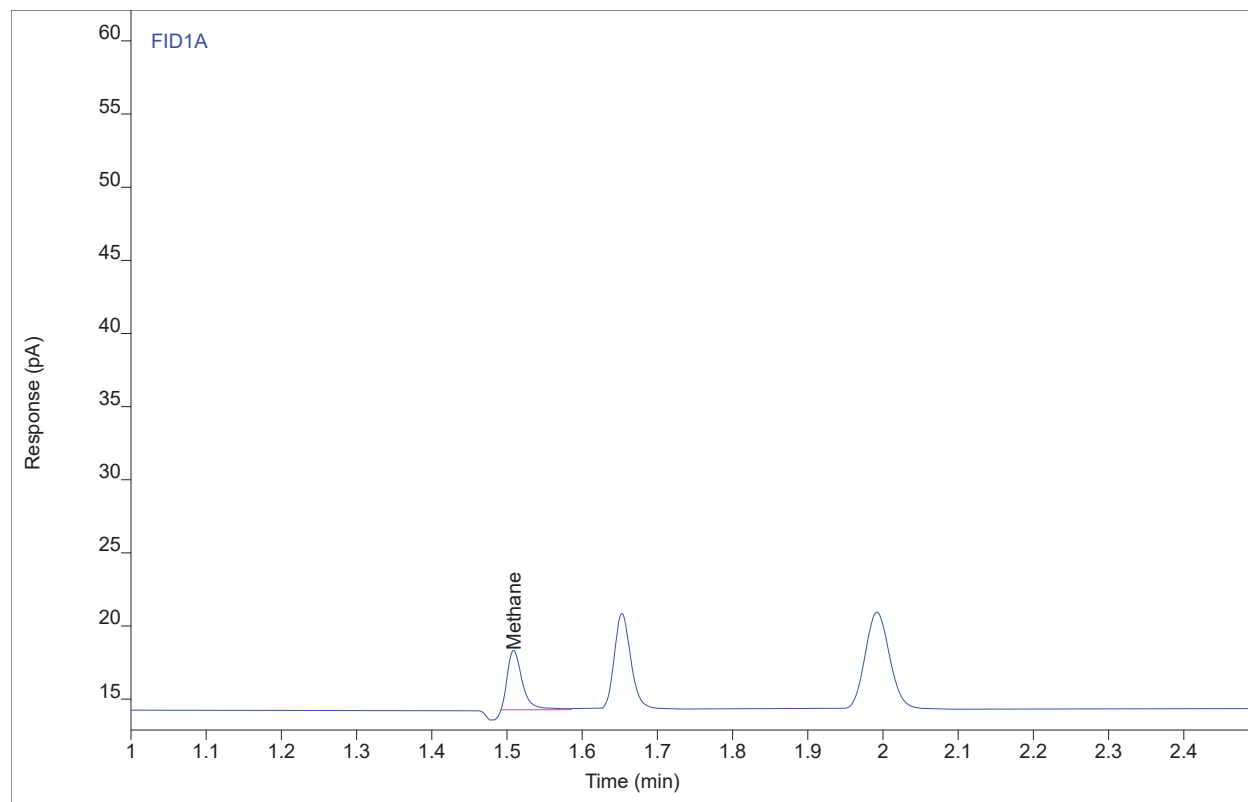
Compound	Type	RT	Area	Height	Amount	DF	SampAmt	Unit
Methane	PB	1.51	11.0219	8.24959	40.4677	1	40.4677	ppm

Chromatogram Report

Sample Name 0319-054.RCO1-1 SP.Bag
Sequence Name EDITHP1712 ver.2
Inj Data File 003F0702.D
File Location GC/2019/Edith/Quarter 1
Injection Date 3/9/2019 12:35 PM
File Modified 3/11/2019 8:06 AM
Instrument
Operator Justin Guenzler

Enthalpy Analytical

Sample Type Sample
Vial Number Vial 3
Injection Volume 250
Injection 2 of 4
Acquisition Method AQ_EDITHP503_HRVOC.M
Analysis Method EDITHP1576F_C1-C7.M
Method Modified 3/8/2019 7:56 AM
Printed 3/11/2019 9:56 AM



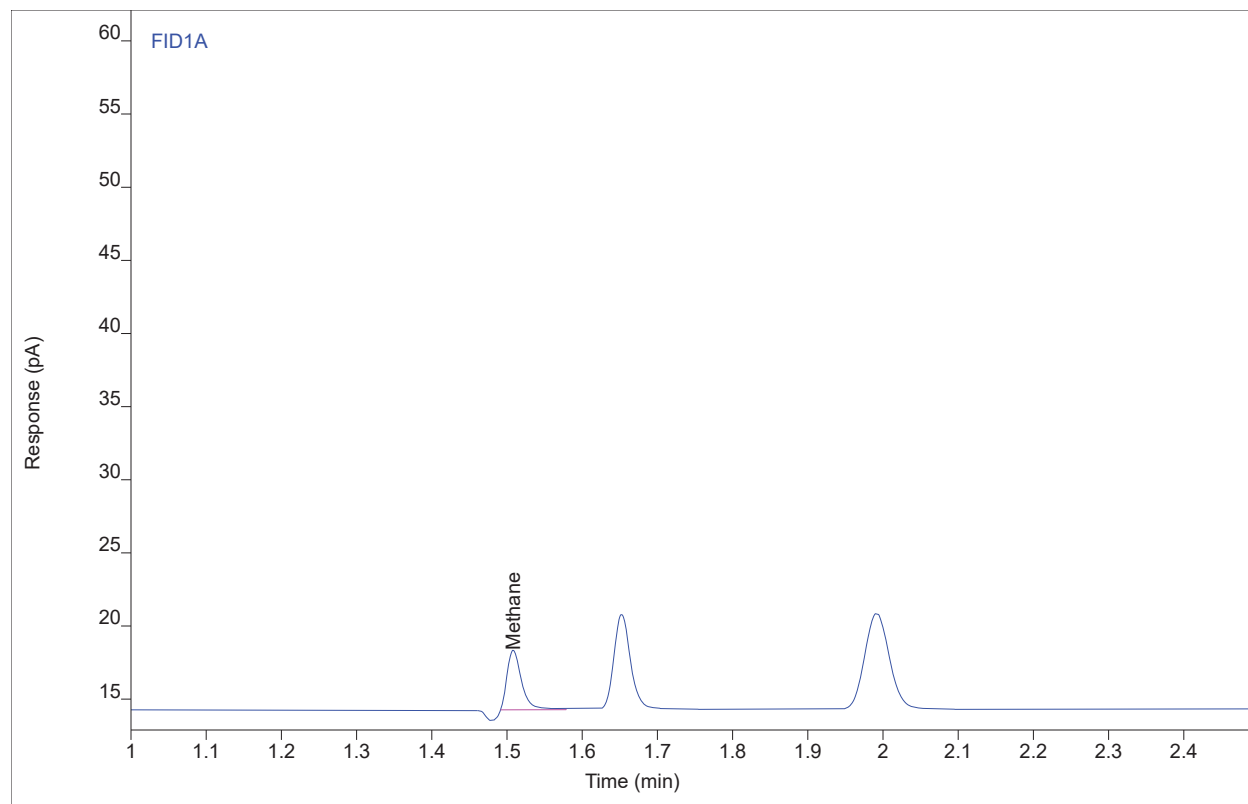
Compound	Type	RT	Area	Height	Amount	DF	SampAmt	Unit
Methane	PB	1.51	5.64455	4.06970	20.9229	1	20.9229	ppm

Chromatogram Report

Sample Name 0319-054.RCO1-1 SP.Bag
Sequence Name EDITHP1712 ver.2
Inj Data File 003F0703.D
File Location GC/2019/Edith/Quarter 1
Injection Date 3/9/2019 12:50 PM
File Modified 3/11/2019 8:06 AM
Instrument
Operator Justin Guenzler

Enthalpy Analytical

Sample Type Sample
Vial Number Vial 3
Injection Volume 250
Injection 3 of 4
Acquisition Method AQ_EDITHP503_HRVOC.M
Analysis Method EDITHP1576F_C1-C7.M
Method Modified 3/8/2019 7:56 AM
Printed 3/11/2019 9:56 AM



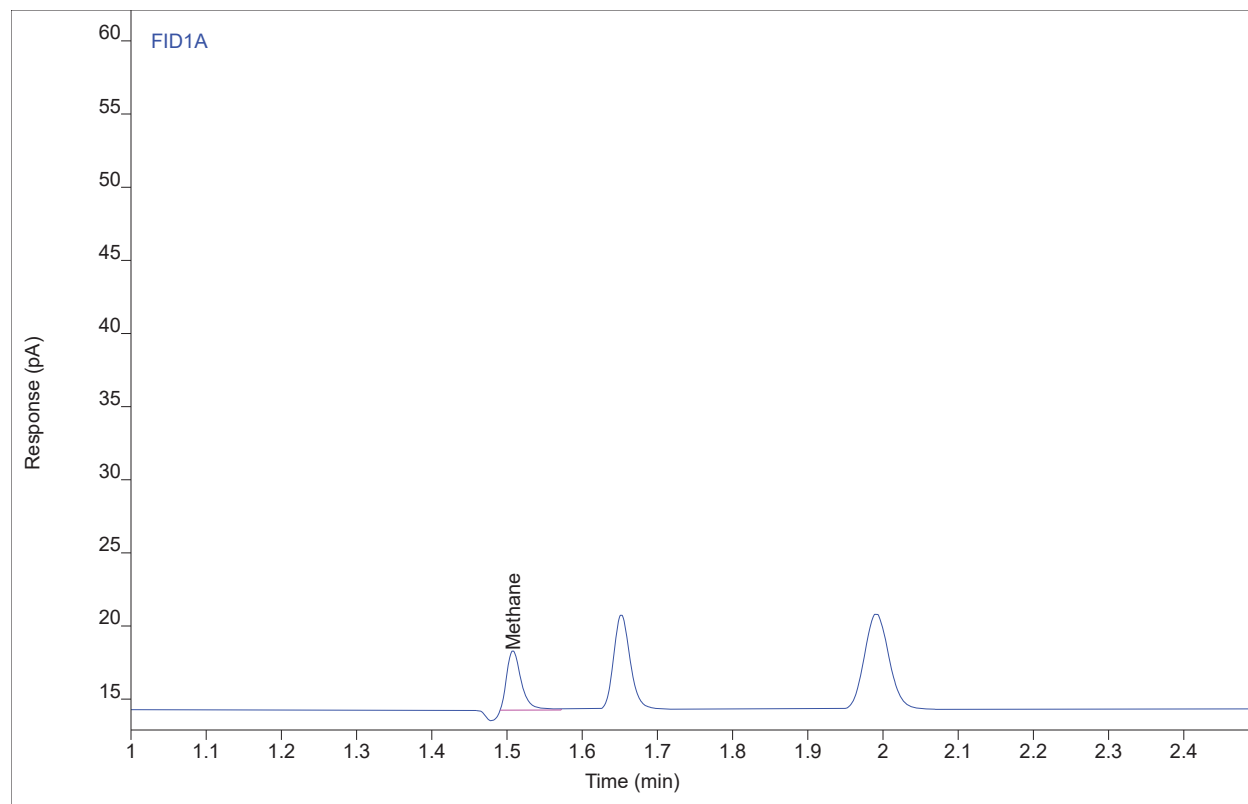
Compound	Type	RT	Area	Height	Amount	DF	SampAmt	Unit
Methane	PB	1.51	5.47103	4.05220	20.2923	1	20.2923	ppm

Chromatogram Report

Sample Name 0319-054.RCO1-1 SP.Bag
Sequence Name EDITHP1712 ver.2
Inj Data File 003F0704.D
File Location GC/2019/Edith/Quarter 1
Injection Date 3/9/2019 1:04 PM
File Modified 3/11/2019 8:06 AM
Instrument
Operator Justin Guenzler

Enthalpy Analytical

Sample Type Sample
Vial Number Vial 3
Injection Volume 250
Injection 4 of 4
Acquisition Method AQ_EDITHP503_HRVOC.M
Analysis Method EDITHP1576F_C1-C7.M
Method Modified 3/8/2019 7:56 AM
Printed 3/11/2019 9:56 AM



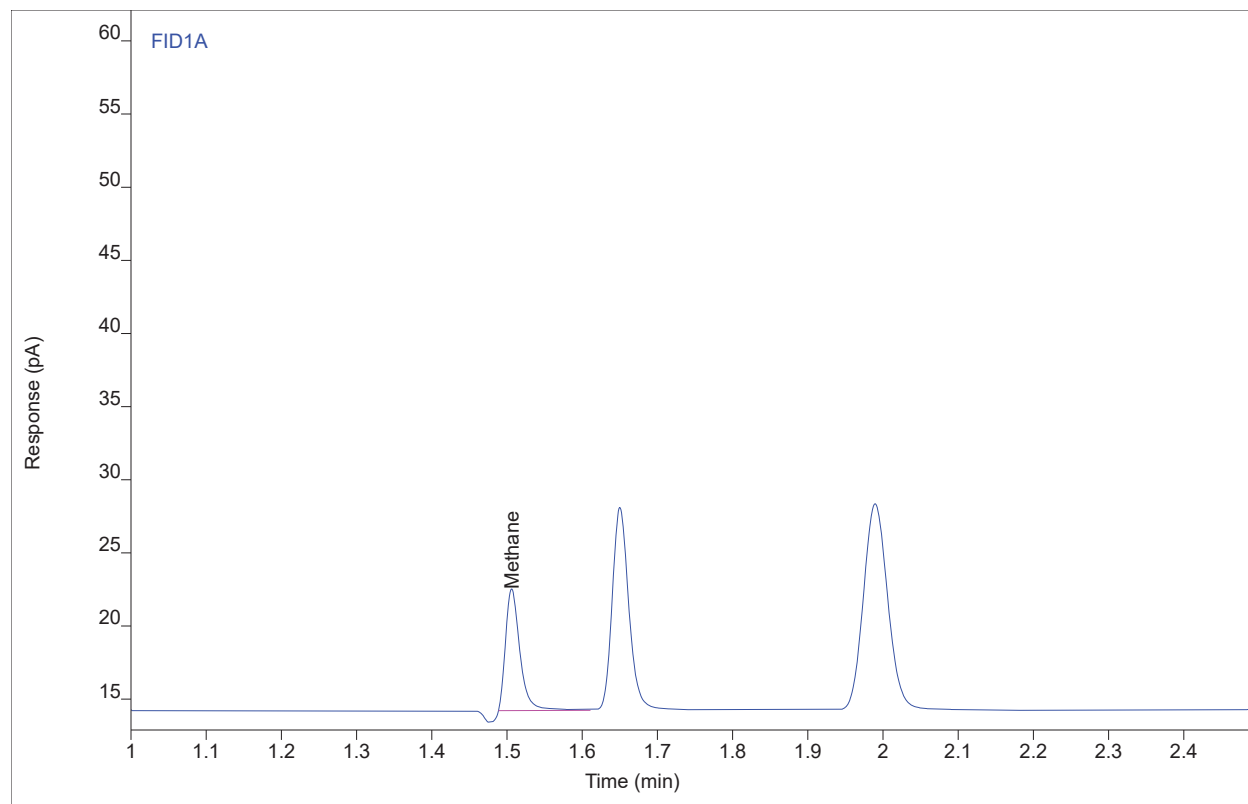
Compound	Type	RT	Area	Height	Amount	DF	SampAmt	Unit
Methane	PB	1.51	5.49131	4.04236	20.3660	1	20.3660	ppm

Chromatogram Report

Sample Name Edithp1686 #C4 ENV(1=600,2=400)
Sequence Name EDITHP1712 ver.2
Inj Data File 002F0802.D
File Location GC/2019/Edith/Quarter 1
Injection Date 3/9/2019 1:36 PM
File Modified 3/11/2019 8:06 AM
Instrument
Operator Justin Guenzler

Enthalpy Analytical

Sample Type Calibration
Vial Number Vial 2
Injection Volume 250
Injection 2 of 4
Acquisition Method AQ_EDITHP503_HRVOC.M
Analysis Method EDITHP1576F_C1-C7.M
Method Modified 3/8/2019 7:56 AM
Printed 3/11/2019 9:56 AM



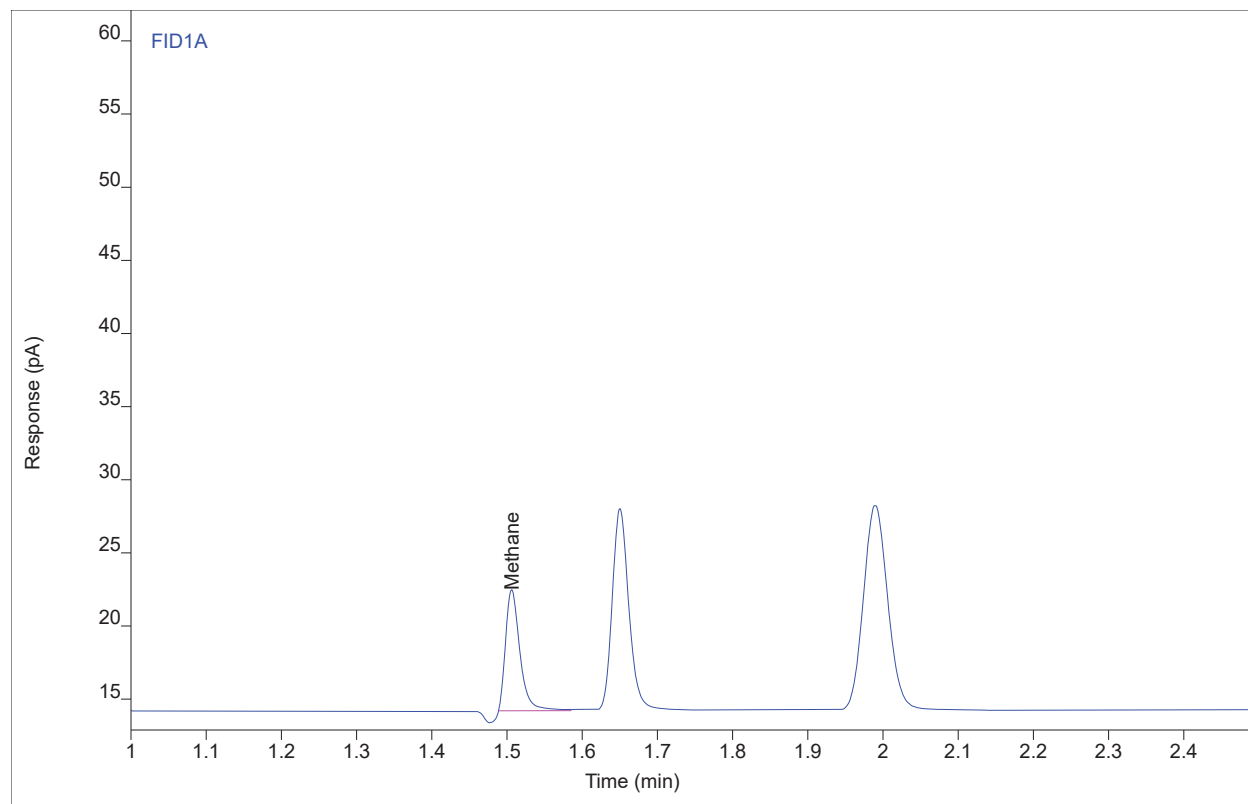
Compound	Type	RT	Area	Height	Amount	DF	SampAmt	Unit
Methane	PV	1.51	11.1332	8.28130	40.8722	1	40.8722	ppm

Chromatogram Report

Sample Name Edithp1686 #C4 ENV(1=600,2=400)
Sequence Name EDITHP1712 ver.2
Inj Data File 002F0803.D
File Location GC/2019/Edith/Quarter 1
Injection Date 3/9/2019 1:51 PM
File Modified 3/11/2019 8:06 AM
Instrument
Operator Justin Guenzler

Enthalpy Analytical

Sample Type Calibration
Vial Number Vial 2
Injection Volume 250
Injection 3 of 4
Acquisition Method AQ_EDITHP503_HRVOC.M
Analysis Method EDITHP1576F_C1-C7.M
Method Modified 3/8/2019 7:56 AM
Printed 3/11/2019 9:56 AM



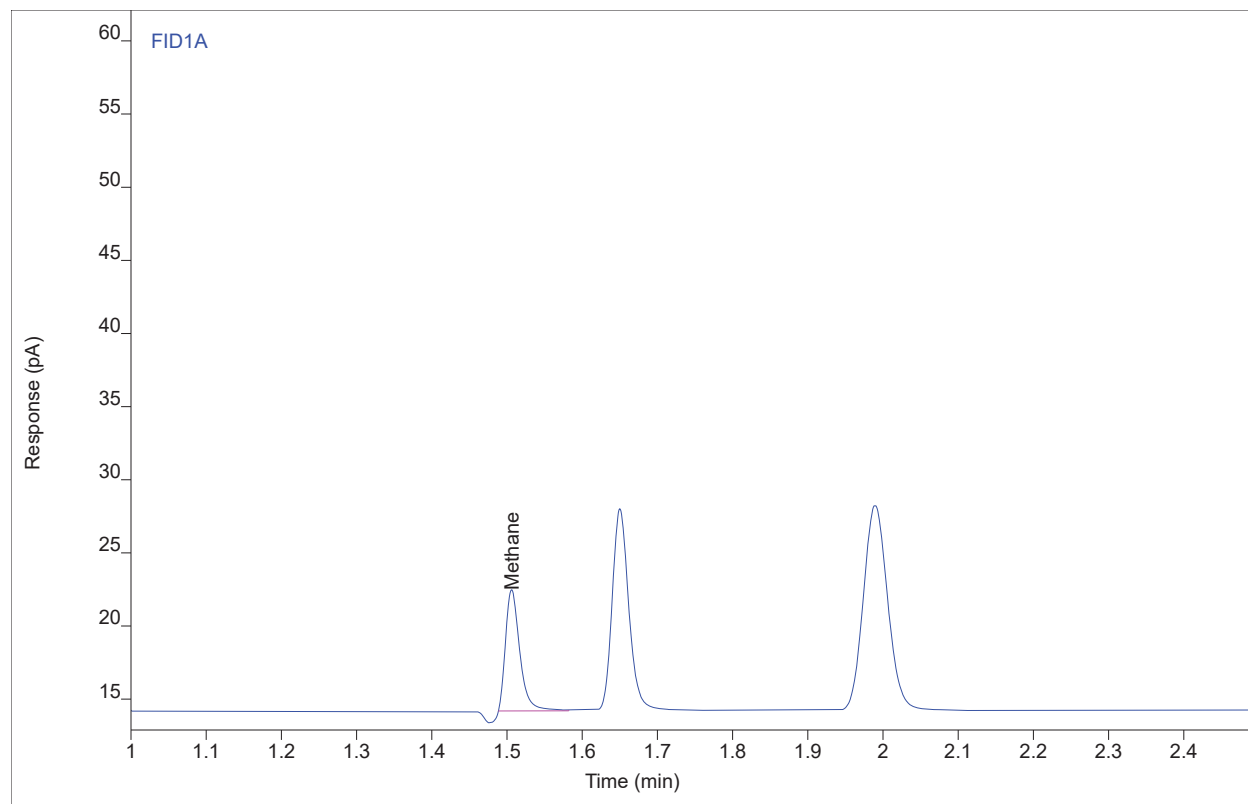
Compound	Type	RT	Area	Height	Amount	DF	SampAmt	Unit
Methane	PB	1.51	11.0235	8.24143	40.4736	1	40.4736	ppm

Chromatogram Report

Sample Name Edithp1686 #C4 ENV(1=600,2=400)
Sequence Name EDITHP1712 ver.2
Inj Data File 002F0804.D
File Location GC/2019/Edith/Quarter 1
Injection Date 3/9/2019 2:07 PM
File Modified 3/11/2019 8:06 AM
Instrument
Operator Justin Guenzler

Enthalpy Analytical

Sample Type Calibration
Vial Number Vial 2
Injection Volume 250
Injection 4 of 4
Acquisition Method AQ_EDITHP503_HRVOC.M
Analysis Method EDITHP1576F_C1-C7.M
Method Modified 3/8/2019 7:56 AM
Printed 3/11/2019 9:56 AM



Compound	Type	RT	Area	Height	Amount	DF	SampAmt	Unit
Methane	PB	1.51	11.0082	8.25576	40.4180	1	40.4180	ppm

Enthalpy Analytical

Company: Air Control Techniques PC
Job No.: 0319-054 EPA Method 18 (Bags)
Client No.: 2333

Analysis Method: EDITHP1576F_C1-C7.M

Methane -- Calibration Standards

SAMPLE NAME	Filename #1	Filename #2	Filename #3	Ret Time (min)	Ret Time (min)	Ret Time (min)	%dif RT	Conc # 1	Conc # 2	Conc # 3	%dif conc	Avg Conc (ppm)	Std Tag (ppm)	% Tag
Edithp1686 #C4 ENV(1=600,2=400)	002F0302.D	002F0303.D	002F0304.D	1.51	1.51	1.51	0.0	41.4	41.5	41.4	0.2	41.4	40.0	104
Zero Air Blank	016F0501.D	016F0502.D	016F0503.D	NA	NA	NA	NA	0.510	0.510	0.510	0.0	0.510	ND	
Edithp1686 #C4 ENV(1=600,2=400)	002F0502.D	002F0503.D	002F0504.D	1.51	1.51	1.51	0.0	40.8	40.6	40.5	0.5	40.6	40.0	102
Edithp1686 #C4 ENV(1=600,2=400)	002F0802.D	002F0803.D	002F0804.D	1.51	1.51	1.51	0.0	40.9	40.5	40.4	0.7	40.6	40.0	101

```
=====
                        Calibration Table
=====
```

Calib. Data Modified : 12/14/2018 9:50:22 AM

Rel. Reference Window : 0.000 %
 Abs. Reference Window : 0.100 min
 Rel. Non-ref. Window : 0.000 %
 Abs. Non-ref. Window : 0.050 min
 Uncalibrated Peaks : Separately calculated (see below)
 Partial Calibration : Yes, identified peaks are recalibrated
 Correct All Ret. Times: No, only for identified peaks

Curve Type : Linear
 Origin : Connected
 Weight : Quadratic (Amnt)

Recalibration Settings:
 Average Response : Average all calibrations
 Average Retention Time: Floating Average New 75%

Calibration Report Options :
 Printout of recalibrations within a sequence:
 Calibration Table after Recalibration
 Normal Report after Recalibration
 If the sequence is done with bracketing:
 Results of first cycle (ending previous bracket)

Signal 1: FID1 A, Front Signal
 Uncalibrated Peaks : using compound Propane
 Signal 2: FID3 B, Back Signal
 Uncalibrated Peaks : not reported

RetTime [min]	Lvl Sig	Amount [ppm]	Area	Amt/Area	Ref Grp Name
1.504	1 1	5.10000	1.29160	3.94858	Methane
	2	20.40000	5.52779	3.69045	
	3	40.80000	11.01984	3.70241	
	4	102.00000	27.69730	3.68267	
	5	2510.00000	684.59015	3.66643	
	6	7528.00000	2076.00431	3.62620	
	7	4.99600e4	1.39978e4	3.56913	
1.643	1 1	5.10000	2.65259	1.92265	Ethane
	2	20.40000	10.88862	1.87352	
	3	40.80000	21.65314	1.88425	
	4	102.00000	54.30959	1.87812	
	5	2513.00000	1316.89852	1.90827	
	6	7537.00000	3991.51025	1.88826	
	7	5.00200e4	2.69156e4	1.85840	
1.977	1 1	5.10000	3.92461	1.29949	Propane
	2	20.40000	16.05077	1.27097	
	3	40.80000	32.02243	1.27411	
	4	102.00000	80.39683	1.26871	
	5	2518.00000	1976.26827	1.27412	
	6	7552.00000	5993.93441	1.25994	
	7	5.01200e4	4.04632e4	1.23866	
2.906	1 1	5.10000	5.31357	9.59807e-1	Butane
	2	20.40000	21.42567	9.52129e-1	
	3	40.80000	42.59832	9.57784e-1	
	4	102.00000	107.09192	9.52453e-1	

RetTime [min]	Lvl Sig	Amount [ppm]	Area	Amt/Area	Ref Grp Name
4.476	1	5 503.00000	520.91770	9.65604e-1	Pentane
		6 1508.00000	1582.14661	9.53135e-1	
		7 1.00100e4	1.07690e4	9.29517e-1	
		1 5.10000	6.70864	7.60214e-1	
		2 20.40000	26.59298	7.67120e-1	
		3 40.80000	52.75502	7.73386e-1	
		4 102.00000	131.93262	7.73122e-1	
6.049	1	5 251.00000	313.40609	8.00878e-1	Hexane
		6 753.00000	956.22872	7.87469e-1	
		7 4998.00000	6587.28239	7.58735e-1	
		1 5.10000	7.79287	6.54445e-1	
		2 20.40000	31.50593	6.47497e-1	
		3 40.80000	62.78177	6.49870e-1	
		4 102.00000	157.50427	6.47601e-1	
7.210	1	5 201.00000	275.12465	7.30578e-1	Heptane
		6 603.00000	841.54812	7.16537e-1	
		7 4000.00000	5994.54932	6.67273e-1	
		1 5.10000	8.83190	5.77452e-1	
		2 20.40000	35.93434	5.67702e-1	
		3 40.80000	71.82188	5.68072e-1	
		4 102.00000	181.16883	5.63011e-1	

=====

Peak Sum Table

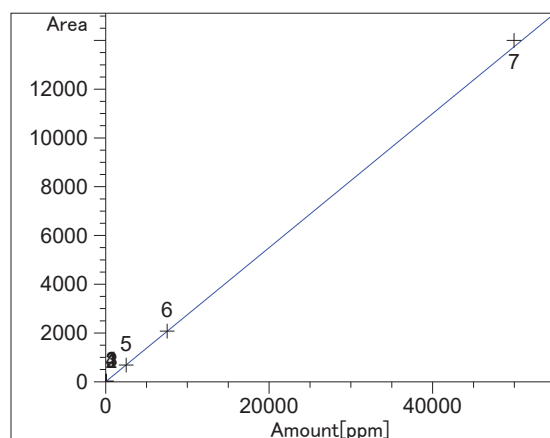
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Name	StartTime [min]	EndTime [min]	Use Reference	Response factor	Multiplier	ISTD Peak
as Ethane	1.560	1.825	None	1.8876	1.8876	None
as Propane	1.825	2.500	None	1.2694	1.2694	None
as Butane	2.500	3.600	None	9.5292e-1	0.9529	None
as Pentane	3.600	5.250	None	7.7442e-1	0.7744	None
as Hexane	5.250	6.600	None	6.7340e-1	0.6734	None
as Heptane	6.600	16.300	None	5.6906e-1	0.5691	None

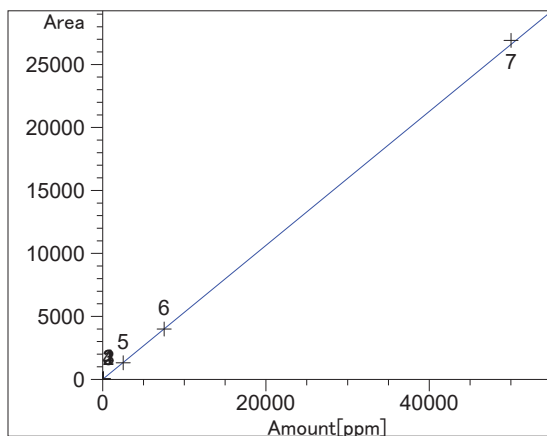
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Calibration Curves

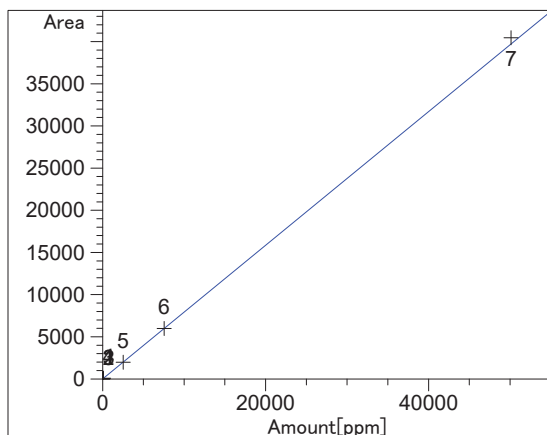
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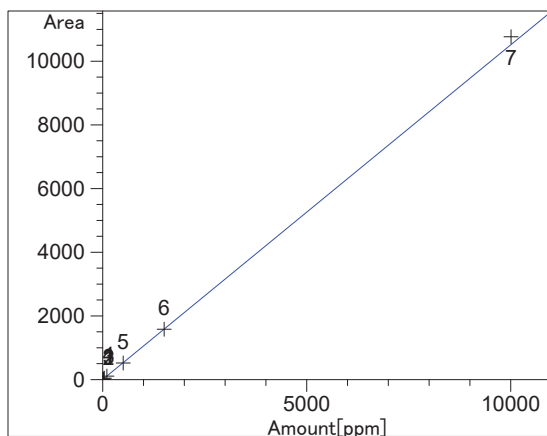
Methane at exp. RT: 1.504
 FID1 A, Front Signal
 Correlation: 0.99994
 Residual Std. Dev.: 112.94523
 Formula: $y = mx + b$
 m: 2.75130e-1
 b: -1.11977e-1
 x: Amount
 y: Area
 Calibration Level Weights:
 Level 1 : 1
 Level 2 : 0.0625
 Level 3 : 0.015625
 Level 4 : 0.0025
 Level 5 : 4.12851e-006
 Level 6 : 4.58967e-007
 Level 7 : 1.04207e-008



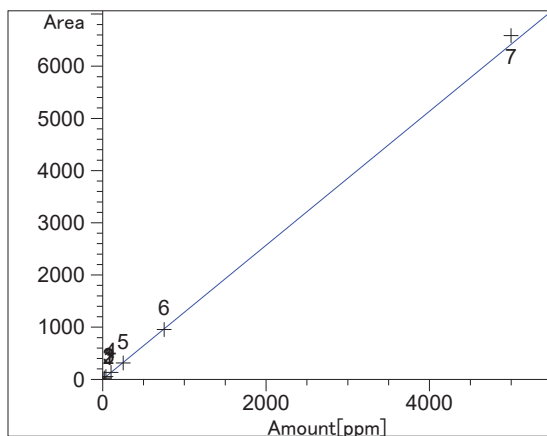
Ethane at exp. RT: 1.643
 FID1 A, Front Signal
 Correlation: 0.99996
 Residual Std. Dev.: 136.58627
 Formula: $y = mx + b$
 m: 5.32016e-1
 b: -5.48544e-2
 x: Amount
 y: Area
 Calibration Level Weights:
 Level 1 : 1
 Level 2 : 0.0625
 Level 3 : 0.015625
 Level 4 : 0.0025
 Level 5 : 4.11865e-006
 Level 6 : 4.57871e-007
 Level 7 : 1.03957e-008



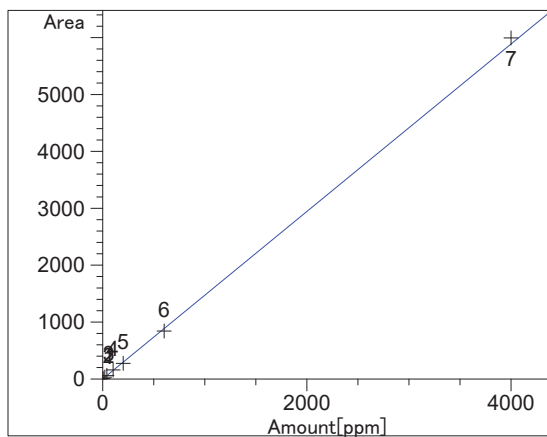
Propane at exp. RT: 1.977
 FID1 A, Front Signal
 Correlation: 0.99995
 Residual Std. Dev.: 325.64908
 Formula: $y = mx + b$
 m: 7.92806e-1
 b: -1.22762e-1
 x: Amount
 y: Area
 Calibration Level Weights:
 Level 1 : 1
 Level 2 : 0.0625
 Level 3 : 0.015625
 Level 4 : 0.0025
 Level 5 : 4.10231e-006
 Level 6 : 4.56054e-007
 Level 7 : 1.03542e-008



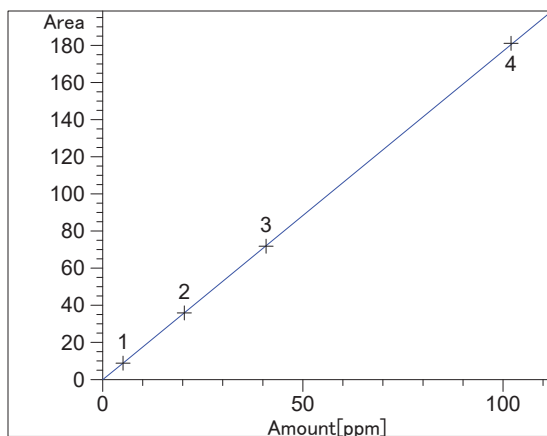
Butane at exp. RT: 2.906
 FID1 A, Front Signal
 Correlation: 0.99992
 Residual Std. Dev.: 108.08724
 Formula: $y = mx + b$
 m: 1.05170
 b: -5.37354e-2
 x: Amount
 y: Area
 Calibration Level Weights:
 Level 1 : 1
 Level 2 : 0.0625
 Level 3 : 0.015625
 Level 4 : 0.0025
 Level 5 : 0.000103
 Level 6 : 0.000011
 Level 7 : 2.59581e-007



Pentane at exp. RT: 4.476
FID1 A, Front Signal
Correlation: 0.99983
Residual Std. Dev.: 74.37563
Formula: $y = mx + b$
m: 1.28480
b: 1.69663e-1
x: Amount
y: Area
Calibration Level Weights:
Level 1 : 1
Level 2 : 0.0625
Level 3 : 0.015625
Level 4 : 0.0025
Level 5 : 0.000413
Level 6 : 0.000046
Level 7 : 1.04123e-006



Hexane at exp. RT: 6.049
FID1 A, Front Signal
Correlation: 0.99868
Residual Std. Dev.: 52.04078
Formula: $y = mx + b$
m: 1.47250
b: 3.87249e-1
x: Amount
y: Area
Calibration Level Weights:
Level 1 : 1
Level 2 : 0.0625
Level 3 : 0.015625
Level 4 : 0.0025
Level 5 : 0.000644
Level 6 : 0.000072
Level 7 : 1.62562e-006



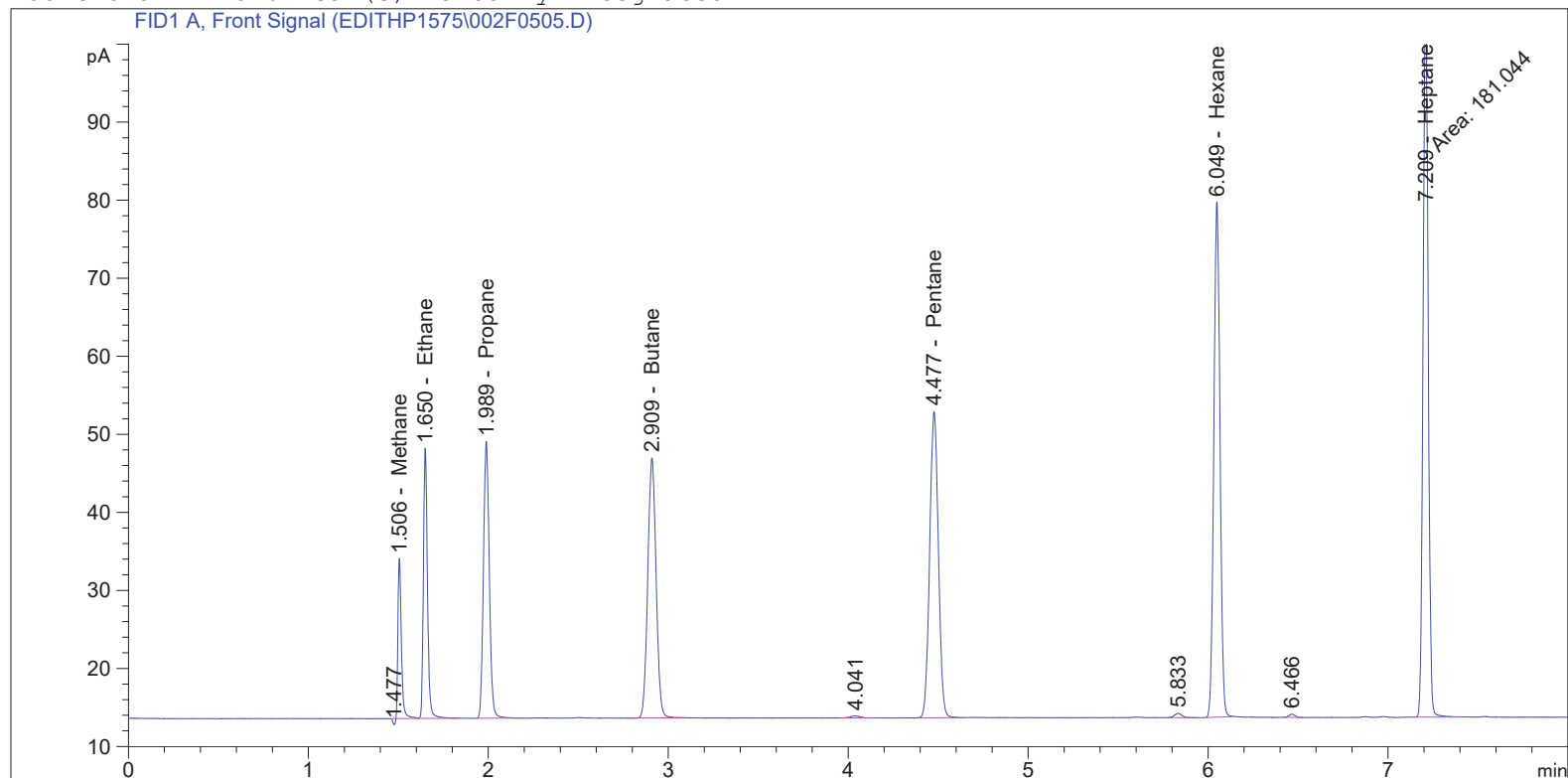
Heptane at exp. RT: 7.210
FID1 A, Front Signal
Correlation: 0.99999
Residual Std. Dev.: 0.48764
Formula: $y = mx + b$
m: 1.77197
b: -2.08074e-1
x: Amount
y: Area
Calibration Level Weights:
Level 1 : 1
Level 2 : 0.0625
Level 3 : 0.015625
Level 4 : 0.0025

=====

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Acq. Operator	: Nicholas Traversa	Seq. Line	: 5
Acq. Instrument	: Edith	Location	: Vial 2
Injection Date	: 11/26/2018 5:22:11 PM	Inj	: 5
		Inj Volume	: 250 µl

Acq. Method : C:\GC\2018\EDITH\QUARTER 4\EDITHP1575\AQ_EDITHP503_HRVOC.M
Last changed : 8/14/2017 12:18:06 PM by Nicholas Traversa
Analysis Method : C:\GC\2018\EDITH\METHODS\EDITHP1576F_C1-C7.M
Last changed : 12/14/2018 9:51:41 AM by Nicole West
ECM Server : http://s022vas01/Enthalpy
ECM Operator : Nicole West
ECM Path : GC\2018\Edith\Quarter 4\EDITHP1575.SC.SSIzip
ECM Version : 3 (modified after loading)
Additional Info : Peak(s) manually integrated



External Standard Report

Sorted By : Signal
Calib. Data Modified : 12/14/2018 9:50:22 AM
Multiplier : 1.0000
Dilution : 1.0000
Use Multiplier & Dilution Factor with ISTDs

Signal 1: FID1 A, Front Signal

RetTime [min]	Type	Area [pA*s]	Amt/Area	Amount [ppm]	Grp	Name
1.506	PV	27.70986	3.64934	101.12263		Methane
1.650	VB	54.33673	1.88154	102.23680		Ethane
1.989	BB	80.35818	1.26327	101.51406		Propane
2.909	BB	107.06507	9.51315e-1	101.85257		Butane
4.477	BB	131.90427	7.77327e-1	102.53277		Pentane
6.049	BB	157.39224	6.77446e-1	106.62477		Hexane
7.209	MM	181.04440	5.64993e-1	102.28874		Heptane

Totals : 718.17235

Uncalibrated Peaks : using compound Propane

RetTime [min]	Type	Area [pA*s]	Amt/Area	Amount [ppm]	Grp	Name
1.477	BP N	7.25178e-1	1.30084	9.43339e-1	?	
4.041	BB	1.00411	1.30084	1.30619	?	
5.833	BB	1.59848	1.30084	2.07936	?	
6.466	BB	9.82327e-1	1.30084	1.27785	?	

Uncalib. totals : 5.60673

Summed Peaks Report

Signal 1: FID1 A, Front Signal

Name	Start Time [min]	End Time [min]	Total Area [pA*s]	Amount [ppm]
as Pentane	3.600	5.250	1.00411	0.7776
as Hexane	5.250	6.600	2.58080	1.7379

Totals : 2.5155

1 Warnings or Errors :

Warning : Reference compound(s) not found

Final Summed Peaks Report

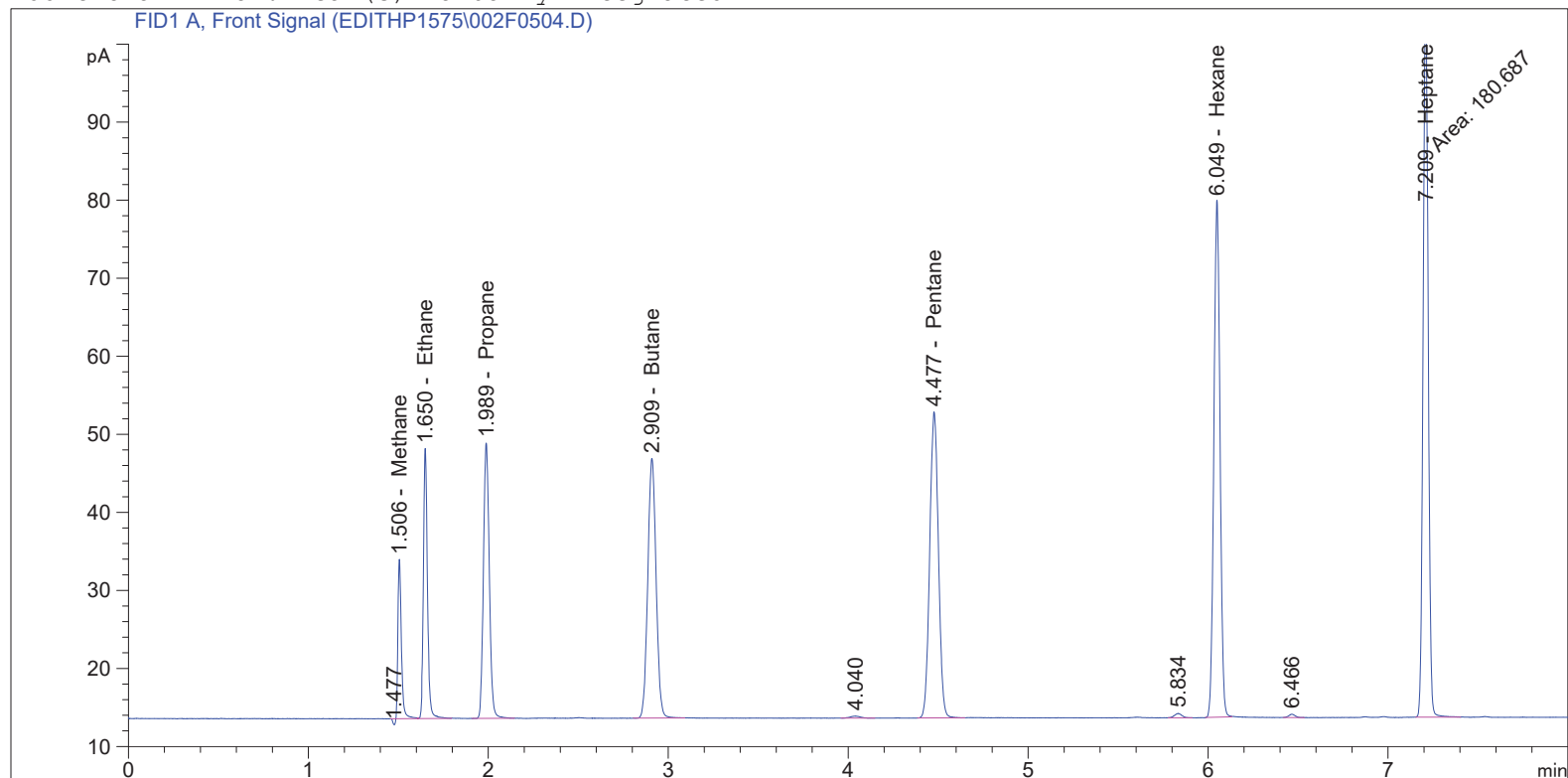
Signal 1: FID1 A, Front Signal

Name	Total Area [pA*s]	Amount [ppm]
as Pentane	1.00411	0.7776
as Hexane	2.58080	1.7379
Methane	27.70986	101.1226
Ethane	54.33673	102.2368
Propane	80.35818	101.5141
Butane	107.06507	101.8526
Pentane	131.90427	102.5328
Hexane	157.39224	106.6248
Heptane	181.04440	102.2887

Totals : 720.6879

*** End of Report ***

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=====
Acq. Operator   : Nicholas Traversa          Seq. Line :    5
Acq. Instrument : Edith                     Location  : Vial 2
Injection Date  : 11/26/2018 5:05:14 PM      Inj       :    4
                                           Inj Volume: 250 µl
Acq. Method     : C:\GC\2018\EDITH\QUARTER 4\EDITHP1575\AQ_EDITHP503_HRVOC.M
Last changed    : 8/14/2017 12:18:06 PM by Nicholas Traversa
Analysis Method : C:\GC\2018\EDITH\METHODS\EDITHP1576F_C1-C7.M
Last changed    : 12/14/2018 9:51:41 AM by Nicole West
ECM Server      : http://s022vas01/Enthalpy
ECM Operator    : Nicole West
ECM Path        : GC\2018\Edith\Quarter 4\EDITHP1575.SC.SSIzip
ECM Version     : 3 (modified after loading)
Additional Info  : Peak(s) manually integrated
=====
```



External Standard Report

```
Sorted By      : Signal
Calib. Data Modified : 12/14/2018 9:50:22 AM
Multiplier     : 1.0000
Dilution       : 1.0000
Use Multiplier & Dilution Factor with ISTDs
```

Signal 1: FID1 A, Front Signal

RetTime [min]	Type	Area [pA*s]	Amt/Area	Amount [ppm]	Grp	Name
1.506	PV	27.66279	3.64936	100.95155		Methane
1.650	VB	54.24749	1.88154	102.06906		Ethane
1.989	PB	80.15423	1.26327	101.25680		Propane
2.909	BB	106.83001	9.51316e-1	101.62907		Butane
4.477	BB	131.70012	7.77326e-1	102.37388		Pentane
6.049	BB	157.16905	6.77444e-1	106.47320		Hexane
7.209	MM	180.68741	5.64994e-1	102.08727		Heptane

Totals : 716.84083

Uncalibrated Peaks : using compound Propane

RetTime [min]	Type	Area [pA*s]	Amt/Area	Amount [ppm]	Grp	Name
1.477	BP N	7.29872e-1	1.30084	9.49446e-1	?	
4.040	BB	1.03790	1.30084	1.35013	?	
5.834	BB	1.55590	1.30084	2.02397	?	
6.466	BB	1.04231	1.30084	1.35588	?	

Uncalib. totals : 5.67943

Summed Peaks Report

Signal 1: FID1 A, Front Signal

Name	Start Time [min]	End Time [min]	Total Area [pA*s]	Amount [ppm]
as Pentane	3.600	5.250	1.03790	0.8038
as Hexane	5.250	6.600	2.59821	1.7496

Totals : 2.5534

1 Warnings or Errors :

Warning : Reference compound(s) not found

Final Summed Peaks Report

Signal 1: FID1 A, Front Signal

Name	Total Area [pA*s]	Amount [ppm]
as Pentane	1.03790	0.8038
as Hexane	2.59821	1.7496
Methane	27.66279	100.9515
Ethane	54.24749	102.0691
Propane	80.15423	101.2568
Butane	106.83001	101.6291
Pentane	131.70012	102.3739
Hexane	157.16905	106.4732
Heptane	180.68741	102.0873

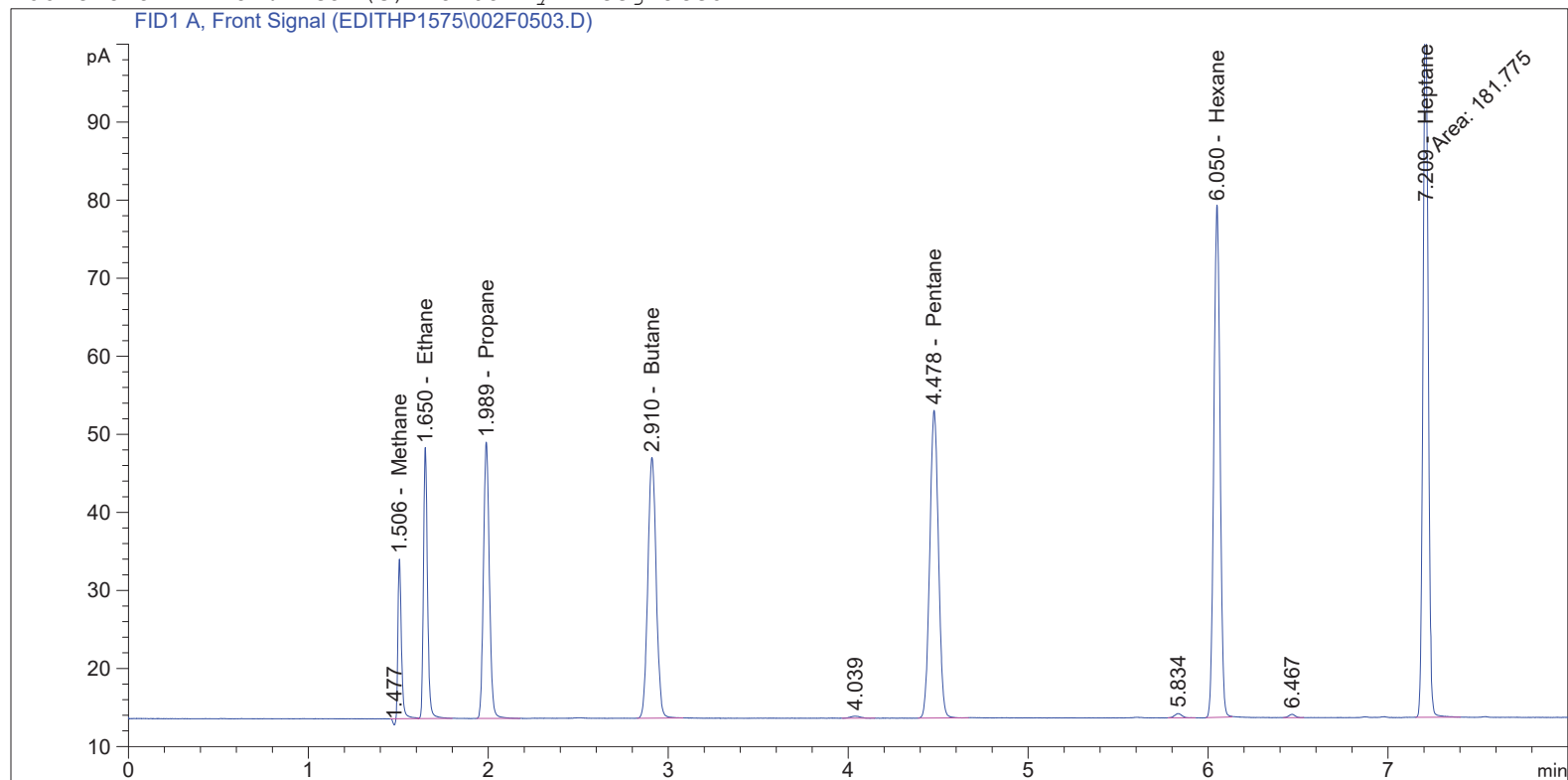
Totals : 719.3942

*** End of Report ***

=====

Acq. Operator : Nicholas Traversa Seq. Line : 5
Acq. Instrument : Edith Location : Vial 2
Injection Date : 11/26/2018 4:48:22 PM Inj : 3
Inj Volume : 250 µl

Acq. Method : C:\GC\2018\EDITH\QUARTER 4\EDITHP1575\AQ_EDITHP503_HRVOC.M
Last changed : 8/14/2017 12:18:06 PM by Nicholas Traversa
Analysis Method : C:\GC\2018\EDITH\METHODS\EDITHP1576F_C1-C7.M
Last changed : 12/14/2018 9:51:41 AM by Nicole West
ECM Server : http://s022vas01/Enthalpy
ECM Operator : Nicole West
ECM Path : GC\2018\Edith\Quarter 4\EDITHP1575.SC.SSIzip
ECM Version : 3 (modified after loading)
Additional Info : Peak(s) manually integrated



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External Standard Report

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Sorted By : Signal
Calib. Data Modified : 12/14/2018 9:50:22 AM
Multiplier : 1.0000
Dilution : 1.0000
Use Multiplier & Dilution Factor with ISTDs

Signal 1: FID1 A, Front Signal

RetTime [min]	Type	Area [pA*s]	Amt/Area	Amount [ppm]	Grp	Name
1.506	PV	27.71927	3.64933	101.15684		Methane
1.650	VB	54.34456	1.88154	102.25151		Ethane
1.989	BB	80.67809	1.26326	101.91757		Propane
2.910	BB	107.38068	9.51313e-1	102.15267		Butane
4.478	BB	132.19347	7.77329e-1	102.75786		Pentane
6.050	BB	157.95152	6.77452e-1	107.00459		Hexane
7.209	MM	181.77467	5.64990e-1	102.70087		Heptane

Totals : 719.94191

Uncalibrated Peaks : using compound Propane

RetTime [min]	Type	Area [pA*s]	Amt/Area	Amount [ppm]	Grp	Name
1.477	BP N	7.39343e-1	1.30084	9.61766e-1	?	
4.039	BB	1.00726	1.30084	1.31028	?	
5.834	BB	1.56231	1.30084	2.03232	?	
6.467	BB	1.01105	1.30084	1.31522	?	

Uncalib. totals : 5.61958

Summed Peaks Report

Signal 1: FID1 A, Front Signal

Name	Start Time [min]	End Time [min]	Total Area [pA*s]	Amount [ppm]
as Pentane	3.600	5.250	1.00726	0.7800
as Hexane	5.250	6.600	2.57336	1.7329

Totals : 2.5129

1 Warnings or Errors :

Warning : Reference compound(s) not found

Final Summed Peaks Report

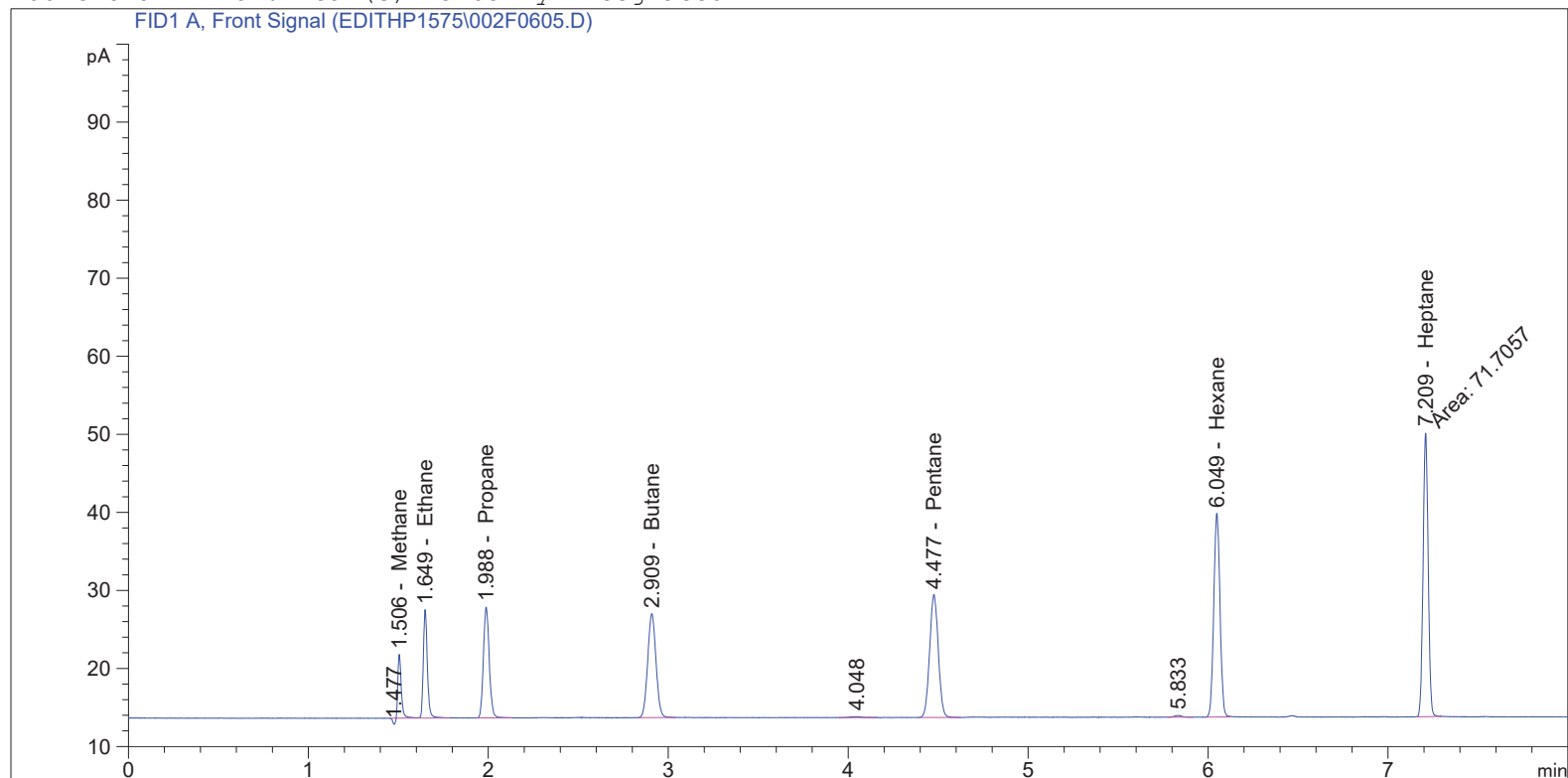
Signal 1: FID1 A, Front Signal

Name	Total Area [pA*s]	Amount [ppm]
as Pentane	1.00726	0.7800
as Hexane	2.57336	1.7329
Methane	27.71927	101.1568
Ethane	54.34456	102.2515
Propane	80.67809	101.9176
Butane	107.38068	102.1527
Pentane	132.19347	102.7579
Hexane	157.95152	107.0046
Heptane	181.77467	102.7009

Totals : 722.4548

*** End of Report ***

=====
Acq. Operator : Nicholas Traversa Seq. Line : 6
Acq. Instrument : Edith Location : Vial 2
Injection Date : 11/26/2018 6:46:11 PM Inj : 5
Inj Volume : 250 µl
Acq. Method : C:\GC\2018\EDITH\QUARTER 4\EDITHP1575\AQ_EDITHP503_HRVOC.M
Last changed : 8/14/2017 12:18:06 PM by Nicholas Traversa
Analysis Method : C:\GC\2018\EDITH\METHODS\EDITHP1576F_C1-C7.M
Last changed : 12/14/2018 9:51:41 AM by Nicole West
ECM Server : http://s022vas01/Enthalpy
ECM Operator : Nicole West
ECM Path : GC\2018\Edith\Quarter 4\EDITHP1575.SC.SSIzip
ECM Version : 3 (modified after loading)
Additional Info : Peak(s) manually integrated



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External Standard Report
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Sorted By : Signal
Calib. Data Modified : 12/14/2018 9:50:22 AM
Multiplier : 1.0000
Dilution : 1.0000
Use Multiplier & Dilution Factor with ISTDs

Signal 1: FID1 A, Front Signal

RetTime [min]	Type	Area [pA*s]	Amt/Area	Amount [ppm]	Grp	Name
1.506	PB	10.99815	3.67166	40.38143		Methane
1.649	BB	21.63459	1.88441	40.76843		Ethane
1.988	BB	32.01132	1.26618	40.53209		Propane
2.909	BB	42.57405	9.52038e-1	40.53210		Butane
4.477	BB	52.74920	7.75825e-1	40.92414		Pentane
6.049	BB	62.75278	6.74926e-1	42.35350		Hexane
7.209	MM	71.70566	5.65982e-1	40.58408		Heptane

Totals : 286.07578

Uncalibrated Peaks : using compound Propane

RetTime [min]	Type	Area [pA*s]	Amt/Area	Amount [ppm]	Grp	Name
1.477	BP N	7.87896e-1	1.30084	1.02492	?	
4.048	BB	4.30614e-1	1.30084	5.60159e-1	?	
5.833	BB	5.81095e-1	1.30084	7.55911e-1	?	

Uncalib. totals : 2.34099

Summed Peaks Report

Signal 1: FID1 A, Front Signal

Name	Start Time [min]	End Time [min]	Total Area [pA*s]	Amount [ppm]
as Pentane	3.600	5.250	4.30614e-1	0.3335
as Hexane	5.250	6.600	5.81095e-1	0.3913

Totals : 7.2478e-1

1 Warnings or Errors :

Warning : Reference compound(s) not found

Final Summed Peaks Report

Signal 1: FID1 A, Front Signal

Name	Total Area [pA*s]	Amount [ppm]
as Pentane	4.30614e-1	0.3335
as Hexane	5.81095e-1	0.3913
Methane	10.99815	40.3814
Ethane	21.63459	40.7684
Propane	32.01132	40.5321
Butane	42.57405	40.5321
Pentane	52.74920	40.9241
Hexane	62.75278	42.3535
Heptane	71.70566	40.5841

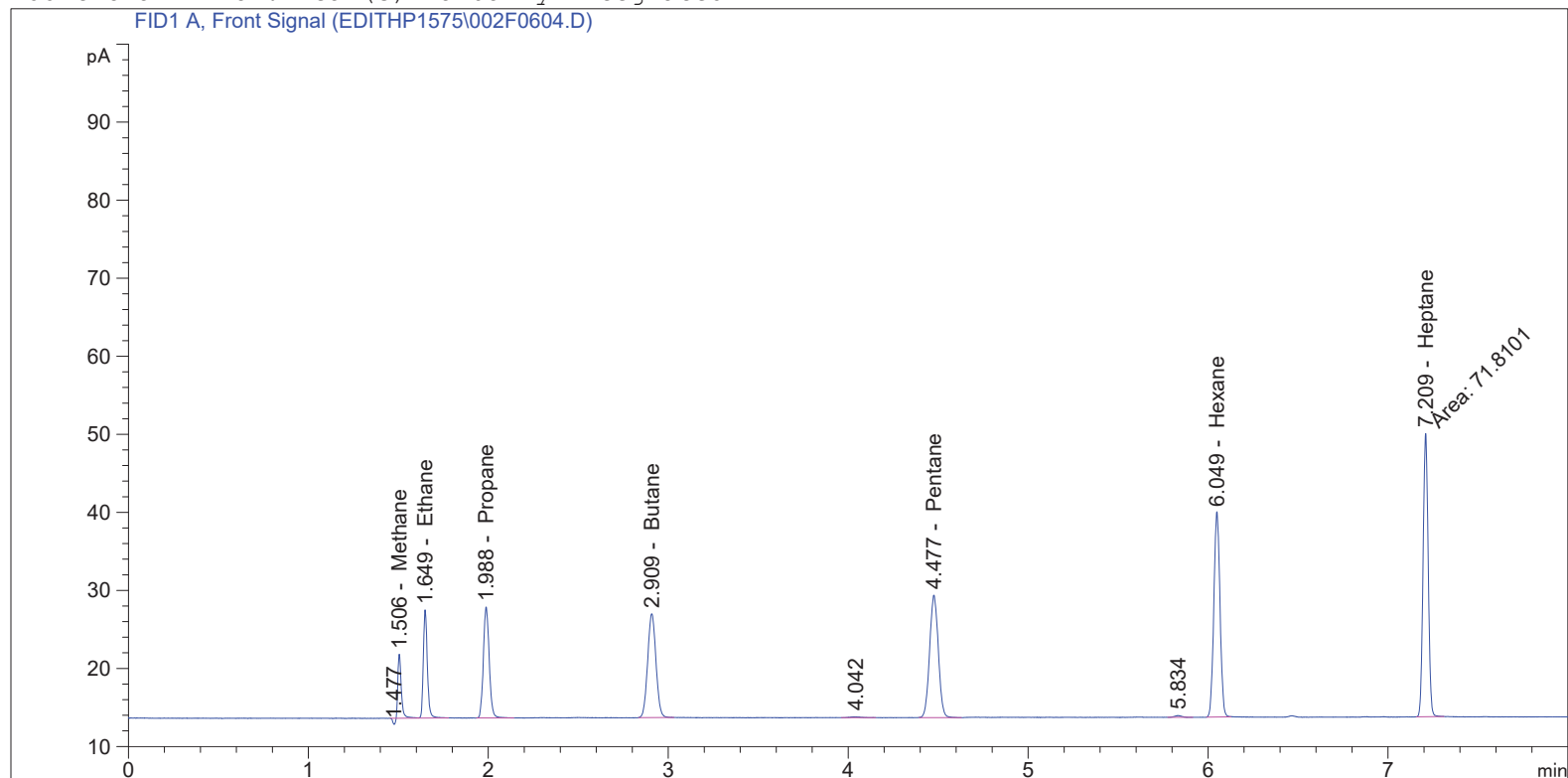
Totals : 286.8006

*** End of Report ***

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Acq. Operator	: Nicholas Traversa	Seq. Line	: 6
Acq. Instrument	: Edith	Location	: Vial 2
Injection Date	: 11/26/2018 6:29:25 PM	Inj	: 4
		Inj Volume	: 250 µl

Acq. Method : C:\GC\2018\EDITH\QUARTER 4\EDITHP1575\AQ_EDITHP503_HRVOC.M
Last changed : 8/14/2017 12:18:06 PM by Nicholas Traversa
Analysis Method : C:\GC\2018\EDITH\METHODS\EDITHP1576F_C1-C7.M
Last changed : 12/14/2018 9:51:41 AM by Nicole West
ECM Server : http://s022vas01/Enthalpy
ECM Operator : Nicole West
ECM Path : GC\2018\Edith\Quarter 4\EDITHP1575.SC.SSIzip
ECM Version : 3 (modified after loading)
Additional Info : Peak(s) manually integrated



External Standard Report

Sorted By : Signal
Calib. Data Modified : 12/14/2018 9:50:22 AM
Multiplier : 1.0000
Dilution : 1.0000
Use Multiplier & Dilution Factor with ISTDs

Signal 1: FID1 A, Front Signal

RetTime [min]	Type	Area [pA*s]	Amt/Area	Amount [ppm]	Grp	Name
1.506	PV	11.07759	3.67139	40.67018		Methane
1.649	VB	21.65865	1.88440	40.81365		Ethane
1.988	BB	32.10891	1.26617	40.65519		Propane
2.909	BB	42.61734	9.52036e-1	40.57326		Butane
4.477	BB	52.77180	7.75826e-1	40.94174		Pentane
6.049	BB	62.79457	6.74929e-1	42.38188		Hexane
7.209	MM	71.81006	5.65979e-1	40.64300		Heptane

Totals : 286.67889

Uncalibrated Peaks : using compound Propane

RetTime [min]	Type	Area [pA*s]	Amt/Area	Amount [ppm]	Grp	Name
1.477	BP N	7.77669e-1	1.30084	1.01162	?	
4.042	BB	4.00612e-1	1.30084	5.21132e-1	?	
5.834	BB	6.06667e-1	1.30084	7.89176e-1	?	

Uncalib. totals : 2.32193

Summed Peaks Report

Signal 1: FID1 A, Front Signal

Name	Start Time [min]	End Time [min]	Total Area [pA*s]	Amount [ppm]
as Pentane	3.600	5.250	4.00612e-1	0.3102
as Hexane	5.250	6.600	6.06667e-1	0.4085

Totals : 7.1877e-1

1 Warnings or Errors :

Warning : Reference compound(s) not found

Final Summed Peaks Report

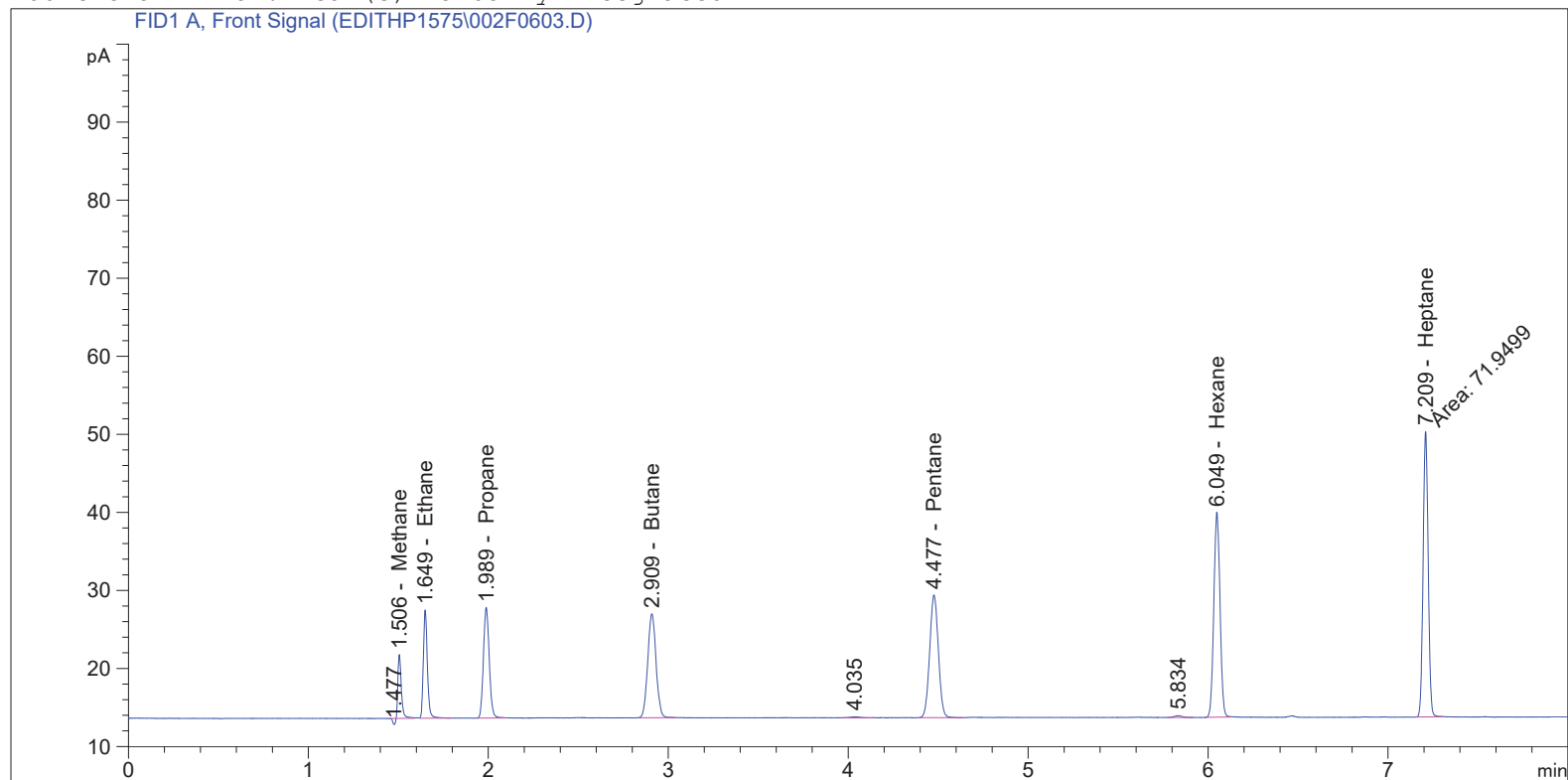
Signal 1: FID1 A, Front Signal

Name	Total Area [pA*s]	Amount [ppm]
as Pentane	4.00612e-1	0.3102
as Hexane	6.06667e-1	0.4085
Methane	11.07759	40.6702
Ethane	21.65865	40.8137
Propane	32.10891	40.6552
Butane	42.61734	40.5733
Pentane	52.77180	40.9417
Hexane	62.79457	42.3819
Heptane	71.81006	40.6430

Totals : 287.3977

*** End of Report ***

=====
Acq. Operator : Nicholas Traversa Seq. Line : 6
Acq. Instrument : Edith Location : Vial 2
Injection Date : 11/26/2018 6:12:40 PM Inj : 3
Inj Volume : 250 µl
Acq. Method : C:\GC\2018\EDITH\QUARTER 4\EDITHP1575\AQ_EDITHP503_HRVOC.M
Last changed : 8/14/2017 12:18:06 PM by Nicholas Traversa
Analysis Method : C:\GC\2018\EDITH\METHODS\EDITHP1576F_C1-C7.M
Last changed : 12/14/2018 9:51:41 AM by Nicole West
ECM Server : http://s022vas01/Enthalpy
ECM Operator : Nicole West
ECM Path : GC\2018\Edith\Quarter 4\EDITHP1575.SC.SSIzip
ECM Version : 3 (modified after loading)
Additional Info : Peak(s) manually integrated



=====
External Standard Report
=====

Sorted By : Signal
Calib. Data Modified : 12/14/2018 9:50:22 AM
Multiplier : 1.0000
Dilution : 1.0000
Use Multiplier & Dilution Factor with ISTDs

Signal 1: FID1 A, Front Signal

RetTime [min]	Type	Area [pA*s]	Amt/Area	Amount [ppm]	Grp	Name
1.506	PB	10.98377	3.67170	40.32915		Methane
1.649	BB	21.66619	1.88440	40.82782		Ethane
1.989	BB	31.94706	1.26619	40.45104		Propane
2.909	BB	42.60355	9.52037e-1	40.56015		Butane
4.477	BB	52.74406	7.75825e-1	40.92014		Pentane
6.049	BB	62.79795	6.74929e-1	42.38417		Hexane
7.209	MM	71.94994	5.65976e-1	40.72194		Heptane

Totals : 286.19440

Uncalibrated Peaks : using compound Propane

RetTime [min]	Type	Area [pA*s]	Amt/Area	Amount [ppm]	Grp	Name
1.477	BP N	7.85343e-1	1.30084	1.02160	?	
4.035	BB	4.51579e-1	1.30084	5.87431e-1	?	
5.834	BB	6.34677e-1	1.30084	8.25612e-1	?	

Uncalib. totals : 2.43465

Summed Peaks Report

Signal 1: FID1 A, Front Signal

Name	Start Time [min]	End Time [min]	Total Area [pA*s]	Amount [ppm]
as Pentane	3.600	5.250	4.51579e-1	0.3497
as Hexane	5.250	6.600	6.34677e-1	0.4274

Totals : 7.7710e-1

1 Warnings or Errors :

Warning : Reference compound(s) not found

Final Summed Peaks Report

Signal 1: FID1 A, Front Signal

Name	Total Area [pA*s]	Amount [ppm]
as Pentane	4.51579e-1	0.3497
as Hexane	6.34677e-1	0.4274
Methane	10.98377	40.3291
Ethane	21.66619	40.8278
Propane	31.94706	40.4510
Butane	42.60355	40.5601
Pentane	52.74406	40.9201
Hexane	62.79795	42.3842
Heptane	71.94994	40.7219

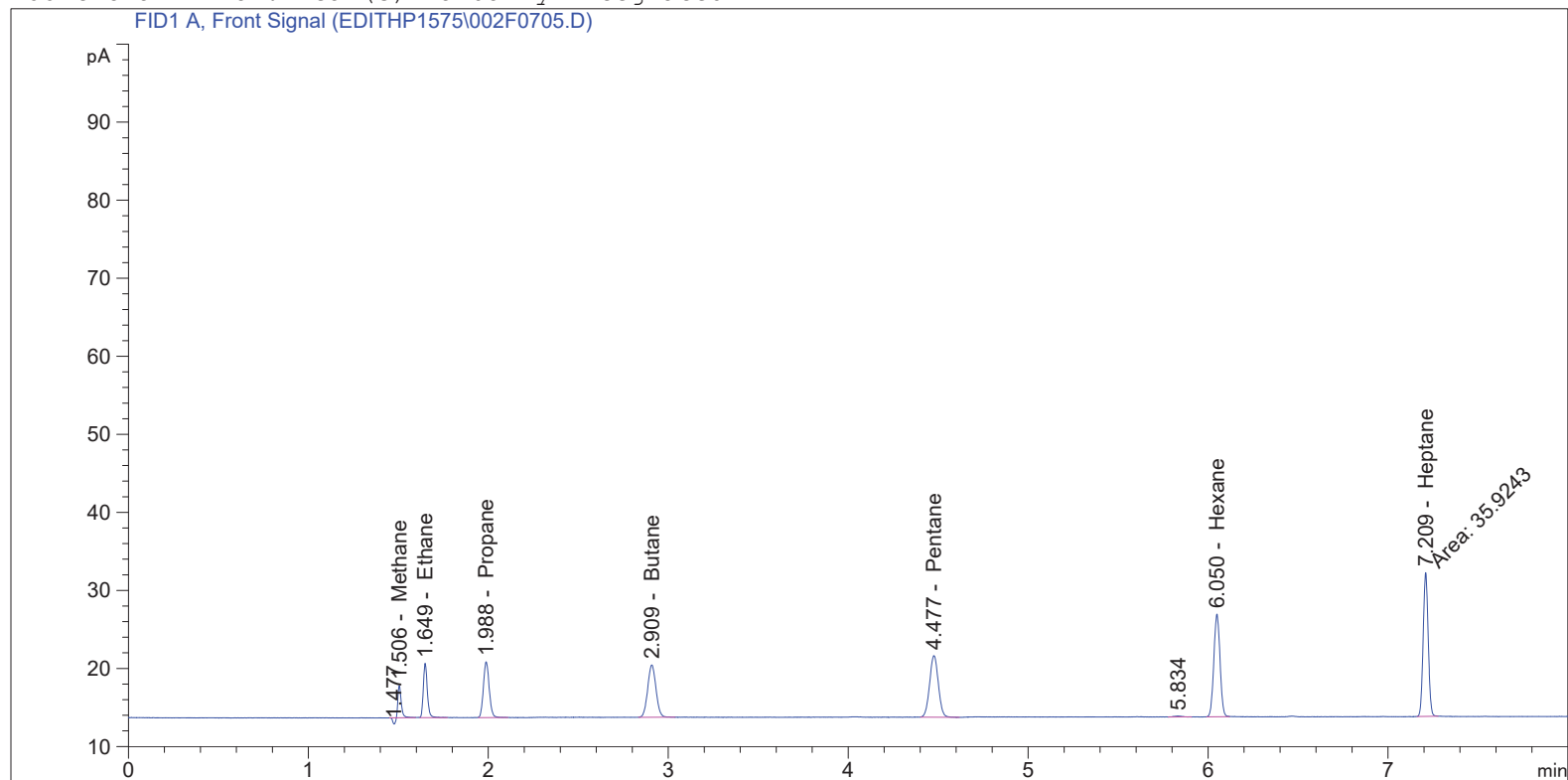
Totals : 286.9715

*** End of Report ***

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Acq. Operator	: Nicholas Traversa	Seq. Line	: 7
Acq. Instrument	: Edith	Location	: Vial 2
Injection Date	: 11/26/2018 8:10:27 PM	Inj	: 5
		Inj Volume	: 250 µl

Acq. Method : C:\GC\2018\EDITH\QUARTER 4\EDITHP1575\AQ_EDITHP503_HRVOC.M
Last changed : 8/14/2017 12:18:06 PM by Nicholas Traversa
Analysis Method : C:\GC\2018\EDITH\METHODS\EDITHP1576F_C1-C7.M
Last changed : 12/14/2018 9:51:41 AM by Nicole West
ECM Server : http://s022vas01/Enthalpy
ECM Operator : Nicole West
ECM Path : GC\2018\Edith\Quarter 4\EDITHP1575.SC.SSIzip
ECM Version : 3 (modified after loading)
Additional Info : Peak(s) manually integrated



External Standard Report

Sorted By : Signal
Calib. Data Modified : 12/14/2018 9:50:22 AM
Multiplier : 1.0000
Dilution : 1.0000
Use Multiplier & Dilution Factor with ISTDs

Signal 1: FID1 A, Front Signal

RetTime [min]	Type	Area [pA*s]	Amt/Area	Amount [ppm]	Grp	Name
1.506	PB	5.51604	3.70843	20.45587		Methane
1.649	BB	10.89861	1.88910	20.58860		Ethane
1.988	BB	16.05990	1.27098	20.41188		Propane
2.909	BB	21.46897	9.53217e-1	20.46459		Butane
4.477	BB	26.60523	7.73365e-1	20.57555		Pentane
6.050	BB	31.52674	6.70775e-1	21.14736		Hexane
7.209	MM	35.92431	5.67613e-1	20.39109		Heptane

Totals : 144.03495

Uncalibrated Peaks : using compound Propane

RetTime [min]	Type	Area [pA*s]	Amt/Area	Amount [ppm]	Grp	Name
1.477	BP N	8.32714e-1	1.30084	1.08323	?	
5.834	BB	3.11135e-1	1.30084	4.04736e-1	?	

Uncalib. totals : 1.48796

Summed Peaks Report

Signal 1: FID1 A, Front Signal

Name	Start Time [min]	End Time [min]	Total Area [pA*s]	Amount [ppm]
as Hexane	5.250	6.600	3.11135e-1	0.2095

Totals : 2.0952e-1

1 Warnings or Errors :

Warning : Reference compound(s) not found

Final Summed Peaks Report

Signal 1: FID1 A, Front Signal

Name	Total Area [pA*s]	Amount [ppm]
as Hexane	3.11135e-1	0.2095
Methane	5.51604	20.4559
Ethane	10.89861	20.5886
Propane	16.05990	20.4119
Butane	21.46897	20.4646
Pentane	26.60523	20.5755
Hexane	31.52674	21.1474
Heptane	35.92431	20.3911

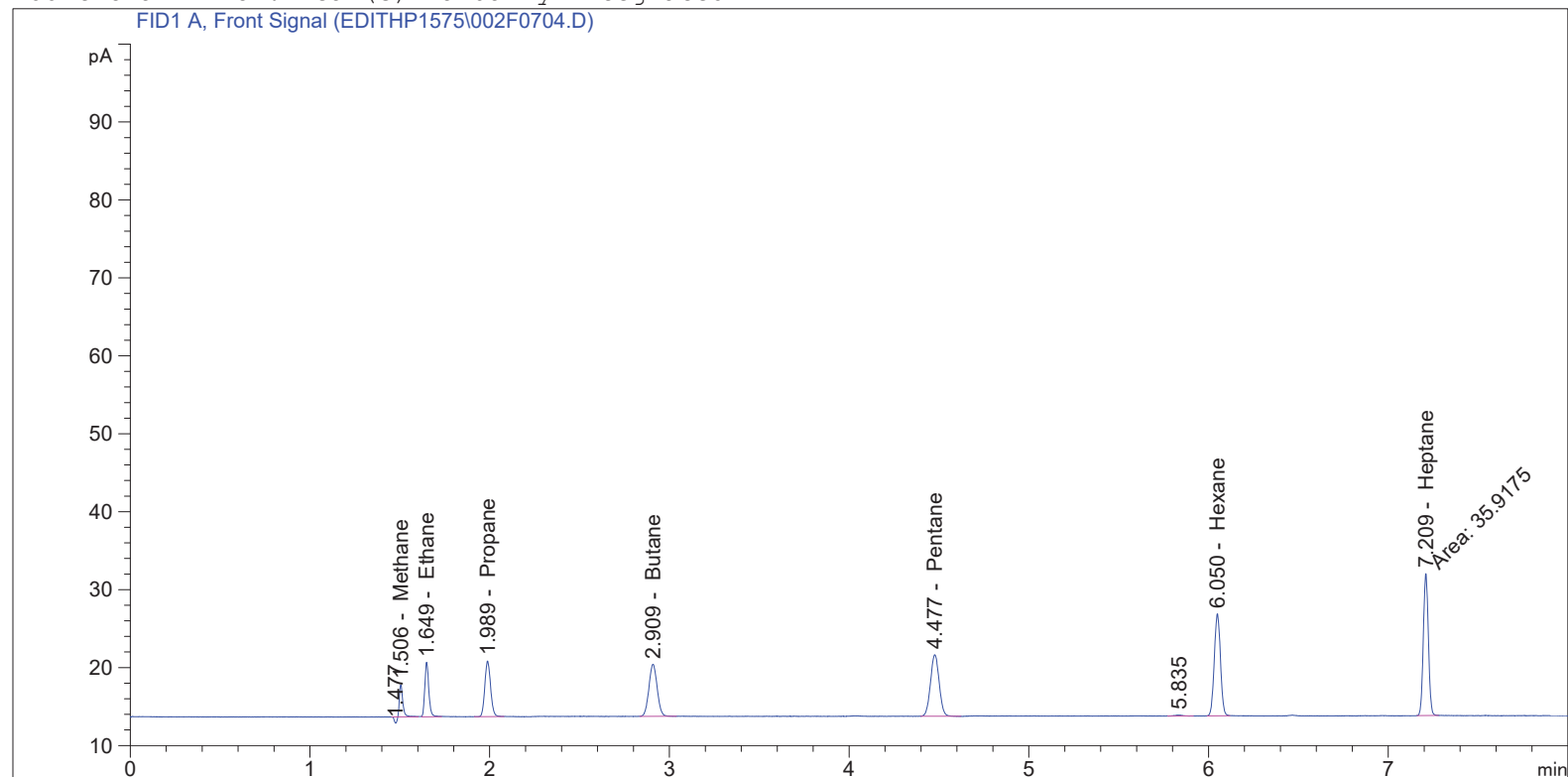
Totals : 144.2445

*** End of Report ***

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Acq. Operator	: Nicholas Traversa	Seq. Line	: 7
Acq. Instrument	: Edith	Location	: Vial 2
Injection Date	: 11/26/2018 7:53:40 PM	Inj	: 4
		Inj Volume	: 250 µl

Acq. Method : C:\GC\2018\EDITH\QUARTER 4\EDITHP1575\AQ_EDITHP503_HRVOC.M
Last changed : 8/14/2017 12:18:06 PM by Nicholas Traversa
Analysis Method : C:\GC\2018\EDITH\METHODS\EDITHP1576F_C1-C7.M
Last changed : 12/14/2018 9:51:41 AM by Nicole West
ECM Server : http://s022vas01/Enthalpy
ECM Operator : Nicole West
ECM Path : GC\2018\Edith\Quarter 4\EDITHP1575.SC.SSIzip
ECM Version : 3 (modified after loading)
Additional Info : Peak(s) manually integrated



External Standard Report

Sorted By : Signal
Calib. Data Modified : 12/14/2018 9:50:22 AM
Multiplier : 1.0000
Dilution : 1.0000
Use Multiplier & Dilution Factor with ISTDs

Signal 1: FID1 A, Front Signal

RetTime [min]	Type	Area [pA*s]	Amt/Area	Amount [ppm]	Grp	Name
1.506	PB	5.57529	3.70765	20.67124		Methane
1.649	BB	10.89599	1.88911	20.58368		Ethane
1.989	PB	15.97103	1.27104	20.29979		Propane
2.909	BB	21.38335	9.53227e-1	20.38318		Butane
4.477	BB	26.52572	7.73350e-1	20.51367		Pentane
6.050	BB	31.44983	6.70755e-1	21.09513		Hexane
7.209	MM	35.91750	5.67613e-1	20.38725		Heptane

Totals : 143.93393

Uncalibrated Peaks : using compound Propane

RetTime [min]	Type	Area [pA*s]	Amt/Area	Amount [ppm]	Grp	Name
1.477	BP N	8.06123e-1	1.30084	1.04864	?	
5.835	BB	3.12239e-1	1.30084	4.06173e-1	?	

Uncalib. totals : 1.45481

Summed Peaks Report

Signal 1: FID1 A, Front Signal

Name	Start Time [min]	End Time [min]	Total Area [pA*s]	Amount [ppm]
as Hexane	5.250	6.600	3.12239e-1	0.2103

Totals : 2.1026e-1

1 Warnings or Errors :

Warning : Reference compound(s) not found

Final Summed Peaks Report

Signal 1: FID1 A, Front Signal

Name	Total Area [pA*s]	Amount [ppm]
as Hexane	3.12239e-1	0.2103
Methane	5.57529	20.6712
Ethane	10.89599	20.5837
Propane	15.97103	20.2998
Butane	21.38335	20.3832
Pentane	26.52572	20.5137
Hexane	31.44983	21.0951
Heptane	35.91750	20.3872

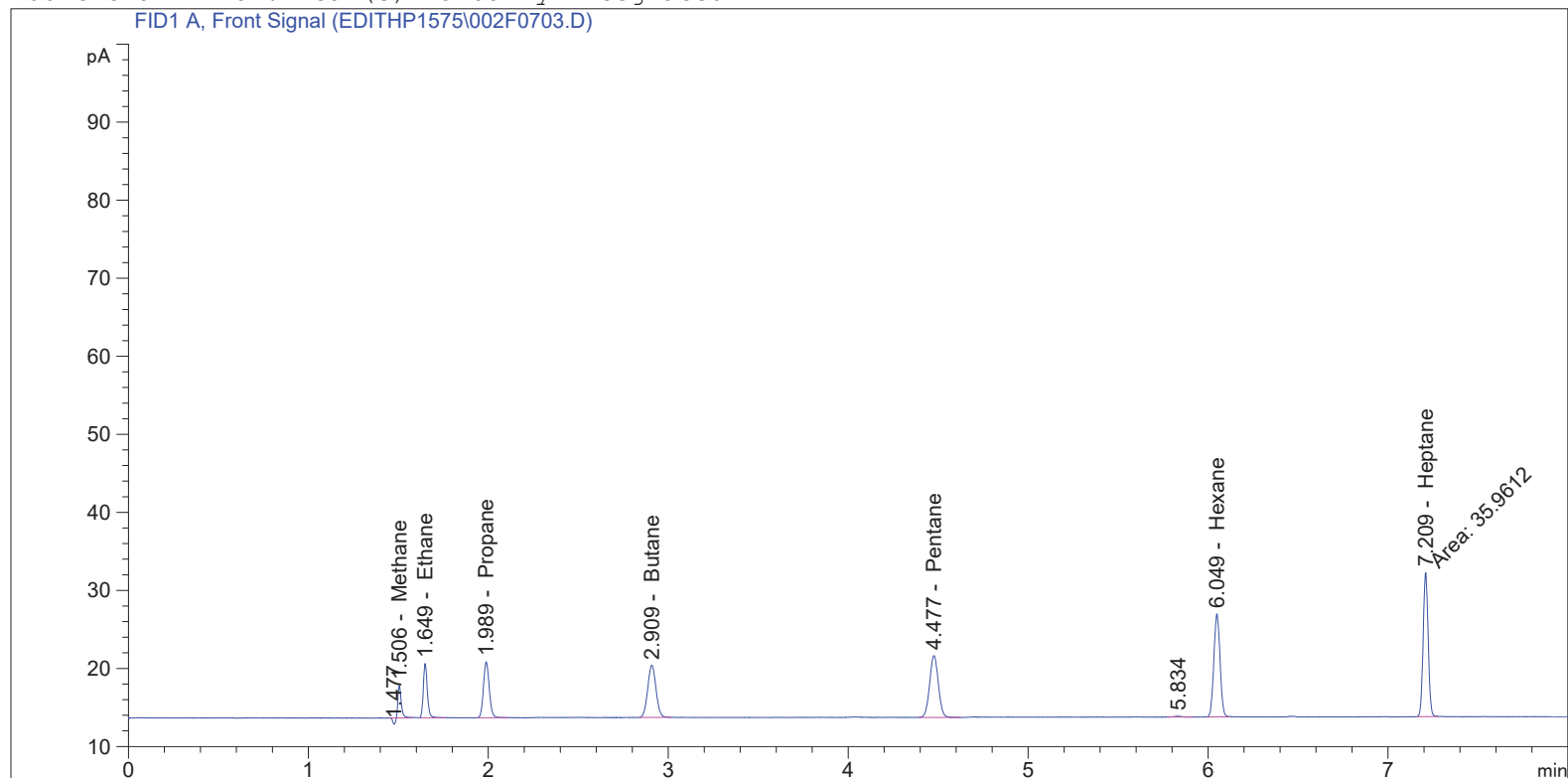
Totals : 144.1442

*** End of Report ***

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Acq. Operator	: Nicholas Traversa	Seq. Line	: 7
Acq. Instrument	: Edith	Location	: Vial 2
Injection Date	: 11/26/2018 7:36:52 PM	Inj	: 3
		Inj Volume	: 250 µl

Acq. Method : C:\GC\2018\EDITH\QUARTER 4\EDITHP1575\AQ_EDITHP503_HRVOC.M
Last changed : 8/14/2017 12:18:06 PM by Nicholas Traversa
Analysis Method : C:\GC\2018\EDITH\METHODS\EDITHP1576F_C1-C7.M
Last changed : 12/14/2018 9:51:41 AM by Nicole West
ECM Server : http://s022vas01/Enthalpy
ECM Operator : Nicole West
ECM Path : GC\2018\Edith\Quarter 4\EDITHP1575.SC.SSIzip
ECM Version : 3 (modified after loading)
Additional Info : Peak(s) manually integrated



External Standard Report

Sorted By : Signal
Calib. Data Modified : 12/14/2018 9:50:22 AM
Multiplier : 1.0000
Dilution : 1.0000
Use Multiplier & Dilution Factor with ISTDs

Signal 1: FID1 A, Front Signal

RetTime [min]	Type	Area [pA*s]	Amt/Area	Amount [ppm]	Grp	Name
1.506	PB	5.49202	3.70876	20.36858		Methane
1.649	BB	10.87127	1.88913	20.53723		Ethane
1.989	BB	16.12137	1.27095	20.48942		Propane
2.909	BB	21.42468	9.53222e-1	20.42249		Butane
4.477	BB	26.64799	7.73373e-1	20.60883		Pentane
6.049	BB	31.54122	6.70779e-1	21.15719		Hexane
7.209	MM	35.96122	5.67609e-1	20.41192		Heptane

Totals : 143.99567

Uncalibrated Peaks : using compound Propane

RetTime [min]	Type	Area [pA*s]	Amt/Area	Amount [ppm]	Grp	Name
1.477	BP N	8.19267e-1	1.30084	1.06573	?	
5.834	BB	3.06913e-1	1.30084	3.99244e-1	?	

Uncalib. totals : 1.46498

Summed Peaks Report

Signal 1: FID1 A, Front Signal

Name	Start Time [min]	End Time [min]	Total Area [pA*s]	Amount [ppm]
as Hexane	5.250	6.600	3.06913e-1	0.2067

Totals : 2.0668e-1

1 Warnings or Errors :

Warning : Reference compound(s) not found

Final Summed Peaks Report

Signal 1: FID1 A, Front Signal

Name	Total Area [pA*s]	Amount [ppm]
as Hexane	3.06913e-1	0.2067
Methane	5.49202	20.3686
Ethane	10.87127	20.5372
Propane	16.12137	20.4894
Butane	21.42468	20.4225
Pentane	26.64799	20.6088
Hexane	31.54122	21.1572
Heptane	35.96122	20.4119

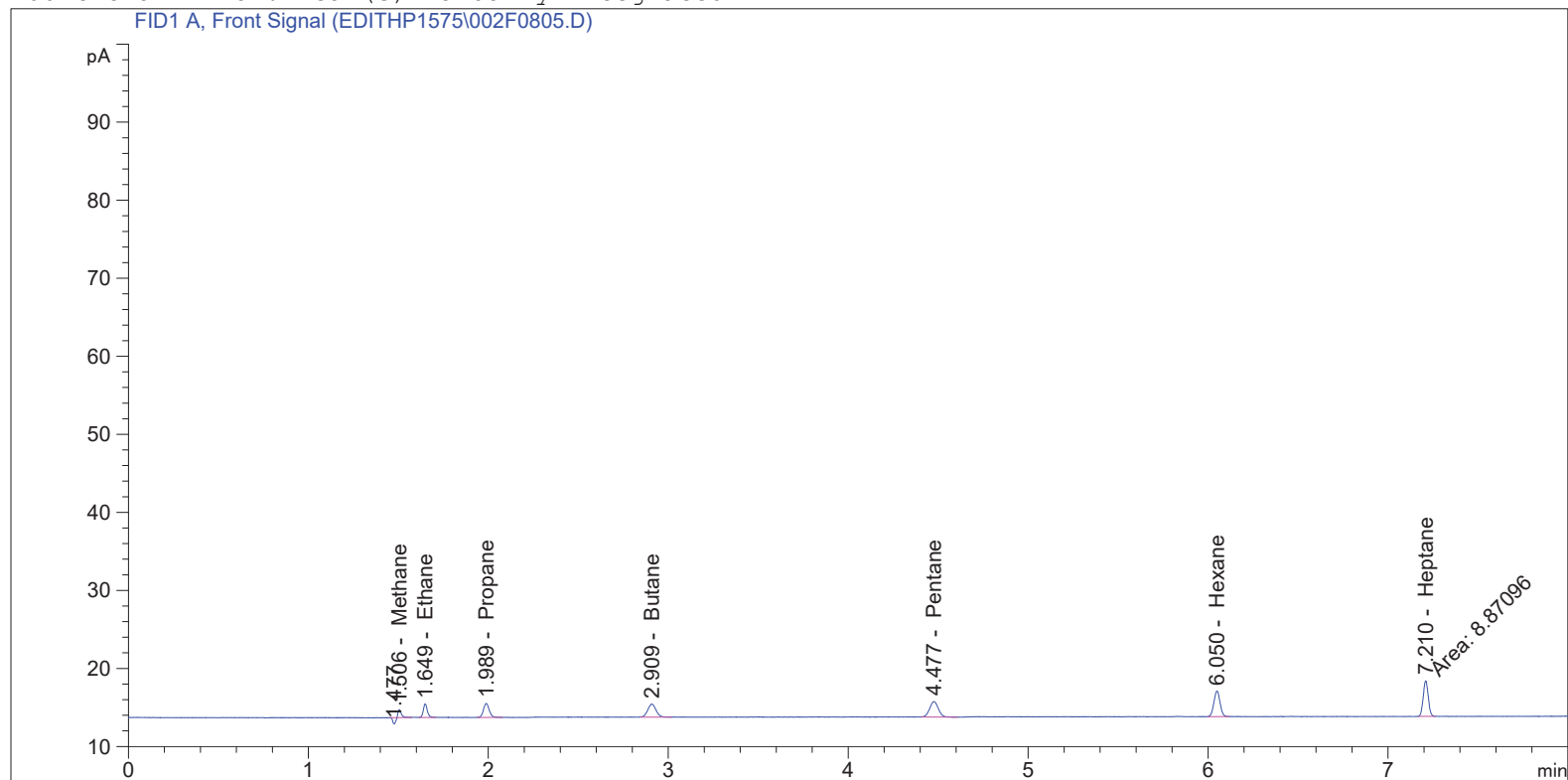
Totals : 144.2023

*** End of Report ***

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Acq. Operator	: Nicholas Traversa	Seq. Line	: 8
Acq. Instrument	: Edith	Location	: Vial 2
Injection Date	: 11/26/2018 9:34:43 PM	Inj	: 5
		Inj Volume	: 250 µl

Acq. Method : C:\GC\2018\EDITH\QUARTER 4\EDITHP1575\AQ_EDITHP503_HRVOC.M
Last changed : 8/14/2017 12:18:06 PM by Nicholas Traversa
Analysis Method : C:\GC\2018\EDITH\METHODS\EDITHP1576F_C1-C7.M
Last changed : 12/14/2018 9:51:41 AM by Nicole West
ECM Server : http://s022vas01/Enthalpy
ECM Operator : Nicole West
ECM Path : GC\2018\Edith\Quarter 4\EDITHP1575.SC.SSIzip
ECM Version : 3 (modified after loading)
Additional Info : Peak(s) manually integrated



External Standard Report

Sorted By : Signal
Calib. Data Modified : 12/14/2018 9:50:22 AM
Multiplier : 1.0000
Dilution : 1.0000
Use Multiplier & Dilution Factor with ISTDs

Signal 1: FID1 A, Front Signal

RetTime [min]	Type	Area [pA*s]	Amt/Area	Amount [ppm]	Grp	Name
1.506	PB	1.34769	3.93665	5.30539		Methane
1.649	BB	2.68938	1.91798	5.15819		Ethane
1.989	BB	3.98060	1.30024	5.17575		Propane
2.909	BB	5.32137	9.60439e-1	5.11086		Butane
4.477	BB	6.75434	7.58777e-1	5.12504		Pentane
6.050	BB	7.80680	6.45815e-1	5.04175		Hexane
7.210	MM	8.87096	5.77581e-1	5.12370		Heptane

Totals : 36.04068

Uncalibrated Peaks : using compound Propane

RetTime [min]	Type	Area [pA*s]	Amt/Area	Amount [ppm]	Grp	Name
1.477	BP N	8.93210e-1	1.30084	1.16192	?	

Uncalib. totals : 1.16192

Summed Peaks Report

Signal 1: FID1 A, Front Signal

1 Warnings or Errors :

Warning : Reference compound(s) not found

Final Summed Peaks Report

Signal 1: FID1 A, Front Signal

Name	Total Area [pA*s]	Amount [ppm]
Methane	1.34769	5.3054
Ethane	2.68938	5.1582
Propane	3.98060	5.1757
Butane	5.32137	5.1109
Pentane	6.75434	5.1250
Hexane	7.80680	5.0417
Heptane	8.87096	5.1237

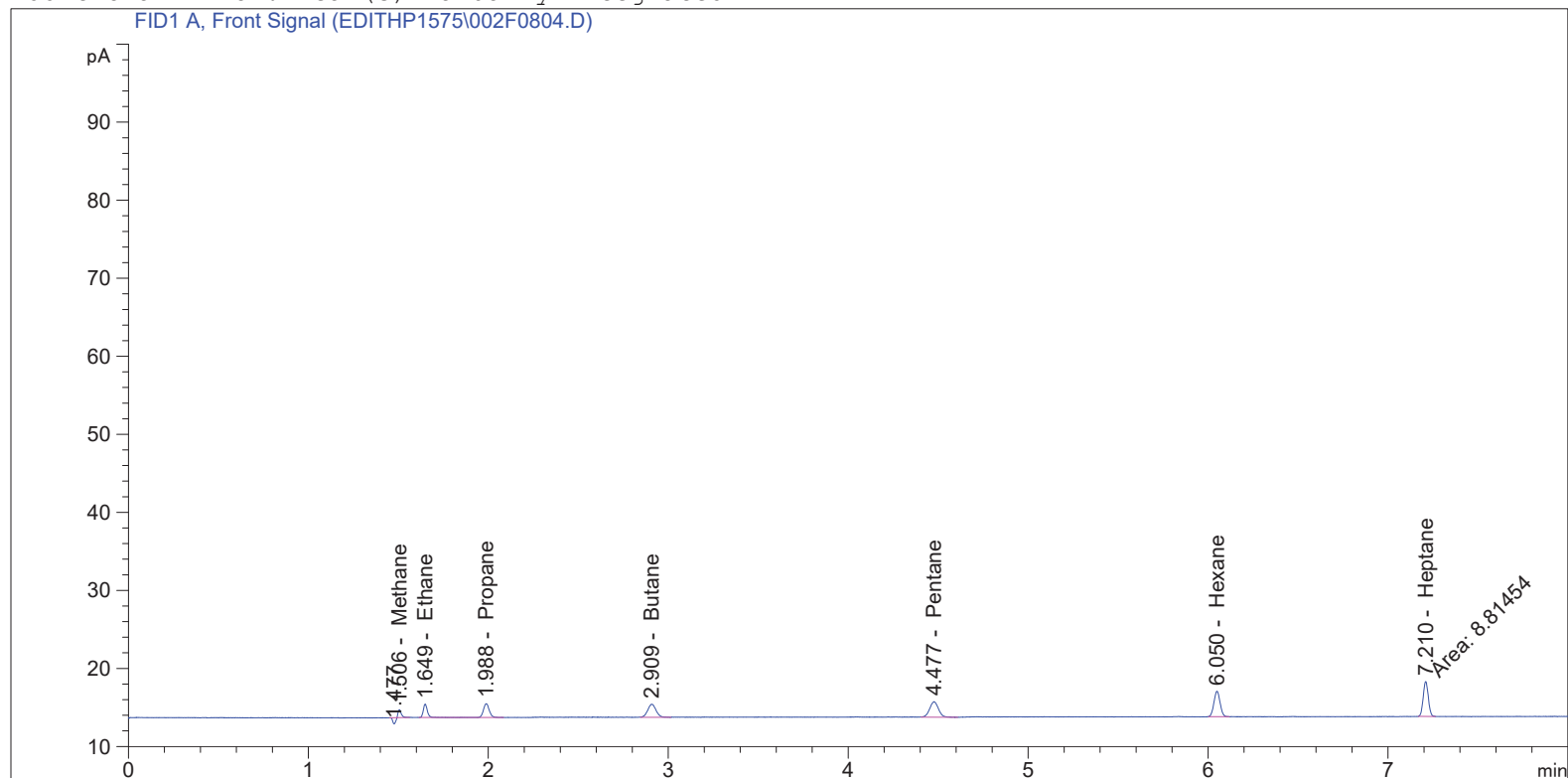
Totals : 36.0407

*** End of Report ***

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Acq. Operator	: Nicholas Traversa	Seq. Line	: 8
Acq. Instrument	: Edith	Location	: Vial 2
Injection Date	: 11/26/2018 9:17:57 PM	Inj	: 4
		Inj Volume	: 250 µl

Acq. Method : C:\GC\2018\EDITH\QUARTER 4\EDITHP1575\AQ_EDITHP503_HRVOC.M
Last changed : 8/14/2017 12:18:06 PM by Nicholas Traversa
Analysis Method : C:\GC\2018\EDITH\METHODS\EDITHP1576F_C1-C7.M
Last changed : 12/14/2018 9:51:41 AM by Nicole West
ECM Server : http://s022vas01/Enthalpy
ECM Operator : Nicole West
ECM Path : GC\2018\Edith\Quarter 4\EDITHP1575.SC.SSIzip
ECM Version : 3 (modified after loading)
Additional Info : Peak(s) manually integrated



External Standard Report

Sorted By : Signal
Calib. Data Modified : 12/14/2018 9:50:22 AM
Multiplier : 1.0000
Dilution : 1.0000
Use Multiplier & Dilution Factor with ISTDs

Signal 1: FID1 A, Front Signal

RetTime [min]	Type	Area [pA*s]	Amt/Area	Amount [ppm]	Grp	Name
1.506	PB	1.27715	3.94986	5.04457		Methane
1.649	BP	2.63685	1.91843	5.05861		Ethane
1.988	VB	3.92124	1.30083	5.10087		Propane
2.909	BB	5.32560	9.60431e-1	5.11487		Butane
4.477	BB	6.70052	7.58684e-1	5.08358		Pentane
6.050	BB	7.77185	6.45815e-1	5.01918		Hexane
7.210	MM	8.81454	5.77644e-1	5.09166		Heptane

Totals : 35.51334

Uncalibrated Peaks : using compound Propane

RetTime [min]	Type	Area [pA*s]	Amt/Area	Amount [ppm]	Grp	Name
1.477	BP N	8.91521e-1	1.30084	1.15972	?	

Uncalib. totals : 1.15972

Summed Peaks Report

Signal 1: FID1 A, Front Signal

1 Warnings or Errors :

Warning : Reference compound(s) not found

Final Summed Peaks Report

Signal 1: FID1 A, Front Signal

Name	Total Area [pA*s]	Amount [ppm]
Methane	1.27715	5.0446
Ethane	2.63685	5.0586
Propane	3.92124	5.1009
Butane	5.32560	5.1149
Pentane	6.70052	5.0836
Hexane	7.77185	5.0192
Heptane	8.81454	5.0917

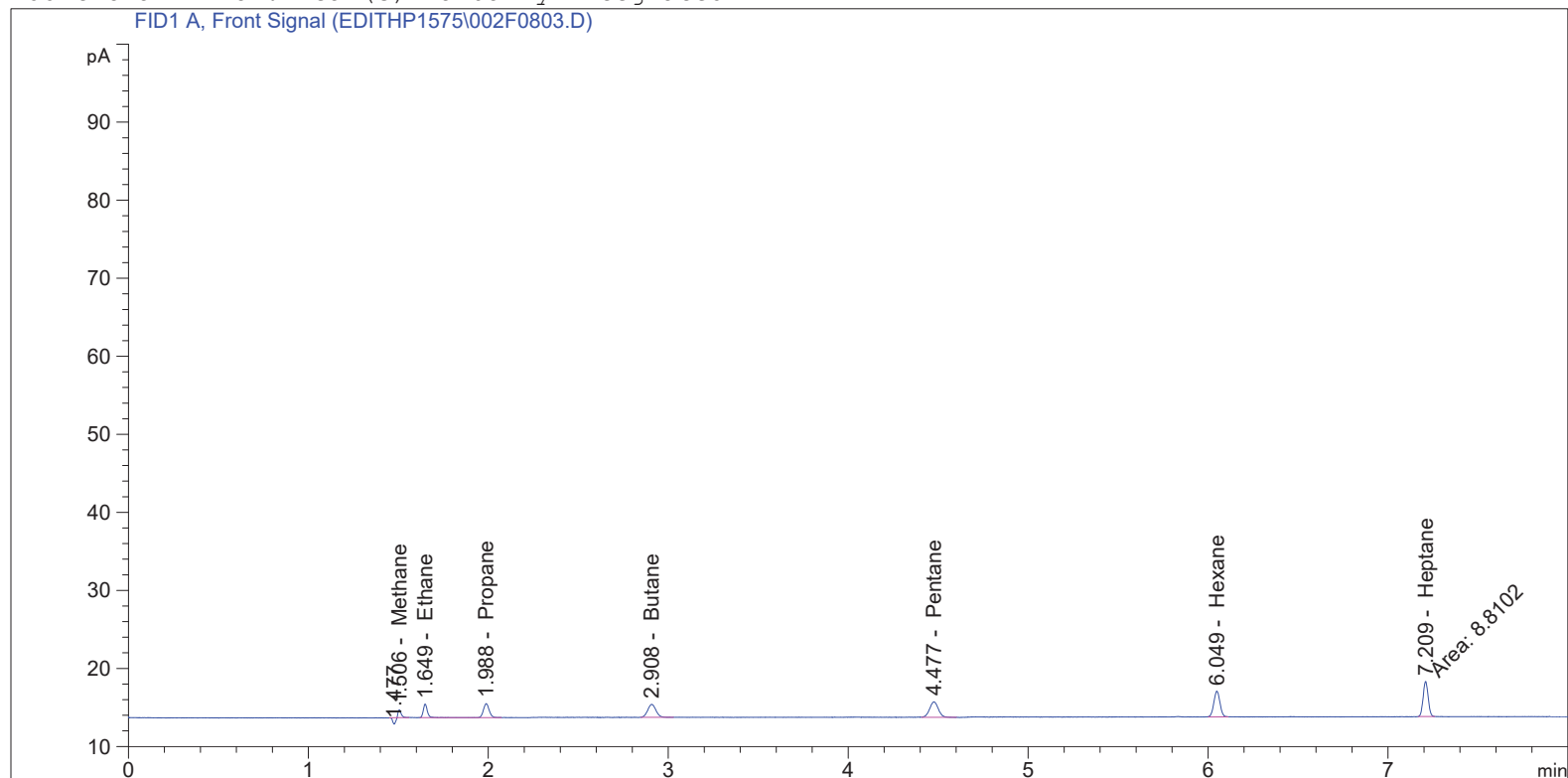
Totals : 35.5133

*** End of Report ***

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Acq. Operator	: Nicholas Traversa	Seq. Line	: 8
Acq. Instrument	: Edith	Location	: Vial 2
Injection Date	: 11/26/2018 9:01:03 PM	Inj	: 3
		Inj Volume	: 250 µl

Acq. Method : C:\GC\2018\EDITH\QUARTER 4\EDITHP1575\AQ_EDITHP503_HRVOC.M
Last changed : 8/14/2017 12:18:06 PM by Nicholas Traversa
Analysis Method : C:\GC\2018\EDITH\METHODS\EDITHP1576F_C1-C7.M
Last changed : 12/14/2018 9:51:41 AM by Nicole West
ECM Server : http://s022vas01/Enthalpy
ECM Operator : Nicole West
ECM Path : GC\2018\Edith\Quarter 4\EDITHP1575.SC.SSIzip
ECM Version : 3 (modified after loading)
Additional Info : Peak(s) manually integrated



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External Standard Report

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Sorted By : Signal
Calib. Data Modified : 12/14/2018 9:50:22 AM
Multiplier : 1.0000
Dilution : 1.0000
Use Multiplier & Dilution Factor with ISTDs

Signal 1: FID1 A, Front Signal

RetTime [min]	Type	Area [pA*s]	Amt/Area	Amount [ppm]	Grp	Name
1.506	PB	1.24997	3.94986	4.93720		Methane
1.649	BP	2.63154	1.91843	5.04842		Ethane
1.988	VB	3.87200	1.30084	5.03684		Propane
2.908	BB	5.29373	9.60460e-1	5.08441		Butane
4.477	BB	6.67106	7.58684e-1	5.06123		Pentane
6.049	BB	7.79994	6.45815e-1	5.03732		Hexane
7.209	MM	8.81020	5.77644e-1	5.08916		Heptane

Totals : 35.29458

Uncalibrated Peaks : using compound Propane

RetTime [min]	Type	Area [pA*s]	Amt/Area	Amount [ppm]	Grp	Name
1.477	BP N	9.15488e-1	1.30084	1.19090	?	

Uncalib. totals : 1.19090

Summed Peaks Report

Signal 1: FID1 A, Front Signal

1 Warnings or Errors :

Warning : Reference compound(s) not found

Final Summed Peaks Report

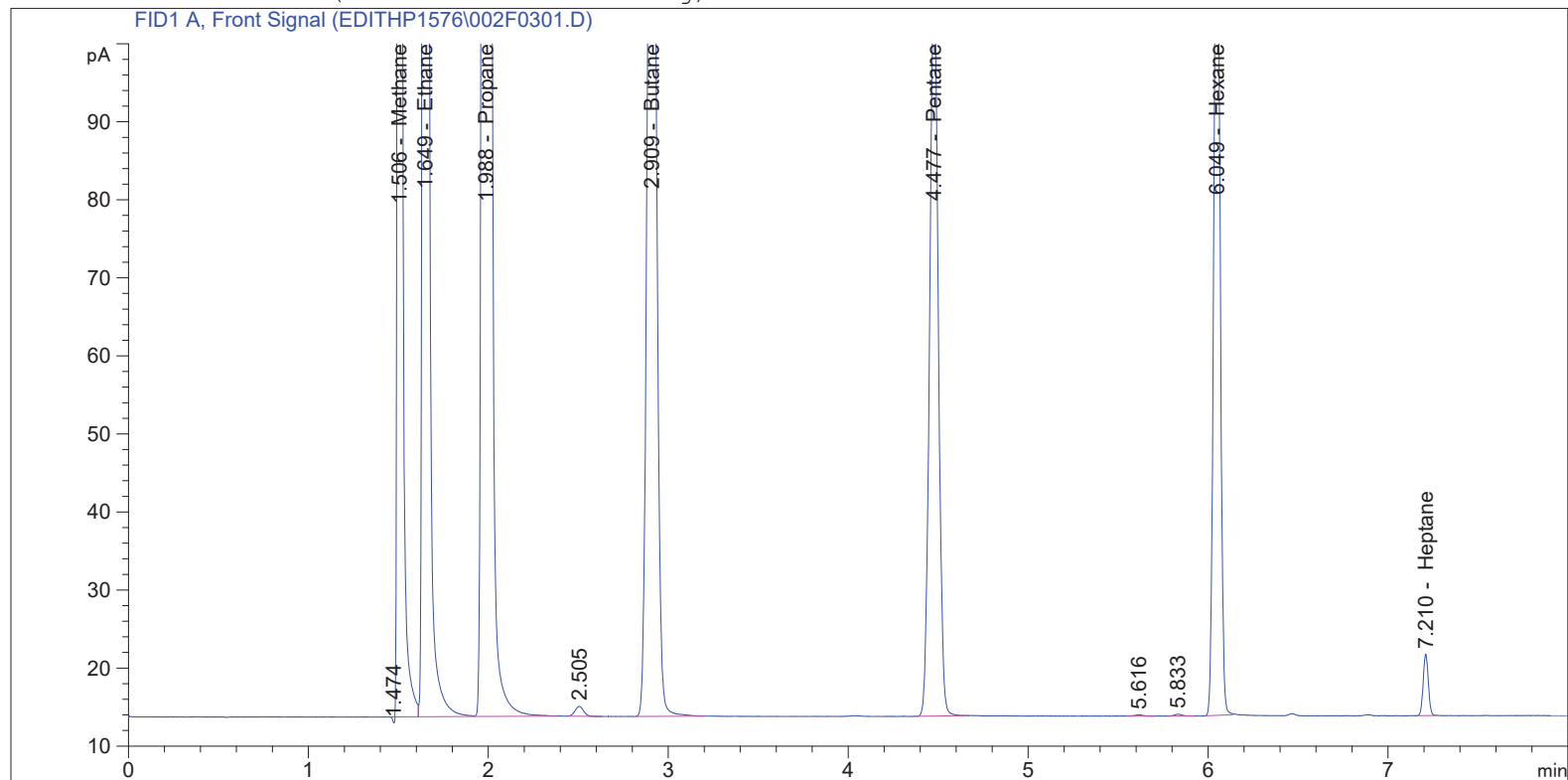
Signal 1: FID1 A, Front Signal

Name	Total Area [pA*s]	Amount [ppm]
Methane	1.24997	4.9372
Ethane	2.63154	5.0484
Propane	3.87200	5.0368
Butane	5.29373	5.0844
Pentane	6.67106	5.0612
Hexane	7.79994	5.0373
Heptane	8.81020	5.0892

Totals : 35.2946

*** End of Report ***

=====
Acq. Operator : Nicholas Traversa Seq. Line : 3
Acq. Instrument : Edith Location : Vial 2
Injection Date : 11/27/2018 9:15:39 AM Inj : 1
Inj Volume : 250 µl
Acq. Method : C:\GC\2018\EDITH\QUARTER 4\EDITHP1576\AQ_EDITHP503_HRVOC.M
Last changed : 8/14/2017 12:18:06 PM by Nicholas Traversa
Analysis Method : C:\GC\2018\EDITH\METHODS\EDITHP1576F_C1-C7.M
Last changed : 12/14/2018 9:51:41 AM by Nicole West
ECM Server : http://s022vas01/Enthalpy
ECM Operator : Nicole West
ECM Path : GC\2018\Edith\Quarter 4\EDITHP1576.SC.SSIzip
ECM Version : 2 (modified after loading)
=====



=====
External Standard Report
=====

Sorted By : Signal
Calib. Data Modified : 12/14/2018 9:50:22 AM
Multiplier : 1.0000
Dilution : 1.0000
Use Multiplier & Dilution Factor with ISTDs

Signal 1: FID1 A, Front Signal

RetTime [min]	Type	Area [pA*s]	Amt/Area	Amount [ppm]	Grp	Name
1.506	PV	683.82556	3.63525	2485.87356		Methane
1.649	VV	1315.96326	1.87972	2473.64508		Ethane
1.988	VB	1975.39160	1.26142	2491.80081		Propane
2.909	BB	520.42926	9.50936e-1	494.89471		Butane
4.477	BB	312.89081	7.77906e-1	243.39972		Pentane
6.049	BB	274.24289	6.78158e-1	185.98005		Hexane
7.210	BB	15.67916	5.71833e-1	8.96586		Heptane

Totals : 8384.55980
490

Uncalibrated Peaks : using compound Propane

RetTime [min]	Type	Area [pA*s]	Amt/Area	Amount [ppm]	Grp	Name
1.474	BP N	5.35620e-1	1.30084	6.96755e-1	?	
2.505	BB	4.10949	1.29902	5.33832	?	
5.616	BB	5.32803e-1	1.30084	6.93091e-1	?	
5.833	BB	6.62697e-1	1.30084	8.62062e-1	?	

Uncalib. totals : 7.59023

Summed Peaks Report

Signal 1: FID1 A, Front Signal

Name	Start Time [min]	End Time [min]	Total Area [pA*s]	Amount [ppm]
as Butane	2.500	3.600	4.10949	3.9160
as Hexane	5.250	6.600	1.19550	0.8050

Totals : 4.7211

1 Warnings or Errors :

Warning : Reference compound(s) not found

Final Summed Peaks Report

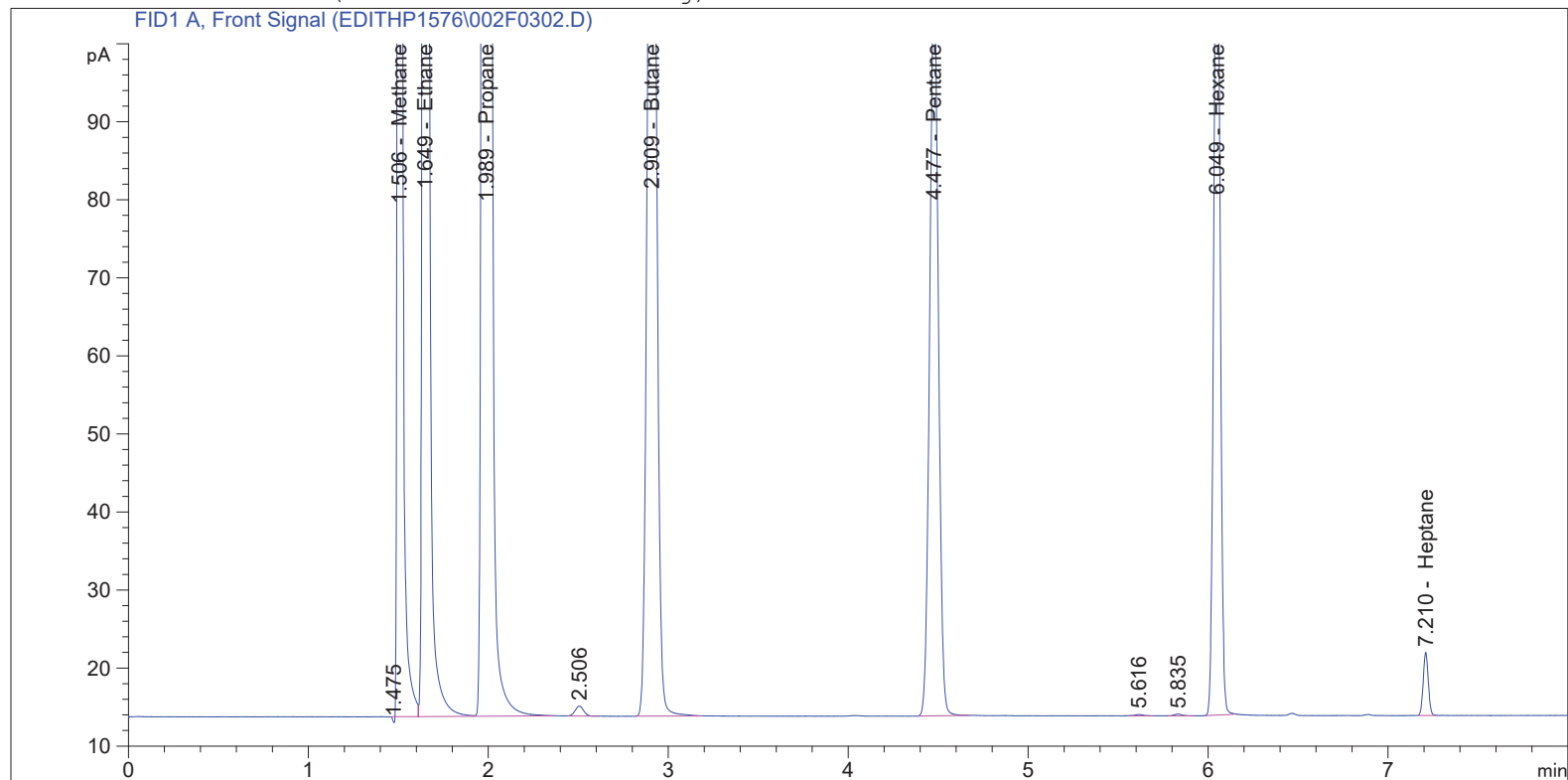
Signal 1: FID1 A, Front Signal

Name	Total Area [pA*s]	Amount [ppm]
as Butane	4.10949	3.9160
as Hexane	1.19550	0.8050
Methane	683.82556	2.486e3
Ethane	1315.96326	2.474e3
Propane	1975.39160	2.492e3
Butane	520.42926	494.8947
Pentane	312.89081	243.3997
Hexane	274.24289	185.9800
Heptane	15.67916	8.9659

Totals : 8389.2809

*** End of Report ***

=====
Acq. Operator : Nicholas Traversa Seq. Line : 3
Acq. Instrument : Edith Location : Vial 2
Injection Date : 11/27/2018 9:32:21 AM Inj : 2
Inj Volume : 250 µl
Acq. Method : C:\GC\2018\EDITH\QUARTER 4\EDITHP1576\AQ_EDITHP503_HRVOC.M
Last changed : 8/14/2017 12:18:06 PM by Nicholas Traversa
Analysis Method : C:\GC\2018\EDITH\METHODS\EDITHP1576F_C1-C7.M
Last changed : 12/14/2018 9:51:41 AM by Nicole West
ECM Server : http://s022vas01/Enthalpy
ECM Operator : Nicole West
ECM Path : GC\2018\Edith\Quarter 4\EDITHP1576.SC.SSIzip
ECM Version : 2 (modified after loading)
=====



=====
External Standard Report
=====

Sorted By : Signal
Calib. Data Modified : 12/14/2018 9:50:22 AM
Multiplier : 1.0000
Dilution : 1.0000
Use Multiplier & Dilution Factor with ISTDs

Signal 1: FID1 A, Front Signal

RetTime [min]	Type	Area [pA*s]	Amt/Area	Amount [ppm]	Grp	Name
1.506	PV	686.03040	3.63524	2493.88736		Methane
1.649	VV	1319.69446	1.87972	2480.65841		Ethane
1.989	VB	1980.55090	1.26142	2498.30846		Propane
2.909	BB	521.80157	9.50935e-1	496.19956		Butane
4.477	BB	314.09924	7.77908e-1	244.34028		Pentane
6.049	BB	275.69302	6.78163e-1	186.96486		Hexane
7.210	BB	15.86714	5.71744e-1	9.07195		Heptane

Totals : 8409.43089
492

Uncalibrated Peaks : using compound Propane

RetTime [min]	Type	Area [pA*s]	Amt/Area	Amount [ppm]	Grp	Name
1.475	BP N	5.47269e-1	1.30084	7.11909e-1	?	
2.506	BB	4.12589	1.29887	5.35900	?	
5.616	BB	5.04847e-1	1.30084	6.56724e-1	?	
5.835	BB	6.49772e-1	1.30084	8.45248e-1	?	

Uncalib. totals : 7.57288

Summed Peaks Report

Signal 1: FID1 A, Front Signal

Name	Start Time [min]	End Time [min]	Total Area [pA*s]	Amount [ppm]
as Butane	2.500	3.600	4.12589	3.9316
as Hexane	5.250	6.600	1.15462	0.7775

Totals : 4.7092

1 Warnings or Errors :

Warning : Reference compound(s) not found

Final Summed Peaks Report

Signal 1: FID1 A, Front Signal

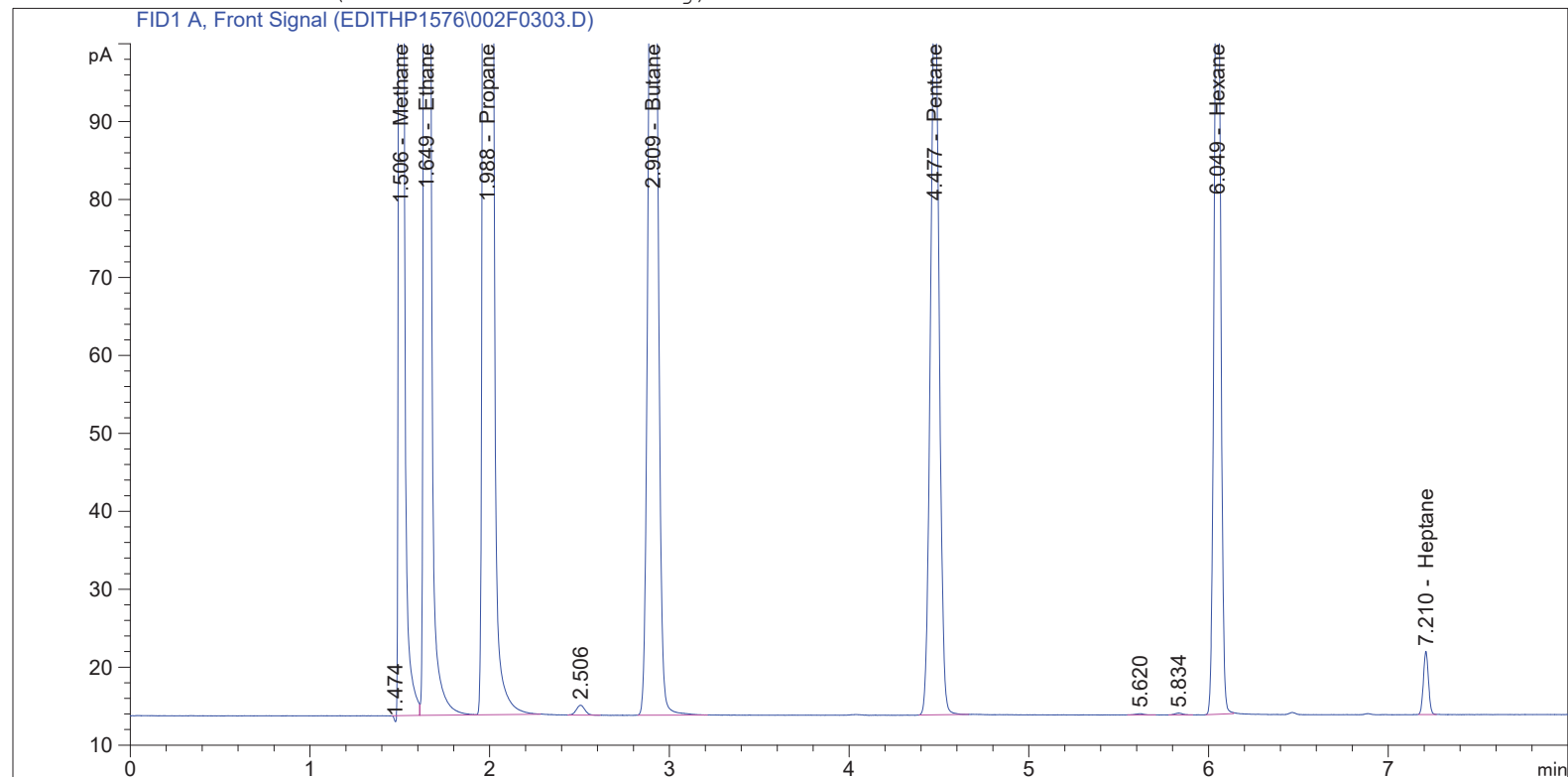
Name	Total Area [pA*s]	Amount [ppm]
as Butane	4.12589	3.9316
as Hexane	1.15462	0.7775
Methane	686.03040	2.494e3
Ethane	1319.69446	2.481e3
Propane	1980.55090	2.498e3
Butane	521.80157	496.1996
Pentane	314.09924	244.3403
Hexane	275.69302	186.9649
Heptane	15.86714	9.0720

Totals : 8414.1400

*** End of Report ***

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Acq. Operator	: Nicholas Traversa	Seq. Line	: 3
Acq. Instrument	: Edith	Location	: Vial 2
Injection Date	: 11/27/2018 9:49:04 AM	Inj	: 3
		Inj Volume	: 250 µl
Acq. Method	: C:\GC\2018\EDITH\QUARTER 4\EDITHP1576\AQ_EDITHP503_HRVOC.M		
Last changed	: 8/14/2017 12:18:06 PM by Nicholas Traversa		
Analysis Method	: C:\GC\2018\EDITH\METHODS\EDITHP1576F_C1-C7.M		
Last changed	: 12/14/2018 9:51:41 AM by Nicole West		
ECM Server	: http://s022vas01/Enthalpy		
ECM Operator	: Nicole West		
ECM Path	: GC\2018\Edith\Quarter 4\EDITHP1576.SC.SSIzip		
ECM Version	: 2 (modified after loading)		



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External Standard Report

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Sorted By : Signal
Calib. Data Modified : 12/14/2018 9:50:22 AM
Multiplier : 1.0000
Dilution : 1.0000
Use Multiplier & Dilution Factor with ISTDs

Signal 1: FID1 A, Front Signal

RetTime [min]	Type	Area [pA*s]	Amt/Area	Amount [ppm]	Grp	Name
1.506	PV	683.91449	3.63525	2486.19678		Methane
1.649	VV	1315.03784	1.87972	2471.90563		Ethane
1.988	VB	1972.86230	1.26142	2488.61050		Propane
2.909	BB	520.52228	9.50936e-1	494.98316		Butane
4.477	BB	313.22821	7.77907e-1	243.66233		Pentane
6.049	BB	275.43805	6.78162e-1	186.79170		Hexane
7.210	BB	15.88176	5.71738e-1	9.08020		Heptane

Totals : 8381.23031494

Uncalibrated Peaks : using compound Propane

RetTime [min]	Type	Area [pA*s]	Amt/Area	Amount [ppm]	Grp	Name
1.474	BP N	5.63313e-1	1.30084	7.32779e-1	?	
2.506	BB	4.15882	1.29858	5.40054	?	
5.620	BB	4.64841e-1	1.30084	6.04684e-1	?	
5.834	BB	6.75879e-1	1.30084	8.79209e-1	?	

Uncalib. totals : 7.61722

Summed Peaks Report

Signal 1: FID1 A, Front Signal

Name	Start Time [min]	End Time [min]	Total Area [pA*s]	Amount [ppm]
as Butane	2.500	3.600	4.15882	3.9630
as Hexane	5.250	6.600	1.14072	0.7682

Totals : 4.7312

1 Warnings or Errors :

Warning : Reference compound(s) not found

Final Summed Peaks Report

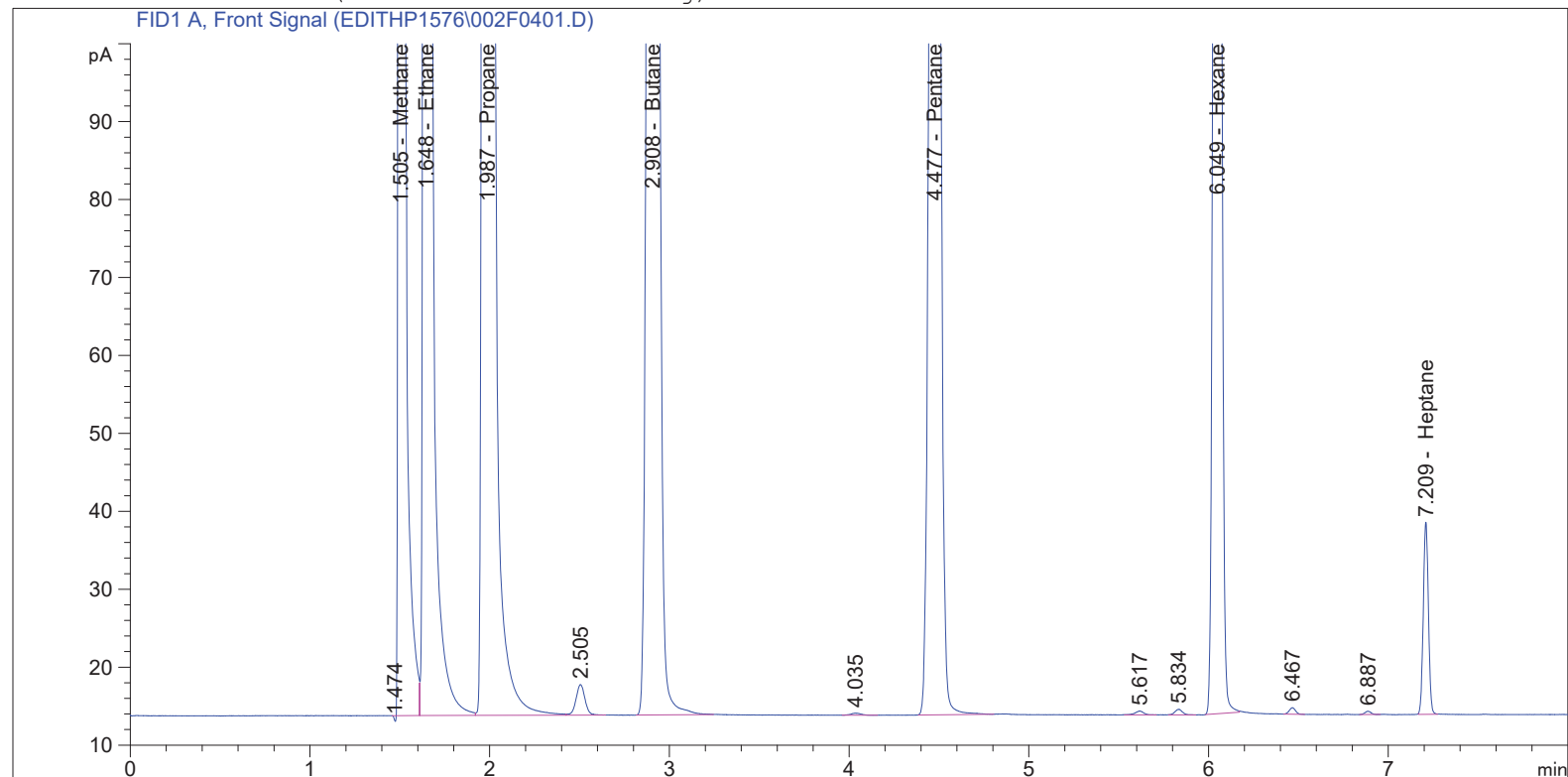
Signal 1: FID1 A, Front Signal

Name	Total Area [pA*s]	Amount [ppm]
as Butane	4.15882	3.9630
as Hexane	1.14072	0.7682
Methane	683.91449	2.486e3
Ethane	1315.03784	2.472e3
Propane	1972.86230	2.489e3
Butane	520.52228	494.9832
Pentane	313.22821	243.6623
Hexane	275.43805	186.7917
Heptane	15.88176	9.0802

Totals : 8385.9615

*** End of Report ***

=====
Acq. Operator : Nicholas Traversa Seq. Line : 4
Acq. Instrument : Edith Location : Vial 2
Injection Date : 11/27/2018 10:05:49 AM Inj : 1
Inj Volume : 250 µl
Acq. Method : C:\GC\2018\EDITH\QUARTER 4\EDITHP1576\AQ_EDITHP503_HRVOC.M
Last changed : 8/14/2017 12:18:06 PM by Nicholas Traversa
Analysis Method : C:\GC\2018\EDITH\METHODS\EDITHP1576F_C1-C7.M
Last changed : 12/14/2018 9:51:41 AM by Nicole West
ECM Server : http://s022vas01/Enthalpy
ECM Operator : Nicole West
ECM Path : GC\2018\Edith\Quarter 4\EDITHP1576.SC.SSIzip
ECM Version : 2 (modified after loading)
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External Standard Report
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Sorted By : Signal
Calib. Data Modified : 12/14/2018 9:50:22 AM
Multiplier : 1.0000
Dilution : 1.0000
Use Multiplier & Dilution Factor with ISTDs

Signal 1: FID1 A, Front Signal

RetTime [min]	Type	Area [pA*s]	Amt/Area	Amount [ppm]	Grp	Name
1.505	PV	2078.42896	3.63485	7554.76875		Methane
1.648	VV	3995.80933	1.87967	7510.80073		Ethane
1.987	VV	6000.27979	1.26137	7568.56454		Propane
2.908	BB	1583.58789	9.50870e-1	1505.78573		Butane
4.477	BB	956.35535	7.78190e-1	744.22639		Pentane
6.049	BB	841.50397	6.78805e-1	571.21674		Hexane
7.209	BB	48.72845	5.66754e-1	27.61703		Heptane

Totals : 2.54830e4₄₉₆

Uncalibrated Peaks : using compound Propane

RetTime [min]	Type	Area [pA*s]	Amt/Area	Amount [ppm]	Grp	Name
1.474	BP N	4.63058e-1	1.30084	6.02363e-1	?	
2.505	VB	13.49588	1.27282	17.17777	?	
4.035	BB	1.00763	1.30084	1.31076	?	
5.617	BB	1.53543	1.30084	1.99735	?	
5.834	BB	2.03289	1.30084	2.64446	?	
6.467	BB	2.01859	1.30084	2.62585	?	
6.887	BB	9.57464e-1	1.30084	1.24551	?	

Uncalib. totals : 27.60406

Summed Peaks Report

Signal 1: FID1 A, Front Signal

Name	Start Time [min]	End Time [min]	Total Area [pA*s]	Amount [ppm]
as Butane	2.500	3.600	13.49588	12.8605
as Pentane	3.600	5.250	1.00763	0.7803
as Hexane	5.250	6.600	5.58690	3.7622
as Heptane	6.600	16.300	9.57464e-1	0.5449

Totals : 17.9479

1 Warnings or Errors :

Warning : Reference compound(s) not found

Final Summed Peaks Report

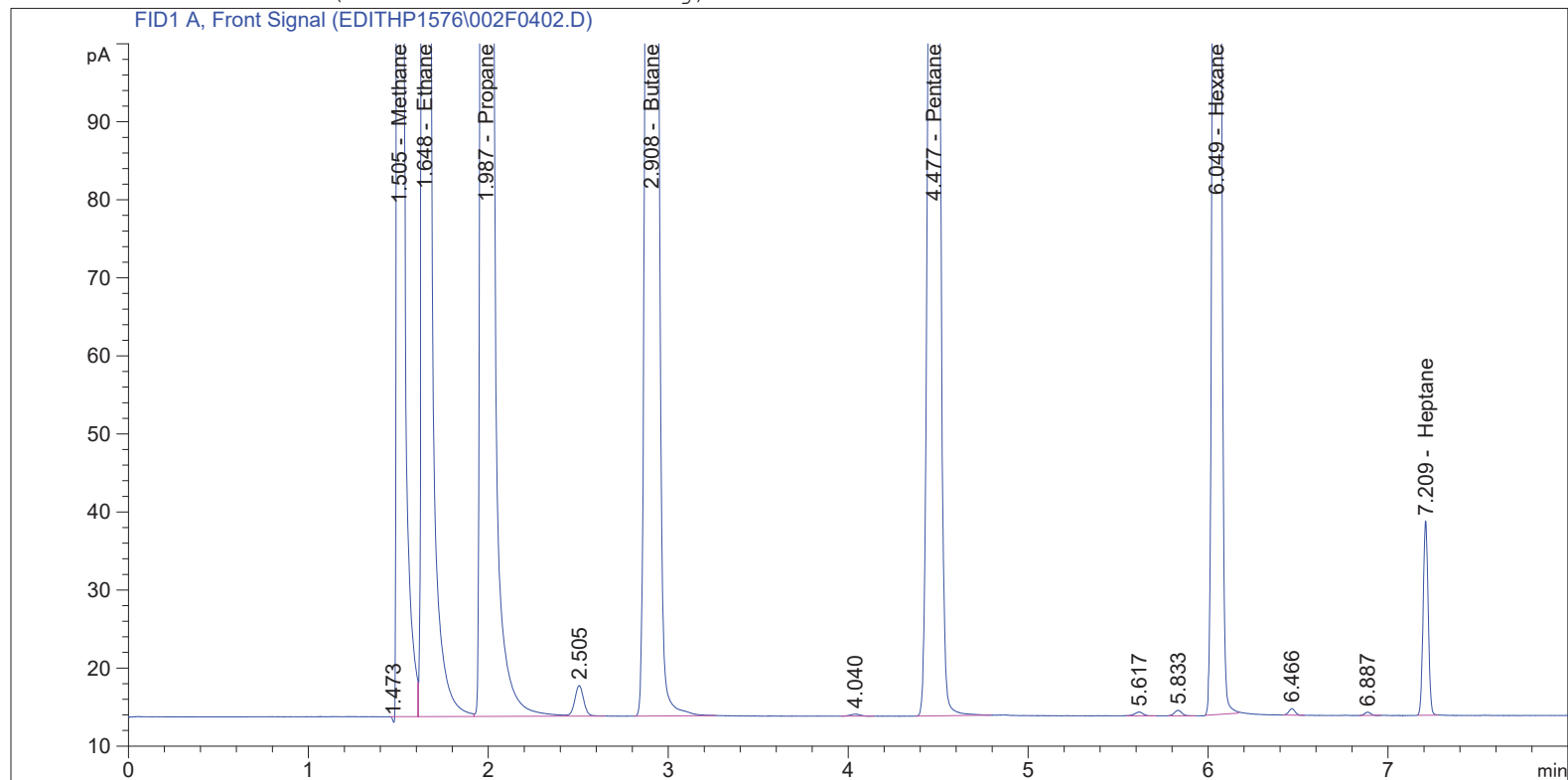
Signal 1: FID1 A, Front Signal

Name	Total Area [pA*s]	Amount [ppm]
as Butane	13.49588	12.8605
as Pentane	1.00763	0.7803
as Hexane	5.58690	3.7622
as Heptane	9.57464e-1	0.5449
Methane	2078.42896	7.555e3
Ethane	3995.80933	7.511e3
Propane	6000.27979	7.569e3
Butane	1583.58789	1.506e3
Pentane	956.35535	744.2264
Hexane	841.50397	571.2167
Heptane	48.72845	27.6170

Totals : 2.5501e4

*** End of Report ***

=====
Acq. Operator : Nicholas Traversa Seq. Line : 4
Acq. Instrument : Edith Location : Vial 2
Injection Date : 11/27/2018 10:22:35 AM Inj : 2
Inj Volume : 250 µl
Acq. Method : C:\GC\2018\EDITH\QUARTER 4\EDITHP1576\AQ_EDITHP503_HRVOC.M
Last changed : 8/14/2017 12:18:06 PM by Nicholas Traversa
Analysis Method : C:\GC\2018\EDITH\METHODS\EDITHP1576F_C1-C7.M
Last changed : 12/14/2018 9:51:41 AM by Nicole West
ECM Server : http://s022vas01/Enthalpy
ECM Operator : Nicole West
ECM Path : GC\2018\Edith\Quarter 4\EDITHP1576.SC.SSIzip
ECM Version : 2 (modified after loading)
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External Standard Report
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Sorted By : Signal
Calib. Data Modified : 12/14/2018 9:50:22 AM
Multiplier : 1.0000
Dilution : 1.0000
Use Multiplier & Dilution Factor with ISTDs

Signal 1: FID1 A, Front Signal

RetTime [min]	Type	Area [pA*s]	Amt/Area	Amount [ppm]	Grp	Name
1.505	PV	2076.99609	3.63485	7549.56080		Methane
1.648	VV	3993.58789	1.87967	7506.62522		Ethane
1.987	VB	5997.00488	1.26137	7564.43376		Propane
2.908	BB	1583.02283	9.50870e-1	1505.24845		Butane
4.477	BB	956.33893	7.78190e-1	744.21362		Pentane
6.049	BB	841.85822	6.78805e-1	571.45732		Hexane
7.209	BB	48.90889	5.66745e-1	27.71886		Heptane

Totals : 2.54693e4₄₉₈

Uncalibrated Peaks : using compound Propane

RetTime [min]	Type	Area [pA*s]	Amt/Area	Amount [ppm]	Grp	Name
1.473	BP N	4.65423e-1	1.30084	6.05440e-1	?	
2.505	BB	13.46173	1.27285	17.13470	?	
4.040	BB	1.01272	1.30084	1.31738	?	
5.617	BB	1.57744	1.30084	2.05199	?	
5.833	BB	2.00139	1.30084	2.60349	?	
6.466	BB	1.99102	1.30084	2.58999	?	
6.887	BB	1.00472	1.30084	1.30698	?	

Uncalib. totals : 27.60999

Summed Peaks Report

Signal 1: FID1 A, Front Signal

Name	Start Time [min]	End Time [min]	Total Area [pA*s]	Amount [ppm]
as Butane	2.500	3.600	13.46173	12.8279
as Pentane	3.600	5.250	1.01272	0.7843
as Hexane	5.250	6.600	5.56985	3.7507
as Heptane	6.600	16.300	1.00472	0.5717

Totals : 17.9347

1 Warnings or Errors :

Warning : Reference compound(s) not found

Final Summed Peaks Report

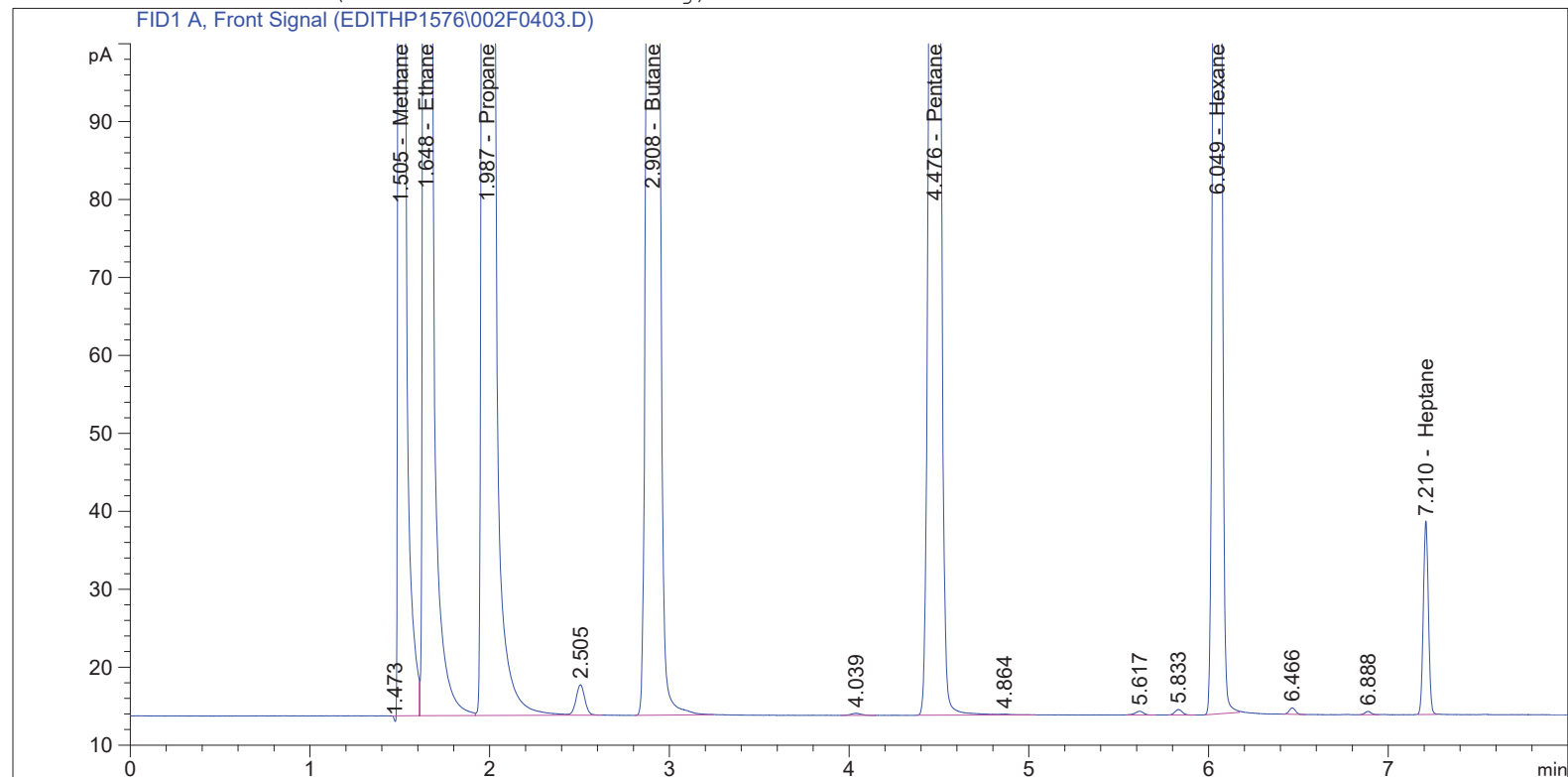
Signal 1: FID1 A, Front Signal

Name	Total Area [pA*s]	Amount [ppm]
as Butane	13.46173	12.8279
as Pentane	1.01272	0.7843
as Hexane	5.56985	3.7507
as Heptane	1.00472	0.5717
Methane	2076.99609	7.550e3
Ethane	3993.58789	7.507e3
Propane	5997.00488	7.564e3
Butane	1583.02283	1.505e3
Pentane	956.33893	744.2136
Hexane	841.85822	571.4573
Heptane	48.90889	27.7189

Totals : 2.5487e4

*** End of Report ***

=====
Acq. Operator : Nicholas Traversa Seq. Line : 4
Acq. Instrument : Edith Location : Vial 2
Injection Date : 11/27/2018 10:39:25 AM Inj : 3
Inj Volume : 250 µl
Acq. Method : C:\GC\2018\EDITH\QUARTER 4\EDITHP1576\AQ_EDITHP503_HRVOC.M
Last changed : 8/14/2017 12:18:06 PM by Nicholas Traversa
Analysis Method : C:\GC\2018\EDITH\METHODS\EDITHP1576F_C1-C7.M
Last changed : 12/14/2018 9:51:41 AM by Nicole West
ECM Server : http://s022vas01/Enthalpy
ECM Operator : Nicole West
ECM Path : GC\2018\Edith\Quarter 4\EDITHP1576.SC.SSIzip
ECM Version : 2 (modified after loading)
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External Standard Report
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Sorted By : Signal
Calib. Data Modified : 12/14/2018 9:50:22 AM
Multiplier : 1.0000
Dilution : 1.0000
Use Multiplier & Dilution Factor with ISTDs

Signal 1: FID1 A, Front Signal

RetTime [min]	Type	Area [pA*s]	Amt/Area	Amount [ppm]	Grp	Name
1.505	PV	2072.58789	3.63485	7533.53853		Methane
1.648	VV	3985.13354	1.87967	7490.73406		Ethane
1.987	VB	5984.51855	1.26137	7548.68422		Propane
2.908	BB	1579.82910	9.50870e-1	1502.21173		Butane
4.476	BB	955.99188	7.78190e-1	743.94350		Pentane
6.049	BB	841.28217	6.78804e-1	571.06611		Hexane
7.210	BB	48.86404	5.66747e-1	27.69355		Heptane

Totals : 2.54179e4₅₀₀

Uncalibrated Peaks : using compound Propane

RetTime [min]	Type	Area [pA*s]	Amt/Area	Amount [ppm]	Grp	Name
1.473	BP N	4.65565e-1	1.30084	6.05625e-1	?	
2.505	BB	13.25031	1.27303	16.86803	?	
4.039	BB	1.00364	1.30084	1.30557	?	
4.864	BB	7.77603e-1	1.30084	1.01154	?	
5.617	BB	1.54241	1.30084	2.00642	?	
5.833	BB	1.98681	1.30084	2.58452	?	
6.466	BB	1.98251	1.30084	2.57893	?	
6.888	BB	1.01848	1.30084	1.32488	?	

Uncalib. totals : 28.28552

Summed Peaks Report

Signal 1: FID1 A, Front Signal

Name	Start Time [min]	End Time [min]	Total Area [pA*s]	Amount [ppm]
as Butane	2.500	3.600	13.25031	12.6265
as Pentane	3.600	5.250	1.78124	1.3794
as Hexane	5.250	6.600	5.51173	3.7116
as Heptane	6.600	16.300	1.01848	0.5796

Totals : 18.2971

1 Warnings or Errors :

Warning : Reference compound(s) not found

Final Summed Peaks Report

Signal 1: FID1 A, Front Signal

Name	Total Area [pA*s]	Amount [ppm]
as Butane	13.25031	12.6265
as Pentane	1.78124	1.3794
as Hexane	5.51173	3.7116
as Heptane	1.01848	0.5796
Methane	2072.58789	7.534e3
Ethane	3985.13354	7.491e3
Propane	5984.51855	7.549e3
Butane	1579.82910	1.502e3
Pentane	955.99188	743.9435
Hexane	841.28217	571.0661
Heptane	48.86404	27.6936

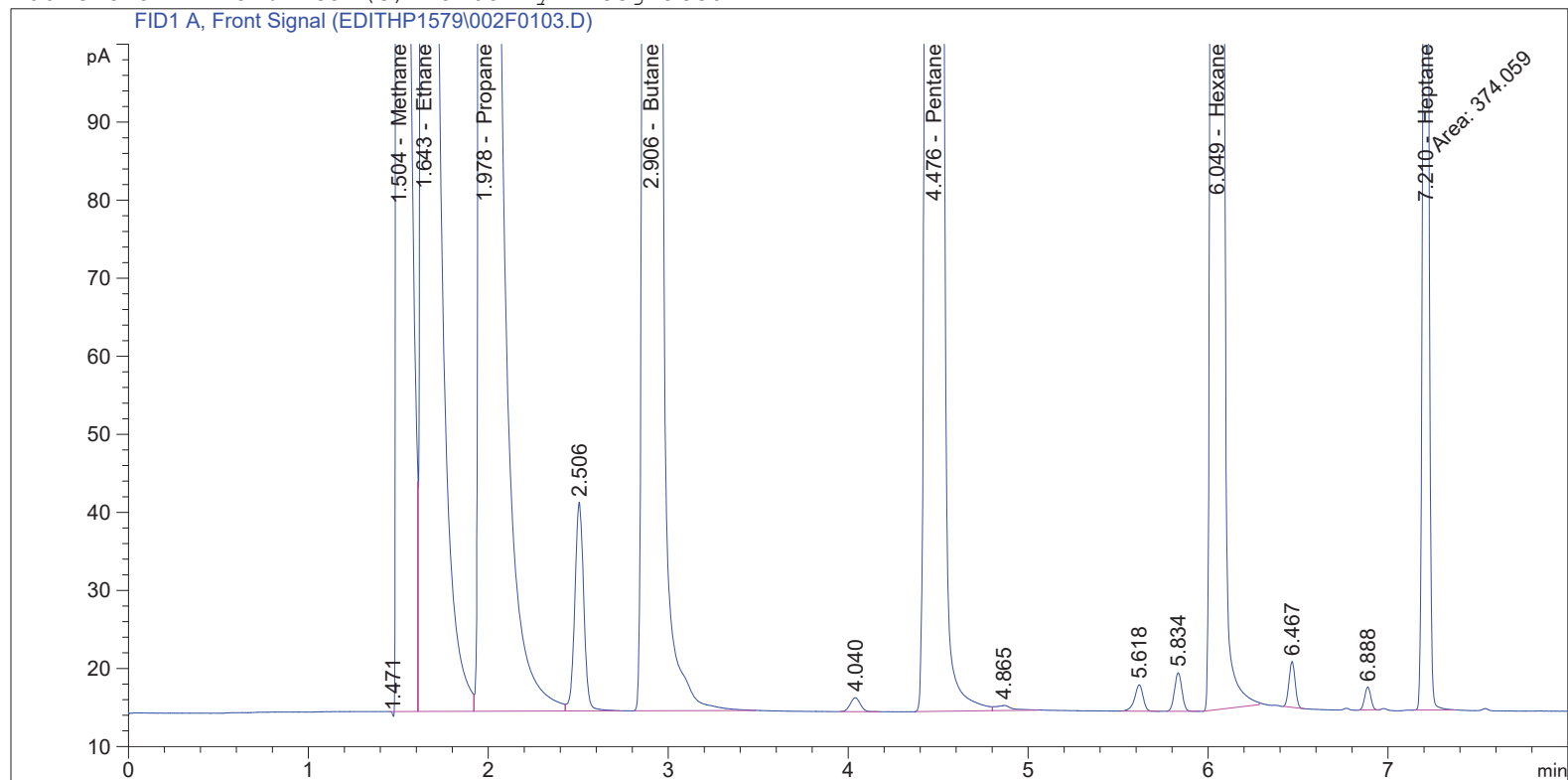
Totals : 2.5436e4

*** End of Report ***

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Acq. Operator	: Nicholas Traversa	Seq. Line	: 1
Acq. Instrument	: Edith	Location	: Vial 2
Injection Date	: 11/29/2018 10:57:57 AM	Inj	: 3
		Inj Volume	: 250 µl

Acq. Method : C:\GC\2018\EDITH\QUARTER 4\EDITHP1579\AQ_EDITHP503_HRVOC.M
Last changed : 8/14/2017 12:18:06 PM by Nicholas Traversa
Analysis Method : C:\GC\2018\EDITH\METHODS\EDITHP1576F_C1-C7.M
Last changed : 12/14/2018 9:51:41 AM by Nicole West
ECM Server : http://s022vas01/Enthalpy
ECM Operator : Nicole West
ECM Path : GC\2018\Edith\Quarter 4\EDITHP1579.SC.SSIzip
ECM Version : 1 (modified after loading)
Additional Info : Peak(s) manually integrated



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External Standard Report

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Sorted By : Signal
Calib. Data Modified : 12/14/2018 9:50:22 AM
Multiplier : 1.0000
Dilution : 1.0000
Use Multiplier & Dilution Factor with ISTDs

Signal 1: FID1 A, Front Signal

RetTime [min]	Type	Area [pA*s]	Amt/Area	Amount [ppm]	Grp	Name
1.504	PV	1.40291e4	3.63468	5.09913e4		Methane
1.643	VV	2.69759e4	1.87965	5.07051e4		Ethane
1.978	VV	4.05528e4	1.26135	5.11512e4		Propane
2.906	BB	1.07922e4	9.50842e-1	1.02617e4		Butane
4.476	BV	6600.19092	7.78308e-1	5136.98344		Pentane
6.049	BB	6003.61182	6.79073e-1	4076.89241		Hexane
7.210	MM	374.05896	5.64658e-1	211.21534		Heptane

Totals : 1.72534e5

Uncalibrated Peaks : using compound Propane

RetTime [min]	Type	Area [pA*s]	Amt/Area	Amount [ppm]	Grp	Name
1.471	BP N	3.21462e-1	1.30084	4.18170e-1	?	
2.506	VB	92.56744	1.26302	116.91411	?	
4.040	BB	6.93200	1.28368	8.89847	?	
4.865	VB	4.33401	1.29707	5.62152	?	
5.618	BB	11.03230	1.27538	14.07036	?	
5.834	BB	14.06593	1.27235	17.89681	?	
6.467	BB	14.20183	1.27225	18.06822	?	
6.888	BB	6.90864	1.28376	8.86901	?	

Uncalib. totals : 190.75667

Summed Peaks Report

Signal 1: FID1 A, Front Signal

Name	Start Time [min]	End Time [min]	Total Area [pA*s]	Amount [ppm]
as Butane	2.500	3.600	92.56744	88.2093
as Pentane	3.600	5.250	11.26601	8.7246
as Hexane	5.250	6.600	39.30007	26.4647
as Heptane	6.600	16.300	6.90864	3.9314

Totals : 127.3299

1 Warnings or Errors :

Warning : Reference compound(s) not found

Final Summed Peaks Report

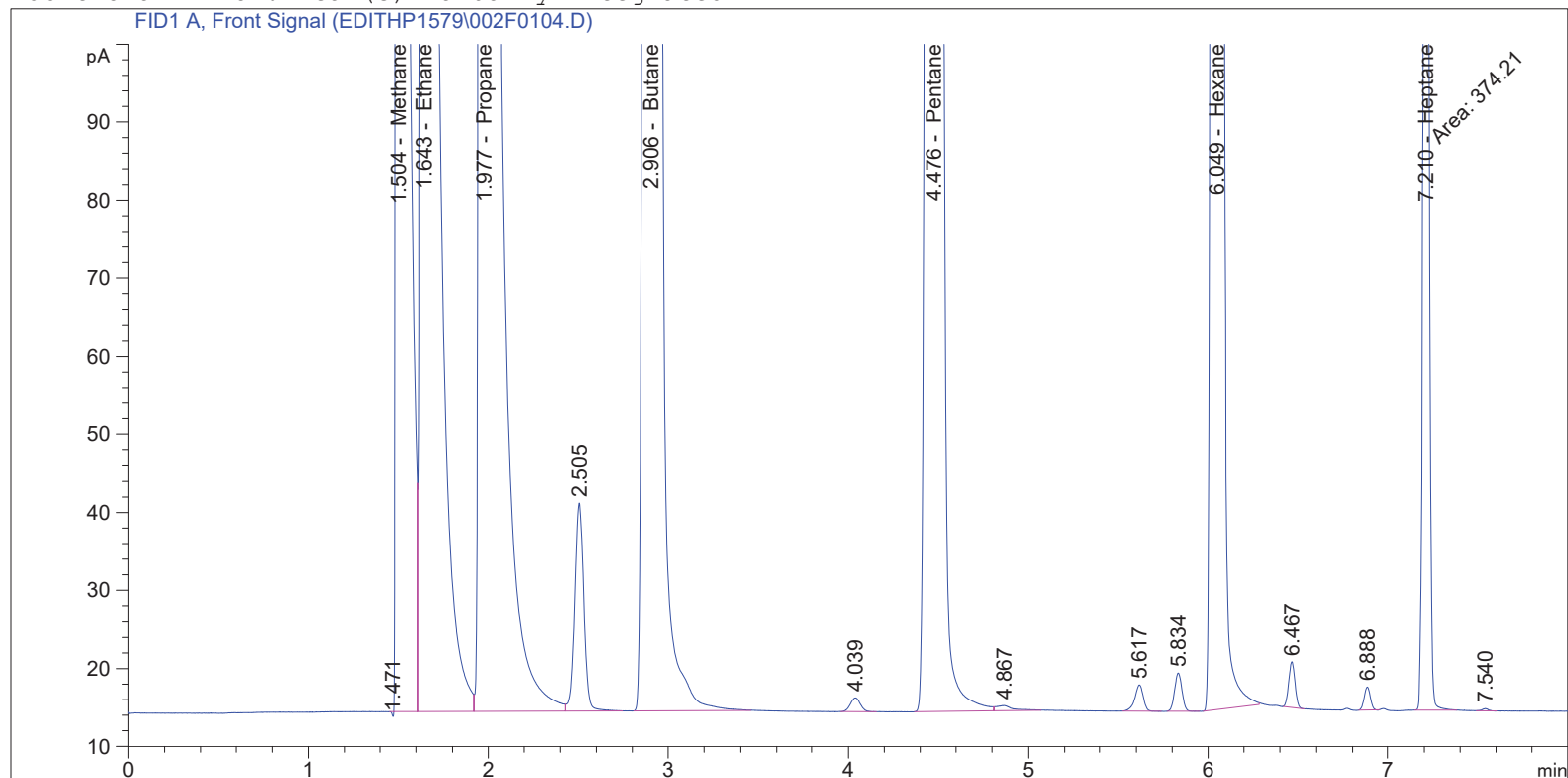
Signal 1: FID1 A, Front Signal

Name	Total Area [pA*s]	Amount [ppm]
as Butane	92.56744	88.2093
as Pentane	11.26601	8.7246
as Hexane	39.30007	26.4647
as Heptane	6.90864	3.9314
Methane	1.40291e4	5.099e4
Ethane	2.69759e4	5.071e4
Propane	4.05528e4	5.115e4
Butane	1.07922e4	1.026e4
Pentane	6600.19092	5.137e3
Hexane	6003.61182	4.077e3
Heptane	374.05896	211.2153

Totals : 1.7266e5

*** End of Report ***

=====
Acq. Operator : Nicholas Traversa Seq. Line : 1
Acq. Instrument : Edith Location : Vial 2
Injection Date : 11/29/2018 11:14:40 AM Inj : 4
Inj Volume : 250 µl
Acq. Method : C:\GC\2018\EDITH\QUARTER 4\EDITHP1579\AQ_EDITHP503_HRVOC.M
Last changed : 8/14/2017 12:18:06 PM by Nicholas Traversa
Analysis Method : C:\GC\2018\EDITH\METHODS\EDITHP1576F_C1-C7.M
Last changed : 12/14/2018 9:51:41 AM by Nicole West
ECM Server : http://s022vas01/Enthalpy
ECM Operator : Nicole West
ECM Path : GC\2018\Edith\Quarter 4\EDITHP1579.SC.SSIzip
ECM Version : 1 (modified after loading)
Additional Info : Peak(s) manually integrated



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External Standard Report
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Sorted By : Signal
Calib. Data Modified : 12/14/2018 9:50:22 AM
Multiplier : 1.0000
Dilution : 1.0000
Use Multiplier & Dilution Factor with ISTDs

Signal 1: FID1 A, Front Signal

RetTime [min]	Type	Area [pA*s]	Amt/Area	Amount [ppm]	Grp	Name
1.504	PV	1.39959e4	3.63468	5.08705e4		Methane
1.643	VV	2.69101e4	1.87965	5.05815e4		Ethane
1.977	VV	4.04556e4	1.26135	5.10286e4		Propane
2.906	BB	1.07665e4	9.50842e-1	1.02372e4		Butane
4.476	BV	6586.56982	7.78308e-1	5126.38176		Pentane
6.049	BB	5993.73096	6.79073e-1	4070.18215		Hexane
7.210	MM	374.21008	5.64658e-1	211.30063		Heptane

Totals : 1.72126e5

Uncalibrated Peaks : using compound Propane

RetTime [min]	Type	Area [pA*s]	Amt/Area	Amount [ppm]	Grp	Name
1.471	BP N	3.29428e-1	1.30084	4.28532e-1	?	
2.505	VB	92.59371	1.26302	116.94726	?	
4.039	BB	6.83739	1.28399	8.77914	?	
4.867	VB	4.29990	1.29735	5.57850	?	
5.617	BB	11.05684	1.27535	14.10131	?	
5.834	BB	14.06647	1.27235	17.89749	?	
6.467	BB	14.17977	1.27226	18.04040	?	
6.888	BB	6.91731	1.28373	8.87995	?	
7.540	BB	6.13440e-1	1.30084	7.97986e-1	?	

Uncalib. totals : 191.45056

Summed Peaks Report

Signal 1: FID1 A, Front Signal

Name	Start Time [min]	End Time [min]	Total Area [pA*s]	Amount [ppm]
as Butane	2.500	3.600	92.59371	88.2343
as Pentane	3.600	5.250	11.13730	8.6249
as Hexane	5.250	6.600	39.30309	26.4667
as Heptane	6.600	16.300	7.53075	4.2854

Totals : 127.6114

1 Warnings or Errors :

Warning : Reference compound(s) not found

Final Summed Peaks Report

Signal 1: FID1 A, Front Signal

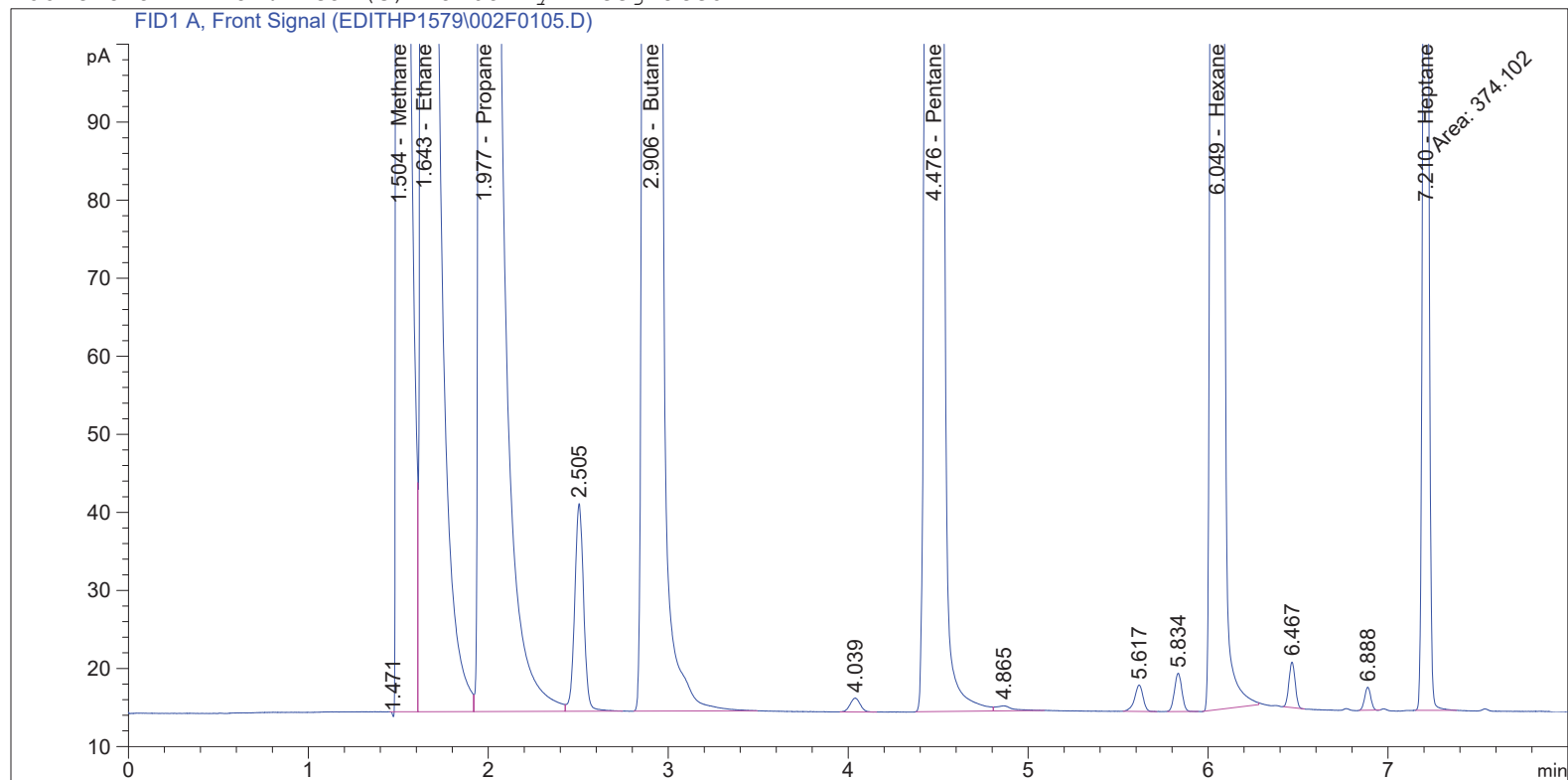
Name	Total Area [pA*s]	Amount [ppm]
as Butane	92.59371	88.2343
as Pentane	11.13730	8.6249
as Hexane	39.30309	26.4667
as Heptane	7.53075	4.2854
Methane	1.39959e4	5.087e4
Ethane	2.69101e4	5.058e4
Propane	4.04556e4	5.103e4
Butane	1.07665e4	1.024e4
Pentane	6586.56982	5.126e3
Hexane	5993.73096	4.070e3
Heptane	374.21008	211.3006

Totals : 1.7225e5

*** End of Report ***

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Acq. Operator	: Nicholas Traversa	Seq. Line	: 1
Acq. Instrument	: Edith	Location	: Vial 2
Injection Date	: 11/29/2018 11:31:21 AM	Inj	: 5
		Inj Volume	: 250 µl
Acq. Method	: C:\GC\2018\EDITH\QUARTER 4\EDITHP1579\AQ_EDITHP503_HRVOC.M		
Last changed	: 8/14/2017 12:18:06 PM by Nicholas Traversa		
Analysis Method	: C:\GC\2018\EDITH\METHODS\EDITHP1576F_C1-C7.M		
Last changed	: 12/14/2018 9:51:41 AM by Nicole West		
ECM Server	: http://s022vas01/Enthalpy		
ECM Operator	: Nicole West		
ECM Path	: GC\2018\Edith\Quarter 4\EDITHP1579.SC.SSIzip		
ECM Version	: 1 (modified after loading)		
Additional Info	: Peak(s) manually integrated		



External Standard Report

Sorted By : Signal
Calib. Data Modified : 12/14/2018 9:50:22 AM
Multiplier : 1.0000
Dilution : 1.0000
Use Multiplier & Dilution Factor with ISTDs

Signal 1: FID1 A, Front Signal

RetTime [min]	Type	Area [pA*s]	Amt/Area	Amount [ppm]	Grp	Name
1.504	PV	1.39684e4	3.63468	5.07708e4		Methane
1.643	VV	2.68608e4	1.87965	5.04888e4		Ethane
1.977	VV	4.03811e4	1.26135	5.09346e4		Propane
2.906	BB	1.07484e4	9.50842e-1	1.02200e4		Butane
4.476	BV	6575.08643	7.78308e-1	5117.44390		Pentane
6.049	BB	5986.30518	6.79073e-1	4065.13918		Hexane
7.210	MM	374.10193	5.64658e-1	211.23959		Heptane

Totals : 1.71808e5

Uncalibrated Peaks : using compound Propane

RetTime [min]	Type	Area [pA*s]	Amt/Area	Amount [ppm]	Grp	Name
1.471	BP N	3.22791e-1	1.30084	4.19899e-1	?	
2.505	VB	92.41842	1.26302	116.72615	?	
4.039	BB	6.87014	1.28388	8.82044	?	
4.865	VB	4.41804	1.29639	5.72751	?	
5.617	BB	11.11505	1.27527	14.17473	?	
5.834	BB	14.08544	1.27234	17.92141	?	
6.467	BB	14.09875	1.27233	17.93820	?	
6.888	BB	6.88028	1.28385	8.83324	?	

Uncalib. totals : 190.56158

Summed Peaks Report

Signal 1: FID1 A, Front Signal

Name	Start Time [min]	End Time [min]	Total Area [pA*s]	Amount [ppm]
as Butane	2.500	3.600	92.41842	88.0673
as Pentane	3.600	5.250	11.28818	8.7418
as Hexane	5.250	6.600	39.29923	26.4641
as Heptane	6.600	16.300	6.88028	3.9153

Totals : 127.1884

1 Warnings or Errors :

Warning : Reference compound(s) not found

Final Summed Peaks Report

Signal 1: FID1 A, Front Signal

Name	Total Area [pA*s]	Amount [ppm]
as Butane	92.41842	88.0673
as Pentane	11.28818	8.7418
as Hexane	39.29923	26.4641
as Heptane	6.88028	3.9153
Methane	1.39684e4	5.077e4
Ethane	2.68608e4	5.049e4
Propane	4.03811e4	5.093e4
Butane	1.07484e4	1.022e4
Pentane	6575.08643	5.117e3
Hexane	5986.30518	4.065e3
Heptane	374.10193	211.2396

Totals : 1.7194e5

*** End of Report ***

CERTIFICATE OF ANALYSIS

Grade of Product: CERTIFIED STANDARD-SPEC

Part Number:	X08NI99C15A0079	Reference Number:	141-401159104-1
Cylinder Number:	CC703691	Cylinder Volume:	144.4 CF
Laboratory:	124 - Conley Stryker (SAP) - OH	Cylinder Pressure:	2015 PSIG
Analysis Date:	Mar 21, 2018	Valve Outlet:	350
Lot Number:	141-401159104-1		

Expiration Date: Mar 21, 2021

Product composition verified by direct comparison to calibration standards traceable to N.I.S.T. weights and/or N.I.S.T. Gas Mixture reference materials.

ANALYTICAL RESULTS

Component	Req Conc	Actual Concentration (Mole %)	Analytical Uncertainty
ETHANE	100.0 PPM	102.0 PPM	+/- 2%
HEXANE	100.0 PPM	102.0 PPM	+/- 2%
METHANE	100.0 PPM	102.0 PPM	+/- 2%
N BUTANE	100.0 PPM	102.0 PPM	+/- 2%
N HEPTANE	100.0 PPM	102.0 PPM	+/- 2%
N PENTANE	100.0 PPM	102.0 PPM	+/- 2%
PROPANE	100.0 PPM	102.0 PPM	+/- 2%
NITROGEN	Balance		

Victoria Bayliff
Approved for Release

Airgas USA, LLC

616 Miller Cut Off Rd.

LaPorte, TX 77571

281-842-6900

Airgas.com

CERTIFICATE OF ANALYSIS**Grade of Product: CERTIFIED HYDROCARBON**

Customer: MONTROSE ENVIRONMENTAL GROUP - LA PORTE, TX

Part: X08NI83C15AC015

Number:

Cylinder: CC172313

Number:

Laboratory: 124 - LaPorte Mix (SAP) - TX

Analysis: Apr 10, 2018

Date:

Lot Number: 126-401156534-1

Reference Number: 126-401156534-1

Cylinder Volume: 37.2 CF

Cylinder Pressure: 500 PSIG

Valve Outlet: 350

Expiration Date: Apr 10, 2021

Traceability Statement: Hydrocarbon Process standards are NIST traceable either directly by weight or by comparison to Airgas laboratory standards that are directly NIST traceable by weight.

CERTIFIED CONCENTRATIONS

Component	Requested Concentration	Reported Mole %	Accuracy
N HEPTANE	250.0 PPM	250.2 PPM	-/- 2%
HEXANE	0.4000 %	0.4000 %	+/- 2%
N PENTANE	0.5000 %	0.4998 %	+/- 2%
N BUTANE	1.000 %	1.001 %	+/- 2%
ETHANE	5.000 %	5.002 %	+/- 2%
METHANE	5.000 %	4.998 %	+/- 2%
PROPANE	5.000 %	5.012 %	+/- 2%
NITROGEN	Balance	Balance	

Notes:

MONTROSE ENVIRONMENTAL GROUP

PO#: 1017793


Approved for Release

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Agilent 7890A

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Oven
Equilibration Time 0.3 min
Max Temperature 200 degrees C
Slow Fan Disabled
Oven Program On
 35 °C for 2.2 min
 then 15 °C/min to 70 °C for 0.07 min
Run Time 4.6033 min

Sample Overlap
Sample overlap is not enabled

Front SS Inlet H2
Mode Split
Heater On 200 °C
Pressure On 5.1931 psi
Total Flow On 15.6 mL/min
Septum Purge Flow On 3 mL/min
Gas Saver Off
Split Ratio 5 :1
Split Flow 10.5 mL/min

Back SS Inlet H2
Mode Split
Heater On 200 °C
Pressure On 14.935 psi
Total Flow On 25.632 mL/min
Septum Purge Flow On 3 mL/min
Gas Saver Off
Split Ratio 2 :1
Split Flow 15.088 mL/min

Column #1
Restek 10198Rtx-1 S/N 1452467
280 °C: 30 m x 320 µm x 4 µm
In: Front SS Inlet H2
Out: Front Detector FID

(Initial) 35 °C
Pressure 5.1931 psi
Flow 2.1 mL/min
Average Velocity 39.91 cm/sec
Holdup Time 1.2528 min
Flow Program On
 2.1 mL/min for 0 min
Run Time 4.6033 min

Column #2
Restek 19757Rt-Alumina BOND/Na2SO4
200 °C: 30 m x 320 µm x 5 µm
In: Back SS Inlet H2
Out: Back Detector FID

(Initial) 35 °C
Pressure 14.935 psi
Flow 7.5439 mL/min
Average Velocity 110 cm/sec
Holdup Time 0.45455 min
Flow Program On
 7.5439 mL/min for 0 min

510

Modified on: 8/14/2017 at 12:20:10 PM

Run Time	4.6033 min
Front Detector FID	
Heater	On 300 °C
H2 Flow	On 50 mL/min
Air Flow	On 450 mL/min
Makeup Flow	On 35 mL/min
Const Col + Makeup	Off
Flame	On
Electrometer	On
Back Detector FID	
Heater	On 200 °C
H2 Flow	On 50 mL/min
Air Flow	On 450 mL/min
Makeup Flow	On 35 mL/min
Const Col + Makeup	Off
Flame	On
Electrometer	On
Valve 1	
Gas Sampling Valve	Unknown
GSV Loop Volume	0.25 mL
Load Time	1.5 min
Inject Time	0.5 min
Valve 2	
Gas Sampling Valve	Unknown
GSV Loop Volume	0.25 mL
Load Time	1.5 min
Inject Time	0.5 min
Valve Box	
Heater	On 150 °C
Signals	
Signal #1: Front Signal	Save On 20 Hz
Signal #2: Test Plot	Save Off 50 Hz
Signal #3: Back Signal	Save On 20 Hz
Signal #4: Test Plot	Save Off 50 Hz

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Agilent 7890A

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Oven
Equilibration Time 0.3 min
Max Temperature 200 degrees C
Slow Fan Disabled
Oven Program On
 35 °C for 2.2 min
#1 then 15 °C/min to 70 °C for 0.07 min
#2 then 30 °C/min to 180 °C for 1 min
Run Time 9.27 min

Sample Overlap
Sample overlap is not enabled

Front SS Inlet H2
Mode Split
Heater On 200 °C
Pressure On 5.1931 psi
Total Flow On 15.6 mL/min
Septum Purge Flow On 3 mL/min
Gas Saver Off
Split Ratio 5 :1
Split Flow 10.5 mL/min

Back SS Inlet H2
Mode Split
Heater On 200 °C
Pressure On 14.935 psi
Total Flow On 25.632 mL/min
Septum Purge Flow On 3 mL/min
Gas Saver Off
Split Ratio 2 :1
Split Flow 15.088 mL/min

Column #1
Restek 10198Rtx-1 S/N 1452467
280 °C: 30 m x 320 µm x 4 µm
In: Front SS Inlet H2
Out: Front Detector FID

(Initial) 35 °C
Pressure 5.1931 psi
Flow 2.1 mL/min
Average Velocity 39.91 cm/sec
Holdup Time 1.2528 min
Flow Program On
 2.1 mL/min for 0 min
Run Time 9.27 min

Column #2
Restek 19757Rt-Alumina BOND/Na2SO4
200 °C: 30 m x 320 µm x 5 µm
In: Back SS Inlet H2
Out: Back Detector FID

(Initial) 35 °C
Pressure 14.935 psi
Flow 7.5439 mL/min
Average Velocity 110 cm/sec
Holdup Time 0.45455 min
Flow Program On

Modified on: 8/14/2017 at 12:18:06 PM

7.5439 mL/min for 0 min

Run Time 9.27 min

Front Detector FID

Heater	On	300 °C
H2 Flow	On	50 mL/min
Air Flow	On	450 mL/min
Makeup Flow	On	35 mL/min
Const Col + Makeup	Off	
Flame	On	
Electrometer	On	

Back Detector FID

Heater	On	200 °C
H2 Flow	On	50 mL/min
Air Flow	On	450 mL/min
Makeup Flow	On	35 mL/min
Const Col + Makeup	Off	
Flame	On	
Electrometer	On	

Valve 1

Gas Sampling Valve	Unknown
GSV Loop Volume	0.25 mL
Load Time	1.5 min
Inject Time	0.5 min

Valve 2

Gas Sampling Valve	Unknown
GSV Loop Volume	0.25 mL
Load Time	1.5 min
Inject Time	0.5 min

Valve Box

Heater	On	150 °C
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Signals

Signal #1: Front Signal	Save On
	20 Hz

Signal #2: Test Plot	Save Off
	50 Hz

Signal #3: Back Signal	Save On
	20 Hz

Signal #4: Test Plot	Save Off
	50 Hz

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Agilent 7890A

=====

Oven
Equilibration Time 0.3 min
Max Temperature 200 degrees C
Slow Fan Disabled
Oven Program On
 35 °C for 2.2 min
#1 then 15 °C/min to 70 °C for 0.07 min
#2 then 30 °C/min to 180 °C for 10 min
Run Time 18.27 min

Sample Overlap
Sample overlap is not enabled

Front SS Inlet H2
Mode Split
Heater On 200 °C
Pressure On 5.1931 psi
Total Flow On 15.6 mL/min
Septum Purge Flow On 3 mL/min
Gas Saver Off
Split Ratio 5 :1
Split Flow 10.5 mL/min

Back SS Inlet H2
Mode Split
Heater On 200 °C
Pressure On 14.935 psi
Total Flow On 25.632 mL/min
Septum Purge Flow On 3 mL/min
Gas Saver Off
Split Ratio 2 :1
Split Flow 15.088 mL/min

Column #1
Restek 10198Rtx-1 S/N 1452467
280 °C: 30 m x 320 µm x 4 µm
In: Front SS Inlet H2
Out: Front Detector FID

(Initial) 35 °C
Pressure 5.1931 psi
Flow 2.1 mL/min
Average Velocity 39.91 cm/sec
Holdup Time 1.2528 min
Flow Program On
 2.1 mL/min for 0 min
Run Time 18.27 min

Column #2
Restek 19757Rt-Alumina BOND/Na2SO4
200 °C: 30 m x 320 µm x 5 µm
In: Back SS Inlet H2
Out: Back Detector FID

(Initial) 35 °C
Pressure 14.935 psi
Flow 7.5439 mL/min
Average Velocity 110 cm/sec
Holdup Time 0.45455 min
Flow Program On

Modified on: 8/14/2017 at 12:18:56 PM

7.5439 mL/min for 0 min

Run Time 18.27 min

Front Detector FID

Heater	On	300 °C
H2 Flow	On	50 mL/min
Air Flow	On	450 mL/min
Makeup Flow	On	35 mL/min
Const Col + Makeup	Off	
Flame	On	
Electrometer	On	

Back Detector FID

Heater	On	200 °C
H2 Flow	On	50 mL/min
Air Flow	On	450 mL/min
Makeup Flow	On	35 mL/min
Const Col + Makeup	Off	
Flame	On	
Electrometer	On	

Valve 1

Gas Sampling Valve	Unknown
GSV Loop Volume	0.25 mL
Load Time	1.5 min
Inject Time	0.5 min

Valve 2

Gas Sampling Valve	Unknown
GSV Loop Volume	0.25 mL
Load Time	1.5 min
Inject Time	0.5 min

Valve Box

Heater	On	150 °C
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Signals

Signal #1: Front Signal	Save On
	20 Hz

Signal #2: Test Plot	Save Off
	50 Hz

Signal #3: Back Signal	Save On
	20 Hz

Signal #4: Test Plot	Save Off
	50 Hz

**This Is The Last Page
Of This Report.**

APPENDIX III-E
Calibration Gas Cylinder Certificates

CERTIFICATE OF ANALYSIS

Grade of Product: EPA Protocol

Part Number:	E03NI79E15A0088	Reference Number:	122-401268406-1
Cylinder Number:	EB0066823	Cylinder Volume:	151.0 CF
Laboratory:	124 - Durham (SAP) - NC	Cylinder Pressure:	2015 PSIG
PGVP Number:	B22018	Valve Outlet:	590
Gas Code:	CO2,O2,BALN	Certification Date:	Aug 06, 2018

Expiration Date: Aug 06, 2026

Certification performed in accordance with "EPA Traceability Protocol for Assay and Certification of Gaseous Calibration Standards (May 2012)" document EPA 600/R-12/531, using the assay procedures listed. Analytical Methodology does not require correction for analytical interference. This cylinder has a total analytical uncertainty as stated below with a confidence level of 95%. There are no significant impurities which affect the use of this calibration mixture. All concentrations are on a volume/volume basis unless otherwise noted.

Do Not Use This Cylinder below 100 psig, i.e. 0.7 megapascals.

ANALYTICAL RESULTS

Component	Requested Concentration	Actual Concentration	Protocol Method	Total Relative Uncertainty	Assay Dates
CARBON DIOXIDE	10.00 %	9.952 %	G1	+/- 0.6% NIST Traceable	08/06/2018
OXYGEN	11.00 %	11.05 %	G1	+/- 0.4% NIST Traceable	08/06/2018
NITROGEN	Balance				

CALIBRATION STANDARDS

Type	Lot ID	Cylinder No	Concentration	Uncertainty	Expiration Date
NTRM	13060638	CC414571	13.359 % CARBON DIOXIDE/NITROGEN	+/- 0.6%	May 09, 2019
NTRM	09060212	CC262381	9.961 % OXYGEN/NITROGEN	+/- 0.3%	Nov 08, 2018

ANALYTICAL EQUIPMENT

Instrument/Make/Model	Analytical Principle	Last Multipoint Calibration
Horiba VIA510 CO2 2L6YXWY0	Nondispersive Infrared (NDIR)	Jul 25, 2018
Horiba MPA510 O2 41499150042	Paramagnetic	Jul 25, 2018

Triad Data Available Upon Request



CS Williams

Approved for Release



Praxair Distribution Mid-Atlantic
One Steel Road East,
Morrisville, PA 19067
Tel: (800) 638-6360 Fax: (215) 736 5240
PGVP ID: F32016

DocNumber: 000019256

CERTIFICATE OF ANALYSIS / EPA PROTOCOL GAS

Customer & Order Information:

CHEROKEE INSTRUMENTS INC
100 LOGAN COURT
ANGIER NC 27501

Praxair Order Number: 86503230
Customer P. O. Number: 14849
Customer Reference Number:

Fill Date: 12/12/2016
Part Number: NI CD1805ZE AS
Lot Number: 301733347606
Cylinder Style & Outlet: AS CGA 590
Cylinder Pressure & Volume: 2000 psig 140 cu. ft.

Certified Concentration:

Expiration Date:	12/16/2024	NIST Traceable
Cylinder Number:	CC200302	Analytical Uncertainty:
18.20 %	CARBON DIOXIDE	± 0.4 %
21.80 %	OXYGEN	± 0.1 %
Balance	NITROGEN	

Certification Information: Certification Date: 12/16/2016 Term: 96 Months Expiration Date: 12/16/2024

This cylinder was certified according to the 2012 EPA Traceability Protocol, Document #EPA-600/R-12/531, using Procedure G1. Do Not Use this Standard if Pressure is less than 100 PSIG.

Analytical Data: (R=Reference Standard, Z=Zero Gas, C=Gas Candidate)

1. Component: CARBON DIOXIDE

Requested Concentration: 18 %
Certified Concentration: 18.20 %
Instrument Used: SIEMENS ULTRAMAT 5E SN: D2-412
Analytical Method: NON-DISPERSIVE INFRARED
Last Multipoint Calibration: 12/7/2018

First Analysis Data:	Date:	12/16/2016
Z: 0 R: 19.99 C: 18.16 Conc: 18.2		
R: 19.92 Z: 0 C: 18.16 Conc: 18.2		
Z: 0 C: 18.16 R: 19.99 Conc: 18.2		
UOM: %	Mean Test Assay:	18.2 %

Reference Standard Type: GMI5
Ref. Std. Cylinder #: CC157538
Ref. Std. Conc: 19.99 %
Ref. Std. Traceable to SRM #: 2745a
SRM Sample #: 9-7-34
SRM Cylinder #: CAL016129

Second Analysis Data:	Date:	
Z: 0 R: 0 C: 0 Conc: 0		
R: 0 Z: 0 C: 0 Conc: 0		
Z: 0 C: 0 R: 0 Conc: 0		
UOM: %	Mean Test Assay:	0 %

2. Component: OXYGEN

Requested Concentration: 21.75 %
Certified Concentration: 21.80 %
Instrument Used: SIEMENS OXYMAT 5F
Analytical Method: PARAMAGNETIC
Last Multipoint Calibration: 12/7/2016

First Analysis Data:	Date:	12/16/2016
Z: 0 R: 21.32 C: 21.8 Conc: 21.8		
R: 21.32 Z: 0 C: 21.8 Conc: 21.8		
Z: 0 C: 21.8 R: 21.32 Conc: 21.8		
UOM: %	Mean Test Assay:	21.8 %

Reference Standard Type: GMS
Ref. Std. Cylinder #: CC8852
Ref. Std. Conc: 21.32 %
Ref. Std. Traceable to SRM #: 2858A
SRM Sample #: 71-E-24
SRM Cylinder #: FF18300

Second Analysis Data:	Date:	
Z: 0 R: 0 C: 0 Conc: 0		
R: 0 Z: 0 C: 0 Conc: 0		
Z: 0 C: 0 R: 0 Conc: 0		
UOM: %	Mean Test Assay:	0 %

Analyzed by:

Jessica Goodman

Certified by:

Jeff Gosner

Information contained herein has been prepared at your request by qualified experts within Praxair Distribution, Inc. While we believe that the information is accurate within the limits of the analytical methods employed and is complete to the extent of the specific analyses performed, we make no warranty or representation as to the suitability of the use of the information for any purpose. The information is offered with the understanding that any use of the information is at the sole discretion and risk of the user. In no event shall the liability of Praxair Distribution, Inc., arising out of the use of the information contained herein exceed the fee established for providing such information.



Praxair Distribution Mid-Atlantic
One Steel Road East,
Morrisville, PA 19067
Tel: (800) 638-6360 Fax: (215) 736 5240
PGVP ID: F32016

DocNumber: 000019320

CERTIFICATE OF ANALYSIS / EPA PROTOCOL GAS

Customer & Order Information:

CHEROKEE INSTRUMENTS INC
100 LOGAN COURT
ANGIER NC 27501

Praxair Order Number: 86501794
Customer P. O. Number: 14848
Customer Reference Number:

Fill Date: 12/16/2016
Part Number: NI CO45ME-AS
Lot Number: 304613351805
Cylinder Style & Outlet: AS CGA 350
Cylinder Pressure & Volume: 2000 psig 140 cu. ft.

Certified Concentration:

Expiration Date:	12/21/2024	NIST Traceable
Cylinder Number:	LCCO-SA15768	Analytical Uncertainty:
46.1 ppm	CARBON MONOXIDE	± 0.5 %
Balance	NITROGEN	

Certification Information: Certification Date: 12/21/2016 Term: 96 Months Expiration Date: 12/21/2024

This cylinder was certified according to the 2012 EPA Traceability Protocol, Document #EPA-800/R-12/531, using Procedure G1. Do Not Use this Standard if Pressure is less than 100 PSIG.

Analytical Data:

(R=Reference Standard, Z=Zero Gas, C=Gas Candidate)

1. Component: CARBON MONOXIDE

Requested Concentration: 45 ppm
Certified Concentration: 46.1 ppm
Instrument Used: HORIBA VIA-510, SN 577172041
Analytical Method: NON-DISPERSIVE INFRARED
Last Multipoint Calibration: 12/15/2016

First Analysis Date:	Date:	12/21/2016
Z: 0 R: 75.2 C: 46.2 Conc: 46.1		
R: 75.2 Z: 0 C: 46.2 Conc: 46.1		
Z: 0 C: 46.2 R: 75.2 Conc: 46.1		
UOM: PPM	Mean Test Assay:	46.1 PPM

Analyzed by:

Jessica Goodman

Reference Standard Type: GMIS
Ref. Std. Cylinder #: CC170310
Ref. Std. Conc: 75.2 PPM
Ref. Std. Traceable to SRM #: 1679C
SRM Sample #: 03-J-47
SRM Cylinder #: CAL018062

Second Analysis Date:	Date:	
Z: 0 R: 0 C: 0 Conc: 0		
R: 0 Z: 0 C: 0 Conc: 0		
Z: 0 C: 0 R: 0 Conc: 0		
UOM: PPM	Mean Test Assay:	0 PPM

Certified by:

Megha Patel



Praxair Distribution Mid-Atlantic
One Steel Road East,
Morrisville, PA 19067
Tel: (800) 638-6360 Fax: (215) 736 5240
PGVP ID: F32013

DocNumber: 000006513

CERTIFICATE OF ANALYSIS / EPA PROTOCOL GAS

Customer & Order Information:

PDI WHSE RALEIGH
2807 GRESHAM LAKE RD
RALEIGH NC 27610

Praxair Order Number: 04602771
Customer P. O. Number: 12593 99
Customer Reference Number:

Fill Date: 11/15/2013
Part Number: NI CO90ME-AS
Lot Number: 304121319303
Cylinder Style & Outlet: AS CGA 350
Cylinder Pressure & Volume: 2000 psig 140 cu. ft.

Certified Concentration:

Expiration Date:	11/19/2021	NIST Traceable
Cylinder Number:	CC14366	Analytical Uncertainty:
89.5 ppm	CARBON MONOXIDE	± 1 %
Balance	NITROGEN	

Certification Information: Certification Date: 11/19/2013 Term: 96 Months Expiration Date: 11/19/2021

This cylinder was certified according to the 2012 EPA Traceability Protocol, Document #EPA-600/R-12/531, using Procedure G1. Do Not Use this Standard if Pressure is less than 100 PSIG.

Analytical Data:

(R=Reference Standard, Z=Zero Gas, C=Gas Candidate)

1. Component: CARBON MONOXIDE

Requested Concentration: 90 ppm
Certified Concentration: 89.5 ppm
Instrument Used: MKS 2031
Analytical Method: FTIR
Last Multipoint Calibration: 10/21/2013

First Analysis Data:		Date:	11/19/2013
Z:	0.029	R:	504.54
R:	506.5	Z:	-0.04
Z:	-0.07	C:	89.79
UOM:	PPM	Mean Test Assay:	89.51 PPM

Analyzed by:

Jeff Gosner

Reference Standard Type:

Ref. Std. Cylinder #: SA2779
Ref. Std. Conc: 505 PPM
Ref. Std. Traceable to SRM #: 1680b
SRM Sample #:
SRM Cylinder #:

Second Analysis Data:		Date:	
Z:	0	R:	0
R:	0	Z:	0
Z:	0	C:	0
UOM:	PPM	Mean Test Assay:	0 PPM

Certified by:

Judith Imperial



Praxair Distribution Mid-Atlantic
One Steel Road East,
Morrisville, PA 19067
Tel: (800) 638-6360 Fax: (215) 736 5240
PGVP ID: F32016

DocNumber: 000015392

CERTIFICATE OF ANALYSIS / EPA PROTOCOL GAS

Customer & Order Information:

CHEROKEE INSTRUMENTS
100 LOGAN COURT
ANGIER

NC 27501

Praxair Order Number: 70027764
Customer P. O. Number:
Customer Reference Number:

Fill Date: 1/29/2016
Part Number: EV AIPR25 5MEAS
Lot Number: 304322029605
Cylinder Style & Outlet: AS CGA 590
Cylinder Pressure & Volume: 2000 psig 140 cu. ft

Certified Concentration:

Expiration Date:	2/2/2024	NIST Traceable
Cylinder Number:	CC154735	Analytical Uncertainty:
25.74 ppm PROPANE	± 0.8 %	
Balance AIR		

Certification Information: Certification Date: 2/2/2016 Term: 96 Months Expiration Date: 2/2/2024

This cylinder was certified according to the 2012 EPA Traceability Protocol, Document #EPA-600/R-12/531, using Procedure G1. Do Not Use this Standard if Pressure is less than 100 PSIG.

Analytical Data:

(R=Reference Standard, Z=Zero Gas, C=Gas Candidate)

1. Component: PROPANE

Requested Concentration: 25.5 ppm
Certified Concentration: 25.74 ppm
Instrument Used: GOW MAC 600
Analytical Method: Flame Ionization Detector
Last Multipoint Calibration: 2/2/2016

First Analysis Data:	Date:	2/2/2016
Z: 0 R: 30.1 C: 25.78 Conc: 25.78		
R: 30.06 Z: 0 C: 25.71 Conc: 25.69		
Z: 0 C: 25.77 R: 30.05 Conc: 25.75		
UOM: PPM	Mean Test Assay:	25.74 PPM

Analyzed by:

Jeff Gosner

Reference Standard Type: GMIS
Ref. Std. Cylinder #: CC107531
Ref. Std. Conc: 30.05 PPM
Ref. Std. Traceable to SRM #: 1667b
SRM Sample #: 83-I-52
SRM Cylinder #: XF0040798

Second Analysis Data:	Date:	
Z: 0 R: 0 C: 0 Conc: 0		
R: 0 Z: 0 C: 0 Conc: 0		
Z: 0 C: 0 R: 0 Conc: 0		
UOM: PPM	Mean Test Assay:	0 PPM

Certified by:

Judith Imperial



Praxair
5700 South Alameda Street
Los Angeles, CA 90058
Tel: (323) 585-2154 Fax: (714) 542-6689
PGVPID: F22016

DocNumber: 000089651

CERTIFICATE OF ANALYSIS / EPA PROTOCOL GAS

Customer & Order Information:

PXPKG RALEIGH NC HS
2807 GRESHAM LAKES RD
RALEIGH NC 27615

Praxair Order Number: 33652518
Customer P. O. Number: 72163933-799700
Customer Reference Number:

Fill Date: 2/3/2016
Part Number: AI NX50ME-AS
Lot Number: 109603402
Cylinder Style & Outlet: AS CGA 660
Cylinder Pressure & Volume: 2000 psig 140 cu. ft.

Certified Concentration:

Expiration Date:	2/12/2019	NIST Traceable
Cylinder Number:	CC266282	Analytical Uncertainty:
50.2 ppm	NITROGEN DIOXIDE (as NO _x)	± 1 %
Balance	AIR	

NO = 0.1 ppm

NO for Reference Only

Certification Information: Certification Date: 2/12/2016 Term: 36 Months Expiration Date: 2/12/2019

This cylinder was certified according to the 2012 EPA Traceability Protocol, Document #EPA-600/R-12/531, using Procedure G1. Do Not Use this Standard if Pressure is less than 100 PSIG.

Analytical Data:

(R=Reference Standard, Z=Zero Gas, C=Gas Candidate)

1. Component: NITROGEN DIOXIDE (as NO_x)

Requested Concentration: 50 ppm
Certified Concentration: 50.2 ppm
Instrument Used: Thermo Env. 42i-HL
Analytical Method: Chemiluminescence
Last Multipoint Calibration: 1/27/2015

Reference Standard Type: GMIS
Ref Std. Cylinder #: CC308931
Ref Std. Conc: 97.3 ppm
Ref Std. Traceable to SRM #: 2660a
SRM Sample #: 2660C-45
SRM Cylinder #: CAL016162

First Analysis Data:		Date: 2/5/2016	
Z:	0	R:	95.6
C:	49.3	Conc:	50.177
R:	95.6	Z:	0
C:	49.5	Conc:	50.38
Z:	0	C:	49.4
R:	95.6	Conc:	50.278
UOM:	ppm	Mean Test Assay:	50.278 ppm

Second Analysis Data:		Date: 2/12/2016	
Z:	0	R:	95.6
C:	49.2	Conc:	50.075
R:	95.6	Z:	0
C:	49.4	Conc:	50.278
Z:	0	C:	49.3
R:	95.6	Conc:	50.177
UOM:	ppm	Mean Test Assay:	50.177 ppm

Analyzed by:

Henry Kung

Certified by:

Matthew Angerer

CERTIFICATE OF ANALYSIS

Grade of Product: EPA Protocol

Part Number:	E02NI99E15A0581	Reference Number:	122-401180044-1
Cylinder Number:	CC341990	Cylinder Volume:	144.4 CF
Laboratory:	124 - Durham (SAP) - NC	Cylinder Pressure:	2015 PSIG
PGVP Number:	B22018	Valve Outlet:	350
Gas Code:	PPN,BALN	Certification Date:	Apr 17, 2018

Expiration Date: Apr 17, 2026

Certification performed in accordance with "EPA Traceability Protocol for Assay and Certification of Gaseous Calibration Standards (May 2012)" document EPA 600/R-12/531, using the assay procedures listed. Analytical Methodology does not require correction for analytical interference. This cylinder has a total analytical uncertainty as stated below with a confidence level of 95%. There are no significant impurities which affect the use of this calibration mixture. All concentrations are on a volume/volume basis unless otherwise noted.

Do Not Use This Cylinder below 100 psig, i.e. 0.7 megapascals.

ANALYTICAL RESULTS

Component	Requested Concentration	Actual Concentration	Protocol Method	Total Relative Uncertainty	Assay Dates
PROPANE	85.00 PPM	85.84 PPM	G1	+/- 0.8% NIST Traceable	04/17/2018
NITROGEN	Balance				

CALIBRATION STANDARDS

Type	Lot ID	Cylinder No	Concentration	Uncertainty	Expiration Date
NTRM	0010613	AAL18527	49.8 PPM PROPANE/AIR	+/- 0.6%	May 23, 2018

ANALYTICAL EQUIPMENT

Instrument/Make/Model	Analytical Principle	Last Multipoint Calibration
Nicolet 6700 AHR0801333 C3H8	FTIR	Mar 22, 2018

Triad Data Available Upon Request



Phil St...
Approved for Release



CERTIFICATE OF ANALYSIS / EPA PROTOCOL GAS

Customer & Order Information

CHEROKEE INSTRUMENTS INC
100 LOGAN COURT
ANGIER NC 27501

Certificate Issuance Date: 02/12/2019

Praxair Order Number: 69497584

Part Number NI NO48MER-AS

Fill Date: 11/21/2018

Lot Number: 70088832502

Cylinder Style & Outlet: AS

CGA 550

Cylinder Pressure and Volume: 2000 psig 140 ft³

Certified Concentration

Expiration Date:	12/13/2021	NIST Traceable
Cylinder Number:	SA6170	Expanded Uncertainty
49.8 ppm	Nitric oxide	± 0.9 %
Balance	Nitrogen	

ProSpec EZ Cert



For Reference Only:

NOx 49.9 ppm

Certification Information:

Certification Date: 12/13/2018

Term: 36 Months

Expiration Date: 12/13/2021

This cylinder was certified according to the 2012 EPA Traceability Protocol, Document #EPA-600/R-12/531, using Procedure G1.

Do Not Use this Standard if Pressure is less than 100 PSIG.

Analytical Data:

(R=Reference Standard, Z=Zero Gas, C=Gas Candidate)

1. Component: Nitric oxide

Requested Concentration: 48 ppm
Certified Concentration: 49.8 ppm
Instrument Used: Thermo Electron 42i-LS S/N 1030645077
Analytical Method: Chemiluminescence
Last Multipoint Calibration: 11/27/2018

Reference Standard: Type / Cylinder #: NTRM / CC506530

Concentration / Uncertainty: 49.23 ppm ±0.853%

Expiration Date: 07/18/2022

Traceable to: SRM # / Sample # / Cylinder #: NTRM / 18070118 / NTRM CC506530

SRM Concentration / Uncertainty: 49.23 ppm / 0.42 ppm

SRM Expiration Date: 07/18/2022

First Analysis Data:				Date	12/04/2018
Z:	0	R:	49.2	C:	49.7
Conc:	49.8				
R:	49.1	Z:	0	C:	49.8
Conc:	49.7				
Z:	0	C:	49.7	R:	49.2
Conc:	49.8				
UOM:	ppm	Mean Test Assay:	49.7	ppm	

Second Analysis Data:				Date	12/13/2018
Z:	0	R:	49.3	C:	50
Conc:	49.9				
R:	49.3	Z:	0	C:	50
Conc:	49.9				
Z:	0	C:	50	R:	49.3
Conc:	49.9				
UOM:	ppm	Mean Test Assay:	49.9	ppm	

Analyzed By

[Signature]
Analia Real

Certified By

[Signature]
Henry Kyoung



Praxair Distribution Mid-Atlantic
One Steel Road East,
Morrisville, PA 19067
Tel: (800) 638-6360 Fax: (215) 736 5240
PGVP ID: F32017

DocNumber: 000021376

CERTIFICATE OF ANALYSIS / EPA PROTOCOL GAS

Customer & Order Information:

CHEROKEE INSTRUMENTS INC
100 LOGAN COURT
ANGIER NC 27501

Praxair Order Number: 92286180
Customer P. O. Number: 0050001228
Customer Reference Number:

Fill Date: 6/10/2017
Part Number: NI ND90ME-AS
Lot Number: 304513161704
Cylinder Style & Outlet: AS CGA 680
Cylinder Pressure & Volume: 2000 psig 140 cu. ft.

Certified Concentration:

Expiration Date:	6/21/2025	NIST Traceable
Cylinder Number:	CC200174	Analytical Uncertainty:
89.5 ppm	NITRIC OXIDE	± 0.5 %
Balance	NITROGEN	

NOx = 90.0 ppm

NOx for Reference Only

Certification Information: Certification Date: 6/21/2017 Term: 96 Months Expiration Date: 6/21/2025

This cylinder was certified according to the 2012 EPA Traceability Protocol, Document #EPA-600/R-12/531, using Procedure G1. Do Not Use this Standard if Pressure is less than 100 PSIG.

Analytical Data:

(R=Reference Standard, Z=Zero Gas, C=Gas Candidate)

1. Component: NITRIC OXIDE

Requested Concentration: 90 ppm
Certified Concentration: 89.5 ppm
Instrument Used: TECO MODEL 42i S/N: 0820017513
Analytical Method: CHEMILUMINESCENCE
Last Multipoint Calibration: 6/13/2017

First Analysis Data:		Date: 6/14/2017	
Z: 0	R: 95	C: 89.5	Conc: 89.5
R: 85	Z: 0	C: 89.4	Conc: 89.4
Z: 0	C: 89.4	R: 95	Conc: 89.4
UOM: PPM	Mean Test Assay:		89.4 PPM

Reference Standard Type: GMS
Ref. Std. Cylinder #: CC352709
Ref. Std. Conc: 95.0 PPM
Ref. Std. Traceable to SRM #: 16848
SRM Sample #: 44-T-48
SRM Cylinder #: FF9239

Second Analysis Data:		Date: 6/21/2017	
Z: 0	R: 95	C: 90	Conc: 89.7
R: 85.4	Z: 0	C: 90	Conc: 89.7
Z: 0	C: 90	R: 95.4	Conc: 89.7
UOM: PPM	Mean Test Assay:		89.7 PPM

Analyzed by:

Jessica Goodman

Certified by:

Megha Patel

Information contained herein has been prepared at your request by qualified experts within Praxair Distribution, Inc. While we believe that the information is accurate within the limits of the analytical methods employed and is complete to the extent of the specific analyses performed, we make no warranty or representation as to the suitability of the use of the information for any purpose. The information is offered with the understanding that any use of the information is at the sole discretion and risk of the user. In no event shall the liability of Praxair Distribution, Inc., arising out of the use of the information contained herein exceed the fee established for providing such information.

APPENDIX III-F
Sampling Equipment Calibration Sheets

APEX INSTRUMENTS METHOD 5 PRE-TEST CONSOLE CALIBRATION
USING CALIBRATED CRITICAL ORIFICES
5-POINT ENGLISH UNITS

Meter Console Information	
Console Model Number	522
Console Serial Number	909033
DGM Model Number	RW 110
DGM Serial Number	972787

Calibration Conditions			
Date	Time	02/14/19	13:50
Barometric Pressure		29.61	in Hg
Theoretical Critical Vacuum ¹		13.98	in Hg
Calibration Technician		JBG	

Factors/Conversions		
Std Temp	528	°R
Std Press	29.92	in Hg
K ₁	17.647	oR/in Hg

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

²The Critical Orifice Coefficient, K', must be entered in English units, (ft³•R^{1/2})/(in.Hg•min).

Calibration Data										
Run Time	Metering Console				Critical Orifice					
Elapsed	DGM Orifice ΔH	Volume Initial	Volume Final	Outlet Temp Initial	Outlet Temp Final	Serial Number	Coefficient	Amb Temp Initial	Amb Temp Final	Actual Vacuum
(θ)	(P _m)	(V _m)	(V _m)	(t _m)	(t _m)		K'	(t _{amb})	(t _{amb})	
min	in H ₂ O	cubic feet	cubic feet	°F	°F		see above ²	°F	°F	in Hg
18.50	0.33	187.000	192.865	64	65	FO 40	0.2380	66	65	19.0
10.50	0.69	200.400	205.253	66	66	FO 48	0.3488	66	67	17.0
11.50	1.20	193.200	200.215	65	66	FO 55	0.4594	65	66	17.0
8.00	2.00	205.600	211.894	66	67	FO 63	0.5906	67	70	15.0
9.00	3.60	212.200	221.692	67	67	FO 73	0.8063	70	68	14.0

Standardized Data				Results				
Dry Gas Meter		Critical Orifice		Calibration Factor		Dry Gas Meter		ΔH @
				Value	Variation	Flowrate	Flowrate	
(V _{m(Std)})	(Q _{m(Std)})	(V _{Cr(Std)})	(Q _{Cr(Std)})	(Y)	(ΔY)	Std & Corr	0.75 SCFM	Variation
cubic feet	cfm	cubic feet	cfm			(Q _{m(Std)(Corr)})	(ΔH@)	(ΔΔH@)
						cfm	in H ₂ O	
5.848	0.316	5.687	0.307	0.9725	-0.003	0.307	1.962	0.033
4.829	0.460	4.726	0.450	0.9786	0.003	0.450	1.911	-0.017
6.996	0.608	6.824	0.593	0.9754	-0.001	0.593	1.919	-0.009
6.278	0.785	6.086	0.761	0.9694	-0.007	0.761	1.950	0.022
9.496	1.055	9.342	1.038	0.9838	0.008	1.038	1.898	-0.030
				0.9760	Y Average		1.928	ΔH@ Average

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

I certify that the above Dry Gas Meter was calibrated in accordance with USEPA Methods, CFR Title 40, Part 60, Appendix A-3, Method 5, 16.2.3

Signature: Jonas Gilbert

Date: 2/14/19

METHOD 5 POST-TEST CONSOLE CALIBRATION USING CALIBRATED CRITICAL ORIFICES
3-POINT ENGLISH UNITS

Meter Console Information	
Console Model Number	522
Console Serial Number	909033
DGM Model Number	RW 110
DGM Serial Number	328893

Calibration Conditions			
Date	Time	03/19/19	10:05
Barometric Pressure		30.6	in Hg
Theoretical Critical Vacuum ¹		14.4	in Hg
Calibration Technician		JBG	

Factors/Conversions		
Std Temp	528	°R
Std Press	29.92	in Hg
K ₁	17.647	oR/in Hg

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

²The Critical Orifice Coefficient, K', must be entered in English units, (ft³•oR^{1/2})/(in.Hg•min).

Calibration Data										
Run Time	Metering Console				Critical Orifice					
Elapsed	DGM Orifice ΔH	Volume Initial	Volume Final	Outlet Temp Initial	Outlet Temp Final	Serial Number	Coefficient	Amb Temp Initial	Amb Temp Final	Actual Vacuum
(θ)	(P _m)	(V _m)	(V _{net})	(t _m)	(t _{net})		K'	(t _{amb})	(t _{amb})	in. Hg
min	in H ₂ O	cubic feet	cubic feet	°F	°F	FO		°F	°F	
7.0	2.00	911.50	916.982	58	68	FO-63	0.5906	63	63	20.00
13.0	2.00	916.982	927.173	60	68	FO-63	0.5906	63	65	20.00
9.0	2.00	927.173	934.257	63	68	FO-63	0.5906	65	65	20.00

Results								
Standardized Data				Dry Gas Meter				
Dry Gas Meter		Critical Orifice		Calibration Factor		Flowrate	0.3488	
(V _{m(std)})	(Q _{cr(std)})	(V _{cr(std)})	(Q _{cr(std)})	Value	Variation	Std & Corr	0.75 SCFM	Variation
(Y)	(ΔY)	(Q _{m(std)(corr)})	(ΔH@)	(ΔΔH@)				
cubic feet	cfm	cubic feet	cfm			cfm	in H ₂ O	
5.687	0.812	5.645	0.806	0.993	0.000	0.806	1.805	0.002
10.553	0.812	10.477	0.806	0.993	0.001	0.806	1.804	0.001
7.314	0.813	7.248	0.805	0.991	-0.001	0.805	1.801	-0.002
Pretest Gamma	0.9760	% Deviation	1.7	0.992	Y Average		1.803	ΔH@ Average

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

I certify that the above Dry Gas Meter was calibrated in accordance with USEPA Methods, CFR Title 40, Part 60, Appendix A-3, Method 5, 16.2.3

Signature Elias Gilbert

Date 3/19/2019

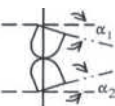
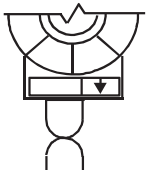


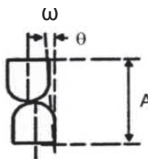
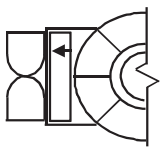
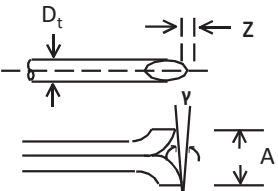
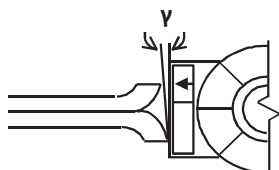
Type S Pitot Tube Inspection

GENERAL INFORMATION

Probe ID	4A	Personnel	EBG
Date	3/19/2019	Coefficient Value	0.84

PITOT TUBE INSPECTION

Pitot Tube assembly level? (yes/no)	yes
Pitot Tube obstruction? (yes/no)	no
Pitot Tube openings damaged? (yes/no)	no

		α_1	0	$\leq \pm 10^\circ$
		α_2	2	$\leq \pm 10^\circ$
		β_1	-1	$\leq \pm 5^\circ$
		β_2	0	$\leq \pm 5^\circ$
		γ	0.0087	
		θ	0.0524	
		$z = A \tan (\gamma)$	0.0200	$\leq \pm \frac{1}{8}"$
		$\omega = A \tan (\theta)$	0.0475	$\leq \pm \frac{1}{32}"$
		D_t	0.375	
		$(\frac{3}{16}" < D_t < \frac{3}{8}" \text{ Recommended})$		
		A	0.906	
		P_A	1.208	
		P_B		$(1.05 < P/D_t < 1.50 \text{ Recommended})$

STACK THERMOCOUPLE CALIBRATION

Ref. Type	Hg Thermometer	Ref. ID	Hg-1
-----------	----------------	---------	------

Source	Ref., °F	Stack TC, °F	Abs. Diff., °F
Ice bath	32	32	0
Ambient	67	67	0
Hot Plate	232	231	1
Maximum Temp. Difference, °F			1

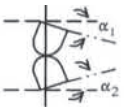
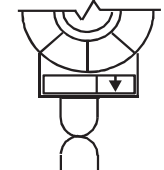
Type S Pitot Tube Inspection

GENERAL INFORMATION

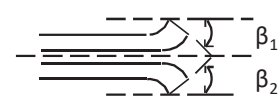
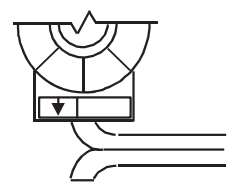
Probe ID	4B	Personnel	EJG
Date	3/19/2019	Coefficient Value	0.84

PITOT TUBE INSPECTION

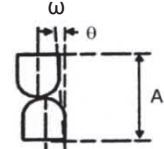
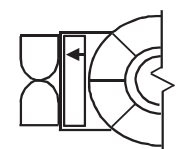
Pitot Tube assembly level? (yes/no)	yes
Pitot Tube obstruction? (yes/no)	no
Pitot Tube openings damaged? (yes/no)	no

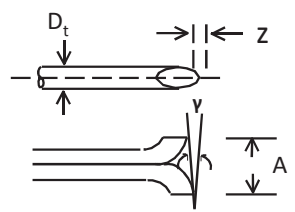
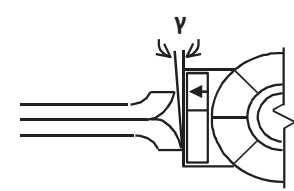
α_1	1	$\leq \pm 10^\circ$
α_2	0	$\leq \pm 10^\circ$

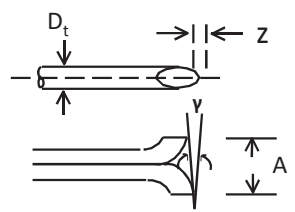
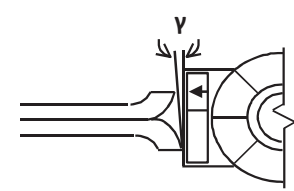
β_1	1	$\leq \pm 5^\circ$
β_2	2	$\leq \pm 5^\circ$

γ	0	
θ	3	

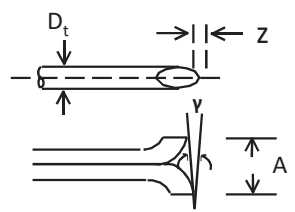
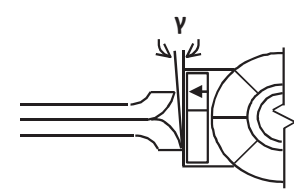



$z = A \tan (\gamma)$	0.00	$\leq \pm \frac{1}{8}''$
$\omega = A \tan (\theta)$	0.049970818	$\leq \pm \frac{1}{32}''$

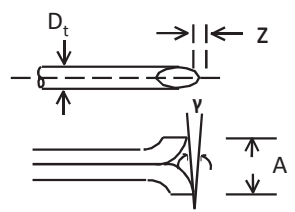
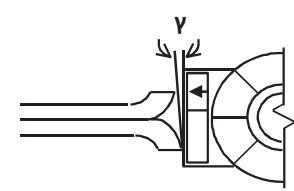



D_t	0.3735	
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$(\frac{3}{16}'' < D_t < \frac{3}{8}'' \text{ Recommended})$

A	0.9535	
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P_A P_B	1.28	
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$(1.05 < P/D_t < 1.50 \text{ Recommended})$

APPENDIX III-G
Process Data

March 7, 2019 Pine 85% wt. processed

Appendix III-G, Table 1. Process Data, RCO 1, March 7, 2019, Run 1						
Process Parameter	9:10 a.m.	9:25 a.m.	9:40 a.m.	9:55 a.m.	10:10 a.m.	Average
Run Time 9:10-10:15 a.m.						
Short Tons/hour (wet basis)	41.7	41.7	41.7	41.7	41.7	41.7
Production, ODT/hour	39.5	39.5	39.5	39.5	39.5	39.5
Pellet Moisture Content, % weight	5.16	5.16	5.16	5.16	5.16	5.16
RCO 1 Differential Pressure, in. w.c.	1.1	1.2	1.2	1.2	1.2	1.2
RCO CC 1 SP, °F	750	750	750	750	750	750
RCO CC 1 PV, °F	948	950	947	946	944	947
Cyclofilter 1 Diff. Pressure., in w.c.	0.6	0.5	0.5	0.6	0.6	0.6
Cyclofilter 2 Diff. Pressure, in w.c.	0.5	0.5	0.4	0.2	0.2	0.4
Cyclofilter 3 Diff. Pressure, in w.c.	0.2	0.2	0.2	0.2	0.2	0.2

Appendix III-G, Table 2. Process Data, RCO 1, March 7, 2019, Run 2						
Process Parameter	11:08 a.m.	11:23 a.m.	11:38 a.m.	11:53 a.m.	12:08 p.m.	Average
Run Time 11:08 a.m.-12:22 p.m..						
Short Tons/hour (wet basis)	42.0	42.0	42.0	42.0	42.0	42.0
Production, ODT/hour	40.3	40.3	40.3	40.3	40.3	40.3
Pellet Moisture Content, % weight	4.69	4.69	4.69	4.69	4.69	4.7
RCO 1 Differential Pressure, in. w.c.	1.2	1.2	1.2	1.2	1.2	1.2
RCO CC 1 SP, °F	750	750	750	750	750	750
RCO CC 1 PV, °F	936	936	939	937	941	938
Cyclofilter 1 Diff. Pressure, in w.c.	0.7	0.7	0.6	0.6	0.7	0.7
Cyclofilter 2 Diff. Pressure, in w.c.	0.3	0.4	0.4	0.4	0.4	0.4
Cyclofilter 3 Diff. Pressure, in w.c.	0.2	0.2	0.2	0.2	0.2	0.2

Appendix III-G, Table 2. Process Data, RCO 1, March 7, 2019, Run 3						
Process Parameter	13:04 p.m.	13:19 p.m.	13:34 p.m.	13:49 p.m.	14:04 p.m.	Average
Run Time 13:04 p.m.-14:18 p.m.						
Short Tons/hour (wet basis)	42.3	42.3	42.3	42.3	42.3	42.3
Production, ODT/hour	40.5	40.5	40.5	40.5	40.5	40.5
Pellet Moisture Content, % weight	4.14	4.14	4.14	4.14	4.14	4.1
RCO 1 Differential Pressure, in. w.c.	1.2	1.2	1.2	1.2	1.2	1.2
RCO CC 1 SP, °F	750	750	750	750	750	750
RCO CC 1 PV, °F	937	941	936	944	944	940
Cyclofilter 1 Diff. Pressure, in w.c.	0.6	0.6	0.6	0.6	0.6	0.6
Cyclofilter 2 Diff. Pressure, in w.c.	0.3	0.3	0.4	0.3	0.3	0.3
Cyclofilter 3 Diff. Pressure, in w.c.	0.2	0.2	0.2	0.2	0.2	0.2