California Air Resources Board

Air Resources Board IFB No. 13-414: Enhanced Inspection & Maintenance for GHG & VOCs at Upstream Facilities –(Revised)

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Acknowledgment

California Air Resources Board
Feather River Air Quality Management District
Glenn County Air Pollution Control District
South Coast Air Quality Management District
Ventura County Air Pollution Control District
San Joaquin Valley Air Pollution Control District
Oilfield Environmental & Compliance, Inc.

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LIST OF ACRONYMS

% REC	Percent Recovery
ASTM	American Society for Testing and Materials
C	Degrees Centigrade
C_2H_6	Ethane
CAN	Canister
CAPCOA	California Air Pollution Control Officers Association
CARB	California Air Resources Board
CCV	Continuing Calibration Verification
CF	Conversion factor
CFM	Cubic Feet per Minute
CH_4	Methane
CO	Carbon Monoxide
CO_2	Carbon Dioxide
COC	Chain-of-Custody
CRDS	Cavity Ring-Down Spectroscopy
DB9	A 9- Pin Serial Port Connector
DOR	Delay of Repair
EPA	Environmental Protection Agency
ER	Emission Rate
FID	Flame Ionization Detector
ft^3/min	Cubic Feet per Minute
GC	Gas Chromatograph
GHG	Greenhouse Gas
H_2S	Hydrogen Sulfide
ID	Identification
inHg	Inches of Mercury
IR	Infared
K	Kelvin
K	One Thousand
KKK	Triple K
KPI	Key Performance Indicator
lb	Pound
LCD	Laboratory Control Duplicate
LCD	Liquid Crystal Display
LCS	Laboratory Control Spike
LCSD	Laboratory Control Spike Duplicate
LDAR	Leak Detection & Repair
LEL	Lower Explosive Limit
Li-Ion	Lithium Ion

LPM	Liters per Minute
mg/m^3	Milligrams per Cubic Meter
MSE	Mean Square Error
MW	Molecular Weight
N_2	Nitrogen
NiCad	Nickel Cadmium
NiMH	Nickel Metal Hydride
NSPS	New Source Performance Standard
O_2	Oxygen
OEC	Oilfield Environmental and Compliance
OEL	Open-Ended Line
OOOO	Quad O
PFCs	Pneumatic Flow Controllers
ppb	Parts per Billion
ppm-m	Parts per Million – Meter
ppmv	Parts per Million by Volume
PRD	Pressure Relief Device
PRV	Pressure Relief Valve
QC	Quality Control
RMLD	Remote Methane Leak Detector
RPD	Relative Percent Difference
SBCF	Scale Bias Correction Factor
SCFD	Standard Cubic Feet per Day
SCFH	Standard Cubic Feet per Hour
SCFM	Standard Cubic Feet per Minute
SV	Screening Value
TB	Tedlar Bag
TDLAS	Tunable Diode Laser Absorption Spectroscopy
TOC	Total Organic Compounds
tpy	Tons/Year
TVA	Toxic Vapor Analyzer
VOC	Volatile Organic Compounds

SECTION 1
EXECUTIVE SUMMARY

1.1 Introduction

Sage Environmental Consulting LP (Sage) has conducted a field study of fugitive methane and hydrocarbon emissions from California natural gas production facilities (gas wells and natural gas processing plants). Testing was conducted in three phases:

- Phase I: testing at sites in southern California from January 20 to January 30, 2015;
- Phase II: testing at sites in central California from February 23 to March 3, 2015; *and*
- Phase III: testing at sites in northern California from August 6 to August 14, 2015.

Over the course of this study, data was collected from one hundred and sixty (160) components at thirty-nine (39) sites for use in the development of correlation equations for leaking equipment in natural gas service following a modified U.S. Environmental Protection Agency (EPA) unit-specific correlation method. Thirty-five (35) samples for laboratory analyses and emissions speciation were also collected from a subset of selected components. Initially the test matrix included components in both gas and liquid phases. At the start of Phase II, however, the focus was restricted to gas phase components only. Emission results for the limited set of liquid service components tested are provided in Appendix E. A map of the test site locations is provided in Section 2.0, Figure 2-1. This study also included an evaluation of six (6) different equipment leak detection technologies and a limited testing of emissions from gas field pneumatic devices.

1.2 Emission Correlation Equation Results

Table 1-1 identifies the completed sample test matrix used to develop the natural gas emission correlations. Emissions from leaking components were measured with a Bacharach Hi Flow Sampler® and reported as methane.

Table 1-1
Completed Sample Test Matrix

Type	EPA Method 21 Reading, ppmv CH_4					
Gas Service	**0 - < 100**	**100 - < 1K**	**1K - < 10K**	**10K - < 100K**	**>= 100K**	**Sum**
Valves	7	7	6	7	6	33
Connectors	6	8	9	6	8	37
Flanges	7	6	6	1	2	22
Connectors + Flanges	13	14	15	7	10	
OELs	9	6	4	7	8	34
Other	6	6	6	8	8	34
TOTAL	48	47	46	36	42	160

Table 1-2 provides the resulting correlation equations developed from the measurement data collected in this project. By inputting a Method 21 screening value (SV), the equation calculates the Leak Rate in kilograms/hour (kg/hr) as methane at standard conditions of 25°C and 1 atmosphere.

Table 1-2
Correlation Equations for Components in Natural Gas Service

Component Type (Gas Service Only)	2015 CARB Study Correlation Equations
	Correlation[1,2,3]
Valves	Leak Rate (kg/hr) = 1.3236E-05 x SV $^{0.81180}$
Connectors	Leak Rate (kg/hr) = 1.5523E-05 x SV $^{0.6848}$
Flanges	Leak Rate (kg/hr) = 3.6815E-03 x SV $^{0.3369}$
Connectors & Flanges	Leak Rate (kg/hr) = 4.1772E-04 x SV $^{0.4666}$
OELs	Leak Rate (kg/hr) = 8.1490E-05 x SV $^{0.7157}$
Other	Leak Rate (kg/hr) = 2.2542E-05 x SV $^{0.7902}$

[1] SV = Screening value in ppmv
[2] These correlations predict methane-equivalent Total Organic Compound (TOC) emission rates. ER, kg/hr = SBCF x 10 $^{\beta 0}$ x SV $^{\beta 1}$
[3] Note that the EPA Protocol often presents the equation noted in item 3 above, as follows: Leak Rate, kg/hr, as methane = C1 x (Monitored Leak Concentration, ppmv as methane) $^{\beta 1}$, Where C1 = SBCF x $10^{\beta 0}$.

Thirty-five (35) sample pairs were collected for EPA Method TO-15 and the American Society for Testing and Materials (ASTM) 1945/3588 analyses from the components tested. The top eleven (11) compounds detected in these samples (excluding oxygen, nitrogen, carbon dioxide and Total Petroleum Hydrocarbons) were, in order of decreasing mass emission rate (kg/hr):

1. Methane
2. Hexane
3. Cyclohexane
4. Heptane
5. Benzene
6. Toluene
7. Xylenes (total)
8. Isopropyl Alcohol
9. Ethylbenzene
10. Ethanol
11. Acetone

Average methane emission rates were several orders of magnitude above all other compounds.

Section 2.0 of this report provides descriptions of the testing methodology and the development of the equations that correlate natural gas mass emissions with the EPA Method 21 concentration readings obtained in this study. Supporting documentation is provided in the Appendices.

1.3 Instrument Evaluations

The Thermo Scientific Toxic Vapor Analyzer (TVA) 1000B was used to obtain EPA Method 21 screening results for use in the correlation equations development. In addition to the TVA, five (5) other instruments/technologies were evaluated for their ability to detect fugitive emissions from natural gas:

- The RKI Eagle Model 1 equipped with a catalytic oxidation sensor;
- The COSMOS XP-3160 equipped with a catalytic oxidation sensor;
- The Bacharach Remote Methane Leak Detector (RMLD);
- The FLIR GF-320 Infrared Camera; *and*
- The Picarro Surveyor.

A side-by-side comparison of the TVA, RKI Eagle 1 and the COSMOS XP-3160 analyzers indicated comparable results over the range of typical regulatory leak definitions. A comparison between the RMLD and the IR Camera showed that both remote sensing instruments were proficient in identifying significant leaks with the IR Camera having the advantage of being able to more precisely identify the leaking component. A brief test of the Picarro Surveyor pointed out both the advantages and the limitations of this new and promising leak detection technology.

Section 3.0 of this report discusses the results of the instrument evaluations.

1.4 Emissions from Pneumatic Controllers

During the third phase of field tests, attention was briefly given to characterizing fugitive emissions from two types of pneumatic controllers in common use at natural gas well sites in California: (1) the Invalco Flex Tube® CT Series Pneumatic Flow Controller and (2) the Kimray® Pneumatic Flow Controller. The Invalco series typifies a high bleed pneumatic device while the Kimray controller is, in comparison, a low bleed pneumatic device. Emissions testing of ten (10) Invalco's and six (6) Kimray's was conducted with the Hi Flow Sampler. Average methane-equivalent emissions from the Invalco pneumatic controller were 0.2 kg/hour or 11 standard cubic feet per hour (SCFH). Average methane-equivalent emissions from the Kimray's were approximately an order of magnitude lower at 0.03 kg/hour or 1.6 SCFH. Even though a small number of pneumatic controllers were tested and further testing is needed, these emission results are similar to those used in ARB's 2007 Oil and Gas Industry Survey (ARB, 2013. 2007 Oil and Gas Industry Survey Results, Final Report (Revised October 2013). The ARB Survey Report used 22 SCFH for high bleed pneumatics, and 4.8 SCFH for low bleed pneumatics. In addition, both the ARB Survey Report low bleed pneumatics and the Kimray's in this study fall below the US EPA's OOOO New Source Performance standard of 6 SCFH for low bleed pneumatics.

Section 4.0 of this report discusses the results of the pneumatic controller emissions test.

1.5 Project Quality Control

The quality of the data produced throughout this project was assured by daily equipment calibration verification checks, the following of documentation protocols, sample chain-of-custody proceedings, and analytical quality control checks. The results of these checks and procedures indicate that instrumentation, both field and analytical, were maintained in a state of control through the project's duration and that the resulting data is of a known and verifiable accuracy.

Section 5.0 of this report includes the results of the project's quality control checks.

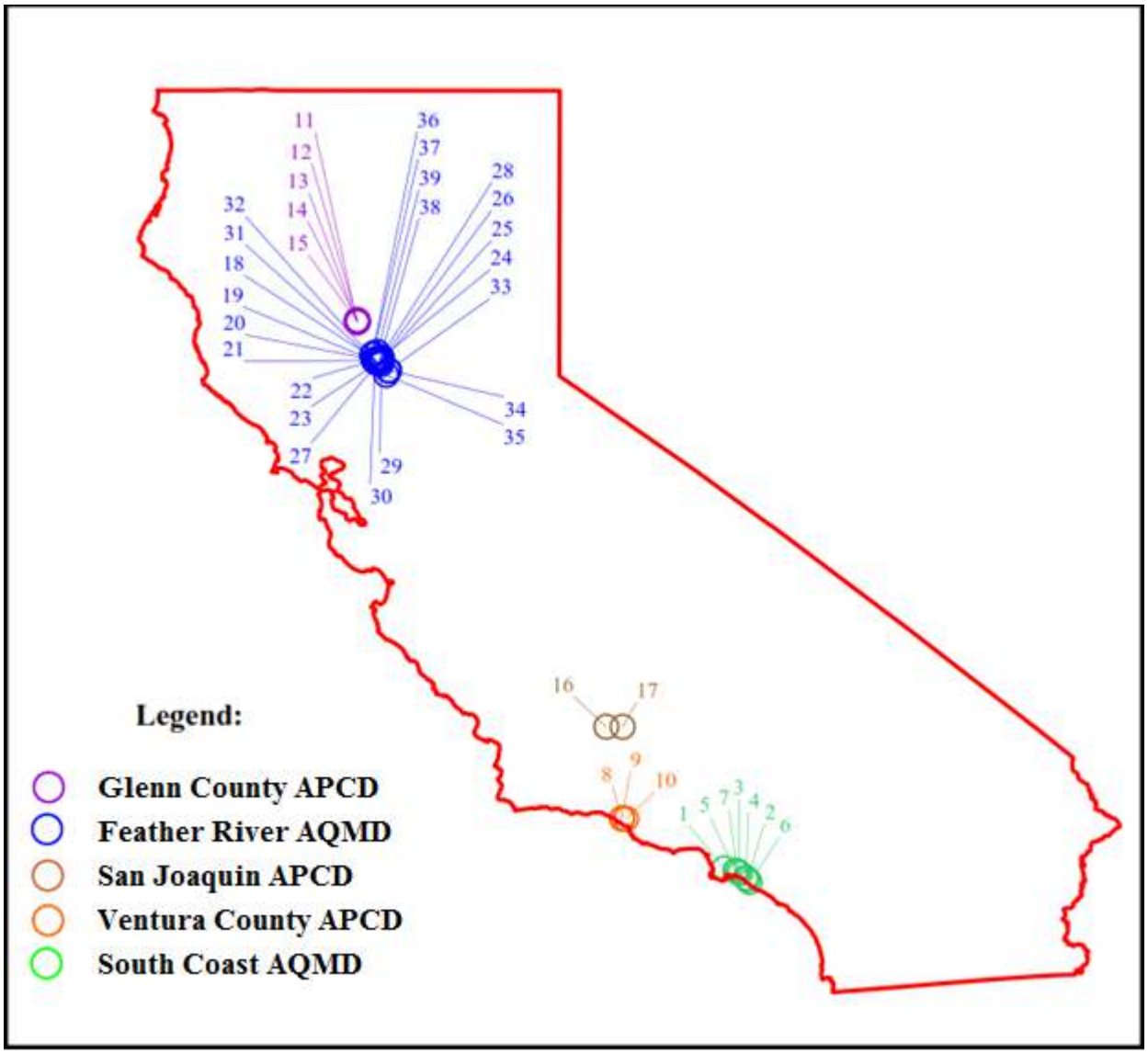
Appendices There are eight (8) appendices to this report:

- Appendix A provides the raw data and calculations;
- Appendix B provides graphs of the correlations between mass emission rates and leak concentrations for the component types tested;
- Appendix C provides an example calculation of the Bias Correction Factor for flanges in gas service;
- Appendix D provides explanatory notes;
- Appendix E reports average emission rates for the components in liquid service that were tested;
- Appendix F provides the results for the pneumatic device tests;
- Appendix G reproduces the project sample log book; and
- Appendix H provides the analytical results from the project's laboratory.

SECTION 2
THE DEVELOPMENT OF FUGITIVE EMISSION CORRELATIONS FOR NATURAL GAS PRODUCTION FACILITIES IN CALIFORNIA

A field study was conducted at thirty-nine (39) gas production facilities in California, located as shown in Figure 2-1.

Figure 2-1
Testing Locations



The purpose of the field study was to measure mass emissions of total hydrocarbons reported as methane from leaking components in natural gas service and correlate them with EPA Method 21 screening values. Originally the study was to include natural gas components in both liquid and gas phases. However, at the beginning of Phase II, the focus was restricted to natural gas components in gas service only. Emission results for the limited set of liquid service components tested are provided in Appendix E. The study was conducted in three (3) phases:

1. Phase I: January 20 to January 30 at sites within the South Coast Air Quality Management District and the Ventura County Air Pollution Control District;
2. Phase II: February 23 to March 3, 2015 at sites within the Glenn County and San Joaquin Valley Air Pollution Control Districts; *and*
3. Phase III: August 6 to August 14, 2015 at sites within the Feather River Air Quality Management District.

Emission testing was conducted at natural gas production facilities on valves, flanges, connectors, open-ended lines (OELs), and a diverse "catch-all" group of "Other" component types. The "Other" group, included gas regulators, pressure gauges, pressure relief devices (PRD), flow and pressure meter fittings, pneumatic devices, compressor vents, temperature controllers, and inactive flare pilots. Pumps were not tested since the study focused only on equipment in gas service. For each component tested, the following data was collected:

- Facility information (name, address, latitude/longitude, etc.);
- Sampling event information (date, time, weather, temperature pressure, percent relative humidity, barometric pressure, site photos, etc.);
- Method 21 equipment leak concentration reading, reported as methane, in parts per million by volume (ppmv); *and*
- The percent methane concentration, the sampled flow rate, and the calculated methane emission rate as reported by the Hi Flow Sampler.

2.1 Sampling Methodology

Equipment leaks were identified by EPA Method 21 using the Thermo Scientific Toxic Vapor Analyzer (TVA). The TVA uses a flame ionization detector (FID) to detect hydrocarbon leaks between 1 and 50,000 ppm. A calibrated dilution probe was used when it was necessary to extend the instrument range above 50,000 ppm[1]. A FLIR GF-320 infrared (IR) camera was also used to survey all equipment for large leaks (i.e. leaks > 10,000 ppm). All leaks identified with the IR Camera were photo and video documented. Figures 2-2 and 2-3 show both instruments being used for leak detection during a typical natural gas well pad survey.

[1] Since the dilution probe's response can be easily changed just through regular handling, frequent verification checks of the dilution ratio were performed.

Figure 2-2
Performing Method 21

Figure 2-3
IR Camera Imaging

Mass emission testing was conducted on matrix-defined components using the Bacharach Hi Flow Sampler®. The Hi Flow Sampler is a portable, intrinsically safe instrument designed to measure the rate of gas leakage from various pipe fittings, valve packings and compressor seals in use at natural gas production facilities. Because of its high flow rate (8 to 10 standard cubic feet per minute) the Hi Flow Sampler is able in most cases to completely capture any gas leaking from a component. The mass emission rate of the gas leak is determined by the sampled flow rate and its methane concentration.

To make an emission measurement with the Hi Flow Sampler, an attachment is chosen that is suitable for enclosing the entire leak area. An assortment of attachments is provided with the instrument to enable testing of a wide variety of components. With one end of the attachment enclosing the emission source and the other end attached to the main sampling hose, the Hi Flow Sampler is switched on and sampling initiated using the menu options available through the unit's controller. An entire Hi Flow Sampler test run lasts approximately 3 to 5 minutes. Table 2-1 provides technical specifications for the Hi Flow Sampler. Figure 2-4 illustrates a Hi Flow Sampler test being conducted on a leaking compressor component.

Table 2-1
Hi Flow Sampler Technical Specifications

Specification	Description	
Information Displayed	• Date and Time • Battery voltage • Leak rate in cfm • Sampling flow rate in cfm	• Leak concentration in ppm or volume % • Background gas concentration in ppm or volume % • Percent difference between leak rate measurements #1 & #2
Display	8 line by 20-character LCD	
Communication	Three DB9 connectors providing serial data transfer 115,200 baud	
Measured Values	• Sampling flow rate • Battery voltage	• Sample gas concentration • Background gas concentration
Calculated Values	• Leak concentration corrected for background gas level • Leak rate • Percent difference between leak rate measurements #1 and #2	
Measurable Leak Rate	• 0.05 to 8.00 SCFM (1.42 to 226 LPM) • 0.05 to 6.00 SCFM (1.42 to 170 LPM)	
Sampling Flow Rate	• Maximum • Operating Flow Points • Measurement Method • Accuracy	• 10.5 SCFM (297 LPM) at full battery charge • Initial flow ~10 SCFM (283 LPM). Second flow ~8 SCFM (226 LPM). • Differential pressure across restriction • ±5% of reading
Natural Gas Sensor	• Detection Method • Range: Catalytic oxidation • Range: Thermal conductivity • Accuracy	• Catalytic oxidation/Thermal conductivity • 0 to 5% by volume methane • 5 to 100% by volume methane • ±5% of reading or 0.02% methane, whichever is greater
Battery	• Voltage …..4.8 V, max. • Recharge Time ….8 to 10 hrs.	• Type…Intrinsically safe NiMH rechargeable pack • Run Time…>4.5 hours continuous @ 20 deg. C.
Memory	Stores up to 1,000 test parameters	
Weight	20 lbs. (9.1 kg)	
Intrinsic Safety	Intrinsically safe for use in Class I, Div. 1, Groups A, B, C, & D areas in North America	

Figure 2-4
Emission Testing with the
Hi Flow Sampler

The Hi Flow Sampler has two on-board detectors, both calibrated to methane -- a Catalytic Oxidation Detector with a measurement range from 0% - 5% and a Thermal Conductivity Detector with a measurement range from 5% to 100%. The instrument automatically switches from one to the other depending on the sample concentration.

The Hi Flow Sampler was operated in its Automatic 2-Stage Mode for all emission tests. In this mode, a leak rate measurement is made first at a high flow rate setting for one minute, and then at a lower flow rate for a second minute of additional sampling. The unit calculates the degree of comparison between two measurements and displays their total sample flow rates in cubic feet per minute (CFM). The leak concentration is displayed as percent methane and the leak's methane emission rate as the percent of the sample flow rate (% CFM). If the two leak rates are within 10% of each other, then it is assumed that all the emitted gas was captured by the Hi Flow Sampler[2].

If the two leak rates differed by more than 10%, the Hi Flow attachment would be re-positioned and the test repeated until successful agreement was achieved or it was determined after several tries, that it could not be achieved. In the latter instance, the test was ended and the final results documented. In the subsequent calculation of emissions, the two results from each Hi Flow Samper test were averaged, except when they differed by more than 10%. In those cases, the higher of the two Hi Flow measurements was used.

A 2014 study has indicated that the Hi Flow Sampler is susceptible to underestimating natural gas emission rates due to a detector switching failure[3]. This failure was observed when calibration was more than two weeks old, firmware was out of date, and when the composition of natural gas was less than 91% methane. To avoid any possible misreading from the Hi Flow Sampler in this study, calibrations were performed daily. In addition, the firmware was up to

[2] Bacharach, Inc. (2015). *Hi Flow® Sampler for Natural Gas Leak Rate Measurement*. Rev. 7. Heath Consultants.
[3] Journal of the Air & Waste Management Association. *Sensor transition failure in the high flow sampler: Implications for methane emission inventories of natural gas infrastructure.* Volume 65, 2015 – Issue 7.

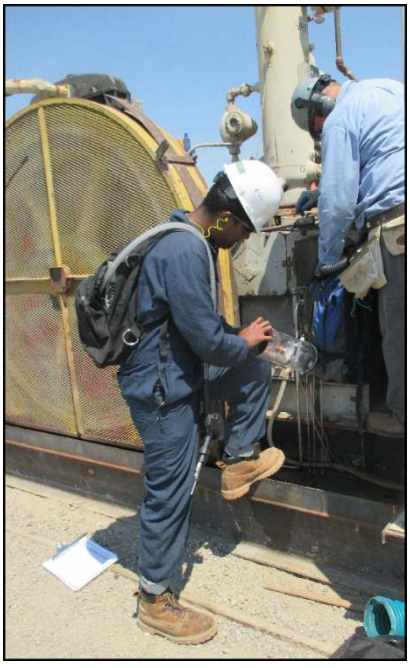
date, and the components tested were at gas processing plants and non-associated gas wells, both of which typically handle natural gas having a methane composition above 90%.

A characteristic of the Hi Flow Sampler is that it only displays leak concentrations in percentages. For example, if the sample stream contains less than one percent (1%) methane, then zero (0) % readings are displayed on the Hi Flow Sampler's controller. In such instances, the TVA was used to record the methane concentration in ppm at the Sampler's exhaust port. The resulting TVA concentration was then converted to a percentage[4] and used to calculate the % CFM emission rate. Figure 2-5 shows an example of the TVA being used to measure Hi Flow Sampler emission concentrations.

Samples for laboratory analysis were collected in pairs from a subset of the monitored components. In Phase I, the sample pairs consisted of a canister sample for EPA Method TO-15 analysis and a 0.7-liter Tedlar® bag sample for ASTM 1945/3588 analysis. In Phases II and III samples for both analyses were collected in 0.7-liter Tedlar® bags only. The EPA Method TO-15 analysis tested for sixty-six (66) toxic organic compounds. The ASTM 1945/3588 analysis tested for oxygen (O_2), nitrogen (N_2), carbon monoxide (CO), carbon dioxide (CO_2), methane (CH_4), ethane (C_2H_6) and other selected light-end Volatile Organic Compounds (VOCs).

Figure 2-5
Using the TVA to Measure Sample Concentrations < 1%

Figure 2-6
Sample Collection with the Vac-U-Tube Sampler



Samples were collected at the exhaust port of the Hi Flow Sampler. For the canisters, which were under a vacuum, sample collection was accomplished by positioning the canister inlet line well

[4] Using the equivalency of 10,000 ppm = 1%.

within the Hi Flow Sampler's exhaust stream, turning on the canister valve and metering the flow so that it did not exceed the Hi Flow Sampler's exhaust flow.

Tedlar bag samples were collected using a Vac-U-Tube® sampler. The Tedlar® bag was first attached inside the Vac-U-Tube. The inlet of the Vac-U-Tube was then positioned within the Hi Flow Sampler's exhaust stream and the bag filled and emptied by alternately pulling and pushing on the Vac-U-Tube's plunger. This flushing action was repeated three (3) times prior to sample collection. An example of a Tedlar® bag sample collection is provided in Figure 2-6.

Samples together with Chain-of-Custody (COC) documentation were shipped on the same day of collection by overnight express to Oilfield Environmental and Compliance, Inc. (OEC) in Santa Maria, California for analysis.

2.2 Direct Emission Calculations, Using Hi Flow Sampler Data

Emissions, as methane, from natural gas production facility component leaks were calculated according to the following steps:

1. The Hi Flow Sampler results were converted from percent concentration by volume to mg/m^3 using Equation 5-1:

$$C = \frac{MW}{24.45} \times (Leak\ \% - Bkg\ \%) \times 10{,}000 \frac{ppmv}{\%vol}$$

Where:

C	=	Concentration in mg/m^3
MW	=	Molecular weight of analyte, CH_4 MW = 16.04 g/mol
24.45	=	Molar volume in L/mol at 25°C (536.67°R) and 1 atm (29.92 inHg)
Leak %	=	Percent organics concentration by volume, of the leak, calibrated as CH_4
Bkg %	=	Percent concentration by volume of the background gas
10,000	=	ppm in 1%

2. Equation 5-2 was used to standardize the Hi Flow Sample gas flow rate[5,6]:

$$CFM_{std} = (CFM_{act}) \left(\frac{T_{std}}{T_{act}}\right) \left(\frac{P_{act}}{P_{std}}\right)$$

Where:

CFM_{std}	=	Standardized volumetric flow rate (ft^3/min)
CFM_{act}	=	Actual volumetric flow rate (ft^3/min)
T_{std}	=	Absolute gas temperature at standard conditions (298.15 K)
T_{act}	=	Absolute gas temperature at actual conditions (K)
P_{act}	=	Absolute barometric pressure at actual conditions (inHg)

[5] Per an email communication from the vendor of the Hi Flow Sampler, the sampler automatically corrects the ambient sample volume from ambient to Standard Temperature, 20 °C, but does not correct for pressure. Therefore, in the calculations, the general temperature correction term (T_{std} /T_{act}) noted above, is replaced with the correction factor (298.15 K / 293.15) in the spreadsheet calculations.

[6] Standard temperature defined as 25°C per EPA "National Primary and Secondary Ambient Air Quality Standards", 40 CFR—Protection of the Environment, Chapter I, Part 50, Section 50.3, 1998. Since the Hi Flow Sampler uses 20°C for standard temperature, its flow data has been corrected to 25°C.

P_{std} = Absolute gas pressure at standard conditions (29.92 inHg)

3. The emission rate of methane was calculated using Equation 5-3:

$$ER = C \times CFM_{std} \times \frac{CF}{2.205}$$

Where:

ER = Emission rate (kg/hr)
C = Analyte concentration (mg/m^3)
CFM_{std} = Standardized volumetric flow rate (ft^3/min)
CF = Conversion factor = 3.75E-06 [(1 m^3/35.32147 ft^3) × 60 min/hr × (1 lb/453592.37 mg)]
2.205 = pounds per kilogram

4. These three equations were combined to form Equation 5-4, which finds the emission rate in kilograms/hour.[7]

$$ER = \frac{MW}{24.45} \times (Leak\ \% - Bkg\ \%) \times 10{,}000\ ppmv/\%vol \times (CFM_{act}) \left(\frac{T_{std}}{T_{act}}\right) \left(\frac{P_{act}}{P_{std}}\right) \times \frac{3.75E\text{-}06}{2.205}$$

2.3 Development of Emissions Correlations by Component Type

The selection of components for emission testing was guided by the unit specific EPA Correlation Approach as described in *Protocol for Equipment Leak Emission Estimates*[8] (*Protocol*). For this method, as few as four (4) readings for each of five (5) concentration ranges (0 to < 100 ppm, 100 to < 1,000 ppm, 1,000 to < 10,000 ppm, 10,000 to < 100,000 ppm and > 100,000 ppm) are considered adequate for the purposes of deriving the correlation equations. To provide greater statistical reliability, this project's goal was to obtain at least six (6) datasets for each combination of component type and concentration range. Table 2-2 defines the resulting project sampling matrix.

[7] See previous footnote 4.
[8] *Protocol for Equipment Leak Emission Estimates*, EPA-453/R-95-017, November 1995.

Table 2-2
Project Sample Design for Development of Natural Gas Production Facility-Specific Correlation Equations

Natural Gas Leak Concentration Ranges → / Component Type ↓	0<100 ppm	100<1,000 Ppm	1,000<10,000 ppm	10,000<100,000 ppm	≥100,000 ppm
Valves	6	6	6	6	6
Connectors	6	6	6	6	6
Flanges	6	6	6	6	6
OELs	6	6	6	6	6
Others	6	6	6	6	6
TOTALS	30	30	30	30	30

The field tests resulted in the collection of one hundred and sixty (160) Method 21 screening concentrations with associated mass emission rates. Following the procedures in Appendix B of the *Protocol*, these 160 mass emission rate/screening value data pairs were used to develop correlations specific to the natural gas production facilities that were tested in California.

Appendix B of the *Protocol* describes the use of a $\log_{10}$-$\log_{10}$ space linear regression correlation, using a Scale Bias Correction Factor (SBCF) to develop unit-specific correlations. The steps that were conducted to prepare the emissions correlations were as follows:

1. Obtain the required Method 21 monitoring data and the mass emission rates data.
2. Conduct a least squares regression of Y = the $\log_{10}$ values of the emission rates (kg/hr) versus X = $\log_{10}$ values of the corresponding Method 21 concentration measurements (ppm), to obtain:

   Log_{10} (Leak Rate, kg/hr, as methane) = $\beta_0 + \beta_1$ x Log_{10} (Monitored Leak Concentration, ppmv as methane).
3. This equation is transformed by using the calculated Scale Bias Correction Factor (SCBF), where:

   Leak Rate, kg/hr, as methane = SBCF x 10^{β_0} x (Monitored Leak Concentration, ppmv as methane)$^{\beta_1}$.

4. Note that the EPA Protocol often presents the equation noted in item 3 above, as follows:

   Leak Rate, kg/hr, as methane = C1 x (Monitored Leak Concentration, ppmv as methane)$^{\beta_1}$,

   Where C1 = SBCF x $10^{\beta 0}$.

The SBCF is required to transform the equation in the log-scale back to arithmetic space. The calculation method used to determine the SBCF is provided in Appendix C of the *Protocol*. An

example calculation of the SBCF value for the flanges in gas service from data collected for this study is provided in Appendix C of this report.

2.4 Sample Composition Results

Thirty-five (35) samples were collected for laboratory analysis from components in gas service. From the combined analyte list of eight-four (84) compounds (Method TO-15 analytes + ASTM 1945/3588 analytes), twenty-seven (27) compounds were detected at least once (excluding oxygen, nitrogen, carbon dioxide and Total Petroleum Hydrocarbons). Of these, eleven (11) analytes, identified in Table 2-3 in order of decreasing emission rate, were detected in 10% or more of the samples with methane emission rates exceeding that of the other compounds by more than three (3) orders of magnitude.

Table 2-3
Frequently Occurring Compounds[9]

Analytes, sorted by average emission rate	Analytical Method
Methane	ASTM 1945/3588
Hexane	EPA Method TO-15
Cyclohexane	EPA Method TO-15
Heptane	EPA Method TO-15
Benzene	EPA Method TO-15
Toluene	EPA Method TO-15
Xylenes (total)	EPA Method TO-15
Isopropyl Alcohol	EPA Method TO-15
Ethylbenzene	EPA Method TO-15
Ethanol	EPA Method TO-15
Acetone	EPA Method TO-15

2.5 Study Limitations

While the development of correlation equations followed the approach described in the *Protocol*, the following limitations are to be noted:

1. EPA Protocol mass emission rates were developed from bagging studies which completely isolate each leaking component from the surrounding environment. Carrier flow gas through the bag is measured directly by a calibrated dry gas meter. However, the Hi Flow Sampler assumes total emissions capture due to its high-volume sampling rate. Sample flow is measured indirectly by means of differential pressure across a restriction.
2. The Hi Flow Sampler is designed to measure emissions from components in natural gas service. Since natural gas is primarily methane, the Hi Flow Sampler's sensors are calibrated

[9] Analytes detected in more than 10% of the samples.

to methane[10] and all emission results are therefore reported as methane. EPA and The California Air Pollution Control Officers Association (CAPCOA) emission correlation studies report emissions as total organic compounds (TOC) based upon compound-specific concentrations obtained from gas chromatographic (GC) analysis of emission samples.

3. The EPA unit-specific correlation approach cautions that the correlations must be developed on a process unit basis in order to "…minimize the error associated with differing leak rate characteristics between units" (1995 *EPA Protocol for Equipment Leak Emission Estimates*, 1995 § 2.3.4). The data for the various component-type groups in this study was collected from different facilities situated in the south, central and northern areas of California. Sampling over such a broad geographic region can be expected to introduce some variability into the derived emission correlations.

4. The EPA Protocol states that as few as four (4) leak rate measurements of a particular component type in a particular service are sufficient for developing an emission to screening value correlation. The project goal was to collect at least six (6) measurements per component type-concentration range category (see Table 2-2). All but two of the component type groups, flanges and OELs, met the project sample design goal of six components per Method 21 concentration range for all ranges, and of these only flanges (in the two ranges 10K to <100K and >100K) failed to meet the EPA criterion of four. By combining the connectors and flanges into a single group, compliance with the EPA Protocol guidance of four components per cell is achieved, and only one category (OEL 1K to <10K) has less than the project's target of six (6) tested components per category. Table 2-4 summarizes the completed project test matrix, both with flanges as a separate group and with flanges combined with the connectors. Highlighted cells indicate where the project's sampling target was not achieved.

5. The measurements collected in this study were meant to fill in a matrix in order to develop correlation equations and not for the development of emission factors. As such, they do not account for super-emitters, and once a component's matrix was completed, additional leaks for that component type were disregarded.

[10] The concentration of methane in natural gas typically varies between 87-96 mole percent (Natural Gas Spec Sheet at https://www.naesb.org/pdf2/wgq_bps100605w2.pdf. Revised 11/06/2003).

Table 2-4
Completed Test Matrix

Component Type in Gas Service	EPA Method 21 TVA Reading, ppmv CH_4					
	0 - < 100	100 - < 1K	1K - < 10K	10K - < 100K	>= 100K	Sum
Valves	7	7	6	7	6	33
Connector	6	8	9	6	8	37
Flange	7	6	6	1	2	22
Connectors + Flanges	13	14	15	7	10	59
OEL	9	6	4	7	8	34
Other	6	6	6	8	8	34
TOTAL	35	33	31	29	32	160

2.6 Results

The field tests resulted in a methane-equivalent mass emission rate and corresponding Method 21 screening value associated with each individual component that was measured with the Hi Flow Sampler. This data was first analyzed in log space to relate the logarithm of the screening value to the logarithm of the mass emission rate. The resulting expressions were then transformed to arithmetic space using the slope (β_0), intercept (β_1), and a scale bias correction factor (SCBF) to derive the correlation equations. The SBCF is a correction factor used to account for the variability of the data in the log space. Table 2-5 reports the coefficients from the $\log_{10}$-$\log_{10}$ linear regression correlations results and the calculated Scale Bias Correction values developed in this study (2015 CARB Study).

Table 2-5
2015 CARB Study Gas Service Correlation Model Parameters

Component Type	2015 CARB Study Gas Service Natural Gas Production Sites				
	N	SBCF	β_0	β_1	r^2
Valves	33	8.6458	-5.8151	0.8118	0.609
Connectors	37	3.6238	-5.3682	0.6848	0.635
Flanges	22	17.9752	-3.6886	0.3369	0.185
Connectors & Flanges	59	10.1848	-4.3871	0.4666	0.352
OELs	34	4.4355	-4.7358	0.7157	0.753
Other	34	4.2958	-5.2801	0.7902	0.645

N = Number of Samples
SBCF = Scale Bias Correction Factor, for log10 values
β_0 = Intercept of regression line
β_1 = Slope of regression line
r^2 = Coefficient of determination

Note that in this study's results, with the exception of Flanges, where the regression coefficient (r^2) was equal to 0.185, and the combined group of Connectors and Flanges which had an r^2 value of 0.352, regression coefficient values for the rest of the component types ranged from 0.609 for Valves to 0.753 for OELs. R^2 values > 0.7 are considered an indication of a good correlation, if other regression model assumptions are met. As discussed earlier, the number of flanges in gas service, in the two highest leak concentration ranges of 50,000 to < 100,000 ppmv and >100,000 was below the project goal of six (6) and below the EPA Protocol guidance of four (4), considered to be sufficient to obtain a good correlation. It was hoped that combining the Connectors and Flanges data would provide sufficient counts to obtain a good regression model with a high r^2 regression correlation factor. As indicated in the table above however, the combined data subsets linear regression had an r^2 value of 0.352.

Table 2-6 below presents the regression model equations developed in this study, using the results from Table 2-5. By inputting a Method 21 screening concentration for the SV, the equation calculates the Leak Rate in kilograms/hour (kg/hr) as methane at standard conditions of 25ºC and 1 atmosphere. Results from the corresponding CAPCOA Screening Value Range Emission Factors are provided for comparison.

It is important to note that the 2015 CARB correlation equations and the CAPCOA Screening Value Range Emission Factors were developed using different EPA Protocol methods and are not directly comparable for the following reasons:

- The CAPCOA Screening Value Range Emission Factors method provides a means of estimating mass fugitive emissions by applying an average emission rate to components with screening values below 10,000 ppmv, and a second average emission rate to components with screening values above 10,000 ppmv. A disadvantage of this method is that it assumes that an average leak rate within a screening range can be applied to all leak sizes and facilites.

- The Correlation Equations developed in this 2015 CARB study were derived from the modeling of Method 21 concentrations and their mass emissions rates as measured with the Hi Flow Sampler, using a log-log linear regression model, for each equipment type. Like the CAPCOA Screening Value Range Emission Factors method, the Correlation Equation method requires that all components must be screened with portable analyzers. The difference is that instead of simply counting the components with screening values below 10,000 ppmv and multiplying the number by a Screening Value Range Emission Factor, each individual screening result is documented and emissions are calculated for each component. The Correlation Equation is, therefore, a more refined method of estimating fugitive emissions and more accurately reflects variations in leak frequency and, to some extent, changes in leak size due to changes in equipment and changes in operational procedures.

- The equations in this 2015 CARB study predict methane-equivalent total hydrocarbon emissions for equipment in gas phase at natural gas production facilities (i.e. wells and gas plants) by inputting a screening value (concentration in ppmv) into the equation. *and*

- The CAPCOA Screening Value Range Emission Factors for oil and gas production facilities predict total hydrocarbon emissions based upon sample speciation results and do not distinguish between gas and light liquid phases.

Table 2-6
Derived 2015 CARB Study Equations

Component Type (Gas Service Only)	2015 CARB Study Correlation Equations	1999 CAPCOA Study [4]	
	Correlation[1,2,3]	< 10,000 ppmv	≥ 10,000 ppmv
Valves	Leak Rate (kg/hr) = 1.3236E-05 x SV $^{0.81180}$	3.50E-05	1.39E-01
Connectors	Leak Rate (kg/hr) = 1.5523E-05 x SV $^{0.6848}$	1.20E-05	2.59E-02
Flanges	Leak Rate (kg/hr) = 3.6815E-03 x SV $^{0.3369}$	2.80E-05	5.49E-02
Connectors & Flanges	Leak Rate (kg/hr) = 4.1772E-04 x SV $^{0.4666}$		
OELs	Leak Rate (kg/hr) = 8.1490E-05 x SV $^{0.7157}$	2.40E-05	1.39E-01
Other	Leak Rate (kg/hr) = 2.2542E-05 x SV $^{0.7902}$	1.47E-04	1.38E-01

[1] SV = Method 21 Screening Value in ppmv
[2] These correlations predict methane-equivalent Total Organic Compound (TOC) emission rates.
[3] The correlation equations are presented in the form $y = C1 \times SV^{b1}$,
Where Y = mass emission rate TOC as methane in kilograms/hour
C1 = Scale Bias Correction Factor (SBCF) x 10^{b0}
SV = Screening Value in ppm TOC as methane
β^0 and β^1 are the slope and intercept of the log10-log10 linear regression line.
[4] CARB-CAPCOA. California Implementation Guidelines for Estimating Mass Emissions of Fugitive Hydrocarbon Leaks at Petroleum Facilities, Table IV-2c., "CAPCOA Oil and Gas Production Screening Value Range Emission Factors, February 1999.

The resulting correlation plots for the different component types are provided in the following figures.

Figure 2-7 Correlation Plot for Valves in Gas Service

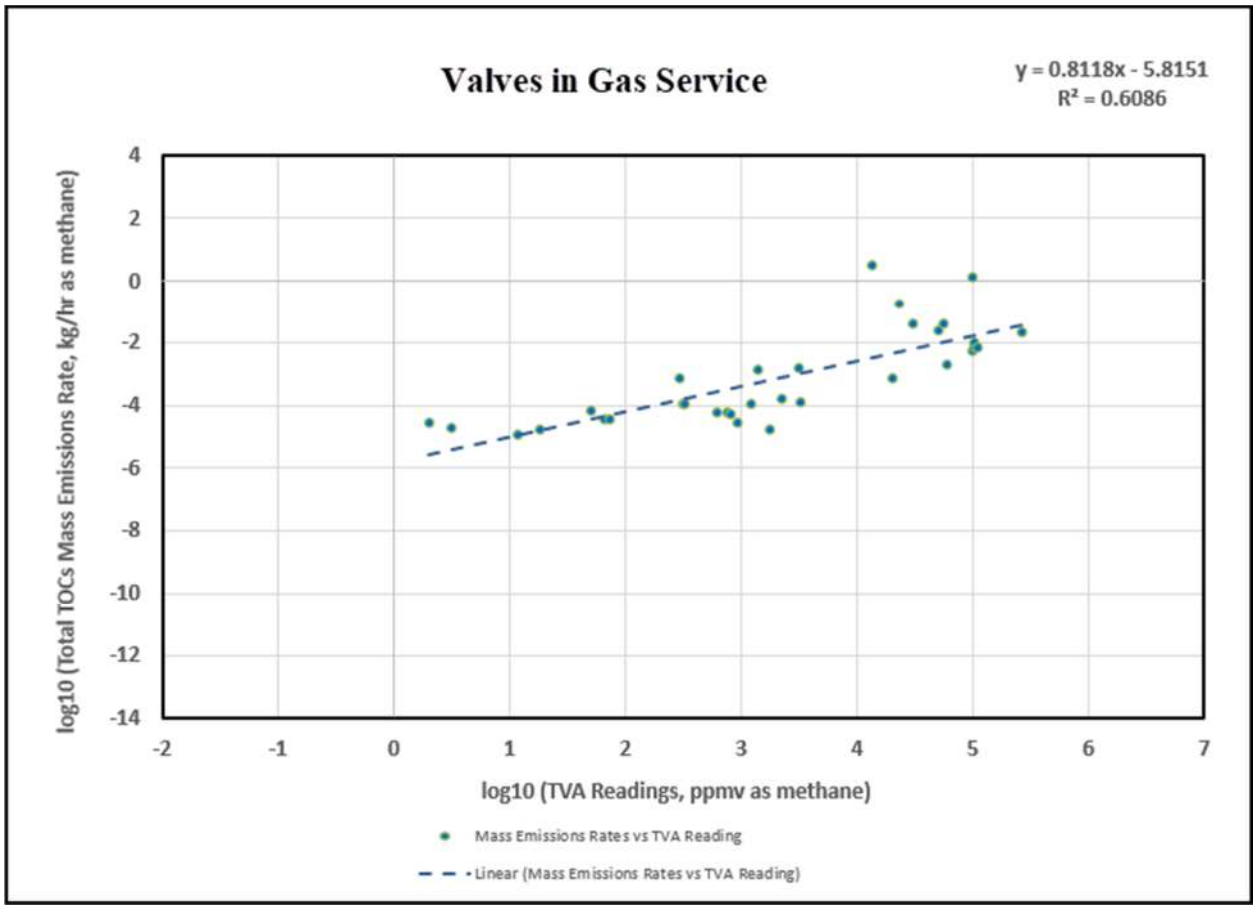


Figure 2-8 Correlation Plot for Connectors in Gas Service

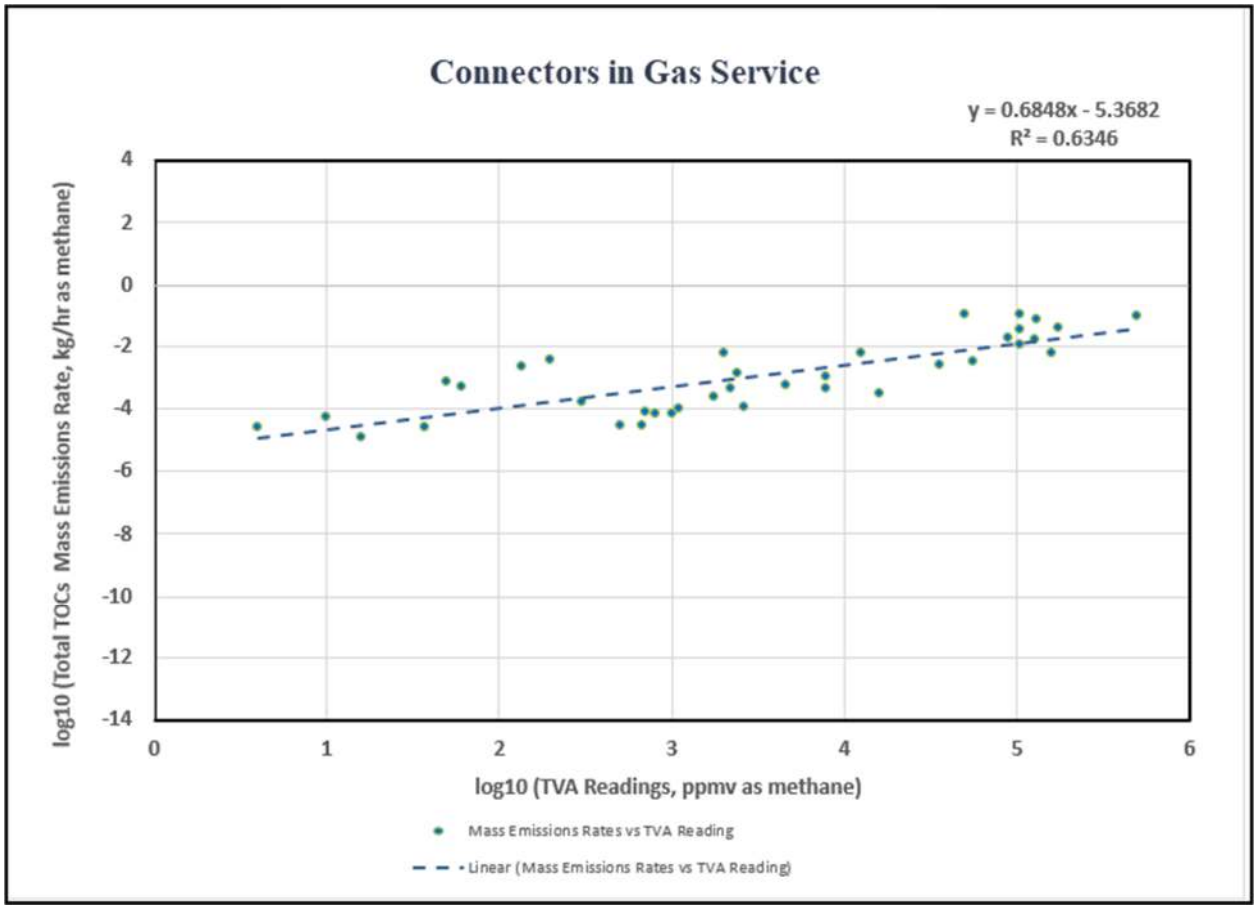


Figure 2-9 Correlation Plot for Flanges in Gas Service

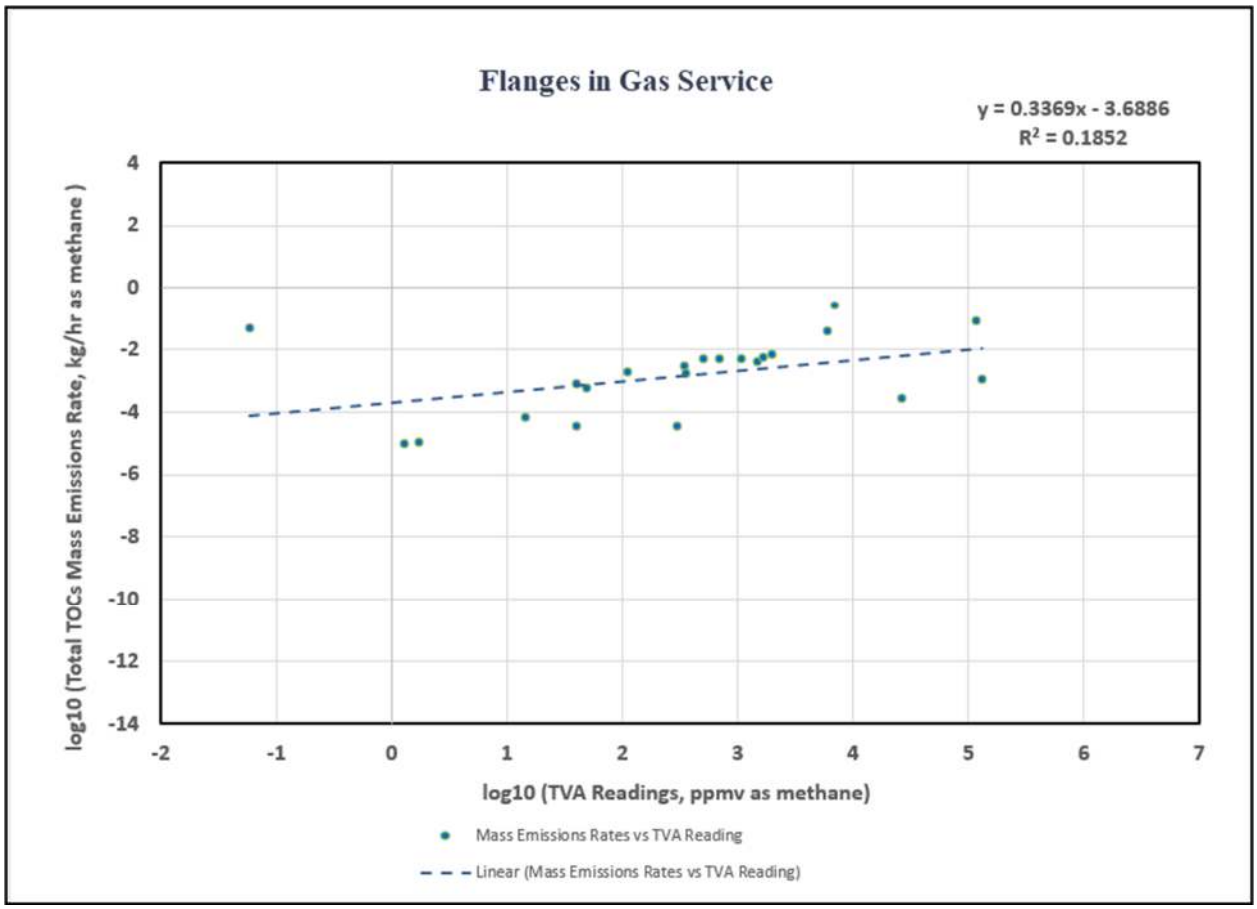


Figure 2-10 Correlation Plot for Connectors & Flanges in Gas Service

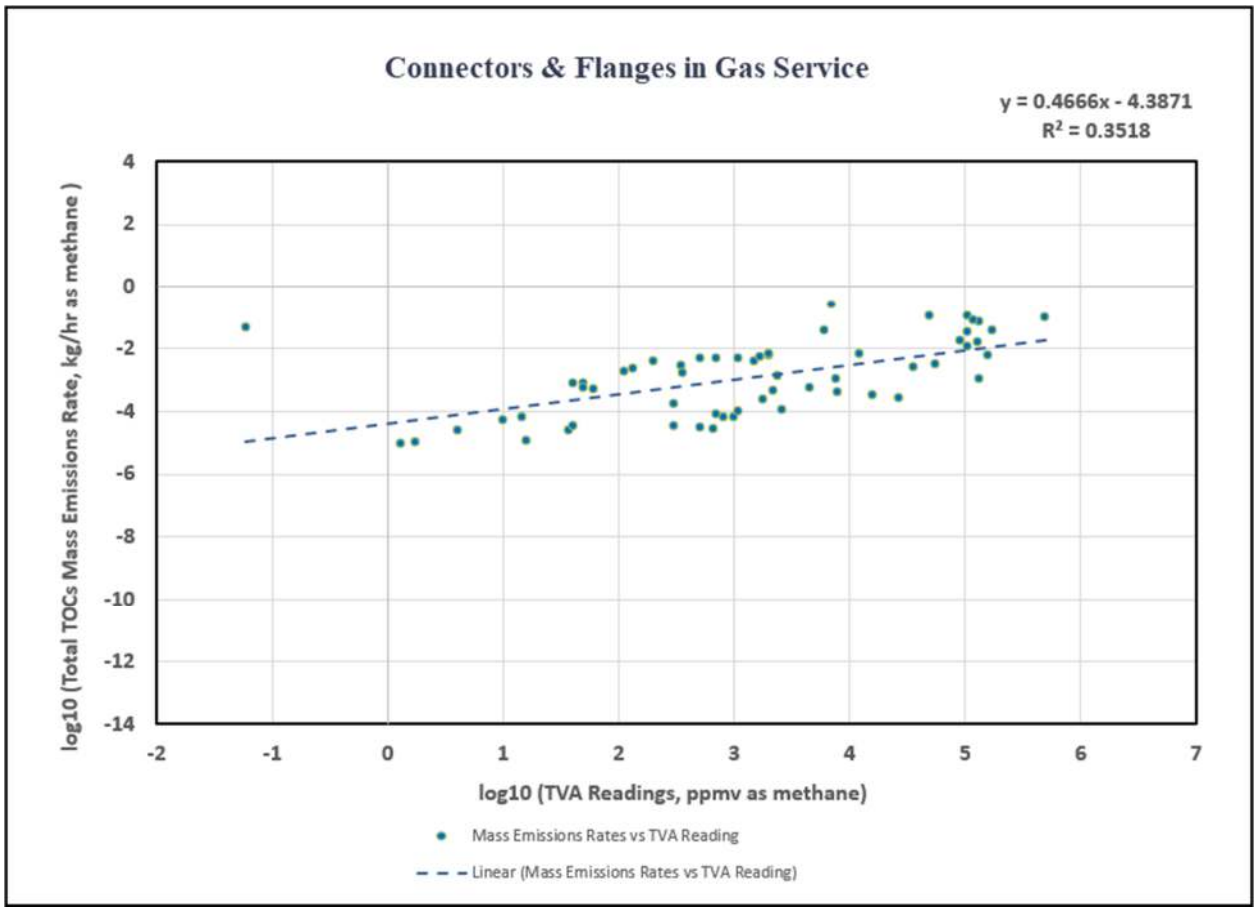


Figure 2-11 Correlation Plot for OELs in Gas Service

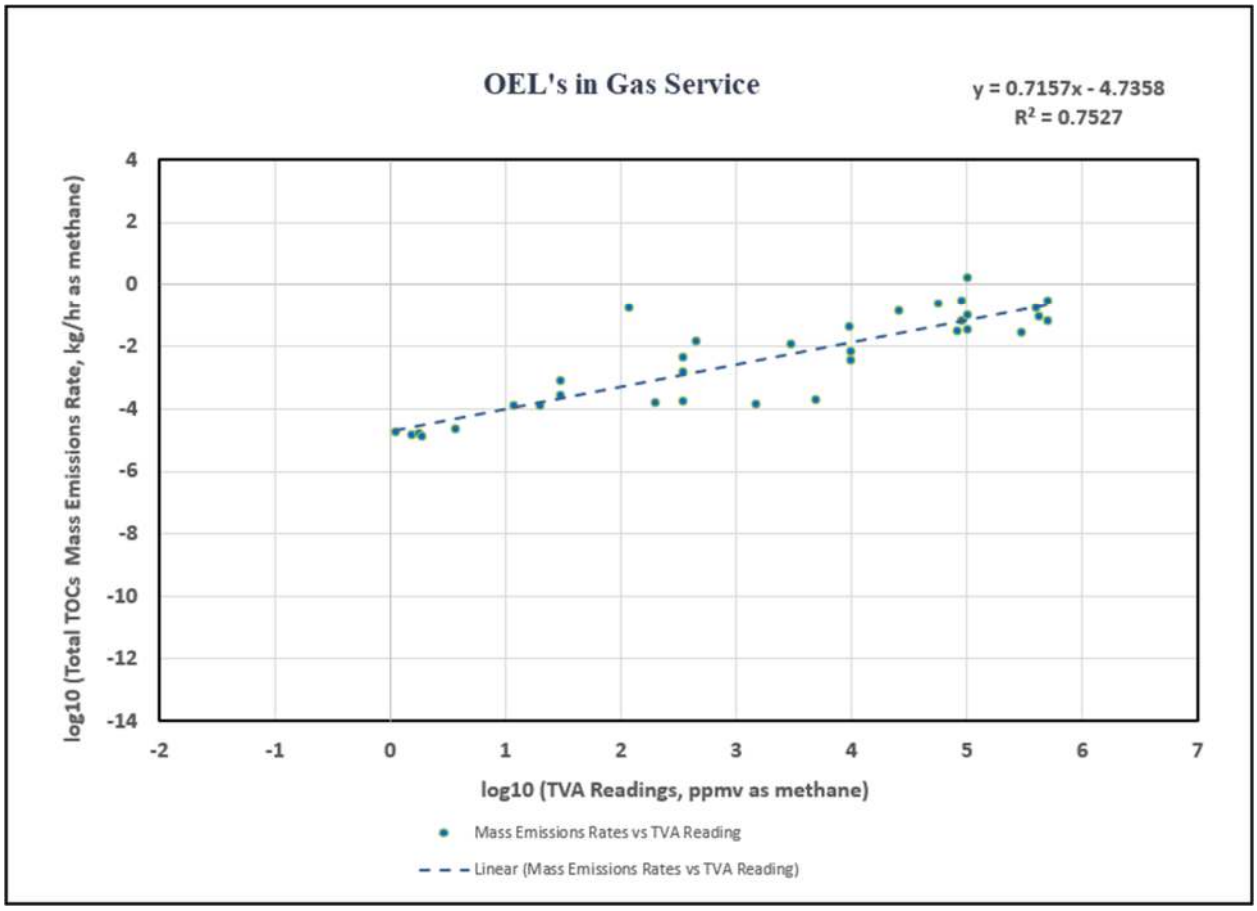
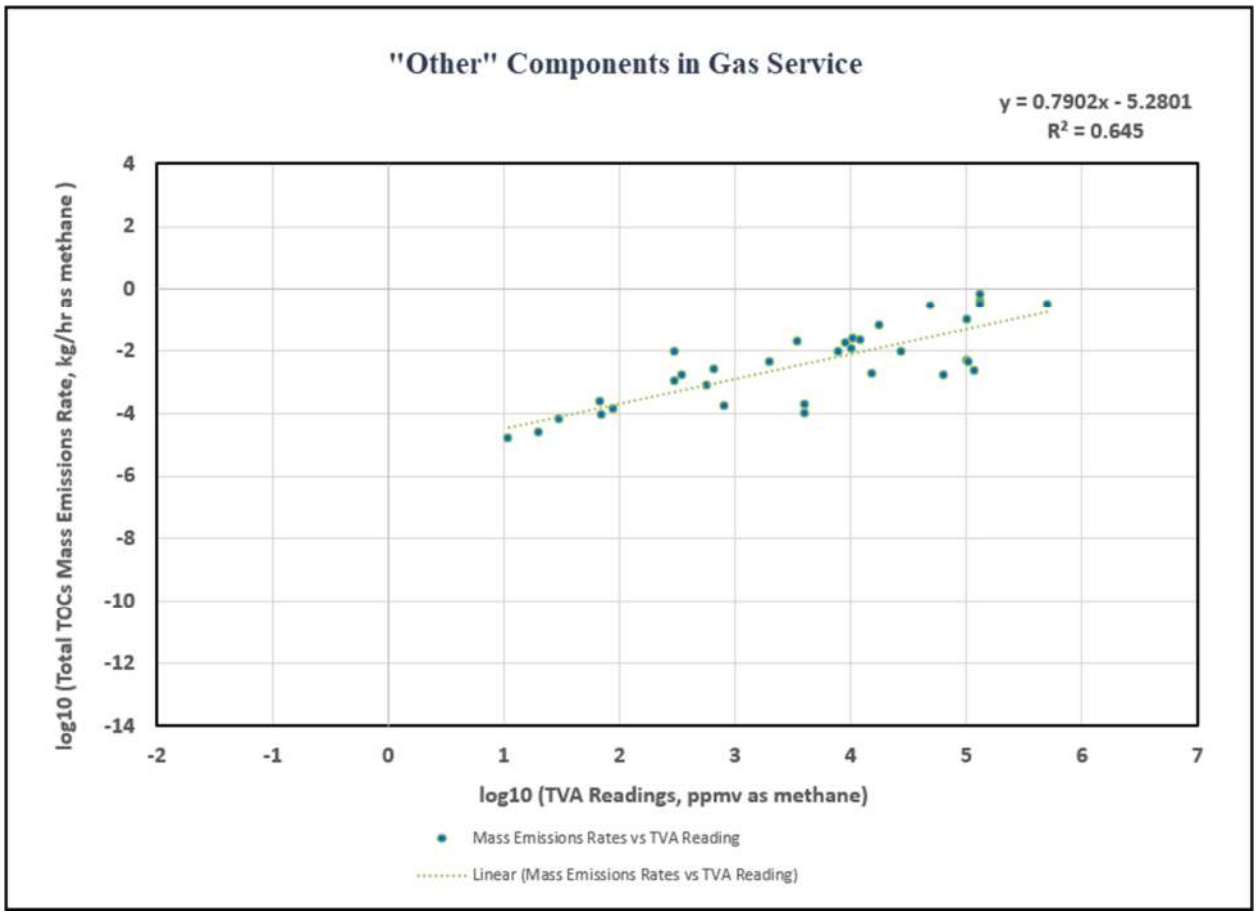


Figure 2-12 Correlation Plot for "Other" Components in Gas Service



The accompanying appendices to this report provide supporting information:

- Appendix A: Field and Lab Data Results and Calculations
- Appendix B: Correlation Plots of Mass Emission Rates vs. Leaking Equipment Concentrations
    - Correlation Plot for Gas Valves;
    - Correlation Plot for Connectors;
    - Correlation Plot for Flanges;
    - Correlation Plot for Connectors & Flanges;
    - Correlation Plot for OELs; *and*
    - Correlation Plot for "Other" Components.
- Appendix C:
    - An Example Calculation of Mean Square Error Used to Calculate the Scale Bias Correction Factor for Flanges in Gas Service
    - An Example Calculation of the Scale Bias Correction Factor for Flanges in Gas Service
- Appendix D: Notes to Updated Calculations 08/20/2019.

SECTION 3
INSTRUMENT EVALUATIONS

3.1 Introduction

As stated in Section I. Purpose/Background/Scope of Work of RFP No. 13-414, an objective of this project was to "…evaluate the effectiveness of various instruments and techniques at detecting and measuring greenhouse gases (GHGs) and volatile organic compounds (VOCs)" at upstream oil and gas facilities for the purpose of determining "…the feasibility of integrating GHG and VOC measurements into a single Inspection and Maintenance (I&M) program that could serve as the basis for new leak standards." This section reports the results of field evaluations conducted at natural gas production facilities using six commercially available instruments designed to detect GHG and VOC contributing emissions from equipment leaks. While there are several Greenhouse Gases, this study focused specifically on the detection of methane from fugitive emissions. The six instruments used in the field evaluations were:

- Thermo Scientific TVA 1000B;
- RKI Eagle;
- Heath Consultant's Remote Methane Leak Detector (RMLD);
- COSMOS XP-3160;
- FLIR GF-320 Infrared Camera; *and*
- Picarro Surveyor.

3.2 TVA 1000B

The Thermo Scientific TVA 1000B is an intrinsically safe, organic vapor analyzer popularly used by refinery, chemical and petrochemical facilities in their Leak Detection and Repair (LDAR) programs. LDAR programs are government mandated programs designed to control fugitive emissions from equipment leaks. The TVA uses a Flame Ionization Detector (FID) which responds to a broad variety of hydrocarbons over a wide concentration range (0-50,000 ppm). The analyzer is portable, most often carried in a small backpack or by a shoulder strap and comes with a handheld probe which displays concentration results in either parts per million (ppm) or percentage (%). The FID is fueled by hydrogen gas from an on-board cylinder which holds sufficient hydrogen for one day of continuous operation. Analyzer specifications are provided in Table 3-1.

Table 3-1
TVA-1000B Toxic Vapor Analyzer Specifications

Description	Specification
Safety Certification	FM (Class 1, Div. 1. Groups A B C & D Hazardous Location. Temp. Class T4
Detection Principle	Flame Ionization Detector
Data logging	Onboard
Probe Display	Bar graph & 4-digit LCD
Range	0.5-50,000 ppm methane
Sample Flow Rate	1 liter/minute
Response Time	4 seconds
Power	Rechargeable NiCad battery
Fuel	99.99% hydrogen
Operating Time	8 hours
Repeatability	±2%
Accuracy	25% of reading or 2.5 ppm, whichever is greater

3.3 RKI Eagle

The RKI Eagle Model 1 is an intrinsically safe, portable gas detector manufactured by RKI Instruments. It uses catalytic combustion, electrochemical cell, galvanic cell, and infrared sensors to detect LEL, Oxygen (O_2), Hydrogen Sulfide (H_2S), Carbon Monoxide (CO) and Methane (CH_4) and other hydrocarbons. Since it does not have an FID, hydrogen gas is not required for its operation. The Eagle is typically used for health and safety purposes, such as for confined space entry, worker exposure surveys, and pipeline leak monitoring and also can be used to conduct fugitive emissions testing according to Method 21 specifications. It is used frequently at natural gas facilities but infrequently in refinery, chemical, or petrochemical LDAR programs. Instrument specifications for the RKI Eagle Model 1 are provided in Table 3-2.

Table 3-2
RKI Eagle Model 1Specifications

Parameter	VOC
Safety Certification	CSA and CE approved; Intrinsically safe, Class I, Groups A, B, C, D
Data logging	Optional feature for up to 4 gases
Range	0 to 50,000 ppm
Display	4 x 20 LCD readout with backlighting
Sample Flow Rate	Approximately 2 SCFH
Response Time	30 seconds
Power	4 Size D batteries (alkaline or Ni-Cad)
Fuel	Not Applicable – solid state sensors
Operating Time	30 hours (alkaline batteries)/18 hours (Ni-Cad)
Detection Principle	Catalytic Oxidation
Accuracy	± 0.5 ppm

3.4 RMLD

The Remote Methane Leak Detector (RMLD) is a methane emission detection device manufactured by Heath Consultants. It detects emissions using Tunable Diode Laser Absorption Spectroscopy (TDLAS) with a detection range between 1 to 99,999 parts per million – meter (ppm-m). The RMLD is able to survey for gas emissions from distances as far as 100 feet or 30 meters allowing remote detection of difficult to access places. A reflective background is necessary since the instrument depends upon the reflection of a transmitted laser beam to determine methane concentrations. The RMLD, although it has an intrinsic safety rating, does not meet Method 21 analyzer requirements. Instrument specifications are provided in Table 3-3.

Table 3-3
RMLD Analyzer Specifications

Parameter	Specification
Intrinsic Safety	Class 1 Div. 1 Group D, T4
Data logging	External capability
Measurement Range	1-99,999 ppm-m
Display	LCD 0.75-inch
Sample Flow Rate	Not Applicable
Power	Li-Ion Battery
Fuel	Not Applicable
Operating Time	8 hours
Detection Principle	TDLAS
Accuracy	5 ppm-m from 0-50 ft 10 ppm-m from 50-100 ft

3.5 COSMOS XP-3160

The COSMOS XP-3160 is a compact and lightweight portable analyzer capable of detecting various combustible gases in one of two selectable ranges: 0-500 ppm and 0-10,000 ppm. Like the RKI Eagle, the COSMOS XP-3160 uses a catalytic combustion sensor. The COSMOS is Method 21 compatible and is rated intrinsically safe. Instrument specifications are provided in Table 3-4. It is the smallest and lightest of the instruments tested.

Table 3-4
COSMOS XP-3160 Analyzer Specifications

Parameter	Specification
Intrinsic Safety	Exibd II BT3
Detection Principle	Catalytic combustion
Data logging	Onboard Optional logger
Probe Display	Digital
Range	0-5,000 ppm or 0-10,000 ppm
Sample Flow Rate	Not specified
Response Time	Not specified
Power	4 AA manganese batteries
Fuel	Not Applicable – solid state sensor
Operating Time	Up to 20 hours on AA manganese cells or up to 5 hours with optional rechargeable NiCd
Accuracy	±10% Low range; ±5% High range

3.6 FLIR GF-320 Infrared Camera

FLIR's GF-320 IR camera detects hydrocarbon emissions otherwise invisible to the eye by being tuned to a very narrow spectral infrared region. This, in addition to a highly sensitive cryo-cooled detector makes it possible for the camera to detect and make visible hydrocarbon emissions from component leaks. The camera's High Sensitivity Mode enables viewing of even relatively small leaks against stationary backgrounds. The GF-320 has the ability to screen large populations of components for fugitive emissions. IR camera technology has been accepted by EPA as an alternative to Method 21 provided certain conditions are met. Table 3-5 provides key specifications. Table 3-6 indicates the Minimum Detected Leak Rate of the GF-320 for various hydrocarbon gas species, as reported by the camera's manufacturer, FLIR, from a controlled laboratory study.

Table 3-5
FLIR GF320 IR Camera Specifications

Parameter	Specification
Intrinsic Safety	Not intrinsically safe
Detection Principle	IR absorption
Data logging	Image storing capability – removable SD Memory cards
Probe Display	LCD screen for image viewing
Range	2,500 -99,999 ppm

Table 3-5 (Continued)
FLIR GF320 IR Camera Specifications

Parameter	Specification
Sample Flow Rate	Not applicable
Response Time	Not applicable
Power	Rechargeable LiIon battery
Fuel	Not Applicable
Operating Time	3 hours continuous use
Accuracy	Not Applicable

Table 3-6
GF-320 IR Camera Minimum Detected Leak Rate

Compound	Detected Leak Rate[1] (g/hr)	MW (g/mol)	ppmv[2]
1-Pentene	5.60	70.13	1966
Benzene	3.50	78.11	1103
Butane	0.40	58.12	169
Ethane	0.60	30.07	491
Ethanol	0.70	46.07	374
Ethylbenzene	1.50	106.17	348
Ethylene	4.40	28.05	3862
Heptane	1.80	100.21	442
Hexane	1.70	86.18	486
Isoprene	8.10	68.12	2927
Methyl Ethyl Ketone	3.50	72.11	1195
Methane	0.80	16.04	1228
Methanol	3.80	32.04	2920
Methyl Isobutyl Ketone	2.10	100.16	516
Octane	1.20	114.23	259
Pentane	3.00	72.15	1024
Propane	0.40	44.10	223
Propylene	2.90	42.08	1697
Toluene	3.80	92.14	1015
Xylene	1.90	106.16	441

Notes:
[1]Under laboratory conditions as stated on the FLIR webpage, http://www.flir.com/ogi/display/?id=55671. These values were obtained in a wind tunnel with a path length of 30 meters, under well-controlled conditions and are not expected to be consistent with real world results.
[2]All calculations according to Ideal Gas Law pv = nRT
Assumed, Pressure = 101,326 Pa, R = 8.3145 J/mol·K, Temperature = 300 K

3.7 The Picarro Surveyor

The Picarro Surveyor is a mobile emissions monitoring system that surveys for equipment leaks at moderate driving speeds using Cavity Ring-Down Spectroscopy (CRDS). In CRDS a laser beam enters a small cylinder (i.e. cavity) where it is reflected multiple times by three mirrors. The laser is then turned off. In the absence of a light source, the light intensity inside the cavity leaks out to zero in an exponential fashion. The ring-down time needed to reach zero is measured. When a gas that absorbs the laser light is introduced into the cavity the ring-down time is accelerated. The Picarro system compares the ring-down time of the cavity without the gas and with it to produce precise, concentration measurements. System specifications are listed in Table 3-7.

Table 3-7
Picarro Surveyor Specifications

Parameter	Specification
Intrinsic Safety	No
Detection Principle	CRDS
Data logging	Yes
Probe Display	i-Pad or Android Display
Range	Unavailable
Sample Flow Rate	Unavailable
Response Time	Unavailable
Power	Inverted 12 vdc
Fuel	Not Applicable
Operating Time	Continuous
Accuracy	PPB Sensitivity, Precision, and Accuracy

3.8 Instrument Evaluation Results

3.8.1 Methodology

To determine the suitability of the various instruments for detection of VOC emissions from equipment leaks, four instrument evaluations were performed. The first evaluation compared the TVA, RMLD, Eagle, COSMOS, IR Camera and Picarro Surveyor using key performance indicators. The second evaluation employed comparative monitoring to assess the field responses of the three Method 21 compatible instruments – the TVA, COSMOS and Eagle. The third evaluation used comparative monitoring to measure how well the RMLD and the IR Camera compared in detecting large, significant leaks. The fourth evaluation tested the ability of the Picarro Surveyor and the IR Camera to quickly identify significant equipment emissions at four sites.

3.8.2 Evaluation #1: Key Performance Indicators (TVA, RMLD, Eagle, COSMOS, IR Camera, Picarro Surveyor)

The Key Performance Indicators (KPIs) listed in Table 3-8 provide metrics which can be used to evaluate the suitability of each of the tested instruments for VOC monitoring by well pad operations and maintenance staff.

Table 3-8
Analyzer KPIs

Key Performance Parameter	Instrument					Picarro Surveyor
	TVA	RMLD	Eagle	COSMOS	IR Camera	
Meets M21 performance specifications	Yes	No	Yes	Yes	No[1]	No
Weight (lbs)	12	6	5	1	5.3	Not Available
Remote Detection Capability	No	Yes	No	No	Yes	Yes
Auto Self-Test?	Yes	Yes	Yes	Yes	Yes	Yes
Auto-calibration	No[2]	Yes	Yes	Yes	NA[3]	Yes
Detects hydrocarbons other than Methane?	Yes	No	Yes	Yes	Yes	Yes
Requires reflective surface behind component?	No	Yes	No	No	No	No
Able to measure emissions in ppm?	Yes	No[4]	Yes	Yes	No	Yes
Easy to identify specific leak point on the leak interface?	Yes	No	Yes	Yes	Yes	No
Can be calibrated with different concentrations to determine response linearity?	Yes	No	No	Yes	No	Not Applicable
Response Time (seconds, under ideal conditions)	< 4	NA[5]	< 30	< 30	NA[5]	NA[5]
Instrument Cost (approximate, dollars)	$10,000	$20,000	$3,800	$1,500	$85,000	Not Available
Upper Measurement Range (ppm)	50,000[6]	100%	50,000	10,000	100%	100%
Detector Type	FID/PID[7]	TDLAS[8]	Catalytic Combustion	Catalytic Combustion	Passive IR	Cavity Ring-Down Spectroscopy
Detection Limit (ppm, at ideal conditions)	1	5 ppm-m	1	1	≥10,000 ppm[9]	ppb levels
Support gases required (other than for calibration)	Yes[10]	No	No	No	No	No
Battery longevity (hours, under ideal conditions)	10	8	30		3	Not Applicable

Table 3-8 (Continued)
Analyzer KPIs

Key Performance Parameter	Instrument					Picarro Surveyor
	TVA	RMLD	Eagle	COSMOS	IR Camera	
Battery Cost ($)[11]	$609	$389	$10 - $50	$15	$210	Not Applicable
Intrinsic Safety Rating	Yes	Yes	Yes	Yes	No	No
Field Suitable?	Yes	Yes	Yes	Yes	Yes	Yes
Instrument manual- ease of use (Scale 1-5)[12]	3	5	5	3	4	Not Available
Learning Curve (Scale 1-5)	5	2	2	2	5	Not Available

Notes:
[1]The IR Camera is considered an acceptable alternative to Method 21 by EPA and several states.
[2]The TVA requires calibration with one or more methane standards having a certified accuracy of ±2%.
[3]The IR Camera does not require calibration since it does not measure concentration. If used as an alternative to Method 21, it does require a daily instrument check using a known gas emission rate.
[4]The RMLD indicates concentration in ppm-meters.
[5]For the RMLD, Picarro Surveyor and IR camera, detection is near-instantaneous.
[6]500,000 ppm with dilution probe.
[7]Flame Ionization Detector/Photo Ionization Detector.
[8]Tunable Diode Laser Absorption Spectroscopy
[9]Typical for field conditions – lower concentrations are detectable with the camera depending upon operator experience and environmental conditions.
[10]The TVA's FID uses hydrogen gas for fuel.
[11]The TVA, Heath RMLD and IR Camera batteries are internally located and are rechargeable. The cost reflects the approximate costs of replacement. The RKI Eagle can use size D Alkaline or Rechargeable Ni-Cad batteries. The COSMOS uses non-rechargeable alkaline batteries.
[12] 1 = easy; 5 = difficult

3.8.3 Evaluation #2: Method 21 Monitoring (TVA, Eagle, COSMOS)

A comparative monitoring evaluation of the three instruments that meet Method 21 performance criteria – the TVA, Eagle, and COSMOS, was conducted on forty-nine (49) components at a natural gas processing facility. Each component was monitored by each instrument in close succession. The resulting concentrations are reported in Table 3-9 together with the standard deviation (σ) from the mean for each set of results. The results are grouped by concentration.

Table 3-9
Comparative Monitoring Results for Method 21 Compatible Instruments

Leak Range (ppm)	Item #	Component Description	Leak Concentration			
			TVA	RKI Eagle	COSMOS	σ
			(ppm)	(ppm)	(ppm)	(ppm)
0 - 499 ppm	1	Ball Valve	1	0	0	*1*
	2	Ball Valve	1	0	0	*1*
	3	PRV Weep Hole	2	0	0	*1*
	4	Ball Valve	2	0	0	*1*
	5	Connector	5	0	0	*3*
	6	PRV Weep Hole	5	0	0	*3*
	7	Flange	7	0	10	*5*
	8	Connector	7	0	15	*8*
	9	Flange	8	0	10	*5*
	10	Connector	8	5	10	*3*
	11	Connector	10	10	0	*6*
	12	OEL	10	0	0	*6*
	13	Connector	10	0	20	*10*
	14	Connector	11	0	25	*13*
	15	Connector	12	10	20	*5*
	16	Ball Valve	12	5	50	*24*
	17	Flange	13	0	30	*15*
	18	Connector	13	10	20	*5*
	19	Connector	14	10	40	*16*
	20	Connector	14	5	15	*6*
	21	Connector	15	15	30	*9*
	22	Ball Valve	15	5	50	*24*
	23	Connector	20	10	10	*6*
	24	Connector	20	10	30	*10*
	25	Connector	20	15	40	*13*
	26	Connector	20	15	30	*8*
	27	Flange	20	40	70	*25*
	28	PRV Weep Hole	20	10	40	*15*
	29	OEL	20	20	40	*12*
	30	*OEL*	*22*	*10*	*60*	*26*
	31	Connector	23	20	30	*5*
	32	Connector	25	20	30	*5*
	33	Flange	30	25	50	*13*
	34	Flange	35	25	40	*8*
	35	Valve	50	100	40	*32*
	36	Pressure Regulator	150	100	110	*26*
	37	Crack Case Vent	230	200	270	*35*
	38	Control Valve	450	410	710	*163*

Table 3-9 (Continued)
Comparative Monitoring Results for Method 21 Compatible Instruments

Leak Range (ppm)	Item #	Component Description	Leak Concentration			
			TVA	RKI Eagle	COSMOS	σ
			(ppm)	(ppm)	(ppm)	(ppm)
500 - 1,999 ppm	39	Level Controller	1,200	1,200	1,400	*115*
2,000 - 9,999 ppm	40	Connector	3,100	2,390	3,400	*519*
	41	OEL	3,200	3,450	8,900	*3221*
	42	Controller	5,000	5,400	5,800	*400*
	43	Pressure Regulator	6,100	4,900	7,300	*1200*
	44	Connector	6,900	3,400	10,100	*3351*
≥10,000 ppm	45	Level Controller	12,300	12,400	>11,000[1]	*71*
	46	Level Controller	24,000	>50,000[2]	>11,000[1]	--
	47	OEL	30,000	28,000	>11000[1]	*1414*
	48	Gate Valve	>50000[3]	>50,000[2]	>11000[1]	--
	49	Controller	>50000[3]	>50,000[2]	>11000[1]	--

[1]The COSMOS has an upper measurement range of 10,000 ppm.
[2]The RKI Eagle has a VOC upper measurement range of 50,000 ppm.
[3]The TVA has a linear VOC upper measurement range of 50,000 ppm.

Among the thirty-eight (38) components in the 0-499 ppm range, there was near-perfect agreement among the analyzers that these components were below the 500 ppm leak threshold. The one exception was with component #38. Both the TVA and the Eagle registered component #38 as a non-leaker (i.e. below 500 ppm). The COSMOS, however measured 710 ppm for this component which would mandate a 15-day repair deadline under certain federal regulations.

There was only one component with a concentration in the 500-1,999 ppm range, #39, and the three analyzers closely agreed with one another on its leak concentration.

Among the five (5) components with leaks in the 2,000-9,999 ppm range, there was one instance of disagreement. Both the TVA and the Eagle recorded <10,000 ppm for component #44, while the COSMOS measured a concentration slightly above 10,000 ppm identifying it as a leaker subject to a 15-day repair deadline.

There were five (5) components in the >10,000 ppm leak range (#45-#49). Since the COSMOS has an upper range of 10,000 ppm, it consistently read off-scale in this category. The TVA and the Eagle agreed closely on the concentrations of components #45 and #47 and both read off-scale for components #48 and #49. On component #46, however, the TVA recorded a concentration of 24,000 ppm while the Eagle produced an off-scale (>50,000 ppm) reading.

These results suggest that each analyzer is most likely proficient in identifying leaks at various regulatory leak thresholds. It should be noted, however, that the results are only the responses of three individual analyzers on a specific day. A more rigorous evaluation of instrument variance would require multiple studies with perhaps three to six analyzers of each type.

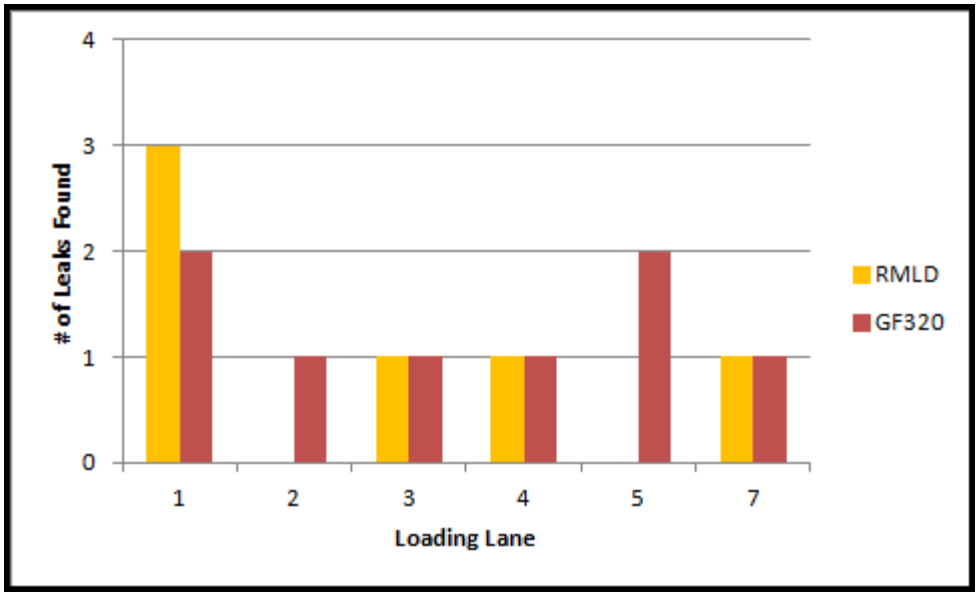
3.8.4 Evaluation #3: Comparative Monitoring (RMLD, IR Camera)

A comparative monitoring study was conducted to evaluate the leak detection abilities of the two remote sensing instruments – the RMLD and IR Camera. The study was conducted on March 3, 2015 at a gas plant truck loading terminal in the Bakersfield area. The RMLD operator and the IR Camera operators worked independently in different lanes surveying all of the components in each lane and documenting whenever a component leak was detected by their instrument. Table 3-10 and Figure 3-1 provide the comparative monitoring results for these two instruments.

Table 3-10
Comparative Monitoring Results: RMLD & IR Camera

Lane	# Leaks Detected by RMLD	# Leaks Detected by IR Camera
1	3	2
2	0	1
3	1	1
4	1	1
5	0	2
6	0	0
7	1	1
8	0	0
TOTALS	**6**	**8**

Figure 3-1
Comparative Monitoring Results: RMLD & IR Camera



The comparative monitoring results indicate generally good agreement between the RMLD and the IR Camera. In the eight truck loading lanes, six (6) leaks were detected with the RMLD while eight (8) were seen with IR camera. A Chi Square test comparing actual number of leaks found with the expected number indicates a 70% probability that the two instruments are equally effective at detecting large VOC leaks.

3.8.5 Evaluation #4: Comparative Monitoring (IR Camera and the Picarro Surveyor)

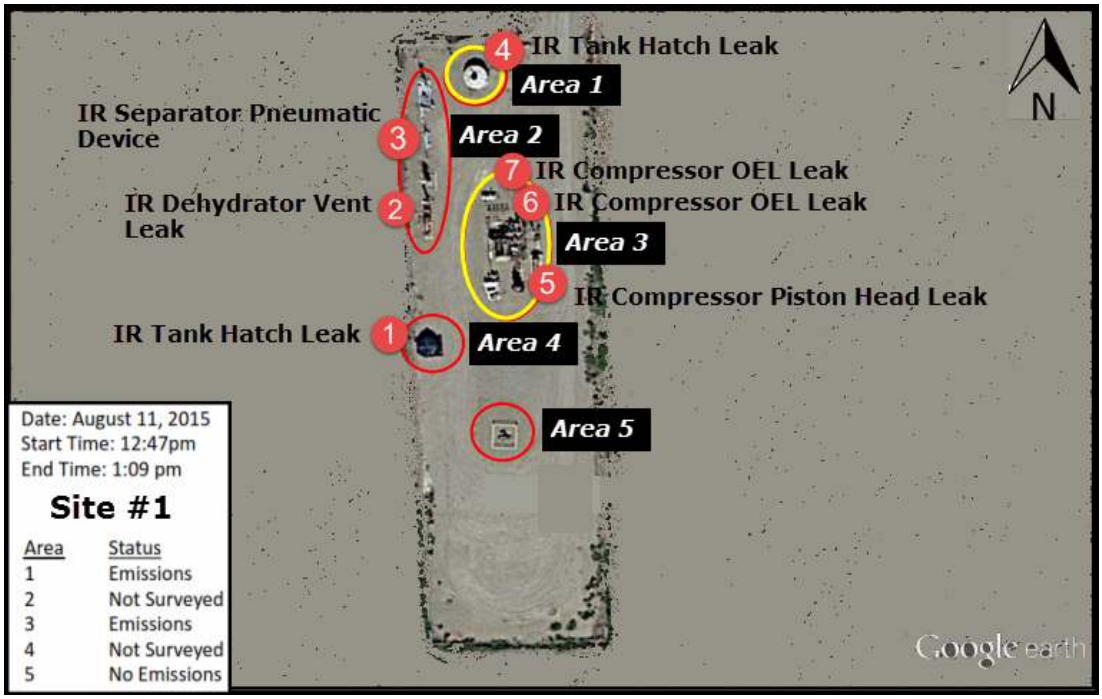
An evaluation of the IR Camera and the Picarro Surveyor was carried out on August 11th, 12th and 13th at four natural gas well sites. The IR Camera operator and the Picarro Surveyor operator conducted VOC monitoring independently and at separate sites with neither informed of the other's results. Table 3-11 reports the number of leak areas identified by the Picarro Surveyor and the number of leaking components seen with the IR Camera for each site. Note that while the IR Camera is able to identify specific leaking components, the Surveyor identifies general leak areas which may contain one or more individual component leaks.

Table 3-11
PICARRO Surveyor & IR Camera

Site	Picarro		IR Camera	
	Test Date	#Leak Areas	Test Date	#Leaks
1	August 11, 2015	3	August 12, 2015	7
2	August 11, 2015	3	August 12, 2015	3
3	August 11, 2015	3	August 12, 2015	4
4	August 11, 2015	3	August 13, 2015	3

Additional survey details are provided in Figures 3-2 to 3-5 and Tables 3-12 to 3-15.

Figure 3-2
Site #1: Picarro Surveyor & IR Camera Results



Site #1 was monitored by the Picarro Surveyor on August 11, 2015 between 12:47 and 13:09. Winds were light and from the north-northwest at the time. The site was divided into five areas with the following results: the Surveyor detected emissions in Areas #1 and #3 (circled in yellow), detected no emissions in Area #5 and was unable to survey downwind of the equipment in Areas #2 and #4.

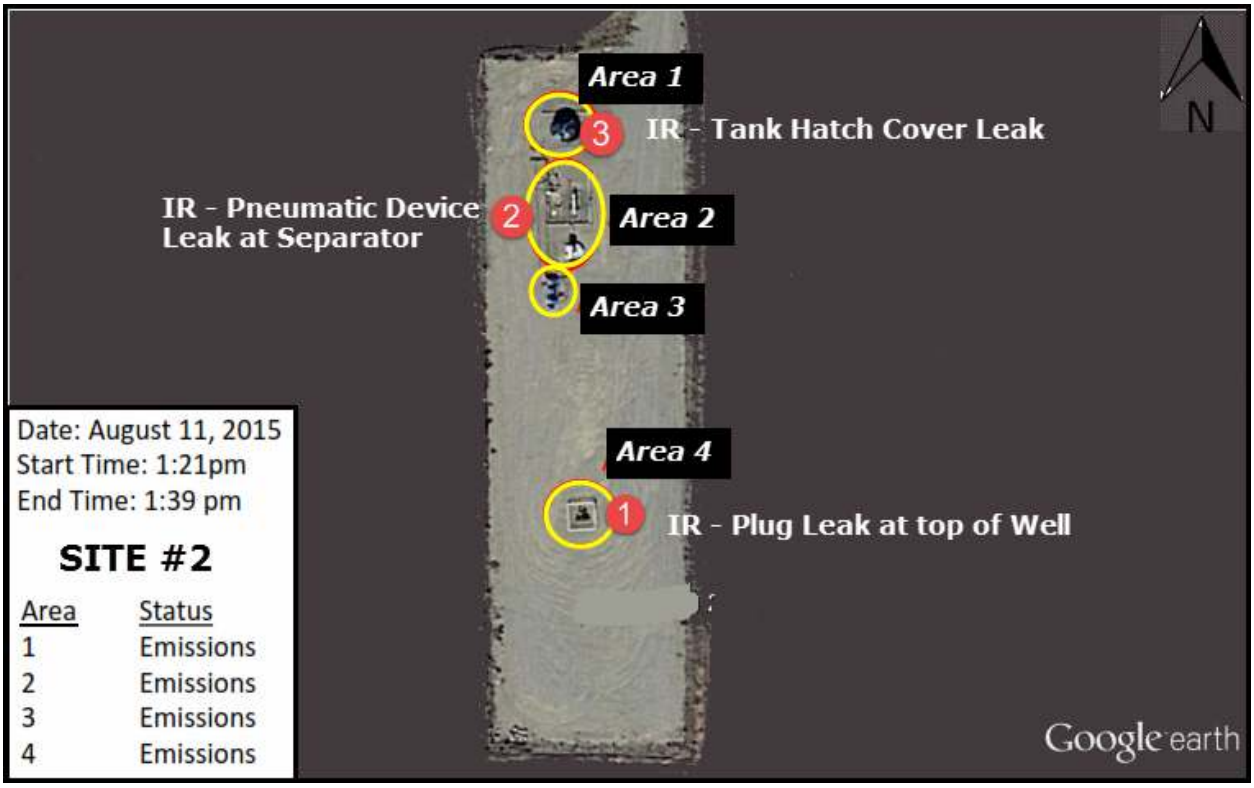
Site #1 was imaged with the IR Camera on the morning of the following day on August 12, 2015, again under low wind conditions. Seven equipment leaks (indicated by numbered red circles) were identified with the IR Camera between 09:21 and 09:40: one from Area #1, two from Area 2, three from Area 3 and one from Area 4. No emissions were detected by the camera in Area 5.

Table 3-12 summarizes the Site #1 area results.

Table 3-12
Site #1 Emissions by Area

Area	Emissions Detected	
	Picarro	IR Camera
1	Yes	Yes
2	No	Yes
3	Yes	Yes
4	No	Yes
5	No	No

Figure 3-3
Site #2: Picarro Surveyor & IR Camera Results



Site #2 was monitored by the Picarro Surveyor on August 11, 2015 between 13:21 and 13:39. Winds were light and predominantly out of the north at the time. The site was divided into four areas with the following results: the Surveyor detected emissions in all areas (circled in yellow).

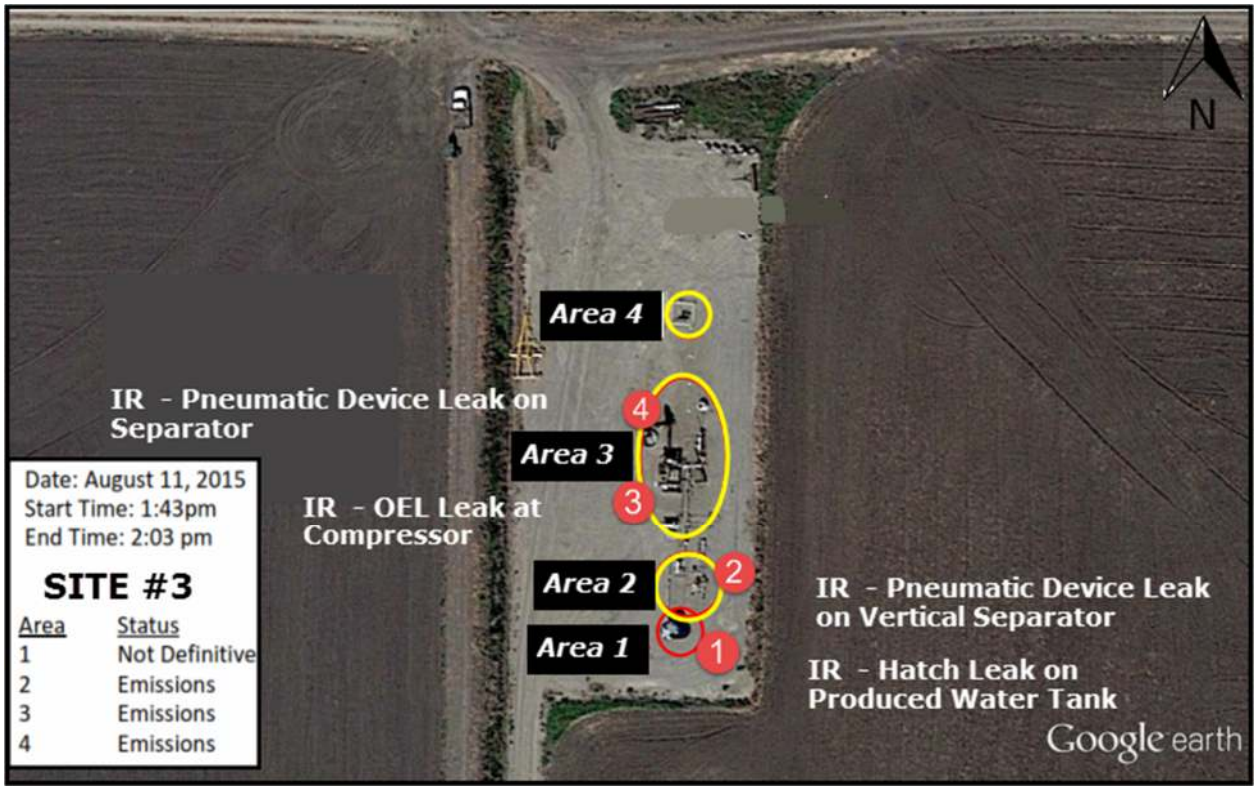
Site #2 was surveyed with the IR Camera in the late morning of August 12, 2015. Three equipment leaks (indicated by numbered red circles) were identified with the IR Camera between 11:25 and 11:37 from Areas #1, #2, and #4.

Table 3-13 summarizes the Site #2 area results.

Table 3-13
Site #2 Emissions by Area

Area	Emissions Detected	
	Picarro	IR Camera
1	Yes	Yes
2	Yes	Yes
3	Yes	No
4	Yes	Yes

Figure 3-4
Site #3: Picarro Surveyor & IR Camera Results



Site #3 was monitored by the Picarro Surveyor on August 11, 2015 between 13:43 and 14:03. Winds were predominantly out of the north at the time. The site was divided into four areas with the following results: the Surveyor detected emissions in Areas #2, #3 and #4 (circled in yellow).

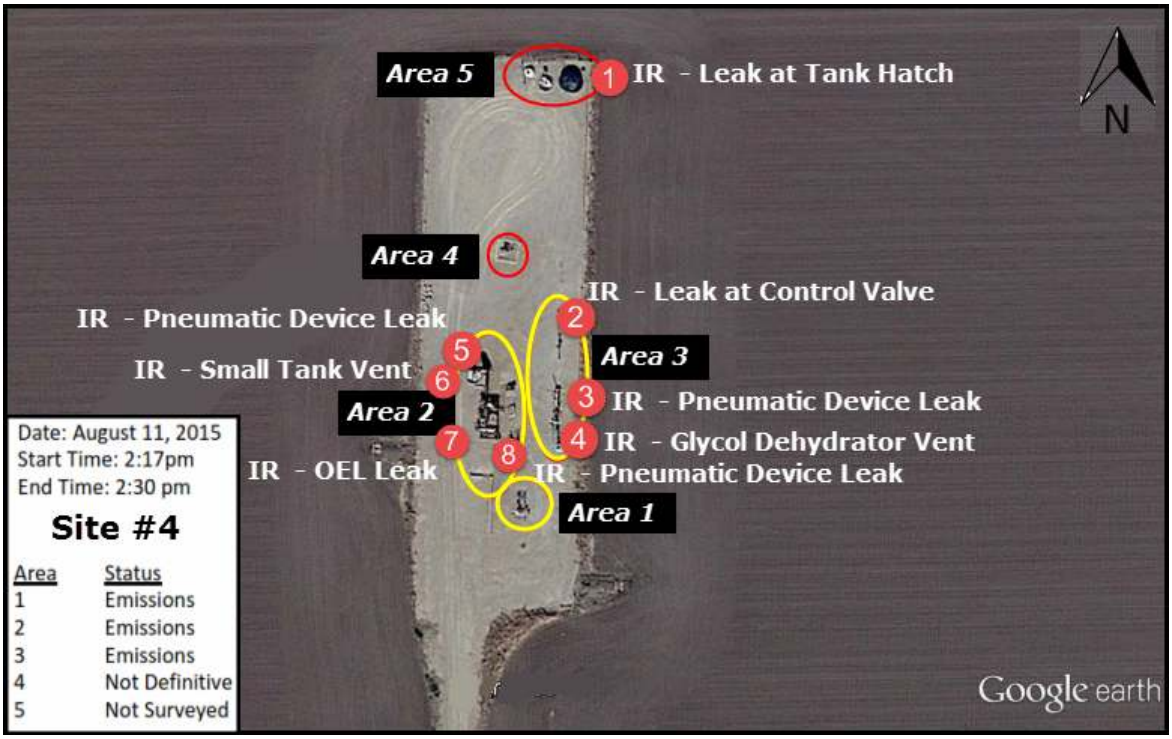
Site #3 was surveyed with the IR Camera in the early afternoon of August 12, 2015. Four equipment leaks (indicated by numbered red circles) were identified with the IR Camera between 12:31 and 12:45 – one each in Areas #1 and #2, and two in Area 3.

Table 3-14 summarizes the Site #3 area results.

Table 3-14
Site #3 Emissions by Area

Area	Emissions Detected	
	Picarro	IR Camera
1	No	Yes
2	Yes	Yes
3	Yes	Yes
4	Yes	No

Figure 3-5
Site #4: Picarro Surveyor & IR Camera Results



Site #4 was monitored by the Picarro Surveyor on August 11, 2015 between 14:17 and 14:30. Light winds out of the north were prevalent at the time. The site was divided into five areas with the following results: the Surveyor detected emissions in Areas #1, #2 and #3 (circled in yellow). No emissions were detected by the Surveyor in Area #4. Area #5 could not be monitored since a suitable downwind location was not accessible to the Surveyor.

Site #4 was surveyed with the IR Camera in the early afternoon of August 10, 2015. Eight equipment leaks (indicated by numbered red circles) were identified with the IR Camera between 12:50 and 13:27 – 4 in Area #2, 3 in Area #3 and one in Area 5. No emissions were detected from Area #4 by the Camera.

Table 3-15 summarizes the Site #4 area results.

Table 3-15
Site #4 Emissions by Area

Area	Emissions Detected	
	Picarro	IR Camera
1	Yes	No
2	Yes	Yes
3	Yes	Yes
4	No	No
5	No	Yes

3.9 Conclusions

The evaluation of the Method 21-compliant analyzers – the TVA, Eagle, and COSMOS -- found only small differences in the ability of these analyzers to detect methane and VOC fugitive emissions. Similarly, the remote sensing instruments -- the RMLD, IR Camera and Picarro Surveyor -- compared favorably in their ability to detect significant emissions. The selection of a particular instrument for fugitive emission monitoring will be guided then upon the particular application, the allotted budget and the level of required operator proficiency and/or training required. The following summaries may also assist in that selection.

Greenhouse Gas and VOC Detection -- Methane (CH4) is a major Greenhouse Gas (GHG). VOCs are volatile compounds that contribute to the formation of smog. Emissions from equipment leaks contribute to atmospheric methane and VOCs resulting in global warming and smog. The TVA, Eagle, COSMOS, IR Camera and Picarro Surveyor all effectively detect these emissions with the following qualifications:

- The RMLD is limited to detecting only methane;
- The COSMOS has an upper measurement range of 10,000 ppm; and
- The RMLD and the Picarro Surveyor identify leak areas but not necessarily specific leaking components.

Concentration Measurement -- The TVA, Eagle, and COSMOS provide component leak concentration measurements in ppm. The Picarro Surveyor provides ambient air concentrations but not component leak concentrations. The RMLD provides concentration measurements in ppm-meters. The IR Camera does not provide any concentration measurements.

Method 21 Compliance – Of the instruments tested, only the TVA, Eagle, or COSMOS comply with Method 21 performance specifications. A forty-nine component side-by-side test of these analyzers suggests that each is effective in identifying leaks at various federal regulatory leak thresholds. The TVA is the most popular Method 21 analyzer in use at refinery, chemical and petrochemical LDAR programs. The TVA uses a flame ionization detector (FID) and therefore requires hydrogen as a fuel source. The Eagle and COSMOS use solid state sensors and do not require any supply gases for operation. For this reason, operator/owners of natural gas production and processing facilities may find the Eagle or COSMOS analyzers more suitable for Method 21-compliant monitoring. While the COSMOS is the smallest and lightest of the three analyzers, it has an upper measurement range of 10,000 ppm while the Eagle will measure concentrations up to 50,000 ppm reliably. Although only the TVA requires hydrogen gas for operation of the FID, all three analyzers do require one or more calibration span gases to confirm their accuracy, precision, and linearity.

Remote Identification of Large Leaks – The TVA, Eagle and COSMOS are designed to perform component by component monitoring (also called "sniffing") while the RMLD and the IR Camera offer remote sensing for safe and quick detection of large leaks. A comparison of the RMLD and IR Camera indicates both can be effectively used to detect substantial leaks that might result in a significant loss of product or that might present an environmental or even safety issue. The RMLD is considerably cheaper than the IR Camera ($20,000 for the RMLD vs. $85,000 for the IR Camera) which may increase its attractiveness among smaller

owner/operators. An important distinction between the two instruments is that the IR Camera, by making an otherwise invisible leak visible to the human eye, enables precise identification of leaking components. The RMLD is limited to indicating the presence of a leak somewhere within the scanned area which will often include multiple components. The IR Camera is most effective when there is a small breeze or slight wind which causes the emission plume to move. In the absence of wind, it can be more difficult to detect an emission with the IR Camera. The RMLD on the other hand, operates independent of wind conditions and will reliably detect an emission provided there is a reflective background.

The Picarro Surveyor vs. the IR Camera – The comparison tests conducted at four gas well sites with the Picarro Surveyor and the IR Camera were revealing in both the capabilities and limitations of the Surveyor system. The Picarro Surveyor is fast – being able to complete three monitoring scans of the equipment at a natural gas well pad in approximately 10 minutes. It can also simultaneously detect multiple compounds, including CH_4 and CO_2 at ppb concentration levels.

However, the results from the Surveyor are subject to the following limitations:

1. The Surveyor's measurements are not made at the leak source but many feet downwind from it. The concentrations recorded by the Surveyor are therefore diluted and do not equal the leak concentration as would be determined by Method 21.

2. Unlike the IR Camera, the Surveyor is not able to pinpoint specific leaking components. In this one respect, the Surveyor is more like the RMLD. For example, at Site #4 (Figure 3-5), the Surveyor identified two leak areas, Area #2 and Area #3 in approximately 15 minutes. In about the same amount of time, the IR Camera operator was able to identify and photo-document four individual component leaks in Area #2 and three individual component leaks in Area #3.

3. In order to detect emissions, the Surveyor must be driven downwind of the leaking source. If this is not possible, as occurred three times during the four site tests, or if there is no wind, the Surveyor will be unable to effectively monitor all of the equipment.

While the Picarro Surveyor is a promising technology, its effectiveness in detecting GHG and VOC emissions from leaking equipment at natural gas facilities appears to be limited by the site's geography and local wind conditions. Additional questions remain regarding its cost and the required level of operator expertise.

SECTION 4
EMISSIONS FROM PNEUMATIC DEVICES

4.1 Introduction

Pneumatic devices such as liquid level and flow controllers are commonly used at oil and gas facilities throughout California. Their chief function is to regulate gas and liquid levels in dehydrators and separators, but they are also used to control temperatures in dehydrator regenerators and flash tank pressures. These devices can be powered by electricity or compressed air, however in the dry natural gas production sector, for practical as well as economic reasons, they are most often powered by compressed natural gas.

As part of their normal operation, pneumatic devices powered by compressed natural gas will release or bleed natural gas to the atmosphere with the actual bleed rate dependent on the design. For the purpose of this study, pneumatic devices can be divided into two groups:

1. High-Bleed Pneumatic Devices *and*
2. Low Bleed Pneumatic Devices.

Two pneumatic devices commonly used in California dry natural gas production fields are the Invalco Flex Tube® (Figure 4-1) and the Kimray® Level Controller (Figure 2). The Invalco Flex Tube® is a high-bleed device having a bleed rate > 0.1 kg/hr while the Kimray® Level Controller is a low-bleed device with a bleed rate < 0.1 kg/hr. At CARB's request, emissions testing using the Hi Flow Sampler was performed on a small number of both types during Phase III of the field work.

Figure 4-1
Invalco Flex Tube® CT Series Pneumatic Flow Controller

Figure 4-2
Kimray® Pneumatic Flow Controller

4.2 Results

Average emissions, measured as methane with the Hi Flow Sampler from ten Flex Tube® controllers were 0.2 kg/hour or 2.3 tons/year (11 SCFH). Average methane emissions from six Kimray® controllers were approximately an order of magnitude lower at 0.03 kg/hour or 0.3 tons/year (1.6 SCFH). These results are summarized in Table 4-1. Complete test results are provided in Appendix F.

Table 4-1
Mass Emissions Summary for Gas Field Pneumatic Devices

Type	Number of Components Tested	Max Emission		Min Emission		Average Emission [1]	
		kg/hr	tons/year	kg/hr	tons/year	kg/hr	tons/year
Flex Tube®	10	0.4	3.5	0.15	1.4	0.2	2.3
Kimray®	6	0.09	0.8	0.004	0.04	0.03	0.3

[1] Tons/year emission calculation assumes worst-case release for 8,760 hours/year

These same results are provided graphically in Figure 4-3, which clearly indicates the difference in emission rates between the two devices.

Figure 4-3
Emissions Rates per Pneumatic Device Type

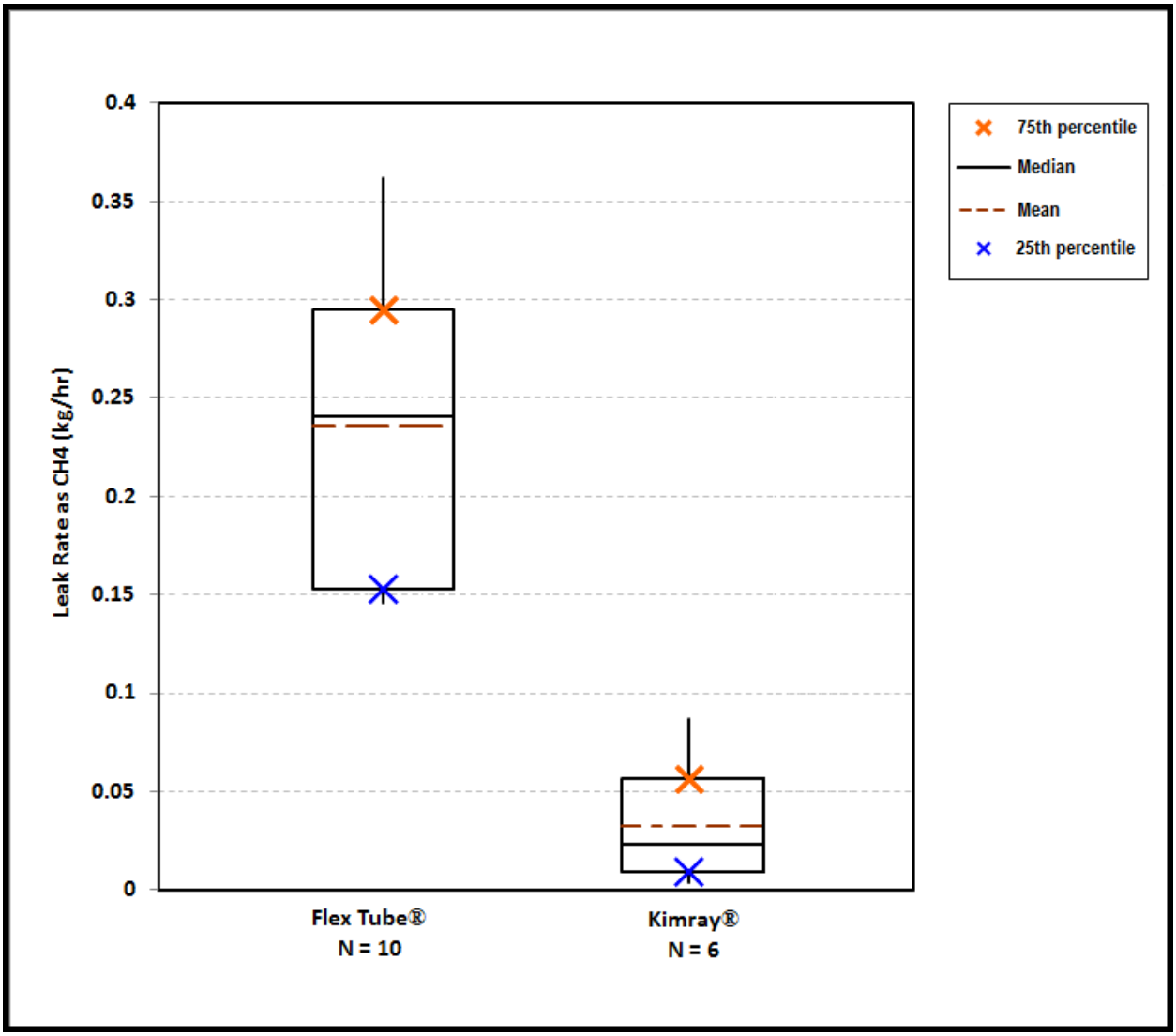


Figure 4-3 plots the mean, median, quartiles, and range of emissions for the two types of pneumatic devices that were tested. The Flex Tube®, being a high-bleed device exhibits variable and high emission rates. The Kimray®, consistent with its design as a low-bleed device, shows much less variability and significantly lower emission rates.

This is a very small sample set which greatly limits statistical comparisons. However, this data appears to confirm that significant differences in emission rates exist between the two designs.

4.3 Emission Calculations

Emissions from the Flex Tube® and Kimray® pneumatic flow controllers, were measured by the Hi Flow Sampler as methane and were calculated according to the following equations:

1. The Hi Flow Sampler results are converted from percent concentration by volume to mg/m^3 (1).

$$C = \frac{MW}{24.45} \times (Leak\ \% - Bkg\ \%) \times 10{,}000\ ppmv/\%vol \qquad (1)$$

Where:

C	=	Concentration in mg/m^3
MW	=	Molecular weight of analyte
24.45	=	Molar volume in L/mol at 25°C (536.67°R) and 1 atm (29.92 inHg)
Leak %	=	Percent organics concentration by volume, of the leak, calibrated as CH_4
Bkg %	=	Percent concentration by volume of the background gas
10,000	=	ppm in 1%.

2. The Hi Flow Sample gas flow rate is corrected to standard conditions (2).

$$CFM_{std} = (CFM_{act}) \left(\frac{T_{std}}{T_{act}}\right) \left(\frac{P_{act}}{P_{std}}\right) \qquad (2)$$

Where:

CFMstd	=	Standardized volumetric flow rate (ft3/min)
CFMact	=	Actual volumetric flow rate (ft3/min)
Tstd	=	Absolute gas temperature at standard conditions (298.15 K)
Tact	=	Absolute gas temperature at actual conditions (K)
Pact	=	Absolute barometric pressure at actual conditions (inHg)
Pstd	=	Absolute gas pressure at standard conditions (29.92 inHg).

3. The emission rate of methane was calculated (3).

$$ER = C \times CFM_{std} \times \frac{CF}{2.205} \qquad (3)$$

Where:

ER	=	Emission rate (kg/hr)
C	=	Analyte concentration (mg/m^3)
CFM_{std}	=	Standardized volumetric flow rate (ft^3/min)
CF	=	Conversion factor = 3.75E-06 [(1 m^3/35.32147 ft^3) × 60 min/hr × (1 lb/453592.37 mg)]
2.205	=	Pounds per kilogram.

4. These three equations are combined to express the emission rate in kilograms/hour (4).

$$ER = \frac{MW}{24.45} \times (Leak\ \% - Bkg\ \%) \times 10{,}000 \frac{ppmv}{\%vol} \times (CFM_{act}) \left(\frac{T_{std}}{T_{act}}\right) \left(\frac{P_{act}}{P_{std}}\right) \times \frac{3.75E\text{-}06}{2.205} \quad (4)$$

5. The emission rate of methane in tons/year (tpy) is then calculated (5).

$$ER = C \times CFM_{std} \times \frac{CF \times 8{,}760}{2000} \quad (5)$$

Where:

8,760	=	Hours per year
2,000	=	Pounds per ton.

SECTION 5
PROJECT QUALITY CONTROL

Project data quality was managed through the following quality control (QC) procedures:

- Hi Flow Sampler calibration verifications;
- TVA calibration verifications;
- Eagle and COSMOS calibration verifications;
- RMLD calibration verification;
- Test data documentation review;
- Sample documentation; *and*
- Analytical quality control.

5.1 Hi Flow Sampler Calibration and Calibration Verifications

Prior to the start of field testing, the background and leak detectors of Hi Flow Sampler #QX 1007 and #QX 1002 were calibrated with the following vendor-provided methane standards:

- 2.5% CH_4 in air (analytical tolerance +2%) *and*
- 99.0% CH_4.

Field calibration verifications of the Hi Flow Samplers were performed with the same two calibration standards. The acceptance criterion was a relative percent difference (RPD) less than 10%. Should a response of the Hi Flow Sampler to either calibration standard be equal to or greater than 10%, the Hi Flow Sampler would be re-calibrated.

Hi Flow Sampler #QX 1007 was used for emission testing throughout the first phase of testing and for most of Phase II. It began on February 25 to respond inaccurately to both calibration gases, however, and arrangements were made to have Hi Flow Sampler #QX 1002 shipped out to the project team as a replacement. In the interval, Hi Flow Sampler #QC 1007 continued to be used for emission testing on February 25 and February 26, but only for sample flow rate measurements. CH_4 concentrations on these days were determined by measuring the Hi Flow's exhaust stream with the TVA.

Beginning on February 27, Hi Flow Sampler #QX 1002 began to be used for emissions testing. By this time the 99% CH_4 calibration gas had become depleted so that only a single point calibration verification was possible using the 2.5% CH_4 standard. Since the instrument responded accurately to the low level calibration standard and since a calibration frequency of only once every thirty days is required by the manufacturer, Hi Flow Sampler #QX 1002 was judged to be in a state of control during the remaining three (3) days of testing. Both Hi Flow Samplers were returned to the manufacturer between Phase II and Phase III. The leak sensors of both were certified to be accurate within +5% and their sample flow rate measurements were

verified to be within specifications. Hi Flow Sampler #QX 1007 was used throughout Phase III field testing.

The results of the daily Hi Flow Sampler calibration verifications are provided in Table 5-1.

Table 5-1
Hi Flow Sampler Daily Calibration Verification Results

Timestamp	Background Sensor Input		Leak Sensor Input	
	2.5% CH4	99% CH4	2.5% CH4	99% CH4
Phase I Hi Flow Sampler #QX 1007				
1/20/2015 9:09	2. 6%	--	2.5%	--
1/21/2015 8:25	2.5%	97.2%	2.5%	97.3%
1/22/2015 8:27	2.6%	97.0%	2.5%	97.5%
1/23/2015 9:02	2.6%	96.3%	2.5%	97.0%
1/26/2015 10:00	2.5%	95.0%	2.5%	97.0%
1/27/2015 8:30	2.5%	94.9%	2.5%	97.6%
1/28/2015 8:08	2.5%	96.6%	2.5%	98.0%
1/29/2015 8:02	2.5%	95.4%	2.5%	96.5%
1/30/2015 8:47	2.5%	96.0%	2.5%	98.0%
Phase II Hi Flow Sampler QX 1007				
2/23/2015 9:30	2.6%	98.9%	2.7%	98.9%
2/24/2015 8:45	3.5%	98.0%	2.9%	97.0%
2/25/2015	*Verification failed. TVA used to measure CH_4 concentration at Hi Flow Sampler's exhaust port.*			
2/26/2015				
Phase II Hi Flow Sampler QX 1002				
2/27/2015 8:47	3.1%	NA[1]	2.5%	NA[1]
3/2/2015 10:45	2.7%	NA[1]	2.5%	NA[1]
3/3/2015 10:05	2.8%	NA[1]	2.6%	NA[1]
Phase III Hi Flow Sampler QX 1007				
8/6/2015 8:20	2.6%	99.1%	2.5%	97.7%
8/7/2015 8:09	2.6%	99.3%	2.6%	97.4%
8/11/2015 8:50	2.6%	99.0%	2.6%	97.4%
8/12/2015 8:17	2.6%	99.4%	2.6%	97.0%
8/13/2015 8:31	2.6%	99.2%	2.6%	97.4%
8/14/2015 8:00	2.6%	99.5%	2.6%	97.4%
8/17/2015 8:00	2.6%	99.6%	2.6%	97.7%

[1] Not Applicable – High Level Calibration Gas not available

5.2 TVA Analyzer Calibration Verifications

Two TVA 1000B analyzers (S/Ns #4048 and #5362) were used for the duration of the field testing. Calibration verification checks were performed on both instruments prior to use each day with a zero air gas, and low, mid, and high level methane-in-air span gases. The acceptance criterion was a Relative Percent Difference (RPD) <10% for any one of the span gases. Failure to meet this criterion would result in a recalibration of the instrument. The TVA calibration verification results are provided in Table 5-2.

Table 5-2
TVA Calibration Verifications

TVA S/N	Timestamp	Calibration Verification (ppm)			
		Zero	499	2028	10,000
Phase I					
4048	1/20/2015 8:13	0.39	472	1,800	9,470
5362	1/20/2015 8:20	0.88	472	2,208	9,800
4048	1/20/2015 9:20	0.23	498	1,970	10,000
5362	1/21/2015 8:41	0.23	505	1,972	10,200
4048	1/21/2015 8:57	0.45	507	2,051	10,100
4048	1/22/2015 8:51	0.25	494	2,015	10,000
5362	1/22/2015 8:58	0.25	502	2,034	10,100
5362	1/23/2015 8:11	0.07	508	2,037	10,200
4048	1/23/2015 8:15	0.20	515	2,045	9,990
4048	1/26/2015 10:23	0.20	508	2,079	10,700
5362	1/26/2015 10:10	0.75	514	2,120	10,600
4048	1/27/2015 8:30	0.30	512	2,028	10,200
5362	1/27/2015 8:35	0.25	502	2,042	10,200
4048	1/28/2015 8:11	0.24	508	1,955	10,000
5362	1/28/2015 8:36	-0.03	511	2,043	10,600
5362	1/29/2015 8:25	0.29	505	2,087	10,900
4048	1/29/2015 8:38	0.07	521	1,907	9,400
5362	1/30/2015 9:05	-0.04	528	2,012	10,000
4048	1/30/2015 9:05	0.01	505	2,036	10,100
TVA S/N	**Timestamp**	**Calibration Verification (ppm)**			
		Zero	**499**	**2028**	**10,000**
Phase II					
5362	2/23/2015 9:29	0.24	512	2,041	10,100
4048	2/23/2015 9:34	0.22	538	2,052	10,300
4048	2/24/2015 9:11	0.36	535	2,087	10,200
5362	2/24/2015 9:16	0.36	510	1,997	10,000
4048	2/25/2015 9:31	1.00	508	2,026	9,900
5362	2/25/2015 9:47	1.20	517	2,017	10,000
4048	2/26/2015 8:44	0.39	530	2,034	10,100
5362	2/26/2015 8:50	0.12	521	2,022	10,000
4048	2/27/2015 8:36	0.46	533	2,012	10,100
5362	2/27/2015 8:40	0.60	515	2,028	10,200
5362	3/02/2015 11:30	0.40	517	2,017	10,300
4048	3/02/2015 11:40	--[1]	490	2,044	10,100
5362	3/03/2015 10:30	0.08	515	2,018	10,100
4048	3/03/2015 14:17	0.70	509	1,977	9,900

[1] Analyzer zero response not recorded

Table 5-2 (Continued)
TVA Calibration Verifications

TVA S/N	Timestamp	Calibration Verification (ppm)			
		Zero	498.7	1005	10,100
Phase III					
4048	8/6/2015 8:19	0.10	489	990	10,000
5362	8/6/2015 8:19	0.09	488	996	10,000
4048	8/7/2015 8:20	-0.04	491	999	10,100
5362	8/7/2015 8:20	-0.10	509	1,007	10,000
4048	8/10/2015 8:45	-0.03	497	1,005	10,100
5362	8/10/2015 8:45	-0.02	489	1,045	9,900
4048	8/11/2015 8:45	0.04	497	1,016	10,100
5362	8/11/2015 8:45	0.06	495	1,010	10,300
4048	8/12/2015 8:15	0.01	495	1,011	10,100
5362	8/12/2015 8:15	-0.10	500	1,016	10,200
4048	8/13/2015 8:35	0.06	499	1,002	10,100
5362	8/13/2015 8:35	0.03	502	1,001	10,200
4048	8/14/2015 8:20	0.01	489	1,021	10,100
5362	8/14/2015 8:20	-0.02	504	1,019	10,000
4048	8/17/2015 8:20	-0.03	489	1,010	10,200
5362	8/17/2015 8:20	-0.03	502	1,019	10,200

5.3 Eagle and COSMOS Calibration Verifications

Evaluation tests of the RKI Eagle Model 1 and the COSMOS XP-3160 were conducted on January 25, 26, and 27, 2015. Calibration verifications were performed on each instrument prior to the evaluations. Table 5-3 and 5-4 record the instrument responses.

Table 5-3
Calibration Verification of the RKI Eagle Model 1

Date	Zero	500 ppm CH_4	2,000 ppm CH_4	10,100 ppm CH_4
2/26/2015	0	1000	1,950	10,250
2/27/2015	0	870	1,890	10,200

Table 5-4
Calibration Verification of the COSMOS XP-3160

Date	Zero	500 ppm CH_4	2,000 ppm CH_4	10,100 ppm CH_4
2/25/2015	0[1]	750	2,070	10,110
2/26/2015	0[1]	760	2,090	10,200
2/27/2015	0[1]	750	2,100	10,210
[1]Ambient air used for zero gas.				

5.4 RMLD Calibration Verification

Evaluation testing of the RMLD was conducted on March 4, 2015. Prior to testing, the RMLD was calibrated according to the instructions provided in the User's Manual:

1. The instrument was turned on and allowed to warm up for two (2) to three (3) minutes;
2. The instrument Self-Test function was initiated and successfully completed; *and*
3. The calibration sweep of the laser frequency was initiated and after approximately 45 seconds the laser calibration was successfully passed.

5.5 Test Data Documentation Review

It was a routine practice, prior to leaving a test site, for one member of the project team to carefully review the site's completed data forms for completeness, accuracy, and legibility. Similarly, completed sample chain-of-custody forms and Sample Log Book entries were reviewed at the end of each test day prior to delivering samples for overnight shipment.

5.6 Sample Documentation

A project Sample Log Book was used to document the following information about each sample:

- Date of sample shipment to the laboratory for analysis;
- Sample Identification Number (a unique sequential number assigned to each sample);
- Site Identification;
- Date of sample collection;
- Time of sample collection;
- Initial vacuum (if an evacuated canister used);
- Final vacuum (if an evacuated canister used);
- Canister ID (if an evacuated canister used); *and*
- Comments pertaining to the sample.

Figure 5-1 provides an example page of the project Sample Log Book. Note that site locations have been removed in this example. Sample numbers beginning with the letters "CAN" indicate a canister sample. Sample numbers beginning with the letters "TB" indicate a sample collected in a Tedlar bag. A complete copy of the Sample Log Book is provided in Appendix G.

Figure 5-1
Sample Logbook

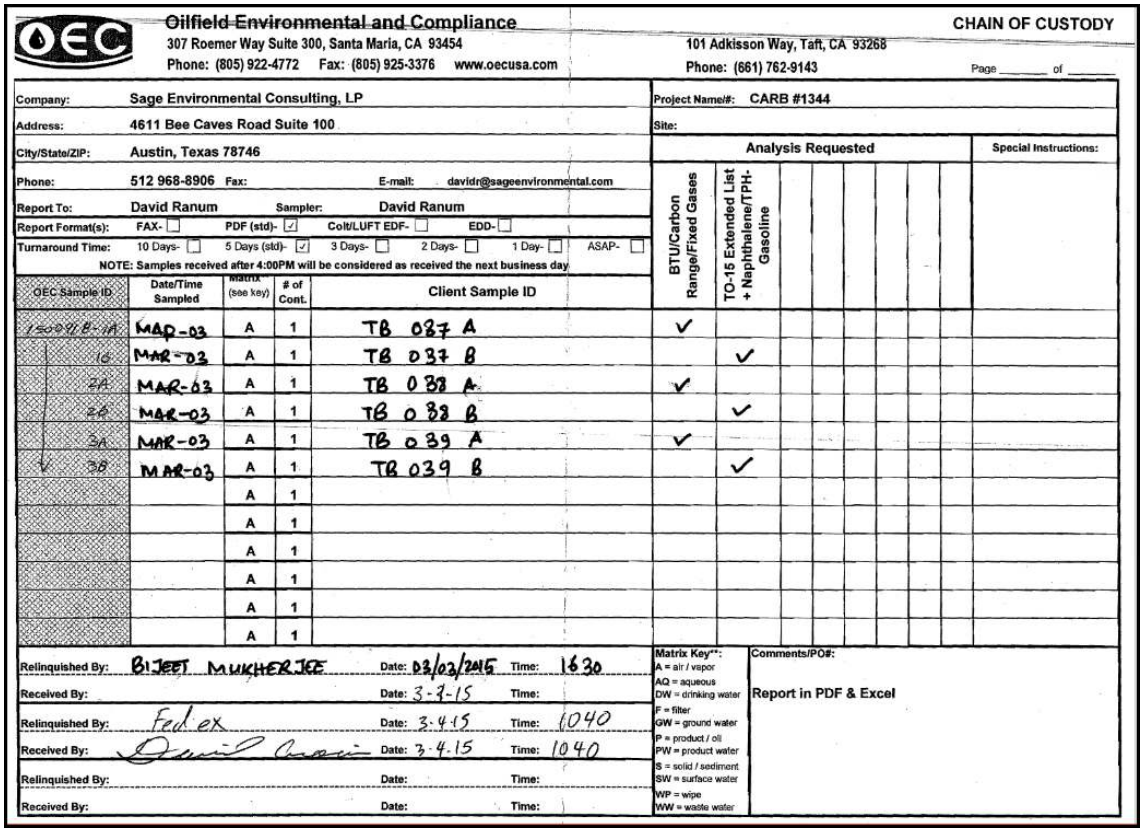
Sent	Sample No.	Site	Date	Time	Vi	Vf	CAN ID	Comments
Jan-22	TB008		Jan-22	11:40	NA	NA	NA	
Jan-23	CAN008		Jan-22	11:37	28	0	DEC-117-42	
Jan-22	TB009		Jan-22	14:50	NA	NA	NA	
Jan-23	CAN009		Jan-22	14:49	28.75	0	DEC-39-0296	
Jan-23	TB010		Jan-23	10:52	NA	NA	NA	
Jan-23	CAN010		Jan-23	10:48	28.5	0	DEC-39-701	
Jan-23	TB011		Jan-23	12:04	NA	NA	NA	
Jan-23	CAN011		Jan-23	12:03	28.5	0	DEC-39-702	
Jan-23	TB012		Jan-23	12:19	NA	NA	NA	
Jan-23	CAN012		Jan-23	12:17	29	0	DEC-39-716	
Jan-26	TB013		Jan-26	12:08	NA	NA	NA	
Jan-30	CAN013		Jan-26	12:06	27.5	0	DEC-117-11	
Jan-27	TB014		Jan-27	12:43	NA	NA	NA	
Jan-30	CAN014		Jan-27	12:41	28.5	0	DEC-39-0359	

Standard chain-of-custody procedures were followed to assure that sample data would not be invalidated due to failure to follow accepted procedures. These procedures included:

- Collected samples were securely maintained in the project team's possession up to the time of shipment;
- A chain-of-custody form was completed for each sample shipment clearly indicating each sample by its unique sample identification number and the analyses to be performed; *and*
- Before being turned over to the shipper, the chain-of-custody form was signed and dated by a project team member and a copy included with the packaged samples.

Figure 5-2 provides an example of a completed project sample chain-of-custody form.

Figure 5-2
Completed Project Sample Chain-of-Custody Form



Oilfield Environmental and Compliance
307 Roemer Way Suite 300, Santa Maria, CA 93454
Phone: (805) 922-4772 Fax: (805) 925-3376 www.oecusa.com
101 Adkisson Way, Taft, CA 93268
Phone: (661) 762-9143

CHAIN OF CUSTODY

Page _____ of _____

Company: Sage Environmental Consulting, LP
Address: 4611 Bee Caves Road Suite 100
City/State/ZIP: Austin, Texas 78746
Phone: 512 968-8906 Fax: E-mail: davidr@sageenvironmental.com
Report To: David Ranum Sampler: David Ranum
Report Format(s): FAX- ☐ PDF (std)- ☑ Colt/LUFT EDF- ☐ EDD- ☐
Turnaround Time: 10 Days- ☐ 5 Days (std)- ☑ 3 Days- ☐ 2 Days- ☐ 1 Day- ☐ ASAP- ☐
NOTE: Samples received after 4:00PM will be considered as received the next business day

Project Name/#: CARB #1344
Site:

OEC Sample ID	Date/Time Sampled	Matrix (see key)	# of Cont.	Client Sample ID	Analysis Requested: BTU/Carbon Range/Fixed Gases	Analysis Requested: TO-15 Extended List + Naphthalene/TPH-Gasoline	Special Instructions:
1509[illegible]-1A	MAR-03	A	1	TB 037 A	✓		
1B	MAR-03	A	1	TB 037 B		✓	
2A	MAR-03	A	1	TB 038 A	✓		
2B	MAR-03	A	1	TB 038 B		✓	
3A	MAR-03	A	1	TB 039 A	✓		
3B	MAR-03	A	1	TB 039 B		✓	
		A	1				
		A	1				
		A	1				
		A	1				
		A	1				
		A	1				

Relinquished By: BIJEET MUKHERJEE Date: 03/03/2015 Time: 1630
Received By: Date: 3-9-15 Time:
Relinquished By: Fed ex Date: 3.4.15 Time: 1040
Received By: [signature] Date: 3.4.15 Time: 1040
Relinquished By: Date: Time:
Received By: Date: Time:

Matrix Key**:
A = air / vapor
AQ = aqueous
DW = drinking water
F = filter
GW = ground water
P = product / oil
PW = product water
S = solid / sediment
SW = surface water
WP = wipe
WW = waste water

Comments/PO#:
Report in PDF & Excel

5.7 TO-15 Analysis Quality Control

All samples were received and analyzed by Oilfield Environmental and Compliance (OEC). Two methods of analyses were performed: (1) EPA TO-15 for volatile organic compounds and (2) ASTM 1945/3588, the Standard Test Method for Analysis of Natural Gas by Gas Chromatography.

For the samples analyzed by EPA TO-15 five (5) quality control analyses were performed:

1. Method Blanks;
2. Laboratory Control Spikes (LCS);
3. Laboratory Control Spike Duplicates (LCSD);
4. Duplicate analyses; *and*
5. Matrix Spike Recovery.

The Method Blank -- The method blank is an ambient air sample used to determine if there is any laboratory contamination. The detection of any analyte that is a target analyte above the laboratory's reporting limit could indicate that there is a laboratory contaminant that may bias any detection of that analyte in the samples. The Blank is put through the same preparation process as the regular samples.

Laboratory Control Spike (LCS) – The LCS is a known matrix spiked with compound(s) representative of the target analytes. It is run regularly with each sample batch and is used to show that sample preparation procedures do not contribute to loss of analytes.

Laboratory Control Duplicate (LCD) – The LCD is a duplicate analysis of the laboratory control spike. The results are reported as a relative percent difference (RPD). Any results outside the control limits are flagged by the laboratory.

Duplicate Analyses – As the name implies, this is a repeated analysis of the same sample.

Matrix Spike Recovery – A matrix spike recovery checks to see if anything in the sample (i.e. the matrix) is interfering with the test for a particular contaminant. To check for possible matrix interference a known amount of the same compound being tested for is added to a sample before the analysis. A recovery between 70-120% is an indication that the matrix is not interfering with the test.

A summary of the quality control results for the TO-15 analyses is provided in Table 5-5.

Table 5-5
QC Results for TO-15 Analyses

Phase I January 20 – 30, 2015			
QC	**Number**	**Result**	**Comment**
Blanks	3	No target analytes detected	
Laboratory Control Spike % REC1	3	**#B5A0773-BS1**: TCE % REC = 125%	The spike recovery is outside the in-house generated control limits but within the 70-130 percent recovery range.
Laboratory Control Spike Duplicate % REC	3	All recoveries within %REC limits	
Duplicate RPD2	3	All results within RPD limits	
Matrix Spike % REC	0		
Phase II February 23 – March 3, 2015			
QC	**Number**	**Result**	**Comment**
Blanks	5	No target analytes detected	
Laboratory Control Spike % REC1	5	All recoveries within %REC limits	
Laboratory Control Spike Duplicate % REC	5	All recoveries within %REC limits	
Duplicate RPD2	3	All results within RPD limits	
Matrix Spike % REC	1	All recoveries within %REC limits	

Table 5-5 (Continued)
QC Results for TO-15 Analyses

Phase III August 6 – 14, 2015			
QC	**Number**	**Result**	**Comment**
Blanks	5	**#B5H0387**: The CCV[3] for t-Butyl alcohol failed low.	t-Butyl alcohol was not detected in any of the project samples.
Laboratory Control Spike % REC1	5	**#B5H0387-BS1**: % RECs for Diisopropyl Ether (80%), ethyl t-Butyl Ether (80%), t-Amyl Methyl Ether (80%), t-Butyl alcohol (69%), & 1, 1, 1-Trichloromethane (91%) were slightly below analytical control limits.	These analytes were not detected in any of the project samples.
Laboratory Control Spike Duplicate % REC	5	**#B5H0387-BSD1**: % RECs for Diisopropyl Ether (79%), Ethyl t-Butyl Ether (81%), t-Amyl Methyl Ether (80%), t-Butyl alcohol (70%), 1, 1, 1 Trichloroethane (91%) & Trichlorofluoromethane (90%) were slightly below analytical control limits.	These analytes were not detected in any of the project samples
Duplicate RPD2	5	**B5H0369-DUP1** – The RPDs for ethylbenzene (31%) and total Xylenes (30%) exceeded the 25% Control Limit. **B5H0387-DUP1** – The CCV for t-Butyl alcohol failed low.	The LCS & LCS DUP % REC s results for ethylbenzene and total Xylenes suggest that their reported results are accurate. t-Butyl alcohol was not detected in any of the project samples.
Matrix Spike % REC	1	All recoveries within %REC limits	

[1] % REC = Percent Recovery
[2] RPD = Relative Percent Difference
[3] CCV = Continuing Calibration Verification

5.8 ASTM 1945/3588 Analysis Quality Control

Quality control for the samples analyzed by ASTM 1945/3588 was limited to the running of calibration standards to ensure that the analytical instrumentation was operating within required specifications. ASTM methods are not regulated in the way that EPA methods are and therefore, less stringent QC requirements are required.

California Air Resources Board

Air Resources Board IFB No. 13-414: Enhanced Inspection & Maintenance for GHG & VOCs at Upstream Facilities – Final (Revised)

APPENDICES

Appendix A - *Field & Lab Data Results & Calculations*

Appendix B - *Correlation Plots of Mass Emission Rates vs. Leaking Equipment Concentrations*

Appendix C - *Example Calculations of Mean Square Error and Scale Bias Correction*

Appendix D - *Notes to Updated Calculations 08/20/2019*

Appendix E - *Average Emission Rates for Components in Liquid Service*

Appendix F - *Pneumatic Device Test Results*

Appendix A:

Field and Lab Data Results and Calculations

Section 2, Appendix A: Field & Lab Data & Calculations

Note: results with all values = zero are hidden, see Appendix E for Descriptive Statistics for all leak

Sort order, sorted by Component Type, & Method 21 Concentration, ppmv	Component Information: Component Type	Service	Site Characterization: EQUIPMENT/ACTIVITY DESCRIPTION	DATE	REGULATORY IDs	#WELLS	FACILITY TYPE: (OIL/GAS)	THROUGHPUT(s)	METEOROLOGY: WIND DIRECTION FROM	WIND SPEED (mph)	AMBIENT TEMPERATURE (F)	% RH	METEOROLOGY: BAROMETRIC PRESSURE (inHg)
A. Components in Gas Service with TVA, HiFlow, TO-15 &													
1	Connector	Gas	Natural Gas Well Site	6-Aug-15		1	Gas	0 SCFM	W	5.2	88.5	52.7	29.73
2	Connector	Gas	Gas Wells	27-Feb-15	SEC.33 T-20N R-2W	2	Gas	2098.5MCF/DAY	N	3	57.1	64	29.67
3	Connector	Gas	Gas Wells	26-Feb-15	SEC.33 T-20N R-2W	4	Gas	140.9MCF/DAY	N	1.3	46	50	29.93
4	Connector	Gas	Oil Production Facility	23-Jan-15	149797	12	Oil	87 bbls/day Oil, 400-500 bbls/day Water	SSE	2.1	65.5	36.9	30.17
5	Connector	Gas	Oil Water Gas Separation	20-Jan-15	LAFD #2990	5	Oil	44 bb/day oil, 51 bb/day water	ESE	4.5	57.2	70.5	29.9
6	Connector	Gas	Oil Production Facility	23-Jan-15	149797	12	Oil	87 bbls/day Oil, 400-500 bbls/day Water	SSE	2.1	65.5	36.9	30.17
7	Connector	Gas	Water separation	29-Jan-15	TITLE V 041	0	Gas		WSW	4	81.3	34.5	29.5
8	Connector	Gas	Oil Water Gas Separation	20-Jan-15	LAFD #2990	5	Oil	44 bb/day oil, 51 bb/day water	ESE	4.5	57.2	70.5	29.9
9	Connector	Gas	Oil Well with flare	20-Jan-15	Not Listed	1	Oil	5 bbls/day oil; 80 bbls/day water	WNW	3.8	64.4	76.4	29.85
10	Connector	Gas	Water separation	29-Jan-15	TITLE V 041	0	Gas		WSW	4	81.3	34.5	29.5
11	Connector	Gas	Water separation	29-Jan-15	TITLE V 041	0	Gas		WSW	4	81.3	34.5	29.5
12	Connector	Gas	Gas Wells	26-Feb-15	SEC.33 T-20N R-2W	4	Gas	140.9MCF/DAY	N	1.3	46	50	29.93
13	Connector	Gas	Water separation	28-Jan-15	TITLE V 041	0	Gas		WSW	1.5	-	-	29.6
14	Connector	Gas	NG Compressor & Transmission	26-Jan-15	TITLE V 041	0	NG	4063 mcf/day	East	3	79.8	21.9	29.37
15	Connector	Gas	Water separation	29-Jan-15	TITLE V 041	0	Gas		WSW	4	81.3	34.5	29.5
16	Connector	Gas	Gas Wells	26-Feb-15	SEC.33 T-20N R-2W	4	Gas	140.9MCF/DAY	N	1.3	46	50	29.93
17	Connector	Gas	Water separation	28-Jan-15	TITLE V 041	0	Gas		WSW	1.5	-	-	29.6
18	Connector	Gas	Oil Well with flare	20-Jan-15	Not Listed	1	Oil	5 bbls/day oil; 80 bbls/day water	WNW	3.8	64.4	76.4	29.85
19	Connector	Gas	NG Compressor & Transmission	26-Jan-15	TITLE V 041	0	NG	4063 mcf/day	East	3	79.8	21.9	29.37
20	Connector	Gas	Water separation	28-Jan-15	TITLE V 041	0	Gas		WSW	1.5	-	-	29.6
21	Connector	Gas	Water separation	29-Jan-15	TITLE V 041	0	Gas		WSW	4	81.3	34.5	29.5
22	Connector	Gas	Natural Gas Well	7-Aug-15		3 + 1 inactive	Gas	19-10: 17.8 MCF/24-1: 18.8 MCF/19.8: 142.4 MCF	E	7	73.4	56.1	29.74
23	Connector	Gas	Gas Wells	24-Feb-15	SEC.33 T-20N R-2W	5	Gas	1252.4MCF/DAY	W	3.1	57.4	24.5	30.2
24	Connector	GAS	Natural Gas Well	14-Aug-15		1	Gas	62.5 MCF/D	W	5.7	72.1	52.2	29.97
25	Connector	Gas	NG Compressor & Transmission	26-Jan-15	TITLE V 041	0	NG	4063 mcf/day	East	3	79.8	21.9	29.37
26	Connector	Gas	Water separation	27-Jan-15	TITLE V 041	0	Gas		WSW	1.3	77.8	47.9	29.68
27	Connector	Gas	Gas Wells	27-Feb-15	SEC.33 T-20N R-2W	2	Gas	2098.5MCF/DAY	N	3	57.1	64	29.67
28	Connector	Gas	NG Compressor & Transmission	26-Jan-15	TITLE V 041	0	NG	4063 mcf/day	East	3	79.8	21.9	29.37
29	Connector	Gas	Oil	22-Jan-15	39632	10	Oil	150 bbls/day Oil, 1000 bbls/day Water	ESE	1.7	76.3	41.8	30.14
30	Connector	Gas	Water separation	28-Jan-15	TITLE V 041	0	Gas		WSW	1.5	-	-	29.6
31	Connector	Gas	Water separation	28-Jan-15	TITLE V 041	0	Gas		WSW	1.5	-	-	29.6
32	Connector	Gas	Water separation	28-Jan-15	TITLE V 041	0	Gas		WSW	1.5	-	-	29.6
33	Connector	Gas	Oil Well with flare	20-Jan-15	Not Listed	1	Oil	5 bbls/day oil; 80 bbls/day water	WNW	3.8	64.4	76.4	29.85
34	Connector	Gas	Natural Gas Well with lift compressor and glycol dehydrator	23-Feb-15	SEC.9 T-19N R-2W	1	Gas	88.1 MCF/DAY	NNW	15.9	52.5	23.1	29.98
35	Connector	Gas	Water separation	29-Jan-15	TITLE V 041	0	Gas		WSW	4	81.3	34.5	29.5
36	Connector	Gas	Oil Water Gas Separation	20-Jan-15	LAFD #2990	5	Oil	44 bb/day oil, 51 bb/day water	ESE	4.5	57.2	70.5	29.9
37	Connector	Gas	Natural Gas Well	12-Aug-15		1	Gas	192.3 MCF/D	SW	3.9	83	44.6	29.96
38	Flange	Gas	Compressors, Pumps, Valves, Connectors, Glycol, Tank	21-Jan-15	CAL000381898	27	Oil & Gas	65 bbls/day Oil + 2000 bbls/day Water	SSW	1.3	66.6	73	29.95
39	Flange	Gas	Testing/Group Gathering Facility, Automatic Well Testing	26-Jan-15	TITLE V 041	0	Gas		SW	4.2	77.8	27.6	29.63
40	Flange	Gas	Testing/Group Gathering Facility, Automatic Well Testing	26-Jan-15	TITLE V 041	0	Gas		SW	4.2	77.8	27.6	29.63
41	Flange	Gas	Gas Wells	25-Feb-15	SEC.33 T-20N R-2W	4	Gas	140.9MCF/DAY	N	3	60	31	30.14
42	Flange	Gas	Gas Wells	26-Feb-15	SEC.33 T-20N R-2W	4	Gas	140.9MCF/DAY	N	1.3	46	50	29.93
43	Flange	Gas	Gas Wells	24-Feb-15	SEC.33 T-20N R-2W	5	Gas	1252.4MCF/DAY	W	3.1	57.4	24.5	30.2
44	Flange	Gas	Natural Gas Well with lift compressor and glycol dehydrator	23-Feb-15	SEC.9 T-19N R-2W	1	Gas	88.1 MCF/DAY	NNW	15.9	52.5	23.1	29.98
45	Flange	Gas	Gas Wells	24-Feb-15	SEC.33 T-20N R-2W	5	Gas	1252.4MCF/DAY	W	3.1	57.4	24.5	30.2
46	Flange	Gas	Water separation	27-Jan-15	TITLE V 041	0	Gas		WSW	1.3	77.8	47.9	29.68
47	Flange	Gas	Natural Gas Well with lift compressor and glycol dehydrator	23-Feb-15	SEC.9 T-19N R-2W	1	Gas	88.1 MCF/DAY	NNW	15.9	52.5	23.1	29.98
48	Flange	Gas	Water separation	27-Jan-15	TITLE V 041	0	Gas		WSW	1.3	77.8	47.9	29.68
49	Flange	Gas	Natural Gas Well	11-Aug-15		1	Gas	612.5 MCF/D	W	3.4	88	48.7	29.77
50	Flange	Gas	Natural Gas Well	11-Aug-15		1	Gas	612.5 MCF/D	W	3.4	88	48.7	29.77
51	Flange	Gas	Natural Gas Well	14-Aug-15		1	Gas	38.1 MCF/D	SE	2.4	81	49.6	29.97

Section 2, Appendix A: Field & Lab Data & Calculations

Note: results with all values = zero are hidden, see Appendix E for Descriptive Statistics for all leak

Y [2] = Y, Avanti
Y [3] = Y, Operator run with Eagle
Y [4] = Y, Operator run with Eagle quarterly
Y [5] = Y, Quarterly, Summit

Sort order, sorted by Component Type, & Method 21 Concentration, ppmv	Component Information				Site Characterization				Component Information	IR CAMERA		EPA Method 21 Results			HIGH FLOW SAMPLER DATA
	Component Type	Service	% CLOUD COVER	WEATHER (sunny, cloudy, fair, fog, haze, light rain, heavy rain)	# SEPARATORS	# TANKS	# COMPRESSORS	DOES SITE HAVE LDAR PLAN? (Y/N)	Description	Date	Time	Date	Time	Method 21 Leak Concentration, ppmv	Date
A. Components in Gas Service with TVA, HiFlow, TO-15 &															
1	Connector	Gas	85	Cloudy	2	1	1	N	1-inch Plug			6-Aug-15	10:35	4.00	6-Aug-15
2	Connector	Gas	20	Sunny	1	2	2	N	3/8" Threaded			Feb-27-2015	10:37	10.00	Feb-27-2015
3	Connector	Gas	10	sunny	4	7	2	N	kwik connect on a simple bomb	-	-	Feb-26-2015	14:36	16.00	Feb-26-2015
4	Connector	Gas	0	Sunny	1	3	2	Y [2]	Tubing Connector	-	-	Jan-23-2015	11:05	37.00	Jan-23-2015
5	Connector	Gas	100	cloudy	0	3	2	Y	Plug	-	-	Jan-20-2015	9:51	50.00	Jan-20-2015
6	Connector	Gas	0	Sunny	1	3	2	Y [2]	Cap	-	-	Jan-23-2015	10:43	61.00	Jan-23-2015
7	Connector	Gas	50	light cloudy				Y [3]	2" Threaded Connector	-	-	Jan-29-2015	13:57	135.00	Jan-29-2015
8	Connector	Gas	100	cloudy	0	3	2	Y	Cap	-	-	Jan-20-2015	9:59	200.00	Jan-20-2015
9	Connector	Gas	100	cloudy	4	0	1	Y	Gas Compressor connector	-	-	Jan-20-2015	14:10	300.00	Jan-20-2015
10	Connector	Gas	50	light cloudy				Y [3]	Plug on a valve attached to a flow meter	-	-	Jan-29-2015	11:08	505.00	Jan-29-2015
11	Connector	Gas	50	light cloudy				Y [3]	1" threaded connector at a pressure transmitter	-	-	Jan-29-2015	11:16	673.00	Jan-29-2015
12	Connector	Gas	10	sunny	4	7	2	N	at wellhead 60-19	-	-	Feb-26-2015	13:53	700.00	Feb-26-2015
13	Connector	Gas	90	cloudy				Y [3]	1" Plug	-	-	Jan-28-2015	13:45	800.00	Jan-28-2015
14	Connector	Gas	95	Cloudy	0	1	2	Y [1]	2"elbow	-	-	Jan-26-2015	11:49	994.00	Jan-26-2015
15	Connector	Gas	50	light cloudy				Y [3]	1" elbow connector at bottom of pressure transmitter	-	-	Jan-29-2015	12:41	1,100.00	Jan-29-2015
16	Connector	Gas	10	sunny	4	7	2	N	Threaded 3" on V4016E at compressor	-	-	Feb-26-2015	9:07	1,770.00	Feb-26-2015
17	Connector	Gas	90	cloudy				Y [3]	Swage Connector on K1400	Jan-28-2015	10:24	Jan-29-2015	14:08	2,000.00	Jan-29-2015
18	Connector	Gas	100	cloudy	4	0	1	Y	Bottom of Level Gauge	-	-	Jan-20-2015	14:25	2,200.00	Jan-20-2015
19	Connector	Gas	95	Cloudy	0	1	2	Y [1]	on the top of Sightglass	-	-	Jan-26-2015	11:40	2,400.00	Jan-26-2015
20	Connector	Gas	90	cloudy				Y [3]	1" Plug	-	-	Jan-28-2015	13:31	2,600.00	Jan-28-2015
21	Connector	Gas	50	light cloudy				Y [3]	Plug on compressor	-	-	Jan-29-2015	13:30	4,600.00	Jan-29-2015
22	Connector	Gas	80	Cloudy/overcast	1	5	1	N	Swagelok 3/8"			7-Aug-15	11:26	7,700.00	7-Aug-15
23	Connector	Gas	0	sunny	4	5	1	N	1" plug on line 60-1A	-	-	Feb-24-2015	10:45	7,800.00	Feb-24-2015
24	Connector	GAS	0	Sunny	1	2	1	N	1/4-INCH SWAGELOK ON KIMRAY			14-Aug-15	10:26	12,400.00	14-Aug-15
25	Connector	Gas	95	Cloudy	0	1	2	Y [1]	Qwik disconnect	-	-	Jan-26-2015	12:22	16,000.00	Jan-26-2015
26	Connector	Gas	10 / 90 / 50/ 98	sunny				Y [3]	1" union connector on Pressure Gauge H-601A	Jan-27-2015	9:17	Jan-27-2015	12:54	36,000.00	Jan-27-2015
27	Connector	Gas	20	Sunny	1	2	2	N	1" Elbow on Compressor by V5530G			Feb-27-2015	9:26	50,000.00	Feb-27-2015
28	Connector	Gas	95	Cloudy	0	1	2	Y [1]	at Sightglass bottom	-	-	Jan-26-2015	11:33	56,000.00	Jan-26-2015
29	Connector	Gas	50	Sunny	15	5	4	Y [2]	Compressor Crankcase Plug by LDAR Tag #7010110	Jan-22-2015	9:37	Jan-22-2015	11:32	90,000.00	Jan-22-2015
30	Connector	Gas	90	cloudy				Y [3]	1/2" Threaded Connector	Jan-28-2015	10:07	Jan-29-2015	12:28	104,501.00	Jan-29-2015
31	Connector	Gas	90	cloudy				Y [3]	Assorted Compressor Fittings	Jan-28-2015	10:44	Jan-29-2015	13:51	104,501.00	Jan-29-2015
32	Connector	Gas	90	cloudy				Y [3]	Tubing Connector	Jan-28-2015	10:38	Jan-29-2015	13:44	104,501.00	Jan-29-2015
33	Connector	Gas	100	cloudy	4	0	1	Y	on a pressure Gauge	-	-	Jan-20-2015	14:15	128,960.00	Jan-20-2015
34	Connector	Gas	10	sunny	1	1	2	N	3" Threaded Connector	-	-	Feb-23-2015	11:49	130,001.00	Feb-23-2015
35	Connector	Gas	50	light cloudy				Y [3]	Threaded Connector	Jan-29-2015	9:52	Jan-29-2015	10:57	160,000.00	Jan-29-2015
36	Connector	Gas	100	cloudy	0	3	2	Y	Compressor Plug	Jan-20-2015	-	Jan-20-2015	9:44	174,000.00	Jan-20-2015
37	Connector	Gas	0	Sunny	1	1	1	N	Plug on top of wellhead			12-Aug-15	12:02	498,000.00	12-Aug-15
38	Flange	Gas	2.3	Sunny	3	11	2	Y [2]	on Compressor No.350	-	-	Jan-21-2015	12:35	0.06	Jan-21-2015
39	Flange	Gas	100	Cloudy	0	0	1	Y [1]	2"	-	-	Jan-26-2015	14:38	1.31	Jan-26-2015
40	Flange	Gas	100	Cloudy	0	0	1	Y [1]	2"	-	-	Jan-26-2015	14:20	1.77	Jan-26-2015
41	Flange	Gas	70	Cloudy	4	7	2	N	4" on V10749	-	-	Feb-25-2015	13:18	15.00	Feb-25-2015
42	Flange	Gas	10	sunny	4	7	2	N	on compressor	-	-	Feb-26-2015	9:38	40.00	Feb-26-2015
43	Flange	Gas	0	sunny	4	5	1	N	at compressor	-	-	Feb-24-2015	13:20	40.00	Feb-24-2015
44	Flange	Gas	10	sunny	1	1	2	N	4" flange on compressor	-	-	Feb-23-2015	12:30	49.00	Feb-23-2015
45	Flange	Gas	0	sunny	4	5	1	N	at compressor	-	-	Feb-24-2015	13:38	111.00	Feb-24-2015
46	Flange	Gas	10 / 90 / 50/ 98	sunny				Y [3]	2"	-	-	Jan-27-2015	14:55	300.00	Jan-27-2015
47	Flange	Gas	10%	sunny	1	1	2	N	3" at compression	-	-	Feb-23-2015	10:56	349.00	Feb-23-2015
48	Flange	Gas	10 / 90 / 50/ 98	sunny				Y [3]	2"	-	-	Jan-27-2015	14:42	358.00	Jan-27-2015
49	Flange	Gas	10	Sunny	1	2	1	N	24-inch on compressor @ end of piston			12-Aug-15	10:35	500.00	12-Aug-15
50	Flange	Gas	10	Sunny	1	2	1	N	12-inch on compressor			12-Aug-15	10:32	700.00	12-Aug-15
51	Flange	Gas	0	Sunny	1	1	1	N	12-inch on compressor			14-Aug-15	12:24	1,100.00	14-Aug-15

Section 2, Appendix A: Field & Lab Data & Calculations

Note: results with all values = zero are hidden, see Appendix E for Descriptive Statistics for all leak

Sort order, sorted by Component Type, & Method 21 Concentration, ppmv	Component Information			Flow #1					Flow #2						Average						HIGH FLOW SAMPLER DATA CALCULATED
	Component Type	Service	Time	Temperature (Degree C)	Flow CFM	Bkg %	%CH4 (%)	% CFM	Temperature (Degree C)	Flow CFM	Bkg %	%CH4	Is the %CH4 a TVA reading?	% CFM	Temperature (°C)	Temperature (°R)	Flow CFM	Bkg %	%CH4	% CFM	Calculated CH4 Emissions Rate, kg/hr, STP, as methane
A. Components in Gas Service with TVA, HiFlow, TO-15 &																					
1	Connector	Gas	10:35	28.1	5.7	0	0.0004	0.00002	28.4	6.0	0	0.0004		0.00002	28.25	542.52	5.850	-	0.000400	0.000023	**2.64E-05**
2	Connector	Gas	10:37	25.5	7.4	0	0.000248	0.00002	25.5	6.2	0	0.0007	Y	0.00004	25.50	537.57	6.800	-	0.0007	0.00004	**5.36E-05**
3	Connector	Gas	14:36	27.6	7		0.000038	0.00000	27.7	6.0		0.000157	Y	0.00001	27.65	541.44	6.500	-	0.000157	0.00001	**1.16E-05**
4	Connector	Gas	11:05	20.9	5.3	0	0.00045	0.00000	21.00	4.9	0	0.00045	Y	0.00000	20.95	529.38	5.100	-	0.00045	0	**2.63E-05**
5	Connector	Gas	11:00	18.2	7.9	0:00	0.0094	0.00000	18.3	6.5	0	0.0094	Y	0.00000	18.25	524.52	7.200	-	0.0094	0.000	**7.68E-04**
6	Connector	Gas	10:43	19.8	6.2	0	0.0071	0.00000	19.80	6.0	0	0.0071	Y	0.00000	19.80	527.31	6.100	-	0.0071	0	**4.96E-04**
7	Connector	Gas	13:57	28.8	7.2	0	0.0312	0.00000	28.80	5.9	0	0.0312	Y	0.00000	28.80	543.51	6.550	-	0.0312	0	**2.29E-03**
8	Connector	Gas	11:11	18.8	7.7	0:00	0.0487	0.00000	18.90	6.4	0	0.0487	Y	0.00000	18.85	525.60	7.050	-	0.0487	0.000	**3.89E-03**
9	Connector	Gas	14:49	19.8	5.2	0	0.0037	0.00000	19.90	3.1	0	0.0037	Y	0.00000	19.85	527.40	4.150	-	0.0037	0.000	**1.74E-04**
10	Connector	Gas	11:08	21.7	4.9	0	0.0006	0.00000	21.80	4.1	0	0.0006	Y	0.00000	21.75	530.82	4.500	-	0.0006	0	**3.02E-05**
11	Connector	Gas	11:16	22.2	3.8	0	0.00068	0.00000	22.30	3.3	0	0.00068	Y	0.00000	22.25	531.72	3.550	-	0.00068	0	**2.70E-05**
12	Connector	Gas	13:53	24.6	7.3		0.000842	0.00006	24.8	6.2		0.001066	Y	0.00007	24.70	536.13	6.750	-	0.001066	0.00007	**8.17E-05**
13	Connector	Gas	13:45	24	5.4	0	0.00124	0.00000	24.00	4.5	0	0.00124	Y	0.00000	24.00	534.87	4.950	-	0.00124	0	**6.89E-05**
14	Connector	Gas	11:47	28.3	4.5	0:00	0.0016	0.00000	28.40	3.2	0	0.0016	Y	0.00000	28.35	542.70	3.850	-	0.0016	0	**6.86E-05**
15	Connector	Gas	12:41	23.6	4.7	0	0.00209	0.00000	23.60	4.0	0	0.00209	Y	0.00000	23.60	534.15	4.350	-	0.00209	0	**1.02E-04**
16	Connector	Gas	9:07	15.2	8.5		0.002	0.00017	15.3	7.0		0.0026	Y	0.00018	15.25	519.12	7.750	-	0.0026	0.00018	**2.29E-04**
17	Connector	Gas	14:08	29	7.9	0	0.0693	0.00000	29.00	6.6	0	0.0693	Y	0.00000	29.00	543.87	7.250	-	0.0693	0	**5.64E-03**
18	Connector	Gas	14:55	19.9	3.3	0	0.01	0.00000	20.00	4.8	0	0.01	Y	0.00000	19.95	527.58	4.050	-	0.0100	0.000	**4.59E-04**
19	Connector	Gas	11:37	27.8	6.4	0	0.02	0.00000	27.80	5.9	0	0.02	Y	0.00000	27.80	541.71	6.150	-	0.02	0	**1.37E-03**
20	Connector	Gas	13:30	24.4	3.1	0	0.0027	0.00000	24.40	4.2	0	0.0027	Y	0.00000	24.40	535.59	3.650	-	0.0027	0	**1.11E-04**
21	Connector	Gas	13:30	26.6	5.7	0	0.0091	0.00000	26.70	4.6	0	0.0091	Y	0.00000	26.65	539.64	5.150	-	0.0091	0	**5.24E-04**
22	Connector	Gas	10:27	33	6.6	0	0.014	0.00092	33.1	6.3	0	0.016		0.00101	33.05	551.16	6.450	-	0.015	0.00097	**1.09E-03**
23	Connector	Gas	10:45	18.7	7.9	0	0.004307	0.00034	18.7	6.5	0	0.0052	Y	0.00034	18.70	525.33	7.200	-	0.0052	0.00034	**4.29E-04**
24	Connector	GAS	9:24	26.6	7	0	0.06	0.00420	26.8	3.5	0	0.15		0.00525	26.70	539.73	5.250	-	0.105	0.00525	**6.27E-03**
25	Connector	Gas	12:20	30	6.6	0	0.00485	0.00000	30.00	5.4	0	0.00485	Y	0.00000	30.00	545.67	6.000	-	0.00485	0	**3.24E-04**
26	Connector	Gas	12:53	27.1	6.9	0	0.0365	0.00000	27.00	5.6	0	0.0365	Y	0.00000	27.05	540.36	6.250	-	0.0365	0	**2.57E-03**
27	Connector	Gas	9:33	22.8	7.4	0	1.18	0.08700	23.1	6.3	0	1.35		0.08500	22.95	532.98	6.850	-	1.35	0.08700	**1.04E-01**
28	Connector	Gas	11:33	27.4	6	0:00	0.049	0.00000	27.40	5.4	0	0.049	Y	0.00000	27.40	540.99	5.700	-	0.049	0	**3.11E-03**
29	Connector	Gas	11:32	27.9	7.2	0	0.21	0.01500	27.8	6.0	0	0.22		0.01300	27.85	541.80	7.200	-	0.22	0.01500	**1.81E-02**
30	Connector	Gas	12:28	22.9	4.5	0	0.22	0.01000	22.9	3.6	0	0.3		0.01100	22.90	532.89	4.050	-	0.26	0.01050	**1.18E-02**
31	Connector	Gas	13:51	28.5	7.2	0	0.41	0.03000	28.5	5.9	0	0.5		0.03000	28.50	542.97	6.550	-	0.455	0.03000	**3.35E-02**
32	Connector	Gas	13:44	28.1	4.6	0	2.01	0.09200	28.1	4.4	0	2.09		0.09200	28.10	542.25	4.500	-	2.05	0.09200	**1.04E-01**
33	Connector	Gas	15:07	19.9	3.8	0	0.36	0.01400	19.9	3.5	0	0.32		0.01100	19.90	527.49	3.800	-	0.36	0.01400	**1.55E-02**
34	Connector	Gas	11:49	18.5	8	0	0.67	0.05400	18.4	6.7	0	0.79		0.05300	18.45	524.88	7.350	-	0.79	0.05400	**6.60E-02**
35	Connector	Gas	10:57	20.9	3.7	0	0.1356	0.00000	21.00	3.7	0	0.1356	Y	0.00000	20.95	529.38	3.700	-	0.1356	0	**5.61E-03**
36	Connector	Gas	11:06	18.5	7.8	0	0.39	0.03000	18.5	6.4	0	0.48		0.03100	18.50	524.97	7.100	-	0.435	0.03050	**3.50E-02**
37	Connector	Gas	11:03	30.9	7.2	0	1.23	0.09000	31	5.8	0	1.4		0.08120	30.95	547.38	6.500		1.315	0.09000	**9.71E-02**
38	Flange	Gas	12:35	23.6	6.7	0	0.46	0.03100	23.5	5.9	0	0.65		0.03800	23.55	534.06	6.700	-	0.65	0.03800	**4.95E-02**
39	Flange	Gas	14:38	26.9	6.1	0	0.000149	0.00000	26.90	5.4	0	0.000149	Y	0.00000	26.90	540.09	5.750	-	0.000149	0	**9.63E-06**
40	Flange	Gas	14:20	27.1	6.5	0	0.00016	0.00000	27.10	5.3	0	0.00016	Y	0.00000	27.10	540.45	5.900	-	0.00016	0	**1.06E-05**
41	Flange	Gas	13:18	25.7	8.2		0.00004	0.00000	25.6	6.8		0.0007	Y	0.00005	25.65	537.84	7.500	-	0.0007	0.00005	**6.00E-05**
42	Flange	Gas	9:38	18.2	6.8		0.00039	0.00003	18.3	5.6		0.00046	Y	0.00003	18.25	524.52	6.200	-	0.00046	0.00003	**3.24E-05**
43	Flange	Gas	13:20	25.1	8.2	0	0.0067	0.00055	25.2	6.6	0	0.0091	Y	0.00060	25.15	536.94	7.400	-	0.0091	0.00060	**7.71E-04**
44	Flange	Gas	12:30	16.3	7.4	0	0	0.00000	16.4	6.1	0	0.0074	Y	0.00045	16.35	521.10	6.750	-	0.0074	0.00045	**5.68E-04**
45	Flange	Gas	13:38	28.1	7.8	0	0.0219	0.00171	28.2	6.5	0	0.0107	Y	0.00070	28.15	542.34	7.150	-	0.0219	0.00171	**1.79E-03**
46	Flange	Gas	14:55	27	6.8	0	0.000463	0.00000	27.00	5.7	0	0.000463	Y	0.00000	27.00	540.27	6.250	-	0.000463	0	**3.26E-05**
47	Flange	Gas	10:56	17.7	8	0	0	0.00000	17.9	6.6	0	0.0345	Y	0.00000	17.80	523.71	7.300	-	0.0345	0.00000	**2.86E-03**
48	Flange	Gas	14:41	26.9	6.2	0:00	0.0249	0.00000	26.90	5.1	0	0.0249	Y	0.00000	26.90	540.09	5.650	-	0.0249	0	**1.58E-03**
49	Flange	Gas	9:36	32.8	6.5	0	0.052	0.00338	32.8	5.3	0	0.095	Y	0.00504	32.80	550.71	5.900		0.0735	0.00504	**4.90E-03**
50	Flange	Gas	9:33	32.5	7.2	0	0.0428	0.00308	32.6	6.0	0.05	0.0922	Y	0.00253	32.55	550.26	6.600		0.0675	0.00308	**5.03E-03**
51	Flange	Gas	11:25	33	7.4	0	0.057	0.00422	33.1	6.1	0	0.066		0.00403	33.05	551.16	6.750	-	0.0615	0.00422	**4.72E-03**

Section 2, Appendix A: Field & Lab Data & Calculations

Note: results with all values = zero are hidden, see Appendix E for Descriptive Statistics for all leak

Sort order, sorted by Component Type, & Method 21 Concentration, ppmv	Component Information					CANISTER DATA						TEDLAR BAG DATA						EPA METHOD TO-15 CONCENTRATION DATA	
			CALCULATED	CALCULATED	CALCULATED										ppmv @ STP	ppmv @ STP	ppmv @ STP	ppmv @ STP	ppmv @ STP
																		58.079	78.112
	Component Type	Service	Log10 TVA as CH4, ppmv	Log10 CH4 EmRate, kg/hr, as methane	Log10 TOC of Linked TOC Emissions Estimates, kg/hr	Sample #	Date	Time	Can ID	Can I-Vac (in Hg)	Can F-Vac (in Hg)	Sample(s) #	Date	Time	1,3,5-Trimethyl benzene	2-Hexanone	4-Ethyltoluene	Acetone	Benzene
A. Components in Gas Service with TVA, HiFlow, TO-15 &																			
1	Connector	Gas	**0.60**	**-4.58**															
2	Connector	Gas	**1.00**	**-4.27**															
3	Connector	Gas	**1.20**	**-4.94**															
4	Connector	Gas	**1.57**	**-4.58**															
5	Connector	Gas	**1.70**	**-3.11**															
6	Connector	Gas	**1.79**	**-3.30**	**-2.84**	CAN010	Jan-23-2015	10:48	OEC-29-701	28.5	0	TB010	Jan-23-2015	10:52	ND	ND	ND	ND	2.20E+02
7	Connector	Gas	**2.13**	**-2.64**															
8	Connector	Gas	**2.30**	**-2.41**															
9	Connector	Gas	**2.48**	**-3.76**															
10	Connector	Gas	**2.70**	**-4.52**															
11	Connector	Gas	**2.83**	**-4.57**															
12	Connector	Gas	**2.85**	**-4.09**	**-5.76**							TB030A/TB030B	Feb-26-2015	13:53	ND	ND	ND	ND	ND
13	Connector	Gas	**2.90**	**-4.16**															
14	Connector	Gas	**3.00**	**-4.16**															
15	Connector	Gas	**3.04**	**-3.99**															
16	Connector	Gas	**3.25**	**-3.64**															
17	Connector	Gas	**3.30**	**-2.25**															
18	Connector	Gas	**3.34**	**-3.34**															
19	Connector	Gas	**3.38**	**-2.86**															
20	Connector	Gas	**3.41**	**-3.96**															
21	Connector	Gas	**3.66**	**-3.28**															
22	Connector	Gas	**3.89**	**-2.96**															
23	Connector	Gas	**3.89**	**-3.37**															
24	Connector	GAS	**4.09**	**-2.20**															
25	Connector	Gas	**4.20**	**-3.49**															
26	Connector	Gas	**4.56**	**-2.59**															
27	Connector	Gas	**4.70**	**-0.98**															
28	Connector	Gas	**4.75**	**-2.51**															
29	Connector	Gas	**4.95**	**-1.74**	**-1.91**	CAN008	Jan-22-2015	0.484027778	OEC-117-42	28	0	TB008	Jan-22-2015	11:40	ND	ND	ND	ND	ND
30	Connector	Gas	**5.02**	**-1.93**															
31	Connector	Gas	**5.02**	**-1.48**															
32	Connector	Gas	**5.02**	**-0.98**															
33	Connector	Gas	**5.11**	**-1.81**	**-2.08**	CAN003	Jan-20-2015	0.631944444	OEC-29-706	28.25	0	TB003	Jan-20-2015	15:16	1.60E+02	ND	2.10E+02	5.70E+02	7.80E+01
34	Connector	Gas	**5.11**	**-1.18**															
35	Connector	Gas	**5.20**	**-2.25**															
36	Connector	Gas	**5.24**	**-1.46**															
37	Connector	Gas	**5.70**	**-1.01**															
38	Flange	Gas	**-1.23**	**-1.31**	**-0.89**	CAN005	Jan-21-2015	0.527777778	OEC-117-32	28	5.6	TB005	Jan-21-2015	12:42	ND	ND	4.00E+01	ND	2.20E+03
39	Flange	Gas	**0.12**	**-5.02**															
40	Flange	Gas	**0.25**	**-4.97**															
41	Flange	Gas	**1.18**	**-4.22**															
42	Flange	Gas	**1.60**	**-4.49**															
43	Flange	Gas	**1.60**	**-3.11**															
44	Flange	Gas	**1.69**	**-3.25**															
45	Flange	Gas	**2.05**	**-2.75**	**-5.72**							TB027A/TB027B	Feb-24-2015	13:40	ND	ND	ND	ND	ND
46	Flange	Gas	**2.48**	**-4.49**															
47	Flange	Gas	**2.54**	**-2.54**								TB024A/TB024B	Feb-23-2015	11:01	ND	ND	ND	ND	ND
48	Flange	Gas	**2.55**	**-2.80**															
49	Flange	Gas	**2.70**	**-2.31**															
50	Flange	Gas	**2.85**	**-2.30**															
51	Flange	Gas	**3.04**	**-2.33**															

Section 2, Appendix A: Field & Lab Data & Calculations

Note: results with all values = zero are hidden, see Appendix E for Descriptive Statistics for all leak

Sort order, sorted by Component Type, & Method 21 Concentration, ppmv	Component Information																METHOD TO-15 Calculated Emissions			METHOD TO-15 Calculated Emissions		
	Component Type	Service	ppmv @ STP	ppmv @ STP	ppmv @ STP	ppmv @ STP	ppmv @ STP	ppmv @ STP	ppmv @ STP	ppmv @ STP	ppmv @ STP	ppmv @ STP	ppmv @ STP	ppmv @ STP	ppmv @ STP	ppmv @ STP	ppmv @ STP	kg/hr	kg/hr	kg/hr	kg/hr	kg/hr	kg/hr
			76.139		84.16	46.068	88.11	106.165	100.21		86.18	60.1	100.16	92.14	105	131.4	106.165	120.19	120.19	100.16	120.1916	58.079	78.112
			Carbon disulfide	Chlorobenzene	Cyclohexane	Ethanol	Ethyl Acetate	Ethylbenzene	Heptane	Hexachlorobutadiene	Hexane	Isopropyl alcohol	Methyl Isobutyl Ketone	Toluene	TPH Gasoline (C4-C12)	Trichloroethene (TCE)	Xylenes (total)	1,2,4-Trimethyl-benzene	1,3,5-Trimethyl-benzene	2-Hexanone	4-Ethyltoluene	Acetone	Benzene
A. Components in Gas Service with TVA, HiFlow, TO-15																							
1	Connector	Gas																					
2	Connector	Gas																					
3	Connector	Gas																					
4	Connector	Gas																					
5	Connector	Gas																					
6	Connector	Gas	ND	ND	8.10E+02	ND	ND	ND	4.40E+02	ND	1.50E+03	ND	ND	1.80E+01	2.90E+04	ND	1.10E+01	-	-	-	-	-	7.4825E-06
7	Connector	Gas																					
8	Connector	Gas																					
9	Connector	Gas																					
10	Connector	Gas																					
11	Connector	Gas																					
12	Connector	Gas	ND	ND	ND	6.10E+01	ND	ND	ND	ND	ND	ND	ND	9.80E+00	ND	ND	ND	-	-	-	-	-	-
13	Connector	Gas																					
14	Connector	Gas																					
15	Connector	Gas																					
16	Connector	Gas																					
17	Connector	Gas																					
18	Connector	Gas																					
19	Connector	Gas																					
20	Connector	Gas																					
21	Connector	Gas																					
22	Connector	Gas																					
23	Connector	Gas																					
24	Connector	GAS																					
25	Connector	Gas																					
26	Connector	Gas																					
27	Connector	Gas																					
28	Connector	Gas																					
29	Connector	Gas	ND	ND	ND	3.90E+02	ND	ND	ND	ND	ND	ND	ND	8.40E+01	ND	ND	ND	-	-	-	-	-	-
30	Connector	Gas																					
31	Connector	Gas																					
32	Connector	Gas																					
33	Connector	Gas	ND	ND	1.60E+03	ND	ND	7.80E+01	4.60E+02	ND	2.60E+03	1.30E+02	ND	8.00E+01	9.00E+04	ND	2.90E+02	1.2575E-05	5.1591E-06	-	6.7714E-06	8.8813E-06	1.6345E-06
34	Connector	Gas																					
35	Connector	Gas																					
36	Connector	Gas																					
37	Connector	Gas																					
38	Flange	Gas	ND	ND	4.40E+03	2.10E+02	ND	7.80E+01	1.90E+03	ND	1.00E+04	6.80E+02	1.20E+02	1.50E+03	3.30E+05	ND	2.40E+02	2.5917E-06	-	-	2.2536E-06	-	8.0555E-05
39	Flange	Gas																					
40	Flange	Gas																					
41	Flange	Gas																					
42	Flange	Gas																					
43	Flange	Gas																					
44	Flange	Gas																					
45	Flange	Gas	ND	ND	ND	8.40E+01	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	-	-	-	-	-	-
46	Flange	Gas																					
47	Flange	Gas	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	-	-	-	-	-	-
48	Flange	Gas																					
49	Flange	Gas																					
50	Flange	Gas																					
51	Flange	Gas																					

Section 2, Appendix A: Field & Lab Data & Calculations

Note: results with all values = zero are hidden, see Appendix E for Descriptive Statistics for all leak

Sort order, sorted by Component Type, & Method 21 Concentration, ppmv	Component Information															ASTM 1945/3588 Concentration Data				
	Component Type	Service	kg/hr	kg/hr	kg/hr	kg/hr	kg/hr	kg/hr	kg/hr	kg/hr	kg/hr	kg/hr	kg/hr	kg/hr	kg/hr					
			76.139	112.56	84.16	46.068	88.11	106.165	100.21	86.18	60.1	100.16	92.14	105	131.4	106.165					
			Carbon disulfide	Chlorobenzene	Cyclohexane	Ethanol	Ethyl Acetate	Ethylbenzene	Heptane	Hexane	Isopropyl alcohol	Methyl Isobutyl Ketone	Toluene	TPH Gasoline (C4-C12)	Trichloroethene (TCE)	Xylenes (total)	Oxygen (Mol%)	Oxygen (ppb)	Nitrogen (Mol%)	Nitrogen (ppb)	Hydrogen (Mol%)
A. Components in Gas Service with TVA, HiFlow, TO-15 &																				
1	Connector	Gas																		
2	Connector	Gas																		
3	Connector	Gas																		
4	Connector	Gas																		
5	Connector	Gas																		
6	Connector	Gas	-	-	2.9682E-05	-	-	-	1.9199E-05	5.6287E-05	-	-	7.2215E-07	1.3259E-03	-	5.0849E-07	2.1483E+01	2.1483E+08	7.8476E+01	7.8476E+08	-
7	Connector	Gas																		
8	Connector	Gas																		
9	Connector	Gas																		
10	Connector	Gas																		
11	Connector	Gas																		
12	Connector	Gas	-	-	-	1.3211E-06	-	-	-	-	-	-	4.2451E-07	-	-	-	2.1559E+01	2.1559E+08	7.8398E+01	7.8398E+08	-
13	Connector	Gas																		
14	Connector	Gas																		
15	Connector	Gas																		
16	Connector	Gas																		
17	Connector	Gas																		
18	Connector	Gas																		
19	Connector	Gas																		
20	Connector	Gas																		
21	Connector	Gas																		
22	Connector	Gas																		
23	Connector	Gas																		
24	Connector	GAS																		
25	Connector	Gas																		
26	Connector	Gas																		
27	Connector	Gas																		
28	Connector	Gas																		
29	Connector	Gas	-	-	-	8.9778E-06	-	-	-	-	-	-	3.8675E-06	-	-	-	2.1482E+01	2.1482E+08	7.8344E+01	7.8344E+08	-
30	Connector	Gas																		
31	Connector	Gas																		
32	Connector	Gas																		
33	Connector	Gas	-	-	3.6125E-05	-	-	2.2216E-06	1.2367E-05	6.0112E-05	2.0960E-06	-	1.9775E-06	2.5352E-03	-	8.2597E-06	2.1354E+01	2.1354E+08	7.8390E+01	7.8390E+08	-
34	Connector	Gas																		
35	Connector	Gas																		
36	Connector	Gas																		
37	Connector	Gas																		
38	Flange	Gas	-	-	1.7358E-04	4.5349E-06	-	3.8817E-06	8.9251E-05	4.0398E-04	1.9157E-05	5.6341E-06	6.4787E-05	1.6243E-02	-	1.1944E-05	2.1273E+01	2.1273E+08	7.7575E+01	7.7575E+08	-
39	Flange	Gas																		
40	Flange	Gas																		
41	Flange	Gas																		
42	Flange	Gas																		
43	Flange	Gas																		
44	Flange	Gas																		
45	Flange	Gas	-	-	-	1.9222E-06	-	-	-	-	-	-	-	-	-	-	2.1569E+01	2.1569E+08	7.8388E+01	7.8388E+08	-
46	Flange	Gas																		
47	Flange	Gas	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2.1533E+01	2.1533E+08	7.8447E+01	7.8447E+08	-
48	Flange	Gas																		
49	Flange	Gas																		
50	Flange	Gas																		
51	Flange	Gas																		

Section 2, Appendix A: Field & Lab Data & Calculations

Note: results with all values = zero are hidden, see Appendix E for Descriptive Statistics for all leak

Sort order, sorted by Component Type, & Method 21 Concentration, ppmv	Component Information: Component Type	Service	Hydrogen (ppb)	Carbon Dioxide (Mol%)	Carbon Dioxide (ppb)	Carbon Monoxide (Mol%)	Carbon Monoxide (ppb)	Methane (Mol%)	Methane (ppb)	Ethane (Mol%)	Ethane (ppb)	Propane (Mol%)	Propane (ppb)	i-Butane (Mol%)	i-Butane (ppb)	n-Butane (Mol%)	n-Butane (ppb)	i-Pentane (Mol%)	ASTM 1945/3588 Concentration Data: i-Pentane (ppb)	n-Pentane (Mol%)	n-Pentane (ppb)	ASTM 1945/3588 Emissions (kg/hr): Oxygen	Nitrogen	Hydrogen	Carbon Monoxide	Carbon Dioxide
																						31.9988	28.0134	2.01	28.0106	44.01
A. Components in Gas Service with TVA, HiFlow, TO-15																										
1	Connector	Gas																								
2	Connector	Gas																								
3	Connector	Gas																								
4	Connector	Gas																								
5	Connector	Gas																								
6	Connector	Gas	-	4.0408E-02	4.0408E+05	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2.9933E+00	9.5722E+00	-	-	7.7433E-03
7	Connector	Gas																								
8	Connector	Gas																								
9	Connector	Gas																								
10	Connector	Gas																								
11	Connector	Gas																								
12	Connector	Gas	-	4.2709E-02	4.2709E+05	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3.2432E+00	1.0325E+01	-	-	8.8365E-03
13	Connector	Gas																								
14	Connector	Gas																								
15	Connector	Gas																								
16	Connector	Gas																								
17	Connector	Gas																								
18	Connector	Gas																								
19	Connector	Gas																								
20	Connector	Gas																								
21	Connector	Gas																								
22	Connector	Gas																								
23	Connector	Gas																								
24	Connector	GAS																								
25	Connector	Gas																								
26	Connector	Gas																								
27	Connector	Gas																								
28	Connector	Gas																								
29	Connector	Gas	-	4.4301E-02	4.4301E+05	-	-	1.1557E-01	1.1557E+06	-	-	1.3587E-02	1.3587E+05	-	-	-	-	-	-	-	-	3.4350E+00	1.0967E+01	-	-	9.7426E-03
30	Connector	Gas																								
31	Connector	Gas																								
32	Connector	Gas																								
33	Connector	Gas	-	1.2396E-01	1.2396E+06	-	-	1.3181E-01	1.3181E+06	-	-	-	-	-	-	-	-	-	-	-	-	1.8332E+00	5.8913E+00	-	-	1.4636E-02
34	Connector	Gas																								
35	Connector	Gas																								
36	Connector	Gas																								
37	Connector	Gas																								
38	Flange	Gas	-	6.4582E-02	6.4582E+05	-	-	8.8723E-01	8.8723E+06	4.8231E-02	4.8231E+05	6.8058E-02	6.8058E+05	2.0348E-02	2.0348E+05	3.7402E-02	3.7402E+05	1.4742E-02	1.4742E+05	1.1443E-02	1.1443E+05	3.1909E+00	1.0187E+01	-	-	1.3323E-02
39	Flange	Gas																								
40	Flange	Gas																								
41	Flange	Gas																								
42	Flange	Gas																								
43	Flange	Gas																								
44	Flange	Gas																								
45	Flange	Gas	-	4.2967E-02	4.2967E+05	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3.4282E+00	1.0908E+01	-	-	9.3929E-03
46	Flange	Gas																								
47	Flange	Gas	-	1.9544E-02	1.9544E+05	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3.5924E+00	1.1457E+01	-	-	4.4843E-03
48	Flange	Gas																								
49	Flange	Gas																								
50	Flange	Gas																								
51	Flange	Gas																								

Section 2, Appendix A: Field & Lab Data & Calculations

Note: results with all values = zero are hidden, see Appendix E for Descriptive Statistics for all leak

Sort order, sorted by Component Type, & Method 21 Concentration, ppmv	Component Information: Component Type	Service	kg/hr 16.043 Methane	kg/hr 30.07 Ethane	kg/hr 44.097 Propane	kg/hr 58.123 i-Butane	kg/hr 58.123 n-Butane	kg/hr 72.15 i-Pentane	kg/hr 72.15 n-Pentane	kg/hr CALCULATED TOC, kg/hr (does not incl. TPH)
A. Components in Gas Service with TVA, HiFlow, TO-15										
1	Connector	Gas								
2	Connector	Gas								
3	Connector	Gas								
4	Connector	Gas								
5	Connector	Gas								
6	Connector	Gas	-	-	-	-	-	-	-	1.4397E-03
7	Connector	Gas								
8	Connector	Gas								
9	Connector	Gas								
10	Connector	Gas								
11	Connector	Gas								
12	Connector	Gas	-	-	-	-	-	-	-	1.7456E-06
13	Connector	Gas								
14	Connector	Gas								
15	Connector	Gas								
16	Connector	Gas								
17	Connector	Gas								
18	Connector	Gas								
19	Connector	Gas								
20	Connector	Gas								
21	Connector	Gas								
22	Connector	Gas								
23	Connector	Gas								
24	Connector	GAS								
25	Connector	Gas								
26	Connector	Gas								
27	Connector	Gas								
28	Connector	Gas								
29	Connector	Gas	9.2648E-03	-	2.9940E-03	-	-	-	-	1.2272E-02
30	Connector	Gas								
31	Connector	Gas								
32	Connector	Gas								
33	Connector	Gas	5.6732E-03	-	-	-	-	-	-	8.3666E-03
34	Connector	Gas								
35	Connector	Gas								
36	Connector	Gas								
37	Connector	Gas								
38	Flange	Gas	6.6723E-02	6.7985E-03	1.4068E-02	5.5439E-03	1.0190E-02	4.9859E-03	3.8703E-03	1.2928E-01
39	Flange	Gas								
40	Flange	Gas								
41	Flange	Gas								
42	Flange	Gas								
43	Flange	Gas								
44	Flange	Gas								
45	Flange	Gas	-	-	-	-	-	-	-	1.9222E-06
46	Flange	Gas								
47	Flange	Gas	-	-	-	-	-	-	-	-
48	Flange	Gas								
49	Flange	Gas								
50	Flange	Gas								
51	Flange	Gas								

Section 2, Appendix A: Field & Lab Data & Calculations

Note: results with all values = zero are hidden, see Appendix E for Descriptive Statistics for all leak

Sort order, sorted by Component Type, & Method 21 Concentration, ppmv	Component Information		Site Characterization						METEOROLOGY:				METEOROLOGY:
	Component Type	Service	EQUIPMENT/ACTIVITY DESCRIPTION	DATE	REGULATORY IDs	#WELLS	FACILITY TYPE: (OIL/GAS)	THROUGHPUT(s)	WIND DIRECTION FROM	WIND SPEED (mph)	AMBIENT TEMPERATURE (F)	% RH	BAROMETRIC PRESSURE (inHg)
A. Components in Gas Service with TVA, HiFlow, TO-15 &													
52	Flange	Gas	Natural Gas Well	14-Aug-15		1	Gas	38.1 MCF/D	SE	2.4	81	49.6	29.97
53	Flange	Gas	Natural Gas Well	11-Aug-15		1	Gas	612.5 MCF/D	W	3.4	88	48.7	29.77
54	Flange	Gas	Natural Gas Well	14-Aug-15		1	Gas	38.1 MCF/D	SE	2.4	81	49.6	29.97
55	Flange	Gas	Natural Gas Well	11-Aug-15		1	Gas	612.5 MCF/D	W	3.4	88	48.7	29.77
56	Flange	Gas	Natural Gas Well	11-Aug-15		1	Gas	612.5 MCF/D	W	3.4	88	48.7	29.77
57	Flange	Gas	Natural Gas Well Site	6-Aug-15		1	Gas	0 SCFM	W	5.2	88.5	52.7	29.73
58	Flange	Gas	Natural Gas Well	14-Aug-15		1	Gas	38.1 MCF/D	SE	2.4	81	49.6	29.97
59	Flange	Gas	Water separation	29-Jan-15	TITLE V 041	0	Gas		WSW	4	81.3	34.5	29.5
60	OEL	Gas	Natural Gas Well	7-Aug-15		3 + 1 inactive	Gas	19-10: 17.8 MCF/24-1: 18.8 MCF/19.8: 142.4 MCF	E	7	73.4	56.1	29.74
61	OEL	Gas	Gas Wells	24-Feb-15	SEC.33 T-20N R-2W	5	Gas	1252.4MCF/DAY	W	3.1	57.4	24.5	30.2
62	OEL	Gas	Gas Wells	24-Feb-15	SEC.33 T-20N R-2W	5	Gas	1252.4MCF/DAY	W	3.1	57.4	24.5	30.2
63	OEL	Gas	Gas Wells	24-Feb-15	SEC.33 T-20N R-2W	5	Gas	1252.4MCF/DAY	W	3.1	57.4	24.5	30.2
64	OEL	Gas	Natural Gas Well with lift compressor and glycol dehydrator	23-Feb-15	SEC.9 T-19N R-2W	1	Gas	88.1 MCF/DAY	NNW	15.9	52.5	23.1	29.98
65	OEL	Gas	Gas Wells	24-Feb-15	SEC.33 T-20N R-2W	5	Gas	1252.4MCF/DAY	W	3.1	57.4	24.5	30.2
66	OEL	Gas	Gas Wells	25-Feb-15	SEC.33 T-20N R-2W	4	Gas	140.9MCF/DAY	N	3	60	31	30.14
67	OEL	Gas	Gas Wells	24-Feb-15	SEC.33 T-20N R-2W	5	Gas	1252.4MCF/DAY	W	3.1	57.4	24.5	30.2
68	OEL	Gas	Gas Wells	25-Feb-15	SEC.33 T-20N R-2W	4	Gas	140.9MCF/DAY	N	3	60	31	30.14
69	OEL	Gas	Natural Gas Well	7-Aug-15		3 + 1 inactive	Gas	19-10: 17.8 MCF/24-1: 18.8 MCF/19.8: 142.4 MCF	E	7	73.4	56.1	29.74
70	OEL	Gas	Natural Gas Well	13-Aug-15		1	Gas	49.1 MCF/D	SE	3.4	82.4	45	29.93
71	OEL	Gas	Gas Wells	26-Feb-15	SEC.33 T-20N R-2W	2	Gas	2098.5MCF/DAY	N	17.9	80.2	23.7	29.7
72	OEL	Gas	Natural Gas Well	11-Aug-15		1	Gas	33-34-2:140.5, 33-34-1:75.9 MCF/D	W	3.6	86.1	46.5	29.78
73	OEL	Gas	Gas Wells	27-Feb-15	SEC.33 T-20N R-2W	2	Gas	2098.5MCF/DAY	N	3	57.1	64	29.67
74	OEL	Gas	Natural Gas Well	11-Aug-15		1	Gas	33-34-2:140.5, 33-34-1:75.9 MCF/D	W	3.6	86.1	46.5	29.78
75	OEL	Gas	Natural Gas Well	12-Aug-15		1	Gas	192.3 MCF/D	SW	3.9	83	44.6	29.96
76	OEL	Gas	Natural Gas Well	14-Aug-15		1	Gas	38.1 MCF/D	SE	2.4	81	49.6	29.97
77	OEL	Gas	Gas Wells	26-Feb-15	SEC.33 T-20N R-2W	4	Gas	140.9MCF/DAY	N	1.3	46	50	29.93
78	OEL	Gas	Natural Gas Well	14-Aug-15		1	Gas	149.9 MCF/D	SE	3.7	86	38.5	29.95
79	OEL	Gas	Natural Gas Well	13-Aug-15		1	Gas	49.1 MCF/D	SE	3.4	82.4	45	29.93
80	OEL	Gas	Natural Gas Well	13-Aug-15		2	Gas	32-12: 71.8 MCF/D, 32-14: 80 MCFD,	SE	3.2	89	38.8	29.91
81	OEL	Gas	Natural Gas Well	11-Aug-15		1	Gas	612.5 MCF/D	W	3.4	88	48.7	29.77
82	OEL	Gas	Natural Gas Well with lift compressor and glycol dehydrator	23-Feb-15	SEC.9 T-19N R-2W	1	Gas	88.1 MCF/DAY	NNW	15.9	52.5	23.1	29.98
83	OEL	Gas	Natural Gas Well	7-Aug-15		3 + 1 inactive	Gas	19-10: 17.8 MCF/24-1: 18.8 MCF/19.8: 142.4 MCF	E	7	73.4	56.1	29.74
84	OEL	Gas	Natural Gas Well	14-Aug-15		1	Gas	62.5 MCF/D	W	5.7	72.1	52.2	29.97
85	OEL	Gas	Natural Gas Well	12-Aug-15		1	Gas	179 MCF/D	SW	2.5	85.2	42.8	29.94
86	OEL	Gas	Gas Wells	24-Feb-15	SEC.33 T-20N R-2W	5	Gas	1252.4MCF/DAY	W	3.1	57.4	24.5	30.2
87	OEL	Gas	Gas Wells	26-Feb-15	SEC.33 T-20N R-2W	4	Gas	140.9MCF/DAY	N	1.3	46	50	29.93
88	OEL	Gas	Gas Wells	27-Feb-15	SEC.33 T-20N R-2W	2	Gas	2098.5MCF/DAY	N	3	57.1	64	29.67
89	OEL	Gas	Gas Wells	27-Feb-15	SEC.33 T-20N R-2W	2	Gas	2098.5MCF/DAY	N	3	57.1	64	29.67
90	OEL	Gas	Gas Wells	27-Feb-15	SEC.33 T-20N R-2W	2	Gas	2098.5MCF/DAY	N	3	57.1	64	29.67
91	OEL	Gas	Natural Gas Well	7-Aug-15		3 + 1 inactive	Gas	19-10: 17.8 MCF/24-1: 18.8 MCF/19.8: 142.4 MCF	E	7	73.4	56.1	29.74
92	OEL	Gas	Natural Gas Well	11-Aug-15		1	Gas	33-34-2:140.5, 33-34-1:75.9 MCF/D	W	3.6	86.1	46.5	29.78
93	OEL	Gas	Natural Gas Well	11-Aug-15		1	Gas	612.5 MCF/D	W	3.4	88	48.7	29.77
94	Other	Gas	Gas Wells	26-Feb-15	SEC.33 T-20N R-2W	4	Gas	140.9MCF/DAY	N	1.3	46	50	29.93
95	Other	Gas	Gas Wells	27-Feb-15	SEC.33 T-20N R-2W	2	Gas	2098.5MCF/DAY	N	3	57.1	64	29.67
96	Other	Gas	Natural Gas Well	7-Aug-15		3 (25-17 inactive)	Gas	30-10: 78.4 MCF/25-17:0/30-6:134.6 MCF	W	0.8	97.2	30.7	29.73
97	Other	Gas	Natural Gas Well	12-Aug-15		1	Gas	179 MCF/D	SW	2.5	85.2	42.8	29.94
98	Other	Gas	Gas Wells	25-Feb-15	SEC.33 T-20N R-2W	4	Gas	140.9MCF/DAY	N	3	60	31	30.14
99	Other	Gas	Natural Gas Well	7-Aug-15		3 (25-17 inactive)	Gas	30-10: 78.4 MCF/25-17:0/30-6:134.6 MCF	W	0.8	97.2	30.7	29.73
100	Other	Gas	Gas Wells	26-Feb-15	SEC.33 T-20N R-2W	4	Gas	140.9MCF/DAY	N	1.3	46	50	29.93
101	Other	Gas	Oil Water Gas Separation	20-Jan-15	LAFD #2990	5	Oil	44 bb/day oil, 51 bb/day water	ESE	4.5	57.2	70.5	29.9
102	Other	Gas	Oil	22-Jan-15	39632	10	Oil	150 bbls/day Oil, 1000 bbls/day Water	ESE	1.7	76.3	41.8	30.14
103	Other	Gas	Gas Wells	25-Feb-15	SEC.33 T-20N R-2W	4	Gas	140.9MCF/DAY	N	3	60	31	30.14

Section 2, Appendix A: Field & Lab Data & Calculations

Note: results with all values = zero are hidden, see Appendix E for Descriptive Statistics for all leak

Y [2] = Y, Avanti
Y [3] = Y, Operator run with Eagle
Y [4] = Y, Operator run with Eagle quarterly
Y [5] = Y, Quarterly, Summit

Sort order, sorted by Component Type, & Method 21 Concentration, ppmv	Component Information: Component Type	Service	% CLOUD COVER	WEATHER (sunny, cloudy, fair, fog, haze, light rain, heavy rain)	Site Characterization: # SEPARATORS	# TANKS	# COMPRESSORS	DOES SITE HAVE LDAR PLAN? (Y/N)	Component Information: Description	IR CAMERA: Date	IR CAMERA: Time	EPA Method 21 Results: Date	EPA Method 21 Results: Time	EPA Method 21 Results: Method 21 Leak Concentration, ppmv	HIGH FLOW SAMPLER DATA: Date
A. Components in Gas Service with TVA, HiFlow, TO-15 &															
52	Flange	Gas	0	Sunny	1	1	1	N	12-INCH ON COMPRESSOR			14-Aug-15	12:21	1,500.00	14-Aug-15
53	Flange	Gas	10	Sunny	1	2	1	N	32-inch on compressor			12-Aug-15	10:38	1,700.00	12-Aug-15
54	Flange	Gas	0	Sunny	1	1	1	N	12-INCH ON LINE BELOW COMPRESSOR			14-Aug-15	12:28	2,000.00	14-Aug-15
55	Flange	Gas	10	Sunny	1	2	1	N	24-inch on compressor @ end of piston			12-Aug-15	10:23	6,000.00	12-Aug-15
56	Flange	Gas	10	Sunny	1	2	1	N	12-inch on compressor			12-Aug-15	10:27	7,000.00	12-Aug-15
57	Flange	Gas	85	Cloudy	2	1	1	N	6-inch			6-Aug-15	14:50	27,000.00	6-Aug-15
58	Flange	Gas	0	Sunny	1	1	1	N	32-INCH AT END OF COMPRESSOR PISTON			14-Aug-15	12:33	116,000.00	14-Aug-15
59	Flange	Gas	50	light cloudy				Y [3]	4''	-	-	Jan-29-2015	11:29	130,000.00	Jan-29-2015
60	OEL	Gas	80	Cloudy/overcast	1	5	1	N	3/8-inch			7-Aug-15	10:55	1.13	7-Aug-15
61	OEL	Gas	0	sunny	4	5	1	N	1/2''	-	-	Feb-24-2015	11:02	1.56	Feb-24-2015
62	OEL	Gas	0	sunny	4	5	1	N	1/4''	-	-	Feb-24-2015	10:59	1.82	Feb-24-2015
63	OEL	Gas	0	sunny	4	5	1	N	1/2''	-	-	Feb-24-2015	11:07	1.87	Feb-24-2015
64	OEL	Gas	10	sunny	1	1	2	N	at Vessel S90 V-11053	-	-	Feb-23-2015	12:17	3.80	Feb-23-2015
65	OEL	Gas	0	sunny	4	5	1	N	1/2''	-	-	Feb-24-2015	12:58	12.00	Feb-24-2015
66	OEL	Gas	70	Cloudy	4	7	2	N	3/8'' on P47	-	-	Feb-25-2015	13:34	20.00	Feb-25-2015
67	OEL	Gas	0	sunny	4	5	1	N	at compressor	-	-	Feb-24-2015	14:29	30.00	Feb-24-2015
68	OEL	Gas	70	Cloudy	4	7	2	N	1/4'' on P47	-	-	Feb-25-2015	13:30	30.00	Feb-25-2015
69	OEL	Gas	80	Cloudy/overcast	1	5	1	N	1/2" Qwik Disconnect			7-Aug-15	11:00	119.00	7-Aug-15
70	OEL	Gas	0	Sunny	2	1	1	N	1-inch OEL @ Separator 3282			13-Aug-15	11:16	200.00	13-Aug-15
71	OEL	Gas	30	sunny	1	2	2	N	3/8'' at compressor	-	-	Feb-26-2015	14:58	350.00	Feb-26-2015
72	OEL	Gas	15	Sunny	3	1	1	N	3/4" @ METER			11-Aug-15	12:29	350.00	11-Aug-15
73	OEL	Gas	20	Sunny	1	2	2	N	Drip Oil Bucket			Feb-27-2015	10:20	350.00	Feb-27-2015
74	OEL	Gas	15	Sunny	3	1	1	N	3/4" spherical well tester			11-Aug-15	12:45	450.00	11-Aug-15
75	OEL	Gas	0	Sunny	1	1	1	N	Valve Bleeder			12-Aug-15	11:51	1,500.00	12-Aug-15
76	OEL	Gas	0	Sunny	1	1	1	N	1/4 AT END OF COMPRESSOR			14-Aug-15	12:09	3,000.00	14-Aug-15
77	OEL	Gas	10	sunny	4	7	2	N	at compressor	-	-	Feb-26-2015	9:28	5,000.00	Feb-26-2015
78	OEL	Gas	5	Sunny	1	1	1	N	3/8-INCH ON COMPRESSOR			14-Aug-15	14:08	9,800.00	14-Aug-15
79	OEL	Gas	0	Sunny	2	1	1	N	1-inch OEL @ Separator 3282			13-Aug-15	11:20	10,000.00	13-Aug-15
80	OEL	Gas	0	Sunny	1	2	1	N	1/2-inch on OOS vessel by large compressor			13-Aug-15	13:16	10,000.00	13-Aug-15
81	OEL	Gas	10	Sunny	1	2	1	N	1-inch on compressor			12-Aug-15	10:19	26,000.00	12-Aug-15
82	OEL	Gas	10	sunny	1	1	2	N	Oil Drain Bucket on compressor engine	-	-	Feb-23-2015	11:12	57,000.00	Feb-23-2015
83	OEL	Gas	80	Cloudy/overcast	1	5	1	N	1/4" vent			7-Aug-15	11:15	83,160.00	7-Aug-15
84	OEL	Gas	0	Sunny	1	2	1	N	AT END OF COMPRESSOR			14-Aug-15	10:32	90,000.00	14-Aug-15
85	OEL	Gas	0	Sunny	2	1	1	N	1/2-inch on Compressor Body			12-Aug-15	13:01	90,000.00	12-Aug-15
86	OEL	Gas	0	sunny	4	5	1	N	at compressor	-	-	Feb-24-2015	13:29	100,000.00	Feb-24-2015
87	OEL	Gas	10	sunny	4	7	2	N	on metering pad	-	-	Feb-26-2015	14:17	100,001.00	Feb-26-2015
88	OEL	Gas	20	Sunny	1	2	2	N	On Compressor Piston Heads by V-4003E			Feb-27-2015	9:52	100,001.00	Feb-27-2015
89	OEL	Gas	20	Sunny	1	2	2	N	On Compressor piston heads by V-4003A			Feb-27-2015	10:04	300,000.00	Feb-27-2015
90	OEL	Gas	20	Sunny	1	2	2	N	at compressor by V5330D above viewing window			Feb-27-2015	9:16	400,000.00	Feb-27-2015
91	OEL	Gas	80	Cloudy/overcast	1	5	1	N	1/4" Vent			7-Aug-15	11:33	420,001.00	7-Aug-15
92	OEL	Gas	15	Sunny	3	1	1	N	1/2" on meter			11-Aug-15	12:22	500,001.00	11-Aug-15
93	OEL	Gas	10	Sunny	1	2	1	N	1-inch on compressor			12-Aug-15	10:05	500,001.00	12-Aug-15
94	Other	Gas	10	sunny	4	7	2	N	PRV Weep hole on compressor V4016E	-	-	Feb-26-2015	9:34	11.00	Feb-26-2015
95	Other	Gas	20	Sunny	1	2	2	N	Meter on Small Blue Compressor			Feb-27-2015	11:12	20.00	Feb-27-2015
96	Other	Gas	30	Sunny	3	2	1	N	Pressure Regulator			7-Aug-15	13:55	30.00	7-Aug-15
97	Other	Gas	0	Sunny	2	1	1	N	Pressure Regulator Vent			12-Aug-15	12:57	68.00	12-Aug-15
98	Other	Gas	70	Cloudy	4	7	2	N	Controller valve actuator on dehydrator P32 V10870	-	-	Feb-25-2015	14:19	71.00	Feb-25-2015
99	Other	Gas	30	Sunny	3	2	1	N	Level Controller			7-Aug-15	13:41	90.00	7-Aug-15
100	Other	Gas	10	sunny	4	7	2	N	level control on compressor	-	-	Feb-26-2015	10:02	300.00	Feb-26-2015
101	Other	Gas	100	cloudy	0	3	2	Y	Gas Regulator	-	-	Jan-20-2015	10:00	300.00	Jan-20-2015
102	Other	Gas	50	Sunny	15	5	4	Y [2]	Plexiglas cover plate on vapor recovery compressor	-	-	Jan-22-2015	12:00	356.00	Jan-22-2015
103	Other	Gas	70	Cloudy	4	7	2	N	Gas regulator on V10749	-	-	Feb-25-2015	13:07	585.00	Feb-25-2015

Section 2, Appendix A: Field & Lab Data & Calculations

Note: results with all values = zero are hidden, see Appendix E for Descriptive Statistics for all leak

Sort order, sorted by Component Type, & Method 21 Concentration, ppmv	Component Information: Component Type	Service	Flow #1: Time	Flow #1: Temperature (Degree C)	Flow #1: Flow CFM	Flow #1: Bkg %	Flow #1: %CH4 (%)	Flow #1: % CFM	Flow #2: Temperature (Degree C)	Flow #2: Flow CFM	Flow #2: Bkg %	Flow #2: %CH4	Is the %CH4 a TVA reading?	Flow #2: % CFM	Average: Temperature (°C)	Average: Temperature (°R)	Average: Flow CFM	Average: Bkg %	Average: %CH4	Average: % CFM	HIGH FLOW SAMPLER DATA CALCULATED: Calculated CH4 Emissions Rate, kg/hr, STP, as methane
A. Components in Gas Service with TVA, HiFlow, TO-15 &																					
52	Flange	Gas	11:22	32.6	7.8	0	0.05	0.00390	32.7	6.3	0	0.042		0.00265	32.65	550.44	7.050	-	0.046	0.00390	**3.69E-03**
53	Flange	Gas	9:39	32.9	5.9	0	0.0465	0.00274	33	5.0	0	0.1296	Y	0.00648	32.95	550.98	5.450		0.08805	0.00648	**5.42E-03**
54	Flange	Gas	11:29	33.3	7.7	0	0.11	0.00847	33.3	6.4	0	0.05		0.01000	33.30	551.61	7.050	-	0.08	0.01000	**6.41E-03**
55	Flange	Gas	9:24	30.5	6.2	0.03	0.46	0.04000	30.9	5.3	0.03	0.67		0.04000	30.70	546.93	5.750		0.565	0.04000	**3.67E-02**
56	Flange	Gas	9:29	32	6.2	0.11	3.77	0.22000	32.1	5.3	0.11	3.68		0.23000	32.05	549.36	5.750		3.725	0.23000	**2.42E-01**
57	Flange	Gas	13:44	37.3	7.8	0	0.002	0.00016	37.3	6.6	0	0.004	Y	0.00026	37.30	558.81	7.200	-	0.003	0.00026	**2.44E-04**
58	Flange	Gas	11:34	33.6	7	0	0.91	0.07000	33.7	6.4	0	1.12		0.07000	33.65	552.24	6.700	-	1.015	0.07000	**7.73E-02**
59	Flange	Gas	11:29	23.1	6.6	0	0.0163	0.00000	23.20	5.5	0	0.0163	Y	0.00000	23.15	533.34	6.050	-	0.0163	0	**1.10E-03**
60	OEL	Gas	9:55	27.1	7.5	0	0.000168	0.00001	27.3	6.3	0	0.000281		0.00002	27.20	540.63	6.900	-	0.0002245	0.00002	**1.75E-05**
61	OEL	Gas	11:02	19.7	7.9	0	0.000155	0.00001	19.6	6.3	0	0.000172	Y	0.00001	19.65	527.04	7.100	-	0.000172	0.00001	**1.40E-05**
62	OEL	Gas	10:59	19.6	8.5	0	0.000172	0.00001	19.6	6.9	0	0.00016	Y	0.00001	19.60	526.95	7.700	-	0.000172	0.00001	**1.52E-05**
63	OEL	Gas	11:07	19.8	7	0	0.000172	0.00001	19.8	5.7	0	0.000165	Y	0.00001	19.80	527.31	6.350	-	0.000172	0.00001	**1.25E-05**
64	OEL	Gas	12:17	16.4	5.6	0	0	0.00000	16.4	4.8	0	0.000356	Y	0.00002	16.40	521.19	5.200	-	0.000356	0.00002	**2.11E-05**
65	OEL	Gas	12:58	22.3	7.9	0	0.0011	0.00009	22.5	6.4	0	0.00157	Y	0.00010	22.40	531.99	7.150	-	0.00157	0.00010	**1.29E-04**
66	OEL	Gas	13:34	25.1	7.4		0.00045	0.00003	25.1	6.1		0.00167	Y	0.00010	25.10	536.85	6.750	-	0.00167	0.00010	**1.29E-04**
67	OEL	Gas	14:29	32.1	7.1	0	0.001	0.00007	32.1	5.6	0	0.0034	Y	0.00019	32.10	549.45	6.350	-	0.0034	0.00019	**2.47E-04**
68	OEL	Gas	13:30	25.2	8.2		0.0032	0.00026	25.2	6.8		0.0092	Y	0.00063	25.20	537.03	7.500	-	0.0092	0.00063	**7.89E-04**
69	OEL	Gas	10:01	28.3	7.4	0	0.00202	0.00015	28.5	6.0	0	4.6		0.27600	28.40	542.79	6.700	-	2.30101	0.27600	**1.74E-01**
70	OEL	Gas	10:17	27.6	6.5	0	0.0024	0.00016	27.7	5.3	0	0.0019		0.00010	27.65	541.44	5.900	-	0.00215	0.00016	**1.44E-04**
71	OEL	Gas	14:58	27.8	8		0.0021	0.00017	27.9	6.5		0.000368	Y	0.00002	27.85	541.80	7.250	-	0.0021	0.00017	**1.72E-04**
72	OEL	Gas	12:26	32.2	8.2	0	0.0122	0.00100	32.3	6.8	0	0.0212	Y	0.00144	32.25	549.72	7.500	-	0.0167	0.00144	**1.41E-03**
73	OEL	Gas	10:20	26.7	6.4	0	0.0596	0.00381	26.6	5.6	0	0.0553	Y	0.00310	26.65	539.64	6.000	-	0.0596	0.00381	**4.02E-03**
74	OEL	Gas	12:46	34.6	7.6	0	0.05	0.00380	34.8	6.3	0	0.3	Y	0.01890	34.70	554.13	6.950	-	0.175	0.01890	**1.37E-02**
75	OEL	Gas	10:52	29.6	7	0	0.0023	0.00016	29.8	5.9	0	0.0015	Y	0.00009	29.70	545.13	6.450		0.0019	0.00016	**1.39E-04**
76	OEL	Gas	11:10	30.7	6.9	0	0.14	0.00966	30.9	5.7	0	0.19		0.01083	30.80	547.11	6.300	-	0.165	0.01083	**1.18E-02**
77	OEL	Gas	9:28	17.4	8.1		0.0018	0.00015	17.6	6.8		0.0023	Y	0.00016	17.50	523.17	7.450	-	0.0023	0.00016	**1.95E-04**
78	OEL	Gas	13:09	32.5	7.6	0	0.54	0.05000	32.7	6.3	0	0.54		0.05000	32.60	550.35	6.950	-	0.54	0.05000	**4.26E-02**
79	OEL	Gas	10:22	29.4	6.9	0	0.008	0.00600	29.5	5.7	0	0.09		0.00500	29.45	544.68	6.300	-	0.049	0.00600	**3.50E-03**
80	OEL	Gas	12:17	32.1	7	0	0.094	0.00658	32.3	5.7	0	0.08		0.00456	32.20	549.63	6.350	-	0.087	0.00658	**6.27E-03**
81	OEL	Gas	9:20	28.6	6.9	0.09	2.03	0.14000	29.1	6.0	0.09	1.69		0.14000	28.85	543.60	6.450		1.86	0.14000	**1.35E-01**
82	OEL	Gas	11:16	19	6.9	0.08	2.87	0.19300	19	5.4	0	3.41		0.18400	19.00	525.87	6.150	0.08	3.41	0.19300	**2.33E-01**
83	OEL	Gas	10:16	31	5.7	0	0.57	0.03249	31.2	4.6	0	0.52		0.02392	31.10	547.65	5.150	-	0.545	0.03249	**3.17E-02**
84	OEL	Gas	9:33	28.3	7.2	0	0.77	0.06000	28.5	5.9	0	0.93		0.06000	28.40	542.79	6.550	-	0.85	0.06000	**6.33E-02**
85	OEL	Gas	12:12	33.2	7.2	0.02	3.92	0.30000	33.4	6.5	0.03	3.45		0.30000	33.30	551.61	6.850		3.685	0.30000	**2.87E-01**
86	OEL	Gas	13:29	26.6	7.9	0	0.3323	0.02625	26.8	6.3	0	0.3995	Y	0.02517	26.70	539.73	7.100	-	0.3995	0.02625	**3.25E-02**
87	OEL	Gas	14:17	27.3	7.4		1.027	0.07600	27.4	5.9		1.306	Y	0.07400	27.35	540.90	6.650	-	1.306	0.07600	**9.86E-02**
88	OEL	Gas	9:52	25.5	7.6	0.09	15.36	1.16100	25.4	6.6	0.15	19.29		1.26300	25.45	537.48	7.100	0.15	19.29	1.26300	**1.53E+00**
89	OEL	Gas	10:04	25.6	6.8	0	0.29	0.02000	25.7	5.7	0	0.36		0.02100	25.65	537.84	6.250	-	0.36	0.02100	**2.53E-02**
90	OEL	Gas	9:16	20.6	7	0	2.08	0.14600	20.7	6.0	0	2.26		0.13600	20.65	528.84	6.500	-	2.26	0.14600	**1.65E-01**
91	OEL	Gas	10:34	33.8	6.1	0	1.31	0.07991	33.9	5.1	0	1.55		0.07905	33.85	552.60	5.600	-	1.43	0.07991	**9.03E-02**
92	OEL	Gas	12:22	31.7	8.1	0	0.64	0.05000	31.9	6.8	0	0.77		0.05000	31.80	548.91	7.450	-	0.705	0.05000	**5.93E-02**
93	OEL	Gas	9:06	23.2	8.1	0.1	3.28	0.26000	23.5	6.2	0.1	4.14		0.26000	23.35	533.70	7.150		3.71	0.26000	**3.00E-01**
94	Other	Gas	9:34	17.9	5.8		0.000059	0.00000	17.9	4.7		0.000267	Y	0.00001	17.90	523.89	5.250	-	0.000267	0.00001	**1.59E-05**
95	Other	Gas	11:12	25.2	6.9	0	0.000198	0.00001	25.3	6.2	0	0.000348	Y	0.00002	25.25	537.12	6.550	-	0.000348	0.00002	**2.57E-05**
96	Other	Gas	12:56	35	7.6	0	0.00058	0.00004	35.2	6.4	0	0.00114		0.00007	35.10	554.85	7.000	-	0.00086	0.00007	**6.79E-05**
97	Other	Gas	11:58	30.4	7.4	0	0.0038	0.00028	30.5	6.2	0	0.0022	Y	0.00014	30.45	546.48	6.800		0.003	0.00028	**2.32E-04**
98	Other	Gas	14:19	24.3	8.1		0.001	0.00008	24.3	6.7		0.00085	Y	0.00006	24.30	535.41	7.400	-	0.001	0.00008	**8.46E-05**
99	Other	Gas	12:42	32.9	7.4	0	0.00104	0.00008	33.1	5.8	0	0.0025		0.00015	33.00	551.07	6.600	-	0.00177	0.00015	**1.32E-04**
100	Other	Gas	10:02	18.7	8.3		0.011	0.00091	18.7	6.8		0.0132	Y	0.00090	18.70	525.33	7.550	-	0.0132	0.00091	**1.13E-03**
101	Other	Gas	10:47	17.6	7.2	0	0.11	0.00800	17.7	5.9	0	0.13		0.00800	17.65	523.44	6.550	-	0.12	0.00800	**8.91E-03**
102	Other	Gas	12:00	28.5	7.6	0	0.0213	0.00000	28.50	6.3	0	0.0213	Y	0.00000	28.50	542.97	6.950	-	0.0213	0	**1.69E-03**
103	Other	Gas	13:07	26.9	7.3		0.0082	0.00060	26.8	6.1		0.0101	Y	0.00062	26.85	540.00	6.700	-	0.0101	0.00062	**7.74E-04**

Section 2, Appendix A: Field & Lab Data & Calculations

Note: results with all values = zero are hidden, see Appendix E for Descriptive Statistics for all leak

Sort order, sorted by Component Type, & Method 21 Concentration, ppmv	Component Information					CANISTER DATA						TEDLAR BAG DATA						EPA METHOD TO-15 CONCENTRATION DATA	
	Component Type	Service	CALCULATED	CALCULATED	CALCULATED										ppmv @ STP	ppmv @ STP	ppmv @ STP	ppmv @ STP	ppmv @ STP
																		58.079	78.112
			Log10 TVA as CH4, ppmv	Log10 CH4 EmRate, kg/hr, as methane	Log10 TOC of Linked TOC Emissions Estimates, kg/hr	Sample #	Date	Time	Can ID	Can I-Vac (in Hg)	Can F-Vac (in Hg)	Sample(s) #	Date	Time	1,3,5-Trimethyl benzene	2-Hexanone	4-Ethyltoluene	Acetone	Benzene
A. Components in Gas Service with TVA, HiFlow, TO-15 &																			
52	Flange	Gas	**3.18**	**-2.43**															
53	Flange	Gas	**3.23**	**-2.27**															
54	Flange	Gas	**3.30**	**-2.19**															
55	Flange	Gas	**3.78**	**-1.44**															
56	Flange	Gas	**3.85**	**-0.62**															
57	Flange	Gas	**4.43**	**-3.61**															
58	Flange	Gas	**5.06**	**-1.11**	**-1.16**							TB-052A/TB-052B	Aug-14-2015	12:35	ND	ND	ND	ND	ND
59	Flange	Gas	**5.11**	**-2.96**															
60	OEL	Gas	**0.05**	**-4.76**															
61	OEL	Gas	**0.19**	**-4.85**															
62	OEL	Gas	**0.26**	**-4.82**															
63	OEL	Gas	**0.27**	**-4.90**															
64	OEL	Gas	**0.58**	**-4.68**															
65	OEL	Gas	**1.08**	**-3.89**															
66	OEL	Gas	**1.30**	**-3.89**															
67	OEL	Gas	**1.48**	**-3.61**															
68	OEL	Gas	**1.48**	**-3.10**															
69	OEL	Gas	**2.08**	**-0.76**															
70	OEL	Gas	**2.30**	**-3.84**															
71	OEL	Gas	**2.54**	**-3.77**															
72	OEL	Gas	**2.54**	**-2.85**															
73	OEL	Gas	**2.54**	**-2.40**															
74	OEL	Gas	**2.65**	**-1.86**															
75	OEL	Gas	**3.18**	**-3.86**	**-5.55**							TB-047A/TB-047B	Aug-12-2015	11:54	ND	ND	ND	ND	ND
76	OEL	Gas	**3.48**	**-1.93**															
77	OEL	Gas	**3.70**	**-3.71**															
78	OEL	Gas	**3.99**	**-1.37**	**-1.39**							TB-053A/TB-053B	Aug-14-2015	14:09	ND	ND	ND	ND	ND
79	OEL	Gas	**4.00**	**-2.46**	**-2.28**							TB-049A/TB-049B	Aug-13-2015	11:23	ND	ND	ND	ND	ND
80	OEL	Gas	**4.00**	**-2.20**	**-5.47**							TB-050A/TB-050B	Aug-13-2015	13:18	ND	ND	ND	ND	ND
81	OEL	Gas	**4.41**	**-0.87**															
82	OEL	Gas	**4.76**	**-0.63**															
83	OEL	Gas	**4.92**	**-1.50**															
84	OEL	Gas	**4.95**	**-1.20**	**-5.36**							TB-051A/TB-051B	Aug-14-2015	10:33	ND	ND	ND	3.90E+01	ND
85	OEL	Gas	**4.95**	**-0.54**	**-1.53**							TB-048A/TB-048B	Aug-12-2015	13:03	ND	ND	ND	ND	ND
86	OEL	Gas	**5.00**	**-1.49**															
87	OEL	Gas	**5.00**	**-1.01**	**-1.09**							TB031A/TB031B	Feb-26-2015	14:20	ND	ND	ND	ND	2.30E+01
88	OEL	Gas	**5.00**	**0.18**															
89	OEL	Gas	**5.48**	**-1.60**															
90	OEL	Gas	**5.60**	**-0.78**															
91	OEL	Gas	**5.62**	**-1.04**	**-1.19**							TB-042A/TB-042B	Aug-07-2015	11:35	ND	ND	ND	3.40E+01	1.30E+02
92	OEL	Gas	**5.70**	**-1.23**	**-5.76**							TB045A/TB045B	Aug-11-2015	12:25	ND	ND	ND	ND	ND
93	OEL	Gas	**5.70**	**-0.52**	**-2.31**							TB-046A/TB046B	Aug-12-2015	10:10	ND	ND	ND	ND	1.10E+01
94	Other	Gas	**1.04**	**-4.80**															
95	Other	Gas	**1.30**	**-4.59**															
96	Other	Gas	**1.48**	**-4.17**															
97	Other	Gas	**1.83**	**-3.64**															
98	Other	Gas	**1.85**	**-4.07**															
99	Other	Gas	**1.95**	**-3.88**	**-5.56**							TB-043A/TB-042B	Aug-07-2015	13:39	ND	ND	ND	4.30E+01	ND
100	Other	Gas	**2.48**	**-2.95**															
101	Other	Gas	**2.48**	**-2.05**	**-2.22**	CAN001	Jan-20-2015	0.452083333	OEC-117-39	28.5	0	TB001	Jan-20-2015	10:55	ND	ND	ND	ND	ND
102	Other	Gas	**2.55**	**-2.77**															
103	Other	Gas	**2.77**	**-3.11**															

Section 2, Appendix A: Field & Lab Data & Calculations

Note: results with all values = zero are hidden, see Appendix E for Descriptive Statistics for all leak

Sort order, sorted by Component Type, & Method 21 Concentration, ppmv	Component Information																METHOD TO-15 Calculated Emissions			METHOD TO-15 Calculated Emissions		
	Component Type	Service	ppmv @ STP	ppmv @ STP	ppmv @ STP	ppmv @ STP	ppmv @ STP	ppmv @ STP	ppmv @ STP	ppmv @ STP	ppmv @ STP	ppmv @ STP	ppmv @ STP	ppmv @ STP	ppmv @ STP	ppmv @ STP	kg/hr	kg/hr	kg/hr	kg/hr	kg/hr	kg/hr
			76.139		84.16	46.068	88.11	106.165	100.21		86.18	60.1	100.16	92.14	105	131.4	106.165	120.19	120.19	100.16	120.1916	58.079	78.112
			Carbon disulfide	Chlorobenzene	Cyclohexane	Ethanol	Ethyl Acetate	Ethylbenzene	Heptane	Hexachlorobutadiene	Hexane	Isopropyl alcohol	Methyl Isobutyl Ketone	Toluene	TPH Gasoline (C4-C12)	Trichloroethene (TCE)	Xylenes (total)	1,2,4-Trimethyl-benzene	1,3,5-Trimethyl-benzene	2-Hexanone	4-Ethyltoluene	Acetone	Benzene
A. Components in Gas Service with TVA, HiFlow, TO-15																							
52	Flange	Gas																					
53	Flange	Gas																					
54	Flange	Gas																					
55	Flange	Gas																					
56	Flange	Gas																					
57	Flange	Gas																					
58	Flange	Gas	ND	ND	1.70E+01	ND	ND	4.20E+01	6.90E+01	ND	3.00E+01	ND	ND	1.50E+02	ND	ND	3.00E+02	-	-	-	-	-	-
59	Flange	Gas																					
60	OEL	Gas																					
61	OEL	Gas																					
62	OEL	Gas																					
63	OEL	Gas																					
64	OEL	Gas																					
65	OEL	Gas																					
66	OEL	Gas																					
67	OEL	Gas																					
68	OEL	Gas																					
69	OEL	Gas																					
70	OEL	Gas																					
71	OEL	Gas																					
72	OEL	Gas																					
73	OEL	Gas																					
74	OEL	Gas																					
75	OEL	Gas	9.70E+00	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	3.30E+01	ND	ND	2.40E+01	-	-	-	-	-	-
76	OEL	Gas																					
77	OEL	Gas																					
78	OEL	Gas	ND	ND	3.90E+02	ND	ND	ND	ND	ND	7.40E+01	ND	ND	ND	2.10E+04	ND	ND	-	-	-	-	-	-
79	OEL	Gas	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	-	-	-	-	-	-
80	OEL	Gas	ND	ND	ND	6.10E+01	1.30E+01	ND	ND	ND	ND	1.50E+01	ND	3.20E+01	ND	ND	ND	-	-	-	-	-	-
81	OEL	Gas																					
82	OEL	Gas																					
83	OEL	Gas																					
84	OEL	Gas	ND	ND	ND	7.00E+01	1.70E+01	ND	ND	ND	ND	2.60E+01	ND	1.30E+01	ND	ND	ND	-	-	-	-	1.0220E-06	-
85	OEL	Gas	ND	ND	1.30E+01	ND	ND	ND	1.90E+01	ND	4.40E+01	2.30E+01	ND	ND	ND	ND	9.40E+00	-	-	-	-	-	-
86	OEL	Gas																					
87	OEL	Gas	ND	ND	9.20E+01	7.40E+01	ND	ND	5.70E+01	ND	1.00E+02	ND	ND	2.30E+01	ND	ND	1.10E+01	-	-	-	-	-	8.2476E-07
88	OEL	Gas																					
89	OEL	Gas																					
90	OEL	Gas																					
91	OEL	Gas	ND	ND	4.10E+01	6.80E+01	ND	1.70E+01	3.30E+01	ND	5.10E+01	1.00E+01	1.00E+01	7.60E+01	3.90E+03	ND	9.00E+01	8.1344E-07	-	-	-	7.4248E-07	3.8181E-06
92	OEL	Gas	ND	ND	ND	ND	ND	ND	ND	ND	8.40E+00	ND	ND	1.30E+01	ND	ND	1.40E+01	-	-	-	-	-	-
93	OEL	Gas	ND	ND	2.90E+01	3.60E+01	ND	ND	2.80E+01	ND	5.80E+01	1.30E+01	ND	ND	3.40E+03	ND	ND	-	-	-	-	-	4.2753E-07
94	Other	Gas																					
95	Other	Gas																					
96	Other	Gas																					
97	Other	Gas																					
98	Other	Gas																					
99	Other	Gas	ND	ND	ND	4.60E+01	ND	ND	ND	ND	ND	ND	1.60E+01	ND	ND	ND	ND	-	-	-	-	1.1094E-06	-
100	Other	Gas																					
101	Other	Gas	ND	ND	4.00E+01	ND	ND	ND	ND	ND	4.40E+01	ND	ND	ND	4.80E+03	ND	ND	-	-	-	-	-	-
102	Other	Gas																					
103	Other	Gas																					

Section 2, Appendix A: Field & Lab Data & Calculations

Note: results with all values = zero are hidden, see Appendix E for Descriptive Statistics for all leak

Sort order, sorted by Component Type, & Method 21 Concentration, ppmv	Component Information																ASTM 1945/3588 Concentration Data				
	Component Type	Service	kg/hr	kg/hr	kg/hr	kg/hr	kg/hr	kg/hr	kg/hr	kg/hr	kg/hr	kg/hr	kg/hr	kg/hr	kg/hr	kg/hr					
			76.139	112.56	84.16	46.068	88.11	106.165	100.21	86.18	60.1	100.16	92.14	105	131.4	106.165					
			Carbon disulfide	Chlorobenzene	Cyclohexane	Ethanol	Ethyl Acetate	Ethylbenzene	Heptane	Hexane	Isopropyl alcohol	Methyl Isobutyl Ketone	Toluene	TPH Gasoline (C4-C12)	Trichloroethene (TCE)	Xylenes (total)	Oxygen (Mol%)	Oxygen (ppb)	Nitrogen (Mol%)	Nitrogen (ppb)	Hydrogen (Mol%)
A. Components in Gas Service with TVA, HiFlow, TO-15 &																					
52	Flange	Gas																			
53	Flange	Gas																			
54	Flange	Gas																			
55	Flange	Gas																			
56	Flange	Gas																			
57	Flange	Gas																			
58	Flange	Gas	-	-	6.4902E-07	-	-	2.0227E-06	3.1366E-06	1.1728E-06	-	-	6.2696E-06	-	-	1.4448E-05	2.1156E+01	2.1156E+08	7.7864E+01	7.7864E+08	-
59	Flange	Gas																			
60	OEL	Gas																			
61	OEL	Gas																			
62	OEL	Gas																			
63	OEL	Gas																			
64	OEL	Gas																			
65	OEL	Gas																			
66	OEL	Gas																			
67	OEL	Gas																			
68	OEL	Gas																			
69	OEL	Gas																			
70	OEL	Gas																			
71	OEL	Gas																			
72	OEL	Gas																			
73	OEL	Gas																			
74	OEL	Gas																			
75	OEL	Gas	3.2663E-07	-	-	-	-	-	-	-	-	-	1.3447E-06	-	-	1.1268E-06	2.1194E+01	2.1194E+08	7.8773E+01	7.8773E+08	-
76	OEL	Gas																			
77	OEL	Gas																			
78	OEL	Gas	-	-	1.5488E-05	-	-	-	-	3.0092E-06	-	-	-	1.0404E-03	-	-	2.1175E+01	2.1175E+08	7.8276E+01	7.8276E+08	-
79	OEL	Gas	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2.1290E+01	2.1290E+08	7.8601E+01	7.8601E+08	-
80	OEL	Gas	-	-	-	1.2115E-06	4.9381E-07	-	-	-	3.8865E-07	-	1.2711E-06	-	-	-	2.1314E+01	2.1314E+08	7.8655E+01	7.8655E+08	-
81	OEL	Gas																			
82	OEL	Gas																			
83	OEL	Gas																			
84	OEL	Gas	-	-	-	1.4550E-06	6.7583E-07	-	-	-	7.0504E-07	-	5.4045E-07	-	-	-	2.1389E+01	2.1389E+08	7.8581E+01	7.8581E+08	-
85	OEL	Gas	-	-	5.0749E-07	-	-	-	8.8317E-07	1.7589E-06	6.4118E-07	-	-	-	-	4.6290E-07	2.1096E+01	2.1096E+08	7.8459E+01	7.8459E+08	-
86	OEL	Gas																			
87	OEL	Gas	-	-	3.5545E-06	1.5650E-06	-	-	2.6222E-06	3.9563E-06	-	-	9.7287E-07	-	-	5.3611E-07	2.1346E+01	2.1346E+08	7.7524E+01	7.7524E+08	-
88	OEL	Gas																			
89	OEL	Gas																			
90	OEL	Gas																			
91	OEL	Gas	-	-	1.2974E-06	1.1779E-06	-	6.7861E-07	1.2434E-06	1.6526E-06	2.2598E-07	3.7660E-07	2.6330E-06	1.5397E-04	-	3.5926E-06	2.1312E+01	2.1312E+08	7.7606E+01	7.7606E+08	-
92	OEL	Gas	-	-	-	-	-	-	-	3.6504E-07	-	-	6.0401E-07	-	-	7.4948E-07	2.1385E+01	2.1385E+08	7.8584E+01	7.8584E+08	-
93	OEL	Gas	-	-	1.2144E-06	8.2520E-07	-	-	1.3961E-06	2.4871E-06	3.8875E-07	-	-	1.7763E-04	-	-	2.1192E+01	2.1192E+08	7.8709E+01	7.8709E+08	-
94	Other	Gas																			
95	Other	Gas																			
96	Other	Gas																			
97	Other	Gas																			
98	Other	Gas																			
99	Other	Gas	-	-	-	9.4137E-07	-	-	-	-	-	7.1189E-07	-	-	-	-	2.1485E+01	2.1485E+08	7.8490E+01	7.8490E+08	-
100	Other	Gas																			
101	Other	Gas	-	-	1.5714E-06	-	-	-	-	1.7700E-06	-	-	-	2.3526E-04	-	-	2.1394E+01	2.1394E+08	7.8483E+01	7.8483E+08	-
102	Other	Gas																			
103	Other	Gas																			

Section 2, Appendix A: Field & Lab Data & Calculations

Note: results with all values = zero are hidden, see Appendix E for Descriptive Statistics for all leak

Sort order, sorted by Component Type, & Method 21 Concentration, ppmv	Component Information																		ASTM 1945/3588 Concentration Data			ASTM 1945/3588 Emissions (kg/hr)				
																						31.9988	28.0134	2.01	28.0106	44.01
	Component Type	Service	Hydrogen (ppb)	Carbon Dioxide (Mol%)	Carbon Dioxide (ppb)	Carbon Monoxide (Mol%)	Carbon Monoxide (ppb)	Methane (Mol%)	Methane (ppb)	Ethane (Mol%)	Ethane (ppb)	Propane (Mol%)	Propane (ppb)	i-Butane (Mol%)	i-Butane (ppb)	n-Butane (Mol%)	n-Butane (ppb)	i-Pentane (Mol%)	i-Pentane (ppb)	n-Pentane (Mol%)	n-Pentane (ppb)	Oxygen	Nitrogen	Hydrogen	Carbon Monoxide	Carbon Dioxide
A. Components in Gas Service with TVA, HiFlow, TO-15																										
52	Flange	Gas																								
53	Flange	Gas																								
54	Flange	Gas																								
55	Flange	Gas																								
56	Flange	Gas																								
57	Flange	Gas																								
58	Flange	Gas	-	1.9678E-02	1.9678E+05	-	-	9.6032E-01	9.6032E+06	-	-	-	-	-	-	-	-	-	-	-	-	3.0709E+00	9.8948E+00	-	-	3.9287E-03
59	Flange	Gas																								
60	OEL	Gas																								
61	OEL	Gas																								
62	OEL	Gas																								
63	OEL	Gas																								
64	OEL	Gas																								
65	OEL	Gas																								
66	OEL	Gas																								
67	OEL	Gas																								
68	OEL	Gas																								
69	OEL	Gas																								
70	OEL	Gas																								
71	OEL	Gas																								
72	OEL	Gas																								
73	OEL	Gas																								
74	OEL	Gas																								
75	OEL	Gas	-	3.3228E-02	3.3228E+05	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2.9992E+00	9.7592E+00	-	-	6.4674E-03
76	OEL	Gas																								
77	OEL	Gas																								
78	OEL	Gas	-	2.3679E-02	2.3679E+05	-	-	5.2555E-01	5.2555E+06	-	-	-	-	-	-	-	-	-	-	-	-	3.1972E+00	1.0347E+01	-	-	4.9173E-03
79	OEL	Gas	-	3.1813E-02	3.1813E+05	-	-	7.6615E-02	7.6615E+05	-	-	-	-	-	-	-	-	-	-	-	-	2.9423E+00	9.5098E+00	-	-	6.0468E-03
80	OEL	Gas	-	3.1149E-02	3.1149E+05	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2.9402E+00	9.4991E+00	-	-	5.9099E-03
81	OEL	Gas																								
82	OEL	Gas																								
83	OEL	Gas																								
84	OEL	Gas	-	2.9746E-02	2.9746E+05	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3.0881E+00	9.9323E+00	-	-	5.9067E-03
85	OEL	Gas	-	4.4500E-02	4.4500E+05	-	-	4.0034E-01	4.0034E+06	-	-	-	-	-	-	-	-	-	-	-	-	3.1312E+00	1.0195E+01	-	-	9.0844E-03
86	OEL	Gas																								
87	OEL	Gas	-	3.4890E-02	3.4890E+05	-	-	1.0954E+00	1.0954E+07	-	-	-	-	-	-	-	-	-	-	-	-	3.1357E+00	9.9697E+00	-	-	7.0492E-03
88	OEL	Gas																								
89	OEL	Gas																								
90	OEL	Gas																								
91	OEL	Gas	-	2.4412E-02	2.4412E+05	-	-	1.0574E+00	1.0574E+07	-	-	-	-	-	-	-	-	-	-	-	-	2.5642E+00	8.1742E+00	-	-	4.0396E-03
92	OEL	Gas	-	3.0608E-02	3.0608E+05	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3.4506E+00	1.1101E+01	-	-	6.7925E-03
93	OEL	Gas	-	3.9909E-02	3.9909E+05	-	-	5.9749E-02	5.9749E+05	-	-	-	-	-	-	-	-	-	-	-	-	3.3741E+00	1.0971E+01	-	-	8.7394E-03
94	Other	Gas																								
95	Other	Gas																								
96	Other	Gas																								
97	Other	Gas																								
98	Other	Gas																								
99	Other	Gas	-	2.4825E-02	2.4825E+05	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3.0540E+00	9.7675E+00	-	-	4.8533E-03
100	Other	Gas																								
101	Other	Gas	-	4.5725E-02	4.5725E+05	-	-	7.7614E-02	7.7614E+05	-	-	-	-	-	-	-	-	-	-	-	-	3.1955E+00	1.0263E+01	-	-	9.3934E-03
102	Other	Gas																								
103	Other	Gas																								

Section 2, Appendix A: Field & Lab Data & Calculations

Note: results with all values = zero hidden, see Appendix E for Descriptive Statistics for all leak

Sort order, sorted by Component Type, & Method 21 Concentration, ppmv	Component Information: Component Type	Service	kg/hr 16.043 Methane	kg/hr 30.07 Ethane	kg/hr 44.097 Propane	kg/hr 58.123 i-Butane	kg/hr 58.123 n-Butane	kg/hr 72.15 i-Pentane	kg/hr 72.15 n-Pentane	kg/hr CALCULATED TOC, kg/hr (does not incl. TPH)
A. Components in Gas Service with TVA, HiFlow, TO-15 &										
52	Flange	Gas								
53	Flange	Gas								
54	Flange	Gas								
55	Flange	Gas								
56	Flange	Gas								
57	Flange	Gas								
58	Flange	Gas	6.9888E-02	-	-	-	-	-	-	6.9916E-02
59	Flange	Gas								
60	OEL	Gas								
61	OEL	Gas								
62	OEL	Gas								
63	OEL	Gas								
64	OEL	Gas								
65	OEL	Gas								
66	OEL	Gas								
67	OEL	Gas								
68	OEL	Gas								
69	OEL	Gas								
70	OEL	Gas								
71	OEL	Gas								
72	OEL	Gas								
73	OEL	Gas								
74	OEL	Gas								
75	OEL	Gas	-	-	-	-	-	-	-	2.7982E-06
76	OEL	Gas								
77	OEL	Gas								
78	OEL	Gas	3.9785E-02	-	-	-	-	-	-	4.0844E-02
79	OEL	Gas	5.3085E-03	-	-	-	-	-	-	5.3085E-03
80	OEL	Gas	-	-	-	-	-	-	-	3.3651E-06
81	OEL	Gas								
82	OEL	Gas								
83	OEL	Gas								
84	OEL	Gas	-	-	-	-	-	-	-	4.3983E-06
85	OEL	Gas	2.9791E-02	-	-	-	-	-	-	2.9796E-02
86	OEL	Gas								
87	OEL	Gas	8.0678E-02	-	-	-	-	-	-	8.0692E-02
88	OEL	Gas								
89	OEL	Gas								
90	OEL	Gas								
91	OEL	Gas	6.3785E-02	-	-	-	-	-	-	6.3958E-02
92	OEL	Gas	-	-	-	-	-	-	-	1.7185E-06
93	OEL	Gas	4.7695E-03	-	-	-	-	-	-	4.9539E-03
94	Other	Gas								
95	Other	Gas								
96	Other	Gas								
97	Other	Gas								
98	Other	Gas								
99	Other	Gas	-	-	-	-	-	-	-	2.7627E-06
100	Other	Gas								
101	Other	Gas	5.8122E-03	-	-	-	-	-	-	6.0508E-03
102	Other	Gas								
103	Other	Gas								

Section 2, Appendix A: Field & Lab Data & Calculations

Note: results with all values = zero are hidden, see Appendix E for Descriptive Statistics for all leak

Sort order, sorted by Component Type, & Method 21 Concentration, ppmv	Component Information							METEOROLOGY:				METEOROLOGY:
	Component Type	Service	DATE	REGULATORY IDs	#WELLS	FACILITY TYPE: (OIL/GAS)	THROUGHPUT(s)	WIND DIRECTION FROM	WIND SPEED (mph)	AMBIENT TEMPERATURE (F)	% RH	BAROMETRIC PRESSURE (inHg)
104	Other	Gas	7-Aug-15		3 + 1 inactive	Gas	19-10: 17.8 MCF/24-1: 18.8 MCF/19.8: 142.4 MCF	E	7	73.4	56.1	29.74
105	Other	Gas	25-Feb-15	SEC.33 T-20N R-2W	4	Gas	140.9MCF/DAY	N	3	60	31	30.14
106	Other	Gas	24-Feb-15	SEC.33 T-20N R-2W	5	Gas	1252.4MCF/DAY	W	3.1	57.4	24.5	30.2
107	Other	Gas	24-Feb-15	SEC.33 T-20N R-2W	5	Gas	1252.4MCF/DAY	W	3.1	57.4	24.5	30.2
108	Other	Gas	26-Feb-15	SEC.33 T-20N R-2W	4	Gas	140.9MCF/DAY	N	1.3	46	50	29.93
109	Other	Gas	26-Feb-15	SEC.33 T-20N R-2W	4	Gas	140.9MCF/DAY	N	1.3	46	50	29.93
110	Other	Gas	27-Jan-15	TITLE V 041	0	Gas		WSW	1.3	77.8	47.9	29.68
111	Other	Gas	23-Feb-15	SEC.9 T-19N R-2W	1	Gas	88.1 MCF/DAY	NNW	15.9	52.5	23.1	29.98
112	Other	Gas	23-Jan-15	149797	12	Oil	87 bbls/day Oil, 400-500 bbls/day Water	SSE	2.1	65.5	36.9	30.17
113	Other	Gas	25-Feb-15	SEC.33 T-20N R-2W	4	Gas	140.9MCF/DAY	N	3	60	31	30.14
114	Other	Gas	24-Feb-15	SEC.33 T-20N R-2W	5	Gas	1252.4MCF/DAY	W	3.1	57.4	24.5	30.2
115	Other	Gas	24-Feb-15	SEC.33 T-20N R-2W	5	Gas	1252.4MCF/DAY	W	3.1	57.4	24.5	30.2
116	Other	Gas	22-Jan-15	Permit Application 171984 EPA ID	2	Oil	5 bbls/day Oil, 50 bbls/day water	SSW	1.9	73.6	48.2	30.12
117	Other	Gas	25-Feb-15	SEC.33 T-20N R-2W	4	Gas	140.9MCF/DAY	N	3	60	31	30.14
118	Other	Gas	24-Feb-15	SEC.33 T-20N R-2W	5	Gas	1252.4MCF/DAY	W	3.1	57.4	24.5	30.2
119	Other	Gas	27-Jan-15	TITLE V 041	0	Gas		WSW	1.3	77.8	47.9	29.68
120	Other	Gas	25-Feb-15	SEC.33 T-20N R-2W	4	Gas	140.9MCF/DAY	N	3	60	31	30.14
121	Other	Gas	29-Jan-15	TITLE V 041	0	Gas		WSW	4	81.3	34.5	29.5
122	Other	Gas	28-Jan-15	TITLE V 041	0	Gas		WSW	1.5	-	-	29.6
123	Other	Gas	27-Jan-15	TITLE V 041	0	Gas		WSW	1.3	77.8	47.9	29.68
124	Other	Gas	23-Feb-15	SEC.9 T-19N R-2W	1	Gas	88.1 MCF/DAY	NNW	15.9	52.5	23.1	29.98
125	Other	Gas	23-Feb-15	SEC.9 T-19N R-2W	1	Gas	88.1 MCF/DAY	NNW	15.9	52.5	23.1	29.98
126	Other	Gas	23-Feb-15	SEC.9 T-19N R-2W	1	Gas	88.1 MCF/DAY	NNW	15.9	52.5	23.1	29.98
127	Other	Gas	6-Aug-15		2	Gas	96.25 SCFM	W	2.9	89.9	27.7	29.74
128	Valve	Gas	23-Jan-15	149797	12	Oil	87 bbls/day Oil, 400-500 bbls/day Water	SSE	2.1	65.5	36.9	30.17
129	Valve	Gas	23-Jan-15	149797	12	Oil	87 bbls/day Oil, 400-500 bbls/day Water	SSE	2.1	65.5	36.9	30.17
130	Valve	Gas	26-Jan-15	TITLE V 041	0	Gas		SW	4.2	77.8	27.6	29.63
131	Valve	Gas	26-Jan-15	TITLE V 041	0	NG	4063 mcf/day	East	3	79.8	21.9	29.37
132	Valve	Gas	22-Jan-15	39632	10	Oil	150 bbls/day Oil, 1000 bbls/day Water	ESE	1.7	76.3	41.8	30.14
133	Valve	Gas	26-Jan-15	TITLE V 041	0	NG	4063 mcf/day	East	3	79.8	21.9	29.37
134	Valve	Gas	22-Jan-15	39632	10	Oil	150 bbls/day Oil, 1000 bbls/day Water	ESE	1.7	76.3	41.8	30.14
135	Valve	Gas	23-Feb-15	SEC.9 T-19N R-2W	1	Gas	88.1 MCF/DAY	NNW	15.9	52.5	23.1	29.98
136	Valve	Gas	27-Jan-15	TITLE V 041	0	Gas		WSW	1.3	77.8	47.9	29.68
137	Valve	Gas	23-Jan-15	149797	12	Oil	87 bbls/day Oil, 400-500 bbls/day Water	SSE	2.1	65.5	36.9	30.17
138	Valve	Gas	29-Jan-15	TITLE V 041	0	Gas		WSW	4	81.3	34.5	29.5
139	Valve	Gas	29-Jan-15	TITLE V 041	0	Gas		WSW	4	81.3	34.5	29.5
140	Valve	Gas	27-Jan-15	TITLE V 041	0	Gas		WSW	1.3	77.8	47.9	29.68
141	Valve	Gas	28-Jan-15	TITLE V 041	0	Gas		WSW	1.5	-	-	29.6
142	Valve	Gas	28-Jan-15	TITLE V 041	0	Gas		WSW	1.5	-	-	29.6
143	Valve	Gas	29-Jan-15	TITLE V 041	0	Gas		WSW	4	81.3	34.5	29.5
144	Valve	Gas	28-Jan-15	TITLE V 041	0	Gas		WSW	1.5	-	-	29.6
145	Valve	Gas	29-Jan-15	TITLE V 041	0	Gas		WSW	4	81.3	34.5	29.5
146	Valve	Gas	28-Jan-15	TITLE V 041	0	Gas		WSW	1.5	-	-	29.6
147	Valve	Gas	26-Feb-15	SEC.33 T-20N R-2W	4	Gas	140.9MCF/DAY	N	1.3	46	50	29.93
148	Valve	Gas	11-Aug-15		1	Gas	33-34-2:140.5, 33-34-1:75.9 MCF/D	W	3.6	86.1	46.5	29.78
149	Valve	Gas	28-Jan-15	TITLE V 041	0	Gas		WSW	1.5	-	-	29.6
150	Valve	Gas	11-Aug-15		2	Gas	14-1:492, 14-4: 101.9, 14-1: 36.4, Mobil: 913.2 MCF/D	W	3.6	85.1	46.5	28.78
151	Valve	Gas	25-Feb-15	SEC.33 T-20N R-2W	4	Gas	140.9MCF/DAY	N	3	60	31	30.14
152	Valve	Gas	26-Feb-15	SEC.33 T-20N R-2W	2	Gas	2098.5MCF/DAY	N	17.9	80.2	23.7	29.7
153	Valve	Gas	26-Jan-15	TITLE V 041	0	NG	4063 mcf/day	East	3	79.8	21.9	29.37
154	Valve	Gas	28-Jan-15	TITLE V 041	0	Gas		WSW	1.5	-	-	29.6
155	Valve	Gas	24-Feb-15	SEC.33 T-20N R-2W	5	Gas	1252.4MCF/DAY	W	3.1	57.4	24.5	30.2
156	Valve	Gas	27-Feb-15	Not Posted	2	Gas	Meter Not Available	S	7.5	69.5	38.7	29.64
157	Valve	Gas	28-Jan-15	TITLE V 041	0	Gas		WSW	1.5	-	-	29.6
158	Valve	Gas	28-Jan-15	TITLE V 041	0	Gas		WSW	1.5	-	-	29.6
159	Valve	Gas	6-Aug-15		1	Gas	0 SCFM	W	5.2	88.5	52.7	29.73
160	Valve	Gas	6-Aug-15		1	Gas	0 SCFM	W	5.2	88.5	52.7	29.74

Section 2, Appendix A: Field & Lab Data & Calculations

Note: results with all values = zero are hidden, see Appendix E for Descriptive Statistics for all leak

Y [2] = Y, Avanti
Y [3] = Y, Operator run with Eagle
Y [4] = Y, Operator run with Eagle quarterly
Y [5] = Y, Quarterly, Summit

Sort order, sorted by Component Type, & Method 21 Concentration, ppmv	Component Information				Site Characterization				Component Information	IR CAMERA		EPA Method 21 Results			HIGH FLOW SAMPLER DATA
	Component Type	Service	% CLOUD COVER	WEATHER (sunny, cloudy, fair, fog, haze, light rain, heavy rain)	# SEPARATORS	# TANKS	# COMPRESSORS	DOES SITE HAVE LDAR PLAN? (Y/N)	Description	Date	Time	Date	Time	Method 21 Leak Concentration, ppmv	Date
104	Other	Gas	80	Cloudy/overcast	1	5	1	N	Pneumatic Liq Level Controller			7-Aug-15	11:21	670.00	7-Aug-15
105	Other	Gas	70	Cloudy	4	7	2	N	Gas regulator on Dehydrator P32 V10870	-	-	Feb-25-2015	14:11	800.00	Feb-25-2015
106	Other	Gas	0	sunny	4	5	1	N	Gas Regulator at compressor	Feb-23-2015	0.611111111	Feb-24-2015	14:02	2,000.00	Feb-24-2015
107	Other	Gas	0	sunny	4	5	1	N	Gas Regulator at compressor	Feb-23-2015	0.623611111	Feb-24-2015	14:14	3,500.00	Feb-24-2015
108	Other	Gas	10	sunny	4	7	2	N	PRV Weep hole on compressor V4016E	-	-	Feb-26-2015	9:18	4,000.00	Feb-26-2015
109	Other	Gas	10	sunny	4	7	2	N	norriseal level controller on V4016E at compressor	-	-	Feb-26-2015	9:12	4,000.00	Feb-26-2015
110	Other	Gas	10 / 90 / 50/ 98	sunny				Y [3]	Senior Daniels Flow Meter on Heater	Jan-27-2015	0.381944444	Jan-27-2015	12:38	7,800.00	Jan-27-2015
111	Other	Gas	10	sunny	1	1	2	N	Gas Regulator	Feb-23-2015	0.4375	Feb-23-2015	12:25	9,000.00	Feb-23-2015
112	Other	Gas	0	Sunny	1	3	2	Y [2]	West Side Compressor Seal	Jan-23-2015	-	Jan-23-2015	12:07	10,100.00	Jan-23-2015
113	Other	Gas	70	Cloudy	4	7	2	N	Temperature controller on reboiler D6	-	-	Feb-25-2015	13:01	10,700.00	Feb-25-2015
114	Other	Gas	0	sunny	4	5	1	N	Gas Regulator P53	Feb-23-2015	0.625694444	Feb-24-2015	10:27	12,000.00	Feb-24-2015
115	Other	Gas	0	sunny	4	5	1	N	Pressure meter on separator 11118	-	-	Feb-24-2015	10:52	15,600.00	Feb-24-2015
116	Other	Gas	60	Cloudy	2	2	0	Y [2]	Inactive Flare Pilots	Jan-22-2015	0.595138889	Jan-22-2015	14 : 45	18,000.00	Jan-22-2015
117	Other	Gas	70	Cloudy	4	7	2	N	Temperature controller on reboiler D6	-	-	Feb-25-2015	12:57	27,500.00	Feb-25-2015
118	Other	Gas	0	sunny	4	5	1	N	Vent at compressor	Feb-23-2015	15:13	Feb-24-2015	14:23	50,000.00	Feb-24-2015
119	Other	Gas	10 / 90 / 50/ 98	sunny				Y [3]	Pig receiver	-	-	Jan-27-2015	14:36	65,300.00	Jan-27-2015
120	Other	Gas	70	Cloudy	4	7	2	N	level control on compressor	-	-	Feb-25-2015	14:48	100,000.00	Feb-25-2015
121	Other	Gas	50	light cloudy				Y [3]	Senior Daniels Flow Meter	Jan-29-2015	9:55	Jan-29-2015	11:00	100,001.00	Jan-29-2015
122	Other	Gas	90	cloudy				Y [3]	Senior Daniels Flow Meter	Jan-28-2015	9:15	Jan-29-2015	10:31	104,501.00	Jan-29-2015
123	Other	Gas	10 / 90 / 50/ 98	sunny				Y [3]	PRV Weep hole	Jan-27-2015	11:10	Jan-27-2015	13:50	115,600.00	Jan-27-2015
124	Other	Gas	10	sunny	1	1	2	N	Fittings on pressure gauge	-	-	Feb-23-2015	12:06	130,001.00	Feb-23-2015
125	Other	Gas	10	sunny	1	1	2	N	Fittings on pressure gauge	-	-	Feb-23-2015	11:34	130,001.00	Feb-23-2015
126	Other	Gas	10	sunny	1	1	2	N	Fittings on pressure gauge on vessel V-2019	-	-	Feb-23-2015	12:01	130,001.00	Feb-23-2015
127	Other	Gas	60	Sunny	2	2	1	N	Regulator			6-Aug-15	13:51	500,001.00	6-Aug-15
128	Valve	Gas	0	Sunny	1	3	2	Y [2]	Valve of Avanti 013698	-	-	Jan-23-2015	11:08	1.98	Jan-23-2015
129	Valve	Gas	0	Sunny	1	3	2	Y [2]	Gauge valve 1/2'' on sight glass	-	-	Jan-23-2015	11:18	3.20	Jan-23-2015
130	Valve	Gas	100	Cloudy	0	0	1	Y [1]	4'' valve	-	-	Jan-26-2015	14:10	12.00	Jan-26-2015
131	Valve	Gas	95	Cloudy	0	1	2	Y [1]	6" Gate	-	-	Jan-26-2015	12:27	18.00	Jan-26-2015
132	Valve	Gas	50	Sunny	15	5	4	Y [2]	10'' Valve	-	-	Jan-22-2015	11:54	50.00	Jan-22-2015
133	Valve	Gas	95	Cloudy	0	1	2	Y [1]	Ball 1''	-	-	Jan-26-2015	11:25	65.00	Jan-26-2015
134	Valve	Gas	50	Sunny	15	5	4	Y [2]	on compressor	-	-	Jan-22-2015	11:26	72.00	Jan-22-2015
135	Valve	Gas	0.1	sunny	1	1	2	N	Control Valve Stem	-	-	Feb-23-2015	12:10	300.00	Feb-23-2015
136	Valve	Gas	10 / 90 / 50/ 98	sunny				Y [3]	4''	-	-	Jan-27-2015	14:30	320.00	Jan-27-2015
137	Valve	Gas	0	Sunny	1	3	2	Y [2]	3 inch plug valve	-	-	Jan-23-2015	11:59	329.00	Jan-23-2015
138	Valve	Gas	50	light cloudy				Y [3]	6" Ball Valve	-	-	Jan-29-2015	12:55	620.00	Jan-29-2015
139	Valve	Gas	50	light cloudy				Y [3]	Control Valve			Jan-29-2015	10:45	750.00	Jan-29-2015
140	Valve	Gas	10 / 90 / 50/ 98	sunny				Y [3]	2''	-	-	Jan-27-2015	14:49	800.00	Jan-27-2015
141	Valve	Gas	90	cloudy				Y [3]	1''	-	-	Jan-28-2015	14:01	940.00	Jan-28-2015
142	Valve	Gas	90	cloudy				Y [3]	2" Gate	-	-	Jan-28-2015	12:42	1,200.00	Jan-28-2015
143	Valve	Gas	50	light cloudy				Y [3]	Control Valve	-	-	Jan-29-2015	11:23	1,400.00	Jan-29-2015
144	Valve	Gas	90	cloudy				Y [3]	1'' Gate	-	-	Jan-28-2015	13:06	1,800.00	Jan-28-2015
145	Valve	Gas	50	light cloudy				Y [3]	6" Ball Valve	-	-	Jan-29-2015	12:48	2,300.00	Jan-29-2015
146	Valve	Gas	90	cloudy				Y [3]	1" Ball	-	-	Jan-28-2015	14:21	3,100.00	Jan-28-2015
147	Valve	Gas	10	sunny	4	7	2	N	1/2''at wellhead 60-24	-	-	Feb-26-2015	14:05	3,300.00	Feb-26-2015
148	Valve	Gas	15	Sunny	3	1	1	N	Control Valve 2" @ spherical separator			11-Aug-15	12:49	13,280.00	11-Aug-15
149	Valve	Gas	90	cloudy				Y [3]	1'' Gate	-	-	Jan-28-2015	13:38	20,100.00	Jan-28-2015
150	Valve	Gas	15	Sunny	2	3	1	N	Control Valve 3-inch			11-Aug-15	11:46	23,240.00	11-Aug-15
151	Valve	Gas	70	Cloudy	4	7	2	N	Kimray Level Controller on V11251	-	-	Feb-25-2015	13:57	30,000.00	Feb-25-2015
152	Valve	Gas	30	sunny	1	2	2	N	at compressor	-	-	Feb-26-2015	15:09	50,000.00	Feb-26-2015
153	Valve	Gas	95	Cloudy	0	1	2	Y [1]	3'' Gate	Jan-26-2015	0.461805556	Jan-26-2015	11:58	56,380.00	Jan-26-2015
154	Valve	Gas	90	cloudy				Y [3]	1'' Gate	-	-	Jan-28-2015	12:58	60,800.00	Jan-28-2015
155	Valve	Gas	0	sunny	4	5	1	N	2'' Control Valve on V11097	Feb-24-2015	0.399305556	Feb-24-2015	10:12	100,001.00	Feb-24-2015
156	Valve	Gas	10	Sunny	2	1	2	N	8" Valve @ Stem on Compressor			Feb-27-2015	11:41	100,001.00	Feb-27-2015
157	Valve	Gas	90	cloudy				Y [3]	3'' Valve	Jan-28-2015	0.400694444	Jan-29-2015	13:08	104,501.00	Jan-29-2015
158	Valve	Gas	90	cloudy				Y [3]	Valve on K1400 Cylinder #3	Jan-28-2015	10:33	Jan-29-2015	13:36	104,501.00	Jan-29-2015
159	Valve	Gas	85	Cloudy	2	1	1	N	6-inch			6-Aug-15	14:43	111,600.00	6-Aug-15
160	Valve	Gas	85	Cloudy	2	1	1	N	6-inch			6-Aug-15	14:28	269,700.00	6-Aug-15

Section 2, Appendix A: Field & Lab Data & Calculations

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Sort order, sorted by Component Type, & Method 21 Concentration, ppmv	Component Information			Flow #1					Flow #2						Average						HIGH FLOW SAMPLER DATA CALCULATED
	Component Type	Service	Time	Temperature (Degree C)	Flow CFM	Bkg %	%CH4 (%)	% CFM	Temperature (Degree C)	Flow CFM	Bkg %	%CH4	Is the %CH4 a TVA reading?	% CFM	Temperature (°C)	Temperature (°R)	Flow CFM	Bkg %	%CH4	% CFM	Calculated CH4 Emissions Rate, kg/hr, STP, as methane
104	Other	Gas	10:22	32.1	5.2	0	0.07	0.00364	32.3	4.6	0	0.02	Y	0.00092	32.20	549.63	4.900	-	0.045	0.00364	**2.49E-03**
105	Other	Gas	14:11	24.2	8.1		0.0021	0.00017	24.2	6.7		0.00072	Y	0.00005	24.20	535.23	7.400	-	0.0021	0.00017	**1.78E-04**
106	Other	Gas	14:02	31.2	8	0	0.05	0.00400	31.2	6.7	0	0.0099	Y	0.00066	31.20	547.83	7.350	-	0.05	0.00400	**4.21E-03**
107	Other	Gas	14:14	31.4	7	0	0.1169	0.00818	31.4	5.9	0	0.1569	Y	0.00926	34.05	552.96	7.000	-	0.24	0.01944	**1.92E-02**
108	Other	Gas	9:18	16.4	7.6		0.000776	0.00006	16.6	6.6		0.0013	Y	0.00009	16.50	521.37	7.100	-	0.0013	0.00009	**1.05E-04**
109	Other	Gas	9:12	15.8	8.4		0.0014	0.00012	15.9	6.9		0.0022	Y	0.00015	15.85	520.20	7.650	-	0.0022	0.00015	**1.91E-04**
110	Other	Gas	12:38	27.5	6.5	0	0.12	0.00800	27.5	5.3	0	0.16		0.00800	27.50	541.17	5.900	-	0.14	0.00800	**9.30E-03**
111	Other	Gas	12:25	16.3	6.7	0	0.21	0.01400	16.3	5.4	0	0.27		0.01500	16.30	521.01	6.050	-	0.27	0.01500	**1.86E-02**
112	Other	Gas	12:07	24.7	6.8	0	0	0.00000	24.7	5.6	0	0.15		0.00800	24.70	536.13	6.800	-	0.15	0.00800	**1.17E-02**
113	Other	Gas	13:01	27.4	7.4		0.0501	0.00371	27.4	6.1		0.2994	Y	0.01826	27.40	540.99	6.750	-	0.2994	0.01826	**2.31E-02**
114	Other	Gas	10:27	18.1	8.2	0	0.2122	0.01740	18.1	6.8	0	0.2595	Y	0.01765	18.10	524.25	7.500	-	0.2595	0.01765	**2.23E-02**
115	Other	Gas	10:52	19.3	8.5	0	0.0135	0.00115	19.4	7.0	0	0.0205	Y	0.00144	19.35	526.50	7.750	-	0.0205	0.00144	**1.82E-03**
116	Other	Gas	14:45	24.5	7.7	0	0.73	0.05600	24.5	6.4	0	0.72		0.05000	24.50	535.77	7.700	-	0.73	0.05600	**6.42E-02**
117	Other	Gas	12:57	27.3	7.3		0.0508	0.00371	27.4	6.0		0.12	Y	0.00720	27.35	540.90	6.650	-	0.12	0.00720	**9.12E-03**
118	Other	Gas	14:24	31.6	8.3	0	>50,000	4150.00000	31.6	6.8	0	3.4	Y	0.23120	31.60	548.55	7.550	-	3.4	4150.00000	**2.94E-01**
119	Other	Gas	14:35	27.1	6.7	0	0.0249	0.00000	27.00	5.6	0	0.0249	Y	0.00000	27.05	540.36	6.150	-	0.0249	0	**1.72E-03**
120	Other	Gas	14:48	26.8	8.3		0.935	0.07761	26.8	6.8		1.08	Y	0.07344	26.80	539.91	7.550	-	1.08	0.07761	**9.32E-02**
121	Other	Gas	11:00	21.3	5.5	0	0.0921	0.00000	21.30	4.1	0	0.0921	Y	0.00000	21.30	530.01	4.800	-	0.0921	0	**4.95E-03**
122	Other	Gas	10:31	19.4	5.7	0	0.073	0.00000	19.50	5.0	0	0.073	Y	0.00000	19.45	526.68	5.350	-	0.073	0	**4.39E-03**
123	Other	Gas	13:50	29.3	7.3	0	0.0291	0.00000	29.30	6.0	0	0.0291	Y	0.00000	29.30	544.41	6.650	-	0.0291	0	**2.18E-03**
124	Other	Gas	12:06	16.9	7.5	0	3.72	0.27900	16.9	6.2	0	4.79		0.29700	16.90	522.09	6.850	-	4.79	0.29700	**3.73E-01**
125	Other	Gas	11:34	19.1	5.3	0	5.32	0.28200	19	4.2	0	5.99		0.25200	19.05	525.96	4.750	-	5.99	0.28200	**3.24E-01**
126	Other	Gas	12:01	17.3	6.2	0	8.29	0.51400	17.1	4.9	0	10.83		0.53100	17.20	522.63	5.550	-	10.83	0.53100	**6.84E-01**
127	Other	Gas	13:51	37.3	6.5	0.15	4.6	0.28925	37.3	5.8	0.15	5.3		0.29870	37.30	558.81	6.150	0.15	4.95	0.29870	**3.33E-01**
128	Valve	Gas	11:08	21.3	6.5	0	0.00044	0.00000	21.40	5.4	0	0.00044	Y	0.00000	21.35	530.10	5.950	-	0.00044	0	**3.00E-05**
129	Valve	Gas	11:18	22.6	6.6	0	0.00029	0.00000	22.70	5.5	0	0.00029	Y	0.00000	22.65	532.44	6.050	-	0.00029	0	**2.01E-05**
130	Valve	Gas	14:11	26.7	6.8	0	0.00017	0.00000	26.80	5.7	0	0.00017	Y	0.00000	26.75	539.82	6.250	-	0.00017	0	**1.19E-05**
131	Valve	Gas	12:26	29.9	6.8	0	0.00025	0.00000	29.90	5.5	0	0.00025	Y	0.00000	29.90	545.49	6.150	-	0.00025	0	**1.71E-05**
132	Valve	Gas	11:54	28	6.7	0:00	0.000911	0.00000	28.10	5.6	0	0.000911	Y	0.00000	28.05	542.16	6.150	-	0.000911	0	**6.41E-05**
133	Valve	Gas	11:23	26.5	7.4	0	0.00047	0.00000	26.70	6.2	0	0.00047	Y	0.00000	26.60	539.55	6.800	-	0.00047	0	**3.56E-05**
134	Valve	Gas	11:26	28.3	7	0	0.00048	0.00000	28.20	5.8	0	0.00048	Y	0.00000	28.25	542.52	6.400	-	0.00048	0	**3.51E-05**
135	Valve	Gas	12:10	16.6	6.9	0	0	0.00000	16.6	6.3	0	0.0209	Y	0.00132	16.60	521.55	6.600	-	0.01045	0.00066	**7.84E-04**
136	Valve	Gas	14:28	27.4	6.9	0	0.001601	0.00000	27.40	5.7	0	0.001601	Y	0.00000	27.40	540.99	6.300	-	0.001601	0	**1.14E-04**
137	Valve	Gas	11:59	24	7	0	0.001508	0.00000	24.20	5.7	0	0.001508	Y	0.00000	24.10	535.05	6.350	-	0.001508	0	**1.10E-04**
138	Valve	Gas	12:55	24.5	7.8	0	0.00078	0.00000	24.60	6.5	0	0.00078	Y	0.00000	24.55	535.86	7.150	-	0.00078	0	**6.24E-05**
139	Valve	Gas	10:45	20.4	6.8	0	0.0008	0.00000	20.40	5.6	0	0.0008	Y	0.00000	20.40	528.39	6.200	-	0.0008	0	**5.55E-05**
140	Valve	Gas	14:49	26.9	6.4	0:00	0.000812	0.00000	26.90	5.2	0	0.000812	Y	0.00000	26.90	540.09	5.800	-	0.000812	0	**5.30E-05**
141	Valve	Gas	14:01	23.4	6.7	0	0.0004	0.00000	23.40	5.5	0	0.0004	Y	0.00000	23.40	533.79	6.100	-	0.0004	0	**2.74E-05**
142	Valve	Gas	12:42	23.8	6.9	0	0.0015	0.00000	23.90	5.7	0	0.0015	Y	0.00000	23.85	534.60	6.300	-	0.0015	0	**1.06E-04**
143	Valve	Gas	11:23	22.7	6.5	0	0.0212	0.00000	22.80	5.3	0	0.0212	Y	0.00000	22.75	532.62	5.900	-	0.0212	0	**1.40E-03**
144	Valve	Gas	13:06	24.7	7.4	0	0.000207	0.00000	24.70	6.2	0	0.000207	Y	0.00000	24.70	536.13	6.800	-	0.000207	0	**1.58E-05**
145	Valve	Gas	12:48	24	7.6	0	0.0021	0.00000	24.00	6.3	0	0.0021	Y	0.00000	24.00	534.87	6.950	-	0.0021	0	**1.63E-04**
146	Valve	Gas	14:21	22.9	3.8	0	0.0406	0.00000	22.90	3.0	0	0.0406	Y	0.00000	22.90	532.89	3.400	-	0.0406	0	**1.55E-03**
147	Valve	Gas	14:05	26.4	6.7		0.001628	0.00011	26.5	5.5		0.001801	Y	0.00010	26.45	539.28	6.100	-	0.001801	0.00011	**1.25E-04**
148	Valve	Gas	12:42	34.2	7.9	0	77	0.06000	34.3	6.6	0	0.96		0.06000	34.25	553.32	7.250	-	38.98	0.06000	**3.19E+00**
149	Valve	Gas	13:38	24.2	6.8	0	0.0107	0.00000	24.20	5.7	0	0.0107	Y	0.00000	24.20	535.23	6.250	-	0.0107	0	**7.51E-04**
150	Valve	Gas	11:46	29.9	7.9	0.18	2.04	0.14694	30.1	6.6		2.42		0.15972	30.00	545.67	7.250	-	2.23	0.15972	**1.77E-01**
151	Valve	Gas	13:57	24.2	8.3		0.3577	0.02969	24.1	6.8		0.4358	Y	0.02963	24.15	535.14	7.550	-	0.4358	0.02969	**3.76E-02**
152	Valve	Gas	15:09	28.2	7.7		0.2175	0.01600	28.2	6.6		0.2817	Y	0.02000	28.20	542.43	7.150	-	0.2817	0.02000	**2.27E-02**
153	Valve	Gas	11:58	29	6.7	0	0.46	0.03100	29.1	5.4	0	0.5		0.02700	29.05	543.96	6.700	-	0.5	0.03100	**3.73E-02**
154	Valve	Gas	12:58	24.4	7.2	0	0.0278	0.00000	24.40	6.0	0	0.0278	Y	0.00000	24.40	535.59	6.600	-	0.0278	0	**2.06E-03**
155	Valve	Gas	10:12	16.7	7.6	0	0.0622	0.00473	16.8	6.4	0	0.07	Y	0.00448	16.75	521.82	7.000	-	0.07	0.00473	**5.61E-03**
156	Valve	Gas	11:41	26.4	7.9	2.06	16.9	1.17200	26.4	6.8	1.63	19.4		1.21000	26.40	539.19	7.350	2.06	19.4	1.21000	**1.43E+00**
157	Valve	Gas	13:08	25.3	3.9	0	0.16	0.00600	25.3	3.6	0	0.18		0.00600	25.30	537.21	3.750	-	0.17	0.00600	**7.16E-03**
158	Valve	Gas	13:36	27.3	7.9	0	0.12	0.00000	27.40	6.6	0	0.12	Y	0.00000	27.35	540.90	7.250	-	0.12	0	**9.77E-03**
159	Valve	Gas	13:43	37.2	8	0	0.063	0.00504	37.2	6.7	0	0.101		0.00677	37.20	558.63	7.350	-	0.082	0.00677	**6.80E-03**
160	Valve	Gas	13:37	36.7	8.1	0	0.24	0.01944	36.8	6.9	0	0.29		0.02001	36.75	557.82	7.500	-	0.265	0.02001	**2.24E-02**

Section 2, Appendix A: Field & Lab Data & Calculations

Note: results with all values = zero are hidden, see Appendix E for Descriptive Statistics for all leak

Sort order, sorted by Component Type, & Method 21 Concentration, ppmv	Component Information					CANISTER DATA						TEDLAR BAG DATA						EPA METHOD TO-15 CONCENTRATION DATA	
			CALCULATED	CALCULATED	CALCULATED										ppmv @ STP	ppmv @ STP	ppmv @ STP	ppmv @ STP	ppmv @ STP
																		58.079	78.112
	Component Type	Service	Log10 TVA as CH4, ppmv	Log10 CH4 EmRate, kg/hr, as methane	Log10 TOC of Linked TOC Emissions Estimates, kg/hr	Sample #	Date	Time	Can ID	Can I-Vac (in Hg)	Can F-Vac (in Hg)	Sample(s) #	Date	Time	1,3,5-Trimethyl benzene	2-Hexanone	4-Ethyltoluene	Acetone	Benzene
104	Other	Gas	**2.83**	**-2.60**															
105	Other	Gas	**2.90**	**-3.75**															
106	Other	Gas	**3.30**	**-2.38**															
107	Other	Gas	**3.54**	**-1.72**															
108	Other	Gas	**3.60**	**-3.98**															
109	Other	Gas	**3.60**	**-3.72**															
110	Other	Gas	**3.89**	**-2.03**	**-2.08**	CAN014	Jan-27-2015	0.528472222	OEC-39-0339	28.5	0	TB014	Jan-27-2015	12:43	ND	ND	ND	ND	2.80E+01
111	Other	Gas	**3.95**	**-1.73**															
112	Other	Gas	**4.00**	**-1.93**															
113	Other	Gas	**4.03**	**-1.64**															
114	Other	Gas	**4.08**	**-1.65**															
115	Other	Gas	**4.19**	**-2.74**															
116	Other	Gas	**4.26**	**-1.19**	**-1.13**	CAN009	Jan-22-2015	0.617361111	OEC-39-0296	28.75	0	TB009	Jan-22-2015	14:50	1.30E+02	2.30E+03	2.40E+02	ND	5.60E+01
117	Other	Gas	**4.44**	**-2.04**															
118	Other	Gas	**4.70**	**-0.53**															
119	Other	Gas	**4.81**	**-2.76**															
120	Other	Gas	**5.00**	**-1.03**	**-1.12**							TB029A/TB029B	Feb-25-2015	14:51	ND	ND	ND	ND	2.10E+01
121	Other	Gas	**5.00**	**-2.31**															
122	Other	Gas	**5.02**	**-2.36**	**-2.65**	CAN020	Jan-29-2015	10:36	OEC-29-708	28.25	0	TB020	Jan-29-2015	10:38	ND	ND	ND	ND	2.00E+01
123	Other	Gas	**5.06**	**-2.66**	**-3.11**	CAN016	Jan-27-2015	14:18	OEC-29-728	27	0	TB016	Jan-27-2015	14:20	ND	ND	ND	ND	4.30E+01
124	Other	Gas	**5.11**	**-0.43**															
125	Other	Gas	**5.11**	**-0.49**	**-0.77**							TB025A/TB025B	Feb-23-2015	0.481944444	ND	ND	ND	ND	5.30E+01
126	Other	Gas	**5.11**	**-0.17**															
127	Other	Gas	**5.70**	**-0.48**	**-0.31**							TB-40A/TB-40B	Aug-06-2015	0.581944444	ND	ND	ND	ND	8.40E+00
128	Valve	Gas	**0.30**	**-4.52**															
129	Valve	Gas	**0.51**	**-4.70**															
130	Valve	Gas	**1.08**	**-4.92**															
131	Valve	Gas	**1.26**	**-4.77**															
132	Valve	Gas	**1.70**	**-4.19**															
133	Valve	Gas	**1.81**	**-4.45**															
134	Valve	Gas	**1.86**	**-4.45**															
135	Valve	Gas	**2.48**	**-3.11**															
136	Valve	Gas	**2.51**	**-3.94**															
137	Valve	Gas	**2.52**	**-3.96**	**-3.43**	CAN011	Jan-23-2015	12:03	OEC-29-702	28.5	0	TB011	Jan-23-2015	12:04	ND	ND	ND	ND	7.40E+01
138	Valve	Gas	**2.79**	**-4.20**															
139	Valve	Gas	**2.88**	**-4.26**															
140	Valve	Gas	**2.90**	**-4.28**															
141	Valve	Gas	**2.97**	**-4.56**		CAN017	Jan-28-2015	14:11	OEC-117-34	28.5	0	TB017	Jan-28-2015	14:16	ND	ND	ND	ND	ND
142	Valve	Gas	**3.08**	**-3.97**															
143	Valve	Gas	**3.15**	**-2.85**															
144	Valve	Gas	**3.26**	**-4.80**															
145	Valve	Gas	**3.36**	**-3.79**															
146	Valve	Gas	**3.49**	**-2.81**															
147	Valve	Gas	**3.52**	**-3.90**															
148	Valve	Gas	**4.12**	**0.50**															
149	Valve	Gas	**4.30**	**-3.12**															
150	Valve	Gas	**4.37**	**-0.75**	**-5.15**							TB044A/TB044B	Aug-11-2015	11:50	ND	ND	ND	ND	ND
151	Valve	Gas	**4.48**	**-1.42**	**-1.71**							TB028A/TB028B	Feb-25-2015	14:02	ND	ND	ND	ND	9.80E+00
152	Valve	Gas	**4.70**	**-1.64**	**-1.76**							TB032A/TB032B	Feb-26-2015	15:15	ND	ND	ND	ND	1.10E+01
153	Valve	Gas	**4.75**	**-1.43**	**-1.59**	CAN013	Jan-26-2015	0.504166667	OEC-117-11	27.5	0	TB013	Jan-26-2015	12:08	ND	ND	ND	ND	ND
154	Valve	Gas	**4.78**	**-2.69**															
155	Valve	Gas	**5.00**	**-2.25**	**-2.19**							TB026A/TB026B	Feb-24-2015	10:15	ND	ND	ND	ND	ND
156	Valve	Gas	**5.00**	**0.16**															
157	Valve	Gas	**5.02**	**-2.15**															
158	Valve	Gas	**5.02**	**-2.01**															
159	Valve	Gas	**5.05**	**-2.17**															
160	Valve	Gas	**5.43**	**-1.65**	**-1.60**							TB-041A/TB-041B	Aug-06-2015	14:35	ND	ND	ND	ND	ND

Section 2, Appendix A: Field & Lab Data & Calculations

Note: results with all values = zero are hidden, see Appendix E for Descriptive Statistics for all leak

Sort order, sorted by Component Type, & Method 21 Concentration, ppmv	Component Information																METHOD TO-15 Calculated Emissions			METHOD TO-15 Calculated Emissions		
	Component Type	Service	ppmv @ STP	ppmv @ STP	ppmv @ STP	ppmv @ STP	ppmv @ STP	ppmv @ STP	ppmv @ STP	ppmv @ STP	ppmv @ STP	ppmv @ STP	ppmv @ STP	ppmv @ STP	ppmv @ STP	ppmv @ STP	ppmv @ STP	kg/hr	kg/hr	kg/hr	kg/hr	kg/hr	kg/hr
			76.139		84.16	46.068	88.11	106.165	100.21		86.18	60.1	100.16	92.14	105	131.4	106.165	120.19	120.19	100.16	120.1916	58.079	78.112
			Carbon disulfide	Chlorobenzene	Cyclohexane	Ethanol	Ethyl Acetate	Ethylbenzene	Heptane	Hexachlorobutadiene	Hexane	Isopropyl alcohol	Methyl Isobutyl Ketone	Toluene	TPH Gasoline (C4-C12)	Trichloroethene (TCE)	Xylenes (total)	1,2,4-Trimethyl-benzene	1,3,5-Trimethyl-benzene	2-Hexanone	4-Ethyltoluene	Acetone	Benzene
104	Other	Gas																					
105	Other	Gas																					
106	Other	Gas																					
107	Other	Gas																					
108	Other	Gas																					
109	Other	Gas																					
110	Other	Gas	ND	ND	1.30E+02	ND	ND	ND	3.20E+01	ND	3.80E+02	ND	ND	1.00E+01	4.50E+03	ND	ND	-	-	-	-	-	8.8293E-07
111	Other	Gas																					
112	Other	Gas																					
113	Other	Gas																					
114	Other	Gas																					
115	Other	Gas																					
116	Other	Gas	ND	7.50E+02	5.00E+03	ND	ND	3.10E+02	1.40E+03	ND	1.70E+03	ND	ND	2.80E+02	2.50E+05	ND	1.00E+03	-	8.4382E-06	1.2441E-04	1.5578E-05	-	2.3623E-06
117	Other	Gas																					
118	Other	Gas																					
119	Other	Gas																					
120	Other	Gas	ND	ND	5.50E+01	6.10E+01	ND	ND	2.90E+01	ND	3.90E+01	ND	ND	1.50E+01	ND	ND	ND	-	-	-	-	-	8.6253E-07
121	Other	Gas																					
122	Other	Gas	ND	ND	9.40E+01	ND	ND	ND	2.10E+01	ND	2.50E+02	ND	ND	ND	ND	ND	ND	-	-	-	-	-	5.8602E-07
123	Other	Gas	ND	ND	1.00E+02	ND	ND	ND	3.30E+01	ND	3.50E+02	ND	ND	1.20E+01	1.60E+04	ND	ND	-	-	-	-	-	1.5192E-06
124	Other	Gas																					
125	Other	Gas	ND	ND	8.70E+01	9.50E+01	ND	ND	3.50E+01	ND	7.30E+01	ND	ND	2.90E+01	ND	ND	ND	-	-	-	-	-	1.3984E-06
126	Other	Gas																					
127	Other	Gas	ND	ND	5.00E+01	ND	ND	ND	7.50E+01	ND	1.90E+02	ND	ND	9.00E+00	7.30E+03	ND	ND	-	-	-	-	-	2.6793E-07
128	Valve	Gas																					
129	Valve	Gas																					
130	Valve	Gas																					
131	Valve	Gas																					
132	Valve	Gas																					
133	Valve	Gas																					
134	Valve	Gas																					
135	Valve	Gas																					
136	Valve	Gas																					
137	Valve	Gas	ND	ND	3.60E+02	ND	ND	ND	1.90E+02	ND	4.50E+02	ND	ND	9.80E+01	6.90E+03	ND	ND	-	-	-	-	-	2.5821E-06
138	Valve	Gas																					
139	Valve	Gas																					
140	Valve	Gas																					
141	Valve	Gas	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	-	-	-	-	-	-
142	Valve	Gas																					
143	Valve	Gas																					
144	Valve	Gas																					
145	Valve	Gas																					
146	Valve	Gas																					
147	Valve	Gas																					
148	Valve	Gas																					
149	Valve	Gas																					
150	Valve	Gas	8.70E+00	ND	1.10E+01	ND	ND	ND	2.10E+01	ND	3.20E+01	4.40E+01	ND	2.00E+01	ND	ND	3.80E+01	-	-	-	-	-	-
151	Valve	Gas	ND	ND	1.70E+01	ND	ND	ND	ND	ND	1.60E+01	ND	ND	ND	ND	ND	ND	-	-	-	-	-	4.0610E-07
152	Valve	Gas	ND	ND	ND	ND	ND	ND	ND	ND	1.70E+01	ND	ND	1.10E+01	ND	ND	ND	-	-	-	-	-	4.1966E-07
153	Valve	Gas	ND	ND	2.70E+01	ND	ND	ND	1.40E+01	ND	5.20E+01	ND	ND	ND	ND	ND	ND	-	-	-	-	-	-
154	Valve	Gas																					
155	Valve	Gas	ND	ND	ND	1.10E+02	ND	ND	ND	ND	ND	ND	ND	9.20E+00	ND	ND	ND	-	-	-	-	-	-
156	Valve	Gas																					
157	Valve	Gas																					
158	Valve	Gas																					
159	Valve	Gas																					
160	Valve	Gas	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	1.40E+01	ND	-	-	-	-	-	-

Section 2, Appendix A: Field & Lab Data & Calculations

Note: results with all values = zero are hidden, see Appendix E for Descriptive Statistics for all leak

Sort order, sorted by Component Type, & Method 21 Concentration, ppmv	Component Information																ASTM 1945/3588 Concentration Data				
	Component Type	Service	kg/hr	kg/hr	kg/hr	kg/hr	kg/hr	kg/hr	kg/hr	kg/hr	kg/hr	kg/hr	kg/hr	kg/hr	kg/hr	kg/hr					
			76.139	112.56	84.16	46.068	88.11	106.165	100.21	86.18	60.1	100.16	92.14	105	131.4	106.165					
			Carbon disulfide	Chlorobenzene	Cyclohexane	Ethanol	Ethyl Acetate	Ethylbenzene	Heptane	Hexane	Isopropyl alcohol	Methyl Isobutyl Ketone	Toluene	TPH Gasoline (C4-C12)	Trichloroethene (TCE)	Xylenes (total)	Oxygen (Mol%)	Oxygen (ppb)	Nitrogen (Mol%)	Nitrogen (ppb)	Hydrogen (Mol%)
104	Other	Gas																			
105	Other	Gas																			
106	Other	Gas																			
107	Other	Gas																			
108	Other	Gas																			
109	Other	Gas																			
110	Other	Gas	-	-	4.4167E-06	-	-	-	1.2945E-06	1.3220E-05	-	-	3.7196E-07	1.9075E-04	-	-	2.1159E+01	2.1159E+08	7.8669E+01	7.8669E+08	-
111	Other	Gas																			
112	Other	Gas																			
113	Other	Gas																			
114	Other	Gas																			
115	Other	Gas																			
116	Other	Gas	-	4.5591E-05	2.2725E-04	-	-	1.7774E-05	7.5766E-05	7.9121E-05	-	-	1.3933E-05	1.4176E-02	-	5.7335E-05	2.1337E+01	2.1337E+08	7.7918E+01	7.7918E+08	-
117	Other	Gas																			
118	Other	Gas																			
119	Other	Gas																			
120	Other	Gas	-	-	2.4339E-06	1.4776E-06	-	-	1.5281E-06	1.7673E-06	-	-	7.2674E-07	-	-	-	2.1354E+01	2.1354E+08	7.7722E+01	7.7722E+08	-
121	Other	Gas																			
122	Other	Gas	-	-	2.9676E-06	-	-	-	7.8940E-07	8.0819E-06	-	-	-	-	-	-	2.1123E+01	2.1123E+08	7.8803E+01	7.8803E+08	-
123	Other	Gas	-	-	3.8066E-06	-	-	-	1.4957E-06	1.3643E-05	-	-	5.0010E-07	7.5987E-04	-	-	2.1196E+01	2.1196E+08	7.8751E+01	7.8751E+08	-
124	Other	Gas																			
125	Other	Gas	-	-	2.4732E-06	1.4783E-06	-	-	1.1847E-06	2.1251E-06	-	-	9.0258E-07	-	-	-	2.0849E+01	2.0849E+08	7.5966E+01	7.5966E+08	-
126	Other	Gas																			
127	Other	Gas	-	-	1.7183E-06	-	-	-	3.0690E-06	6.6862E-06	-	-	3.3862E-07	3.1299E-04	-	-	1.9457E+01	1.9457E+08	7.2992E+01	7.2992E+08	-
128	Valve	Gas																			
129	Valve	Gas																			
130	Valve	Gas																			
131	Valve	Gas																			
132	Valve	Gas																			
133	Valve	Gas																			
134	Valve	Gas																			
135	Valve	Gas																			
136	Valve	Gas																			
137	Valve	Gas	-	-	1.3534E-05	-	-	-	8.5053E-06	1.7324E-05	-	-	4.0336E-06	3.2364E-04	-	-	2.1565E+01	2.1565E+08	7.8405E+01	7.8405E+08	-
138	Valve	Gas																			
139	Valve	Gas																			
140	Valve	Gas																			
141	Valve	Gas	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2.1249E+01	2.1249E+08	7.8726E+01	7.8726E+08	-
142	Valve	Gas																			
143	Valve	Gas																			
144	Valve	Gas																			
145	Valve	Gas																			
146	Valve	Gas																			
147	Valve	Gas																			
148	Valve	Gas																			
149	Valve	Gas																			
150	Valve	Gas	3.1601E-07	-	4.4164E-07	-	-	-	1.0039E-06	1.3156E-06	1.2615E-06	-	8.7912E-07	-	-	1.9246E-06	2.1413E+01	2.1413E+08	7.8556E+01	7.8556E+08	-
151	Valve	Gas	-	-	7.5901E-07	-	-	-	-	7.3151E-07	-	-	-	-	-	-	2.1458E+01	2.1458E+08	7.8291E+01	7.8291E+08	-
152	Valve	Gas	-	-	-	-	-	-	-	7.1556E-07	-	-	4.9503E-07	-	-	-	2.1536E+01	2.1536E+08	7.8207E+01	7.8207E+08	-
153	Valve	Gas	-	-	1.0255E-06	-	-	-	6.3317E-07	2.0225E-06	-	-	-	-	-	-	2.1339E+01	2.1339E+08	7.8363E+01	7.8363E+08	-
154	Valve	Gas																			
155	Valve	Gas	-	-	-	2.5612E-06	-	-	-	-	-	-	4.2844E-07	-	-	-	2.1522E+01	2.1522E+08	7.8359E+01	7.8359E+08	-
156	Valve	Gas																			
157	Valve	Gas																			
158	Valve	Gas																			
159	Valve	Gas																			
160	Valve	Gas	-	-	-	-	-	-	-	-	-	-	-	-	9.1770E-07	-	2.1021E+01	2.1021E+08	7.8635E+01	7.8635E+08	-

Section 2, Appendix A: Field & Lab Data & Calculations

Note: results with all values = zero are hidden, see Appendix E for Descriptive Statistics for all leak

Sort order, sorted by Component Type, & Method 21 Concentration, ppmv	Component Information																		ASTM 1945/3588 Concentration Data			ASTM 1945/3588 Emissions (kg/hr)				
																						31.9988	28.0134	2.01	28.0106	44.01
	Component Type	Service	Hydrogen (ppb)	Carbon Dioxide (Mol%)	Carbon Dioxide (ppb)	Carbon Monoxide (Mol%)	Carbon Monoxide (ppb)	Methane (Mol%)	Methane (ppb)	Ethane (Mol%)	Ethane (ppb)	Propane (Mol%)	Propane (ppb)	i-Butane (Mol%)	i-Butane (ppb)	n-Butane (Mol%)	n-Butane (ppb)	i-Pentane (Mol%)	i-Pentane (ppb)	n-Pentane (Mol%)	n-Pentane (ppb)	Oxygen	Nitrogen	Hydrogen	Carbon Monoxide	Carbon Dioxide
104	Other	Gas																								
105	Other	Gas																								
106	Other	Gas																								
107	Other	Gas																								
108	Other	Gas																								
109	Other	Gas																								
110	Other	Gas	-	4.6944E-02	4.6944E+05	-	-	1.2485E-01	1.2485E+06	-	-	-	-	-	-	-	-	-	-	-	-	2.7332E+00	8.8966E+00	-	-	8.3404E-03
111	Other	Gas																								
112	Other	Gas																								
113	Other	Gas																								
114	Other	Gas																								
115	Other	Gas																								
116	Other	Gas	-	5.3201E-02	5.3201E+05	-	-	6.9183E-01	6.9183E+06	-	-	-	-	-	-	-	-	-	-	-	-	3.6872E+00	1.1788E+01	-	-	1.2645E-02
117	Other	Gas																								
118	Other	Gas																								
119	Other	Gas																								
120	Other	Gas	-	2.6735E-02	2.6735E+05	-	-	8.9746E-01	8.9746E+06	-	-	-	-	-	-	-	-	-	-	-	-	3.5930E+00	1.1448E+01	-	-	6.1870E-03
121	Other	Gas																								
122	Other	Gas	-	3.7738E-02	3.7738E+05	-	-	3.6850E-02	3.6850E+05	-	-	-	-	-	-	-	-	-	-	-	-	2.5354E+00	8.2808E+00	-	-	6.2302E-03
123	Other	Gas	-	5.2817E-02	5.2817E+05	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3.0677E+00	9.9782E+00	-	-	1.0514E-02
124	Other	Gas																								
125	Other	Gas	-	4.0529E-02	4.0529E+05	-	-	3.1437E+00	3.1437E+07	-	-	-	-	-	-	-	-	-	-	-	-	2.2536E+00	7.1883E+00	-	-	6.0250E-03
126	Other	Gas																								
127	Other	Gas	-	3.1145E-02	3.1145E+05	-	-	7.4954E+00	7.4954E+07	2.4252E-02	2.4252E+05	-	-	-	-	-	-	-	-	-	-	2.5423E+00	8.3495E+00	-	-	5.5970E-03
128	Valve	Gas																								
129	Valve	Gas																								
130	Valve	Gas																								
131	Valve	Gas																								
132	Valve	Gas																								
133	Valve	Gas																								
134	Valve	Gas																								
135	Valve	Gas																								
136	Valve	Gas																								
137	Valve	Gas	-	2.9548E-02	2.9548E+05	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3.0826E+00	9.8115E+00	-	-	5.8091E-03
138	Valve	Gas																								
139	Valve	Gas																								
140	Valve	Gas																								
141	Valve	Gas	-	2.4328E-02	2.4328E+05	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2.8695E+00	9.3069E+00	-	-	4.5183E-03
142	Valve	Gas																								
143	Valve	Gas																								
144	Valve	Gas																								
145	Valve	Gas																								
146	Valve	Gas																								
147	Valve	Gas																								
148	Valve	Gas																								
149	Valve	Gas																								
150	Valve	Gas	-	3.1394E-02	3.1394E+05	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3.2687E+00	1.0498E+01	-	-	6.5911E-03
151	Valve	Gas	-	2.0747E-02	2.0747E+05	-	-	2.2977E-01	2.2977E+06	-	-	-	-	-	-	-	-	-	-	-	-	3.6427E+00	1.1635E+01	-	-	4.8438E-03
152	Valve	Gas	-	3.4662E-02	3.4662E+05	-	-	2.2236E-01	2.2236E+06	-	-	-	-	-	-	-	-	-	-	-	-	3.3658E+00	1.0700E+01	-	-	7.4507E-03
153	Valve	Gas	-	2.1833E-02	2.1833E+05	-	-	2.3700E-01	2.3700E+06	-	-	2.5404E-02	2.5404E+05	-	-	1.3713E-02	1.3713E+05	-	-	-	-	3.0816E+00	9.9074E+00	-	-	4.3365E-03
154	Valve	Gas																								
155	Valve	Gas	-	3.9323E-02	3.9323E+05	-	-	7.8798E-02	7.8798E+05	-	-	-	-	-	-	-	-	-	-	-	-	3.4808E+00	1.1095E+01	-	-	8.7469E-03
156	Valve	Gas																								
157	Valve	Gas																								
158	Valve	Gas																								
159	Valve	Gas																								
160	Valve	Gas	-	3.2144E-02	3.2144E+05	-	-	3.1213E-01	3.1213E+06	-	-	-	-	-	-	-	-	-	-	-	-	3.3556E+00	1.0989E+01	-	-	7.0572E-03

Section 2, Appendix A: Field & Lab Data & Calculations

Note: results with all values = zero are hidden, see Appendix E for Descriptive Statistics for all leak

Sort order, sorted by Component Type, & Method 21 Concentration, ppmv	Component Information									
	Component Type	Service	kg/hr	kg/hr	kg/hr	kg/hr	kg/hr	kg/hr	kg/hr	kg/hr
			16.043	30.07	44.097	58.123	58.123	72.15	72.15	CALCULATED
			Methane	Ethane	Propane	i-Butane	n-Butane	i-Pentane	n-Pentane	TOC, kg/hr (does not incl. TPH)
104	Other	Gas								
105	Other	Gas								
106	Other	Gas								
107	Other	Gas								
108	Other	Gas								
109	Other	Gas								
110	Other	Gas	8.0859E-03	-	-	-	-	-	-	8.2968E-03
111	Other	Gas								
112	Other	Gas								
113	Other	Gas								
114	Other	Gas								
115	Other	Gas								
116	Other	Gas	5.9941E-02	-	-	-	-	-	-	7.4785E-02
117	Other	Gas								
118	Other	Gas								
119	Other	Gas								
120	Other	Gas	7.5708E-02	-	-	-	-	-	-	7.5717E-02
121	Other	Gas								
122	Other	Gas	2.2176E-03	-	-	-	-	-	-	2.2300E-03
123	Other	Gas	-	-	-	-	-	-	-	7.8083E-04
124	Other	Gas								
125	Other	Gas	1.7036E-01	-	-	-	-	-	-	1.7037E-01
126	Other	Gas								
127	Other	Gas	4.9102E-01	2.9779E-03	-	-	-	-	-	4.9433E-01
128	Valve	Gas								
129	Valve	Gas								
130	Valve	Gas								
131	Valve	Gas								
132	Valve	Gas								
133	Valve	Gas								
134	Valve	Gas								
135	Valve	Gas								
136	Valve	Gas								
137	Valve	Gas	-	-	-	-	-	-	-	3.6962E-04
138	Valve	Gas								
139	Valve	Gas								
140	Valve	Gas								
141	Valve	Gas	-	-	-	-	-	-	-	-
142	Valve	Gas								
143	Valve	Gas								
144	Valve	Gas								
145	Valve	Gas								
146	Valve	Gas								
147	Valve	Gas								
148	Valve	Gas								
149	Valve	Gas								
150	Valve	Gas	-	-	-	-	-	-	-	7.1424E-06
151	Valve	Gas	1.9555E-02	-	-	-	-	-	-	1.9557E-02
152	Valve	Gas	1.7424E-02	-	-	-	-	-	-	1.7425E-02
153	Valve	Gas	1.7160E-02	-	5.0557E-03	-	3.5971E-03	-	-	2.5817E-02
154	Valve	Gas								
155	Valve	Gas	6.3893E-03	-	-	-	-	-	-	6.3923E-03
156	Valve	Gas								
157	Valve	Gas								
158	Valve	Gas								
159	Valve	Gas								
160	Valve	Gas	2.4980E-02	-	-	-	-	-	-	2.4981E-02

Section 2, Appendix A: Field & Lab Data & Calculations

Note: results with all values = zero are hidden, see Appendix E for Descriptive Statistics for all leak

	Component Information		Site Characterization						METEOROLOGY:				METEOROLOGY:
Sort order, sorted by Component Type, & Method 21 Concentration, ppmv	Component Type	Service	EQUIPMENT/ACTIVITY DESCRIPTION	DATE	REGULATORY IDs	#WELLS	FACILITY TYPE: (OIL/GAS)	THROUGHPUT(s)	WIND DIRECTION FROM	WIND SPEED (mph)	AMBIENT TEMPERATURE (F)	% RH	BAROMETRIC PRESSURE (inHg)
161	Connector	Liquid	Natural Gas Processing	3-Mar-15		0	Natural Gas Liquids	Multiple Inputs/Outputs	SE	7.1	57.7	70	29.69
162	Connector	Liquid	Oil Water Gas Separation	20-Jan-15	LAFD #2990	5	Oil	44 bb/day oil, 51 bb/day water	ESE	4.5	57.2	70.5	29.9
163	Connector	Liquid	Natural Gas Processing	3-Mar-15		0	Natural Gas Liquids	Multiple Inputs/Outputs	SE	7.1	57.7	70	29.69
164	Connector	Liquid	Gas Plant	2-Mar-15		0	Natural Gas Liquids (butane/Propane)/Light Oil	214 mmscf/day	NW	0.8	64.5	48.6	28.4
165	Connector	Liquid	Natural Gas Processing	3-Mar-15		0	Natural Gas Liquids	Multiple Inputs/Outputs	SE	7.1	57.7	70	29.69
166	Connector	Liquid	Gas Plant	2-Mar-15		0	Natural Gas Liquids (butane/Propane)/Light Oil	214 mmscf/day	NW	0.8	64.5	48.6	28.4
167	Connector	Liquid	Gas Plant	2-Mar-15		0	Natural Gas Liquids (butane/Propane)/Light Oil	214 mmscf/day	NW	0.8	64.5	48.6	28.4
168	Connector	Liquid	Gas Plant	2-Mar-15		0	Natural Gas Liquids (butane/Propane)/Light Oil	214 mmscf/day	NW	0.8	64.5	48.6	28.4
169	Connector	Liquid	Gas Plant	2-Mar-15		0	Natural Gas Liquids (butane/Propane)/Light Oil	214 mmscf/day	NW	0.8	64.5	48.6	28.4
170	Flange	Liquid	Water separation	30-Jan-15	TITLE V 041	0	Gas		W	3.5	71	44.6	29.41
171	OEL	Liquid	Compressors, Pumps, Valves, Connectors, Glycol, Tank	21-Jan-15	CAL000381898	27	Oil & Gas	65 bbls/day Oil + 2000 bbls/day Water	SSW	1.3	66.6	73	29.95
172	OEL	Liquid	Natural Gas Processing	3-Mar-15		0	Natural Gas Liquids	Multiple Inputs/Outputs	SE	7.1	57.7	70	29.69
173	OEL	Liquid	Oil Production Facility	23-Jan-15	149797	12	Oil	87 bbls/day Oil, 400-500 bbls/day Water	SSE	2.1	65.5	36.9	30.17
174	OEL	Liquid	Oil	22-Jan-15	39632	10	Oil	150 bbls/day Oil, 1000 bbls/day Water	ESE	1.7	76.3	41.8	30.14
175	OEL	Liquid	Compressors, Pumps, Valves, Connectors, Glycol, Tank	21-Jan-15	CAL000381898	27	Oil & Gas	65 bbls/day Oil + 2000 bbls/day Water	SSW	1.3	66.6	73	29.95
176	OEL	Liquid	Oil	21-Jan-15	California T2175	4	Oil	11-12 bbls/day Oil, 500 bbls/day Water	SW	2.7	68.8	59.1	29.86
177	OEL	Liquid	Compressors, Pumps, Valves, Connectors, Glycol, Tank	21-Jan-15	CAL000381898	27	Oil & Gas	65 bbls/day Oil + 2000 bbls/day Water	SSW	1.3	66.6	73	29.95
178	OEL	Liquid	Water separation	27-Jan-15	TITLE V 041	0	Gas		WSW	1.3	77.8	47.9	29.68
179	OEL	Liquid	Gas Plant	2-Mar-15		0	Natural Gas Liquids (butane/Propane)/Light Oil	214 mmscf/day	NW	0.8	64.5	48.6	28.4
180	OEL	Liquid	Natural Gas Processing	3-Mar-15		0	Natural Gas Liquids	Multiple Inputs/Outputs	SE	7.1	57.7	70	29.69
181	Other	Liquid	Oil	22-Jan-15	39632	10	Oil	150 bbls/day Oil, 1000 bbls/day Water	ESE	1.7	76.3	41.8	30.14
182	Other	Liquid	Oil	22-Jan-15	39632	10	Oil	150 bbls/day Oil, 1000 bbls/day Water	ESE	1.7	76.3	41.8	30.14
183	Other	Liquid	Water separation	29-Jan-15	TITLE V 041	0	Gas		WSW	4	81.3	34.5	29.5
184	Other	Liquid	Natural Gas Well with lift compressor and glycol dehydrator	23-Feb-15	SEC.9 T-19N R-2W	1	Gas	88.1 MCF/DAY	NNW	15.9	52.5	23.1	29.98
185	Pump	Liquid	Water separation	30-Jan-15	TITLE V 041	0	Gas		W	3.5	71	44.6	29.41
186	Pump	Liquid	Water separation	28-Jan-15	TITLE V 041	0	Gas		WSW	1.5	-	-	29.6
187	Pump	Liquid	Water separation	28-Jan-15	TITLE V 041	0	Gas		WSW	1.5	-	-	29.6
188	Valve	Liquid	Gas Plant	2-Mar-15		0	Natural Gas Liquids (butane/Propane)/Light Oil	214 mmscf/day	NW	0.8	64.5	48.6	28.4
189	Valve	Liquid	Gas Plant	2-Mar-15		0	Natural Gas Liquids (butane/Propane)/Light Oil	214 mmscf/day	NW	0.8	64.5	48.6	28.4
190	Valve	Liquid	Water separation	28-Jan-15	TITLE V 041	0	Gas		WSW	1.5	-	-	29.6
191	Valve	Liquid	Gas Plant	2-Mar-15		0	Natural Gas Liquids (butane/Propane)/Light Oil	214 mmscf/day	NW	0.8	64.5	48.6	28.4
192	Valve	Liquid	Water separation	30-Jan-15	TITLE V 041	0	Gas		W	3.5	71	44.6	29.41
193	Valve	Liquid	Water separation	30-Jan-15	TITLE V 041	0	Gas		W	3.5	71	44.6	29.41
194	Valve	Liquid	Gas Plant	2-Mar-15		0	Natural Gas Liquids (butane/Propane)/Light Oil	214 mmscf/day	NW	0.8	64.5	48.6	28.4
195	Valve	Liquid	Water separation	27-Jan-15	TITLE V 041	0	Gas		WSW	1.3	77.8	47.9	29.68
196	Valve	Liquid	Gas Plant	2-Mar-15		0	Natural Gas Liquids (butane/Propane)/Light Oil	214 mmscf/day	NW	0.8	64.5	48.6	28.4
197	Valve	Liquid	Water separation	28-Jan-15	TITLE V 041	0	Gas		WSW	1.5	-	-	29.6
198	Valve	Liquid	Water separation	28-Jan-15	TITLE V 041	0	Gas		WSW	1.5	-	-	29.6
199	Valve	Liquid	Gas Plant	2-Mar-15		0	Natural Gas Liquids (butane/Propane)/Light Oil	214 mmscf/day	NW	0.8	64.5	48.6	28.4
200	Valve	Liquid	Gas Plant	2-Mar-15		0	Natural Gas Liquids (butane/Propane)/Light Oil	214 mmscf/day	NW	0.8	64.5	48.6	28.4
201	Valve	Liquid	Oil	22-Jan-15	39632	10	Oil	150 bbls/day Oil, 1000 bbls/day Water	ESE	1.7	76.3	41.8	30.14
202	Valve	Liquid	Water separation	28-Jan-15	TITLE V 041	0	Gas		WSW	1.5	-	-	29.6
203	Valve	Liquid	Water separation	30-Jan-15	TITLE V 041	0	Gas		W	3.5	71	44.6	29.41
204	Valve	Liquid	Water separation	28-Jan-15	TITLE V 041	0	Gas		WSW	1.5	-	-	29.6
205	Valve	Liquid	Water separation	30-Jan-15	TITLE V 041	0	Gas		W	3.5	71	44.6	29.41
206	Valve	Liquid	Gas Plant	2-Mar-15		0	Natural Gas Liquids (butane/Propane)/Light Oil	214 mmscf/day	NW	0.8	64.5	48.6	28.4
207	Valve	Liquid	Water separation	28-Jan-15	TITLE V 041	0	Gas		WSW	1.5	-	-	29.6
208	Valve	Liquid	Water separation	30-Jan-15	TITLE V 041	0	Gas		W	3.5	71	44.6	29.41
209	Valve	Liquid	Water separation	29-Jan-15	TITLE V 041	0	Gas		WSW	4	81.3	34.5	29.5
210	Valve	Liquid	Water separation	29-Jan-15	TITLE V 041	0	Gas		WSW	4	81.3	34.5	29.5
211	Valve	Liquid	Water separation	28-Jan-15	TITLE V 041	0	Gas		WSW	1.5	-	-	29.6

Section 2, Appendix A: Field & Lab Data & Calculations

Note: results with all values = zero are hidden, see Appendix E for Descriptive Statistics for all leak

Y [2] = Y, Avanti
Y [3] = Y, Operator run with Eagle
Y [4] = Y, Operator run with Eagle quarterly
Y [5] = Y, Quarterly, Summit

	Component Information				Site Characterization				Component Information	IR CAMERA		EPA Method 21 Results			HIGH FLOW SAMPLER DATA
Sort order, sorted by Component Type, & Method 21 Concentration, ppmv	Component Type	Service	% CLOUD COVER	WEATHER (sunny, cloudy, fair, fog, haze, light rain, heavy rain)	# SEPARATORS	# TANKS	# COMPRESSORS	DOES SITE HAVE LDAR PLAN? (Y/N)	Description	Date	Time	Date	Time	Method 21 Leak Concentration, ppmv	Date
161	Connector	Liquid	5	Sunny	0	1		Y Quarterly Summit	Threaded, Propane, LDAR Tag 006519	3-Mar-1`5		3-Mar-15	14:49	200.00	3-Mar-15
162	Connector	Liquid	100	cloudy	0	3	2	Y	UNION "L" on Valve#066868	-	-	Jan-20-2015	9:46	530.00	Jan-20-2015
163	Connector	Liquid	5	Sunny	0	1		Y Quarterly Summit	1.5" Plug Propane LDAR Tag #006312	3-Mar-1`5	12:01	3-Mar-15	14:30	15000.00	3-Mar-15
164	Connector	Liquid	95	Cloudy	0		Several (electric)	Y Quarterly Paradyme - use Eagle	Plug Butane			Mar-2-2015	14:37	39000.00	Mar-2-2015
165	Connector	Liquid	5	Sunny	0	1		Y Quarterly Summit	1/4" Swagelok Connector Natural Gasoline	3-Mar-1`5		3-Mar-15	15:21	50001.00	3-Mar-15
166	Connector	Liquid	95	Cloudy	0		Several (electric)	Y Quarterly Paradyme - use Eagle	Plug Propane			Mar-2-2015	14:49	148000.00	Mar-2-2015
167	Connector	Liquid	95	Cloudy	0		Several (electric)	Y Quarterly Paradyme - use Eagle	3/8" Butane			Mar-2-2015	15:00	150000.00	Mar-2-2015
168	Connector	Liquid	95	Cloudy	0		Several (electric)	Y Quarterly Paradyme - use Eagle	3/8" Butane Mix			Mar-2-2026	15:04	150000.00	Mar-2-2015
169	Connector	Liquid	95	Cloudy	0		Several (electric)	Y Quarterly Paradyme - use Eagle	1" Plug on Natural Gasoline Line - Dripping	2-Mar-15	12:25	Mar-2-2015	13:52	207000.00	Mar-2-2015
170	Flange	Liquid	98	cloudy				Y, Operator run with Eagle	on Reflux line to V-504	-	-	Jan-30-2015	10:11	120.00	Jan-30-2015
171	OEL	Liquid	23	Sunny	3	11	2	Y, Avanti	Christmas Tree at Oil Well No.10	-	-	Jan-21-2015	12:08	0.01	Jan-21-2015
172	OEL	Liquid	5	Sunny	0	1		Y Quarterly Summit	1/2" Propane	3-Mar-1`5		3-Mar-15	14:42	0.70	3-Mar-15
173	OEL	Liquid	0	Sunny	1	3	2	Y, Avanti	at West Side compressor	-	-	Jan-23-2015	12:13	45.00	Jan-23-2015
174	OEL	Liquid	50	Sunny	15	5	4	Y, Avanti	OEL at Well #9	-	-	Jan-22-2015	10:39	300.00	Jan-22-2015
175	OEL	Liquid	23	Sunny	3	11	2	Y, Avanti	Christmas Tree at Oil Well No.14	-	-	Jan-21-2015	12:18	603.00	Jan-21-2015
176	OEL	Liquid	0	Sunny	0	3	0	Y	Christmas Tree at well	-	-	Jan-21-2015	15:09	1600.00	Jan-21-2015
177	OEL	Liquid	23	Sunny	3	11	2	Y, Avanti	Christmas Tree at Oil Well No.8	-	-	Jan-21-2015	11:45	1900.00	Jan-21-2015
178	OEL	Liquid	10 / 90 / 50/ 98	sunny				Y, Operator run with Eagle	Glycol Drain Pot	Jan-27-2015	10:17	Jan-27-2015	13:26	2800.00	Jan-27-2015
179	OEL	Liquid	95	Cloudy	0		Several (electric)	Y Quarterly Paradyme - use Eagle	Natural Gas			Mar-2-2015	14:19	24000.00	Mar-2-2015
180	OEL	Liquid	5	Sunny	0	1		Y Quarterly Summit	National Gasoline Sample Line	3-Mar-1`5		3-Mar-15	15:30	150000.00	3-Mar-15
181	Other	Liquid	50	Sunny	15	5	4	Y, Avanti	Stuffing Box at Well #12	-	-	Jan-22-2015	11:06	75.00	Jan-22-2015
182	Other	Liquid	50	Sunny	15	5	4	Y, Avanti	Stuffing Box at Well #11	-	-	Jan-22-2015	10:59	1136.00	Jan-22-2015
183	Other	Liquid	50	light cloudy				Y, Operator run with Eagle	Vent	Jan-29-2015	14:35	Jan-30-2015	10:41	128000.00	Jan-30-2015
184	Other	Liquid	10	sunny	1	1	2	N	Engine Oil Filter	Feb-23-2015	10:25	Feb-23-2015	11:24	130001.00	Feb-23-2015
185	Pump	Liquid	98	cloudy				Y, Operator run with Eagle	P-915 lean oil rate pump	-	-	Jan-30-2015	10:06	115.00	Jan-30-2015
186	Pump	Liquid	90	cloudy				Y, Operator run with Eagle	East De-ethanizer Feed Pump	-	-	Jan-28-2015	15:11	5000.00	Jan-28-2015
187	Pump	Liquid	90	cloudy				Y, Operator run with Eagle	West De-ethanizer Feed Pump	-	-	Jan-28-2015	15:02	50200.00	Jan-28-2015
188	Valve	Liquid	95	Cloudy	0		Several (electric)	Y Quarterly Paradyme - use Eagle	1" Natural Gasoline			Mar-2-2015	14:33	10.00	Mar-2-2015
189	Valve	Liquid	95	Cloudy	0		Several (electric)	Y Quarterly Paradyme - use Eagle	1/2 Gate Natural Gasoline			Mar-2-2015	14:24	56.00	Mar-2-2015
190	Valve	Liquid	90	cloudy				Y, Operator run with Eagle	1'' Valve at the Bottom of Sight Glass Lean Oil	-	-	Jan-28-2015	14:35	57.00	Jan-28-2015
191	Valve	Liquid	95	Cloudy	0		Several (electric)	Y Quarterly Paradyme - use Eagle	4" Propane			Mar-2-2015	14:56	60.00	Mar-2-2015
192	Valve	Liquid	98	cloudy				Y, Operator run with Eagle	Ball on Sight Glass lean oil vessel V-522	-	-	Jan-30-2015	9:48	86.00	Jan-30-2015
193	Valve	Liquid	98	cloudy				Y, Operator run with Eagle	3'' Ball on Reflux Line to V-504	-	-	Jan-30-2015	10:18	99.00	Jan-30-2015
194	Valve	Liquid	95	Cloudy	0		Several (electric)	Y Quarterly Paradyme - use Eagle	1" Depropanizer Liquid			Mar-2-2027	15:10	110.00	Mar-2-2015
195	Valve	Liquid	10 / 90 / 50/ 98	sunny				Y, Operator run with Eagle	10'' valve	-	-	Jan-27-2015	13:10	128.00	Jan-27-2015
196	Valve	Liquid	95	Cloudy	0		Several (electric)	Y Quarterly Paradyme - use Eagle	6" Natural Gasoline			Mar-2-2015	14:49	139.00	Mar-2-2015
197	Valve	Liquid	90	cloudy				Y, Operator run with Eagle	1/2'' Gate	-	-	Jan-28-2015	12:51	200.00	Jan-28-2015
198	Valve	Liquid	90	cloudy				Y, Operator run with Eagle	3'' Ball Valve	-	-	Jan-28-2015	12:35	230.00	Jan-28-2015
199	Valve	Liquid	95	Cloudy	0		Several (electric)	Y Quarterly Paradyme - use Eagle	4" Propane			Mar-2-2015	14:45	300.00	Mar-2-2015
200	Valve	Liquid	95	Cloudy	0		Several (electric)	Y Quarterly Paradyme - use Eagle	6" Depropanizer Liquid			Mar-2-2027	15:13	350.00	Mar-2-2015
201	Valve	Liquid	50	Sunny	15	5	4	Y, Avanti	base of the valve at compressor in Glycol Skid	-	-	Jan-22-2015	11:20	356.00	Jan-22-2015
202	Valve	Liquid	90	cloudy				Y, Operator run with Eagle	6'' Gate	-	-	Jan-28-2015	13:20	687.00	Jan-28-2015
203	Valve	Liquid	98	cloudy				Y, Operator run with Eagle	Gate 3/4'' on Pressure side of still reflux pump P-906	-	-	Jan-30-2015	10:34	3300.00	Jan-30-2015
204	Valve	Liquid	90	cloudy				Y, Operator run with Eagle	2'' Gate	-	-	Jan-28-2015	14:45	10200.00	Jan-28-2015
205	Valve	Liquid	98	cloudy				Y, Operator run with Eagle	Gate on lean oil vessel V-522	-	-	Jan-30-2015	9:43	14000.00	Jan-30-2015
206	Valve	Liquid	95	Cloudy	0		Several (electric)	Y Quarterly Paradyme - use Eagle	PRV - Natural Gasoline	2-Mar-15	12:34	Mar-2-2015	14:11	20000.00	Mar-2-2015
207	Valve	Liquid	90	cloudy				Y, Operator run with Eagle	6'' Gate	-	-	Jan-28-2015	13:50	27500.00	Jan-28-2015
208	Valve	Liquid	98	cloudy				Y, Operator run with Eagle	Control Valve on Rich Oil Flash Tank V-521 Control Loop	Jan-30-2015	11:53	Jan-30-2015	9:33	48700.00	Jan-30-2015
209	Valve	Liquid	50	light cloudy				Y, Operator run with Eagle	4" Gate Valve, Connect	Jan-29-2015	14:34	Jan-30-2015	10:27	128000.00	Jan-30-2015
210	Valve	Liquid	50	light cloudy				Y, Operator run with Eagle	6" Red Handle Valve	Jan-29-2015	14:25	Jan-30-2015	9:56	186000.00	Jan-30-2015
211	Valve	Liquid	90	cloudy				Y, Operator run with Eagle	1/2" Blue Valve	Jan-28-2015	10:21	Jan-29-2015	13:15	290001.00	Jan-29-2015

Section 2, Appendix A: Field & Lab Data & Calculations

Note: results with all values = zero are hidden, see Appendix E for Descriptive Statistics for all leak

Sort order, sorted by Component Type, & Method 21 Concentration, ppmv	Component Information																			HIGH FLOW SAMPLER DATA
				Flow #1					Flow #2						Average					CALCULATED
	Component Type	Service	Time	Temperature (Degree C)	Flow CFM	Bkg %	%CH4 (%)	% CFM	Temperature (Degree C)	Flow CFM	Bkg %	%CH4	Is the %CH4 a TVA reading?	% CFM	Temperature (°C)	Temperature (°R)	Flow CFM	Bkg %	%CH4	% CFM	Calculated CH4 Emissions Rate, kg/hr, STP, as methane
161	Connector	Liquid	14:49	25.8	6.9		0.000552	0.00004	25.8	5.6		0.000652		0.00004	25.80	538.11	6.250	0.000	0.000652	0.00004	**4.59E-05**
162	Connector	Liquid	11:21	19.7	8.3	0	0.0079	0.00000	19.70	6.9	0	0.0079		0.00000	19.70	527.13	7.600	0.000	0.0079	0.000	**6.81E-04**
163	Connector	Liquid	14:30	23.9	7.2		0.0553	0.00398	24	5.9		0.066		0.00389	23.95	534.78	6.550	0.000	0.066	0.00398	**4.87E-03**
164	Connector	Liquid	14:37	19.9	6.2		0.03	0.00186	19.9	5.3		0.022		0.00117	19.90	527.49	5.750	0.000	0.03	0.00186	**1.86E-03**
165	Connector	Liquid	15:21	28.2	6.7		0.059	0.00395	28.2	5.6		0.096		0.00538	28.20	542.43	6.150	0.000	0.096	0.00538	**6.65E-03**
166	Connector	Liquid	14:49	19.5	6.9		0.085	0.00587	19.4	5.7		0.106		0.00604	19.45	526.68	6.300	0.000	0.106	0.00604	**7.19E-03**
167	Connector	Liquid	15:00	18.9	6.2		0.0371	0.00230	18.9	5.2		0.0257		0.00134	18.90	525.69	5.700	0.000	0.0371	0.00230	**2.28E-03**
168	Connector	Liquid	15:04	18.8	7.8		0.1341	0.01046	18.7	6.4		0.1487		0.00952	18.75	525.42	7.100	0.000	0.1487	0.01046	**1.14E-02**
169	Connector	Liquid	13:52	20	6.8	0	0.43	0.02900	20.2	5.4	0	0.5		0.02700	20.10	527.85	6.100	0.000	0.5	0.02900	**3.29E-02**
170	Flange	Liquid	10:11	20.4	7.7	0	0.00137	0.00000	20.50	6.4	0	0.00137		0.00000	20.45	528.48	7.050	0.000	0.00137	0	**1.08E-04**
171	OEL	Liquid	12:08	23.7	7.8	0	0.0045	0.00000	23.60	6.3	0	0.0045		0.00000	23.65	534.24	7.050	0.000	0.0045	0.000	**3.60E-04**
172	OEL	Liquid	14:42	25.4	6.8		0.00008	0.00001	25.4	5.6		0.000019		0.00000	25.40	537.39	6.200	0.000	0.00008	0.00001	**5.59E-06**
173	OEL	Liquid	12:13	25	6.8	0	0.00041	0.00000	25.20	5.6	0	0.00041		0.00000	25.10	536.85	6.200	0.000	0.00041	0	**2.91E-05**
174	OEL	Liquid	10:39	21.5	7.2	0	0.0025	0.00000	21.70	6.1	0	0.0025		0.00000	21.60	530.55	6.650	0.000	0.0025	0.000	**1.90E-04**
175	OEL	Liquid	12:18	23.1	8	0	0.0113	0.00000	23.20	6.5	0	0.0113		0.00000	23.15	533.34	7.250	0.000	0.0113	0.000	**9.31E-04**
176	OEL	Liquid	15:09	23.7	8	0	0.0279	0.00000	23.70	6.5	0	0.0279		0.00000	23.70	534.33	7.250	0.000	0.0279	0.000	**2.29E-03**
177	OEL	Liquid	11:45	25	7.2	0:00	0.04	0.00000	25.10	6.0	0	0.04		0.00000	25.05	536.76	6.600	0.000	0.0400	0.000	**3.00E-03**
178	OEL	Liquid	13:26	27.9	7.2	0	0.1137	0.00000	28.00	6.0	0	0.1137		0.00000	27.95	541.98	6.600	0.000	0.1137	0	**8.45E-03**
179	OEL	Liquid	14:19	20.5	7.4		0.029	0.00215	20.5	6.3		0.02		0.00126	20.50	528.57	6.850	0.000	0.029	0.00215	**2.14E-03**
180	OEL	Liquid	15:30	28.2	7		0.046	0.00322	28.2	5.5		0.054		0.00297	28.20	542.43	6.250	0.000	0.054	0.00322	**3.80E-03**
181	Other	Liquid	11:06	26.7	6.5	0	0.0323	0.00000	26.80	5.1	0	0.0323		0.00000	26.75	539.82	5.800	0.000	0.0323	0.000	**2.14E-03**
182	Other	Liquid	10:59	25.8	7.8	0	0.0025	0.00000	26.00	6.5	0	0.0025		0.00000	25.90	538.29	7.150	0.000	0.0025	0.000	**2.04E-04**
183	Other	Liquid	10:41	21.7	7.9	0	2.62	0.20700	21.60	6.5	0	3.01		0.19600	21.65	530.64	7.200	0.000	2.815	0.2015	**2.27E-01**
184	Other	Liquid	11:24	19.1	10.8	0	72.88	7.87100	19.1	9.6	0.07	85.09		8.16200	19.10	526.05	10.200	0.070	85.09	8.16200	**9.86E+00**
185	Pump	Liquid	10:06	20.1	7.7	0	0.0139	0.00000	20.10	6.4	0	0.0139		0.00000	20.10	527.85	7.050	0.000	0.0139	0	**1.09E-03**
186	Pump	Liquid	15:11	23.4	7.1	0	0.0478	0.00000	23.50	5.9	0	0.0478		0.00000	23.45	533.88	6.500	0.000	0.0478	0	**3.49E-03**
187	Pump	Liquid	15:02	22.9	7	0	0.1158	0.00000	22.90	5.9	0	0.1158		0.00000	22.90	532.89	6.450	0.000	0.1158	0	**8.39E-03**
188	Valve	Liquid	14:33	20.1	7.4		0.0014	0.00010	20.1	6.1		0.0015		0.00009	20.10	527.85	6.750	0.000	0.0015	0.00010	**1.09E-04**
189	Valve	Liquid	14:24	20.4	6.9		0.0062	0.00043	20.3	6.0		0.0067		0.00040	20.35	528.30	6.450	0.000	0.0067	0.00043	**4.66E-04**
190	Valve	Liquid	14:35	23	6.6	0	0.000678	0.00000	23.00	5.5	0	0.000678		0.00000	23.00	533.07	6.050	0.000	0.000678	0	**4.61E-05**
191	Valve	Liquid	14:56	19.1	7.6		0.0015	0.00011	19.1	5.7		0.0009		0.00005	19.10	526.05	6.650	0.000	0.0015	0.00011	**1.07E-04**
192	Valve	Liquid	9:48	19.8	7.6	0	0.001	0.00000	19.80	6.4	0	0.001		0.00000	19.80	527.31	7.000	0.000	0.001	0	**7.81E-05**
193	Valve	Liquid	10:18	20.7	7.5	0	0.00126	0.00000	20.70	6.2	0	0.00126		0.00000	20.70	528.93	6.850	0.000	0.00126	0	**9.63E-05**
194	Valve	Liquid	15:10	18.6	7.8		0.0015	0.00012	18.6	6.3		0.0017		0.00011	18.60	525.15	7.050	0.000	0.0017	0.00012	**1.29E-04**
195	Valve	Liquid	13:10	26.9	6.4	0	0.00039	0.00000	26.90	5.2	0	0.00039		0.00000	26.90	540.09	5.800	0.000	0.00039	0	**2.55E-05**
196	Valve	Liquid	14:29	20.3	7.1		0.0091	0.00065	20.2	6.1		0.0102		0.00062	20.25	528.12	6.600	0.000	0.0102	0.00065	**7.25E-04**
197	Valve	Liquid	12:51	24.2	6.6	0	0.00042	0.00000	24.30	5.5	0	0.00042		0.00000	24.25	535.32	6.050	0.000	0.00042	0	**2.85E-05**
198	Valve	Liquid	12:33	23.2	4.3	0	0.00107	0.00000	23.30	3.3	0	0.00107		0.00000	23.25	533.52	3.800	0.000	0.00107	0	**4.57E-05**
199	Valve	Liquid	14:45	19.7	7.4		0.001	0.00007	19.6	6.1		0.0007		0.00004	19.65	527.04	6.750	0.000	0.001	0.00007	**7.27E-05**
200	Valve	Liquid	15:13	18.6	6.4		0.0022	0.00014	18.5	5.1		0.003		0.00015	18.55	525.06	5.750	0.000	0.003	0.00015	**1.86E-04**
201	Valve	Liquid	11:20	28.3	7	0	0.001597	0.00000	28.40	5.9	0	0.001597		0.00000	28.35	542.70	6.450	0.000	0.0016	0.000	**1.18E-04**
202	Valve	Liquid	13:20	24.7	7.3	0	0.00153	0.00000	24.60	6.0	0	0.00153		0.00000	24.65	536.04	6.650	0.000	0.00153	0	**1.14E-04**
203	Valve	Liquid	10:34	21.4	7.9	0	0.002	0.00000	21.40	6.4	0	0.002		0.00000	21.40	530.19	7.150	0.000	0.002	0.00000	**1.60E-04**
204	Valve	Liquid	14:45	22.9	7	0	0.0206	0.00000	22.90	5.8	0	0.0206		0.00000	22.90	532.89	6.400	0.000	0.0206	0	**1.48E-03**
205	Valve	Liquid	9:43	19.6	8.3	0	0.0196	0.00000	19.70	6.8	0	0.0196		0.00000	19.65	527.04	7.550	0.000	0.0196	0	**1.65E-03**
206	Valve	Liquid	14:11	20.5	7.2		0.0278	0.00200	20.5	6.3		0.0302		0.00190	20.50	528.57	6.750	0.000	0.0302	0.00200	**2.20E-03**
207	Valve	Liquid	13:50	23.9	7.2	0	0.0058	0.00000	23.80	5.9	0	0.0058		0.00000	23.85	534.60	6.550	0.000	0.0058	0	**4.27E-04**
208	Valve	Liquid	9:36	19.1	5.3	0	0.1298	0.00000	19.30	4.5	0	0.1298		0.00000	19.20	526.23	4.900	0.000	0.1298	0	**7.10E-03**
209	Valve	Liquid	10:27	21	7.9	0	0.18	0.00000	21.10	6.5	0	0.18		0.00000	21.05	529.56	7.200	0.000	0.18	0	**1.45E-02**
210	Valve	Liquid	9:56	20	8	0	0.3	0.00000	20.00	6.7	0	0.3		0.00000	20.00	527.67	7.350	0.000	0.3	0	**2.47E-02**
211	Valve	Liquid	13:15	25.5	7.2	0	0.51	0.03700	25.60	6.0	0	0.61		0.03700	25.55	537.66	6.600	0.000	0.56	0.037	`

Section 2, Appendix A: Field & Lab Data & Calculations

Note: results with all values = zero are hidden, see Appendix E for Descriptive Statistics for all leak

Sort order, sorted by Component Type, & Method 21 Concentration, ppmv	Component Information					CANISTER DATA						TEDLAR BAG DATA			EPA METHOD TO-15 CONCENTRATION DATA				
	Component Type	Service	CALCULATED	CALCULATED	CALCULATED										ppmv @ STP	ppmv @ STP	ppmv @ STP	ppmv @ STP	ppmv @ STP
																		58.079	78.112
			Log10 TVA as CH4, ppmv	Log10 CH4 EmRate, kg/hr, as methane	Log10 TOC of Linked TOC Emissions Estimates, kg/hr	Sample #	Date	Time	Can ID	Can I-Vac (in Hg)	Can F-Vac (in Hg)	Sample(s) #	Date	Time	1,3,5-Trimethyl benzene	2-Hexanone	4-Ethyltoluene	Acetone	Benzene
161	Connector	Liquid										TB-038A/TB-038B	3-Mar-15	14:53	0	0	0	0	0
162	Connector	Liquid				CAN002	Jan-20-2015	11:26	OEC-39-0298	28.5	0	TB002	Jan-20-2015	11:27	ND	ND	ND	ND	ND
163	Connector	Liquid										TB-037A/TB-037B	3-Mar-15	14:35	0	0	0	0	0
164	Connector	Liquid										TB034A/TB034B	Mar-2-2015	14:40	0	0	0	0	0
165	Connector	Liquid										TB-039A/TB-039B	3-Mar-15	15:33	0	0	0	0	0
166	Connector	Liquid										TB035A/TB035B	Mar-2-2015	14:53	0	0	0	0	0
167	Connector	Liquid													0	0	0	0	0
168	Connector	Liquid													0	0	0	0	0
169	Connector	Liquid				N/A	N/A	N/A	N/A	N/A	N/A	TB033A/TB033B	Mar-2-2015	14:02	0	0	0	0	0
170	Flange	Liquid													ND	ND	ND	ND	ND
171	OEL	Liquid				-		-	-	-	-	-		-	ND	ND	ND	ND	ND
172	OEL	Liquid													0	0	0	0	0
173	OEL	Liquid				CAN012	Jan-23-2015	12:17	OEC-29-716	29	0	TB012	Jan-23-2015	12:19	ND	ND	ND	ND	ND
174	OEL	Liquid				CAN007	Jan-22-2015	10:42	OEC-39-0334	28.5	0	TB007	Jan-22-2015	10:45	ND	ND	ND	ND	ND
175	OEL	Liquid				-		-	-	-	-	-		-	ND	ND	ND	ND	ND
176	OEL	Liquid				CAN006	Jan-21-2015	15:15	OEC-39-0304	28.5	0	TB006	Jan-21-2015	15:20	ND	ND	ND	ND	ND
177	OEL	Liquid				CAN004	Jan-21-2015	11:55	OEC-29-704	28.5	0	TB004	Jan-21-2015	12:04	ND	ND	ND	ND	ND
178	OEL	Liquid				CAN015	Jan-27-2015	13:30	OEC-39-0295	28.5	0	TB015	Jan-27-2015	13:32	ND	ND	ND	ND	ND
179	OEL	Liquid													0	0	0	0	0
180	OEL	Liquid													0	0	0	0	0
181	Other	Liquid													ND	ND	ND	ND	ND
182	Other	Liquid													ND	ND	ND	ND	ND
183	Other	Liquid				CAN022	Jan-30-2015	10:45	OEC-39-0303	28.25	0	TB022	Jan-30-2015	10:47	ND	ND	ND	ND	ND
184	Other	Liquid													ND	ND	ND	ND	ND
185	Pump	Liquid													ND	ND	ND	ND	ND
186	Pump	Liquid													ND	ND	ND	ND	ND
187	Pump	Liquid				CAN019	Jan-28-2015	15:05	OEC-29-732	28.25	0	TB019	Jan-28-2015	15:06	ND	ND	ND	ND	ND
188	Valve	Liquid													0	0	0	0	0
189	Valve	Liquid													0	0	0	0	0
190	Valve	Liquid													ND	ND	ND	ND	ND
191	Valve	Liquid													0	0	0	0	0
192	Valve	Liquid													ND	ND	ND	ND	ND
193	Valve	Liquid													ND	ND	ND	ND	ND
194	Valve	Liquid													0	0	0	0	0
195	Valve	Liquid													ND	ND	ND	ND	ND
196	Valve	Liquid													0	0	0	0	0
197	Valve	Liquid													ND	ND	ND	ND	ND
198	Valve	Liquid													ND	ND	ND	ND	ND
199	Valve	Liquid													0	0	0	0	0
200	Valve	Liquid										TB036A/TB036B	Mar-2-2015	15:18	0	0	0	0	0
201	Valve	Liquid													ND	ND	ND	ND	ND
202	Valve	Liquid													ND	ND	ND	ND	ND
203	Valve	Liquid													ND	ND	ND	ND	ND
204	Valve	Liquid				CAN018	Jan-28-2015	14:47	OEC-29-707	28.1	1	TB018	Jan-28-2015	14:50	ND	ND	ND	ND	ND
205	Valve	Liquid													ND	ND	ND	ND	ND
206	Valve	Liquid													0	0	0	0	0
207	Valve	Liquid													ND	ND	ND	ND	ND
208	Valve	Liquid				CAN023	Jan-30-2015	10:57	OEC-29-726	28	0	TB023	Jan-30-2015	11:00	ND	ND	ND	ND	ND
209	Valve	Liquid													ND	ND	ND	ND	ND
210	Valve	Liquid													ND	ND	ND	ND	ND
211	Valve	Liquid				CAN021	Jan-29-2015	13:19	OEC-29-731	27.5	0	TB021	Jan-29-2015	13:21	ND	ND	ND	ND	ND

Section 2, Appendix A: Field & Lab Data & Calculations

Note: results with all values = zero are hidden, see Appendix E for Descriptive Statistics for all leak

Sort order, sorted by Component Type, & Method 21 Concentration, ppmv	Component Information																METHOD TO-15 Calculated Emissions			METHOD TO-15 Calculated Emissions		
	Component Type	Service	ppmv @ STP	ppmv @ STP	ppmv @ STP	ppmv @ STP	ppmv @ STP	ppmv @ STP	ppmv @ STP	ppmv @ STP	ppmv @ STP	ppmv @ STP	ppmv @ STP	ppmv @ STP	ppmv @ STP	ppmv @ STP	ppmv @ STP	kg/hr	kg/hr	kg/hr	kg/hr	kg/hr	kg/hr
			76.139		84.16	46.068	88.11	106.165	100.21		86.18	60.1	100.16	92.14	105	131.4	106.165	120.19	120.19	100.16	120.1916	58.079	78.112
			Carbon disulfide	Chlorobenzene	Cyclohexane	Ethanol	Ethyl Acetate	Ethylbenzene	Heptane	Hexachlorobutadiene	Hexane	Isopropyl alcohol	Methyl Isobutyl Ketone	Toluene	TPH Gasoline (C4-C12)	Trichloroethene (TCE)	Xylenes (total)	1,2,4-Trimethyl-benzene	1,3,5-Trimethyl-benzene	2-Hexanone	4-Ethyltoluene	Acetone	Benzene
B. Components in Liquid Service, With TVA and HiFlow																							
161	Connector	Liquid	0	0	0	0	0	0	0	0	NT	0	0	0	0	0	0	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
162	Connector	Liquid	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0	0	0	0	0	0
163	Connector	Liquid	0	0	0	0	0	0	0	0	NT	0	0	0	0	0	0	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
164	Connector	Liquid	0	0	0	0	0	0	0	0	NT	0	0	0	0	26	0	0	0	0	0	0	0
165	Connector	Liquid	0	0	0	0	0	0	0	0		0	0	0	0	12,047	0	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
166	Connector	Liquid	0	0	0	0	0	NT	0	0	NT	0	0	0	0	0	0	0	0	0	0	0	0
167	Connector	Liquid	0	0	0	0	0	NT	0	0	NT	0	0	0	0	0	0	0	0	0	0	0	0
168	Connector	Liquid	0	0	0	0	0	NT	0	0	NT	0	0	0	0	0	0	0	0	0	0	0	0
169	Connector	Liquid	0	0	0	0	0	0	0	NT	NT	0	0	0	0	444,119	0	0	0	0	0	0	0
170	Flange	Liquid	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	140	ND	77	ND	0	0	0	0	0	0
171	OEL	Liquid	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	35	68	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
172	OEL	Liquid	0	0	0	0	0	0	0	0	NT	0	0	0	0	0	0	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
173	OEL	Liquid	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	25	ND	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
174	OEL	Liquid	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	36	0	0	0	0	0	0
175	OEL	Liquid	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	35	68	0	0	0	0	0	0
176	OEL	Liquid	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	630	630	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
177	OEL	Liquid	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	35	68	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
178	OEL	Liquid	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	1200	ND	13000	ND	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
179	OEL	Liquid	0	0	0	0	0	0	0	NT	NT	0	0	0	0	444,119	0	0	0	0	0	0	0
180	OEL	Liquid	0	0	0	0	0	0	0	0		0	0	0	0	12,047	0	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
181	Other	Liquid	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	36	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
182	Other	Liquid	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	36	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
183	Other	Liquid	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	14	ND	0	0	0	0	0	0
184	Other	Liquid	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0	0	0	0	0	0
185	Pump	Liquid	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0	0	0	0	0	0
186	Pump	Liquid	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0	0	0	0	0	0
187	Pump	Liquid	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0	0	0	0	0	0
188	Valve	Liquid	0	0	0	0	0	0	0	NT	NT	0	0	0	0	444,119	0	0	0	0	0	0	0
189	Valve	Liquid	0	0	0	0	0	0	0	NT	NT	0	0	0	0	444,119	0	0	0	0	0	0	0
190	Valve	Liquid	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	5500	150	0	0	0	0	0	0
191	Valve	Liquid	0	0	0	0	0	NT	0	0	NT	0	0	0	0	0	0	0	0	0	0	0	0
192	Valve	Liquid	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	140	ND	77	ND	0	0	0	0	0	0
193	Valve	Liquid	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	140	ND	77	ND	0	0	0	0	0	0
194	Valve	Liquid	0	0	0	0	0	NT	0	0	NT	0	0	0	0	0	0	0	0	0	0	0	0
195	Valve	Liquid	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	1200	ND	13000	ND	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
196	Valve	Liquid	0	0	0	0	0	0	0	NT	NT	0	0	0	0	444,119	0	0	0	0	0	0	0
197	Valve	Liquid	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	5500	150	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
198	Valve	Liquid	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	5500	150	0	0	0	0	0	0
199	Valve	Liquid	0	0	0	0	0	0	0	0	NT	0	0	0	0	26	0	0	0	0	0	0	0
200	Valve	Liquid	0	0	0	0	0	0	0	0	NT	0	563	0	0	0	0	0	0	0	0	0	0
201	Valve	Liquid	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	36	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
202	Valve	Liquid	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	5500	150	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
203	Valve	Liquid	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	140	ND	77	ND	0	0	0	0	0	0
204	Valve	Liquid	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	5500	150	0	0	0	0	0	0
205	Valve	Liquid	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	140	ND	77	ND	0	0	0	0	0	0
206	Valve	Liquid	0	0	0	0	0	0	0	NT	NT	0	0	0	0	444,119	0	0	0	0	0	0	0
207	Valve	Liquid	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	5500	150	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
208	Valve	Liquid	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	170	ND	0	0	0	0	0	0
209	Valve	Liquid	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	140	ND	77	ND	0	0	0	0	0	0
210	Valve	Liquid	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	140	ND	77	ND	0	0	0	0	0	0
211	Valve	Liquid	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	140	ND	77	ND	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

Section 2, Appendix A: Field & Lab Data & Calculations

Note: results with all values = zero are hidden, see Appendix E for Descriptive Statistics for all leak

Sort order, sorted by Component Type, & Method 21 Concentration, ppmv	Component Information																ASTM 1945/3588 Concentration Data					
	Component Type	Service	kg/hr	kg/hr	kg/hr	kg/hr	kg/hr	kg/hr	kg/hr	kg/hr	kg/hr	kg/hr	kg/hr	kg/hr	kg/hr	kg/hr					
			76.139	112.56	84.16	46.068	88.11	106.165	100.21	86.18	60.1	100.16	92.14	105	131.4	106.165					
			Carbon disulfide	Chlorobenzene	Cyclohexane	Ethanol	Ethyl Acetate	Ethylbenzene	Heptane	Hexane	Isopropyl alcohol	Methyl Isobutyl Ketone	Toluene	TPH Gasoline (C4-C12)	Trichloroethene (TCE)	Xylenes (total)	Oxygen (Mol%)	Oxygen (ppb)	Nitrogen (Mol%)	Nitrogen (ppb)	Hydrogen (Mol%)
B. Components in Liquid Service, With TVA and HiFlow																					
161	Connector	Liquid	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0	0	0	0	21.16822471	211682247.1	78.80460381	788046038.1	0
162	Connector	Liquid	0	0	0	0	0	0	0	0	0	0	0	0	0	0	21.41180768	214118076.8	78.54285769	785428576.9	0
163	Connector	Liquid	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0	0	0	0	21.1376933	211376933	78.79639468	787963946.8	0
164	Connector	Liquid	0	0	0	0	0	0	0	0	0	0	0	0	1.3195E-06	0	21.04383166	210438316.6	78.9272283	789272283	0
165	Connector	Liquid	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0	0	0.000664791	0	21.1666063	211666063	78.80348439	788034843.9	0
166	Connector	Liquid	0	0	0	0	0	0	0	0	0	0	0	0	0	0	21.00175247	210017524.7	78.92045961	789204596.1	0
167	Connector	Liquid	0	0	0	0	0	0	0	0	0	0	0	0	0	0	21.00175247	210017524.7	78.92045961	789204596.1	0
168	Connector	Liquid	0	0	0	0	0	0	0	0	0	0	0	0	0	0	21.00175247	210017524.7	78.92045961	789204596.1	0
169	Connector	Liquid	0	0	0	0	0	0	0	0	0	0	0	0	0.0238947	0	20.92242604	209224260.4	78.94515511	789451551.1	0
170	Flange	Liquid	0	0	0	0	0	0	0	0	0	0	6.31395E-06	0	4.95235E-06	0	21.00829629	210082962.9	78.41234669	784123466.9	0
171	OEL	Liquid	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0	0	2.26768E-06	3.55966E-06	21.50639849	215063984.9	78.45685664	784568566.4	0
172	OEL	Liquid	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0	0	0	0	21.1376933	211376933	78.79639468	787963946.8	0
173	OEL	Liquid	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0	0	1.42797E-06	0	21.44673979	214467397.9	78.52806812	785280681.2	0
174	OEL	Liquid	0	0	0	0	0	0	0	0	0	0	0	0	0	1.80132E-06	21.48455066	214845506.6	78.47044029	784704402.9	0
175	OEL	Liquid	0	0	0	0	0	0	0	0	0	0	0	0	2.33595E-06	3.66682E-06	21.50639849	215063984.9	78.45685664	784568566.4	0
176	OEL	Liquid	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0	0	4.18431E-05	3.38072E-05	21.50591971	215059197.1	78.45557927	784555792.7	0
177	OEL	Liquid	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0	0	2.11297E-06	3.31681E-06	21.50639849	215063984.9	78.45685664	784568566.4	0
178	OEL	Liquid	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.98567E-05	0	0.000770251	0	21.18042688	211804268.8	78.62358513	786235851.3	0
179	OEL	Liquid	0	0	0	0	0	0	0	0	0	0	0	0	0.026796023	0	20.92242604	209224260.4	78.94515511	789451551.1	0
180	OEL	Liquid	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0	0	0.000675601	0	21.1666063	211666063	78.80348439	788034843.9	0
181	Other	Liquid	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0	0	0	1.5441E-06	21.48455066	214845506.6	78.47044029	784704402.9	0
182	Other	Liquid	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0	0	0	1.90891E-06	21.48455066	214845506.6	78.47044029	784704402.9	0
183	Other	Liquid	0	0	0	0	0	0	0	0	0	0	0	0	9.18644E-07	0	20.58259903	205825990.3	76.89761346	768976134.6	0
184	Other	Liquid	0	0	0	0	0	0	0	0	0	0	0	0	0	0	21.53348482	215334848.2	78.44697118	784469711.8	0
185	Pump	Liquid	0	0	0	0	0	0	0	0	0	0	0	0	0	0	21.23606013	212360601.3	78.68307973	786830797.3	0
186	Pump	Liquid	0	0	0	0	0	0	0	0	0	0	0	0	0	0	21.23606013	212360601.3	78.68307973	786830797.3	0
187	Pump	Liquid	0	0	0	0	0	0	0	0	0	0	0	0	0	0	21.23606013	212360601.3	78.68307973	786830797.3	0
188	Valve	Liquid	0	0	0	0	0	0	0	0	0	0	0	0	0.026440857	0	20.92242604	209224260.4	78.94515511	789451551.1	0
189	Valve	Liquid	0	0	0	0	0	0	0	0	0	0	0	0	0.025244187	0	20.92242604	209224260.4	78.94515511	789451551.1	0
190	Valve	Liquid	0	0	0	0	0	0	0	0	0	0	0	0	0.000302894	6.67428E-06	21.27330451	212733045.1	78.69463404	786946340.4	0
191	Valve	Liquid	0	0	0	0	0	0	0	0	0	0	0	0	0	0	21.00175247	210017524.7	78.92045961	789204596.1	0
192	Valve	Liquid	0	0	0	0	0	0	0	0	0	0	6.28308E-06	0	4.92813E-06	0	21.00829629	210082962.9	78.41234669	784123466.9	0
193	Valve	Liquid	0	0	0	0	0	0	0	0	0	0	6.12961E-06	0	4.80776E-06	0	21.00829629	210082962.9	78.41234669	784123466.9	0
194	Valve	Liquid	0	0	0	0	0	0	0	0	0	0	0	0	0	0	21.00175247	210017524.7	78.92045961	789204596.1	0
195	Valve	Liquid	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.39668E-05	0	0.000679256	0	21.18042688	211804268.8	78.62358513	786235851.3	0
196	Valve	Liquid	0	0	0	0	0	0	0	0	0	0	0	0	0.025840065	0	20.92242604	209224260.4	78.94515511	789451551.1	0
197	Valve	Liquid	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0	0	0.000301621	6.64623E-06	21.27330451	212733045.1	78.69463404	786946340.4	0
198	Valve	Liquid	0	0	0	0	0	0	0	0	0	0	0	0	0.000190087	4.18858E-06	21.27330451	212733045.1	78.69463404	786946340.4	0
199	Valve	Liquid	0	0	0	0	0	0	0	0	0	0	0	0	1.5503E-06	0	21.04383166	210438316.6	78.9272283	789272283	0
200	Valve	Liquid	0	0	0	0	0	0	0	0	1.70933E-05	2.18801E-05	0	0	0	0	20.94570819	209457081.9	79.03818818	790381881.8	0
201	Valve	Liquid	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0	0	0	1.70803E-06	21.48455066	214845506.6	78.47044029	784704402.9	0
202	Valve	Liquid	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0	0	0.000331088	7.29555E-06	21.27330451	212733045.1	78.69463404	786946340.4	0
203	Valve	Liquid	0	0	0	0	0	0	0	0	0	0	6.38286E-06	0	5.00639E-06	0	21.00829629	210082962.9	78.41234669	784123466.9	0
204	Valve	Liquid	0	0	0	0	0	0	0	0	0	0	0	0	0.000320525	7.06278E-06	21.27330451	212733045.1	78.69463404	786946340.4	0
205	Valve	Liquid	0	0	0	0	0	0	0	0	0	0	6.78022E-06	0	5.31807E-06	0	21.00829629	210082962.9	78.41234669	784123466.9	0
206	Valve	Liquid	0	0	0	0	0	0	0	0	0	0	0	0	0.02640484	0	20.92242604	209224260.4	78.94515511	789451551.1	0
207	Valve	Liquid	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0	0	0.000326988	7.2052E-06	21.27330451	212733045.1	78.69463404	786946340.4	0
208	Valve	Liquid	0	0	0	0	0	0	0	0	0	0	0	0	7.63184E-06	0	21.12040622	211204062.2	78.84201995	788420199.5	0
209	Valve	Liquid	0	0	0	0	0	0	0	0	0	0	6.45483E-06	0	5.06285E-06	0	21.00829629	210082962.9	78.41234669	784123466.9	0
210	Valve	Liquid	0	0	0	0	0	0	0	0	0	0	6.61291E-06	0	5.18683E-06	0	21.00829629	210082962.9	78.41234669	784123466.9	0
211	Valve	Liquid	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.84754E-06	0	4.58652E-06	0	21.00829629	210082962.9	78.41234669	784123466.9	0

Section 2, Appendix A: Field & Lab Data & Calculations

Note: results with all values = zero are hidden, see Appendix E for Descriptive Statistics for all leak

Sort order, sorted by Component Type, & Method 21 Concentration, ppmv	Component Information																		ASTM 1945/3588 Concentration Data			ASTM 1945/3588 Emissions (kg/hr)				
																						31.9988	28.0134	2.01	28.0106	44.01
	Component Type	Service	Hydrogen (ppb)	Carbon Dioxide (Mol%)	Carbon Dioxide (ppb)	Carbon Monoxide (Mol%)	Carbon Monoxide (ppb)	Methane (Mol%)	Methane (ppb)	Ethane (Mol%)	Ethane (ppb)	Propane (Mol%)	Propane (ppb)	i-Butane (Mol%)	i-Butane (ppb)	n-Butane (Mol%)	n-Butane (ppb)	i-Pentane (Mol%)	i-Pentane (ppb)	n-Pentane (Mol%)	n-Pentane (ppb)	Oxygen	Nitrogen	Hydrogen	Carbon Monoxide	Carbon Dioxide
161	Connector	Liquid	0	0.027171482	271714.8237	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2.914113752	9.497423058	0	0	0.005144617
162	Connector	Liquid	0	0.045334627	453346.2653	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3.684879515	11.83337936	0	0	0.010730444
163	Connector	Liquid	0	0.029744676	297446.761	0	0	0	0	0	0	0.036167344	361673.4391	0	0	0	0	0	0	0	0	3.068575718	10.01423386	0	0	0.005938902
164	Connector	Liquid	0	0.028940039	289400.3936	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2.60075645	8.539527621	0	0	0.004919168
165	Connector	Liquid	0	0.029909309	299093.087	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2.84443331	9.270903809	0	0	0.005528007
166	Connector	Liquid	0	0.030199871	301998.7067	0	0	0	0	0	0	0.047588049	475880.4931	0	0	0	0	0	0	0	0	2.848200179	9.369937849	0	0	0.005632974
167	Connector	Liquid	0	0.030199871	301998.7067	0	0	0	0	0	0	0.047588049	475880.4931	0	0	0	0	0	0	0	0	2.581796019	8.493528094	0	0	0.005106098
168	Connector	Liquid	0	0.030199871	301998.7067	0	0	0	0	0	0	0.047588049	475880.4931	0	0	0	0	0	0	0	0	3.217573938	10.58509442	0	0	0.006363496
169	Connector	Liquid	0	0.017229038	172290.3803	0	0	0	0	0	0	0	0	0	0	0	0	0.065364753	653647.528	0.049825055	498250.5495	2.741274977	9.055202636	0	0	0.003104697
170	Flange	Liquid	0	0.053755007	537550.0728	0	0	0.489804612	4898046.117	0.035797397	357973.9742	0	0	0	0	0	0	0	0	0	0	3.290404802	10.75164901	0	0	0.011579641
171	OEL	Liquid	0	0.036744868	367448.6827	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3.393283472	10.83716007	0	0	0.007973827
172	OEL	Liquid	0	0.029744676	297446.761	0	0	0	0	0	0	0.036167344	361673.4391	0	0	0	0	0	0	0	0	2.890498909	9.433083856	0	0	0.005594253
173	OEL	Liquid	0	0.025192095	251920.9458	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2.983171601	9.562556132	0	0	0.004819466
174	OEL	Liquid	0	0.04500905	450090.4961	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3.240169731	10.36047592	0	0	0.00933596
175	OEL	Liquid	0	0.036744868	367448.6827	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3.49543537	11.16340351	0	0	0.008213873
176	OEL	Liquid	0	0.038501021	385010.2118	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3.478397281	11.10905525	0	0	0.008564679
177	OEL	Liquid	0	0.036744868	367448.6827	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3.161776869	10.09779534	0	0	0.007429813
178	OEL	Liquid	0	0.038957471	389574.7105	0	0	0	0	0	0	0	0	0	0	0.031108409	311084.0893	0.03759231	375923.0994	0.042662022	426620.2222	3.056062217	9.931445336	0	0	0.007731004
179	OEL	Liquid	0	0.017229038	172290.3803	0	0	0	0	0	0	0	0	0	0	0	0	0.065364753	653647.528	0.049825055	498250.5495	3.074123804	10.15469598	0	0	0.003481673
180	OEL	Liquid	0	0.029909309	299093.087	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2.890684258	9.421650212	0	0	0.005617893
181	Other	Liquid	0	0.04500905	450090.4961	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2.777483303	8.881031326	0	0	0.008002814
182	Other	Liquid	0	0.04500905	450090.4961	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3.433698542	10.97928628	0	0	0.009893579
183	Other	Liquid	0	0.07378612	737861.1965	0	0	0.304516402	3045164.019	1.398338436	13983384.36	0.743146554	7431465.545	0	0	0	0	0	0	0	0	3.288952891	10.75727897	0	0	0.016216226
184	Other	Liquid	0	0.019543999	195439.9896	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4.997145617	15.93734586	0	0	0.006237906
185	Pump	Liquid	0	0.034378497	343784.9668	0	0	0	0	0	0	0.022312921	223129.2142	0	0	0.024168722	241687.2232	0	0	0	0	3.330047844	10.80164768	0	0	0.007414487
186	Pump	Liquid	0	0.034378497	343784.9668	0	0	0	0	0	0	0.022312921	223129.2142	0	0	0.024168722	241687.2232	0	0	0	0	3.05519035	9.910094778	0	0	0.006802505
187	Pump	Liquid	0	0.034378497	343784.9668	0	0	0	0	0	0	0.022312921	223129.2142	0	0	0.024168722	241687.2232	0	0	0	0	3.03732114	9.852132574	0	0	0.006762719
188	Valve	Liquid	0	0.017229038	172290.3803	0	0	0	0	0	0	0	0	0	0	0	0	0.065364753	653647.528	0.049825055	498250.5495	3.033378049	10.02010128	0	0	0.003435526
189	Valve	Liquid	0	0.017229038	172290.3803	0	0	0	0	0	0	0	0	0	0	0	0	0.065364753	653647.528	0.049825055	498250.5495	2.896092285	9.566607768	0	0	0.003280039
190	Valve	Liquid	0	0.032061443	320614.4318	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2.852993037	9.23938375	0	0	0.005913798
191	Valve	Liquid	0	0.030199871	301998.7067	0	0	0	0	0	0	0.047588049	475880.4931	0	0	0	0	0	0	0	0	3.010034042	9.90233485	0	0	0.005953038
192	Valve	Liquid	0	0.053755007	537550.0728	0	0	0.489804612	4898046.117	0.035797397	357973.9742	0	0	0	0	0	0	0	0	0	0	3.274317598	10.69908284	0	0	0.011523027
193	Valve	Liquid	0	0.053755007	537550.0728	0	0	0.489804612	4898046.117	0.035797397	357973.9742	0	0	0	0	0	0	0	0	0	0	3.194340009	10.43774996	0	0	0.011241568
194	Valve	Liquid	0	0.030199871	301998.7067	0	0	0	0	0	0	0.047588049	475880.4931	0	0	0	0	0	0	0	0	3.196557596	10.51595538	0	0	0.006321931
195	Valve	Liquid	0	0.038957471	389574.7105	0	0	0	0	0	0	0	0	0	0	0.031108409	311084.0893	0.03759231	375923.0994	0.042662022	426620.2222	2.695028573	8.758175408	0	0	0.006817688
196	Valve	Liquid	0	0.017229038	172290.3803	0	0	0	0	0	0	0	0	0	0	0	0	0.065364753	653647.528	0.049825055	498250.5495	2.964453303	9.792423449	0	0	0.003357463
197	Valve	Liquid	0	0.032061443	320614.4318	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2.84100164	9.200549757	0	0	0.005888942
198	Valve	Liquid	0	0.032061443	320614.4318	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1.790451129	5.798354519	0	0	0.003711319
199	Valve	Liquid	0	0.028940039	289400.3936	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3.055668701	10.03222217	0	0	0.005779606
200	Valve	Liquid	0	0.016103623	161036.2309	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2.600609895	8.591109779	0	0	0.002749929
201	Valve	Liquid	0	0.04500905	450090.4961	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3.072361592	9.823907674	0	0	0.008852452
202	Valve	Liquid	0	0.032061443	320614.4318	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3.118559438	10.09941736	0	0	0.006464275
203	Valve	Liquid	0	0.053755007	537550.0728	0	0	0.489804612	4898046.117	0.035797397	357973.9742	0	0	0	0	0	0	0	0	0	0	3.326314273	10.86898595	0	0	0.011706014
204	Valve	Liquid	0	0.032061443	320614.4318	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3.019061657	9.777194987	0	0	0.006258032
205	Valve	Liquid	0	0.053755007	537550.0728	0	0	0.489804612	4898046.117	0.035797397	357973.9742	0	0	0	0	0	0	0	0	0	0	3.533394623	11.54563681	0	0	0.012434774
206	Valve	Liquid	0	0.017229038	172290.3803	0	0	0	0	0	0	0	0	0	0	0	0	0.065364753	653647.528	0.049825055	498250.5495	3.029246085	10.00645224	0	0	0.003430846
207	Valve	Liquid	0	0.032061443	320614.4318	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3.079937649	9.974341158	0	0	0.006384218
208	Valve	Liquid	0	0.037573828	375738.2782	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2.308982702	7.545852045	0	0	0.00564965
209	Valve	Liquid	0	0.053755007	537550.0728	0	0	0.489804612	4898046.117	0.035797397	357973.9742	0	0	0	0	0	0	0	0	0	0	3.3638226	10.99154728	0	0	0.011838014
210	Valve	Liquid	0	0.053755007	537550.0728	0	0	0.489804612	4898046.117	0.035797397	357973.9742	0	0	0	0	0	0	0	0	0	0	3.446201734	11.26072739	0	0	0.012127924
211	Valve	Liquid	0	0.053755007	537550.0728	0	0	0.489804612	4898046.117	0.035797397	357973.9742	0	0	0	0	0	0	0	0	0	0	3.047345275	9.957433442	0	0	0.010724262

Section 2, Appendix A: Field & Lab Data & Calculations

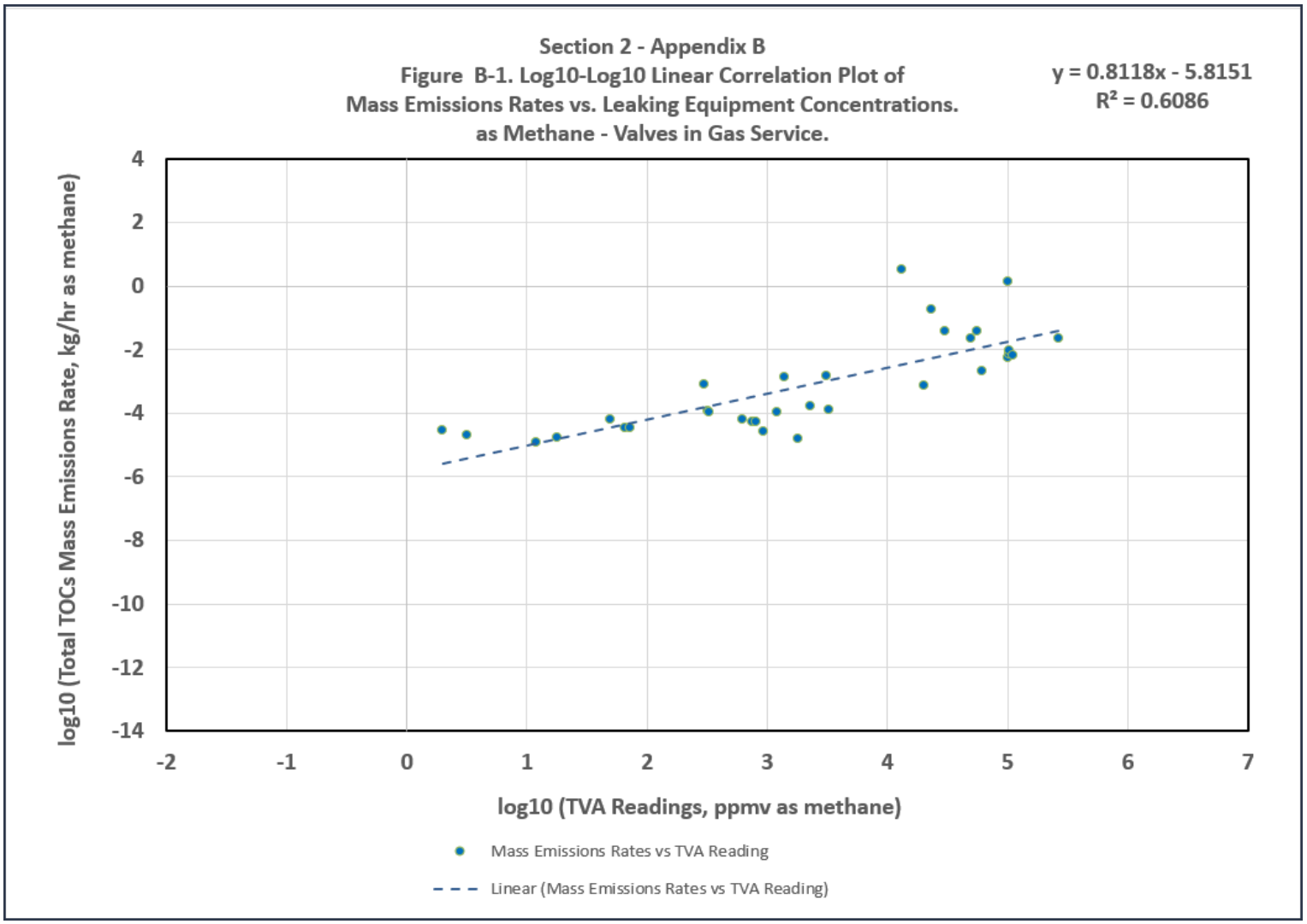
Note: results with all values = zero are hidden, see Appendix E for Descriptive Statistics for all leak

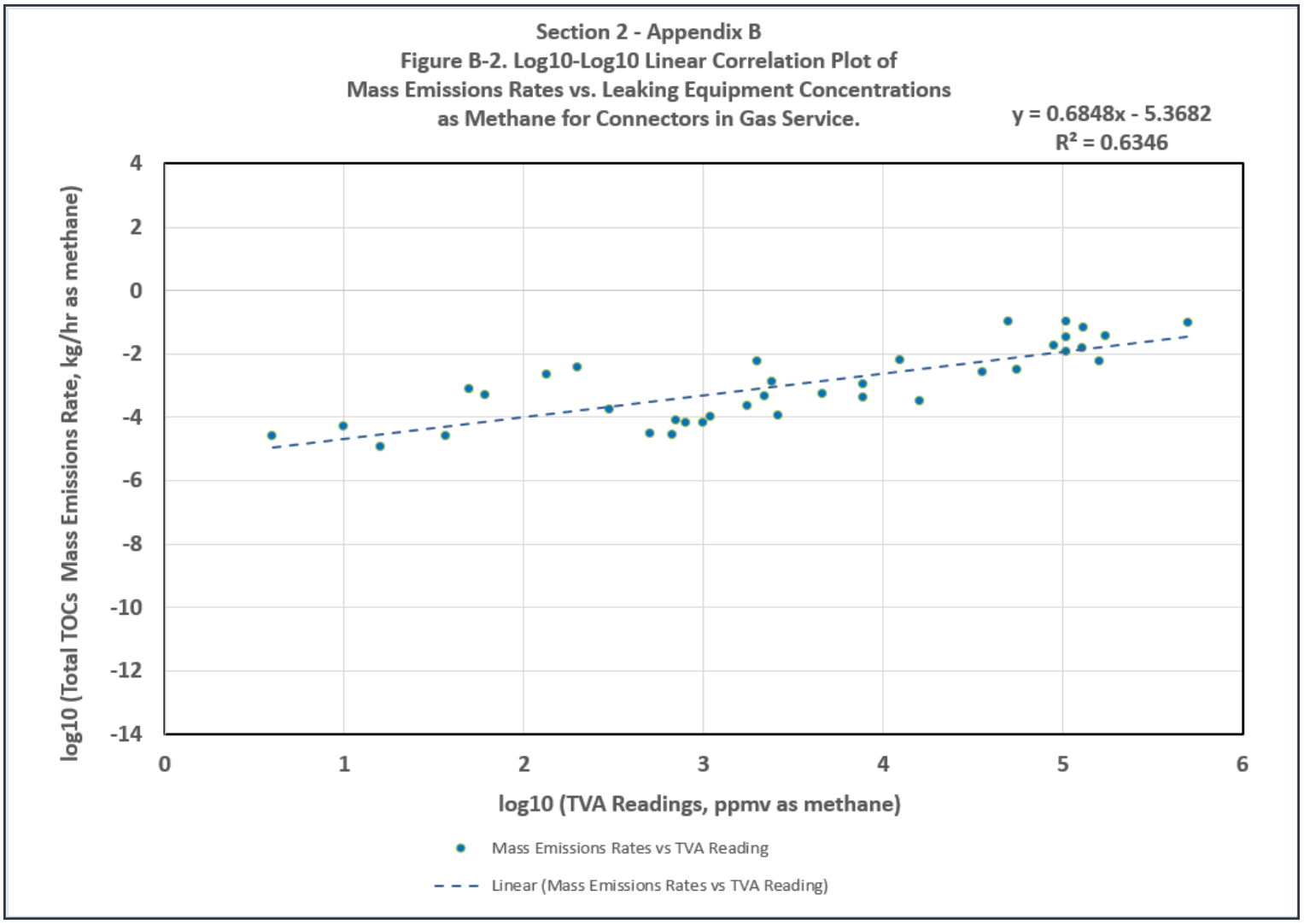
Sort order, sorted by Component Type, & Method 21 Concentration, ppmv	Component Information									
	Component Type	Service	kg/hr	kg/hr	kg/hr	kg/hr	kg/hr	kg/hr	kg/hr	kg/hr
			16.043	30.07	44.097	58.123	58.123	72.15	72.15	CALCULATED
			Methane	Ethane	Propane	i-Butane	n-Butane	i-Pentane	n-Pentane	TOC, kg/hr (does not incl. TPH)
161	Connector	Liquid	0	0	0	0	0	0	0	
162	Connector	Liquid	0	0	0	0	0	0	0	
163	Connector	Liquid	0	0	0.007235545	0	0	0	0	
164	Connector	Liquid	0	0	0	0	0	0	0	
165	Connector	Liquid	0	0	0	0	0	0	0	
166	Connector	Liquid	0	0	0.008893818	0	0	0	0	
167	Connector	Liquid	0	0	0.008061942	0	0	0	0	
168	Connector	Liquid	0	0	0.010047228	0	0	0	0	
169	Connector	Liquid	0	0	0	0	0	0.019310202	0.01471943	
170	Flange	Liquid	0.038462123	0.005268775	0	0	0	0	0	
171	OEL	Liquid	0	0	0	0	0	0	0	
172	OEL	Liquid	0	0	0.006815649	0	0	0	0	
173	OEL	Liquid	0	0	0	0	0	0	0	
174	OEL	Liquid	0	0	0	0	0	0	0	
175	OEL	Liquid	0	0	0	0	0	0	0	
176	OEL	Liquid	0	0	0	0	0	0	0	
177	OEL	Liquid	0	0	0	0	0	0	0	
178	OEL	Liquid	0	0	0	0	0.008153041	0.012230076	0.013879428	
179	OEL	Liquid	0	0	0	0	0	0.02165487	0.01650668	
180	OEL	Liquid	0	0	0	0	0	0	0	
181	Other	Liquid	0	0	0	0	0	0	0	
182	Other	Liquid	0	0	0	0	0	0	0	
183	Other	Liquid	0.024396078	0.209975909	0.163646703	0	0	0	0	
184	Other	Liquid	0	0	0	0	0	0	0	
185	Pump	Liquid	0	0	0.00482179	0	0.006884058	0	0	
186	Pump	Liquid	0	0	0.004423806	0	0.006315858	0	0	
187	Pump	Liquid	0	0	0.004397932	0	0.006278918	0	0	
188	Valve	Liquid	0	0	0	0	0	0.021367847	0.016287894	
189	Valve	Liquid	0	0	0	0	0	0.020400773	0.01555073	
190	Valve	Liquid	0	0	0	0	0	0	0	
191	Valve	Liquid	0	0	0.009399162	0	0	0	0	
192	Valve	Liquid	0.038274077	0.005243016	0	0	0	0	0	
193	Valve	Liquid	0.037339205	0.005114951	0	0	0	0	0	
194	Valve	Liquid	0	0	0.009981602	0	0	0	0	
195	Valve	Liquid	0	0	0	0	0.007189866	0.010785253	0.012239756	
196	Valve	Liquid	0	0	0	0	0	0.020882324	0.015917798	
197	Valve	Liquid	0	0	0	0	0	0	0	
198	Valve	Liquid	0	0	0	0	0	0	0	
199	Valve	Liquid	0	0	0	0	0	0	0	
200	Valve	Liquid	0	0	0	0	0	0	0	
201	Valve	Liquid	0	0	0	0	0	0	0	
202	Valve	Liquid	0	0	0	0	0	0	0	
203	Valve	Liquid	0.038881876	0.005326276	0	0	0	0	0	
204	Valve	Liquid	0	0	0	0	0	0	0	
205	Valve	Liquid	0.041302474	0.005657864	0	0	0	0	0	
206	Valve	Liquid	0	0	0	0	0	0.02133874	0.016265707	
207	Valve	Liquid	0	0	0	0	0	0	0	
208	Valve	Liquid	0	0	0	0	0	0	0	
209	Valve	Liquid	0.039320317	0.005386336	0	0	0	0	0	
210	Valve	Liquid	0.040283261	0.005518246	0	0	0	0	0	
211	Valve	Liquid	0.035620958	0.004879575	0	0	0	0	0	

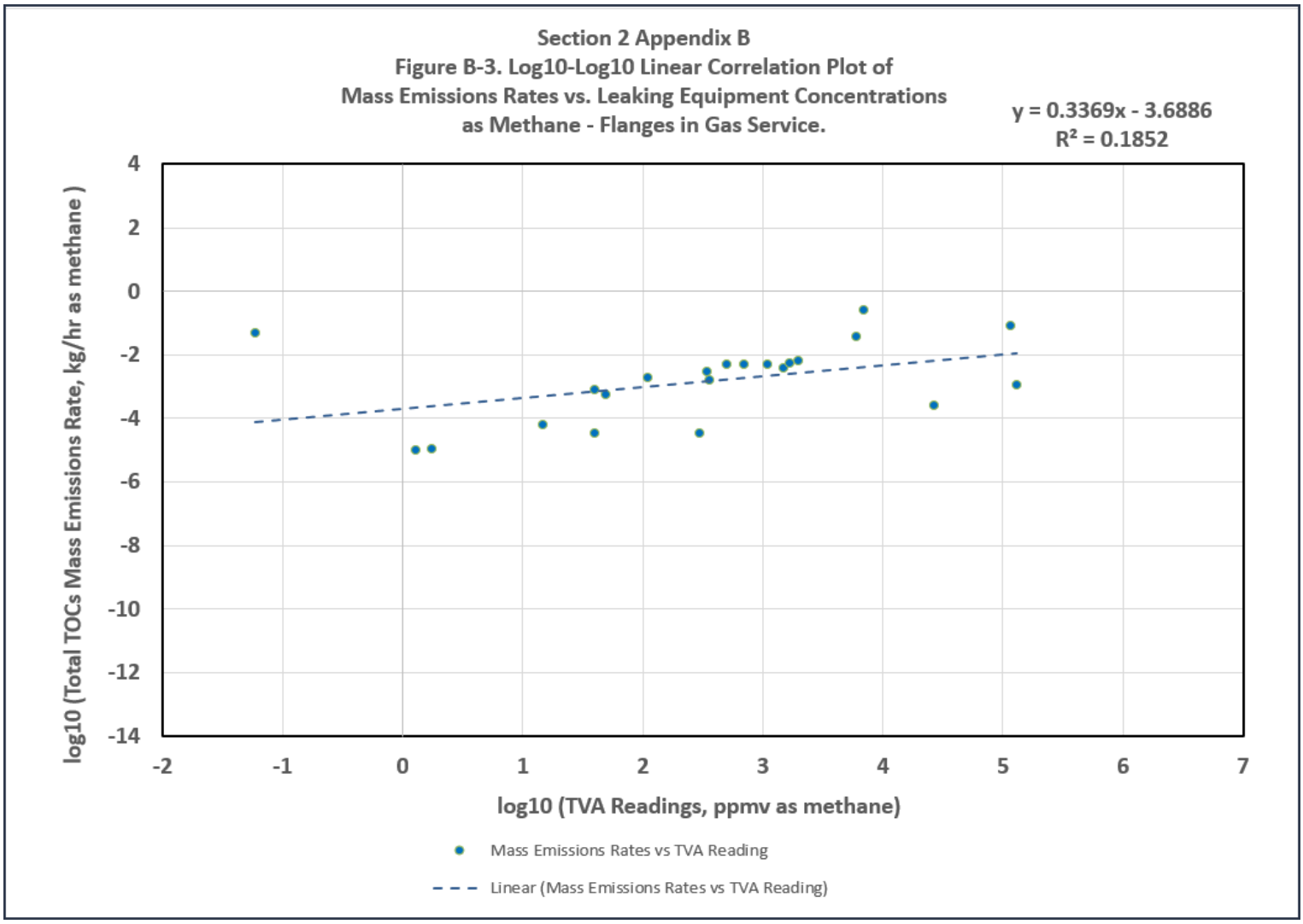
Appendix B:

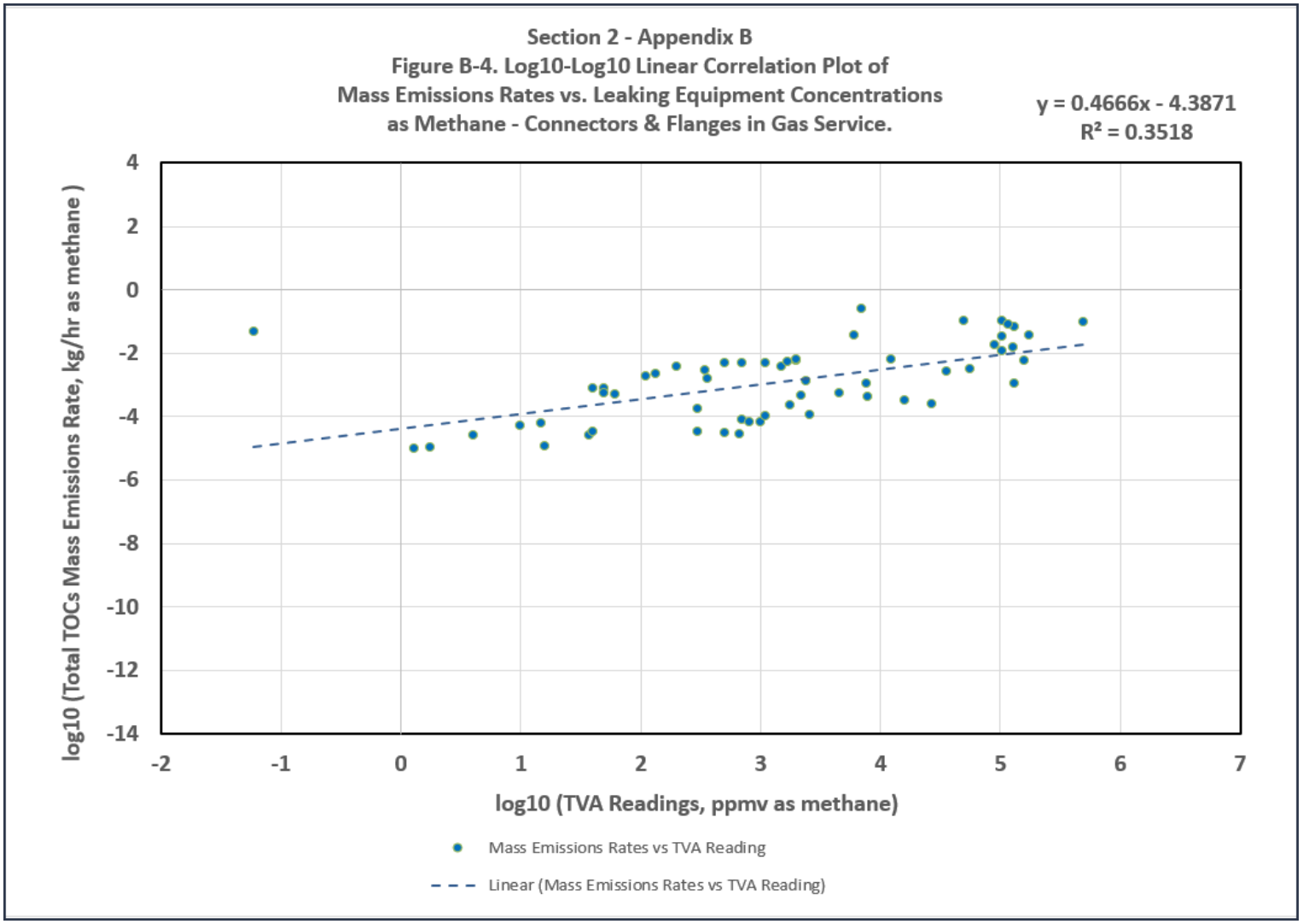
Correlation Plots of Mass Emission Rates vs. Leaking Equipment Concentrations

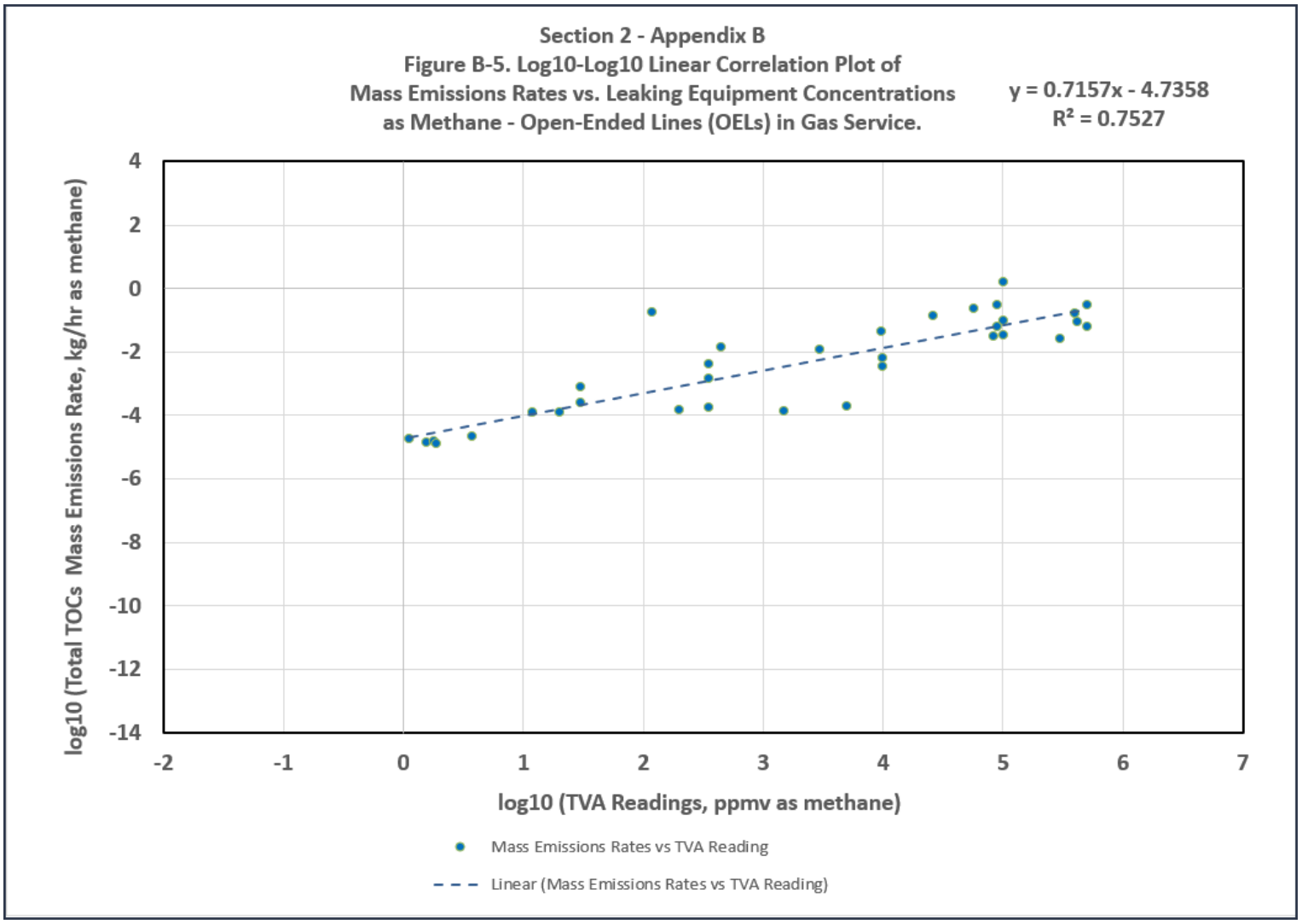
- **Correlation Plot for Gas Valves**
- **Correlation Plot for Connectors**
- **Correlation Plot for Flanges**
- **Correlation Plot for Connectors & Flanges**
- **Correlation Plot for OELs *and***
- **Correlation Plot for "Other" Components**

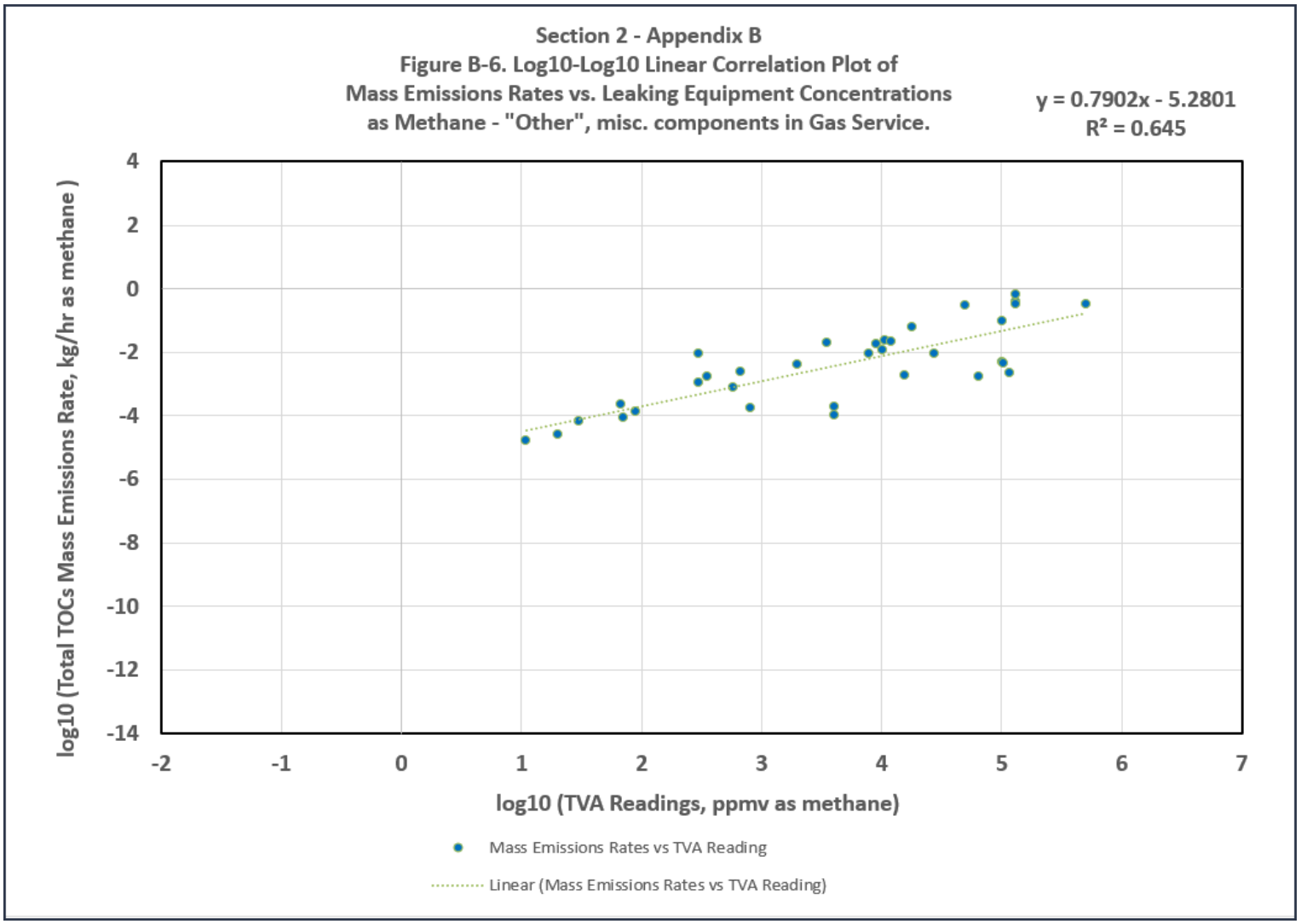

Section 2 - Appendix B
Figure B-1. Log10-Log10 Linear Correlation Plot of
Mass Emissions Rates vs. Leaking Equipment Concentrations.
as Methane - Valves in Gas Service.
y = 0.8118x - 5.8151
R² = 0.6086
log10 (Total TOCs Mass Emissions Rate, kg/hr as methane)
4
2
0
-2
-4
-6
-8
-10
-12
-14
-2
-1
0
1
2
3
4
5
6
7
log10 (TVA Readings, ppmv as methane)
Mass Emissions Rates vs TVA Reading
Linear (Mass Emissions Rates vs TVA Reading)


Section 2 - Appendix B
Figure B-2. Log10-Log10 Linear Correlation Plot of
Mass Emissions Rates vs. Leaking Equipment Concentrations
as Methane for Connectors in Gas Service.
y = 0.6848x - 5.3682
R² = 0.6346
log10 (Total TOCs Mass Emissions Rate, kg/hr as methane)
4
2
0
-2
-4
-6
-8
-10
-12
-14
0
1
2
3
4
5
6
log10 (TVA Readings, ppmv as methane)
Mass Emissions Rates vs TVA Reading
Linear (Mass Emissions Rates vs TVA Reading)


Section 2 Appendix B
Figure B-3. Log10-Log10 Linear Correlation Plot of
Mass Emissions Rates vs. Leaking Equipment Concentrations
as Methane - Flanges in Gas Service.
y = 0.3369x - 3.6886
R² = 0.1852
log10 (Total TOCs Mass Emissions Rate, kg/hr as methane)
4
2
0
-2
-4
-6
-8
-10
-12
-14
-2
-1
0
1
2
3
4
5
6
7
log10 (TVA Readings, ppmv as methane)
Mass Emissions Rates vs TVA Reading
Linear (Mass Emissions Rates vs TVA Reading)


Section 2 - Appendix B
Figure B-4. Log10-Log10 Linear Correlation Plot of
Mass Emissions Rates vs. Leaking Equipment Concentrations
as Methane - Connectors & Flanges in Gas Service.
y = 0.4666x - 4.3871
R² = 0.3518
log10 (Total TOCs Mass Emissions Rate, kg/hr as methane)
4
2
0
-2
-4
-6
-8
-10
-12
-14
-2
-1
0
1
2
3
4
5
6
7
log10 (TVA Readings, ppmv as methane)
Mass Emissions Rates vs TVA Reading
Linear (Mass Emissions Rates vs TVA Reading)


Section 2 - Appendix B
Figure B-5. Log10-Log10 Linear Correlation Plot of
Mass Emissions Rates vs. Leaking Equipment Concentrations
as Methane - Open-Ended Lines (OELs) in Gas Service.
y = 0.7157x - 4.7358
R² = 0.7527
log10 (Total TOCs Mass Emissions Rate, kg/hr as methane)
4
2
0
-2
-4
-6
-8
-10
-12
-14
-2
-1
0
1
2
3
4
5
6
7
log10 (TVA Readings, ppmv as methane)
Mass Emissions Rates vs TVA Reading
Linear (Mass Emissions Rates vs TVA Reading)


Section 2 - Appendix B
Figure B-6. Log10-Log10 Linear Correlation Plot of
Mass Emissions Rates vs. Leaking Equipment Concentrations
as Methane - "Other", misc. components in Gas Service.
y = 0.7902x - 5.2801
R² = 0.645
log10 (Total TOCs Mass Emissions Rate, kg/hr as methane)
4
2
0
-2
-4
-6
-8
-10
-12
-14
-2
-1
0
1
2
3
4
5
6
7
log10 (TVA Readings, ppmv as methane)
Mass Emissions Rates vs TVA Reading
Linear (Mass Emissions Rates vs TVA Reading)

Appendix C

- **An Example Calculation of Mean Square Error Used to Calculate the Scale Bias Correction Factor for Flanges in Gas Service**

- **An Example Calculation of the Scale Bias Correction Factor for Flanges in Gas Service**

Section 2 - Appendix C Table C-1: An Example Calculation of Mean Square Error (MSE), used to Calculate the Scale Bias Correction Factor (SBCF) for Flanges in Gas Service

To calculate the MSE follow the instructions below:

abc123 - data inputs

Step 1: Enter in all samples with concentration and mass emission measurements. Note, that if you are looking to develop a correlation equations for
Step 2: Adjust the intercept and slope ranges depending on the number of row items.
Step 3: Adjust the count depending on the number of row items.
Step 4: Adjust the MSEri to match the number of rows.
Step 5: Adjust the summation function is the MSE equation to match the number of row.

Sample ID	X (Col AN)	Y (Col BI)	Calculated Transformation = log10()						
(Col A)	Concentration (ppmv)	Mass Emission (kg/hr)	Concentration (ppmv)	Mass Emission (kg/hr)	Intercept (B0)	Slope (B1)	Count	MSEri	MSE
38	0.06	4.95E-02	-1.229147988	-1.305602294	-3.688648393	0.336871594	22	7.823830737	**1.287220669**
39	1.31	9.63E-06	0.117271296	-5.016401515				1.869395781	
40	1.77	1.06E-05	0.247973266	-4.974283634				1.874627559	
41	15.00	6.00E-05	1.176091259	-4.221684729				0.863464811	
42	40.00	3.24E-05	1.602059991	-4.489731042				1.797667282	
43	40.00	7.71E-04	1.602059991	-3.112707225				0.001314256	
44	49.00	5.68E-04	1.69019608	-3.245620159				0.015964528	
45	111.00	1.79E-03	2.045322979	-2.74623018				0.064215108	
46	300.00	3.26E-05	2.477121255	-4.487062375				2.666315931	
47	349.00	2.86E-03	2.542825427	-2.543013696				0.083537787	
48	358.00	1.58E-03	2.553883027	-2.800275589				0.000786363	
49	500.00	4.90E-03	2.698970004	-2.310069095				0.220310985	
50	700.00	5.03E-03	2.84509804	-2.298360737				0.186498693	
51	1,100.00	4.72E-03	3.041392685	-2.326121649				0.11422233	
52	1,500.00	3.69E-03	3.176091259	-2.433353588				0.034358285	
53	1,700.00	5.42E-03	3.230448921	-2.266082583				0.111769416	
54	2,000.00	6.41E-03	3.301029996	-2.193021433				0.147151816	
55	6,000.00	3.67E-02	3.77815125	-1.435492153				0.961192799	
56	7,000.00	2.42E-01	3.84509804	-0.616414324				3.157479383	
57	27,000.00	2.44E-04	4.431363764	-3.61333862				2.009280174	
58	116,000.00	7.73E-02	5.064457989	-1.111759692				0.758321664	
59	130,000.00	1.10E-03	5.113943352	-2.957222285				0.982707692	

Section 2 - Appendix C Table C-2: An Example Calculation of the Scale Bias Correction Factor (SBCF) for Flanges in Gas Service.

For correlation equation development follow the 1995 Emission Estimating Protocol (B.1.2).

abc123 - data inputs

Step 1: Transform the data to log-log scale of the mass emissions and concentration. I prefer natural log but you can use log bas 10. Note if you use log base 10 the calculation for the SBCF will change by altering the way "T" is calculated.

Step 2a: Perform a least squares linear regression in log space.
Step 2b: Note the

Step 3: Obtain the slope and intercept from 2a.
Step 4: Calculate the mean square error (MSE). There is adequate instructions on how to do this in the 1995 protocol. I have also created a tab for the MSE.
Step 5: Plug in the MSE into the values column.

Note, in order to calculate the SBCF you should only need to plug in the values for the number of concentration/bagging pairs and MSE.

```
SBCF=1+((m-1)*T)/m+(((m-1)^3)*T^2)/((m^2)*i1*(m+1))+(((m-
1)^5)*T^3)/((m^3)*i2*(m+1)*(m+3))+(((m-1)^7)*T^4)/((m^4)*i3*(m+1)*(m+3)*(m+5))+(((m-
1)^9)*T^5)/((m^5)*i4*(m+1)*(m+3)*(m+5)*(m+7))+(((m-
1)^11)*T^6)/((m^6)*i5*(m+1)*(m+3)*(m+5)*(m+7)*(m+9))+(((m-
1)^13)*T^7)/((m^7)*i6*(m+1)*(m+3)*(m+5)*(m+7)*(m+9)*(m+11))+(((m-
1)^15)*T^8)/((m^8)*i7*(m+1)*(m+3)*(m+5)*(m+7)*(m+9)*(m+11)*(m+13))+(((m-
1)^17)*T^9)/((m^9)*i8*(m+1)*(m+3)*(m+5)*(m+7)*(m+9)*(m+11)*(m+13)*(m+15))+(((m-
1)^19)*T^10)/((m^10)*i9*(m+1)*(m+3)*(m+5)*(m+7)*(m+9)*(m+11)*(m+13)*(m+15)*(m+17))+((
(m-
1)^21)*T^11)/((m^11)*i10*(m+1)*(m+3)*(m+5)*(m+7)*(m+9)*(m+11)*(m+13)*(m+15)*(m+17)*(
m+19))+(((m-
1)^23)*T^12)/((m^12)*i11*(m+1)*(m+3)*(m+5)*(m+7)*(m+9)*(m+11)*(m+13)*(m+15)*(m+17)*(
m+19)*(m+21))+(((m-
1)^25)*T^13)/((m^13)*i12*(m+1)*(m+3)*(m+5)*(m+7)*(m+9)*(m+11)*(m+13)*(m+15)*(m+17)*(
m+19)*(m+21)*(m+23))+(((m-
1)^27)*T^14)/((m^14)*i13*(m+1)*(m+3)*(m+5)*(m+7)*(m+9)*(m+11)*(m+13)*(m+15)*(m+17)*(
m+19)*(m+21)*(m+23)*(m+25))+(((m-
1)^29)*T^15)/((m^15)*i14*(m+1)*(m+3)*(m+5)*(m+7)*(m+9)*(m+11)*(m+13)*(m+15)*(m+17)*(
```

Formulas	Values	
MSE=;	**MSE**	**1.287220669**
n=;	**n**	**22**
T=MSE/2 x ln(10^2);	**T**	3.412356416
m=n-1;	**m**	21
i1=2*1;	**i1**	2
i2=3*2*1;	**i2**	6
i3=4*3*2*1;	**i3**	24
i4=5*4*3*2*1;	**i4**	120
i5=6*5*4*3*2*1;	**i5**	720
i6=7*6*5*4*3*2*1;	**i6**	5040
i7=8*7*6*5*4*3*2*1;	**i7**	40320
i8=9*8*7*6*5*4*3*2*1;	**i8**	362880
i9=10*9*8*7*6*5*4*3*2*1;	**i9**	3628800
i10=11*10*9*8*7*6*5*4*3*2*1;	**i10**	39916800
i11=12*11*10*9*8*7*6*5*4*3*2*1;	**i11**	479001600
i12=13*12*11*10*9*8*7*6*5*4*3*2*1;	**i12**	6227020800
i13=14*13*12*11*10*9*8*7*6*5*4*3*2*1;	**i13**	87178291200
i14=15*14*13*12*11*10*9*8*7*6*5*4*3*2*1;	**i14**	1.30767E+12
	SBCF [1]	**17.975**

Note:
ln(10^2)= 5.3018981

Note: This current goes up to i13 due to processing limitation in MS Excel.

Eqpt	R^2	N	MSE	T	SBCF	B0	B1	C1 =(SBCF) x 10^b0
V	0.609	33	0.8932008	2.3678298	8.6458	-5.815062685	0.8118	1.3236E-05
C	0.635	37	0.5166433	1.369595	3.6238	-5.368188432	0.6848	1.5523E-05
F	0.185	22	1.2872207	3.4123564	17.9753	-3.688648393	0.3369	3.6815E-03
C + F	0.352	59	0.9251642	2.4525633	10.1849	-4.387074589	0.4666	4.1772E-04
OELs	0.753	34	0.604349	1.6020985	4.4356	-4.735842576	0.7157	8.1490E-05
Other	0.645	34	0.5908473	1.566306	4.2958	-5.280052948	0.7902	2.2542E-05

Appendix D:

- **Notes to Updated Calculations 08/20/2019**

Notes to this updated report: 08/20/2019:

1) The general forms of the equations presented in the report text, section 2.2, shows sample volume correction terms for both temperature and pressure from ambient to standard conditions at 25 C, 29.92 mmHg. A communication from the Bacharach flow measurement device vendor pertaining to temperature and pressure correction, stated that the Hi Flow Sampler automatically corrects from ambient to a Standard Temperature of 20 C, but does not correct for pressure. Therefore, the general temperature-pressure corrections of "(Tstd/Tact)(Pact/Pstd)" to a standard molar volume of 24.45 L at STP of 25 C, 29.92 mmHg is corrected in the spreadsheet calculations to "(298.15 K / 293.15 K)(Tstd/Tact)".

2) During a review of the temperature-pressure correction issue, four ambient pressure outliers for the date 08/06/2015 were noted for sample #s 1, 57, 159, and 160 were found, each = 20.73. A review of the original field data sheets was made, and the first three values were corrected to 29.73 mmHg, and the value for sample #160 was corrected to 29.74 mmHg.

3) The SBCF values calculations are calcuated in accordance with the procedure in the 1995 EPA Protocol, Section B.1.2, where the value of T, used in the calculation of the SBCF, T (when regression performed using base 10 logarithms) = (MSE/2)×((ln10)2).

Appendix E:

Average Emission Rates for Components in Liquid Service

Appendix E: Average Emissions Rates for Components in Liquid Service

The initial sample matrix design for the components in liquid service was the same as for the components in gas service, six (6) components per each combination of five concentration ranges and five (5) component types, for a total of 150 sets of results. The 1995 EPA protocol requires at least four (4) sets of data for each combination, for a total of 100 sets of results, for the correlation to be considered acceptable. During the course of the project it was determined that the rate of discovery of components in liquid service would fall well below either of these goals. Therefore, no attempt was made to prepare any correlations for components in liquid service. The statistics below were calculated from the collected field measurements and calculated emission rates for components in liquid service.

Average Emission Rates for Components in Liquid Service, kg/hr as methane		
Component Type	**Emission Rate**	**N**
Valves	2.08E-04	24
Connectors	3.65E-04	9
Flanges	2.06E-08	1
Connectors & Flanges	3.29E-04	10
OELs	2.11E-05	10
Pumps	5.82E-05	3
Other	5.82E-05	3

Appendix F:

Pneumatic Device Test Results

Pneumatic Device Test Results

SAMPLING DATA					HIGH FLOW DATA					EMISSIONS	
Date	Pressure (inHg)	TVA Reading (ppm)	PFC Type	Time	Bkg %	1-2%	Avg Temp (°C)	Flow (CFM)	CH4 Leak %	(kg/hr)	(Tons/ Year)
8/12/2015	30.02	262,500	Flextube®	13:11	0	12.9	33.3	7.9	3.33	0.287	2.768
8/12/2015	30.01	189,167	Flextube®	13:24	0.2	14.1	33.3	3.6	6.5	0.247	2.385
8/13/2015	30.02	> 625,000	Flextube®	10:27	0	3.9	25	6.6	2.08	0.154	1.484
8/13/2015	30.02	> 625,000	Flextube®	11:33	0.1	3.2	29.5	5.8	3.17	0.199	1.925
8/13/2015	30	> 625,000	Flextube®	12:28	0.3	4	30.6	6.7	3.81	0.259	2.501
8/13/2015	29.98	> 625,000	Flextube®	13:25	0	5.5	33.6	6.8	4.9	0.362	3.494
8/14/2015	30.03	> 416,667	Kimray®	12:49	0	63	34.6	7.4	0.05	0.004	0.039
8/14/2015	30.03	> 416,667	Flextube®	12:54	0.3	26.2	35.2	6.7	10.3	0.725 [1]	7.002 [1]
8/14/2015	30.03	> 416,667	Kimray®	13:01	0.1	10.8	35.9	4.5	1.88	0.087	0.836
8/14/2015	30.01	41,667	Kimray®	14:21	0	2.1	34.6	6.8	0.23	0.017	0.164
8/14/2015	30.01	37,500	Flextube®	14:26	0.1	5.1	35.6	7	2.07	0.149	1.44
8/14/2015	30.01	2,800	Kimray®	14:33	0	0	36.9	6.7	0.41	0.029	0.28
8/14/2015	30	8,600	Kimray®	14:39	0	0	38.1	6.2	0.7	0.046	0.442
8/14/2015	30	> 416,667	Flextube®	14:44	0.1	1.5	38.8	6.7	2.12	0.146	1.408
8/17/2015	29.85	> 416,667	Flextube®	10:40	0	4.5	27.2	6.6	3.25	0.235	2.272
8/17/2015	29.84	16,000	Kimray®	11:51	0	1.6	32.8	6.9	0.15	0.011	0.105
8/17/2015	29.79	211,667	Flextube®	14:22	0.1	1.9	35.7	7.25	4.18	0.318	3.068

[1] Inconsistent Test Results - data not used

Appendix G:

Project Sample Logbook

CARB Sample Logbook

Sent	Sample No.	Site No.	Date	Time	Vi	Vf	Can ID	Comment
1/20/2015	TB001	01	1/20/2015	10:55	--	--	--	
1/23/2015	CAN001	01	1/23/2015	10:51	28.5	0	DEC-117-39	
1/20/2015	TB002	01	1/20/2015	11:27	--	--	--	
1/23/2015	CAN002	01	1/23/2015	11:26	28.5	0	DEC-39-0298	
1/20/2015	TB003	02	1/20/2015	15:16	--	--	--	
1/23/2015	CAN003	02	1/23/2015	15:10	28.25	0	DEC-29-706	
1/21/2015	TB004	03	1/21/2015	12:04	--	--	--	
1/23/2015	CAN004	03	1/23/2015	11:55	28.5	0	DEC-29-704	
1/21/2015	TB005	03	1/21/2015	12:42	--	--	--	
1/23/2015	CAN005	03	1/23/2015	12:40	28	5.6	DEC-117-32	
1/21/2015	TB006	04	1/21/2015	15:20	--	--	--	
1/23/2015	CAN006	04	1/23/2015	15:15	28.5	0	DEC-39-0304	
1/22/2015	TB007	05	1/22/2015	10:45	--	--	--	
1/23/2015	CAN007	05	1/23/2015	10:42	28.5	0	DEC-39-0334	
1/22/2015	TB008	05	1/22/2015	11:40	--	--	--	
1/23/2015	CAN008	05	1/23/2015	11:37	28	0	DEC-117-42	
1/22/2015	TB009	06	1/22/2015	14:50	--	--	--	
1/23/2015	CAN009	06	1/23/2015	14:49	28.75	0	DEC-39-0296	
1/23/2015	TB010	07	1/23/2015	10:52	--	--	--	
1/23/2015	CAN010	07	1/23/2015	10:48	28.5	0	DEC-29-701	
1/23/2015	TB011	07	1/23/2015	12:04	--	--	--	
1/23/2015	CAN011	07	1/23/2015	12:03	28.5	0	DEC-29-702	
1/23/2015	TB012	07	1/23/2015	12:19	--	--	--	
1/23/2015	CAN012	07	1/23/2015	12:17	29	0	DEC-29-716	
1/26/2015	TB013	08	1/26/2015	12:08	--	--	--	
1/30/2015	CAN013	08	1/30/2015	12:06	27.5	0	DEC-117-11	
1/27/2015	TB014	09	1/27/2015	12:43	--	--	--	

Sent	Sample No.	Site No.	Date	Time	Vi	Vf	Can ID	Comment
1/30/2015	CAN014	09	1/30/2015	12:41	28.5	0	DEC-39-0339	
1/27/2015	TB015	09	1/27/2015	13:32	--	--	--	
1/30/2015	CAN015	09	1/30/2015	13:30	28.5	0	DEC-39-0295	
1/27/2015	TB016	09	1/27/2015	14:20	--	--	--	
1/30/2015	CAN016	09	1/30/2015	14:18	27	0	DEC-29-728	
1/28/2015	TB017	09	1/28/2015	14:16	--	--	--	
1/30/2015	CAN017	09	1/30/2015	14:11	28.5	0	DEC-117-34	
1/28/2015	TB018	09	1/28/2015	14:50	--	--	--	
1/30/2015	CAN018	09	1/30/2015	14:47	28.1	1	DEC-29-707	
1/28/2015	TB019	09	1/28/2015	15:06	--	--	--	
1/30/2015	CAN019	09	1/30/2015	15:05	28.25	0	DEC-29-732	
1/29/2015	TB020	09	1/29/2015	10:38	--	--	--	
1/30/2015	CAN020	09	1/30/2015	10:36	28.25	0	DEC-29-708	
1/29/2015	TB021	09	1/29/2015	13:21	--	--	--	
1/30/2015	CAN021	09	1/30/2015	13:19	27.5	0	DEC-29-731	
1/30/2015	TB022	09	1/30/2015	10:47	--	--	--	
1/30/2015	CAN022	09	1/30/2015	10:45	28.25	0	DEC-39-0303	
1/30/2015	TB023	09	1/30/2015	11:00	--	--	--	
1/30/2015	CAN023	09	1/30/2015	10:57	28	0	DEC-29-726	
2/23/2015	TB024A	10	2/23/2015	11:01	--	--	--	
2/23/2015	TB024B	10	2/23/2015	11:03	--	--	--	
2/23/2015	TB025A	10	2/23/2015	11:34	--	--	--	
2/23/2015	TB025B	10	2/23/2015	11:36	--	--	--	
2/24/2015	TB026A	11	2/24/2015	10:15	--	--	--	
2/24/2015	TB26B	11	2/24/2015	10:15	--	--	--	
2/24/2015	TB27A	11	2/24/2015	13:40	--	--	--	
2/24/2015	TB27B	11	2/24/2015	13:40	--	--	--	
2/25/2015	TB28A	12	2/25/2015	14:02	--	--	--	
2/25/2015	TB28B	12	2/25/2015	14:02	--	--	--	

Sent	Sample No.	Site No.	Date	Time	Vi	Vf	Can ID	Comment
2/25/2015	TB29A	12	2/25/2015	14:51	--	--	--	
2/25/2015	TB29B	12	2/25/2015	14:51	--	--	--	
2/26/2015	TB30A	12	2/26/2015	13:53	--	--	--	
2/26/2015	TB30B	12	2/26/2015	13:53	--	--	--	
2/26/2015	TB31A	12	2/26/2015	14:20	--	--	--	
2/26/2015	TB31B	12	2/26/2015	14:20	--	--	--	
2/26/2015	TB32A	13	2/26/2015	15:15	--	--	--	
2/26/2015	TB32B	13	2/26/2015	15:15	--	--	--	
3/2/2015	TB33A	14	3/2/2015	14:02	--	--	--	
3/2/2015	TB33B	14	3/2/2015	14:02	--	--	--	
3/2/2015	TB34A	14	3/2/2015	14:40	--	--	--	
3/2/2015	TB34B	14	3/2/2015	14:40	--	--	--	
3/2/2015	TB35A	14	3/2/2015	14:53	--	--	--	
3/2/2015	TB35B	14	3/2/2015	14:53	--	--	--	
3/2/2015	TB36A	14	3/2/2015	15:18	--	--	--	
3/2/2015	TB36B	14	3/2/2015	15:18	--	--	--	
3/3/2015	TB37A	15	3/3/2015	16:30	--	--	--	
3/3/2015	TB37B	15	3/3/2015	16:30	--	--	--	
3/3/2015	TB38A	15	3/3/2015	16:30	--	--	--	
3/3/2015	TB38B	15	3/3/2015	16:30	--	--	--	
3/3/2015	TB39A	15	3/3/2015	16:30	--	--	--	
3/3/2015	TB39B	15	3/3/2015	16:30	--	--	--	
8/6/2015	TB40A	16	8/6/2015	13:58	--	--	--	
8/6/2015	TB40B	16	8/6/2015	13:59	--	--	--	
8/6/2015	TB41A	17	8/6/2015	14:35	--	--	--	
8/6/2015	TB41B	17	8/6/2015	14:37	--	--	--	
8/7/2015	TB42A	18	8/7/2015	14:36	--	--	--	
8/7/2015	TB42B	18	8/7/2015	14:36	--	--	--	
8/7/2015	TB43A	19	8/7/2015	14:36	--	--	--	

Sent	Sample No.	Site No.	Date	Time	Vi	Vf	Can ID	Comment
8/7/2015	TB43B	19	8/7/2015	14:36	--	--	--	
8/11/2015	TB44A	20	8/11/2015	17:15	--	--	--	
8/11/2015	TB44B	20	8/11/2015	17:15	--	--	--	
8/11/2015	TB45A	21	8/11/2015	17:15	--	--	--	
8/11/2015	TB45B	21	8/11/2015	17:15	--	--	--	
8/12/2015	TB46A	22	8/12/2015	15:15	--	--	--	
8/12/2015	TB46B	22	8/12/2015	15:15	--	--	--	
8/12/2015	TB47A	23	8/12/2015	15:15	--	--	--	
8/12/2015	TB47B	23	8/12/2015	15:15	--	--	--	
8/12/2015	TB48A	24	8/12/2015	15:15	--	--	--	
8/12/2015	TB48B	24	8/12/2015	15:15	--	--	--	
8/13/2015	TB49A	25	8/13/2015	15:15	--	--	--	
8/13/2015	TB49B	25	8/13/2015	15:15	--	--	--	
8/13/2015	TB50A	26	8/13/2015	15:15	--	--	--	
8/13/2015	TB50B	26	8/13/2015	15:15	--	--	--	
8/14/2015	TB51A	27	8/14/2015	10:33				
8/14/2015	TB51B	27	8/14/2015	10:33				
8/14/2015	TB52A	28	8/14/2015	12:35				
8/14/2015	TB52B	28	8/14/2015	12:35				
8/14/2015	TB53A	29	8/14/2015	14:09				

Appendix H:

Analytical Results

Oilfield Environmental and Compliance, INC.

Sage Environmental Consulting	Project: CARB	
720 West Arapaho Road	Project Number: CARB #1344	**Reported:**
Richardson TX, 75080	Project Manager: David Ranum	04-Feb-15 16:10

CAN001

1500318-01 (Air)

Oilfield Environmental and Compliance

Volatile Organic Compounds by EPA Method TO-15

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
Acetone	ND	44	ppbv	21.83	B5A0713	27-Jan-15	27-Jan-15	TO-15 mod.	
Benzene	ND	11	"	"	"	"	"	"	
Benzyl chloride	ND	11	"	"	"	"	"	"	
Bromodichloromethane	ND	11	"	"	"	"	"	"	
Bromoform	ND	11	"	"	"	"	"	"	
Bromomethane	ND	11	"	"	"	"	"	"	
1,3-Butadiene	ND	11	"	"	"	"	"	"	
Carbon disulfide	ND	11	"	"	"	"	"	"	
Carbon tetrachloride	ND	11	"	"	"	"	"	"	
Chlorobenzene	ND	11	"	"	"	"	"	"	
Chloroethane	ND	11	"	"	"	"	"	"	
Chloroform	ND	11	"	"	"	"	"	"	
Chloromethane	ND	11	"	"	"	"	"	"	
Cyclohexane	**40**	11	"	"	"	"	"	"	
Dibromochloromethane	ND	11	"	"	"	"	"	"	
1,2-Dibromoethane (EDB)	ND	11	"	"	"	"	"	"	
1,2-Dichlorobenzene	ND	11	"	"	"	"	"	"	
1,3-Dichlorobenzene	ND	11	"	"	"	"	"	"	
1,4-Dichlorobenzene	ND	11	"	"	"	"	"	"	
Dichlorodifluoromethane	ND	11	"	"	"	"	"	"	
1,1-Dichloroethane	ND	11	"	"	"	"	"	"	
1,2-Dichloroethane	ND	11	"	"	"	"	"	"	
1,1-Dichloroethene	ND	11	"	"	"	"	"	"	
cis-1,2-Dichloroethene	ND	11	"	"	"	"	"	"	
trans-1,2-Dichloroethene	ND	11	"	"	"	"	"	"	
1,2-Dichloropropane	ND	11	"	"	"	"	"	"	
cis-1,3-Dichloropropene	ND	11	"	"	"	"	"	"	
trans-1,3-Dichloropropene	ND	11	"	"	"	"	"	"	
1,2-Dichloro-1,1,2,2-tetrafluoroethane	ND	11	"	"	"	"	"	"	
Diisopropyl Ether	ND	11	"	"	"	"	"	"	
1,4-Dioxane	ND	11	"	"	"	"	"	"	
Ethanol	ND	44	"	"	"	"	"	"	

Oilfield Environmental and Compliance, INC.

Sage Environmental Consulting	Project: CARB	
720 West Arapaho Road	Project Number: CARB #1344	**Reported:**
Richardson TX, 75080	Project Manager: David Ranum	04-Feb-15 16:10

CAN001

1500318-01 (Air)

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes

Oilfield Environmental and Compliance

Volatile Organic Compounds by EPA Method TO-15

Ethyl Acetate	ND	11	ppbv	21.83	B5A0713	27-Jan-15	27-Jan-15	TO-15 mod.
Ethylbenzene	ND	11	"	"	"	"	"	"
Ethyl t-Butyl Ether	ND	11	"	"	"	"	"	"
4-Ethyltoluene	ND	11	"	"	"	"	"	"
Heptane	ND	11	"	"	"	"	"	"
Hexachlorobutadiene	ND	11	"	"	"	"	"	"
Hexane	**44**	11	"	"	"	"	"	"
2-Hexanone	ND	11	"	"	"	"	"	"
Isopropyl alcohol	ND	11	"	"	"	"	"	"
Methylene chloride	ND	11	"	"	"	"	"	"
Methyl Ethyl Ketone	ND	11	"	"	"	"	"	"
Methyl Isobutyl Ketone	ND	11	"	"	"	"	"	"
Methyl-t-butyl ether	ND	11	"	"	"	"	"	"
Naphthalene	ND	22	"	"	"	"	"	"
Propylene	ND	11	"	"	"	"	"	"
Styrene	ND	11	"	"	"	"	"	"
t-Amyl Methyl Ether	ND	11	"	"	"	"	"	"
t-Butyl alcohol	ND	11	"	"	"	"	"	"
1,1,2,2-Tetrachloroethane	ND	11	"	"	"	"	"	"
Tetrachloroethene (PCE)	ND	11	"	"	"	"	"	"
Tetrahydrofuran	ND	11	"	"	"	"	"	"
Toluene	ND	11	"	"	"	"	"	"
1,2,4-Trichlorobenzene	ND	11	"	"	"	"	"	"
1,1,1-Trichloroethane	ND	11	"	"	"	"	"	"
1,1,2-Trichloroethane	ND	11	"	"	"	"	"	"
Trichloroethene (TCE)	ND	11	"	"	"	"	"	"
Trichlorofluoromethane	ND	11	"	"	"	"	"	"
1,1,2-Trichlorotrifluoroethane	ND	11	"	"	"	"	"	"
1,2,4-Trimethylbenzene	ND	11	"	"	"	"	"	"
1,3,5-Trimethylbenzene	ND	11	"	"	"	"	"	"
Vinyl acetate	ND	11	"	"	"	"	"	"
Vinyl chloride	ND	11	"	"	"	"	"	"
Xylenes (total)	ND	11	"	"	"	"	"	"
TPH Gasoline (C4-C12)	**4800**	4400	"	"	"	"	"	"

Oilfield Environmental and Compliance, INC.

Sage Environmental Consulting	Project: CARB	
720 West Arapaho Road	Project Number: CARB #1344	**Reported:**
Richardson TX, 75080	Project Manager: David Ranum	04-Feb-15 16:10

CAN002

1500318-02 (Air)

Oilfield Environmental and Compliance

Volatile Organic Compounds by EPA Method TO-15 **R-01**

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
Acetone	ND	43	ppbv	21.5	B5A0713	27-Jan-15	27-Jan-15	TO-15 mod.	
Benzene	ND	11	"	"	"	"	"	"	
Benzyl chloride	ND	11	"	"	"	"	"	"	
Bromodichloromethane	ND	11	"	"	"	"	"	"	
Bromoform	ND	11	"	"	"	"	"	"	
Bromomethane	ND	11	"	"	"	"	"	"	
1,3-Butadiene	ND	11	"	"	"	"	"	"	
Carbon disulfide	ND	11	"	"	"	"	"	"	
Carbon tetrachloride	ND	11	"	"	"	"	"	"	
Chlorobenzene	ND	11	"	"	"	"	"	"	
Chloroethane	ND	11	"	"	"	"	"	"	
Chloroform	ND	11	"	"	"	"	"	"	
Chloromethane	ND	11	"	"	"	"	"	"	
Cyclohexane	ND	11	"	"	"	"	"	"	
Dibromochloromethane	ND	11	"	"	"	"	"	"	
1,2-Dibromoethane (EDB)	ND	11	"	"	"	"	"	"	
1,2-Dichlorobenzene	ND	11	"	"	"	"	"	"	
1,3-Dichlorobenzene	ND	11	"	"	"	"	"	"	
1,4-Dichlorobenzene	ND	11	"	"	"	"	"	"	
Dichlorodifluoromethane	ND	11	"	"	"	"	"	"	
1,1-Dichloroethane	ND	11	"	"	"	"	"	"	
1,2-Dichloroethane	ND	11	"	"	"	"	"	"	
1,1-Dichloroethene	ND	11	"	"	"	"	"	"	
cis-1,2-Dichloroethene	ND	11	"	"	"	"	"	"	
trans-1,2-Dichloroethene	ND	11	"	"	"	"	"	"	
1,2-Dichloropropane	ND	11	"	"	"	"	"	"	
cis-1,3-Dichloropropene	ND	11	"	"	"	"	"	"	
trans-1,3-Dichloropropene	ND	11	"	"	"	"	"	"	
1,2-Dichloro-1,1,2,2-tetrafluoroethane	ND	11	"	"	"	"	"	"	
Diisopropyl Ether	ND	11	"	"	"	"	"	"	
1,4-Dioxane	ND	11	"	"	"	"	"	"	
Ethanol	ND	43	"	"	"	"	"	"	
Ethyl Acetate	ND	11	"	"	"	"	"	"	
Ethylbenzene	ND	11	"	"	"	"	"	"	
Ethyl t-Butyl Ether	ND	11	"	"	"	"	"	"	
4-Ethyltoluene	ND	11	"	"	"	"	"	"	

Oilfield Environmental and Compliance, INC.

Sage Environmental Consulting	Project: CARB	
720 West Arapaho Road	Project Number: CARB #1344	**Reported:**
Richardson TX, 75080	Project Manager: David Ranum	04-Feb-15 16:10

CAN002

1500318-02 (Air)

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes

Oilfield Environmental and Compliance

Volatile Organic Compounds by EPA Method TO-15 **R-01**

Heptane	ND	11	ppbv	21.5	B5A0713	27-Jan-15	27-Jan-15	TO-15 mod.	
Hexachlorobutadiene	ND	11	"	"	"	"	"	"	
Hexane	ND	11	"	"	"	"	"	"	
2-Hexanone	ND	11	"	"	"	"	"	"	
Isopropyl alcohol	ND	11	"	"	"	"	"	"	
Methylene chloride	ND	11	"	"	"	"	"	"	
Methyl Ethyl Ketone	ND	11	"	"	"	"	"	"	
Methyl Isobutyl Ketone	ND	11	"	"	"	"	"	"	
Methyl-t-butyl ether	ND	11	"	"	"	"	"	"	
Naphthalene	ND	22	"	"	"	"	"	"	
Propylene	ND	11	"	"	"	"	"	"	
Styrene	ND	11	"	"	"	"	"	"	
t-Amyl Methyl Ether	ND	11	"	"	"	"	"	"	
t-Butyl alcohol	ND	11	"	"	"	"	"	"	
1,1,2,2-Tetrachloroethane	ND	11	"	"	"	"	"	"	
Tetrachloroethene (PCE)	ND	11	"	"	"	"	"	"	
Tetrahydrofuran	ND	11	"	"	"	"	"	"	
Toluene	ND	11	"	"	"	"	"	"	
1,2,4-Trichlorobenzene	ND	11	"	"	"	"	"	"	
1,1,1-Trichloroethane	ND	11	"	"	"	"	"	"	
1,1,2-Trichloroethane	ND	11	"	"	"	"	"	"	
Trichloroethene (TCE)	ND	11	"	"	"	"	"	"	
Trichlorofluoromethane	ND	11	"	"	"	"	"	"	
1,1,2-Trichlorotrifluoroethane	ND	11	"	"	"	"	"	"	
1,2,4-Trimethylbenzene	ND	11	"	"	"	"	"	"	
1,3,5-Trimethylbenzene	ND	11	"	"	"	"	"	"	
Vinyl acetate	ND	11	"	"	"	"	"	"	
Vinyl chloride	ND	11	"	"	"	"	"	"	
Xylenes (total)	ND	11	"	"	"	"	"	"	
TPH Gasoline (C4-C12)	ND	4300	"	"	"	"	"	"	

Oilfield Environmental and Compliance, INC.

Sage Environmental Consulting	Project: CARB	
720 West Arapaho Road	Project Number: CARB #1344	**Reported:**
Richardson TX, 75080	Project Manager: David Ranum	04-Feb-15 16:10

CAN003

1500318-03 (Air)

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes

Oilfield Environmental and Compliance

Volatile Organic Compounds by EPA Method TO-15

Acetone	**570**	43	ppbv	21.5	B5A0713	27-Jan-15	27-Jan-15	TO-15 mod.	
Benzene	**78**	11	"	"	"	"	"	"	
Benzyl chloride	ND	11	"	"	"	"	"	"	
Bromodichloromethane	ND	11	"	"	"	"	"	"	
Bromoform	ND	11	"	"	"	"	"	"	
Bromomethane	ND	11	"	"	"	"	"	"	
1,3-Butadiene	ND	11	"	"	"	"	"	"	
Carbon disulfide	ND	11	"	"	"	"	"	"	
Carbon tetrachloride	ND	11	"	"	"	"	"	"	
Chlorobenzene	ND	11	"	"	"	"	"	"	
Chloroethane	ND	11	"	"	"	"	"	"	
Chloroform	ND	11	"	"	"	"	"	"	
Chloromethane	ND	11	"	"	"	"	"	"	
Cyclohexane	**1600**	54	"	107.5	B5A0773	28-Jan-15	28-Jan-15	"	
Dibromochloromethane	ND	11	"	21.5	B5A0713	27-Jan-15	27-Jan-15	"	
1,2-Dibromoethane (EDB)	ND	11	"	"	"	"	"	"	
1,2-Dichlorobenzene	ND	11	"	"	"	"	"	"	
1,3-Dichlorobenzene	ND	11	"	"	"	"	"	"	
1,4-Dichlorobenzene	ND	11	"	"	"	"	"	"	
Dichlorodifluoromethane	ND	11	"	"	"	"	"	"	
1,1-Dichloroethane	ND	11	"	"	"	"	"	"	
1,2-Dichloroethane	ND	11	"	"	"	"	"	"	
1,1-Dichloroethene	ND	11	"	"	"	"	"	"	
cis-1,2-Dichloroethene	ND	11	"	"	"	"	"	"	
trans-1,2-Dichloroethene	ND	11	"	"	"	"	"	"	
1,2-Dichloropropane	ND	11	"	"	"	"	"	"	
cis-1,3-Dichloropropene	ND	11	"	"	"	"	"	"	
trans-1,3-Dichloropropene	ND	11	"	"	"	"	"	"	
1,2-Dichloro-1,1,2,2-tetrafluoroethane	ND	11	"	"	"	"	"	"	
Diisopropyl Ether	ND	11	"	"	"	"	"	"	
1,4-Dioxane	ND	11	"	"	"	"	"	"	
Ethanol	ND	43	"	"	"	"	"	"	
Ethyl Acetate	ND	11	"	"	"	"	"	"	
Ethylbenzene	**78**	11	"	"	"	"	"	"	
Ethyl t-Butyl Ether	ND	11	"	"	"	"	"	"	
4-Ethyltoluene	**210**	11	"	"	"	"	"	"	

Oilfield Environmental and Compliance, INC.

Sage Environmental Consulting	Project: CARB	
720 West Arapaho Road	Project Number: CARB #1344	**Reported:**
Richardson TX, 75080	Project Manager: David Ranum	04-Feb-15 16:10

CAN003

1500318-03 (Air)

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes

Oilfield Environmental and Compliance

Volatile Organic Compounds by EPA Method TO-15

Heptane	**460**	11	ppbv	21.5	B5A0713	27-Jan-15	27-Jan-15	TO-15 mod.	
Hexachlorobutadiene	ND	11	"	"	"	"	"	"	
Hexane	**2600**	54	"	107.5	B5A0773	28-Jan-15	28-Jan-15	"	
2-Hexanone	ND	11	"	21.5	B5A0713	27-Jan-15	27-Jan-15	"	
Isopropyl alcohol	**130**	11	"	"	"	"	"	"	
Methylene chloride	ND	11	"	"	"	"	"	"	
Methyl Ethyl Ketone	ND	11	"	"	"	"	"	"	
Methyl Isobutyl Ketone	ND	11	"	"	"	"	"	"	
Methyl-t-butyl ether	ND	11	"	"	"	"	"	"	
Naphthalene	ND	22	"	"	"	"	"	"	
Propylene	ND	11	"	"	"	"	"	"	
Styrene	ND	11	"	"	"	"	"	"	
t-Amyl Methyl Ether	ND	11	"	"	"	"	"	"	
t-Butyl alcohol	ND	11	"	"	"	"	"	"	
1,1,2,2-Tetrachloroethane	ND	11	"	"	"	"	"	"	
Tetrachloroethene (PCE)	ND	11	"	"	"	"	"	"	
Tetrahydrofuran	ND	11	"	"	"	"	"	"	
Toluene	**80**	11	"	"	"	"	"	"	
1,2,4-Trichlorobenzene	ND	11	"	"	"	"	"	"	
1,1,1-Trichloroethane	ND	11	"	"	"	"	"	"	
1,1,2-Trichloroethane	ND	11	"	"	"	"	"	"	
Trichloroethene (TCE)	ND	11	"	"	"	"	"	"	
Trichlorofluoromethane	ND	11	"	"	"	"	"	"	
1,1,2-Trichlorotrifluoroethane	ND	11	"	"	"	"	"	"	
1,2,4-Trimethylbenzene	**390**	11	"	"	"	"	"	"	
1,3,5-Trimethylbenzene	**160**	11	"	"	"	"	"	"	
Vinyl acetate	ND	11	"	"	"	"	"	"	
Vinyl chloride	ND	11	"	"	"	"	"	"	
Xylenes (total)	**290**	11	"	"	"	"	"	"	
TPH Gasoline (C4-C12)	**90000**	22000	"	107.5	B5A0773	28-Jan-15	28-Jan-15	"	

Oilfield Environmental and Compliance, INC.

Sage Environmental Consulting	Project: CARB	
720 West Arapaho Road	Project Number: CARB #1344	**Reported:**
Richardson TX, 75080	Project Manager: David Ranum	04-Feb-15 16:10

CAN004

1500318-04 (Air)

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes

Oilfield Environmental and Compliance

Volatile Organic Compounds by EPA Method TO-15

Acetone	ND	34	ppbv	17	B5A0773	28-Jan-15	28-Jan-15	TO-15 mod.	
Benzene	ND	8.5	"	"	"	"	"	"	
Benzyl chloride	ND	8.5	"	"	"	"	"	"	
Bromodichloromethane	ND	8.5	"	"	"	"	"	"	
Bromoform	ND	8.5	"	"	"	"	"	"	
Bromomethane	ND	8.5	"	"	"	"	"	"	
1,3-Butadiene	ND	8.5	"	"	"	"	"	"	
Carbon disulfide	ND	8.5	"	"	"	"	"	"	
Carbon tetrachloride	ND	8.5	"	"	"	"	"	"	
Chlorobenzene	ND	8.5	"	"	"	"	"	"	
Chloroethane	ND	8.5	"	"	"	"	"	"	
Chloroform	ND	8.5	"	"	"	"	"	"	
Chloromethane	ND	8.5	"	"	"	"	"	"	
Cyclohexane	**33**	8.5	"	"	"	"	"	"	
Dibromochloromethane	ND	8.5	"	"	"	"	"	"	
1,2-Dibromoethane (EDB)	ND	8.5	"	"	"	"	"	"	
1,2-Dichlorobenzene	ND	8.5	"	"	"	"	"	"	
1,3-Dichlorobenzene	ND	8.5	"	"	"	"	"	"	
1,4-Dichlorobenzene	ND	8.5	"	"	"	"	"	"	
Dichlorodifluoromethane	ND	8.5	"	"	"	"	"	"	
1,1-Dichloroethane	ND	8.5	"	"	"	"	"	"	
1,2-Dichloroethane	ND	8.5	"	"	"	"	"	"	
1,1-Dichloroethene	ND	8.5	"	"	"	"	"	"	
cis-1,2-Dichloroethene	ND	8.5	"	"	"	"	"	"	
trans-1,2-Dichloroethene	ND	8.5	"	"	"	"	"	"	
1,2-Dichloropropane	ND	8.5	"	"	"	"	"	"	
cis-1,3-Dichloropropene	ND	8.5	"	"	"	"	"	"	
trans-1,3-Dichloropropene	ND	8.5	"	"	"	"	"	"	
1,2-Dichloro-1,1,2,2-tetrafluoroethane	ND	8.5	"	"	"	"	"	"	
Diisopropyl Ether	ND	8.5	"	"	"	"	"	"	
1,4-Dioxane	ND	8.5	"	"	"	"	"	"	
Ethanol	ND	34	"	"	"	"	"	"	
Ethyl Acetate	ND	8.5	"	"	"	"	"	"	
Ethylbenzene	**16**	8.5	"	"	"	"	"	"	
Ethyl t-Butyl Ether	ND	8.5	"	"	"	"	"	"	
4-Ethyltoluene	**31**	8.5	"	"	"	"	"	"	

Oilfield Environmental and Compliance, INC.

Sage Environmental Consulting	Project: CARB	
720 West Arapaho Road	Project Number: CARB #1344	**Reported:**
Richardson TX, 75080	Project Manager: David Ranum	04-Feb-15 16:10

CAN004

1500318-04 (Air)

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes

Oilfield Environmental and Compliance

Volatile Organic Compounds by EPA Method TO-15

Heptane	**32**	8.5	ppbv	17	B5A0773	28-Jan-15	28-Jan-15	TO-15 mod.	
Hexachlorobutadiene	ND	8.5	"	"	"	"	"	"	
Hexane	**35**	8.5	"	"	"	"	"	"	
2-Hexanone	ND	8.5	"	"	"	"	"	"	
Isopropyl alcohol	ND	8.5	"	"	"	"	"	"	
Methylene chloride	ND	8.5	"	"	"	"	"	"	
Methyl Ethyl Ketone	ND	8.5	"	"	"	"	"	"	
Methyl Isobutyl Ketone	ND	8.5	"	"	"	"	"	"	
Methyl-t-butyl ether	ND	8.5	"	"	"	"	"	"	
Naphthalene	ND	17	"	"	"	"	"	"	
Propylene	ND	8.5	"	"	"	"	"	"	
Styrene	ND	8.5	"	"	"	"	"	"	
t-Amyl Methyl Ether	ND	8.5	"	"	"	"	"	"	
t-Butyl alcohol	ND	8.5	"	"	"	"	"	"	
1,1,2,2-Tetrachloroethane	ND	8.5	"	"	"	"	"	"	
Tetrachloroethene (PCE)	ND	8.5	"	"	"	"	"	"	
Tetrahydrofuran	ND	8.5	"	"	"	"	"	"	
Toluene	**30**	8.5	"	"	"	"	"	"	
1,2,4-Trichlorobenzene	ND	8.5	"	"	"	"	"	"	
1,1,1-Trichloroethane	ND	8.5	"	"	"	"	"	"	
1,1,2-Trichloroethane	ND	8.5	"	"	"	"	"	"	
Trichloroethene (TCE)	ND	8.5	"	"	"	"	"	"	
Trichlorofluoromethane	ND	8.5	"	"	"	"	"	"	
1,1,2-Trichlorotrifluoroethane	ND	8.5	"	"	"	"	"	"	
1,2,4-Trimethylbenzene	**44**	8.5	"	"	"	"	"	"	
1,3,5-Trimethylbenzene	**10**	8.5	"	"	"	"	"	"	
Vinyl acetate	ND	8.5	"	"	"	"	"	"	
Vinyl chloride	ND	8.5	"	"	"	"	"	"	
Xylenes (total)	**68**	8.5	"	"	"	"	"	"	
TPH Gasoline (C4-C12)	**4800**	3400	"	"	"	"	"	"	

Oilfield Environmental and Compliance, INC.

Sage Environmental Consulting	Project: CARB	
720 West Arapaho Road	Project Number: CARB #1344	**Reported:**
Richardson TX, 75080	Project Manager: David Ranum	04-Feb-15 16:10

CAN005

1500318-05 (Air)

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes

Oilfield Environmental and Compliance

Volatile Organic Compounds by EPA Method TO-15

Acetone	ND	160	ppbv	77.5	B5A0713	27-Jan-15	27-Jan-15	TO-15 mod.	
Benzene	**2200**	39	"	"	"	"	"	"	
Benzyl chloride	ND	39	"	"	"	"	"	"	
Bromodichloromethane	ND	39	"	"	"	"	"	"	
Bromoform	ND	39	"	"	"	"	"	"	
Bromomethane	ND	39	"	"	"	"	"	"	
1,3-Butadiene	ND	39	"	"	"	"	"	"	
Carbon disulfide	ND	39	"	"	"	"	"	"	
Carbon tetrachloride	ND	39	"	"	"	"	"	"	
Chlorobenzene	ND	39	"	"	"	"	"	"	
Chloroethane	ND	39	"	"	"	"	"	"	
Chloroform	ND	39	"	"	"	"	"	"	
Chloromethane	ND	39	"	"	"	"	"	"	
Cyclohexane	**4400**	390	"	775	B5A0773	28-Jan-15	28-Jan-15	"	
Dibromochloromethane	ND	39	"	77.5	B5A0713	27-Jan-15	27-Jan-15	"	
1,2-Dibromoethane (EDB)	ND	39	"	"	"	"	"	"	
1,2-Dichlorobenzene	ND	39	"	"	"	"	"	"	
1,3-Dichlorobenzene	ND	39	"	"	"	"	"	"	
1,4-Dichlorobenzene	ND	39	"	"	"	"	"	"	
Dichlorodifluoromethane	ND	39	"	"	"	"	"	"	
1,1-Dichloroethane	ND	39	"	"	"	"	"	"	
1,2-Dichloroethane	ND	39	"	"	"	"	"	"	
1,1-Dichloroethene	ND	39	"	"	"	"	"	"	
cis-1,2-Dichloroethene	ND	39	"	"	"	"	"	"	
trans-1,2-Dichloroethene	ND	39	"	"	"	"	"	"	
1,2-Dichloropropane	ND	39	"	"	"	"	"	"	
cis-1,3-Dichloropropene	ND	39	"	"	"	"	"	"	
trans-1,3-Dichloropropene	ND	39	"	"	"	"	"	"	
1,2-Dichloro-1,1,2,2-tetrafluoroethane	ND	39	"	"	"	"	"	"	
Diisopropyl Ether	ND	39	"	"	"	"	"	"	
1,4-Dioxane	ND	39	"	"	"	"	"	"	
Ethanol	**210**	160	"	"	"	"	"	"	
Ethyl Acetate	ND	39	"	"	"	"	"	"	
Ethylbenzene	**78**	39	"	"	"	"	"	"	
Ethyl t-Butyl Ether	ND	39	"	"	"	"	"	"	
4-Ethyltoluene	**40**	39	"	"	"	"	"	"	

Oilfield Environmental and Compliance, INC.

Sage Environmental Consulting	Project: CARB	
720 West Arapaho Road	Project Number: CARB #1344	**Reported:**
Richardson TX, 75080	Project Manager: David Ranum	04-Feb-15 16:10

CAN005

1500318-05 (Air)

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes

Oilfield Environmental and Compliance

Volatile Organic Compounds by EPA Method TO-15

Heptane	**1900**	390	ppbv	775	B5A0773	28-Jan-15	28-Jan-15	TO-15 mod.	
Hexachlorobutadiene	ND	39	"	77.5	B5A0713	27-Jan-15	27-Jan-15	"	
Hexane	**10000**	390	"	775	B5A0773	28-Jan-15	28-Jan-15	"	
2-Hexanone	ND	39	"	77.5	B5A0713	27-Jan-15	27-Jan-15	"	
Isopropyl alcohol	**680**	39	"	"	"	"	"	"	
Methylene chloride	ND	39	"	"	"	"	"	"	
Methyl Ethyl Ketone	ND	39	"	"	"	"	"	"	
Methyl Isobutyl Ketone	**120**	39	"	"	"	"	"	"	
Methyl-t-butyl ether	ND	39	"	"	"	"	"	"	
Naphthalene	ND	78	"	"	"	"	"	"	
Propylene	ND	39	"	"	"	"	"	"	
Styrene	ND	39	"	"	"	"	"	"	
t-Amyl Methyl Ether	ND	39	"	"	"	"	"	"	
t-Butyl alcohol	ND	39	"	"	"	"	"	"	
1,1,2,2-Tetrachloroethane	ND	39	"	"	"	"	"	"	
Tetrachloroethene (PCE)	ND	39	"	"	"	"	"	"	
Tetrahydrofuran	ND	39	"	"	"	"	"	"	
Toluene	**1500**	39	"	"	"	"	"	"	
1,2,4-Trichlorobenzene	ND	39	"	"	"	"	"	"	
1,1,1-Trichloroethane	ND	39	"	"	"	"	"	"	
1,1,2-Trichloroethane	ND	39	"	"	"	"	"	"	
Trichloroethene (TCE)	ND	39	"	"	"	"	"	"	
Trichlorofluoromethane	ND	39	"	"	"	"	"	"	
1,1,2-Trichlorotrifluoroethane	ND	39	"	"	"	"	"	"	
1,2,4-Trimethylbenzene	**46**	39	"	"	"	"	"	"	
1,3,5-Trimethylbenzene	ND	39	"	"	"	"	"	"	
Vinyl acetate	ND	39	"	"	"	"	"	"	
Vinyl chloride	ND	39	"	"	"	"	"	"	
Xylenes (total)	**240**	39	"	"	"	"	"	"	
TPH Gasoline (C4-C12)	**330000**	160000	"	775	B5A0773	28-Jan-15	28-Jan-15	"	

Oilfield Environmental and Compliance, INC.

Sage Environmental Consulting	Project: CARB	
720 West Arapaho Road	Project Number: CARB #1344	**Reported:**
Richardson TX, 75080	Project Manager: David Ranum	04-Feb-15 16:10

CAN006

1500318-06 (Air)

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes

Oilfield Environmental and Compliance

Volatile Organic Compounds by EPA Method TO-15

Acetone	ND	130	ppbv	66	B5A0713	27-Jan-15	27-Jan-15	TO-15 mod.	
Benzene	**75**	33	"	"	"	"	"	"	
Benzyl chloride	ND	33	"	"	"	"	"	"	
Bromodichloromethane	ND	33	"	"	"	"	"	"	
Bromoform	ND	33	"	"	"	"	"	"	
Bromomethane	ND	33	"	"	"	"	"	"	
1,3-Butadiene	ND	33	"	"	"	"	"	"	
Carbon disulfide	ND	33	"	"	"	"	"	"	
Carbon tetrachloride	ND	33	"	"	"	"	"	"	
Chlorobenzene	ND	33	"	"	"	"	"	"	
Chloroethane	ND	33	"	"	"	"	"	"	
Chloroform	ND	33	"	"	"	"	"	"	
Chloromethane	ND	33	"	"	"	"	"	"	
Cyclohexane	**630**	33	"	"	"	"	"	"	
Dibromochloromethane	ND	33	"	"	"	"	"	"	
1,2-Dibromoethane (EDB)	ND	33	"	"	"	"	"	"	
1,2-Dichlorobenzene	ND	33	"	"	"	"	"	"	
1,3-Dichlorobenzene	ND	33	"	"	"	"	"	"	
1,4-Dichlorobenzene	ND	33	"	"	"	"	"	"	
Dichlorodifluoromethane	ND	33	"	"	"	"	"	"	
1,1-Dichloroethane	ND	33	"	"	"	"	"	"	
1,2-Dichloroethane	ND	33	"	"	"	"	"	"	
1,1-Dichloroethene	ND	33	"	"	"	"	"	"	
cis-1,2-Dichloroethene	ND	33	"	"	"	"	"	"	
trans-1,2-Dichloroethene	ND	33	"	"	"	"	"	"	
1,2-Dichloropropane	ND	33	"	"	"	"	"	"	
cis-1,3-Dichloropropene	ND	33	"	"	"	"	"	"	
trans-1,3-Dichloropropene	ND	33	"	"	"	"	"	"	
1,2-Dichloro-1,1,2,2-tetrafluoroethane	ND	33	"	"	"	"	"	"	
Diisopropyl Ether	ND	33	"	"	"	"	"	"	
1,4-Dioxane	ND	33	"	"	"	"	"	"	
Ethanol	ND	130	"	"	"	"	"	"	
Ethyl Acetate	ND	33	"	"	"	"	"	"	
Ethylbenzene	**240**	33	"	"	"	"	"	"	
Ethyl t-Butyl Ether	ND	33	"	"	"	"	"	"	
4-Ethyltoluene	**140**	33	"	"	"	"	"	"	

Oilfield Environmental and Compliance, INC.

Sage Environmental Consulting	Project: CARB	
720 West Arapaho Road	Project Number: CARB #1344	**Reported:**
Richardson TX, 75080	Project Manager: David Ranum	04-Feb-15 16:10

CAN006

1500318-06 (Air)

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes

Oilfield Environmental and Compliance

Volatile Organic Compounds by EPA Method TO-15

Heptane	**340**	33	ppbv	66	B5A0713	27-Jan-15	27-Jan-15	TO-15 mod.	
Hexachlorobutadiene	ND	33	"	"	"	"	"	"	
Hexane	**630**	33	"	"	"	"	"	"	
2-Hexanone	ND	33	"	"	"	"	"	"	
Isopropyl alcohol	ND	33	"	"	"	"	"	"	
Methylene chloride	ND	33	"	"	"	"	"	"	
Methyl Ethyl Ketone	ND	33	"	"	"	"	"	"	
Methyl Isobutyl Ketone	ND	33	"	"	"	"	"	"	
Methyl-t-butyl ether	ND	33	"	"	"	"	"	"	
Naphthalene	ND	66	"	"	"	"	"	"	
Propylene	ND	33	"	"	"	"	"	"	
Styrene	ND	33	"	"	"	"	"	"	
t-Amyl Methyl Ether	ND	33	"	"	"	"	"	"	
t-Butyl alcohol	ND	33	"	"	"	"	"	"	
1,1,2,2-Tetrachloroethane	ND	33	"	"	"	"	"	"	
Tetrachloroethene (PCE)	ND	33	"	"	"	"	"	"	
Tetrahydrofuran	ND	33	"	"	"	"	"	"	
Toluene	**400**	33	"	"	"	"	"	"	
1,2,4-Trichlorobenzene	ND	33	"	"	"	"	"	"	
1,1,1-Trichloroethane	ND	33	"	"	"	"	"	"	
1,1,2-Trichloroethane	ND	33	"	"	"	"	"	"	
Trichloroethene (TCE)	ND	33	"	"	"	"	"	"	
Trichlorofluoromethane	ND	33	"	"	"	"	"	"	
1,1,2-Trichlorotrifluoroethane	ND	33	"	"	"	"	"	"	
1,2,4-Trimethylbenzene	**180**	33	"	"	"	"	"	"	
1,3,5-Trimethylbenzene	**38**	33	"	"	"	"	"	"	
Vinyl acetate	ND	33	"	"	"	"	"	"	
Vinyl chloride	ND	33	"	"	"	"	"	"	
Xylenes (total)	**630**	33	"	"	"	"	"	"	
TPH Gasoline (C4-C12)	**67000**	13000	"	"	"	"	"	"	

Oilfield Environmental and Compliance, INC.

Sage Environmental Consulting	Project: CARB	
720 West Arapaho Road	Project Number: CARB #1344	**Reported:**
Richardson TX, 75080	Project Manager: David Ranum	04-Feb-15 16:10

CAN007

1500318-07 (Air)

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes

Oilfield Environmental and Compliance

Volatile Organic Compounds by EPA Method TO-15

Acetone	ND	44	ppbv	21.83	B5A0773	28-Jan-15	29-Jan-15	TO-15 mod.	
Benzene	ND	11	"	"	"	"	"	"	
Benzyl chloride	ND	11	"	"	"	"	"	"	
Bromodichloromethane	ND	11	"	"	"	"	"	"	
Bromoform	ND	11	"	"	"	"	"	"	
Bromomethane	ND	11	"	"	"	"	"	"	
1,3-Butadiene	ND	11	"	"	"	"	"	"	
Carbon disulfide	ND	11	"	"	"	"	"	"	
Carbon tetrachloride	ND	11	"	"	"	"	"	"	
Chlorobenzene	ND	11	"	"	"	"	"	"	
Chloroethane	ND	11	"	"	"	"	"	"	
Chloroform	ND	11	"	"	"	"	"	"	
Chloromethane	ND	11	"	"	"	"	"	"	
Cyclohexane	ND	11	"	"	"	"	"	"	
Dibromochloromethane	ND	11	"	"	"	"	"	"	
1,2-Dibromoethane (EDB)	ND	11	"	"	"	"	"	"	
1,2-Dichlorobenzene	ND	11	"	"	"	"	"	"	
1,3-Dichlorobenzene	ND	11	"	"	"	"	"	"	
1,4-Dichlorobenzene	ND	11	"	"	"	"	"	"	
Dichlorodifluoromethane	ND	11	"	"	"	"	"	"	
1,1-Dichloroethane	ND	11	"	"	"	"	"	"	
1,2-Dichloroethane	ND	11	"	"	"	"	"	"	
1,1-Dichloroethene	ND	11	"	"	"	"	"	"	
cis-1,2-Dichloroethene	ND	11	"	"	"	"	"	"	
trans-1,2-Dichloroethene	ND	11	"	"	"	"	"	"	
1,2-Dichloropropane	ND	11	"	"	"	"	"	"	
cis-1,3-Dichloropropene	ND	11	"	"	"	"	"	"	
trans-1,3-Dichloropropene	ND	11	"	"	"	"	"	"	
1,2-Dichloro-1,1,2,2-tetrafluoroethane	ND	11	"	"	"	"	"	"	
Diisopropyl Ether	ND	11	"	"	"	"	"	"	
1,4-Dioxane	ND	11	"	"	"	"	"	"	
Ethanol	ND	44	"	"	"	"	"	"	
Ethyl Acetate	ND	11	"	"	"	"	"	"	
Ethylbenzene	ND	11	"	"	"	"	"	"	
Ethyl t-Butyl Ether	ND	11	"	"	"	"	"	"	
4-Ethyltoluene	**30**	11	"	"	"	"	"	"	

Oilfield Environmental and Compliance, INC.

Sage Environmental Consulting	Project: CARB	
720 West Arapaho Road	Project Number: CARB #1344	**Reported:**
Richardson TX, 75080	Project Manager: David Ranum	04-Feb-15 16:10

CAN007

1500318-07 (Air)

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes

Oilfield Environmental and Compliance

Volatile Organic Compounds by EPA Method TO-15

Heptane	ND	11	ppbv	21.83	B5A0773	28-Jan-15	29-Jan-15	TO-15 mod.
Hexachlorobutadiene	ND	11	"	"	"	"	"	"
Hexane	ND	11	"	"	"	"	"	"
2-Hexanone	ND	11	"	"	"	"	"	"
Isopropyl alcohol	**24**	11	"	"	"	"	"	"
Methylene chloride	ND	11	"	"	"	"	"	"
Methyl Ethyl Ketone	ND	11	"	"	"	"	"	"
Methyl Isobutyl Ketone	ND	11	"	"	"	"	"	"
Methyl-t-butyl ether	ND	11	"	"	"	"	"	"
Naphthalene	ND	22	"	"	"	"	"	"
Propylene	ND	11	"	"	"	"	"	"
Styrene	ND	11	"	"	"	"	"	"
t-Amyl Methyl Ether	ND	11	"	"	"	"	"	"
t-Butyl alcohol	ND	11	"	"	"	"	"	"
1,1,2,2-Tetrachloroethane	ND	11	"	"	"	"	"	"
Tetrachloroethene (PCE)	ND	11	"	"	"	"	"	"
Tetrahydrofuran	ND	11	"	"	"	"	"	"
Toluene	**12**	11	"	"	"	"	"	"
1,2,4-Trichlorobenzene	ND	11	"	"	"	"	"	"
1,1,1-Trichloroethane	ND	11	"	"	"	"	"	"
1,1,2-Trichloroethane	ND	11	"	"	"	"	"	"
Trichloroethene (TCE)	ND	11	"	"	"	"	"	"
Trichlorofluoromethane	ND	11	"	"	"	"	"	"
1,1,2-Trichlorotrifluoroethane	ND	11	"	"	"	"	"	"
1,2,4-Trimethylbenzene	**65**	11	"	"	"	"	"	"
1,3,5-Trimethylbenzene	**12**	11	"	"	"	"	"	"
Vinyl acetate	ND	11	"	"	"	"	"	"
Vinyl chloride	ND	11	"	"	"	"	"	"
Xylenes (total)	**36**	11	"	"	"	"	"	"
TPH Gasoline (C4-C12)	ND	4400	"	"	"	"	"	"

Oilfield Environmental and Compliance, INC.

Sage Environmental Consulting	Project: CARB	
720 West Arapaho Road	Project Number: CARB #1344	**Reported:**
Richardson TX, 75080	Project Manager: David Ranum	04-Feb-15 16:10

CAN008

1500318-08 (Air)

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes

Oilfield Environmental and Compliance

Volatile Organic Compounds by EPA Method TO-15 **R-05**

Acetone	ND	320	ppbv	161.3	B5B0018	02-Feb-15	03-Feb-15	TO-15 mod.	
Benzene	ND	81	"	"	"	"	"	"	
Benzyl chloride	ND	81	"	"	"	"	"	"	
Bromodichloromethane	ND	81	"	"	"	"	"	"	
Bromoform	ND	81	"	"	"	"	"	"	
Bromomethane	ND	81	"	"	"	"	"	"	
1,3-Butadiene	ND	81	"	"	"	"	"	"	
Carbon disulfide	ND	81	"	"	"	"	"	"	
Carbon tetrachloride	ND	81	"	"	"	"	"	"	
Chlorobenzene	ND	81	"	"	"	"	"	"	
Chloroethane	ND	81	"	"	"	"	"	"	
Chloroform	ND	81	"	"	"	"	"	"	
Chloromethane	ND	81	"	"	"	"	"	"	
Cyclohexane	ND	81	"	"	"	"	"	"	
Dibromochloromethane	ND	81	"	"	"	"	"	"	
1,2-Dibromoethane (EDB)	ND	81	"	"	"	"	"	"	
1,2-Dichlorobenzene	ND	81	"	"	"	"	"	"	
1,3-Dichlorobenzene	ND	81	"	"	"	"	"	"	
1,4-Dichlorobenzene	ND	81	"	"	"	"	"	"	
Dichlorodifluoromethane	ND	81	"	"	"	"	"	"	
1,1-Dichloroethane	ND	81	"	"	"	"	"	"	
1,2-Dichloroethane	ND	81	"	"	"	"	"	"	
1,1-Dichloroethene	ND	81	"	"	"	"	"	"	
cis-1,2-Dichloroethene	ND	81	"	"	"	"	"	"	
trans-1,2-Dichloroethene	ND	81	"	"	"	"	"	"	
1,2-Dichloropropane	ND	81	"	"	"	"	"	"	
cis-1,3-Dichloropropene	ND	81	"	"	"	"	"	"	
trans-1,3-Dichloropropene	ND	81	"	"	"	"	"	"	
1,2-Dichloro-1,1,2,2-tetrafluoroethane	ND	81	"	"	"	"	"	"	
Diisopropyl Ether	ND	81	"	"	"	"	"	"	
1,4-Dioxane	ND	81	"	"	"	"	"	"	
Ethanol	**390**	320	"	"	"	"	"	"	
Ethyl Acetate	ND	81	"	"	"	"	"	"	
Ethylbenzene	ND	81	"	"	"	"	"	"	
Ethyl t-Butyl Ether	ND	81	"	"	"	"	"	"	
4-Ethyltoluene	ND	81	"	"	"	"	"	"	

Oilfield Environmental and Compliance, INC.

Sage Environmental Consulting	Project: CARB	
720 West Arapaho Road	Project Number: CARB #1344	**Reported:**
Richardson TX, 75080	Project Manager: David Ranum	04-Feb-15 16:10

CAN008

1500318-08 (Air)

Oilfield Environmental and Compliance

Volatile Organic Compounds by EPA Method TO-15 **R-05**

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
Heptane	ND	81	ppbv	161.3	B5B0018	02-Feb-15	03-Feb-15	TO-15 mod.	
Hexachlorobutadiene	ND	81	"	"	"	"	"	"	
Hexane	ND	81	"	"	"	"	"	"	
2-Hexanone	ND	81	"	"	"	"	"	"	
Isopropyl alcohol	ND	81	"	"	"	"	"	"	
Methylene chloride	ND	81	"	"	"	"	"	"	
Methyl Ethyl Ketone	ND	81	"	"	"	"	"	"	
Methyl Isobutyl Ketone	ND	81	"	"	"	"	"	"	
Methyl-t-butyl ether	ND	81	"	"	"	"	"	"	
Naphthalene	ND	160	"	"	"	"	"	"	
Propylene	ND	81	"	"	"	"	"	"	
Styrene	ND	81	"	"	"	"	"	"	
t-Amyl Methyl Ether	ND	81	"	"	"	"	"	"	
t-Butyl alcohol	ND	81	"	"	"	"	"	"	
1,1,2,2-Tetrachloroethane	ND	81	"	"	"	"	"	"	
Tetrachloroethene (PCE)	ND	81	"	"	"	"	"	"	
Tetrahydrofuran	ND	81	"	"	"	"	"	"	
Toluene	**84**	81	"	"	"	"	"	"	
1,2,4-Trichlorobenzene	ND	81	"	"	"	"	"	"	
1,1,1-Trichloroethane	ND	81	"	"	"	"	"	"	
1,1,2-Trichloroethane	ND	81	"	"	"	"	"	"	
Trichloroethene (TCE)	ND	81	"	"	"	"	"	"	
Trichlorofluoromethane	ND	81	"	"	"	"	"	"	
1,1,2-Trichlorotrifluoroethane	ND	81	"	"	"	"	"	"	
1,2,4-Trimethylbenzene	ND	81	"	"	"	"	"	"	
1,3,5-Trimethylbenzene	ND	81	"	"	"	"	"	"	
Vinyl acetate	ND	81	"	"	"	"	"	"	
Vinyl chloride	ND	81	"	"	"	"	"	"	
Xylenes (total)	ND	81	"	"	"	"	"	"	
TPH Gasoline (C4-C12)	ND	32000	"	"	"	"	"	"	

Oilfield Environmental and Compliance, INC.

Sage Environmental Consulting	Project: CARB	
720 West Arapaho Road	Project Number: CARB #1344	**Reported:**
Richardson TX, 75080	Project Manager: David Ranum	04-Feb-15 16:10

CAN009

1500318-09 (Air)

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes

Oilfield Environmental and Compliance

Volatile Organic Compounds by EPA Method TO-15

Acetone	ND	130	ppbv	65.5	B5A0773	28-Jan-15	28-Jan-15	TO-15 mod.	
Benzene	**56**	33	"	"	"	"	"	"	
Benzyl chloride	ND	33	"	"	"	"	"	"	
Bromodichloromethane	ND	33	"	"	"	"	"	"	
Bromoform	ND	33	"	"	"	"	"	"	
Bromomethane	ND	33	"	"	"	"	"	"	
1,3-Butadiene	ND	33	"	"	"	"	"	"	
Carbon disulfide	ND	33	"	"	"	"	"	"	
Carbon tetrachloride	ND	33	"	"	"	"	"	"	
Chlorobenzene	**750**	33	"	"	"	"	"	"	
Chloroethane	ND	33	"	"	"	"	"	"	
Chloroform	ND	33	"	"	"	"	"	"	
Chloromethane	ND	33	"	"	"	"	"	"	
Cyclohexane	**5000**	160	"	327.5	"	"	29-Jan-15	"	
Dibromochloromethane	ND	33	"	65.5	"	"	28-Jan-15	"	
1,2-Dibromoethane (EDB)	ND	33	"	"	"	"	"	"	
1,2-Dichlorobenzene	ND	33	"	"	"	"	"	"	
1,3-Dichlorobenzene	ND	33	"	"	"	"	"	"	
1,4-Dichlorobenzene	ND	33	"	"	"	"	"	"	
Dichlorodifluoromethane	ND	33	"	"	"	"	"	"	
1,1-Dichloroethane	ND	33	"	"	"	"	"	"	
1,2-Dichloroethane	ND	33	"	"	"	"	"	"	
1,1-Dichloroethene	ND	33	"	"	"	"	"	"	
cis-1,2-Dichloroethene	ND	33	"	"	"	"	"	"	
trans-1,2-Dichloroethene	ND	33	"	"	"	"	"	"	
1,2-Dichloropropane	ND	33	"	"	"	"	"	"	
cis-1,3-Dichloropropene	ND	33	"	"	"	"	"	"	
trans-1,3-Dichloropropene	ND	33	"	"	"	"	"	"	
1,2-Dichloro-1,1,2,2-tetrafluoroethane	ND	33	"	"	"	"	"	"	
Diisopropyl Ether	ND	33	"	"	"	"	"	"	
1,4-Dioxane	ND	33	"	"	"	"	"	"	
Ethanol	ND	130	"	"	"	"	"	"	
Ethyl Acetate	ND	33	"	"	"	"	"	"	
Ethylbenzene	**310**	33	"	"	"	"	"	"	
Ethyl t-Butyl Ether	ND	33	"	"	"	"	"	"	
4-Ethyltoluene	**240**	33	"	"	"	"	"	"	

Oilfield Environmental and Compliance, INC.

Sage Environmental Consulting	Project: CARB	
720 West Arapaho Road	Project Number: CARB #1344	**Reported:**
Richardson TX, 75080	Project Manager: David Ranum	04-Feb-15 16:10

CAN009

1500318-09 (Air)

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes

Oilfield Environmental and Compliance

Volatile Organic Compounds by EPA Method TO-15

Heptane	**1400**	33	ppbv	65.5	B5A0773	28-Jan-15	28-Jan-15	TO-15 mod.	
Hexachlorobutadiene	ND	33	"	"	"	"	"	"	
Hexane	**1700**	160	"	327.5	"	"	29-Jan-15	"	
2-Hexanone	**2300**	33	"	65.5	"	"	28-Jan-15	"	
Isopropyl alcohol	ND	33	"	"	"	"	"	"	
Methylene chloride	ND	33	"	"	"	"	"	"	
Methyl Ethyl Ketone	ND	33	"	"	"	"	"	"	
Methyl Isobutyl Ketone	ND	33	"	"	"	"	"	"	
Methyl-t-butyl ether	ND	33	"	"	"	"	"	"	
Naphthalene	ND	66	"	"	"	"	"	"	
Propylene	ND	33	"	"	"	"	"	"	
Styrene	ND	33	"	"	"	"	"	"	
t-Amyl Methyl Ether	ND	33	"	"	"	"	"	"	
t-Butyl alcohol	ND	33	"	"	"	"	"	"	
1,1,2,2-Tetrachloroethane	ND	33	"	"	"	"	"	"	
Tetrachloroethene (PCE)	ND	33	"	"	"	"	"	"	
Tetrahydrofuran	ND	33	"	"	"	"	"	"	
Toluene	**280**	33	"	"	"	"	"	"	
1,2,4-Trichlorobenzene	ND	33	"	"	"	"	"	"	
1,1,1-Trichloroethane	ND	33	"	"	"	"	"	"	
1,1,2-Trichloroethane	ND	33	"	"	"	"	"	"	
Trichloroethene (TCE)	ND	33	"	"	"	"	"	"	
Trichlorofluoromethane	ND	33	"	"	"	"	"	"	
1,1,2-Trichlorotrifluoroethane	ND	33	"	"	"	"	"	"	
1,2,4-Trimethylbenzene	ND	33	"	"	"	"	"	"	
1,3,5-Trimethylbenzene	**130**	33	"	"	"	"	"	"	
Vinyl acetate	ND	33	"	"	"	"	"	"	
Vinyl chloride	ND	33	"	"	"	"	"	"	
Xylenes (total)	**1000**	33	"	"	"	"	"	"	
TPH Gasoline (C4-C12)	**250000**	66000	"	327.5	"	"	29-Jan-15	"	

Oilfield Environmental and Compliance, INC.

Sage Environmental Consulting	Project: CARB	
720 West Arapaho Road	Project Number: CARB #1344	**Reported:**
Richardson TX, 75080	Project Manager: David Ranum	04-Feb-15 16:10

CAN010

1500318-10 (Air)

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes

Oilfield Environmental and Compliance

Volatile Organic Compounds by EPA Method TO-15

Acetone	ND	44	ppbv	22.16	B5A0713	27-Jan-15	27-Jan-15	TO-15 mod.	
Benzene	**220**	11	"	"	"	"	"	"	
Benzyl chloride	ND	11	"	"	"	"	"	"	
Bromodichloromethane	ND	11	"	"	"	"	"	"	
Bromoform	ND	11	"	"	"	"	"	"	
Bromomethane	ND	11	"	"	"	"	"	"	
1,3-Butadiene	ND	11	"	"	"	"	"	"	
Carbon disulfide	ND	11	"	"	"	"	"	"	
Carbon tetrachloride	ND	11	"	"	"	"	"	"	
Chlorobenzene	ND	11	"	"	"	"	"	"	
Chloroethane	ND	11	"	"	"	"	"	"	
Chloroform	ND	11	"	"	"	"	"	"	
Chloromethane	ND	11	"	"	"	"	"	"	
Cyclohexane	**810**	55	"	110.83	B5A0773	28-Jan-15	28-Jan-15	"	
Dibromochloromethane	ND	11	"	22.16	B5A0713	27-Jan-15	27-Jan-15	"	
1,2-Dibromoethane (EDB)	ND	11	"	"	"	"	"	"	
1,2-Dichlorobenzene	ND	11	"	"	"	"	"	"	
1,3-Dichlorobenzene	ND	11	"	"	"	"	"	"	
1,4-Dichlorobenzene	ND	11	"	"	"	"	"	"	
Dichlorodifluoromethane	ND	11	"	"	"	"	"	"	
1,1-Dichloroethane	ND	11	"	"	"	"	"	"	
1,2-Dichloroethane	ND	11	"	"	"	"	"	"	
1,1-Dichloroethene	ND	11	"	"	"	"	"	"	
cis-1,2-Dichloroethene	ND	11	"	"	"	"	"	"	
trans-1,2-Dichloroethene	ND	11	"	"	"	"	"	"	
1,2-Dichloropropane	ND	11	"	"	"	"	"	"	
cis-1,3-Dichloropropene	ND	11	"	"	"	"	"	"	
trans-1,3-Dichloropropene	ND	11	"	"	"	"	"	"	
1,2-Dichloro-1,1,2,2-tetrafluoroethane	ND	11	"	"	"	"	"	"	
Diisopropyl Ether	ND	11	"	"	"	"	"	"	
1,4-Dioxane	ND	11	"	"	"	"	"	"	
Ethanol	ND	44	"	"	"	"	"	"	
Ethyl Acetate	ND	11	"	"	"	"	"	"	
Ethylbenzene	ND	11	"	"	"	"	"	"	
Ethyl t-Butyl Ether	ND	11	"	"	"	"	"	"	
4-Ethyltoluene	ND	11	"	"	"	"	"	"	

Oilfield Environmental and Compliance, INC.

Sage Environmental Consulting	Project: CARB	
720 West Arapaho Road	Project Number: CARB #1344	**Reported:**
Richardson TX, 75080	Project Manager: David Ranum	04-Feb-15 16:10

CAN010

1500318-10 (Air)

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes

Oilfield Environmental and Compliance

Volatile Organic Compounds by EPA Method TO-15

Heptane	**440**	11	ppbv	22.16	B5A0713	27-Jan-15	27-Jan-15	TO-15 mod.	
Hexachlorobutadiene	ND	11	"	"	"	"	"	"	
Hexane	**1500**	55	"	110.83	B5A0773	28-Jan-15	28-Jan-15	"	
2-Hexanone	ND	11	"	22.16	B5A0713	27-Jan-15	27-Jan-15	"	
Isopropyl alcohol	ND	11	"	"	"	"	"	"	
Methylene chloride	ND	11	"	"	"	"	"	"	
Methyl Ethyl Ketone	ND	11	"	"	"	"	"	"	
Methyl Isobutyl Ketone	ND	11	"	"	"	"	"	"	
Methyl-t-butyl ether	ND	11	"	"	"	"	"	"	
Naphthalene	ND	22	"	"	"	"	"	"	
Propylene	ND	11	"	"	"	"	"	"	
Styrene	ND	11	"	"	"	"	"	"	
t-Amyl Methyl Ether	ND	11	"	"	"	"	"	"	
t-Butyl alcohol	ND	11	"	"	"	"	"	"	
1,1,2,2-Tetrachloroethane	ND	11	"	"	"	"	"	"	
Tetrachloroethene (PCE)	ND	11	"	"	"	"	"	"	
Tetrahydrofuran	ND	11	"	"	"	"	"	"	
Toluene	**18**	11	"	"	"	"	"	"	
1,2,4-Trichlorobenzene	ND	11	"	"	"	"	"	"	
1,1,1-Trichloroethane	ND	11	"	"	"	"	"	"	
1,1,2-Trichloroethane	ND	11	"	"	"	"	"	"	
Trichloroethene (TCE)	ND	11	"	"	"	"	"	"	
Trichlorofluoromethane	ND	11	"	"	"	"	"	"	
1,1,2-Trichlorotrifluoroethane	ND	11	"	"	"	"	"	"	
1,2,4-Trimethylbenzene	ND	11	"	"	"	"	"	"	
1,3,5-Trimethylbenzene	ND	11	"	"	"	"	"	"	
Vinyl acetate	ND	11	"	"	"	"	"	"	
Vinyl chloride	ND	11	"	"	"	"	"	"	
Xylenes (total)	**11**	11	"	"	"	"	"	"	
TPH Gasoline (C4-C12)	**29000**	4400	"	"	"	"	"	"	

Oilfield Environmental and Compliance, INC.

Sage Environmental Consulting	Project: CARB	
720 West Arapaho Road	Project Number: CARB #1344	**Reported:**
Richardson TX, 75080	Project Manager: David Ranum	04-Feb-15 16:10

CAN011

1500318-11 (Air)

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes

Oilfield Environmental and Compliance

Volatile Organic Compounds by EPA Method TO-15

Acetone	ND	43	ppbv	21.67	B5A0713	27-Jan-15	27-Jan-15	TO-15 mod.	
Benzene	**74**	11	"	"	"	"	"	"	
Benzyl chloride	ND	11	"	"	"	"	"	"	
Bromodichloromethane	ND	11	"	"	"	"	"	"	
Bromoform	ND	11	"	"	"	"	"	"	
Bromomethane	ND	11	"	"	"	"	"	"	
1,3-Butadiene	ND	11	"	"	"	"	"	"	
Carbon disulfide	ND	11	"	"	"	"	"	"	
Carbon tetrachloride	ND	11	"	"	"	"	"	"	
Chlorobenzene	ND	11	"	"	"	"	"	"	
Chloroethane	ND	11	"	"	"	"	"	"	
Chloroform	ND	11	"	"	"	"	"	"	
Chloromethane	ND	11	"	"	"	"	"	"	
Cyclohexane	**360**	11	"	"	"	"	"	"	
Dibromochloromethane	ND	11	"	"	"	"	"	"	
1,2-Dibromoethane (EDB)	ND	11	"	"	"	"	"	"	
1,2-Dichlorobenzene	ND	11	"	"	"	"	"	"	
1,3-Dichlorobenzene	ND	11	"	"	"	"	"	"	
1,4-Dichlorobenzene	ND	11	"	"	"	"	"	"	
Dichlorodifluoromethane	ND	11	"	"	"	"	"	"	
1,1-Dichloroethane	ND	11	"	"	"	"	"	"	
1,2-Dichloroethane	ND	11	"	"	"	"	"	"	
1,1-Dichloroethene	ND	11	"	"	"	"	"	"	
cis-1,2-Dichloroethene	ND	11	"	"	"	"	"	"	
trans-1,2-Dichloroethene	ND	11	"	"	"	"	"	"	
1,2-Dichloropropane	ND	11	"	"	"	"	"	"	
cis-1,3-Dichloropropene	ND	11	"	"	"	"	"	"	
trans-1,3-Dichloropropene	ND	11	"	"	"	"	"	"	
1,2-Dichloro-1,1,2,2-tetrafluoroethane	ND	11	"	"	"	"	"	"	
Diisopropyl Ether	ND	11	"	"	"	"	"	"	
1,4-Dioxane	ND	11	"	"	"	"	"	"	
Ethanol	ND	43	"	"	"	"	"	"	
Ethyl Acetate	ND	11	"	"	"	"	"	"	
Ethylbenzene	ND	11	"	"	"	"	"	"	
Ethyl t-Butyl Ether	ND	11	"	"	"	"	"	"	
4-Ethyltoluene	ND	11	"	"	"	"	"	"	

Oilfield Environmental and Compliance, INC.

Sage Environmental Consulting	Project: CARB	
720 West Arapaho Road	Project Number: CARB #1344	**Reported:**
Richardson TX, 75080	Project Manager: David Ranum	04-Feb-15 16:10

CAN011

1500318-11 (Air)

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes

Oilfield Environmental and Compliance

Volatile Organic Compounds by EPA Method TO-15

Heptane	**190**	11	ppbv	21.67	B5A0713	27-Jan-15	27-Jan-15	TO-15 mod.	
Hexachlorobutadiene	ND	11	"	"	"	"	"	"	
Hexane	**450**	11	"	"	"	"	"	"	
2-Hexanone	ND	11	"	"	"	"	"	"	
Isopropyl alcohol	ND	11	"	"	"	"	"	"	
Methylene chloride	ND	11	"	"	"	"	"	"	
Methyl Ethyl Ketone	ND	11	"	"	"	"	"	"	
Methyl Isobutyl Ketone	ND	11	"	"	"	"	"	"	
Methyl-t-butyl ether	ND	11	"	"	"	"	"	"	
Naphthalene	ND	22	"	"	"	"	"	"	
Propylene	ND	11	"	"	"	"	"	"	
Styrene	ND	11	"	"	"	"	"	"	
t-Amyl Methyl Ether	ND	11	"	"	"	"	"	"	
t-Butyl alcohol	ND	11	"	"	"	"	"	"	
1,1,2,2-Tetrachloroethane	ND	11	"	"	"	"	"	"	
Tetrachloroethene (PCE)	ND	11	"	"	"	"	"	"	
Tetrahydrofuran	ND	11	"	"	"	"	"	"	
Toluene	**98**	11	"	"	"	"	"	"	
1,2,4-Trichlorobenzene	ND	11	"	"	"	"	"	"	
1,1,1-Trichloroethane	ND	11	"	"	"	"	"	"	
1,1,2-Trichloroethane	ND	11	"	"	"	"	"	"	
Trichloroethene (TCE)	ND	11	"	"	"	"	"	"	
Trichlorofluoromethane	ND	11	"	"	"	"	"	"	
1,1,2-Trichlorotrifluoroethane	ND	11	"	"	"	"	"	"	
1,2,4-Trimethylbenzene	ND	11	"	"	"	"	"	"	
1,3,5-Trimethylbenzene	ND	11	"	"	"	"	"	"	
Vinyl acetate	ND	11	"	"	"	"	"	"	
Vinyl chloride	ND	11	"	"	"	"	"	"	
Xylenes (total)	ND	11	"	"	"	"	"	"	
TPH Gasoline (C4-C12)	**6900**	4300	"	"	"	"	"	"	

Oilfield Environmental and Compliance, INC.

Sage Environmental Consulting	Project: CARB	
720 West Arapaho Road	Project Number: CARB #1344	**Reported:**
Richardson TX, 75080	Project Manager: David Ranum	04-Feb-15 16:10

CAN012

1500318-12 (Air)

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes

Oilfield Environmental and Compliance

Volatile Organic Compounds by EPA Method TO-15

Acetone	ND	43	ppbv	21.67	B5A0713	27-Jan-15	27-Jan-15	TO-15 mod.
Benzene	ND	11	"	"	"	"	"	"
Benzyl chloride	ND	11	"	"	"	"	"	"
Bromodichloromethane	ND	11	"	"	"	"	"	"
Bromoform	ND	11	"	"	"	"	"	"
Bromomethane	ND	11	"	"	"	"	"	"
1,3-Butadiene	ND	11	"	"	"	"	"	"
Carbon disulfide	ND	11	"	"	"	"	"	"
Carbon tetrachloride	ND	11	"	"	"	"	"	"
Chlorobenzene	ND	11	"	"	"	"	"	"
Chloroethane	ND	11	"	"	"	"	"	"
Chloroform	ND	11	"	"	"	"	"	"
Chloromethane	ND	11	"	"	"	"	"	"
Cyclohexane	**39**	11	"	"	"	"	"	"
Dibromochloromethane	ND	11	"	"	"	"	"	"
1,2-Dibromoethane (EDB)	ND	11	"	"	"	"	"	"
1,2-Dichlorobenzene	ND	11	"	"	"	"	"	"
1,3-Dichlorobenzene	ND	11	"	"	"	"	"	"
1,4-Dichlorobenzene	ND	11	"	"	"	"	"	"
Dichlorodifluoromethane	ND	11	"	"	"	"	"	"
1,1-Dichloroethane	ND	11	"	"	"	"	"	"
1,2-Dichloroethane	ND	11	"	"	"	"	"	"
1,1-Dichloroethene	ND	11	"	"	"	"	"	"
cis-1,2-Dichloroethene	ND	11	"	"	"	"	"	"
trans-1,2-Dichloroethene	ND	11	"	"	"	"	"	"
1,2-Dichloropropane	ND	11	"	"	"	"	"	"
cis-1,3-Dichloropropene	ND	11	"	"	"	"	"	"
trans-1,3-Dichloropropene	ND	11	"	"	"	"	"	"
1,2-Dichloro-1,1,2,2-tetrafluoroethane	ND	11	"	"	"	"	"	"
Diisopropyl Ether	ND	11	"	"	"	"	"	"
1,4-Dioxane	ND	11	"	"	"	"	"	"
Ethanol	ND	43	"	"	"	"	"	"
Ethyl Acetate	ND	11	"	"	"	"	"	"
Ethylbenzene	ND	11	"	"	"	"	"	"
Ethyl t-Butyl Ether	ND	11	"	"	"	"	"	"
4-Ethyltoluene	ND	11	"	"	"	"	"	"

Oilfield Environmental and Compliance, INC.

Sage Environmental Consulting	Project: CARB	
720 West Arapaho Road	Project Number: CARB #1344	**Reported:**
Richardson TX, 75080	Project Manager: David Ranum	04-Feb-15 16:10

CAN012

1500318-12 (Air)

Oilfield Environmental and Compliance

Volatile Organic Compounds by EPA Method TO-15

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
Heptane	**17**	11	ppbv	21.67	B5A0713	27-Jan-15	27-Jan-15	TO-15 mod.	
Hexachlorobutadiene	ND	11	"	"	"	"	"	"	
Hexane	**25**	11	"	"	"	"	"	"	
2-Hexanone	ND	11	"	"	"	"	"	"	
Isopropyl alcohol	ND	11	"	"	"	"	"	"	
Methylene chloride	ND	11	"	"	"	"	"	"	
Methyl Ethyl Ketone	ND	11	"	"	"	"	"	"	
Methyl Isobutyl Ketone	ND	11	"	"	"	"	"	"	
Methyl-t-butyl ether	ND	11	"	"	"	"	"	"	
Naphthalene	ND	22	"	"	"	"	"	"	
Propylene	ND	11	"	"	"	"	"	"	
Styrene	ND	11	"	"	"	"	"	"	
t-Amyl Methyl Ether	ND	11	"	"	"	"	"	"	
t-Butyl alcohol	ND	11	"	"	"	"	"	"	
1,1,2,2-Tetrachloroethane	ND	11	"	"	"	"	"	"	
Tetrachloroethene (PCE)	ND	11	"	"	"	"	"	"	
Tetrahydrofuran	ND	11	"	"	"	"	"	"	
Toluene	**15**	11	"	"	"	"	"	"	
1,2,4-Trichlorobenzene	ND	11	"	"	"	"	"	"	
1,1,1-Trichloroethane	ND	11	"	"	"	"	"	"	
1,1,2-Trichloroethane	ND	11	"	"	"	"	"	"	
Trichloroethene (TCE)	ND	11	"	"	"	"	"	"	
Trichlorofluoromethane	ND	11	"	"	"	"	"	"	
1,1,2-Trichlorotrifluoroethane	ND	11	"	"	"	"	"	"	
1,2,4-Trimethylbenzene	ND	11	"	"	"	"	"	"	
1,3,5-Trimethylbenzene	ND	11	"	"	"	"	"	"	
Vinyl acetate	ND	11	"	"	"	"	"	"	
Vinyl chloride	ND	11	"	"	"	"	"	"	
Xylenes (total)	ND	11	"	"	"	"	"	"	
TPH Gasoline (C4-C12)	ND	4300	"	"	"	"	"	"	

Oilfield Environmental and Compliance, INC.

Sage Environmental Consulting	Project: CARB	
720 West Arapaho Road	Project Number: CARB #1344	**Reported:**
Richardson TX, 75080	Project Manager: David Ranum	06-Feb-15 15:41

CAN013

1500415-01 (Air)

Oilfield Environmental and Compliance

Volatile Organic Compounds by EPA Method TO-15

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
Ethyl Acetate	ND	8.4	ppbv	16.88	B5B0018	02-Feb-15	02-Feb-15	TO-15 mod.	
Ethylbenzene	ND	8.4	"	"	"	"	"	"	
Ethyl t-Butyl Ether	ND	8.4	"	"	"	"	"	"	
4-Ethyltoluene	ND	8.4	"	"	"	"	"	"	
Heptane	**14**	8.4	"	"	"	"	"	"	
Hexachlorobutadiene	ND	8.4	"	"	"	"	"	"	
Hexane	**52**	8.4	"	"	"	"	"	"	
2-Hexanone	ND	8.4	"	"	"	"	"	"	
Isopropyl alcohol	ND	8.4	"	"	"	"	"	"	
Methylene chloride	ND	8.4	"	"	"	"	"	"	
Methyl Ethyl Ketone	ND	8.4	"	"	"	"	"	"	
Methyl Isobutyl Ketone	ND	8.4	"	"	"	"	"	"	
Methyl-t-butyl ether	ND	8.4	"	"	"	"	"	"	
Naphthalene	ND	17	"	"	"	"	"	"	
Propylene	ND	8.4	"	"	"	"	"	"	
Styrene	ND	8.4	"	"	"	"	"	"	
t-Amyl Methyl Ether	ND	8.4	"	"	"	"	"	"	
t-Butyl alcohol	ND	8.4	"	"	"	"	"	"	
1,1,2,2-Tetrachloroethane	ND	8.4	"	"	"	"	"	"	
Tetrachloroethene (PCE)	ND	8.4	"	"	"	"	"	"	
Tetrahydrofuran	ND	8.4	"	"	"	"	"	"	
Toluene	ND	8.4	"	"	"	"	"	"	
1,2,4-Trichlorobenzene	ND	8.4	"	"	"	"	"	"	
1,1,1-Trichloroethane	ND	8.4	"	"	"	"	"	"	
1,1,2-Trichloroethane	ND	8.4	"	"	"	"	"	"	
Trichloroethene (TCE)	ND	8.4	"	"	"	"	"	"	
Trichlorofluoromethane	ND	8.4	"	"	"	"	"	"	
1,1,2-Trichlorotrifluoroethane	ND	8.4	"	"	"	"	"	"	
1,2,4-Trimethylbenzene	ND	8.4	"	"	"	"	"	"	
1,3,5-Trimethylbenzene	ND	8.4	"	"	"	"	"	"	
Vinyl acetate	ND	8.4	"	"	"	"	"	"	
Vinyl chloride	ND	8.4	"	"	"	"	"	"	
Xylenes (total)	ND	8.4	"	"	"	"	"	"	
TPH Gasoline (C4-C12)	ND	3400	"	"	"	"	"	"	

Oilfield Environmental and Compliance, INC.

Sage Environmental Consulting	Project: CARB	
720 West Arapaho Road	Project Number: CARB #1344	**Reported:**
Richardson TX, 75080	Project Manager: David Ranum	06-Feb-15 15:41

CAN014

1500415-02 (Air)

Oilfield Environmental and Compliance

Volatile Organic Compounds by EPA Method TO-15

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
Acetone	ND	34	ppbv	17.13	B5B0018	02-Feb-15	02-Feb-15	TO-15 mod.	
Benzene	**28**	8.6	"	"	"	"	"	"	
Benzyl chloride	ND	8.6	"	"	"	"	"	"	
Bromodichloromethane	ND	8.6	"	"	"	"	"	"	
Bromoform	ND	8.6	"	"	"	"	"	"	
Bromomethane	ND	8.6	"	"	"	"	"	"	
1,3-Butadiene	ND	8.6	"	"	"	"	"	"	
Carbon disulfide	ND	8.6	"	"	"	"	"	"	
Carbon tetrachloride	ND	8.6	"	"	"	"	"	"	
Chlorobenzene	ND	8.6	"	"	"	"	"	"	
Chloroethane	ND	8.6	"	"	"	"	"	"	
Chloroform	ND	8.6	"	"	"	"	"	"	
Chloromethane	ND	8.6	"	"	"	"	"	"	
Cyclohexane	**130**	8.6	"	"	"	"	"	"	
Dibromochloromethane	ND	8.6	"	"	"	"	"	"	
1,2-Dibromoethane (EDB)	ND	8.6	"	"	"	"	"	"	
1,2-Dichlorobenzene	ND	8.6	"	"	"	"	"	"	
1,3-Dichlorobenzene	ND	8.6	"	"	"	"	"	"	
1,4-Dichlorobenzene	ND	8.6	"	"	"	"	"	"	
Dichlorodifluoromethane	ND	8.6	"	"	"	"	"	"	
1,1-Dichloroethane	ND	8.6	"	"	"	"	"	"	
1,2-Dichloroethane	ND	8.6	"	"	"	"	"	"	
1,1-Dichloroethene	ND	8.6	"	"	"	"	"	"	
cis-1,2-Dichloroethene	ND	8.6	"	"	"	"	"	"	
trans-1,2-Dichloroethene	ND	8.6	"	"	"	"	"	"	
1,2-Dichloropropane	ND	8.6	"	"	"	"	"	"	
cis-1,3-Dichloropropene	ND	8.6	"	"	"	"	"	"	
trans-1,3-Dichloropropene	ND	8.6	"	"	"	"	"	"	
1,2-Dichloro-1,1,2,2-tetrafluoroethane	ND	8.6	"	"	"	"	"	"	
Diisopropyl Ether	ND	8.6	"	"	"	"	"	"	
1,4-Dioxane	ND	8.6	"	"	"	"	"	"	
Ethanol	ND	34	"	"	"	"	"	"	
Ethyl Acetate	ND	8.6	"	"	"	"	"	"	
Ethylbenzene	ND	8.6	"	"	"	"	"	"	
Ethyl t-Butyl Ether	ND	8.6	"	"	"	"	"	"	
4-Ethyltoluene	ND	8.6	"	"	"	"	"	"	

Oilfield Environmental and Compliance, INC.

Sage Environmental Consulting	Project: CARB	
720 West Arapaho Road	Project Number: CARB #1344	**Reported:**
Richardson TX, 75080	Project Manager: David Ranum	06-Feb-15 15:41

CAN014

1500415-02 (Air)

Oilfield Environmental and Compliance

Volatile Organic Compounds by EPA Method TO-15

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
Heptane	**32**	8.6	ppbv	17.13	B5B0018	02-Feb-15	02-Feb-15	TO-15 mod.	
Hexachlorobutadiene	ND	8.6	"	"	"	"	"	"	
Hexane	**380**	8.6	"	"	"	"	"	"	
2-Hexanone	ND	8.6	"	"	"	"	"	"	
Isopropyl alcohol	ND	8.6	"	"	"	"	"	"	
Methylene chloride	ND	8.6	"	"	"	"	"	"	
Methyl Ethyl Ketone	ND	8.6	"	"	"	"	"	"	
Methyl Isobutyl Ketone	ND	8.6	"	"	"	"	"	"	
Methyl-t-butyl ether	ND	8.6	"	"	"	"	"	"	
Naphthalene	ND	17	"	"	"	"	"	"	
Propylene	ND	8.6	"	"	"	"	"	"	
Styrene	ND	8.6	"	"	"	"	"	"	
t-Amyl Methyl Ether	ND	8.6	"	"	"	"	"	"	
t-Butyl alcohol	ND	8.6	"	"	"	"	"	"	
1,1,2,2-Tetrachloroethane	ND	8.6	"	"	"	"	"	"	
Tetrachloroethene (PCE)	ND	8.6	"	"	"	"	"	"	
Tetrahydrofuran	ND	8.6	"	"	"	"	"	"	
Toluene	**10**	8.6	"	"	"	"	"	"	
1,2,4-Trichlorobenzene	ND	8.6	"	"	"	"	"	"	
1,1,1-Trichloroethane	ND	8.6	"	"	"	"	"	"	
1,1,2-Trichloroethane	ND	8.6	"	"	"	"	"	"	
Trichloroethene (TCE)	ND	8.6	"	"	"	"	"	"	
Trichlorofluoromethane	ND	8.6	"	"	"	"	"	"	
1,1,2-Trichlorotrifluoroethane	ND	8.6	"	"	"	"	"	"	
1,2,4-Trimethylbenzene	ND	8.6	"	"	"	"	"	"	
1,3,5-Trimethylbenzene	ND	8.6	"	"	"	"	"	"	
Vinyl acetate	ND	8.6	"	"	"	"	"	"	
Vinyl chloride	ND	8.6	"	"	"	"	"	"	
Xylenes (total)	ND	8.6	"	"	"	"	"	"	
TPH Gasoline (C4-C12)	**4500**	3400	"	"	"	"	"	"	

Oilfield Environmental and Compliance, INC.

Sage Environmental Consulting	Project: CARB	
720 West Arapaho Road	Project Number: CARB #1344	**Reported:**
Richardson TX, 75080	Project Manager: David Ranum	06-Feb-15 15:41

CAN015

1500415-03 (Air)

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes

Oilfield Environmental and Compliance

Volatile Organic Compounds by EPA Method TO-15

Acetone	ND	230	ppbv	116.67	B5B0018	02-Feb-15	02-Feb-15	TO-15 mod.
Benzene	**260**	58	"	"	"	"	"	"
Benzyl chloride	ND	58	"	"	"	"	"	"
Bromodichloromethane	ND	58	"	"	"	"	"	"
Bromoform	ND	58	"	"	"	"	"	"
Bromomethane	ND	58	"	"	"	"	"	"
1,3-Butadiene	ND	58	"	"	"	"	"	"
Carbon disulfide	ND	58	"	"	"	"	"	"
Carbon tetrachloride	ND	58	"	"	"	"	"	"
Chlorobenzene	ND	58	"	"	"	"	"	"
Chloroethane	ND	58	"	"	"	"	"	"
Chloroform	ND	58	"	"	"	"	"	"
Chloromethane	ND	58	"	"	"	"	"	"
Cyclohexane	**1900**	58	"	"	"	"	"	"
Dibromochloromethane	ND	58	"	"	"	"	"	"
1,2-Dibromoethane (EDB)	ND	58	"	"	"	"	"	"
1,2-Dichlorobenzene	ND	58	"	"	"	"	"	"
1,3-Dichlorobenzene	ND	58	"	"	"	"	"	"
1,4-Dichlorobenzene	ND	58	"	"	"	"	"	"
Dichlorodifluoromethane	ND	58	"	"	"	"	"	"
1,1-Dichloroethane	ND	58	"	"	"	"	"	"
1,2-Dichloroethane	ND	58	"	"	"	"	"	"
1,1-Dichloroethene	ND	58	"	"	"	"	"	"
cis-1,2-Dichloroethene	ND	58	"	"	"	"	"	"
trans-1,2-Dichloroethene	ND	58	"	"	"	"	"	"
1,2-Dichloropropane	ND	58	"	"	"	"	"	"
cis-1,3-Dichloropropene	ND	58	"	"	"	"	"	"
trans-1,3-Dichloropropene	ND	58	"	"	"	"	"	"
1,2-Dichloro-1,1,2,2-tetrafluoroethane	ND	58	"	"	"	"	"	"
Diisopropyl Ether	ND	58	"	"	"	"	"	"
1,4-Dioxane	ND	58	"	"	"	"	"	"
Ethanol	**1200**	230	"	"	"	"	"	"
Ethyl Acetate	ND	58	"	"	"	"	"	"
Ethylbenzene	ND	58	"	"	"	"	"	"
Ethyl t-Butyl Ether	ND	58	"	"	"	"	"	"
4-Ethyltoluene	ND	58	"	"	"	"	"	"

Oilfield Environmental and Compliance, INC.

Sage Environmental Consulting	Project: CARB	
720 West Arapaho Road	Project Number: CARB #1344	**Reported:**
Richardson TX, 75080	Project Manager: David Ranum	06-Feb-15 15:41

CAN015

1500415-03 (Air)

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes

Oilfield Environmental and Compliance

Volatile Organic Compounds by EPA Method TO-15

Heptane	**720**	58	ppbv	116.67	B5B0018	02-Feb-15	02-Feb-15	TO-15 mod.	
Hexachlorobutadiene	ND	58	"	"	"	"	"	"	
Hexane	**13000**	180	"	350	"	"	03-Feb-15	"	
2-Hexanone	ND	58	"	116.67	"	"	02-Feb-15	"	
Isopropyl alcohol	**91**	58	"	"	"	"	"	"	
Methylene chloride	ND	58	"	"	"	"	"	"	
Methyl Ethyl Ketone	ND	58	"	"	"	"	"	"	
Methyl Isobutyl Ketone	ND	58	"	"	"	"	"	"	
Methyl-t-butyl ether	ND	58	"	"	"	"	"	"	
Naphthalene	ND	120	"	"	"	"	"	"	
Propylene	ND	58	"	"	"	"	"	"	
Styrene	ND	58	"	"	"	"	"	"	
t-Amyl Methyl Ether	ND	58	"	"	"	"	"	"	
t-Butyl alcohol	ND	58	"	"	"	"	"	"	
1,1,2,2-Tetrachloroethane	ND	58	"	"	"	"	"	"	
Tetrachloroethene (PCE)	ND	58	"	"	"	"	"	"	
Tetrahydrofuran	ND	58	"	"	"	"	"	"	
Toluene	**190**	58	"	"	"	"	"	"	
1,2,4-Trichlorobenzene	ND	58	"	"	"	"	"	"	
1,1,1-Trichloroethane	ND	58	"	"	"	"	"	"	
1,1,2-Trichloroethane	ND	58	"	"	"	"	"	"	
Trichloroethene (TCE)	ND	58	"	"	"	"	"	"	
Trichlorofluoromethane	ND	58	"	"	"	"	"	"	
1,1,2-Trichlorotrifluoroethane	ND	58	"	"	"	"	"	"	
1,2,4-Trimethylbenzene	ND	58	"	"	"	"	"	"	
1,3,5-Trimethylbenzene	ND	58	"	"	"	"	"	"	
Vinyl acetate	ND	58	"	"	"	"	"	"	
Vinyl chloride	ND	58	"	"	"	"	"	"	
Xylenes (total)	ND	58	"	"	"	"	"	"	
TPH Gasoline (C4-C12)	**99000**	23000	"	"	"	"	"	"	

Oilfield Environmental and Compliance, INC.

Sage Environmental Consulting	Project: CARB	
720 West Arapaho Road	Project Number: CARB #1344	**Reported:**
Richardson TX, 75080	Project Manager: David Ranum	06-Feb-15 15:41

CAN016

1500415-04 (Air)

Oilfield Environmental and Compliance

Volatile Organic Compounds by EPA Method TO-15

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
Acetone	ND	34	ppbv	17	B5B0018	02-Feb-15	02-Feb-15	TO-15 mod.	
Benzene	**43**	8.5	"	"	"	"	"	"	
Benzyl chloride	ND	8.5	"	"	"	"	"	"	
Bromodichloromethane	ND	8.5	"	"	"	"	"	"	
Bromoform	ND	8.5	"	"	"	"	"	"	
Bromomethane	ND	8.5	"	"	"	"	"	"	
1,3-Butadiene	ND	8.5	"	"	"	"	"	"	
Carbon disulfide	ND	8.5	"	"	"	"	"	"	
Carbon tetrachloride	ND	8.5	"	"	"	"	"	"	
Chlorobenzene	ND	8.5	"	"	"	"	"	"	
Chloroethane	ND	8.5	"	"	"	"	"	"	
Chloroform	ND	8.5	"	"	"	"	"	"	
Chloromethane	ND	8.5	"	"	"	"	"	"	
Cyclohexane	**100**	8.5	"	"	"	"	"	"	
Dibromochloromethane	ND	8.5	"	"	"	"	"	"	
1,2-Dibromoethane (EDB)	ND	8.5	"	"	"	"	"	"	
1,2-Dichlorobenzene	ND	8.5	"	"	"	"	"	"	
1,3-Dichlorobenzene	ND	8.5	"	"	"	"	"	"	
1,4-Dichlorobenzene	ND	8.5	"	"	"	"	"	"	
Dichlorodifluoromethane	ND	8.5	"	"	"	"	"	"	
1,1-Dichloroethane	ND	8.5	"	"	"	"	"	"	
1,2-Dichloroethane	ND	8.5	"	"	"	"	"	"	
1,1-Dichloroethene	ND	8.5	"	"	"	"	"	"	
cis-1,2-Dichloroethene	ND	8.5	"	"	"	"	"	"	
trans-1,2-Dichloroethene	ND	8.5	"	"	"	"	"	"	
1,2-Dichloropropane	ND	8.5	"	"	"	"	"	"	
cis-1,3-Dichloropropene	ND	8.5	"	"	"	"	"	"	
trans-1,3-Dichloropropene	ND	8.5	"	"	"	"	"	"	
1,2-Dichloro-1,1,2,2-tetrafluoroethane	ND	8.5	"	"	"	"	"	"	
Diisopropyl Ether	ND	8.5	"	"	"	"	"	"	
1,4-Dioxane	ND	8.5	"	"	"	"	"	"	
Ethanol	ND	34	"	"	"	"	"	"	
Ethyl Acetate	ND	8.5	"	"	"	"	"	"	
Ethylbenzene	ND	8.5	"	"	"	"	"	"	
Ethyl t-Butyl Ether	ND	8.5	"	"	"	"	"	"	
4-Ethyltoluene	ND	8.5	"	"	"	"	"	"	

Oilfield Environmental and Compliance, INC.

Sage Environmental Consulting	Project: CARB	
720 West Arapaho Road	Project Number: CARB #1344	**Reported:**
Richardson TX, 75080	Project Manager: David Ranum	06-Feb-15 15:41

CAN016

1500415-04 (Air)

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes

Oilfield Environmental and Compliance

Volatile Organic Compounds by EPA Method TO-15

Heptane	**33**	8.5	ppbv	17	B5B0018	02-Feb-15	02-Feb-15	TO-15 mod.	
Hexachlorobutadiene	ND	8.5	"	"	"	"	"	"	
Hexane	**350**	8.5	"	"	"	"	"	"	
2-Hexanone	ND	8.5	"	"	"	"	"	"	
Isopropyl alcohol	ND	8.5	"	"	"	"	"	"	
Methylene chloride	ND	8.5	"	"	"	"	"	"	
Methyl Ethyl Ketone	ND	8.5	"	"	"	"	"	"	
Methyl Isobutyl Ketone	ND	8.5	"	"	"	"	"	"	
Methyl-t-butyl ether	ND	8.5	"	"	"	"	"	"	
Naphthalene	ND	17	"	"	"	"	"	"	
Propylene	ND	8.5	"	"	"	"	"	"	
Styrene	ND	8.5	"	"	"	"	"	"	
t-Amyl Methyl Ether	ND	8.5	"	"	"	"	"	"	
t-Butyl alcohol	ND	8.5	"	"	"	"	"	"	
1,1,2,2-Tetrachloroethane	ND	8.5	"	"	"	"	"	"	
Tetrachloroethene (PCE)	ND	8.5	"	"	"	"	"	"	
Tetrahydrofuran	ND	8.5	"	"	"	"	"	"	
Toluene	**12**	8.5	"	"	"	"	"	"	
1,2,4-Trichlorobenzene	ND	8.5	"	"	"	"	"	"	
1,1,1-Trichloroethane	ND	8.5	"	"	"	"	"	"	
1,1,2-Trichloroethane	ND	8.5	"	"	"	"	"	"	
Trichloroethene (TCE)	ND	8.5	"	"	"	"	"	"	
Trichlorofluoromethane	ND	8.5	"	"	"	"	"	"	
1,1,2-Trichlorotrifluoroethane	ND	8.5	"	"	"	"	"	"	
1,2,4-Trimethylbenzene	ND	8.5	"	"	"	"	"	"	
1,3,5-Trimethylbenzene	ND	8.5	"	"	"	"	"	"	
Vinyl acetate	ND	8.5	"	"	"	"	"	"	
Vinyl chloride	ND	8.5	"	"	"	"	"	"	
Xylenes (total)	ND	8.5	"	"	"	"	"	"	
TPH Gasoline (C4-C12)	**16000**	3400	"	"	"	"	"	"	

Oilfield Environmental and Compliance, INC.

Sage Environmental Consulting	Project: CARB	
720 West Arapaho Road	Project Number: CARB #1344	**Reported:**
Richardson TX, 75080	Project Manager: David Ranum	06-Feb-15 15:41

CAN017

1500415-05 (Air)

Oilfield Environmental and Compliance

Volatile Organic Compounds by EPA Method TO-15 **R-05**

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
Acetone	ND	67	ppbv	33.5	B5B0018	02-Feb-15	03-Feb-15	TO-15 mod.	
Benzene	ND	17	"	"	"	"	"	"	
Benzyl chloride	ND	17	"	"	"	"	"	"	
Bromodichloromethane	ND	17	"	"	"	"	"	"	
Bromoform	ND	17	"	"	"	"	"	"	
Bromomethane	ND	17	"	"	"	"	"	"	
1,3-Butadiene	ND	17	"	"	"	"	"	"	
Carbon disulfide	ND	17	"	"	"	"	"	"	
Carbon tetrachloride	ND	17	"	"	"	"	"	"	
Chlorobenzene	ND	17	"	"	"	"	"	"	
Chloroethane	ND	17	"	"	"	"	"	"	
Chloroform	ND	17	"	"	"	"	"	"	
Chloromethane	ND	17	"	"	"	"	"	"	
Cyclohexane	ND	17	"	"	"	"	"	"	
Dibromochloromethane	ND	17	"	"	"	"	"	"	
1,2-Dibromoethane (EDB)	ND	17	"	"	"	"	"	"	
1,2-Dichlorobenzene	ND	17	"	"	"	"	"	"	
1,3-Dichlorobenzene	ND	17	"	"	"	"	"	"	
1,4-Dichlorobenzene	ND	17	"	"	"	"	"	"	
Dichlorodifluoromethane	ND	17	"	"	"	"	"	"	
1,1-Dichloroethane	ND	17	"	"	"	"	"	"	
1,2-Dichloroethane	ND	17	"	"	"	"	"	"	
1,1-Dichloroethene	ND	17	"	"	"	"	"	"	
cis-1,2-Dichloroethene	ND	17	"	"	"	"	"	"	
trans-1,2-Dichloroethene	ND	17	"	"	"	"	"	"	
1,2-Dichloropropane	ND	17	"	"	"	"	"	"	
cis-1,3-Dichloropropene	ND	17	"	"	"	"	"	"	
trans-1,3-Dichloropropene	ND	17	"	"	"	"	"	"	
1,2-Dichloro-1,1,2,2-tetrafluoroethane	ND	17	"	"	"	"	"	"	
Diisopropyl Ether	ND	17	"	"	"	"	"	"	
1,4-Dioxane	ND	17	"	"	"	"	"	"	
Ethanol	ND	67	"	"	"	"	"	"	
Ethyl Acetate	ND	17	"	"	"	"	"	"	
Ethylbenzene	ND	17	"	"	"	"	"	"	
Ethyl t-Butyl Ether	ND	17	"	"	"	"	"	"	
4-Ethyltoluene	ND	17	"	"	"	"	"	"	

Oilfield Environmental and Compliance, INC.

Sage Environmental Consulting	Project: CARB	
720 West Arapaho Road	Project Number: CARB #1344	**Reported:**
Richardson TX, 75080	Project Manager: David Ranum	06-Feb-15 15:41

CAN017

1500415-05 (Air)

Oilfield Environmental and Compliance

Volatile Organic Compounds by EPA Method TO-15 **R-05**

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
Heptane	ND	17	ppbv	33.5	B5B0018	02-Feb-15	03-Feb-15	TO-15 mod.	
Hexachlorobutadiene	ND	17	"	"	"	"	"	"	
Hexane	ND	17	"	"	"	"	"	"	
2-Hexanone	ND	17	"	"	"	"	"	"	
Isopropyl alcohol	ND	17	"	"	"	"	"	"	
Methylene chloride	ND	17	"	"	"	"	"	"	
Methyl Ethyl Ketone	ND	17	"	"	"	"	"	"	
Methyl Isobutyl Ketone	ND	17	"	"	"	"	"	"	
Methyl-t-butyl ether	ND	17	"	"	"	"	"	"	
Naphthalene	ND	34	"	"	"	"	"	"	
Propylene	ND	17	"	"	"	"	"	"	
Styrene	ND	17	"	"	"	"	"	"	
t-Amyl Methyl Ether	ND	17	"	"	"	"	"	"	
t-Butyl alcohol	ND	17	"	"	"	"	"	"	
1,1,2,2-Tetrachloroethane	ND	17	"	"	"	"	"	"	
Tetrachloroethene (PCE)	ND	17	"	"	"	"	"	"	
Tetrahydrofuran	ND	17	"	"	"	"	"	"	
Toluene	ND	17	"	"	"	"	"	"	
1,2,4-Trichlorobenzene	ND	17	"	"	"	"	"	"	
1,1,1-Trichloroethane	ND	17	"	"	"	"	"	"	
1,1,2-Trichloroethane	ND	17	"	"	"	"	"	"	
Trichloroethene (TCE)	ND	17	"	"	"	"	"	"	
Trichlorofluoromethane	ND	17	"	"	"	"	"	"	
1,1,2-Trichlorotrifluoroethane	ND	17	"	"	"	"	"	"	
1,2,4-Trimethylbenzene	ND	17	"	"	"	"	"	"	
1,3,5-Trimethylbenzene	ND	17	"	"	"	"	"	"	
Vinyl acetate	ND	17	"	"	"	"	"	"	
Vinyl chloride	ND	17	"	"	"	"	"	"	
Xylenes (total)	ND	17	"	"	"	"	"	"	
TPH Gasoline (C4-C12)	ND	6700	"	"	"	"	"	"	

Oilfield Environmental and Compliance, INC.

Sage Environmental Consulting	Project: CARB	
720 West Arapaho Road	Project Number: CARB #1344	**Reported:**
Richardson TX, 75080	Project Manager: David Ranum	06-Feb-15 15:41

CAN018

1500415-06 (Air)

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes

Oilfield Environmental and Compliance

Volatile Organic Compounds by EPA Method TO-15

Acetone	ND	140	ppbv	69	B5B0018	02-Feb-15	02-Feb-15	TO-15 mod.	
Benzene	**490**	35	"	"	"	"	"	"	
Benzyl chloride	ND	35	"	"	"	"	"	"	
Bromodichloromethane	ND	35	"	"	"	"	"	"	
Bromoform	ND	35	"	"	"	"	"	"	
Bromomethane	ND	35	"	"	"	"	"	"	
1,3-Butadiene	ND	35	"	"	"	"	"	"	
Carbon disulfide	ND	35	"	"	"	"	"	"	
Carbon tetrachloride	ND	35	"	"	"	"	"	"	
Chlorobenzene	ND	35	"	"	"	"	"	"	
Chloroethane	ND	35	"	"	"	"	"	"	
Chloroform	ND	35	"	"	"	"	"	"	
Chloromethane	ND	35	"	"	"	"	"	"	
Cyclohexane	**3400**	86	"	172.5	"	"	03-Feb-15	"	
Dibromochloromethane	ND	35	"	69	"	"	02-Feb-15	"	
1,2-Dibromoethane (EDB)	ND	35	"	"	"	"	"	"	
1,2-Dichlorobenzene	ND	35	"	"	"	"	"	"	
1,3-Dichlorobenzene	ND	35	"	"	"	"	"	"	
1,4-Dichlorobenzene	ND	35	"	"	"	"	"	"	
Dichlorodifluoromethane	ND	35	"	"	"	"	"	"	
1,1-Dichloroethane	ND	35	"	"	"	"	"	"	
1,2-Dichloroethane	ND	35	"	"	"	"	"	"	
1,1-Dichloroethene	ND	35	"	"	"	"	"	"	
cis-1,2-Dichloroethene	ND	35	"	"	"	"	"	"	
trans-1,2-Dichloroethene	ND	35	"	"	"	"	"	"	
1,2-Dichloropropane	ND	35	"	"	"	"	"	"	
cis-1,3-Dichloropropene	ND	35	"	"	"	"	"	"	
trans-1,3-Dichloropropene	ND	35	"	"	"	"	"	"	
1,2-Dichloro-1,1,2,2-tetrafluoroethane	ND	35	"	"	"	"	"	"	
Diisopropyl Ether	ND	35	"	"	"	"	"	"	
1,4-Dioxane	ND	35	"	"	"	"	"	"	
Ethanol	ND	140	"	"	"	"	"	"	
Ethyl Acetate	ND	35	"	"	"	"	"	"	
Ethylbenzene	**52**	35	"	"	"	"	"	"	
Ethyl t-Butyl Ether	ND	35	"	"	"	"	"	"	
4-Ethyltoluene	ND	35	"	"	"	"	"	"	

Oilfield Environmental and Compliance, INC.

Sage Environmental Consulting	Project: CARB	
720 West Arapaho Road	Project Number: CARB #1344	**Reported:**
Richardson TX, 75080	Project Manager: David Ranum	06-Feb-15 15:41

CAN018

1500415-06 (Air)

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes

Oilfield Environmental and Compliance

Volatile Organic Compounds by EPA Method TO-15

Heptane	**2400**	86	ppbv	172.5	B5B0018	02-Feb-15	03-Feb-15	TO-15 mod.	
Hexachlorobutadiene	ND	35	"	69	"	"	02-Feb-15	"	
Hexane	**5500**	86	"	172.5	"	"	03-Feb-15	"	
2-Hexanone	ND	35	"	69	"	"	02-Feb-15	"	
Isopropyl alcohol	ND	35	"	"	"	"	"	"	
Methylene chloride	ND	35	"	"	"	"	"	"	
Methyl Ethyl Ketone	ND	35	"	"	"	"	"	"	
Methyl Isobutyl Ketone	ND	35	"	"	"	"	"	"	
Methyl-t-butyl ether	ND	35	"	"	"	"	"	"	
Naphthalene	ND	69	"	"	"	"	"	"	
Propylene	ND	35	"	"	"	"	"	"	
Styrene	ND	35	"	"	"	"	"	"	
t-Amyl Methyl Ether	ND	35	"	"	"	"	"	"	
t-Butyl alcohol	ND	35	"	"	"	"	"	"	
1,1,2,2-Tetrachloroethane	ND	35	"	"	"	"	"	"	
Tetrachloroethene (PCE)	ND	35	"	"	"	"	"	"	
Tetrahydrofuran	ND	35	"	"	"	"	"	"	
Toluene	**850**	35	"	"	"	"	"	"	
1,2,4-Trichlorobenzene	ND	35	"	"	"	"	"	"	
1,1,1-Trichloroethane	ND	35	"	"	"	"	"	"	
1,1,2-Trichloroethane	ND	35	"	"	"	"	"	"	
Trichloroethene (TCE)	ND	35	"	"	"	"	"	"	
Trichlorofluoromethane	ND	35	"	"	"	"	"	"	
1,1,2-Trichlorotrifluoroethane	ND	35	"	"	"	"	"	"	
1,2,4-Trimethylbenzene	ND	35	"	"	"	"	"	"	
1,3,5-Trimethylbenzene	ND	35	"	"	"	"	"	"	
Vinyl acetate	ND	35	"	"	"	"	"	"	
Vinyl chloride	ND	35	"	"	"	"	"	"	
Xylenes (total)	**150**	35	"	"	"	"	"	"	
TPH Gasoline (C4-C12)	**77000**	14000	"	"	"	"	"	"	

Oilfield Environmental and Compliance, INC.

Sage Environmental Consulting	Project: CARB	
720 West Arapaho Road	Project Number: CARB #1344	**Reported:**
Richardson TX, 75080	Project Manager: David Ranum	06-Feb-15 15:41

CAN019

1500415-07 (Air)

Oilfield Environmental and Compliance

Volatile Organic Compounds by EPA Method TO-15 **R-05**

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
Acetone	ND	44	ppbv	21.83	B5B0018	02-Feb-15	02-Feb-15	TO-15 mod.	
Benzene	ND	11	"	"	"	"	"	"	
Benzyl chloride	ND	11	"	"	"	"	"	"	
Bromodichloromethane	ND	11	"	"	"	"	"	"	
Bromoform	ND	11	"	"	"	"	"	"	
Bromomethane	ND	11	"	"	"	"	"	"	
1,3-Butadiene	ND	11	"	"	"	"	"	"	
Carbon disulfide	ND	11	"	"	"	"	"	"	
Carbon tetrachloride	ND	11	"	"	"	"	"	"	
Chlorobenzene	ND	11	"	"	"	"	"	"	
Chloroethane	ND	11	"	"	"	"	"	"	
Chloroform	ND	11	"	"	"	"	"	"	
Chloromethane	ND	11	"	"	"	"	"	"	
Cyclohexane	ND	11	"	"	"	"	"	"	
Dibromochloromethane	ND	11	"	"	"	"	"	"	
1,2-Dibromoethane (EDB)	ND	11	"	"	"	"	"	"	
1,2-Dichlorobenzene	ND	11	"	"	"	"	"	"	
1,3-Dichlorobenzene	ND	11	"	"	"	"	"	"	
1,4-Dichlorobenzene	ND	11	"	"	"	"	"	"	
Dichlorodifluoromethane	ND	11	"	"	"	"	"	"	
1,1-Dichloroethane	ND	11	"	"	"	"	"	"	
1,2-Dichloroethane	ND	11	"	"	"	"	"	"	
1,1-Dichloroethene	ND	11	"	"	"	"	"	"	
cis-1,2-Dichloroethene	ND	11	"	"	"	"	"	"	
trans-1,2-Dichloroethene	ND	11	"	"	"	"	"	"	
1,2-Dichloropropane	ND	11	"	"	"	"	"	"	
cis-1,3-Dichloropropene	ND	11	"	"	"	"	"	"	
trans-1,3-Dichloropropene	ND	11	"	"	"	"	"	"	
1,2-Dichloro-1,1,2,2-tetrafluoroethane	ND	11	"	"	"	"	"	"	
Diisopropyl Ether	ND	11	"	"	"	"	"	"	
1,4-Dioxane	ND	11	"	"	"	"	"	"	
Ethanol	ND	44	"	"	"	"	"	"	
Ethyl Acetate	ND	11	"	"	"	"	"	"	
Ethylbenzene	ND	11	"	"	"	"	"	"	
Ethyl t-Butyl Ether	ND	11	"	"	"	"	"	"	
4-Ethyltoluene	ND	11	"	"	"	"	"	"	

Oilfield Environmental and Compliance, INC.

Sage Environmental Consulting	Project: CARB	
720 West Arapaho Road	Project Number: CARB #1344	**Reported:**
Richardson TX, 75080	Project Manager: David Ranum	06-Feb-15 15:41

CAN019

1500415-07 (Air)

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes

Oilfield Environmental and Compliance

Volatile Organic Compounds by EPA Method TO-15 **R-05**

Heptane	ND	11	ppbv	21.83	B5B0018	02-Feb-15	02-Feb-15	TO-15 mod.	
Hexachlorobutadiene	ND	11	"	"	"	"	"	"	
Hexane	ND	11	"	"	"	"	"	"	
2-Hexanone	ND	11	"	"	"	"	"	"	
Isopropyl alcohol	ND	11	"	"	"	"	"	"	
Methylene chloride	ND	11	"	"	"	"	"	"	
Methyl Ethyl Ketone	ND	11	"	"	"	"	"	"	
Methyl Isobutyl Ketone	ND	11	"	"	"	"	"	"	
Methyl-t-butyl ether	ND	11	"	"	"	"	"	"	
Naphthalene	ND	22	"	"	"	"	"	"	
Propylene	ND	11	"	"	"	"	"	"	
Styrene	ND	11	"	"	"	"	"	"	
t-Amyl Methyl Ether	ND	11	"	"	"	"	"	"	
t-Butyl alcohol	ND	11	"	"	"	"	"	"	
1,1,2,2-Tetrachloroethane	ND	11	"	"	"	"	"	"	
Tetrachloroethene (PCE)	ND	11	"	"	"	"	"	"	
Tetrahydrofuran	ND	11	"	"	"	"	"	"	
Toluene	ND	11	"	"	"	"	"	"	
1,2,4-Trichlorobenzene	ND	11	"	"	"	"	"	"	
1,1,1-Trichloroethane	ND	11	"	"	"	"	"	"	
1,1,2-Trichloroethane	ND	11	"	"	"	"	"	"	
Trichloroethene (TCE)	ND	11	"	"	"	"	"	"	
Trichlorofluoromethane	ND	11	"	"	"	"	"	"	
1,1,2-Trichlorotrifluoroethane	ND	11	"	"	"	"	"	"	
1,2,4-Trimethylbenzene	ND	11	"	"	"	"	"	"	
1,3,5-Trimethylbenzene	ND	11	"	"	"	"	"	"	
Vinyl acetate	ND	11	"	"	"	"	"	"	
Vinyl chloride	ND	11	"	"	"	"	"	"	
Xylenes (total)	ND	11	"	"	"	"	"	"	
TPH Gasoline (C4-C12)	ND	4400	"	"	"	"	"	"	

Oilfield Environmental and Compliance, INC.

Sage Environmental Consulting	Project: CARB	
720 West Arapaho Road	Project Number: CARB #1344	**Reported:**
Richardson TX, 75080	Project Manager: David Ranum	06-Feb-15 15:41

CAN020

1500415-08 (Air)

Oilfield Environmental and Compliance

Volatile Organic Compounds by EPA Method TO-15 **R-05**

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
Acetone	ND	66	ppbv	32.75	B5B0018	02-Feb-15	03-Feb-15	TO-15 mod.	
Benzene	**20**	16	"	"	"	"	"	"	
Benzyl chloride	ND	16	"	"	"	"	"	"	
Bromodichloromethane	ND	16	"	"	"	"	"	"	
Bromoform	ND	16	"	"	"	"	"	"	
Bromomethane	ND	16	"	"	"	"	"	"	
1,3-Butadiene	ND	16	"	"	"	"	"	"	
Carbon disulfide	ND	16	"	"	"	"	"	"	
Carbon tetrachloride	ND	16	"	"	"	"	"	"	
Chlorobenzene	ND	16	"	"	"	"	"	"	
Chloroethane	ND	16	"	"	"	"	"	"	
Chloroform	ND	16	"	"	"	"	"	"	
Chloromethane	ND	16	"	"	"	"	"	"	
Cyclohexane	**94**	16	"	"	"	"	"	"	
Dibromochloromethane	ND	16	"	"	"	"	"	"	
1,2-Dibromoethane (EDB)	ND	16	"	"	"	"	"	"	
1,2-Dichlorobenzene	ND	16	"	"	"	"	"	"	
1,3-Dichlorobenzene	ND	16	"	"	"	"	"	"	
1,4-Dichlorobenzene	ND	16	"	"	"	"	"	"	
Dichlorodifluoromethane	ND	16	"	"	"	"	"	"	
1,1-Dichloroethane	ND	16	"	"	"	"	"	"	
1,2-Dichloroethane	ND	16	"	"	"	"	"	"	
1,1-Dichloroethene	ND	16	"	"	"	"	"	"	
cis-1,2-Dichloroethene	ND	16	"	"	"	"	"	"	
trans-1,2-Dichloroethene	ND	16	"	"	"	"	"	"	
1,2-Dichloropropane	ND	16	"	"	"	"	"	"	
cis-1,3-Dichloropropene	ND	16	"	"	"	"	"	"	
trans-1,3-Dichloropropene	ND	16	"	"	"	"	"	"	
1,2-Dichloro-1,1,2,2-tetrafluoroethane	ND	16	"	"	"	"	"	"	
Diisopropyl Ether	ND	16	"	"	"	"	"	"	
1,4-Dioxane	ND	16	"	"	"	"	"	"	
Ethanol	ND	66	"	"	"	"	"	"	
Ethyl Acetate	ND	16	"	"	"	"	"	"	
Ethylbenzene	ND	16	"	"	"	"	"	"	
Ethyl t-Butyl Ether	ND	16	"	"	"	"	"	"	
4-Ethyltoluene	ND	16	"	"	"	"	"	"	

Oilfield Environmental and Compliance, INC.

Sage Environmental Consulting	Project: CARB	
720 West Arapaho Road	Project Number: CARB #1344	**Reported:**
Richardson TX, 75080	Project Manager: David Ranum	06-Feb-15 15:41

CAN020

1500415-08 (Air)

Oilfield Environmental and Compliance

Volatile Organic Compounds by EPA Method TO-15 **R-05**

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
Heptane	**21**	16	ppbv	32.75	B5B0018	02-Feb-15	03-Feb-15	TO-15 mod.	
Hexachlorobutadiene	ND	16	"	"	"	"	"	"	
Hexane	**250**	16	"	"	"	"	"	"	
2-Hexanone	ND	16	"	"	"	"	"	"	
Isopropyl alcohol	ND	16	"	"	"	"	"	"	
Methylene chloride	ND	16	"	"	"	"	"	"	
Methyl Ethyl Ketone	ND	16	"	"	"	"	"	"	
Methyl Isobutyl Ketone	ND	16	"	"	"	"	"	"	
Methyl-t-butyl ether	ND	16	"	"	"	"	"	"	
Naphthalene	ND	33	"	"	"	"	"	"	
Propylene	ND	16	"	"	"	"	"	"	
Styrene	ND	16	"	"	"	"	"	"	
t-Amyl Methyl Ether	ND	16	"	"	"	"	"	"	
t-Butyl alcohol	ND	16	"	"	"	"	"	"	
1,1,2,2-Tetrachloroethane	ND	16	"	"	"	"	"	"	
Tetrachloroethene (PCE)	ND	16	"	"	"	"	"	"	
Tetrahydrofuran	ND	16	"	"	"	"	"	"	
Toluene	ND	16	"	"	"	"	"	"	
1,2,4-Trichlorobenzene	ND	16	"	"	"	"	"	"	
1,1,1-Trichloroethane	ND	16	"	"	"	"	"	"	
1,1,2-Trichloroethane	ND	16	"	"	"	"	"	"	
Trichloroethene (TCE)	ND	16	"	"	"	"	"	"	
Trichlorofluoromethane	ND	16	"	"	"	"	"	"	
1,1,2-Trichlorotrifluoroethane	ND	16	"	"	"	"	"	"	
1,2,4-Trimethylbenzene	ND	16	"	"	"	"	"	"	
1,3,5-Trimethylbenzene	ND	16	"	"	"	"	"	"	
Vinyl acetate	ND	16	"	"	"	"	"	"	
Vinyl chloride	ND	16	"	"	"	"	"	"	
Xylenes (total)	ND	16	"	"	"	"	"	"	
TPH Gasoline (C4-C12)	ND	6600	"	"	"	"	"	"	

Oilfield Environmental and Compliance, INC.

Sage Environmental Consulting	Project: CARB	
720 West Arapaho Road	Project Number: CARB #1344	**Reported:**
Richardson TX, 75080	Project Manager: David Ranum	06-Feb-15 15:41

CAN021

1500415-09 (Air)

Oilfield Environmental and Compliance

Volatile Organic Compounds by EPA Method TO-15 **R-05**

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
Acetone	ND	67	ppbv	33.5	B5B0018	02-Feb-15	03-Feb-15	TO-15 mod.	
Benzene	ND	17	"	"	"	"	"	"	
Benzyl chloride	ND	17	"	"	"	"	"	"	
Bromodichloromethane	ND	17	"	"	"	"	"	"	
Bromoform	ND	17	"	"	"	"	"	"	
Bromomethane	ND	17	"	"	"	"	"	"	
1,3-Butadiene	ND	17	"	"	"	"	"	"	
Carbon disulfide	ND	17	"	"	"	"	"	"	
Carbon tetrachloride	ND	17	"	"	"	"	"	"	
Chlorobenzene	ND	17	"	"	"	"	"	"	
Chloroethane	ND	17	"	"	"	"	"	"	
Chloroform	ND	17	"	"	"	"	"	"	
Chloromethane	ND	17	"	"	"	"	"	"	
Cyclohexane	**36**	17	"	"	"	"	"	"	
Dibromochloromethane	ND	17	"	"	"	"	"	"	
1,2-Dibromoethane (EDB)	ND	17	"	"	"	"	"	"	
1,2-Dichlorobenzene	ND	17	"	"	"	"	"	"	
1,3-Dichlorobenzene	ND	17	"	"	"	"	"	"	
1,4-Dichlorobenzene	ND	17	"	"	"	"	"	"	
Dichlorodifluoromethane	ND	17	"	"	"	"	"	"	
1,1-Dichloroethane	ND	17	"	"	"	"	"	"	
1,2-Dichloroethane	ND	17	"	"	"	"	"	"	
1,1-Dichloroethene	ND	17	"	"	"	"	"	"	
cis-1,2-Dichloroethene	ND	17	"	"	"	"	"	"	
trans-1,2-Dichloroethene	ND	17	"	"	"	"	"	"	
1,2-Dichloropropane	ND	17	"	"	"	"	"	"	
cis-1,3-Dichloropropene	ND	17	"	"	"	"	"	"	
trans-1,3-Dichloropropene	ND	17	"	"	"	"	"	"	
1,2-Dichloro-1,1,2,2-tetrafluoroethane	ND	17	"	"	"	"	"	"	
Diisopropyl Ether	ND	17	"	"	"	"	"	"	
1,4-Dioxane	ND	17	"	"	"	"	"	"	
Ethanol	**140**	67	"	"	"	"	"	"	
Ethyl Acetate	ND	17	"	"	"	"	"	"	
Ethylbenzene	ND	17	"	"	"	"	"	"	
Ethyl t-Butyl Ether	ND	17	"	"	"	"	"	"	
4-Ethyltoluene	ND	17	"	"	"	"	"	"	

Oilfield Environmental and Compliance, INC.

Sage Environmental Consulting	Project: CARB	
720 West Arapaho Road	Project Number: CARB #1344	**Reported:**
Richardson TX, 75080	Project Manager: David Ranum	06-Feb-15 15:41

CAN021

1500415-09 (Air)

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes

Oilfield Environmental and Compliance

Volatile Organic Compounds by EPA Method TO-15 **R-05**

Heptane	ND	17	ppbv	33.5	B5B0018	02-Feb-15	03-Feb-15	TO-15 mod.	
Hexachlorobutadiene	ND	17	"	"	"	"	"	"	
Hexane	**77**	17	"	"	"	"	"	"	
2-Hexanone	ND	17	"	"	"	"	"	"	
Isopropyl alcohol	ND	17	"	"	"	"	"	"	
Methylene chloride	ND	17	"	"	"	"	"	"	
Methyl Ethyl Ketone	ND	17	"	"	"	"	"	"	
Methyl Isobutyl Ketone	ND	17	"	"	"	"	"	"	
Methyl-t-butyl ether	ND	17	"	"	"	"	"	"	
Naphthalene	ND	34	"	"	"	"	"	"	
Propylene	ND	17	"	"	"	"	"	"	
Styrene	ND	17	"	"	"	"	"	"	
t-Amyl Methyl Ether	ND	17	"	"	"	"	"	"	
t-Butyl alcohol	ND	17	"	"	"	"	"	"	
1,1,2,2-Tetrachloroethane	ND	17	"	"	"	"	"	"	
Tetrachloroethene (PCE)	ND	17	"	"	"	"	"	"	
Tetrahydrofuran	ND	17	"	"	"	"	"	"	
Toluene	ND	17	"	"	"	"	"	"	
1,2,4-Trichlorobenzene	ND	17	"	"	"	"	"	"	
1,1,1-Trichloroethane	ND	17	"	"	"	"	"	"	
1,1,2-Trichloroethane	ND	17	"	"	"	"	"	"	
Trichloroethene (TCE)	ND	17	"	"	"	"	"	"	
Trichlorofluoromethane	ND	17	"	"	"	"	"	"	
1,1,2-Trichlorotrifluoroethane	ND	17	"	"	"	"	"	"	
1,2,4-Trimethylbenzene	ND	17	"	"	"	"	"	"	
1,3,5-Trimethylbenzene	ND	17	"	"	"	"	"	"	
Vinyl acetate	ND	17	"	"	"	"	"	"	
Vinyl chloride	ND	17	"	"	"	"	"	"	
Xylenes (total)	ND	17	"	"	"	"	"	"	
TPH Gasoline (C4-C12)	ND	6700	"	"	"	"	"	"	

Oilfield Environmental and Compliance, INC.

Sage Environmental Consulting	Project: CARB	
720 West Arapaho Road	Project Number: CARB #1344	**Reported:**
Richardson TX, 75080	Project Manager: David Ranum	06-Feb-15 15:41

CAN022

1500415-10 (Air)

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes

Oilfield Environmental and Compliance

Volatile Organic Compounds by EPA Method TO-15

Acetone	ND	44	ppbv	22	B5B0018	02-Feb-15	02-Feb-15	TO-15 mod.	
Benzene	ND	11	"	"	"	"	"	"	
Benzyl chloride	ND	11	"	"	"	"	"	"	
Bromodichloromethane	ND	11	"	"	"	"	"	"	
Bromoform	ND	11	"	"	"	"	"	"	
Bromomethane	ND	11	"	"	"	"	"	"	
1,3-Butadiene	ND	11	"	"	"	"	"	"	
Carbon disulfide	ND	11	"	"	"	"	"	"	
Carbon tetrachloride	ND	11	"	"	"	"	"	"	
Chlorobenzene	ND	11	"	"	"	"	"	"	
Chloroethane	ND	11	"	"	"	"	"	"	
Chloroform	ND	11	"	"	"	"	"	"	
Chloromethane	ND	11	"	"	"	"	"	"	
Cyclohexane	ND	11	"	"	"	"	"	"	
Dibromochloromethane	ND	11	"	"	"	"	"	"	
1,2-Dibromoethane (EDB)	ND	11	"	"	"	"	"	"	
1,2-Dichlorobenzene	ND	11	"	"	"	"	"	"	
1,3-Dichlorobenzene	ND	11	"	"	"	"	"	"	
1,4-Dichlorobenzene	ND	11	"	"	"	"	"	"	
Dichlorodifluoromethane	ND	11	"	"	"	"	"	"	
1,1-Dichloroethane	ND	11	"	"	"	"	"	"	
1,2-Dichloroethane	ND	11	"	"	"	"	"	"	
1,1-Dichloroethene	ND	11	"	"	"	"	"	"	
cis-1,2-Dichloroethene	ND	11	"	"	"	"	"	"	
trans-1,2-Dichloroethene	ND	11	"	"	"	"	"	"	
1,2-Dichloropropane	ND	11	"	"	"	"	"	"	
cis-1,3-Dichloropropene	ND	11	"	"	"	"	"	"	
trans-1,3-Dichloropropene	ND	11	"	"	"	"	"	"	
1,2-Dichloro-1,1,2,2-tetrafluoroethane	ND	11	"	"	"	"	"	"	
Diisopropyl Ether	ND	11	"	"	"	"	"	"	
1,4-Dioxane	ND	11	"	"	"	"	"	"	
Ethanol	ND	44	"	"	"	"	"	"	
Ethyl Acetate	ND	11	"	"	"	"	"	"	
Ethylbenzene	ND	11	"	"	"	"	"	"	
Ethyl t-Butyl Ether	ND	11	"	"	"	"	"	"	
4-Ethyltoluene	ND	11	"	"	"	"	"	"	

Oilfield Environmental and Compliance, INC.

Sage Environmental Consulting	Project: CARB	
720 West Arapaho Road	Project Number: CARB #1344	**Reported:**
Richardson TX, 75080	Project Manager: David Ranum	06-Feb-15 15:41

CAN022

1500415-10 (Air)

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes

Oilfield Environmental and Compliance

Volatile Organic Compounds by EPA Method TO-15

Heptane	ND	11	ppbv	22	B5B0018	02-Feb-15	02-Feb-15	TO-15 mod.	
Hexachlorobutadiene	ND	11	"	"	"	"	"	"	
Hexane	**14**	11	"	"	"	"	"	"	
2-Hexanone	ND	11	"	"	"	"	"	"	
Isopropyl alcohol	ND	11	"	"	"	"	"	"	
Methylene chloride	ND	11	"	"	"	"	"	"	
Methyl Ethyl Ketone	ND	11	"	"	"	"	"	"	
Methyl Isobutyl Ketone	ND	11	"	"	"	"	"	"	
Methyl-t-butyl ether	ND	11	"	"	"	"	"	"	
Naphthalene	ND	22	"	"	"	"	"	"	
Propylene	ND	11	"	"	"	"	"	"	
Styrene	ND	11	"	"	"	"	"	"	
t-Amyl Methyl Ether	ND	11	"	"	"	"	"	"	
t-Butyl alcohol	ND	11	"	"	"	"	"	"	
1,1,2,2-Tetrachloroethane	ND	11	"	"	"	"	"	"	
Tetrachloroethene (PCE)	ND	11	"	"	"	"	"	"	
Tetrahydrofuran	ND	11	"	"	"	"	"	"	
Toluene	ND	11	"	"	"	"	"	"	
1,2,4-Trichlorobenzene	ND	11	"	"	"	"	"	"	
1,1,1-Trichloroethane	ND	11	"	"	"	"	"	"	
1,1,2-Trichloroethane	ND	11	"	"	"	"	"	"	
Trichloroethene (TCE)	ND	11	"	"	"	"	"	"	
Trichlorofluoromethane	ND	11	"	"	"	"	"	"	
1,1,2-Trichlorotrifluoroethane	ND	11	"	"	"	"	"	"	
1,2,4-Trimethylbenzene	ND	11	"	"	"	"	"	"	
1,3,5-Trimethylbenzene	ND	11	"	"	"	"	"	"	
Vinyl acetate	ND	11	"	"	"	"	"	"	
Vinyl chloride	ND	11	"	"	"	"	"	"	
Xylenes (total)	ND	11	"	"	"	"	"	"	
TPH Gasoline (C4-C12)	**12000**	4400	"	"	"	"	"	"	D-02

Oilfield Environmental and Compliance, INC.

Sage Environmental Consulting	Project: CARB	
720 West Arapaho Road	Project Number: CARB #1344	**Reported:**
Richardson TX, 75080	Project Manager: David Ranum	06-Feb-15 15:41

CAN023

1500415-11 (Air)

Oilfield Environmental and Compliance

Volatile Organic Compounds by EPA Method TO-15

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
Acetone	ND	45	ppbv	22.5	B5B0018	02-Feb-15	02-Feb-15	TO-15 mod.	
Benzene	**16**	11	"	"	"	"	"	"	
Benzyl chloride	ND	11	"	"	"	"	"	"	
Bromodichloromethane	ND	11	"	"	"	"	"	"	
Bromoform	ND	11	"	"	"	"	"	"	
Bromomethane	ND	11	"	"	"	"	"	"	
1,3-Butadiene	ND	11	"	"	"	"	"	"	
Carbon disulfide	ND	11	"	"	"	"	"	"	
Carbon tetrachloride	ND	11	"	"	"	"	"	"	
Chlorobenzene	ND	11	"	"	"	"	"	"	
Chloroethane	ND	11	"	"	"	"	"	"	
Chloroform	ND	11	"	"	"	"	"	"	
Chloromethane	ND	11	"	"	"	"	"	"	
Cyclohexane	**80**	11	"	"	"	"	"	"	
Dibromochloromethane	ND	11	"	"	"	"	"	"	
1,2-Dibromoethane (EDB)	ND	11	"	"	"	"	"	"	
1,2-Dichlorobenzene	ND	11	"	"	"	"	"	"	
1,3-Dichlorobenzene	ND	11	"	"	"	"	"	"	
1,4-Dichlorobenzene	ND	11	"	"	"	"	"	"	
Dichlorodifluoromethane	ND	11	"	"	"	"	"	"	
1,1-Dichloroethane	ND	11	"	"	"	"	"	"	
1,2-Dichloroethane	ND	11	"	"	"	"	"	"	
1,1-Dichloroethene	ND	11	"	"	"	"	"	"	
cis-1,2-Dichloroethene	ND	11	"	"	"	"	"	"	
trans-1,2-Dichloroethene	ND	11	"	"	"	"	"	"	
1,2-Dichloropropane	ND	11	"	"	"	"	"	"	
cis-1,3-Dichloropropene	ND	11	"	"	"	"	"	"	
trans-1,3-Dichloropropene	ND	11	"	"	"	"	"	"	
1,2-Dichloro-1,1,2,2-tetrafluoroethane	ND	11	"	"	"	"	"	"	
Diisopropyl Ether	ND	11	"	"	"	"	"	"	
1,4-Dioxane	ND	11	"	"	"	"	"	"	
Ethanol	ND	45	"	"	"	"	"	"	
Ethyl Acetate	ND	11	"	"	"	"	"	"	
Ethylbenzene	ND	11	"	"	"	"	"	"	
Ethyl t-Butyl Ether	ND	11	"	"	"	"	"	"	
4-Ethyltoluene	ND	11	"	"	"	"	"	"	

Oilfield Environmental and Compliance, INC.

Sage Environmental Consulting	Project: CARB	
720 West Arapaho Road	Project Number: CARB #1344	**Reported:**
Richardson TX, 75080	Project Manager: David Ranum	06-Feb-15 15:41

CAN023

1500415-11 (Air)

Oilfield Environmental and Compliance

Volatile Organic Compounds by EPA Method TO-15

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
Heptane	**26**	11	ppbv	22.5	B5B0018	02-Feb-15	02-Feb-15	TO-15 mod.	
Hexachlorobutadiene	ND	11	"	"	"	"	"	"	
Hexane	**170**	11	"	"	"	"	"	"	
2-Hexanone	ND	11	"	"	"	"	"	"	
Isopropyl alcohol	ND	11	"	"	"	"	"	"	
Methylene chloride	ND	11	"	"	"	"	"	"	
Methyl Ethyl Ketone	ND	11	"	"	"	"	"	"	
Methyl Isobutyl Ketone	ND	11	"	"	"	"	"	"	
Methyl-t-butyl ether	ND	11	"	"	"	"	"	"	
Naphthalene	ND	23	"	"	"	"	"	"	
Propylene	ND	11	"	"	"	"	"	"	
Styrene	ND	11	"	"	"	"	"	"	
t-Amyl Methyl Ether	ND	11	"	"	"	"	"	"	
t-Butyl alcohol	ND	11	"	"	"	"	"	"	
1,1,2,2-Tetrachloroethane	ND	11	"	"	"	"	"	"	
Tetrachloroethene (PCE)	ND	11	"	"	"	"	"	"	
Tetrahydrofuran	ND	11	"	"	"	"	"	"	
Toluene	**12**	11	"	"	"	"	"	"	
1,2,4-Trichlorobenzene	ND	11	"	"	"	"	"	"	
1,1,1-Trichloroethane	ND	11	"	"	"	"	"	"	
1,1,2-Trichloroethane	ND	11	"	"	"	"	"	"	
Trichloroethene (TCE)	ND	11	"	"	"	"	"	"	
Trichlorofluoromethane	ND	11	"	"	"	"	"	"	
1,1,2-Trichlorotrifluoroethane	ND	11	"	"	"	"	"	"	
1,2,4-Trimethylbenzene	ND	11	"	"	"	"	"	"	
1,3,5-Trimethylbenzene	ND	11	"	"	"	"	"	"	
Vinyl acetate	ND	11	"	"	"	"	"	"	
Vinyl chloride	ND	11	"	"	"	"	"	"	
Xylenes (total)	ND	11	"	"	"	"	"	"	
TPH Gasoline (C4-C12)	ND	4500	"	"	"	"	"	"	

Oilfield Environmental and Compliance, INC.

Sage Environmental Consulting	Project: CARB	
720 West Arapaho Road	Project Number: CARB #1344	**Reported:**
Richardson TX, 75080	Project Manager: David Ranum	10-Mar-15 14:34

TB024B

1500806-02 (Air)

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes

Oilfield Environmental and Compliance

Volatile Organic Compounds by EPA Method TO-15 **R-02, TS-3**

Acetone	ND	37	ppbv	18.7	B5C0189	06-Mar-15	07-Mar-15	TO-15 mod.	
Benzene	ND	9.4	"	"	"	"	"	"	
Benzyl chloride	ND	9.4	"	"	"	"	"	"	
Bromodichloromethane	ND	9.4	"	"	"	"	"	"	
Bromoform	ND	9.4	"	"	"	"	"	"	
Bromomethane	ND	9.4	"	"	"	"	"	"	
1,3-Butadiene	ND	9.4	"	"	"	"	"	"	
Carbon disulfide	ND	9.4	"	"	"	"	"	"	
Carbon tetrachloride	ND	9.4	"	"	"	"	"	"	
Chlorobenzene	ND	9.4	"	"	"	"	"	"	
Chloroethane	ND	9.4	"	"	"	"	"	"	
Chloroform	ND	9.4	"	"	"	"	"	"	
Chloromethane	ND	9.4	"	"	"	"	"	"	
Cyclohexane	ND	9.4	"	"	"	"	"	"	
Dibromochloromethane	ND	9.4	"	"	"	"	"	"	
1,2-Dibromoethane (EDB)	ND	9.4	"	"	"	"	"	"	
1,2-Dichlorobenzene	ND	9.4	"	"	"	"	"	"	
1,3-Dichlorobenzene	ND	9.4	"	"	"	"	"	"	
1,4-Dichlorobenzene	ND	9.4	"	"	"	"	"	"	
Dichlorodifluoromethane	ND	9.4	"	"	"	"	"	"	
1,1-Dichloroethane	ND	9.4	"	"	"	"	"	"	
1,2-Dichloroethane	ND	9.4	"	"	"	"	"	"	
1,1-Dichloroethene	ND	9.4	"	"	"	"	"	"	
cis-1,2-Dichloroethene	ND	9.4	"	"	"	"	"	"	
trans-1,2-Dichloroethene	ND	9.4	"	"	"	"	"	"	
1,2-Dichloropropane	ND	9.4	"	"	"	"	"	"	
cis-1,3-Dichloropropene	ND	9.4	"	"	"	"	"	"	
trans-1,3-Dichloropropene	ND	9.4	"	"	"	"	"	"	
1,2-Dichloro-1,1,2,2-tetrafluoroethane	ND	9.4	"	"	"	"	"	"	
Diisopropyl Ether	ND	9.4	"	"	"	"	"	"	
1,4-Dioxane	ND	9.4	"	"	"	"	"	"	
Ethanol	ND	37	"	"	"	"	"	"	

Oilfield Environmental and Compliance, INC.

Sage Environmental Consulting	Project: CARB	
720 West Arapaho Road	Project Number: CARB #1344	**Reported:**
Richardson TX, 75080	Project Manager: David Ranum	10-Mar-15 14:34

TB024B

1500806-02 (Air)

Oilfield Environmental and Compliance

Volatile Organic Compounds by EPA Method TO-15 **R-02, TS-3**

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
Ethyl Acetate	ND	9.4	ppbv	18.7	B5C0189	06-Mar-15	07-Mar-15	TO-15 mod.	
Ethylbenzene	ND	9.4	"	"	"	"	"	"	
Ethyl t-Butyl Ether	ND	9.4	"	"	"	"	"	"	
4-Ethyltoluene	ND	9.4	"	"	"	"	"	"	
Heptane	ND	9.4	"	"	"	"	"	"	
Hexachlorobutadiene	ND	9.4	"	"	"	"	"	"	
Hexane	ND	9.4	"	"	"	"	"	"	
2-Hexanone	ND	9.4	"	"	"	"	"	"	
Isopropyl alcohol	ND	9.4	"	"	"	"	"	"	
Methylene chloride	ND	9.4	"	"	"	"	"	"	
Methyl Ethyl Ketone	ND	9.4	"	"	"	"	"	"	
Methyl Isobutyl Ketone	ND	9.4	"	"	"	"	"	"	
Methyl-t-butyl ether	ND	9.4	"	"	"	"	"	"	
Naphthalene	ND	19	"	"	"	"	"	"	
Propylene	ND	9.4	"	"	"	"	"	"	
Styrene	ND	9.4	"	"	"	"	"	"	
t-Amyl Methyl Ether	ND	9.4	"	"	"	"	"	"	
t-Butyl alcohol	ND	9.4	"	"	"	"	"	"	
1,1,2,2-Tetrachloroethane	ND	9.4	"	"	"	"	"	"	
Tetrachloroethene (PCE)	ND	9.4	"	"	"	"	"	"	
Tetrahydrofuran	ND	9.4	"	"	"	"	"	"	
Toluene	ND	9.4	"	"	"	"	"	"	
1,2,4-Trichlorobenzene	ND	9.4	"	"	"	"	"	"	
1,1,1-Trichloroethane	ND	9.4	"	"	"	"	"	"	
1,1,2-Trichloroethane	ND	9.4	"	"	"	"	"	"	
Trichloroethene (TCE)	ND	9.4	"	"	"	"	"	"	
Trichlorofluoromethane	ND	9.4	"	"	"	"	"	"	
1,1,2-Trichlorotrifluoroethane	ND	9.4	"	"	"	"	"	"	
1,2,4-Trimethylbenzene	ND	9.4	"	"	"	"	"	"	
1,3,5-Trimethylbenzene	ND	9.4	"	"	"	"	"	"	
Vinyl acetate	ND	9.4	"	"	"	"	"	"	
Vinyl chloride	ND	9.4	"	"	"	"	"	"	
Xylenes (total)	ND	9.4	"	"	"	"	"	"	
TPH Gasoline (C4-C12)	ND	3700	"	"	"	"	"	"	

Oilfield Environmental and Compliance, INC.

Sage Environmental Consulting	Project: CARB	
720 West Arapaho Road	Project Number: CARB #1344	**Reported:**
Richardson TX, 75080	Project Manager: David Ranum	10-Mar-15 14:34

TB025B

1500806-04 (Air)

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes

Oilfield Environmental and Compliance

Volatile Organic Compounds by EPA Method TO-15 **R-05, TS-3**

Acetone	ND	72	ppbv	35.95	B5C0189	06-Mar-15	07-Mar-15	TO-15 mod.	
Benzene	**53**	18	"	"	"	"	"	"	
Benzyl chloride	ND	18	"	"	"	"	"	"	
Bromodichloromethane	ND	18	"	"	"	"	"	"	
Bromoform	ND	18	"	"	"	"	"	"	
Bromomethane	ND	18	"	"	"	"	"	"	
1,3-Butadiene	ND	18	"	"	"	"	"	"	
Carbon disulfide	ND	18	"	"	"	"	"	"	
Carbon tetrachloride	ND	18	"	"	"	"	"	"	
Chlorobenzene	ND	18	"	"	"	"	"	"	
Chloroethane	ND	18	"	"	"	"	"	"	
Chloroform	ND	18	"	"	"	"	"	"	
Chloromethane	ND	18	"	"	"	"	"	"	
Cyclohexane	**87**	18	"	"	"	"	"	"	
Dibromochloromethane	ND	18	"	"	"	"	"	"	
1,2-Dibromoethane (EDB)	ND	18	"	"	"	"	"	"	
1,2-Dichlorobenzene	ND	18	"	"	"	"	"	"	
1,3-Dichlorobenzene	ND	18	"	"	"	"	"	"	
1,4-Dichlorobenzene	ND	18	"	"	"	"	"	"	
Dichlorodifluoromethane	ND	18	"	"	"	"	"	"	
1,1-Dichloroethane	ND	18	"	"	"	"	"	"	
1,2-Dichloroethane	ND	18	"	"	"	"	"	"	
1,1-Dichloroethene	ND	18	"	"	"	"	"	"	
cis-1,2-Dichloroethene	ND	18	"	"	"	"	"	"	
trans-1,2-Dichloroethene	ND	18	"	"	"	"	"	"	
1,2-Dichloropropane	ND	18	"	"	"	"	"	"	
cis-1,3-Dichloropropene	ND	18	"	"	"	"	"	"	
trans-1,3-Dichloropropene	ND	18	"	"	"	"	"	"	
1,2-Dichloro-1,1,2,2-tetrafluoroethane	ND	18	"	"	"	"	"	"	
Diisopropyl Ether	ND	18	"	"	"	"	"	"	
1,4-Dioxane	ND	18	"	"	"	"	"	"	
Ethanol	**95**	72	"	"	"	"	"	"	
Ethyl Acetate	ND	18	"	"	"	"	"	"	
Ethylbenzene	ND	18	"	"	"	"	"	"	
Ethyl t-Butyl Ether	ND	18	"	"	"	"	"	"	
4-Ethyltoluene	ND	18	"	"	"	"	"	"	

Oilfield Environmental and Compliance, INC.

Sage Environmental Consulting	Project: CARB	
720 West Arapaho Road	Project Number: CARB #1344	**Reported:**
Richardson TX, 75080	Project Manager: David Ranum	10-Mar-15 14:34

TB025B

1500806-04 (Air)

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes

Oilfield Environmental and Compliance

Volatile Organic Compounds by EPA Method TO-15 **R-05, TS-3**

Heptane	**35**	18	ppbv	35.95	B5C0189	06-Mar-15	07-Mar-15	TO-15 mod.	
Hexachlorobutadiene	ND	18	"	"	"	"	"	"	
Hexane	**73**	18	"	"	"	"	"	"	
2-Hexanone	ND	18	"	"	"	"	"	"	
Isopropyl alcohol	ND	18	"	"	"	"	"	"	
Methylene chloride	ND	18	"	"	"	"	"	"	
Methyl Ethyl Ketone	ND	18	"	"	"	"	"	"	
Methyl Isobutyl Ketone	ND	18	"	"	"	"	"	"	
Methyl-t-butyl ether	ND	18	"	"	"	"	"	"	
Naphthalene	ND	36	"	"	"	"	"	"	
Propylene	ND	18	"	"	"	"	"	"	
Styrene	ND	18	"	"	"	"	"	"	
t-Amyl Methyl Ether	ND	18	"	"	"	"	"	"	
t-Butyl alcohol	ND	18	"	"	"	"	"	"	
1,1,2,2-Tetrachloroethane	ND	18	"	"	"	"	"	"	
Tetrachloroethene (PCE)	ND	18	"	"	"	"	"	"	
Tetrahydrofuran	ND	18	"	"	"	"	"	"	
Toluene	**29**	18	"	"	"	"	"	"	
1,2,4-Trichlorobenzene	ND	18	"	"	"	"	"	"	
1,1,1-Trichloroethane	ND	18	"	"	"	"	"	"	
1,1,2-Trichloroethane	ND	18	"	"	"	"	"	"	
Trichloroethene (TCE)	ND	18	"	"	"	"	"	"	
Trichlorofluoromethane	ND	18	"	"	"	"	"	"	
1,1,2-Trichlorotrifluoroethane	ND	18	"	"	"	"	"	"	
1,2,4-Trimethylbenzene	ND	18	"	"	"	"	"	"	
1,3,5-Trimethylbenzene	ND	18	"	"	"	"	"	"	
Vinyl acetate	ND	18	"	"	"	"	"	"	
Vinyl chloride	ND	18	"	"	"	"	"	"	
Xylenes (total)	ND	18	"	"	"	"	"	"	
TPH Gasoline (C4-C12)	ND	7200	"	"	"	"	"	"	

Oilfield Environmental and Compliance, INC.

Sage Environmental Consulting	Project: CARB	
720 West Arapaho Road	Project Number: CARB #1344	**Reported:**
Richardson TX, 75080	Project Manager: David Ranum	10-Mar-15 14:08

TB026A/B

1500835-01 (Air)

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes

Oilfield Environmental and Compliance

Volatile Organic Compounds by EPA Method TO-15 **TS-3**

Acetone	ND	35	ppbv	17.73	B5C0189	06-Mar-15	07-Mar-15	TO-15 mod.
Benzene	ND	8.9	"	"	"	"	"	"
Benzyl chloride	ND	8.9	"	"	"	"	"	"
Bromodichloromethane	ND	8.9	"	"	"	"	"	"
Bromoform	ND	8.9	"	"	"	"	"	"
Bromomethane	ND	8.9	"	"	"	"	"	"
1,3-Butadiene	ND	8.9	"	"	"	"	"	"
Carbon disulfide	ND	8.9	"	"	"	"	"	"
Carbon tetrachloride	ND	8.9	"	"	"	"	"	"
Chlorobenzene	ND	8.9	"	"	"	"	"	"
Chloroethane	ND	8.9	"	"	"	"	"	"
Chloroform	ND	8.9	"	"	"	"	"	"
Chloromethane	ND	8.9	"	"	"	"	"	"
Cyclohexane	ND	8.9	"	"	"	"	"	"
Dibromochloromethane	ND	8.9	"	"	"	"	"	"
1,2-Dibromoethane (EDB)	ND	8.9	"	"	"	"	"	"
1,2-Dichlorobenzene	ND	8.9	"	"	"	"	"	"
1,3-Dichlorobenzene	ND	8.9	"	"	"	"	"	"
1,4-Dichlorobenzene	ND	8.9	"	"	"	"	"	"
Dichlorodifluoromethane	ND	8.9	"	"	"	"	"	"
1,1-Dichloroethane	ND	8.9	"	"	"	"	"	"
1,2-Dichloroethane	ND	8.9	"	"	"	"	"	"
1,1-Dichloroethene	ND	8.9	"	"	"	"	"	"
cis-1,2-Dichloroethene	ND	8.9	"	"	"	"	"	"
trans-1,2-Dichloroethene	ND	8.9	"	"	"	"	"	"
1,2-Dichloropropane	ND	8.9	"	"	"	"	"	"
cis-1,3-Dichloropropene	ND	8.9	"	"	"	"	"	"
trans-1,3-Dichloropropene	ND	8.9	"	"	"	"	"	"
1,2-Dichloro-1,1,2,2-tetrafluoroethane	ND	8.9	"	"	"	"	"	"
Diisopropyl Ether	ND	8.9	"	"	"	"	"	"
1,4-Dioxane	ND	8.9	"	"	"	"	"	"
Ethanol	**110**	35	"	"	"	"	"	"

Oilfield Environmental and Compliance, INC.

Sage Environmental Consulting	Project: CARB	
720 West Arapaho Road	Project Number: CARB #1344	**Reported:**
Richardson TX, 75080	Project Manager: David Ranum	10-Mar-15 14:08

TB026A/B

1500835-01 (Air)

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes

Oilfield Environmental and Compliance

Volatile Organic Compounds by EPA Method TO-15 **TS-3**

Ethyl Acetate	ND	8.9	ppbv	17.73	B5C0189	06-Mar-15	07-Mar-15	TO-15 mod.	
Ethylbenzene	ND	8.9	"	"	"	"	"	"	
Ethyl t-Butyl Ether	ND	8.9	"	"	"	"	"	"	
4-Ethyltoluene	ND	8.9	"	"	"	"	"	"	
Heptane	ND	8.9	"	"	"	"	"	"	
Hexachlorobutadiene	ND	8.9	"	"	"	"	"	"	
Hexane	ND	8.9	"	"	"	"	"	"	
2-Hexanone	ND	8.9	"	"	"	"	"	"	
Isopropyl alcohol	ND	8.9	"	"	"	"	"	"	
Methylene chloride	ND	8.9	"	"	"	"	"	"	
Methyl Ethyl Ketone	ND	8.9	"	"	"	"	"	"	
Methyl Isobutyl Ketone	ND	8.9	"	"	"	"	"	"	
Methyl-t-butyl ether	ND	8.9	"	"	"	"	"	"	
Naphthalene	ND	18	"	"	"	"	"	"	
Propylene	ND	8.9	"	"	"	"	"	"	
Styrene	ND	8.9	"	"	"	"	"	"	
t-Amyl Methyl Ether	ND	8.9	"	"	"	"	"	"	
t-Butyl alcohol	ND	8.9	"	"	"	"	"	"	
1,1,2,2-Tetrachloroethane	ND	8.9	"	"	"	"	"	"	
Tetrachloroethene (PCE)	ND	8.9	"	"	"	"	"	"	
Tetrahydrofuran	ND	8.9	"	"	"	"	"	"	
Toluene	**9.2**	8.9	"	"	"	"	"	"	
1,2,4-Trichlorobenzene	ND	8.9	"	"	"	"	"	"	
1,1,1-Trichloroethane	ND	8.9	"	"	"	"	"	"	
1,1,2-Trichloroethane	ND	8.9	"	"	"	"	"	"	
Trichloroethene (TCE)	ND	8.9	"	"	"	"	"	"	
Trichlorofluoromethane	ND	8.9	"	"	"	"	"	"	
1,1,2-Trichlorotrifluoroethane	ND	8.9	"	"	"	"	"	"	
1,2,4-Trimethylbenzene	ND	8.9	"	"	"	"	"	"	
1,3,5-Trimethylbenzene	ND	8.9	"	"	"	"	"	"	
Vinyl acetate	ND	8.9	"	"	"	"	"	"	
Vinyl chloride	ND	8.9	"	"	"	"	"	"	
Xylenes (total)	ND	8.9	"	"	"	"	"	"	
TPH Gasoline (C4-C12)	ND	3500	"	"	"	"	"	"	

Oilfield Environmental and Compliance, INC.

Sage Environmental Consulting	Project: CARB	
720 West Arapaho Road	Project Number: CARB #1344	**Reported:**
Richardson TX, 75080	Project Manager: David Ranum	10-Mar-15 14:08

TB027A/B

1500835-02 (Air)

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes

Oilfield Environmental and Compliance

Volatile Organic Compounds by EPA Method TO-15 **TS-3**

Acetone	ND	36	ppbv	17.95	B5C0189	06-Mar-15	07-Mar-15	TO-15 mod.	
Benzene	ND	9.0	"	"	"	"	"	"	
Benzyl chloride	ND	9.0	"	"	"	"	"	"	
Bromodichloromethane	ND	9.0	"	"	"	"	"	"	
Bromoform	ND	9.0	"	"	"	"	"	"	
Bromomethane	ND	9.0	"	"	"	"	"	"	
1,3-Butadiene	ND	9.0	"	"	"	"	"	"	
Carbon disulfide	ND	9.0	"	"	"	"	"	"	
Carbon tetrachloride	ND	9.0	"	"	"	"	"	"	
Chlorobenzene	ND	9.0	"	"	"	"	"	"	
Chloroethane	ND	9.0	"	"	"	"	"	"	
Chloroform	ND	9.0	"	"	"	"	"	"	
Chloromethane	ND	9.0	"	"	"	"	"	"	
Cyclohexane	ND	9.0	"	"	"	"	"	"	
Dibromochloromethane	ND	9.0	"	"	"	"	"	"	
1,2-Dibromoethane (EDB)	ND	9.0	"	"	"	"	"	"	
1,2-Dichlorobenzene	ND	9.0	"	"	"	"	"	"	
1,3-Dichlorobenzene	ND	9.0	"	"	"	"	"	"	
1,4-Dichlorobenzene	ND	9.0	"	"	"	"	"	"	
Dichlorodifluoromethane	ND	9.0	"	"	"	"	"	"	
1,1-Dichloroethane	ND	9.0	"	"	"	"	"	"	
1,2-Dichloroethane	ND	9.0	"	"	"	"	"	"	
1,1-Dichloroethene	ND	9.0	"	"	"	"	"	"	
cis-1,2-Dichloroethene	ND	9.0	"	"	"	"	"	"	
trans-1,2-Dichloroethene	ND	9.0	"	"	"	"	"	"	
1,2-Dichloropropane	ND	9.0	"	"	"	"	"	"	
cis-1,3-Dichloropropene	ND	9.0	"	"	"	"	"	"	
trans-1,3-Dichloropropene	ND	9.0	"	"	"	"	"	"	
1,2-Dichloro-1,1,2,2-tetrafluoroethane	ND	9.0	"	"	"	"	"	"	
Diisopropyl Ether	ND	9.0	"	"	"	"	"	"	
1,4-Dioxane	ND	9.0	"	"	"	"	"	"	
Ethanol	**84**	36	"	"	"	"	"	"	
Ethyl Acetate	ND	9.0	"	"	"	"	"	"	
Ethylbenzene	ND	9.0	"	"	"	"	"	"	
Ethyl t-Butyl Ether	ND	9.0	"	"	"	"	"	"	
4-Ethyltoluene	ND	9.0	"	"	"	"	"	"	

Oilfield Environmental and Compliance, INC.

Sage Environmental Consulting	Project: CARB	
720 West Arapaho Road	Project Number: CARB #1344	**Reported:**
Richardson TX, 75080	Project Manager: David Ranum	10-Mar-15 14:08

TB027A/B

1500835-02 (Air)

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes

Oilfield Environmental and Compliance

Volatile Organic Compounds by EPA Method TO-15 **TS-3**

Heptane	ND	9.0	ppbv	17.95	B5C0189	06-Mar-15	07-Mar-15	TO-15 mod.	
Hexachlorobutadiene	ND	9.0	"	"	"	"	"	"	
Hexane	ND	9.0	"	"	"	"	"	"	
2-Hexanone	ND	9.0	"	"	"	"	"	"	
Isopropyl alcohol	ND	9.0	"	"	"	"	"	"	
Methylene chloride	ND	9.0	"	"	"	"	"	"	
Methyl Ethyl Ketone	ND	9.0	"	"	"	"	"	"	
Methyl Isobutyl Ketone	ND	9.0	"	"	"	"	"	"	
Methyl-t-butyl ether	ND	9.0	"	"	"	"	"	"	
Naphthalene	ND	18	"	"	"	"	"	"	
Propylene	ND	9.0	"	"	"	"	"	"	
Styrene	ND	9.0	"	"	"	"	"	"	
t-Amyl Methyl Ether	ND	9.0	"	"	"	"	"	"	
t-Butyl alcohol	ND	9.0	"	"	"	"	"	"	
1,1,2,2-Tetrachloroethane	ND	9.0	"	"	"	"	"	"	
Tetrachloroethene (PCE)	ND	9.0	"	"	"	"	"	"	
Tetrahydrofuran	ND	9.0	"	"	"	"	"	"	
Toluene	ND	9.0	"	"	"	"	"	"	
1,2,4-Trichlorobenzene	ND	9.0	"	"	"	"	"	"	
1,1,1-Trichloroethane	ND	9.0	"	"	"	"	"	"	
1,1,2-Trichloroethane	ND	9.0	"	"	"	"	"	"	
Trichloroethene (TCE)	ND	9.0	"	"	"	"	"	"	
Trichlorofluoromethane	ND	9.0	"	"	"	"	"	"	
1,1,2-Trichlorotrifluoroethane	ND	9.0	"	"	"	"	"	"	
1,2,4-Trimethylbenzene	ND	9.0	"	"	"	"	"	"	
1,3,5-Trimethylbenzene	ND	9.0	"	"	"	"	"	"	
Vinyl acetate	ND	9.0	"	"	"	"	"	"	
Vinyl chloride	ND	9.0	"	"	"	"	"	"	
Xylenes (total)	ND	9.0	"	"	"	"	"	"	
TPH Gasoline (C4-C12)	ND	3600	"	"	"	"	"	"	

Oilfield Environmental and Compliance, INC.

Sage Environmental Consulting	Project: CARB	
720 West Arapaho Road	Project Number: CARB #1344	**Reported:**
Richardson TX, 75080	Project Manager: David Ranum	10-Mar-15 10:14

TB028A

1500853-01 (Air)

Oilfield Environmental and Compliance

Volatile Organic Compounds by EPA Method TO-15 **TS-3**

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
Acetone	ND	39	ppbv	19.5	B5C0204	07-Mar-15	07-Mar-15	TO-15 mod.	
Benzene	**9.8**	9.8	"	"	"	"	"	"	
Benzyl chloride	ND	9.8	"	"	"	"	"	"	
Bromodichloromethane	ND	9.8	"	"	"	"	"	"	
Bromoform	ND	9.8	"	"	"	"	"	"	
Bromomethane	ND	9.8	"	"	"	"	"	"	
1,3-Butadiene	ND	9.8	"	"	"	"	"	"	
Carbon disulfide	ND	9.8	"	"	"	"	"	"	
Carbon tetrachloride	ND	9.8	"	"	"	"	"	"	
Chlorobenzene	ND	9.8	"	"	"	"	"	"	
Chloroethane	ND	9.8	"	"	"	"	"	"	
Chloroform	ND	9.8	"	"	"	"	"	"	
Chloromethane	ND	9.8	"	"	"	"	"	"	
Cyclohexane	**17**	9.8	"	"	"	"	"	"	
Dibromochloromethane	ND	9.8	"	"	"	"	"	"	
1,2-Dibromoethane (EDB)	ND	9.8	"	"	"	"	"	"	
1,2-Dichlorobenzene	ND	9.8	"	"	"	"	"	"	
1,3-Dichlorobenzene	ND	9.8	"	"	"	"	"	"	
1,4-Dichlorobenzene	ND	9.8	"	"	"	"	"	"	
Dichlorodifluoromethane	ND	9.8	"	"	"	"	"	"	
1,1-Dichloroethane	ND	9.8	"	"	"	"	"	"	
1,2-Dichloroethane	ND	9.8	"	"	"	"	"	"	
1,1-Dichloroethene	ND	9.8	"	"	"	"	"	"	
cis-1,2-Dichloroethene	ND	9.8	"	"	"	"	"	"	
trans-1,2-Dichloroethene	ND	9.8	"	"	"	"	"	"	
1,2-Dichloropropane	ND	9.8	"	"	"	"	"	"	
cis-1,3-Dichloropropene	ND	9.8	"	"	"	"	"	"	
trans-1,3-Dichloropropene	ND	9.8	"	"	"	"	"	"	
1,2-Dichloro-1,1,2,2-tetrafluoroethane	ND	9.8	"	"	"	"	"	"	
Diisopropyl Ether	ND	9.8	"	"	"	"	"	"	
1,4-Dioxane	ND	9.8	"	"	"	"	"	"	
Ethanol	ND	39	"	"	"	"	"	"	

Oilfield Environmental and Compliance, INC.

Sage Environmental Consulting	Project: CARB	
720 West Arapaho Road	Project Number: CARB #1344	**Reported:**
Richardson TX, 75080	Project Manager: David Ranum	10-Mar-15 10:14

TB028A

1500853-01 (Air)

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes

Oilfield Environmental and Compliance

Volatile Organic Compounds by EPA Method TO-15 **TS-3**

Ethyl Acetate	ND	9.8	ppbv	19.5	B5C0204	07-Mar-15	07-Mar-15	TO-15 mod.	
Ethylbenzene	ND	9.8	"	"	"	"	"	"	
Ethyl t-Butyl Ether	ND	9.8	"	"	"	"	"	"	
4-Ethyltoluene	ND	9.8	"	"	"	"	"	"	
Heptane	ND	9.8	"	"	"	"	"	"	
Hexachlorobutadiene	ND	9.8	"	"	"	"	"	"	
Hexane	**16**	9.8	"	"	"	"	"	"	
2-Hexanone	ND	9.8	"	"	"	"	"	"	
Isopropyl alcohol	ND	9.8	"	"	"	"	"	"	
Methylene chloride	ND	9.8	"	"	"	"	"	"	
Methyl Ethyl Ketone	ND	9.8	"	"	"	"	"	"	
Methyl Isobutyl Ketone	ND	9.8	"	"	"	"	"	"	
Methyl-t-butyl ether	ND	9.8	"	"	"	"	"	"	
Naphthalene	ND	20	"	"	"	"	"	"	
Propylene	ND	9.8	"	"	"	"	"	"	
Styrene	ND	9.8	"	"	"	"	"	"	
t-Amyl Methyl Ether	ND	9.8	"	"	"	"	"	"	
t-Butyl alcohol	ND	9.8	"	"	"	"	"	"	
1,1,2,2-Tetrachloroethane	ND	9.8	"	"	"	"	"	"	
Tetrachloroethene (PCE)	ND	9.8	"	"	"	"	"	"	
Tetrahydrofuran	ND	9.8	"	"	"	"	"	"	
Toluene	ND	9.8	"	"	"	"	"	"	
1,2,4-Trichlorobenzene	ND	9.8	"	"	"	"	"	"	
1,1,1-Trichloroethane	ND	9.8	"	"	"	"	"	"	
1,1,2-Trichloroethane	ND	9.8	"	"	"	"	"	"	
Trichloroethene (TCE)	ND	9.8	"	"	"	"	"	"	
Trichlorofluoromethane	ND	9.8	"	"	"	"	"	"	
1,1,2-Trichlorotrifluoroethane	ND	9.8	"	"	"	"	"	"	
1,2,4-Trimethylbenzene	ND	9.8	"	"	"	"	"	"	
1,3,5-Trimethylbenzene	ND	9.8	"	"	"	"	"	"	
Vinyl acetate	ND	9.8	"	"	"	"	"	"	
Vinyl chloride	ND	9.8	"	"	"	"	"	"	
Xylenes (total)	ND	9.8	"	"	"	"	"	"	
TPH Gasoline (C4-C12)	ND	3900	"	"	"	"	"	"	

Oilfield Environmental and Compliance, INC.

Sage Environmental Consulting	Project: CARB	
720 West Arapaho Road	Project Number: CARB #1344	**Reported:**
Richardson TX, 75080	Project Manager: David Ranum	10-Mar-15 10:14

TB029B

1500853-02 (Air)

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes

Oilfield Environmental and Compliance

Volatile Organic Compounds by EPA Method TO-15 **TS-3**

Acetone	ND	37	ppbv	18.5	B5C0204	07-Mar-15	08-Mar-15	TO-15 mod.	
Benzene	**21**	9.3	"	"	"	"	"	"	
Benzyl chloride	ND	9.3	"	"	"	"	"	"	
Bromodichloromethane	ND	9.3	"	"	"	"	"	"	
Bromoform	ND	9.3	"	"	"	"	"	"	
Bromomethane	ND	9.3	"	"	"	"	"	"	
1,3-Butadiene	ND	9.3	"	"	"	"	"	"	
Carbon disulfide	ND	9.3	"	"	"	"	"	"	
Carbon tetrachloride	ND	9.3	"	"	"	"	"	"	
Chlorobenzene	ND	9.3	"	"	"	"	"	"	
Chloroethane	ND	9.3	"	"	"	"	"	"	
Chloroform	ND	9.3	"	"	"	"	"	"	
Chloromethane	ND	9.3	"	"	"	"	"	"	
Cyclohexane	**55**	9.3	"	"	"	"	"	"	
Dibromochloromethane	ND	9.3	"	"	"	"	"	"	
1,2-Dibromoethane (EDB)	ND	9.3	"	"	"	"	"	"	
1,2-Dichlorobenzene	ND	9.3	"	"	"	"	"	"	
1,3-Dichlorobenzene	ND	9.3	"	"	"	"	"	"	
1,4-Dichlorobenzene	ND	9.3	"	"	"	"	"	"	
Dichlorodifluoromethane	ND	9.3	"	"	"	"	"	"	
1,1-Dichloroethane	ND	9.3	"	"	"	"	"	"	
1,2-Dichloroethane	ND	9.3	"	"	"	"	"	"	
1,1-Dichloroethene	ND	9.3	"	"	"	"	"	"	
cis-1,2-Dichloroethene	ND	9.3	"	"	"	"	"	"	
trans-1,2-Dichloroethene	ND	9.3	"	"	"	"	"	"	
1,2-Dichloropropane	ND	9.3	"	"	"	"	"	"	
cis-1,3-Dichloropropene	ND	9.3	"	"	"	"	"	"	
trans-1,3-Dichloropropene	ND	9.3	"	"	"	"	"	"	
1,2-Dichloro-1,1,2,2-tetrafluoroethane	ND	9.3	"	"	"	"	"	"	
Diisopropyl Ether	ND	9.3	"	"	"	"	"	"	
1,4-Dioxane	ND	9.3	"	"	"	"	"	"	
Ethanol	**61**	37	"	"	"	"	"	"	
Ethyl Acetate	ND	9.3	"	"	"	"	"	"	
Ethylbenzene	ND	9.3	"	"	"	"	"	"	
Ethyl t-Butyl Ether	ND	9.3	"	"	"	"	"	"	
4-Ethyltoluene	ND	9.3	"	"	"	"	"	"	

Oilfield Environmental and Compliance, INC.

Sage Environmental Consulting	Project: CARB	
720 West Arapaho Road	Project Number: CARB #1344	**Reported:**
Richardson TX, 75080	Project Manager: David Ranum	10-Mar-15 10:14

TB029B

1500853-02 (Air)

Oilfield Environmental and Compliance

Volatile Organic Compounds by EPA Method TO-15 **TS-3**

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
Heptane	**29**	9.3	ppbv	18.5	B5C0204	07-Mar-15	08-Mar-15	TO-15 mod.	
Hexachlorobutadiene	ND	9.3	"	"	"	"	"	"	
Hexane	**39**	9.3	"	"	"	"	"	"	
2-Hexanone	ND	9.3	"	"	"	"	"	"	
Isopropyl alcohol	ND	9.3	"	"	"	"	"	"	
Methylene chloride	ND	9.3	"	"	"	"	"	"	
Methyl Ethyl Ketone	ND	9.3	"	"	"	"	"	"	
Methyl Isobutyl Ketone	ND	9.3	"	"	"	"	"	"	
Methyl-t-butyl ether	ND	9.3	"	"	"	"	"	"	
Naphthalene	ND	19	"	"	"	"	"	"	
Propylene	ND	9.3	"	"	"	"	"	"	
Styrene	ND	9.3	"	"	"	"	"	"	
t-Amyl Methyl Ether	ND	9.3	"	"	"	"	"	"	
t-Butyl alcohol	ND	9.3	"	"	"	"	"	"	
1,1,2,2-Tetrachloroethane	ND	9.3	"	"	"	"	"	"	
Tetrachloroethene (PCE)	ND	9.3	"	"	"	"	"	"	
Tetrahydrofuran	ND	9.3	"	"	"	"	"	"	
Toluene	**15**	9.3	"	"	"	"	"	"	
1,2,4-Trichlorobenzene	ND	9.3	"	"	"	"	"	"	
1,1,1-Trichloroethane	ND	9.3	"	"	"	"	"	"	
1,1,2-Trichloroethane	ND	9.3	"	"	"	"	"	"	
Trichloroethene (TCE)	ND	9.3	"	"	"	"	"	"	
Trichlorofluoromethane	ND	9.3	"	"	"	"	"	"	
1,1,2-Trichlorotrifluoroethane	ND	9.3	"	"	"	"	"	"	
1,2,4-Trimethylbenzene	ND	9.3	"	"	"	"	"	"	
1,3,5-Trimethylbenzene	ND	9.3	"	"	"	"	"	"	
Vinyl acetate	ND	9.3	"	"	"	"	"	"	
Vinyl chloride	ND	9.3	"	"	"	"	"	"	
Xylenes (total)	ND	9.3	"	"	"	"	"	"	
TPH Gasoline (C4-C12)	ND	3700	"	"	"	"	"	"	

Oilfield Environmental and Compliance, INC.

Sage Environmental Consulting	Project: CARB	
720 West Arapaho Road	Project Number: CARB #1344	**Reported:**
Richardson TX, 75080	Project Manager: David Ranum	11-Mar-15 16:23

TB030A/B

1500870-01 (Air)

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes

Oilfield Environmental and Compliance

Volatile Organic Compounds by EPA Method TO-15 **TS-3**

Acetone	ND	39	ppbv	19.53	B5C0244	09-Mar-15	09-Mar-15	TO-15 mod.	
Benzene	ND	9.8	"	"	"	"	"	"	
Benzyl chloride	ND	9.8	"	"	"	"	"	"	
Bromodichloromethane	ND	9.8	"	"	"	"	"	"	
Bromoform	ND	9.8	"	"	"	"	"	"	
Bromomethane	ND	9.8	"	"	"	"	"	"	
1,3-Butadiene	ND	9.8	"	"	"	"	"	"	
Carbon disulfide	ND	9.8	"	"	"	"	"	"	
Carbon tetrachloride	ND	9.8	"	"	"	"	"	"	
Chlorobenzene	ND	9.8	"	"	"	"	"	"	
Chloroethane	ND	9.8	"	"	"	"	"	"	
Chloroform	ND	9.8	"	"	"	"	"	"	
Chloromethane	ND	9.8	"	"	"	"	"	"	
Cyclohexane	ND	9.8	"	"	"	"	"	"	
Dibromochloromethane	ND	9.8	"	"	"	"	"	"	
1,2-Dibromoethane (EDB)	ND	9.8	"	"	"	"	"	"	
1,2-Dichlorobenzene	ND	9.8	"	"	"	"	"	"	
1,3-Dichlorobenzene	ND	9.8	"	"	"	"	"	"	
1,4-Dichlorobenzene	ND	9.8	"	"	"	"	"	"	
Dichlorodifluoromethane	ND	9.8	"	"	"	"	"	"	
1,1-Dichloroethane	ND	9.8	"	"	"	"	"	"	
1,2-Dichloroethane	ND	9.8	"	"	"	"	"	"	
1,1-Dichloroethene	ND	9.8	"	"	"	"	"	"	
cis-1,2-Dichloroethene	ND	9.8	"	"	"	"	"	"	
trans-1,2-Dichloroethene	ND	9.8	"	"	"	"	"	"	
1,2-Dichloropropane	ND	9.8	"	"	"	"	"	"	
cis-1,3-Dichloropropene	ND	9.8	"	"	"	"	"	"	
trans-1,3-Dichloropropene	ND	9.8	"	"	"	"	"	"	
1,2-Dichloro-1,1,2,2-tetrafluoroethane	ND	9.8	"	"	"	"	"	"	
Diisopropyl Ether	ND	9.8	"	"	"	"	"	"	
1,4-Dioxane	ND	9.8	"	"	"	"	"	"	
Ethanol	**61**	39	"	"	"	"	"	"	

Oilfield Environmental and Compliance, INC.

Sage Environmental Consulting	Project: CARB	
720 West Arapaho Road	Project Number: CARB #1344	**Reported:**
Richardson TX, 75080	Project Manager: David Ranum	11-Mar-15 16:23

TB030A/B

1500870-01 (Air)

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes

Oilfield Environmental and Compliance

Volatile Organic Compounds by EPA Method TO-15 **TS-3**

Ethyl Acetate	ND	9.8	ppbv	19.53	B5C0244	09-Mar-15	09-Mar-15	TO-15 mod.	
Ethylbenzene	ND	9.8	"	"	"	"	"	"	
Ethyl t-Butyl Ether	ND	9.8	"	"	"	"	"	"	
4-Ethyltoluene	ND	9.8	"	"	"	"	"	"	
Heptane	ND	9.8	"	"	"	"	"	"	
Hexachlorobutadiene	ND	9.8	"	"	"	"	"	"	
Hexane	ND	9.8	"	"	"	"	"	"	
2-Hexanone	ND	9.8	"	"	"	"	"	"	
Isopropyl alcohol	ND	9.8	"	"	"	"	"	"	
Methylene chloride	ND	9.8	"	"	"	"	"	"	
Methyl Ethyl Ketone	ND	9.8	"	"	"	"	"	"	
Methyl Isobutyl Ketone	ND	9.8	"	"	"	"	"	"	
Methyl-t-butyl ether	ND	9.8	"	"	"	"	"	"	
Naphthalene	ND	20	"	"	"	"	"	"	
Propylene	ND	9.8	"	"	"	"	"	"	
Styrene	ND	9.8	"	"	"	"	"	"	
t-Amyl Methyl Ether	ND	9.8	"	"	"	"	"	"	
t-Butyl alcohol	ND	9.8	"	"	"	"	"	"	
1,1,2,2-Tetrachloroethane	ND	9.8	"	"	"	"	"	"	
Tetrachloroethene (PCE)	ND	9.8	"	"	"	"	"	"	
Tetrahydrofuran	ND	9.8	"	"	"	"	"	"	
Toluene	**9.8**	9.8	"	"	"	"	"	"	
1,2,4-Trichlorobenzene	ND	9.8	"	"	"	"	"	"	
1,1,1-Trichloroethane	ND	9.8	"	"	"	"	"	"	
1,1,2-Trichloroethane	ND	9.8	"	"	"	"	"	"	
Trichloroethene (TCE)	ND	9.8	"	"	"	"	"	"	
Trichlorofluoromethane	ND	9.8	"	"	"	"	"	"	
1,1,2-Trichlorotrifluoroethane	ND	9.8	"	"	"	"	"	"	
1,2,4-Trimethylbenzene	ND	9.8	"	"	"	"	"	"	
1,3,5-Trimethylbenzene	ND	9.8	"	"	"	"	"	"	
Vinyl acetate	ND	9.8	"	"	"	"	"	"	
Vinyl chloride	ND	9.8	"	"	"	"	"	"	
Xylenes (total)	ND	9.8	"	"	"	"	"	"	
TPH Gasoline (C4-C12)	ND	3900	"	"	"	"	"	"	

Oilfield Environmental and Compliance, INC.

Sage Environmental Consulting	Project: CARB	
720 West Arapaho Road	Project Number: CARB #1344	**Reported:**
Richardson TX, 75080	Project Manager: David Ranum	11-Mar-15 16:23

TB031A/B

1500870-02 (Air)

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes

Oilfield Environmental and Compliance

Volatile Organic Compounds by EPA Method TO-15 **TS-2**

Acetone	ND	40	ppbv	20	B5C0244	09-Mar-15	09-Mar-15	TO-15 mod.	
Benzene	**23**	10	"	"	"	"	"	"	
Benzyl chloride	ND	10	"	"	"	"	"	"	
Bromodichloromethane	ND	10	"	"	"	"	"	"	
Bromoform	ND	10	"	"	"	"	"	"	
Bromomethane	ND	10	"	"	"	"	"	"	
1,3-Butadiene	ND	10	"	"	"	"	"	"	
Carbon disulfide	ND	10	"	"	"	"	"	"	
Carbon tetrachloride	ND	10	"	"	"	"	"	"	
Chlorobenzene	ND	10	"	"	"	"	"	"	
Chloroethane	ND	10	"	"	"	"	"	"	
Chloroform	ND	10	"	"	"	"	"	"	
Chloromethane	ND	10	"	"	"	"	"	"	
Cyclohexane	**92**	10	"	"	"	"	"	"	
Dibromochloromethane	ND	10	"	"	"	"	"	"	
1,2-Dibromoethane (EDB)	ND	10	"	"	"	"	"	"	
1,2-Dichlorobenzene	ND	10	"	"	"	"	"	"	
1,3-Dichlorobenzene	ND	10	"	"	"	"	"	"	
1,4-Dichlorobenzene	ND	10	"	"	"	"	"	"	
Dichlorodifluoromethane	ND	10	"	"	"	"	"	"	
1,1-Dichloroethane	ND	10	"	"	"	"	"	"	
1,2-Dichloroethane	ND	10	"	"	"	"	"	"	
1,1-Dichloroethene	ND	10	"	"	"	"	"	"	
cis-1,2-Dichloroethene	ND	10	"	"	"	"	"	"	
trans-1,2-Dichloroethene	ND	10	"	"	"	"	"	"	
1,2-Dichloropropane	ND	10	"	"	"	"	"	"	
cis-1,3-Dichloropropene	ND	10	"	"	"	"	"	"	
trans-1,3-Dichloropropene	ND	10	"	"	"	"	"	"	
1,2-Dichloro-1,1,2,2-tetrafluoroethane	ND	10	"	"	"	"	"	"	
Diisopropyl Ether	ND	10	"	"	"	"	"	"	
1,4-Dioxane	ND	10	"	"	"	"	"	"	
Ethanol	**74**	40	"	"	"	"	"	"	
Ethyl Acetate	ND	10	"	"	"	"	"	"	
Ethylbenzene	ND	10	"	"	"	"	"	"	
Ethyl t-Butyl Ether	ND	10	"	"	"	"	"	"	
4-Ethyltoluene	ND	10	"	"	"	"	"	"	

Oilfield Environmental and Compliance, INC.

Sage Environmental Consulting	Project: CARB	
720 West Arapaho Road	Project Number: CARB #1344	**Reported:**
Richardson TX, 75080	Project Manager: David Ranum	11-Mar-15 16:23

TB031A/B

1500870-02 (Air)

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes

Oilfield Environmental and Compliance

Volatile Organic Compounds by EPA Method TO-15 **TS-2**

Heptane	**57**	10	ppbv	20	B5C0244	09-Mar-15	09-Mar-15	TO-15 mod.	
Hexachlorobutadiene	ND	10	"	"	"	"	"	"	
Hexane	**100**	10	"	"	"	"	"	"	
2-Hexanone	ND	10	"	"	"	"	"	"	
Isopropyl alcohol	ND	10	"	"	"	"	"	"	
Methylene chloride	ND	10	"	"	"	"	"	"	
Methyl Ethyl Ketone	ND	10	"	"	"	"	"	"	
Methyl Isobutyl Ketone	ND	10	"	"	"	"	"	"	
Methyl-t-butyl ether	ND	10	"	"	"	"	"	"	
Naphthalene	ND	20	"	"	"	"	"	"	
Propylene	ND	10	"	"	"	"	"	"	
Styrene	ND	10	"	"	"	"	"	"	
t-Amyl Methyl Ether	ND	10	"	"	"	"	"	"	
t-Butyl alcohol	ND	10	"	"	"	"	"	"	
1,1,2,2-Tetrachloroethane	ND	10	"	"	"	"	"	"	
Tetrachloroethene (PCE)	ND	10	"	"	"	"	"	"	
Tetrahydrofuran	ND	10	"	"	"	"	"	"	
Toluene	**23**	10	"	"	"	"	"	"	
1,2,4-Trichlorobenzene	ND	10	"	"	"	"	"	"	
1,1,1-Trichloroethane	ND	10	"	"	"	"	"	"	
1,1,2-Trichloroethane	ND	10	"	"	"	"	"	"	
Trichloroethene (TCE)	ND	10	"	"	"	"	"	"	
Trichlorofluoromethane	ND	10	"	"	"	"	"	"	
1,1,2-Trichlorotrifluoroethane	ND	10	"	"	"	"	"	"	
1,2,4-Trimethylbenzene	ND	10	"	"	"	"	"	"	
1,3,5-Trimethylbenzene	ND	10	"	"	"	"	"	"	
Vinyl acetate	ND	10	"	"	"	"	"	"	
Vinyl chloride	ND	10	"	"	"	"	"	"	
Xylenes (total)	**11**	10	"	"	"	"	"	"	
TPH Gasoline (C4-C12)	ND	4000	"	"	"	"	"	"	

Oilfield Environmental and Compliance, INC.

Sage Environmental Consulting	Project: CARB	
720 West Arapaho Road	Project Number: CARB #1344	**Reported:**
Richardson TX, 75080	Project Manager: David Ranum	11-Mar-15 16:23

TB032A/B

1500870-03 (Air)

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes

Oilfield Environmental and Compliance

Volatile Organic Compounds by EPA Method TO-15 **TS-1**

Acetone	ND	40	ppbv	20	B5C0204	07-Mar-15	08-Mar-15	TO-15 mod.	
Benzene	**11**	10	"	"	"	"	"	"	
Benzyl chloride	ND	10	"	"	"	"	"	"	
Bromodichloromethane	ND	10	"	"	"	"	"	"	
Bromoform	ND	10	"	"	"	"	"	"	
Bromomethane	ND	10	"	"	"	"	"	"	
1,3-Butadiene	ND	10	"	"	"	"	"	"	
Carbon disulfide	ND	10	"	"	"	"	"	"	
Carbon tetrachloride	ND	10	"	"	"	"	"	"	
Chlorobenzene	ND	10	"	"	"	"	"	"	
Chloroethane	ND	10	"	"	"	"	"	"	
Chloroform	ND	10	"	"	"	"	"	"	
Chloromethane	ND	10	"	"	"	"	"	"	
Cyclohexane	ND	10	"	"	"	"	"	"	
Dibromochloromethane	ND	10	"	"	"	"	"	"	
1,2-Dibromoethane (EDB)	ND	10	"	"	"	"	"	"	
1,2-Dichlorobenzene	ND	10	"	"	"	"	"	"	
1,3-Dichlorobenzene	ND	10	"	"	"	"	"	"	
1,4-Dichlorobenzene	ND	10	"	"	"	"	"	"	
Dichlorodifluoromethane	ND	10	"	"	"	"	"	"	
1,1-Dichloroethane	ND	10	"	"	"	"	"	"	
1,2-Dichloroethane	ND	10	"	"	"	"	"	"	
1,1-Dichloroethene	ND	10	"	"	"	"	"	"	
cis-1,2-Dichloroethene	ND	10	"	"	"	"	"	"	
trans-1,2-Dichloroethene	ND	10	"	"	"	"	"	"	
1,2-Dichloropropane	ND	10	"	"	"	"	"	"	
cis-1,3-Dichloropropene	ND	10	"	"	"	"	"	"	
trans-1,3-Dichloropropene	ND	10	"	"	"	"	"	"	
1,2-Dichloro-1,1,2,2-tetrafluoroethane	ND	10	"	"	"	"	"	"	
Diisopropyl Ether	ND	10	"	"	"	"	"	"	
1,4-Dioxane	ND	10	"	"	"	"	"	"	
Ethanol	ND	40	"	"	"	"	"	"	
Ethyl Acetate	ND	10	"	"	"	"	"	"	
Ethylbenzene	ND	10	"	"	"	"	"	"	
Ethyl t-Butyl Ether	ND	10	"	"	"	"	"	"	
4-Ethyltoluene	ND	10	"	"	"	"	"	"	

Oilfield Environmental and Compliance, INC.

Sage Environmental Consulting	Project: CARB	
720 West Arapaho Road	Project Number: CARB #1344	**Reported:**
Richardson TX, 75080	Project Manager: David Ranum	11-Mar-15 16:23

TB032A/B

1500870-03 (Air)

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes

Oilfield Environmental and Compliance

Volatile Organic Compounds by EPA Method TO-15 **TS-1**

Heptane	ND	10	ppbv	20	B5C0204	07-Mar-15	08-Mar-15	TO-15 mod.	
Hexachlorobutadiene	ND	10	"	"	"	"	"	"	
Hexane	**17**	10	"	"	"	"	"	"	
2-Hexanone	ND	10	"	"	"	"	"	"	
Isopropyl alcohol	ND	10	"	"	"	"	"	"	
Methylene chloride	ND	10	"	"	"	"	"	"	
Methyl Ethyl Ketone	ND	10	"	"	"	"	"	"	
Methyl Isobutyl Ketone	ND	10	"	"	"	"	"	"	
Methyl-t-butyl ether	ND	10	"	"	"	"	"	"	
Naphthalene	ND	20	"	"	"	"	"	"	
Propylene	ND	10	"	"	"	"	"	"	
Styrene	ND	10	"	"	"	"	"	"	
t-Amyl Methyl Ether	ND	10	"	"	"	"	"	"	
t-Butyl alcohol	ND	10	"	"	"	"	"	"	
1,1,2,2-Tetrachloroethane	ND	10	"	"	"	"	"	"	
Tetrachloroethene (PCE)	ND	10	"	"	"	"	"	"	
Tetrahydrofuran	ND	10	"	"	"	"	"	"	
Toluene	**11**	10	"	"	"	"	"	"	
1,2,4-Trichlorobenzene	ND	10	"	"	"	"	"	"	
1,1,1-Trichloroethane	ND	10	"	"	"	"	"	"	
1,1,2-Trichloroethane	ND	10	"	"	"	"	"	"	
Trichloroethene (TCE)	ND	10	"	"	"	"	"	"	
Trichlorofluoromethane	ND	10	"	"	"	"	"	"	
1,1,2-Trichlorotrifluoroethane	ND	10	"	"	"	"	"	"	
1,2,4-Trimethylbenzene	ND	10	"	"	"	"	"	"	
1,3,5-Trimethylbenzene	ND	10	"	"	"	"	"	"	
Vinyl acetate	ND	10	"	"	"	"	"	"	
Vinyl chloride	ND	10	"	"	"	"	"	"	
Xylenes (total)	ND	10	"	"	"	"	"	"	
TPH Gasoline (C4-C12)	ND	4000	"	"	"	"	"	"	

ANALYTICAL REPORT

ENVIRONMENTAL
Analytical Service, Inc.

EPA Method TO-15 Modified Full Scan GC/MS

SDG: 215096
Analytical Method: TO-15 **Laboratory ID:** 01

File Name: 1509601B.D **Date Sampled:** 03/02/15 **Time:** 00:00
Description: 1500906-01 **Date Analyzed:** 03/04/15 **Time:** 12:45
Can/Tube#: TBAG **Can Dilution Factor:** 1.00
QC_Batch: 030415-MA1 **Air Volume:** 0.10 ml

CAS#	Compound	MDL PPBV	RL PPBV	Amount PPBV	MDL UG/M3	RL UG/M3	Amount UG/M3	Flag
75-71-8	Dichlorodifluoromethane	503	1,006	ND	2,486	4,972	ND	
74-87-3	Chloromethane	503	1,006	ND	1,038	2,077	ND	
76-14-2	Freon 114	503	1,006	ND	3,514	7,028	ND	
75-01-4	Vinyl chloride	503	1,006	ND	1,285	2,570	ND	
106-99-0	1,3-Butadiene	503	1,006	ND	1,112	2,225	ND	
74-83-9	Bromomethane	503	1,006	ND	1,951	3,903	ND	
75-00-3	Chloroethane	503	1,006	ND	1,326	2,653	ND	
64-17-5	Ethanol	10,000	20,000	ND	18,845	37,691	ND	
75-69-4	Trichlorofluoromethane	5,000	10,000	ND	28,084	56,168	ND	
67-64-1	Acetone	5,000	10,000	ND	11,875	23,751	ND	
67-63-0	2-propanol	5,000	10,000	ND	12,284	24,569	ND	
75-65-0	t-Butanol	10,000	20,000	ND	30,292	60,583	ND	
75-35-4	1,1-Dichloroethene	5,000	10,000	ND	19,806	39,612	ND	
76-13-1	Freon 113	500	1,000	ND	3,830	7,661	ND	
75-09-2	Dichloromethane	1,000	2,000	ND	3,471	6,941	ND	
75-15-0	Carbon disulfide	5,000	10,000	ND	15,555	31,109	ND	
156-60-5	trans-1,2-Dichloroethene	500	1,000	ND	1,981	3,961	ND	
1634-04-4	Methyl tert butyl ether	500	1,000	ND	1,801	3,601	ND	
75-34-3	1,1-Dichloroethane	499	997	ND	2,018	4,037	ND	
637-92-3	Ethyl tert butyl ether	500	1,000	ND	2,089	4,178	ND	
108-05-4	Vinyl acetate	500	1,000	ND	1,760	3,520	ND	
78-93-3	2-Butanone	2,000	4,000	ND	5,895	11,790	ND	
108-20-3	Diisopropyl ether	2,000	4,000	ND	8,356	16,711	ND	
110-54-3	Hexane	2,500	5,000	444,119	8,810	17,619	1,564,989	E
141-78-6	Ethyl acetate	5,000	10,000	ND	18,007	36,015	ND	
109-99-9	Tetrahydrofuran	503	1,006	ND	1,483	2,965	ND	
156-59-2	cis-1,2-Dichloroethene	537	1,074	ND	2,127	4,254	ND	
67-66-3	Chloroform	502	1,003	ND	2,448	4,896	ND	
71-55-6	1,1,1-Trichloroethane	500	1,000	ND	2,727	5,453	ND	
107-06-2	1,2-Dichloroethane	500	1,000	ND	2,024	4,047	ND	
110-82-7	Cyclohexane	500	1,000	175,668	1,721	3,442	604,656	
71-43-2	Benzene	1,000	2,000	80,493	3,193	6,385	256,989	
56-23-5	Carbon tetrachloride	500	1,000	ND	3,144	6,287	ND	
142-82-5	n-Heptane	5,000	10,000	37,978	20,481	40,961	155,564	
78-87-5	1,2-Dichloropropane	500	1,000	ND	2,310	4,619	ND	
123-91-1	1,4-Dioxane	1,000	2,000	ND	3,601	7,203	ND	
994-05-8	t-Amyl Methyl Ether	500	1,000	ND	3,552	7,105	ND	

CAS#	Compound	MDL PPBV	RL PPBV	Amount PPBV	MDL UG/M3	RL UG/M3	Amount UG/M3	Flag
79-01-6	Trichloroethene	250	500	ND	1,343	2,686	ND	
75-27-4	Bromodichloromethane	500	1,000	ND	3,348	6,696	ND	
108-10-1	4-Methyl-2-pentanone	5,000	10,000	ND	20,481	40,961	ND	
10061-01-5	cis-1,3-Dichloropropene	500	1,000	ND	2,269	4,538	ND	
108-88-3	Toluene	1,000	2,000	13,252	3,765	7,530	49,895	
10061-02-6	trans-1,3-Dichloropropene	500	1,000	ND	2,269	4,538	ND	
79-00-5	1,1,2-Trichloroethane	500	1,000	ND	2,727	5,453	ND	
591-78-6	2-Hexanone	5,000	10,000	ND	20,481	40,961	ND	
124-48-1	Dibromochloromethane	500	1,000	ND	4,258	8,515	ND	
106-93-4	1,2-Dibromoethane	500	1,000	ND	3,841	7,681	ND	
127-18-4	Tetrachloroethene	250	500	ND	1,694	3,389	ND	
108-90-7	Chlorobenzene	500	1,000	ND	2,302	4,603	ND	
100-41-4	Ethylbenzene	500	1,000	ND	2,171	4,341	ND	
1330-20-7	m,p-Xylenes	500	1,000	ND	2,171	4,341	ND	
100-42-5	Styrene	500	1,000	ND	2,130	4,260	ND	
75-25-2	Bromoform	500	1,000	ND	5,165	10,330	ND	
95-47-6	o-Xylene	500	1,000	ND	2,171	4,341	ND	
79-34-5	1,1,2,2-Tetrachloroethane	500	1,000	ND	3,430	6,860	ND	
622-96-8	4-Ethyltoluene	500	1,000	ND	2,457	4,914	ND	
108-67-8	1,3,5-Trimethylbenzene	500	1,000	ND	2,457	4,914	ND	
95-63-6	1,2,4-Trimethylbenzene	500	1,000	ND	2,457	4,914	ND	
541-73-1	1,3-Dichlorobenzene	1,000	2,000	ND	6,009	12,019	ND	
100-44-7	Benzyl chloride	1,000	2,000	ND	5,175	10,351	ND	
106-46-7	1,4-Dichlorobenzene	1,000	2,000	ND	6,009	12,019	ND	
95-50-1	1,2-Dichlorobenzene	1,000	2,000	ND	6,009	12,019	ND	
120-82-1	1,2,4-Trichlorobenzene	2,500	5,000	ND	18,539	37,078	ND	
91-20-3	Naphthalene	500	1,000	ND	2,620	5,241	ND	
87-68-3	Hexachlorobutadiene	2,500	5,000	ND	26,653	53,307	ND	

	Surrogate Recovery	% Rec.	QC Limits LCL	UCL	Flag
2037-26-5	Toluene-d8	97	70	130	

ANALYTICAL REPORT

ENVIRONMENTAL
Analytical Service, Inc.

EPA Method TO-15 Modified Full Scan GC/MS

Analytical Method: TO-15 **SDG:** 215096 **Laboratory ID:** 02

File Name: 1509602B.D **Date Sampled:** 03/02/15 **Time:** 00:00
Description: 1500906-02 **Date Analyzed:** 03/04/15 **Time:** 15:19
Can/Tube#: TBAG **Can Dilution Factor:** 1.00
QC_Batch: 030415-MA1 **Air Volume:** 20.00 ml

CAS#	Compound	MDL PPBV	RL PPBV	Amount PPBV	MDL UG/M3	RL UG/M3	Amount UG/M3	Flag
75-71-8	Dichlorodifluoromethane	3	5	ND	12	25	ND	
74-87-3	Chloromethane	3	5	ND	5	10	ND	
76-14-2	Freon 114	3	5	ND	18	35	ND	
75-01-4	Vinyl chloride	3	5	ND	6	13	ND	
106-99-0	1,3-Butadiene	3	5	ND	6	11	ND	
74-83-9	Bromomethane	3	5	ND	10	20	ND	
75-00-3	Chloroethane	3	5	ND	7	13	ND	
64-17-5	Ethanol	50	100	ND	94	188	ND	
75-69-4	Trichlorofluoromethane	25	50	ND	140	281	ND	
67-64-1	Acetone	25	50	ND	59	119	ND	
67-63-0	2-propanol	25	50	ND	61	123	ND	
75-65-0	t-Butanol	50	100	ND	151	303	ND	
75-35-4	1,1-Dichloroethene	25	50	ND	99	198	ND	
76-13-1	Freon 113	3	5	ND	19	38	ND	
75-09-2	Dichloromethane	5	10	ND	17	35	ND	
75-15-0	Carbon disulfide	25	50	ND	78	156	ND	
156-60-5	trans-1,2-Dichloroethene	3	5	ND	10	20	ND	
1634-04-4	Methyl tert butyl ether	3	5	ND	9	18	ND	
75-34-3	1,1-Dichloroethane	2	5	ND	10	20	ND	
637-92-3	Ethyl tert butyl ether	3	5	ND	10	21	ND	
108-05-4	Vinyl acetate	3	5	ND	9	18	ND	
78-93-3	2-Butanone	10	20	ND	29	59	ND	
108-20-3	Diisopropyl ether	10	20	ND	42	84	ND	
110-54-3	Hexane	13	25	26	44	88	90	
141-78-6	Ethyl acetate	25	50	ND	90	180	ND	
109-99-9	Tetrahydrofuran	3	5	ND	7	15	ND	
156-59-2	cis-1,2-Dichloroethene	3	5	ND	11	21	ND	
67-66-3	Chloroform	3	5	ND	12	24	ND	
71-55-6	1,1,1-Trichloroethane	3	5	ND	14	27	ND	
107-06-2	1,2-Dichloroethane	3	5	ND	10	20	ND	
110-82-7	Cyclohexane	3	5	10	9	17	34	
71-43-2	Benzene	5	10	13	16	32	40	
56-23-5	Carbon tetrachloride	3	5	ND	16	31	ND	
142-82-5	n-Heptane	25	50	ND	102	205	ND	
78-87-5	1,2-Dichloropropane	3	5	ND	12	23	ND	
123-91-1	1,4-Dioxane	5	10	ND	18	36	ND	
994-05-8	t-Amyl Methyl Ether	3	5	ND	18	36	ND	

CAS#	Compound	MDL PPBV	RL PPBV	Amount PPBV	MDL UG/M3	RL UG/M3	Amount UG/M3	Flag
79-01-6	Trichloroethene	1	3	ND	7	13	ND	
75-27-4	Bromodichloromethane	3	5	ND	17	33	ND	
108-10-1	4-Methyl-2-pentanone	25	50	ND	102	205	ND	
10061-01-5	cis-1,3-Dichloropropene	3	5	ND	11	23	ND	
108-88-3	Toluene	5	10	12	19	38	46	
10061-02-6	trans-1,3-Dichloropropene	3	5	ND	11	23	ND	
79-00-5	1,1,2-Trichloroethane	3	5	ND	14	27	ND	
591-78-6	2-Hexanone	25	50	ND	102	205	ND	
124-48-1	Dibromochloromethane	3	5	ND	21	43	ND	
106-93-4	1,2-Dibromoethane	3	5	ND	19	38	ND	
127-18-4	Tetrachloroethene	1	3	ND	8	17	ND	
108-90-7	Chlorobenzene	3	5	ND	12	23	ND	
100-41-4	Ethylbenzene	3	5	ND	11	22	ND	
1330-20-7	m,p-Xylenes	3	5	ND	11	22	ND	
100-42-5	Styrene	3	5	ND	11	21	ND	
75-25-2	Bromoform	3	5	ND	26	52	ND	
95-47-6	o-Xylene	3	5	ND	11	22	ND	
79-34-5	1,1,2,2-Tetrachloroethane	3	5	ND	17	34	ND	
622-96-8	4-Ethyltoluene	3	5	ND	12	25	ND	
108-67-8	1,3,5-Trimethylbenzene	3	5	ND	12	25	ND	
95-63-6	1,2,4-Trimethylbenzene	3	5	ND	12	25	ND	
541-73-1	1,3-Dichlorobenzene	5	10	ND	30	60	ND	
100-44-7	Benzyl chloride	5	10	ND	26	52	ND	
106-46-7	1,4-Dichlorobenzene	5	10	ND	30	60	ND	
95-50-1	1,2-Dichlorobenzene	5	10	ND	30	60	ND	
120-82-1	1,2,4-Trichlorobenzene	13	25	ND	93	185	ND	
91-20-3	Naphthalene	3	5	ND	13	26	ND	
87-68-3	Hexachlorobutadiene	13	25	ND	133	267	ND	

	Surrogate Recovery	% Rec.	QC Limits LCL	UCL	Flag
2037-26-5	Toluene-d8	99	70	130	

ANALYTICAL REPORT

ENVIRONMENTAL
Analytical Service, Inc.

EPA Method TO-15 Modified Full Scan GC/MS

SDG: 215096
Analytical Method: TO-15
Laboratory ID: 03

File Name: 1509603B.D
Description: 1500906-03
Can/Tube#: TBAG
QC_Batch: 030415-MA1

Date Sampled: 03/02/15 **Time:** 00:00
Date Analyzed: 03/04/15 **Time:** 16:00
Can Dilution Factor: 1.00
Air Volume: 20.00 ml

CAS#	Compound	MDL PPBV	RL PPBV	Amount PPBV	MDL UG/M3	RL UG/M3	Amount UG/M3	Flag
75-71-8	Dichlorodifluoromethane	3	5	ND	12	25	ND	
74-87-3	Chloromethane	3	5	ND	5	10	ND	
76-14-2	Freon 114	3	5	ND	18	35	ND	
75-01-4	Vinyl chloride	3	5	ND	6	13	ND	
106-99-0	1,3-Butadiene	3	5	ND	6	11	ND	
74-83-9	Bromomethane	3	5	ND	10	20	ND	
75-00-3	Chloroethane	3	5	ND	7	13	ND	
64-17-5	Ethanol	50	100	ND	94	188	ND	
75-69-4	Trichlorofluoromethane	25	50	ND	140	281	ND	
67-64-1	Acetone	25	50	ND	59	119	ND	
67-63-0	2-propanol	25	50	ND	61	123	ND	
75-65-0	t-Butanol	50	100	ND	151	303	ND	
75-35-4	1,1-Dichloroethene	25	50	ND	99	198	ND	
76-13-1	Freon 113	3	5	ND	19	38	ND	
75-09-2	Dichloromethane	5	10	ND	17	35	ND	
75-15-0	Carbon disulfide	25	50	ND	78	156	ND	
156-60-5	trans-1,2-Dichloroethene	3	5	ND	10	20	ND	
1634-04-4	Methyl tert butyl ether	3	5	ND	9	18	ND	
75-34-3	1,1-Dichloroethane	2	5	ND	10	20	ND	
637-92-3	Ethyl tert butyl ether	3	5	ND	10	21	ND	
108-05-4	Vinyl acetate	3	5	ND	9	18	ND	
78-93-3	2-Butanone	10	20	ND	29	59	ND	
108-20-3	Diisopropyl ether	10	20	ND	42	84	ND	
110-54-3	Hexane	13	25	ND	44	88	ND	
141-78-6	Ethyl acetate	25	50	ND	90	180	ND	
109-99-9	Tetrahydrofuran	3	5	ND	7	15	ND	
156-59-2	cis-1,2-Dichloroethene	3	5	ND	11	21	ND	
67-66-3	Chloroform	3	5	ND	12	24	ND	
71-55-6	1,1,1-Trichloroethane	3	5	ND	14	27	ND	
107-06-2	1,2-Dichloroethane	3	5	ND	10	20	ND	
110-82-7	Cyclohexane	3	5	5	9	17	19	
71-43-2	Benzene	5	10	9	16	32	29	J
56-23-5	Carbon tetrachloride	3	5	ND	16	31	ND	
142-82-5	n-Heptane	25	50	ND	102	205	ND	
78-87-5	1,2-Dichloropropane	3	5	ND	12	23	ND	
123-91-1	1,4-Dioxane	5	10	ND	18	36	ND	
994-05-8	t-Amyl Methyl Ether	3	5	ND	18	36	ND	

CAS#	Compound	MDL PPBV	RL PPBV	Amount PPBV	MDL UG/M3	RL UG/M3	Amount UG/M3	Flag
79-01-6	Trichloroethene	1	3	ND	7	13	ND	
75-27-4	Bromodichloromethane	3	5	ND	17	33	ND	
108-10-1	4-Methyl-2-pentanone	25	50	ND	102	205	ND	
10061-01-5	cis-1,3-Dichloropropene	3	5	ND	11	23	ND	
108-88-3	Toluene	5	10	11	19	38	40	
10061-02-6	trans-1,3-Dichloropropene	3	5	ND	11	23	ND	
79-00-5	1,1,2-Trichloroethane	3	5	ND	14	27	ND	
591-78-6	2-Hexanone	25	50	ND	102	205	ND	
124-48-1	Dibromochloromethane	3	5	ND	21	43	ND	
106-93-4	1,2-Dibromoethane	3	5	ND	19	38	ND	
127-18-4	Tetrachloroethene	1	3	ND	8	17	ND	
108-90-7	Chlorobenzene	3	5	ND	12	23	ND	
100-41-4	Ethylbenzene	3	5	ND	11	22	ND	
1330-20-7	m,p-Xylenes	3	5	ND	11	22	ND	
100-42-5	Styrene	3	5	ND	11	21	ND	
75-25-2	Bromoform	3	5	ND	26	52	ND	
95-47-6	o-Xylene	3	5	ND	11	22	ND	
79-34-5	1,1,2,2-Tetrachloroethane	3	5	ND	17	34	ND	
622-96-8	4-Ethyltoluene	3	5	ND	12	25	ND	
108-67-8	1,3,5-Trimethylbenzene	3	5	ND	12	25	ND	
95-63-6	1,2,4-Trimethylbenzene	3	5	ND	12	25	ND	
541-73-1	1,3-Dichlorobenzene	5	10	ND	30	60	ND	
100-44-7	Benzyl chloride	5	10	ND	26	52	ND	
106-46-7	1,4-Dichlorobenzene	5	10	ND	30	60	ND	
95-50-1	1,2-Dichlorobenzene	5	10	ND	30	60	ND	
120-82-1	1,2,4-Trichlorobenzene	13	25	ND	93	185	ND	
91-20-3	Naphthalene	3	5	ND	13	26	ND	
87-68-3	Hexachlorobutadiene	13	25	ND	133	267	ND	

	Surrogate Recovery	% Rec.	QC Limits LCL	UCL	Flag
2037-26-5	Toluene-d8	92	70	130	

ANALYTICAL REPORT

ENVIRONMENTAL
Analytical Service, Inc.

EPA Method TO-15 Modified Full Scan GC/MS

Analytical Method: TO-15

SDG: 215096
Laboratory ID: 04

File Name: 1509604A.D
Description: 1500906-04
Can/Tube#: TBAG
QC_Batch: 030415-MA1

Date Sampled: 03/02/15 **Time:** 00:00
Date Analyzed: 03/04/15 **Time:** 14:40
Can Dilution Factor: 1.00
Air Volume: 0.10 ml

CAS#	Compound	MDL PPBV	RL PPBV	Amount PPBV	MDL UG/M3	RL UG/M3	Amount UG/M3	Flag
75-71-8	Dichlorodifluoromethane	503	1,006	ND	2,486	4,972	ND	
74-87-3	Chloromethane	503	1,006	ND	1,038	2,077	ND	
76-14-2	Freon 114	503	1,006	ND	3,514	7,028	ND	
75-01-4	Vinyl chloride	503	1,006	ND	1,285	2,570	ND	
106-99-0	1,3-Butadiene	503	1,006	ND	1,112	2,225	ND	
74-83-9	Bromomethane	503	1,006	ND	1,951	3,903	ND	
75-00-3	Chloroethane	503	1,006	ND	1,326	2,653	ND	
64-17-5	Ethanol	10,000	20,000	ND	18,845	37,691	ND	
75-69-4	Trichlorofluoromethane	5,000	10,000	ND	28,084	56,168	ND	
67-64-1	Acetone	5,000	10,000	ND	11,875	23,751	ND	
67-63-0	2-propanol	5,000	10,000	ND	12,284	24,569	ND	
75-65-0	t-Butanol	10,000	20,000	ND	30,292	60,583	ND	
75-35-4	1,1-Dichloroethene	5,000	10,000	ND	19,806	39,612	ND	
76-13-1	Freon 113	500	1,000	ND	3,830	7,661	ND	
75-09-2	Dichloromethane	1,000	2,000	ND	3,471	6,941	ND	
75-15-0	Carbon disulfide	5,000	10,000	ND	15,555	31,109	ND	
156-60-5	trans-1,2-Dichloroethene	500	1,000	ND	1,981	3,961	ND	
1634-04-4	Methyl tert butyl ether	500	1,000	ND	1,801	3,601	ND	
75-34-3	1,1-Dichloroethane	499	997	ND	2,018	4,037	ND	
637-92-3	Ethyl tert butyl ether	500	1,000	ND	2,089	4,178	ND	
108-05-4	Vinyl acetate	500	1,000	733	1,760	3,520	2,579	J
78-93-3	2-Butanone	2,000	4,000	ND	5,895	11,790	ND	
108-20-3	Diisopropyl ether	2,000	4,000	ND	8,356	16,711	ND	
110-54-3	Hexane	2,500	5,000	ND	8,810	17,619	ND	
141-78-6	Ethyl acetate	5,000	10,000	ND	18,007	36,015	ND	
109-99-9	Tetrahydrofuran	503	1,006	563	1,483	2,965	1,658	J
156-59-2	cis-1,2-Dichloroethene	537	1,074	ND	2,127	4,254	ND	
67-66-3	Chloroform	502	1,003	ND	2,448	4,896	ND	
71-55-6	1,1,1-Trichloroethane	500	1,000	ND	2,727	5,453	ND	
107-06-2	1,2-Dichloroethane	500	1,000	ND	2,024	4,047	ND	
110-82-7	Cyclohexane	500	1,000	ND	1,721	3,442	ND	
71-43-2	Benzene	1,000	2,000	ND	3,193	6,385	ND	
56-23-5	Carbon tetrachloride	500	1,000	ND	3,144	6,287	ND	
142-82-5	n-Heptane	5,000	10,000	ND	20,481	40,961	ND	
78-87-5	1,2-Dichloropropane	500	1,000	ND	2,310	4,619	ND	
123-91-1	1,4 Dioxane	1,000	2,000	ND	3,601	7,203	ND	
994-05-8	t-Amyl Methyl Ether	500	1,000	ND	3,552	7,105	ND	

CAS#	Compound	MDL PPBV	RL PPBV	Amount PPBV	MDL UG/M3	RL UG/M3	Amount UG/M3	Flag
79-01-6	Trichloroethene	250	500	ND	1,343	2,686	ND	
75-27-4	Bromodichloromethane	500	1,000	ND	3,348	6,696	ND	
108-10-1	4-Methyl-2-pentanone	5,000	10,000	ND	20,481	40,961	ND	
10061-01-5	cis-1,3-Dichloropropene	500	1,000	ND	2,269	4,538	ND	
108-88-3	Toluene	1,000	2,000	ND	3,765	7,530	ND	
10061-02-6	trans-1,3-Dichloropropene	500	1,000	ND	2,269	4,538	ND	
79-00-5	1,1,2-Trichloroethane	500	1,000	ND	2,727	5,453	ND	
591-78-6	2-Hexanone	5,000	10,000	ND	20,481	40,961	ND	
124-48-1	Dibromochloromethane	500	1,000	ND	4,258	8,515	ND	
106-93-4	1,2-Dibromoethane	500	1,000	ND	3,841	7,681	ND	
127-18-4	Tetrachloroethene	250	500	ND	1,694	3,389	ND	
108-90-7	Chlorobenzene	500	1,000	ND	2,302	4,603	ND	
100-41-4	Ethylbenzene	500	1,000	ND	2,171	4,341	ND	
1330-20-7	m,p-Xylenes	500	1,000	ND	2,171	4,341	ND	
100-42-5	Styrene	500	1,000	ND	2,130	4,260	ND	
75-25-2	Bromoform	500	1,000	ND	5,165	10,330	ND	
95-47-6	o-Xylene	500	1,000	ND	2,171	4,341	ND	
79-34-5	1,1,2,2-Tetrachloroethane	500	1,000	ND	3,430	6,860	ND	
622-96-8	4-Ethyltoluene	500	1,000	ND	2,457	4,914	ND	
108-67-8	1,3,5-Trimethylbenzene	500	1,000	ND	2,457	4,914	ND	
95-63-6	1,2,4-Trimethylbenzene	500	1,000	ND	2,457	4,914	ND	
541-73-1	1,3-Dichlorobenzene	1,000	2,000	ND	6,009	12,019	ND	
100-44-7	Benzyl chloride	1,000	2,000	ND	5,175	10,351	ND	
106-46-7	1,4-Dichlorobenzene	1,000	2,000	ND	6,009	12,019	ND	
95-50-1	1,2-Dichlorobenzene	1,000	2,000	ND	6,009	12,019	ND	
120-82-1	1,2,4-Trichlorobenzene	2,500	5,000	ND	18,539	37,078	ND	
91-20-3	Naphthalene	500	1,000	ND	2,620	5,241	ND	
87-68-3	Hexachlorobutadiene	2,500	5,000	ND	26,653	53,307	ND	

	Surrogate Recovery	% Rec.	QC Limits LCL	UCL	Flag
2037-26-5	Toluene-d8	89	70	130	

METHOD BLANK REPORT

ENVIRONMENTAL
Analytical Service, Inc.

TPH-Gasoline by GC/MS

Analytical Method: TO-15

SDG: LABQC
Laboratory Number: B03045

File:	B03045B	**Date Sampled:**		**Time:**	
Description:	METHOD BLANK	**Date Analyzed:**	03/04/15	**Time:**	11:25
Sam_Type:	MB	**Can Dilution Factor:**	1.00		
QC_Batch:	030415-MA1	**Air Volume:**	0.10 ml		

Compound	MDL PPBV	RL PPBV	Amount PPBV	MDL UG/M3	RL UG/M3	Amount UG/M3	Flag
TPH-Gasoline	2,500	5,000	ND	10,557	21,115	ND	ND

ANALYTICAL REPORT

ENVIRONMENTAL
Analytical Service, Inc.

TPH-Gasoline by GC/MS

SDG: 215096
Analytical Method: TO-15
Laboratory Number: 01

File:	1509601B	**Date Sampled:**	03/02/15	**Time:**	0:00
Description:	1500906-01	**Date Analyzed:**	03/04/15	**Time:**	12:45
Sam_Type:	SA	**Can Dilution Factor:**	1.00		
QC_Batch:	030415-MA1	**Air Volume:**	0.10 ml		

Compound	MDL PPBV	RL PPBV	Amount PPBV	MDL UG/M3	RL UG/M3	Amount UG/M3	Flag
TPH-Gasoline	2,500	5,000	4,009,254	10,557	21,115	16,930,972	

ANALYTICAL REPORT

ENVIRONMENTAL
Analytical Service, Inc.

TPH-Gasoline by GC/MS

Analytical Method: TO-15

SDG: 215096
Laboratory Number: 02

File:	1509602B	**Date Sampled:**	03/02/15	**Time:**	0:00
Description:	1500906-02	**Date Analyzed:**	03/04/15	**Time:**	15:19
Sam_Type:	SA	**Can Dilution Factor:**	1.00		
QC_Batch:	030415-MA1	**Air Volume:**	20.00 ml		

Compound	MDL PPBV	RL PPBV	Amount PPBV	MDL UG/M3	RL UG/M3	Amount UG/M3	Flag
TPH-Gasoline	13	25	6,877	53	106	29,042	

ANALYTICAL REPORT

ENVIRONMENTAL
Analytical Service, Inc.

TPH-Gasoline by GC/MS

SDG: 215096
Analytical Method: TO-15
Laboratory Number: 03

File:	1509603B	**Date Sampled:**	03/02/15	**Time:**	0:00
Description:	1500906-03	**Date Analyzed:**	03/04/15	**Time:**	16:00
Sam_Type:	SA	**Can Dilution Factor:**	1.00		
QC_Batch:	030415-MA1	**Air Volume:**	20.00 ml		

Compound	MDL PPBV	RL PPBV	Amount PPBV	MDL UG/M3	RL UG/M3	Amount UG/M3	Flag
TPH-Gasoline	13	25	5,460	53	106	23,059	

ANALYTICAL REPORT

ENVIRONMENTAL
Analytical Service, Inc.

TPH-Gasoline by GC/MS

SDG: 215096
Analytical Method: TO-15
Laboratory Number: 04

File:	1509604A	**Date Sampled:**	03/02/15	**Time:**	0:00
Description:	1500906-04	**Date Analyzed:**	03/04/15	**Time:**	14:40
Sam_Type:	SA	**Can Dilution Factor:**	1.00		
QC_Batch:	030415-MA1	**Air Volume:**	0.10 ml		

Compound	MDL PPBV	RL PPBV	Amount PPBV	MDL UG/M3	RL UG/M3	Amount UG/M3	Flag
TPH-Gasoline	13	25	ND	53	106	ND	ND

ANALYTICAL REPORT

ENVIRONMENTAL
Analytical Service, Inc.

EPA Method TO-15 Modified Full Scan GC/MS

SDG: 215100
Analytical Method: TO-15
Laboratory ID: 01

File Name: 1510001A.D
Description: 1500918-01
Can/Tube#: TBAG
QC_Batch: 030515-MA1

Date Sampled: 03/03/15 **Time:** 00:00
Date Analyzed: 03/05/15 **Time:** 16:15
Can Dilution Factor: 1.00
Air Volume: 20.00 ml

CAS#	Compound	MDL PPBV	RL PPBV	Amount PPBV	MDL UG/M3	RL UG/M3	Amount UG/M3	Flag
75-71-8	Dichlorodifluoromethane	3	5	ND	12	25	ND	
74-87-3	Chloromethane	3	5	ND	5	10	ND	
76-14-2	Freon 114	3	5	ND	18	35	ND	
75-01-4	Vinyl chloride	3	5	ND	6	13	ND	
106-99-0	1,3-Butadiene	3	5	ND	6	11	ND	
74-83-9	Bromomethane	3	5	ND	10	20	ND	
75-00-3	Chloroethane	3	5	ND	7	13	ND	
64-17-5	Ethanol	50	100	ND	94	188	ND	
75-69-4	Trichlorofluoromethane	25	50	ND	140	281	ND	
67-64-1	Acetone	25	50	ND	59	119	ND	
67-63-0	2-propanol	25	50	ND	61	123	ND	
75-65-0	t-Butanol	50	100	ND	151	303	ND	
75-35-4	1,1-Dichloroethene	25	50	ND	99	198	ND	
76-13-1	Freon 113	3	5	ND	19	38	ND	
75-09-2	Dichloromethane	5	10	ND	17	35	ND	
75-15-0	Carbon disulfide	25	50	ND	78	156	ND	
156-60-5	trans-1,2-Dichloroethene	3	5	ND	10	20	ND	
1634-04-4	Methyl tert butyl ether	3	5	ND	9	18	ND	
75-34-3	1,1-Dichloroethane	2	5	ND	10	20	ND	
637-92-3	Ethyl tert butyl ether	3	5	ND	10	21	ND	
108-05-4	Vinyl acetate	3	5	ND	9	18	ND	
78-93-3	2-Butanone	10	20	ND	29	59	ND	
108-20-3	Diisopropyl ether	10	20	ND	42	84	ND	
110-54-3	Hexane	13	25	ND	44	88	ND	
141-78-6	Ethyl acetate	25	50	ND	90	180	ND	
109-99-9	Tetrahydrofuran	3	5	ND	7	15	ND	
156-59-2	cis-1,2-Dichloroethene	3	5	ND	11	21	ND	
67-66-3	Chloroform	3	5	ND	12	24	ND	
71-55-6	1,1,1-Trichloroethane	3	5	ND	14	27	ND	
107-06-2	1,2-Dichloroethane	3	5	ND	10	20	ND	
110-82-7	Cyclohexane	3	5	ND	9	17	ND	
71-43-2	Benzene	5	10	ND	16	32	ND	
56-23-5	Carbon tetrachloride	3	5	ND	16	31	ND	
142-82-5	n-Heptane	25	50	ND	102	205	ND	
78-87-5	1,2-Dichloropropane	3	5	ND	12	23	ND	
123-91-1	1,4-Dioxane	5	10	ND	18	36	ND	
994-05-8	t-Amyl Methyl Ether	3	5	ND	18	36	ND	

CAS#	Compound	MDL PPBV	RL PPBV	Amount PPBV	MDL UG/M3	RL UG/M3	Amount UG/M3	Flag
79-01-6	Trichloroethene	1	3	ND	7	13	ND	
75-27-4	Bromodichloromethane	3	5	ND	17	33	ND	
108-10-1	4-Methyl-2-pentanone	25	50	ND	102	205	ND	
10061-01-5	cis-1,3-Dichloropropene	3	5	ND	11	23	ND	
108-88-3	Toluene	5	10	ND	19	38	ND	
10061-02-6	trans-1,3-Dichloropropene	3	5	ND	11	23	ND	
79-00-5	1,1,2-Trichloroethane	3	5	ND	14	27	ND	
591-78-6	2-Hexanone	25	50	ND	102	205	ND	
124-48-1	Dibromochloromethane	3	5	ND	21	43	ND	
106-93-4	1,2-Dibromoethane	3	5	ND	19	38	ND	
127-18-4	Tetrachloroethene	1	3	ND	8	17	ND	
108-90-7	Chlorobenzene	3	5	ND	12	23	ND	
100-41-4	Ethylbenzene	3	5	ND	11	22	ND	
1330-20-7	m,p-Xylenes	3	5	ND	11	22	ND	
100-42-5	Styrene	3	5	ND	11	21	ND	
75-25-2	Bromoform	3	5	ND	26	52	ND	
95-47-6	o-Xylene	3	5	ND	11	22	ND	
79-34-5	1,1,2,2-Tetrachloroethane	3	5	ND	17	34	ND	
622-96-8	4-Ethyltoluene	3	5	ND	12	25	ND	
108-67-8	1,3,5-Trimethylbenzene	3	5	ND	12	25	ND	
95-63-6	1,2,4-Trimethylbenzene	3	5	ND	12	25	ND	
541-73-1	1,3-Dichlorobenzene	5	10	ND	30	60	ND	
100-44-7	Benzyl chloride	5	10	ND	26	52	ND	
106-46-7	1,4-Dichlorobenzene	5	10	ND	30	60	ND	
95-50-1	1,2-Dichlorobenzene	5	10	ND	30	60	ND	
120-82-1	1,2,4-Trichlorobenzene	13	25	ND	93	185	ND	
91-20-3	Naphthalene	3	5	ND	13	26	ND	
87-68-3	Hexachlorobutadiene	13	25	ND	133	267	ND	

	Surrogate Recovery	% Rec.	QC Limits LCL	UCL	Flag
2037-26-5	Toluene-d8	117	70	130	

ANALYTICAL REPORT

ENVIRONMENTAL
Analytical Service, Inc.

EPA Method TO-15 Modified Full Scan GC/MS

Analytical Method: TO-15 **SDG:** 215100 **Laboratory ID:** 02

File Name: 1510002A.D **Description:** 1500918-02 **Can/Tube#:** TBAG **QC_Batch:** 030515-MA1

Date Sampled: 03/03/15 **Time:** 00:00 **Date Analyzed:** 03/05/15 **Time:** 16:58 **Can Dilution Factor:** 1.00 **Air Volume:** 20.00 ml

CAS#	Compound	MDL PPBV	RL PPBV	Amount PPBV	MDL UG/M3	RL UG/M3	Amount UG/M3	Flag
75-71-8	Dichlorodifluoromethane	3	5	ND	12	25	ND	
74-87-3	Chloromethane	3	5	ND	5	10	ND	
76-14-2	Freon 114	3	5	ND	18	35	ND	
75-01-4	Vinyl chloride	3	5	ND	6	13	ND	
106-99-0	1,3-Butadiene	3	5	ND	6	11	ND	
74-83-9	Bromomethane	3	5	ND	10	20	ND	
75-00-3	Chloroethane	3	5	ND	7	13	ND	
64-17-5	Ethanol	50	100	ND	94	188	ND	
75-69-4	Trichlorofluoromethane	25	50	ND	140	281	ND	
67-64-1	Acetone	25	50	ND	59	119	ND	
67-63-0	2-propanol	25	50	ND	61	123	ND	
75-65-0	t-Butanol	50	100	ND	151	303	ND	
75-35-4	1,1-Dichloroethene	25	50	ND	99	198	ND	
76-13-1	Freon 113	3	5	ND	19	38	ND	
75-09-2	Dichloromethane	5	10	ND	17	35	ND	
75-15-0	Carbon disulfide	25	50	ND	78	156	ND	
156-60-5	trans-1,2-Dichloroethene	3	5	ND	10	20	ND	
1634-04-4	Methyl tert butyl ether	3	5	ND	9	18	ND	
75-34-3	1,1-Dichloroethane	2	5	ND	10	20	ND	
637-92-3	Ethyl tert butyl ether	3	5	ND	10	21	ND	
108-05-4	Vinyl acetate	3	5	ND	9	18	ND	
78-93-3	2-Butanone	10	20	ND	29	59	ND	
108-20-3	Diisopropyl ether	10	20	ND	42	84	ND	
110-54-3	Hexane	13	25	ND	44	88	ND	
141-78-6	Ethyl acetate	25	50	ND	90	180	ND	
109-99-9	Tetrahydrofuran	3	5	ND	7	15	ND	
156-59-2	cis-1,2-Dichloroethene	3	5	ND	11	21	ND	
67-66-3	Chloroform	3	5	ND	12	24	ND	
71-55-6	1,1,1-Trichloroethane	3	5	ND	14	27	ND	
107-06-2	1,2-Dichloroethane	3	5	ND	10	20	ND	
110-82-7	Cyclohexane	3	5	ND	9	17	ND	
71-43-2	Benzene	5	10	ND	16	32	ND	
56-23-5	Carbon tetrachloride	3	5	ND	16	31	ND	
142-82-5	n-Heptane	25	50	ND	102	205	ND	
78-87-5	1,2-Dichloropropane	3	5	ND	12	23	ND	
123-91-1	1,4-Dioxane	5	10	ND	18	36	ND	
994-05-8	t-Amyl Methyl Ether	3	5	ND	18	36	ND	

CAS#	Compound	MDL PPBV	RL PPBV	Amount PPBV	MDL UG/M3	RL UG/M3	Amount UG/M3	Flag
79-01-6	Trichloroethene	1	3	ND	7	13	ND	
75-27-4	Bromodichloromethane	3	5	ND	17	33	ND	
108-10-1	4-Methyl-2-pentanone	25	50	ND	102	205	ND	
10061-01-5	cis-1,3-Dichloropropene	3	5	ND	11	23	ND	
108-88-3	Toluene	5	10	ND	19	38	ND	
10061-02-6	trans-1,3-Dichloropropene	3	5	ND	11	23	ND	
79-00-5	1,1,2-Trichloroethane	3	5	ND	14	27	ND	
591-78-6	2-Hexanone	25	50	ND	102	205	ND	
124-48-1	Dibromochloromethane	3	5	ND	21	43	ND	
106-93-4	1,2-Dibromoethane	3	5	ND	19	38	ND	
127-18-4	Tetrachloroethene	1	3	ND	8	17	ND	
108-90-7	Chlorobenzene	3	5	ND	12	23	ND	
100-41-4	Ethylbenzene	3	5	ND	11	22	ND	
1330-20-7	m,p-Xylenes	3	5	ND	11	22	ND	
100-42-5	Styrene	3	5	ND	11	21	ND	
75-25-2	Bromoform	3	5	ND	26	52	ND	
95-47-6	o-Xylene	3	5	ND	11	22	ND	
79-34-5	1,1,2,2-Tetrachloroethane	3	5	ND	17	34	ND	
622-96-8	4-Ethyltoluene	3	5	ND	12	25	ND	
108-67-8	1,3,5-Trimethylbenzene	3	5	ND	12	25	ND	
95-63-6	1,2,4-Trimethylbenzene	3	5	ND	12	25	ND	
541-73-1	1,3-Dichlorobenzene	5	10	ND	30	60	ND	
100-44-7	Benzyl chloride	5	10	ND	26	52	ND	
106-46-7	1,4-Dichlorobenzene	5	10	ND	30	60	ND	
95-50-1	1,2-Dichlorobenzene	5	10	ND	30	60	ND	
120-82-1	1,2,4-Trichlorobenzene	13	25	ND	93	185	ND	
91-20-3	Naphthalene	3	5	ND	13	26	ND	
87-68-3	Hexachlorobutadiene	13	25	ND	133	267	ND	

	Surrogate Recovery	% Rec.	QC LCL	Limits UCL	Flag
2037-26-5	Toluene-d8	96	70	130	

ANALYTICAL REPORT

ENVIRONMENTAL
Analytical Service, Inc.

EPA Method TO-15 Modified Full Scan GC/MS

Analytical Method: TO-15 **SDG:** 215100 **Laboratory ID:** 03

File Name: 1510003B.D **Date Sampled:** 03/03/15 **Time:** 00:00
Description: 1500918-03 **Date Analyzed:** 03/05/15 **Time:** 19:39
Can/Tube#: TBAG **Can Dilution Factor:** 1.00
QC_Batch: 030515-MA1 **Air Volume:** 0.10 ml

CAS#	Compound	MDL PPBV	RL PPBV	Amount PPBV	MDL UG/M3	RL UG/M3	Amount UG/M3	Flag
75-71-8	Dichlorodifluoromethane	503	1,006	ND	2,486	4,972	ND	
74-87-3	Chloromethane	503	1,006	ND	1,038	2,077	ND	
76-14-2	Freon 114	503	1,006	ND	3,514	7,028	ND	
75-01-4	Vinyl chloride	503	1,006	ND	1,285	2,570	ND	
106-99-0	1,3-Butadiene	503	1,006	ND	1,112	2,225	ND	
74-83-9	Bromomethane	503	1,006	ND	1,951	3,903	ND	
75-00-3	Chloroethane	503	1,006	ND	1,326	2,653	ND	
64-17-5	Ethanol	10,000	20,000	ND	18,845	37,691	ND	
75-69-4	Trichlorofluoromethane	5,000	10,000	ND	28,084	56,168	ND	
67-64-1	Acetone	5,000	10,000	ND	11,875	23,751	ND	
67-63-0	2-propanol	5,000	10,000	ND	12,284	24,569	ND	
75-65-0	t-Butanol	10,000	20,000	ND	30,292	60,583	ND	
75-35-4	1,1-Dichloroethene	5,000	10,000	ND	19,806	39,612	ND	
76-13-1	Freon 113	500	1,000	ND	3,830	7,661	ND	
75-09-2	Dichloromethane	1,000	2,000	ND	3,471	6,941	ND	
75-15-0	Carbon disulfide	5,000	10,000	ND	15,555	31,109	ND	
156-60-5	trans-1,2-Dichloroethene	500	1,000	ND	1,981	3,961	ND	
1634-04-4	Methyl tert butyl ether	500	1,000	ND	1,801	3,601	ND	
75-34-3	1,1-Dichloroethane	499	997	ND	2,018	4,037	ND	
637-92-3	Ethyl tert butyl ether	500	1,000	ND	2,089	4,178	ND	
108-05-4	Vinyl acetate	500	1,000	ND	1,760	3,520	ND	
78-93-3	2-Butanone	2,000	4,000	ND	5,895	11,790	ND	
108-20-3	Diisopropyl ether	2,000	4,000	ND	8,356	16,711	ND	
110-54-3	Hexane	2,500	5,000	12,047	8,810	17,619	42,451	
141-78-6	Ethyl acetate	5,000	10,000	ND	18,007	36,015	ND	
109-99-9	Tetrahydrofuran	503	1,006	ND	1,483	2,965	ND	
156-59-2	cis-1,2-Dichloroethene	537	1,074	ND	2,127	4,254	ND	
67-66-3	Chloroform	502	1,003	ND	2,448	4,896	ND	
71-55-6	1,1,1-Trichloroethane	500	1,000	ND	2,727	5,453	ND	
107-06-2	1,2-Dichloroethane	500	1,000	ND	2,024	4,047	ND	
110-82-7	Cyclohexane	500	1,000	4,284	1,721	3,442	14,745	
71-43-2	Benzene	1,000	2,000	2,192	3,193	6,385	6,999	
56-23-5	Carbon tetrachloride	500	1,000	ND	3,144	6,287	ND	
142-82-5	n-Heptane	5,000	10,000	ND	20,481	40,961	ND	
78-87-5	1,2-Dichloropropane	500	1,000	ND	2,310	4,619	ND	
123-91-1	1,4-Dioxane	1,000	2,000	ND	3,601	7,203	ND	
994-05-8	t-Amyl Methyl Ether	500	1,000	ND	3,552	7,105	ND	

CAS#	Compound	MDL PPBV	RL PPBV	Amount PPBV	MDL UG/M3	RL UG/M3	Amount UG/M3	Flag
79-01-6	Trichloroethene	250	500	ND	1,343	2,686	ND	
75-27-4	Bromodichloromethane	500	1,000	ND	3,348	6,696	ND	
108-10-1	4-Methyl-2-pentanone	5,000	10,000	ND	20,481	40,961	ND	
10061-01-5	cis-1,3-Dichloropropene	500	1,000	ND	2,269	4,538	ND	
108-88-3	Toluene	1,000	2,000	ND	3,765	7,530	ND	
10061-02-6	trans-1,3-Dichloropropene	500	1,000	ND	2,269	4,538	ND	
79-00-5	1,1,2-Trichloroethane	500	1,000	ND	2,727	5,453	ND	
591-78-6	2-Hexanone	5,000	10,000	ND	20,481	40,961	ND	
124-48-1	Dibromochloromethane	500	1,000	ND	4,258	8,515	ND	
106-93-4	1,2-Dibromoethane	500	1,000	ND	3,841	7,681	ND	
127-18-4	Tetrachloroethene	250	500	ND	1,694	3,389	ND	
108-90-7	Chlorobenzene	500	1,000	ND	2,302	4,603	ND	
100-41-4	Ethylbenzene	500	1,000	ND	2,171	4,341	ND	
1330-20-7	m,p-Xylenes	500	1,000	ND	2,171	4,341	ND	
100-42-5	Styrene	500	1,000	ND	2,130	4,260	ND	
75-25-2	Bromoform	500	1,000	ND	5,165	10,330	ND	
95-47-6	o-Xylene	500	1,000	ND	2,171	4,341	ND	
79-34-5	1,1,2,2-Tetrachloroethane	500	1,000	ND	3,430	6,860	ND	
622-96-8	4-Ethyltoluene	500	1,000	ND	2,457	4,914	ND	
108-67-8	1,3,5-Trimethylbenzene	500	1,000	ND	2,457	4,914	ND	
95-63-6	1,2,4-Trimethylbenzene	500	1,000	ND	2,457	4,914	ND	
541-73-1	1,3-Dichlorobenzene	1,000	2,000	ND	6,009	12,019	ND	
100-44-7	Benzyl chloride	1,000	2,000	ND	5,175	10,351	ND	
106-46-7	1,4-Dichlorobenzene	1,000	2,000	ND	6,009	12,019	ND	
95-50-1	1,2-Dichlorobenzene	1,000	2,000	ND	6,009	12,019	ND	
120-82-1	1,2,4-Trichlorobenzene	2,500	5,000	ND	18,539	37,078	ND	
91-20-3	Naphthalene	500	1,000	ND	2,620	5,241	ND	
87-68-3	Hexachlorobutadiene	2,500	5,000	ND	26,653	53,307	ND	

	Surrogate Recovery	% Rec.	QC Limits LCL	UCL	Flag
2037-26-5	Toluene-d8	93	70	130	

METHOD BLANK REPORT

ENVIRONMENTAL
Analytical Service, Inc.

TPH-Gasoline by GC/MS
Analytical Method: TO-15

SDG: LABQC
Laboratory Number: B03055

File:	B03055C	**Date Sampled:**		**Time:**	
Description:	METHOD BLANK	**Date Analyzed:**	03/05/15	**Time:**	14:14
Sam_Type:	MB	**Can Dilution Factor:**	1.00		
QC_Batch:	030515-MA1	**Air Volume:**	0.10 ml		

Compound	MDL PPBV	RL PPBV	Amount PPBV	MDL UG/M3	RL UG/M3	Amount UG/M3	Flag
TPH-Gasoline	13	25	ND	53	106	ND	ND

ANALYTICAL REPORT

ENVIRONMENTAL
Analytical Service, Inc.

TPH-Gasoline by GC/MS

Analytical Method: TO-15

SDG: 215100
Laboratory Number: 01

File:	1510001A	**Date Sampled:**	03/03/15	**Time:**	0:00
Description:	1500918-01	**Date Analyzed:**	03/05/15	**Time:**	16:15
Sam_Type:	SA	**Can Dilution Factor:**	1.00		
QC_Batch:	030515-MA1	**Air Volume:**	20.00 ml		

Compound	MDL PPBV	RL PPBV	Amount PPBV	MDL UG/M3	RL UG/M3	Amount UG/M3	Flag
TPH-Gasoline	13	25	723	53	106	3,051	

ANALYTICAL REPORT

ENVIRONMENTAL
Analytical Service, Inc.

TPH-Gasoline by GC/MS

Analytical Method: TO-15

SDG: 215100
Laboratory Number: 02

File:	1510002A	**Date Sampled:**	03/03/15	**Time:**	0:00
Description:	1500918-02	**Date Analyzed:**	03/05/15	**Time:**	16:58
Sam_Type:	SA	**Can Dilution Factor:**	1.00		
QC_Batch:	030515-MA1	**Air Volume:**	20.00 ml		

Compound	MDL PPBV	RL PPBV	Amount PPBV	MDL UG/M3	RL UG/M3	Amount UG/M3	Flag
TPH-Gasoline	13	25	9,425	53	106	39,801	

ANALYTICAL REPORT

ENVIRONMENTAL
Analytical Service, Inc.

TPH-Gasoline by GC/MS

Analytical Method: TO-15

SDG: 215100
Laboratory Number: 03

File:	1510003B	**Date Sampled:**	03/03/15	**Time:**	0:00
Description:	1500918-03	**Date Analyzed:**	03/05/15	**Time:**	19:39
Sam_Type:	SA	**Can Dilution Factor:**	1.00		
QC_Batch:	030515-MA1	**Air Volume:**	0.10 ml		

Compound	MDL PPBV	RL PPBV	Amount PPBV	MDL UG/M3	RL UG/M3	Amount UG/M3	Flag
TPH-Gasoline	2,500	5,000	263,684	10,557	21,115	1,113,530	

Oilfield Environmental and Compliance, INC.

Sage Environmental Consulting	Project: CARB	
720 West Arapaho Road	Project Number: CARB #1344 Guisti 20-2, Gou 32-8/32-9	**Reported:**
Richardson TX, 75080	Project Manager: David Ranum	14-Aug-15 16:15

TB 040 A

1503374-01 (Air)

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes

Oilfield Environmental and Compliance

Volatile Organic Compounds by EPA Method TO-15

Acetone	ND	33	ppbv	16.7	B5H0193	07-Aug-15	07-Aug-15	TO-15 mod.	
Benzene	**8.4**	8.4	"	"	"	"	"	"	
Benzyl chloride	ND	8.4	"	"	"	"	"	"	
Bromodichloromethane	ND	8.4	"	"	"	"	"	"	
Bromoform	ND	8.4	"	"	"	"	"	"	
Bromomethane	ND	8.4	"	"	"	"	"	"	
1,3-Butadiene	ND	8.4	"	"	"	"	"	"	
Carbon disulfide	ND	8.4	"	"	"	"	"	"	
Carbon tetrachloride	ND	8.4	"	"	"	"	"	"	
Chlorobenzene	ND	8.4	"	"	"	"	"	"	
Chloroethane	ND	8.4	"	"	"	"	"	"	
Chloroform	ND	8.4	"	"	"	"	"	"	
Chloromethane	ND	8.4	"	"	"	"	"	"	
Cyclohexane	**50**	8.4	"	"	"	"	"	"	
Dibromochloromethane	ND	8.4	"	"	"	"	"	"	
1,2-Dibromoethane (EDB)	ND	8.4	"	"	"	"	"	"	
1,2-Dichlorobenzene	ND	8.4	"	"	"	"	"	"	
1,3-Dichlorobenzene	ND	8.4	"	"	"	"	"	"	
1,4-Dichlorobenzene	ND	8.4	"	"	"	"	"	"	
Dichlorodifluoromethane	ND	8.4	"	"	"	"	"	"	
1,1-Dichloroethane	ND	8.4	"	"	"	"	"	"	
1,2-Dichloroethane	ND	8.4	"	"	"	"	"	"	
1,1-Dichloroethene	ND	8.4	"	"	"	"	"	"	
cis-1,2-Dichloroethene	ND	8.4	"	"	"	"	"	"	
trans-1,2-Dichloroethene	ND	8.4	"	"	"	"	"	"	
1,2-Dichloropropane	ND	8.4	"	"	"	"	"	"	
cis-1,3-Dichloropropene	ND	8.4	"	"	"	"	"	"	
trans-1,3-Dichloropropene	ND	8.4	"	"	"	"	"	"	
1,2-Dichloro-1,1,2,2-tetrafluoroethane	ND	8.4	"	"	"	"	"	"	
Diisopropyl Ether	ND	8.4	"	"	"	"	"	"	
1,4-Dioxane	ND	8.4	"	"	"	"	"	"	
Ethanol	ND	33	"	"	"	"	"	"	

Oilfield Environmental and Compliance, INC.

Sage Environmental Consulting	Project: CARB	
720 West Arapaho Road	Project Number: CARB #1344 Guisti 20-2, Gou 32-8/32-9	**Reported:**
Richardson TX, 75080	Project Manager: David Ranum	14-Aug-15 16:15

TB 040 A

1503374-01 (Air)

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
Oilfield Environmental and Compliance									
Volatile Organic Compounds by EPA Method TO-15									
Ethyl Acetate	ND	8.4	ppbv	16.7	B5H0193	07-Aug-15	07-Aug-15	TO-15 mod.	
Ethylbenzene	ND	8.4	"	"	"	"	"	"	
Ethyl t-Butyl Ether	ND	8.4	"	"	"	"	"	"	
4-Ethyltoluene	ND	8.4	"	"	"	"	"	"	
Heptane	**75**	8.4	"	"	"	"	"	"	
Hexachlorobutadiene	ND	8.4	"	"	"	"	"	"	
Hexane	**190**	8.4	"	"	"	"	"	"	
2-Hexanone	ND	8.4	"	"	"	"	"	"	
Isopropyl alcohol	ND	8.4	"	"	"	"	"	"	
Methylene chloride	ND	8.4	"	"	"	"	"	"	
Methyl Ethyl Ketone	ND	8.4	"	"	"	"	"	"	
Methyl Isobutyl Ketone	ND	8.4	"	"	"	"	"	"	
Methyl-t-butyl ether	ND	8.4	"	"	"	"	"	"	
Naphthalene	ND	17	"	"	"	"	"	"	CCHI
Propylene	ND	8.4	"	"	"	"	"	"	
Styrene	ND	8.4	"	"	"	"	"	"	
t-Amyl Methyl Ether	ND	8.4	"	"	"	"	"	"	
t-Butyl alcohol	ND	8.4	"	"	"	"	"	"	
1,1,2,2-Tetrachloroethane	ND	8.4	"	"	"	"	"	"	
Tetrachloroethene (PCE)	ND	8.4	"	"	"	"	"	"	
Tetrahydrofuran	ND	8.4	"	"	"	"	"	"	
Toluene	**9.0**	8.4	"	"	"	"	"	"	
1,2,4-Trichlorobenzene	ND	8.4	"	"	"	"	"	"	CCHI
1,1,1-Trichloroethane	ND	8.4	"	"	"	"	"	"	
1,1,2-Trichloroethane	ND	8.4	"	"	"	"	"	"	
Trichloroethene (TCE)	ND	8.4	"	"	"	"	"	"	
Trichlorofluoromethane	ND	8.4	"	"	"	"	"	"	
1,1,2-Trichlorotrifluoroethane	ND	8.4	"	"	"	"	"	"	
1,2,4-Trimethylbenzene	ND	8.4	"	"	"	"	"	"	
1,3,5-Trimethylbenzene	ND	8.4	"	"	"	"	"	"	
Vinyl acetate	ND	8.4	"	"	"	"	"	"	
Vinyl chloride	ND	8.4	"	"	"	"	"	"	
Xylenes (total)	ND	8.4	"	"	"	"	"	"	
TPH Gasoline (C4-C12)	**7300**	3300	"	"	"	"	"	"	

Oilfield Environmental and Compliance, INC.

Sage Environmental Consulting	Project: CARB	
720 West Arapaho Road	Project Number: CARB #1344 Guisti 20-2, Gou 32-8/32-9	**Reported:**
Richardson TX, 75080	Project Manager: David Ranum	14-Aug-15 16:15

TB 041 A

1503374-03 (Air)

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes

Oilfield Environmental and Compliance

Volatile Organic Compounds by EPA Method TO-15

Acetone	ND	33	ppbv	16.7	B5H0193	07-Aug-15	07-Aug-15	TO-15 mod.
Benzene	ND	8.4	"	"	"	"	"	"
Benzyl chloride	ND	8.4	"	"	"	"	"	"
Bromodichloromethane	ND	8.4	"	"	"	"	"	"
Bromoform	ND	8.4	"	"	"	"	"	"
Bromomethane	ND	8.4	"	"	"	"	"	"
1,3-Butadiene	ND	8.4	"	"	"	"	"	"
Carbon disulfide	ND	8.4	"	"	"	"	"	"
Carbon tetrachloride	ND	8.4	"	"	"	"	"	"
Chlorobenzene	ND	8.4	"	"	"	"	"	"
Chloroethane	ND	8.4	"	"	"	"	"	"
Chloroform	ND	8.4	"	"	"	"	"	"
Chloromethane	ND	8.4	"	"	"	"	"	"
Cyclohexane	ND	8.4	"	"	"	"	"	"
Dibromochloromethane	ND	8.4	"	"	"	"	"	"
1,2-Dibromoethane (EDB)	ND	8.4	"	"	"	"	"	"
1,2-Dichlorobenzene	ND	8.4	"	"	"	"	"	"
1,3-Dichlorobenzene	ND	8.4	"	"	"	"	"	"
1,4-Dichlorobenzene	ND	8.4	"	"	"	"	"	"
Dichlorodifluoromethane	ND	8.4	"	"	"	"	"	"
1,1-Dichloroethane	ND	8.4	"	"	"	"	"	"
1,2-Dichloroethane	ND	8.4	"	"	"	"	"	"
1,1-Dichloroethene	ND	8.4	"	"	"	"	"	"
cis-1,2-Dichloroethene	ND	8.4	"	"	"	"	"	"
trans-1,2-Dichloroethene	ND	8.4	"	"	"	"	"	"
1,2-Dichloropropane	ND	8.4	"	"	"	"	"	"
cis-1,3-Dichloropropene	ND	8.4	"	"	"	"	"	"
trans-1,3-Dichloropropene	ND	8.4	"	"	"	"	"	"
1,2-Dichloro-1,1,2,2-tetrafluoroethane	ND	8.4	"	"	"	"	"	"
Diisopropyl Ether	ND	8.4	"	"	"	"	"	"
1,4-Dioxane	ND	8.4	"	"	"	"	"	"
Ethanol	ND	33	"	"	"	"	"	"
Ethyl Acetate	ND	8.4	"	"	"	"	"	"
Ethylbenzene	ND	8.4	"	"	"	"	"	"
Ethyl t-Butyl Ether	ND	8.4	"	"	"	"	"	"
4-Ethyltoluene	ND	8.4	"	"	"	"	"	"

Oilfield Environmental and Compliance, INC.

Sage Environmental Consulting	Project: CARB	
720 West Arapaho Road	Project Number: CARB #1344 Guisti 20-2, Gou 32-8/32-9	**Reported:**
Richardson TX, 75080	Project Manager: David Ranum	14-Aug-15 16:15

TB 041 A

1503374-03 (Air)

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes

Oilfield Environmental and Compliance

Volatile Organic Compounds by EPA Method TO-15

Heptane	ND	8.4	ppbv	16.7	B5H0193	07-Aug-15	07-Aug-15	TO-15 mod.	
Hexachlorobutadiene	ND	8.4	"	"	"	"	"	"	
Hexane	ND	8.4	"	"	"	"	"	"	
2-Hexanone	ND	8.4	"	"	"	"	"	"	
Isopropyl alcohol	ND	8.4	"	"	"	"	"	"	
Methylene chloride	ND	8.4	"	"	"	"	"	"	
Methyl Ethyl Ketone	ND	8.4	"	"	"	"	"	"	
Methyl Isobutyl Ketone	ND	8.4	"	"	"	"	"	"	
Methyl-t-butyl ether	ND	8.4	"	"	"	"	"	"	
Naphthalene	ND	17	"	"	"	"	"	"	CCHI
Propylene	ND	8.4	"	"	"	"	"	"	
Styrene	ND	8.4	"	"	"	"	"	"	
t-Amyl Methyl Ether	ND	8.4	"	"	"	"	"	"	
t-Butyl alcohol	ND	8.4	"	"	"	"	"	"	
1,1,2,2-Tetrachloroethane	ND	8.4	"	"	"	"	"	"	
Tetrachloroethene (PCE)	ND	8.4	"	"	"	"	"	"	
Tetrahydrofuran	ND	8.4	"	"	"	"	"	"	
Toluene	ND	8.4	"	"	"	"	"	"	
1,2,4-Trichlorobenzene	ND	8.4	"	"	"	"	"	"	CCHI
1,1,1-Trichloroethane	ND	8.4	"	"	"	"	"	"	
1,1,2-Trichloroethane	ND	8.4	"	"	"	"	"	"	
Trichloroethene (TCE)	**14**	8.4	"	"	"	"	"	"	
Trichlorofluoromethane	ND	8.4	"	"	"	"	"	"	
1,1,2-Trichlorotrifluoroethane	ND	8.4	"	"	"	"	"	"	
1,2,4-Trimethylbenzene	ND	8.4	"	"	"	"	"	"	
1,3,5-Trimethylbenzene	ND	8.4	"	"	"	"	"	"	
Vinyl acetate	ND	8.4	"	"	"	"	"	"	
Vinyl chloride	ND	8.4	"	"	"	"	"	"	
Xylenes (total)	ND	8.4	"	"	"	"	"	"	
TPH Gasoline (C4-C12)	ND	3300	"	"	"	"	"	"	

Oilfield Environmental and Compliance, INC.

Sage Environmental Consulting	Project: CARB	
720 West Arapaho Road	Project Number: Sanborn #4, 19-8, 19-10, 30-10, 25-17, 30-6	**Reported:**
Richardson TX, 75080	Project Manager: David Ranum	17-Aug-15 15:13

TB 042 A

1503396-01 (Air)

Oilfield Environmental and Compliance

Volatile Organic Compounds by EPA Method TO-15

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
Acetone	**34**	33	ppbv	16.7	B5H0193	08-Aug-15	08-Aug-15	TO-15 mod.	
Benzene	**130**	8.4	"	"	"	"	"	"	
Benzyl chloride	ND	8.4	"	"	"	"	"	"	
Bromodichloromethane	ND	8.4	"	"	"	"	"	"	
Bromoform	ND	8.4	"	"	"	"	"	"	
Bromomethane	ND	8.4	"	"	"	"	"	"	
1,3-Butadiene	ND	8.4	"	"	"	"	"	"	
Carbon disulfide	ND	8.4	"	"	"	"	"	"	
Carbon tetrachloride	ND	8.4	"	"	"	"	"	"	
Chlorobenzene	ND	8.4	"	"	"	"	"	"	
Chloroethane	ND	8.4	"	"	"	"	"	"	
Chloroform	ND	8.4	"	"	"	"	"	"	
Chloromethane	ND	8.4	"	"	"	"	"	"	
Cyclohexane	**41**	8.4	"	"	"	"	"	"	
Dibromochloromethane	ND	8.4	"	"	"	"	"	"	
1,2-Dibromoethane (EDB)	ND	8.4	"	"	"	"	"	"	
1,2-Dichlorobenzene	ND	8.4	"	"	"	"	"	"	
1,3-Dichlorobenzene	ND	8.4	"	"	"	"	"	"	
1,4-Dichlorobenzene	ND	8.4	"	"	"	"	"	"	
Dichlorodifluoromethane	ND	8.4	"	"	"	"	"	"	
1,1-Dichloroethane	ND	8.4	"	"	"	"	"	"	
1,2-Dichloroethane	ND	8.4	"	"	"	"	"	"	
1,1-Dichloroethene	ND	8.4	"	"	"	"	"	"	
cis-1,2-Dichloroethene	ND	8.4	"	"	"	"	"	"	
trans-1,2-Dichloroethene	ND	8.4	"	"	"	"	"	"	
1,2-Dichloropropane	ND	8.4	"	"	"	"	"	"	
cis-1,3-Dichloropropene	ND	8.4	"	"	"	"	"	"	
trans-1,3-Dichloropropene	ND	8.4	"	"	"	"	"	"	
1,2-Dichloro-1,1,2,2-tetrafluoroethane	ND	8.4	"	"	"	"	"	"	
Diisopropyl Ether	ND	8.4	"	"	"	"	"	"	
1,4-Dioxane	ND	8.4	"	"	"	"	"	"	
Ethanol	**68**	33	"	"	"	"	"	"	

Oilfield Environmental and Compliance, INC.

Sage Environmental Consulting	Project: CARB	
720 West Arapaho Road	Project Number: Sanborn #4, 19-8, 19-10, 30-10, 25-17, 30-6	**Reported:**
Richardson TX, 75080	Project Manager: David Ranum	17-Aug-15 15:13

TB 042 A

1503396-01 (Air)

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
Oilfield Environmental and Compliance									
Volatile Organic Compounds by EPA Method TO-15									
Ethyl Acetate	ND	8.4	ppbv	16.7	B5H0193	08-Aug-15	08-Aug-15	TO-15 mod.	
Ethylbenzene	**17**	8.4	"	"	"	"	"	"	
Ethyl t-Butyl Ether	ND	8.4	"	"	"	"	"	"	
4-Ethyltoluene	ND	8.4	"	"	"	"	"	"	
Heptane	**33**	8.4	"	"	"	"	"	"	
Hexachlorobutadiene	ND	8.4	"	"	"	"	"	"	
Hexane	**51**	8.4	"	"	"	"	"	"	
2-Hexanone	ND	8.4	"	"	"	"	"	"	
Isopropyl alcohol	**10**	8.4	"	"	"	"	"	"	
Methylene chloride	ND	8.4	"	"	"	"	"	"	
Methyl Ethyl Ketone	ND	8.4	"	"	"	"	"	"	
Methyl Isobutyl Ketone	**10**	8.4	"	"	"	"	"	"	
Methyl-t-butyl ether	ND	8.4	"	"	"	"	"	"	
Naphthalene	ND	17	"	"	"	"	"	"	CCHI
Propylene	ND	8.4	"	"	"	"	"	"	
Styrene	ND	8.4	"	"	"	"	"	"	
t-Amyl Methyl Ether	ND	8.4	"	"	"	"	"	"	
t-Butyl alcohol	ND	8.4	"	"	"	"	"	"	
1,1,2,2-Tetrachloroethane	ND	8.4	"	"	"	"	"	"	
Tetrachloroethene (PCE)	ND	8.4	"	"	"	"	"	"	
Tetrahydrofuran	ND	8.4	"	"	"	"	"	"	
Toluene	**76**	8.4	"	"	"	"	"	"	
1,2,4-Trichlorobenzene	ND	8.4	"	"	"	"	"	"	CCHI
1,1,1-Trichloroethane	ND	8.4	"	"	"	"	"	"	
1,1,2-Trichloroethane	ND	8.4	"	"	"	"	"	"	
Trichloroethene (TCE)	ND	8.4	"	"	"	"	"	"	
Trichlorofluoromethane	ND	8.4	"	"	"	"	"	"	
1,1,2-Trichlorotrifluoroethane	ND	8.4	"	"	"	"	"	"	
1,2,4-Trimethylbenzene	**18**	8.4	"	"	"	"	"	"	
1,3,5-Trimethylbenzene	ND	8.4	"	"	"	"	"	"	
Vinyl acetate	ND	8.4	"	"	"	"	"	"	
Vinyl chloride	ND	8.4	"	"	"	"	"	"	
Xylenes (total)	**90**	8.4	"	"	"	"	"	"	
TPH Gasoline (C4-C12)	**3900**	3300	"	"	"	"	"	"	

Oilfield Environmental and Compliance, INC.

Sage Environmental Consulting	Project: CARB	
720 West Arapaho Road	Project Number: Sanborn #4, 19-8, 19-10, 30-10, 25-17, 30-6	**Reported:**
Richardson TX, 75080	Project Manager: David Ranum	17-Aug-15 15:13

TB 043 A

1503396-03 (Air)

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes

Oilfield Environmental and Compliance

Volatile Organic Compounds by EPA Method TO-15

Acetone	**43**	33	ppbv	16.7	B5H0193	08-Aug-15	08-Aug-15	TO-15 mod.	
Benzene	ND	8.4	"	"	"	"	"	"	
Benzyl chloride	ND	8.4	"	"	"	"	"	"	
Bromodichloromethane	ND	8.4	"	"	"	"	"	"	
Bromoform	ND	8.4	"	"	"	"	"	"	
Bromomethane	ND	8.4	"	"	"	"	"	"	
1,3-Butadiene	ND	8.4	"	"	"	"	"	"	
Carbon disulfide	ND	8.4	"	"	"	"	"	"	
Carbon tetrachloride	ND	8.4	"	"	"	"	"	"	
Chlorobenzene	ND	8.4	"	"	"	"	"	"	
Chloroethane	ND	8.4	"	"	"	"	"	"	
Chloroform	ND	8.4	"	"	"	"	"	"	
Chloromethane	ND	8.4	"	"	"	"	"	"	
Cyclohexane	ND	8.4	"	"	"	"	"	"	
Dibromochloromethane	ND	8.4	"	"	"	"	"	"	
1,2-Dibromoethane (EDB)	ND	8.4	"	"	"	"	"	"	
1,2-Dichlorobenzene	ND	8.4	"	"	"	"	"	"	
1,3-Dichlorobenzene	ND	8.4	"	"	"	"	"	"	
1,4-Dichlorobenzene	ND	8.4	"	"	"	"	"	"	
Dichlorodifluoromethane	ND	8.4	"	"	"	"	"	"	
1,1-Dichloroethane	ND	8.4	"	"	"	"	"	"	
1,2-Dichloroethane	ND	8.4	"	"	"	"	"	"	
1,1-Dichloroethene	ND	8.4	"	"	"	"	"	"	
cis-1,2-Dichloroethene	ND	8.4	"	"	"	"	"	"	
trans-1,2-Dichloroethene	ND	8.4	"	"	"	"	"	"	
1,2-Dichloropropane	ND	8.4	"	"	"	"	"	"	
cis-1,3-Dichloropropene	ND	8.4	"	"	"	"	"	"	
trans-1,3-Dichloropropene	ND	8.4	"	"	"	"	"	"	
1,2-Dichloro-1,1,2,2-tetrafluoroethane	ND	8.4	"	"	"	"	"	"	
Diisopropyl Ether	ND	8.4	"	"	"	"	"	"	
1,4-Dioxane	ND	8.4	"	"	"	"	"	"	
Ethanol	**46**	33	"	"	"	"	"	"	
Ethyl Acetate	ND	8.4	"	"	"	"	"	"	
Ethylbenzene	ND	8.4	"	"	"	"	"	"	
Ethyl t-Butyl Ether	ND	8.4	"	"	"	"	"	"	
4-Ethyltoluene	ND	8.4	"	"	"	"	"	"	

Oilfield Environmental and Compliance, INC.

Sage Environmental Consulting	Project: CARB	
720 West Arapaho Road	Project Number: Sanborn #4, 19-8, 19-10, 30-10, 25-17, 30-6	**Reported:**
Richardson TX, 75080	Project Manager: David Ranum	17-Aug-15 15:13

TB 043 A

1503396-03 (Air)

Oilfield Environmental and Compliance

Volatile Organic Compounds by EPA Method TO-15

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
Heptane	ND	8.4	ppbv	16.7	B5H0193	08-Aug-15	08-Aug-15	TO-15 mod.	
Hexachlorobutadiene	ND	8.4	"	"	"	"	"	"	
Hexane	ND	8.4	"	"	"	"	"	"	
2-Hexanone	ND	8.4	"	"	"	"	"	"	
Isopropyl alcohol	ND	8.4	"	"	"	"	"	"	
Methylene chloride	ND	8.4	"	"	"	"	"	"	
Methyl Ethyl Ketone	ND	8.4	"	"	"	"	"	"	
Methyl Isobutyl Ketone	**16**	8.4	"	"	"	"	"	"	
Methyl-t-butyl ether	ND	8.4	"	"	"	"	"	"	
Naphthalene	ND	17	"	"	"	"	"	"	CCHI
Propylene	ND	8.4	"	"	"	"	"	"	
Styrene	ND	8.4	"	"	"	"	"	"	
t-Amyl Methyl Ether	ND	8.4	"	"	"	"	"	"	
t-Butyl alcohol	ND	8.4	"	"	"	"	"	"	
1,1,2,2-Tetrachloroethane	ND	8.4	"	"	"	"	"	"	
Tetrachloroethene (PCE)	ND	8.4	"	"	"	"	"	"	
Tetrahydrofuran	ND	8.4	"	"	"	"	"	"	
Toluene	ND	8.4	"	"	"	"	"	"	
1,2,4-Trichlorobenzene	ND	8.4	"	"	"	"	"	"	CCHI
1,1,1-Trichloroethane	ND	8.4	"	"	"	"	"	"	
1,1,2-Trichloroethane	ND	8.4	"	"	"	"	"	"	
Trichloroethene (TCE)	ND	8.4	"	"	"	"	"	"	
Trichlorofluoromethane	ND	8.4	"	"	"	"	"	"	
1,1,2-Trichlorotrifluoroethane	ND	8.4	"	"	"	"	"	"	
1,2,4-Trimethylbenzene	ND	8.4	"	"	"	"	"	"	
1,3,5-Trimethylbenzene	ND	8.4	"	"	"	"	"	"	
Vinyl acetate	ND	8.4	"	"	"	"	"	"	
Vinyl chloride	ND	8.4	"	"	"	"	"	"	
Xylenes (total)	ND	8.4	"	"	"	"	"	"	
TPH Gasoline (C4-C12)	ND	3300	"	"	"	"	"	"	

Oilfield Environmental and Compliance, INC.

Sage Environmental Consulting	Project: CARB	
720 West Arapaho Road	Project Number: CARB #1344 Feather River AQMD	**Reported:**
Richardson TX, 75080	Project Manager: David Ranum	19-Aug-15 14:05

TB 044

1503434-01 (Air)

Oilfield Environmental and Compliance

Volatile Organic Compounds by EPA Method TO-15

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
Acetone	ND	33	ppbv	16.7	B5H0369	12-Aug-15	12-Aug-15	TO-15 mod.	
Benzene	ND	8.4	"	"	"	"	"	"	
Benzyl chloride	ND	8.4	"	"	"	"	"	"	CCHI
Bromodichloromethane	ND	8.4	"	"	"	"	"	"	
Bromoform	ND	8.4	"	"	"	"	"	"	
Bromomethane	ND	8.4	"	"	"	"	"	"	
1,3-Butadiene	ND	8.4	"	"	"	"	"	"	
Carbon disulfide	**8.7**	8.4	"	"	"	"	"	"	
Carbon tetrachloride	ND	8.4	"	"	"	"	"	"	
Chlorobenzene	ND	8.4	"	"	"	"	"	"	
Chloroethane	ND	8.4	"	"	"	"	"	"	
Chloroform	ND	8.4	"	"	"	"	"	"	
Chloromethane	ND	8.4	"	"	"	"	"	"	
Cyclohexane	**11**	8.4	"	"	"	"	"	"	
Dibromochloromethane	ND	8.4	"	"	"	"	"	"	
1,2-Dibromoethane (EDB)	ND	8.4	"	"	"	"	"	"	
1,2-Dichlorobenzene	ND	8.4	"	"	"	"	"	"	
1,3-Dichlorobenzene	ND	8.4	"	"	"	"	"	"	
1,4-Dichlorobenzene	ND	8.4	"	"	"	"	"	"	
Dichlorodifluoromethane	ND	8.4	"	"	"	"	"	"	
1,1-Dichloroethane	ND	8.4	"	"	"	"	"	"	
1,2-Dichloroethane	ND	8.4	"	"	"	"	"	"	
1,1-Dichloroethene	ND	8.4	"	"	"	"	"	"	
cis-1,2-Dichloroethene	ND	8.4	"	"	"	"	"	"	
trans-1,2-Dichloroethene	ND	8.4	"	"	"	"	"	"	
1,2-Dichloropropane	ND	8.4	"	"	"	"	"	"	
cis-1,3-Dichloropropene	ND	8.4	"	"	"	"	"	"	
trans-1,3-Dichloropropene	ND	8.4	"	"	"	"	"	"	
1,2-Dichloro-1,1,2,2-tetrafluoroethane	ND	8.4	"	"	"	"	"	"	
Diisopropyl Ether	ND	8.4	"	"	"	"	"	"	
1,4-Dioxane	ND	8.4	"	"	"	"	"	"	CCHI
Ethanol	ND	33	"	"	"	"	"	"	

Oilfield Environmental and Compliance, INC.

Sage Environmental Consulting	Project: CARB	
720 West Arapaho Road	Project Number: CARB #1344 Feather River AQMD	**Reported:**
Richardson TX, 75080	Project Manager: David Ranum	19-Aug-15 14:05

TB 044

1503434-01 (Air)

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
Oilfield Environmental and Compliance									
Volatile Organic Compounds by EPA Method TO-15									
Ethyl Acetate	ND	8.4	ppbv	16.7	B5H0369	12-Aug-15	12-Aug-15	TO-15 mod.	
Ethylbenzene	ND	8.4	"	"	"	"	"	"	
Ethyl t-Butyl Ether	ND	8.4	"	"	"	"	"	"	
4-Ethyltoluene	ND	8.4	"	"	"	"	"	"	
Heptane	**21**	8.4	"	"	"	"	"	"	
Hexachlorobutadiene	ND	8.4	"	"	"	"	"	"	
Hexane	**32**	8.4	"	"	"	"	"	"	
2-Hexanone	ND	8.4	"	"	"	"	"	"	CCHI
Isopropyl alcohol	**44**	8.4	"	"	"	"	"	"	
Methylene chloride	ND	8.4	"	"	"	"	"	"	
Methyl Ethyl Ketone	ND	8.4	"	"	"	"	"	"	
Methyl Isobutyl Ketone	ND	8.4	"	"	"	"	"	"	
Methyl-t-butyl ether	ND	8.4	"	"	"	"	"	"	
Naphthalene	ND	17	"	"	"	"	"	"	CCHI
Propylene	ND	8.4	"	"	"	"	"	"	
Styrene	ND	8.4	"	"	"	"	"	"	
t-Amyl Methyl Ether	ND	8.4	"	"	"	"	"	"	
t-Butyl alcohol	ND	8.4	"	"	"	"	"	"	
1,1,2,2-Tetrachloroethane	ND	8.4	"	"	"	"	"	"	
Tetrachloroethene (PCE)	ND	8.4	"	"	"	"	"	"	
Tetrahydrofuran	ND	8.4	"	"	"	"	"	"	
Toluene	**20**	8.4	"	"	"	"	"	"	
1,2,4-Trichlorobenzene	ND	8.4	"	"	"	"	"	"	CCHI
1,1,1-Trichloroethane	ND	8.4	"	"	"	"	"	"	
1,1,2-Trichloroethane	ND	8.4	"	"	"	"	"	"	
Trichloroethene (TCE)	ND	8.4	"	"	"	"	"	"	
Trichlorofluoromethane	ND	8.4	"	"	"	"	"	"	
1,1,2-Trichlorotrifluoroethane	ND	8.4	"	"	"	"	"	"	
1,2,4-Trimethylbenzene	ND	8.4	"	"	"	"	"	"	
1,3,5-Trimethylbenzene	ND	8.4	"	"	"	"	"	"	
Vinyl acetate	ND	8.4	"	"	"	"	"	"	
Vinyl chloride	ND	8.4	"	"	"	"	"	"	
Xylenes (total)	**38**	8.4	"	"	"	"	"	"	
TPH Gasoline (C4-C12)	ND	3300	"	"	"	"	"	"	

Oilfield Environmental and Compliance, INC.

Sage Environmental Consulting	Project: CARB	
720 West Arapaho Road	Project Number: CARB #1344 Feather River AQMD	**Reported:**
Richardson TX, 75080	Project Manager: David Ranum	19-Aug-15 14:05

TB 045

1503434-02 (Air)

Oilfield Environmental and Compliance

Volatile Organic Compounds by EPA Method TO-15

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
Acetone	ND	33	ppbv	16.7	B5H0369	12-Aug-15	12-Aug-15	TO-15 mod.	
Benzene	ND	8.4	"	"	"	"	"	"	
Benzyl chloride	ND	8.4	"	"	"	"	"	"	CCHI
Bromodichloromethane	ND	8.4	"	"	"	"	"	"	
Bromoform	ND	8.4	"	"	"	"	"	"	
Bromomethane	ND	8.4	"	"	"	"	"	"	
1,3-Butadiene	ND	8.4	"	"	"	"	"	"	
Carbon disulfide	ND	8.4	"	"	"	"	"	"	
Carbon tetrachloride	ND	8.4	"	"	"	"	"	"	
Chlorobenzene	ND	8.4	"	"	"	"	"	"	
Chloroethane	ND	8.4	"	"	"	"	"	"	
Chloroform	ND	8.4	"	"	"	"	"	"	
Chloromethane	ND	8.4	"	"	"	"	"	"	
Cyclohexane	ND	8.4	"	"	"	"	"	"	
Dibromochloromethane	ND	8.4	"	"	"	"	"	"	
1,2-Dibromoethane (EDB)	ND	8.4	"	"	"	"	"	"	
1,2-Dichlorobenzene	ND	8.4	"	"	"	"	"	"	
1,3-Dichlorobenzene	ND	8.4	"	"	"	"	"	"	
1,4-Dichlorobenzene	ND	8.4	"	"	"	"	"	"	
Dichlorodifluoromethane	ND	8.4	"	"	"	"	"	"	
1,1-Dichloroethane	ND	8.4	"	"	"	"	"	"	
1,2-Dichloroethane	ND	8.4	"	"	"	"	"	"	
1,1-Dichloroethene	ND	8.4	"	"	"	"	"	"	
cis-1,2-Dichloroethene	ND	8.4	"	"	"	"	"	"	
trans-1,2-Dichloroethene	ND	8.4	"	"	"	"	"	"	
1,2-Dichloropropane	ND	8.4	"	"	"	"	"	"	
cis-1,3-Dichloropropene	ND	8.4	"	"	"	"	"	"	
trans-1,3-Dichloropropene	ND	8.4	"	"	"	"	"	"	
1,2-Dichloro-1,1,2,2-tetrafluoroethane	ND	8.4	"	"	"	"	"	"	
Diisopropyl Ether	ND	8.4	"	"	"	"	"	"	
1,4-Dioxane	ND	8.4	"	"	"	"	"	"	CCHI
Ethanol	ND	33	"	"	"	"	"	"	
Ethyl Acetate	ND	8.4	"	"	"	"	"	"	
Ethylbenzene	ND	8.4	"	"	"	"	"	"	
Ethyl t-Butyl Ether	ND	8.4	"	"	"	"	"	"	
4-Ethyltoluene	ND	8.4	"	"	"	"	"	"	

Oilfield Environmental and Compliance, INC.

Sage Environmental Consulting	Project: CARB	
720 West Arapaho Road	Project Number: CARB #1344 Feather River AQMD	**Reported:**
Richardson TX, 75080	Project Manager: David Ranum	19-Aug-15 14:05

TB 045

1503434-02 (Air)

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes

Oilfield Environmental and Compliance

Volatile Organic Compounds by EPA Method TO-15

Heptane	ND	8.4	ppbv	16.7	B5H0369	12-Aug-15	12-Aug-15	TO-15 mod.	
Hexachlorobutadiene	ND	8.4	"	"	"	"	"	"	
Hexane	**8.4**	8.4	"	"	"	"	"	"	
2-Hexanone	ND	8.4	"	"	"	"	"	"	CCHI
Isopropyl alcohol	ND	8.4	"	"	"	"	"	"	
Methylene chloride	ND	8.4	"	"	"	"	"	"	
Methyl Ethyl Ketone	ND	8.4	"	"	"	"	"	"	
Methyl Isobutyl Ketone	ND	8.4	"	"	"	"	"	"	
Methyl-t-butyl ether	ND	8.4	"	"	"	"	"	"	
Naphthalene	ND	17	"	"	"	"	"	"	CCHI
Propylene	ND	8.4	"	"	"	"	"	"	
Styrene	ND	8.4	"	"	"	"	"	"	
t-Amyl Methyl Ether	ND	8.4	"	"	"	"	"	"	
t-Butyl alcohol	ND	8.4	"	"	"	"	"	"	
1,1,2,2-Tetrachloroethane	ND	8.4	"	"	"	"	"	"	
Tetrachloroethene (PCE)	ND	8.4	"	"	"	"	"	"	
Tetrahydrofuran	ND	8.4	"	"	"	"	"	"	
Toluene	**13**	8.4	"	"	"	"	"	"	
1,2,4-Trichlorobenzene	ND	8.4	"	"	"	"	"	"	CCHI
1,1,1-Trichloroethane	ND	8.4	"	"	"	"	"	"	
1,1,2-Trichloroethane	ND	8.4	"	"	"	"	"	"	
Trichloroethene (TCE)	ND	8.4	"	"	"	"	"	"	
Trichlorofluoromethane	ND	8.4	"	"	"	"	"	"	
1,1,2-Trichlorotrifluoroethane	ND	8.4	"	"	"	"	"	"	
1,2,4-Trimethylbenzene	ND	8.4	"	"	"	"	"	"	
1,3,5-Trimethylbenzene	ND	8.4	"	"	"	"	"	"	
Vinyl acetate	ND	8.4	"	"	"	"	"	"	
Vinyl chloride	ND	8.4	"	"	"	"	"	"	
Xylenes (total)	**14**	8.4	"	"	"	"	"	"	
TPH Gasoline (C4-C12)	ND	3300	"	"	"	"	"	"	

Oilfield Environmental and Compliance, INC.

Sage Environmental Consulting	Project: CARB	
720 West Arapaho Road	Project Number: CARB #1344 Feather River AQMD	**Reported:**
Richardson TX, 75080	Project Manager: David Ranum	20-Aug-15 15:50

TB 046 A & B

1503463-01 (Air)

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes

Oilfield Environmental and Compliance

Volatile Organic Compounds by EPA Method TO-15

Acetone	ND	33	ppbv	16.7	B5H0369	13-Aug-15	13-Aug-15	TO-15 mod.	
Benzene	**11**	8.4	"	"	"	"	"	"	
Benzyl chloride	ND	8.4	"	"	"	"	"	"	CCHI
Bromodichloromethane	ND	8.4	"	"	"	"	"	"	
Bromoform	ND	8.4	"	"	"	"	"	"	
Bromomethane	ND	8.4	"	"	"	"	"	"	
1,3-Butadiene	ND	8.4	"	"	"	"	"	"	
Carbon disulfide	ND	8.4	"	"	"	"	"	"	
Carbon tetrachloride	ND	8.4	"	"	"	"	"	"	
Chlorobenzene	ND	8.4	"	"	"	"	"	"	
Chloroethane	ND	8.4	"	"	"	"	"	"	
Chloroform	ND	8.4	"	"	"	"	"	"	
Chloromethane	ND	8.4	"	"	"	"	"	"	
Cyclohexane	**29**	8.4	"	"	"	"	"	"	
Dibromochloromethane	ND	8.4	"	"	"	"	"	"	
1,2-Dibromoethane (EDB)	ND	8.4	"	"	"	"	"	"	
1,2-Dichlorobenzene	ND	8.4	"	"	"	"	"	"	
1,3-Dichlorobenzene	ND	8.4	"	"	"	"	"	"	
1,4-Dichlorobenzene	ND	8.4	"	"	"	"	"	"	
Dichlorodifluoromethane	ND	8.4	"	"	"	"	"	"	
1,1-Dichloroethane	ND	8.4	"	"	"	"	"	"	
1,2-Dichloroethane	ND	8.4	"	"	"	"	"	"	
1,1-Dichloroethene	ND	8.4	"	"	"	"	"	"	
cis-1,2-Dichloroethene	ND	8.4	"	"	"	"	"	"	
trans-1,2-Dichloroethene	ND	8.4	"	"	"	"	"	"	
1,2-Dichloropropane	ND	8.4	"	"	"	"	"	"	
cis-1,3-Dichloropropene	ND	8.4	"	"	"	"	"	"	
trans-1,3-Dichloropropene	ND	8.4	"	"	"	"	"	"	
1,2-Dichloro-1,1,2,2-tetrafluoroethane	ND	8.4	"	"	"	"	"	"	
Diisopropyl Ether	ND	8.4	"	"	"	"	"	"	
1,4-Dioxane	ND	8.4	"	"	"	"	"	"	CCHI
Ethanol	**36**	33	"	"	"	"	"	"	

Oilfield Environmental and Compliance, INC.

Sage Environmental Consulting	Project: CARB	
720 West Arapaho Road	Project Number: CARB #1344 Feather River AQMD	**Reported:**
Richardson TX, 75080	Project Manager: David Ranum	20-Aug-15 15:50

TB 046 A & B
1503463-01 (Air)

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes

Oilfield Environmental and Compliance

Volatile Organic Compounds by EPA Method TO-15

Ethyl Acetate	ND	8.4	ppbv	16.7	B5H0369	13-Aug-15	13-Aug-15	TO-15 mod.	
Ethylbenzene	ND	8.4	"	"	"	"	"	"	
Ethyl t-Butyl Ether	ND	8.4	"	"	"	"	"	"	
4-Ethyltoluene	ND	8.4	"	"	"	"	"	"	
Heptane	**28**	8.4	"	"	"	"	"	"	
Hexachlorobutadiene	ND	8.4	"	"	"	"	"	"	
Hexane	**58**	8.4	"	"	"	"	"	"	
2-Hexanone	ND	8.4	"	"	"	"	"	"	CCHI
Isopropyl alcohol	**13**	8.4	"	"	"	"	"	"	
Methylene chloride	ND	8.4	"	"	"	"	"	"	
Methyl Ethyl Ketone	ND	8.4	"	"	"	"	"	"	
Methyl Isobutyl Ketone	ND	8.4	"	"	"	"	"	"	
Methyl-t-butyl ether	ND	8.4	"	"	"	"	"	"	
Naphthalene	ND	17	"	"	"	"	"	"	CCHI
Propylene	ND	8.4	"	"	"	"	"	"	
Styrene	ND	8.4	"	"	"	"	"	"	
t-Amyl Methyl Ether	ND	8.4	"	"	"	"	"	"	
t-Butyl alcohol	ND	8.4	"	"	"	"	"	"	
1,1,2,2-Tetrachloroethane	ND	8.4	"	"	"	"	"	"	
Tetrachloroethene (PCE)	ND	8.4	"	"	"	"	"	"	
Tetrahydrofuran	ND	8.4	"	"	"	"	"	"	
Toluene	ND	8.4	"	"	"	"	"	"	
1,2,4-Trichlorobenzene	ND	8.4	"	"	"	"	"	"	CCHI
1,1,1-Trichloroethane	ND	8.4	"	"	"	"	"	"	
1,1,2-Trichloroethane	ND	8.4	"	"	"	"	"	"	
Trichloroethene (TCE)	ND	8.4	"	"	"	"	"	"	
Trichlorofluoromethane	ND	8.4	"	"	"	"	"	"	
1,1,2-Trichlorotrifluoroethane	ND	8.4	"	"	"	"	"	"	
1,2,4-Trimethylbenzene	ND	8.4	"	"	"	"	"	"	
1,3,5-Trimethylbenzene	ND	8.4	"	"	"	"	"	"	
Vinyl acetate	ND	8.4	"	"	"	"	"	"	
Vinyl chloride	ND	8.4	"	"	"	"	"	"	
Xylenes (total)	ND	8.4	"	"	"	"	"	"	
TPH Gasoline (C4-C12)	**3400**	3300	"	"	"	"	"	"	

Oilfield Environmental and Compliance, INC.

Sage Environmental Consulting	Project: CARB	
720 West Arapaho Road	Project Number: CARB #1344 Feather River AQMD	**Reported:**
Richardson TX, 75080	Project Manager: David Ranum	20-Aug-15 15:50

TB 047 A & B

1503463-02 (Air)

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes

Oilfield Environmental and Compliance

Volatile Organic Compounds by EPA Method TO-15

Acetone	ND	33	ppbv	16.7	B5H0369	13-Aug-15	13-Aug-15	TO-15 mod.	
Benzene	ND	8.4	"	"	"	"	"	"	
Benzyl chloride	ND	8.4	"	"	"	"	"	"	CCHI
Bromodichloromethane	ND	8.4	"	"	"	"	"	"	
Bromoform	ND	8.4	"	"	"	"	"	"	
Bromomethane	ND	8.4	"	"	"	"	"	"	
1,3-Butadiene	ND	8.4	"	"	"	"	"	"	
Carbon disulfide	**9.7**	8.4	"	"	"	"	"	"	
Carbon tetrachloride	ND	8.4	"	"	"	"	"	"	
Chlorobenzene	ND	8.4	"	"	"	"	"	"	
Chloroethane	ND	8.4	"	"	"	"	"	"	
Chloroform	ND	8.4	"	"	"	"	"	"	
Chloromethane	ND	8.4	"	"	"	"	"	"	
Cyclohexane	ND	8.4	"	"	"	"	"	"	
Dibromochloromethane	ND	8.4	"	"	"	"	"	"	
1,2-Dibromoethane (EDB)	ND	8.4	"	"	"	"	"	"	
1,2-Dichlorobenzene	ND	8.4	"	"	"	"	"	"	
1,3-Dichlorobenzene	ND	8.4	"	"	"	"	"	"	
1,4-Dichlorobenzene	ND	8.4	"	"	"	"	"	"	
Dichlorodifluoromethane	ND	8.4	"	"	"	"	"	"	
1,1-Dichloroethane	ND	8.4	"	"	"	"	"	"	
1,2-Dichloroethane	ND	8.4	"	"	"	"	"	"	
1,1-Dichloroethene	ND	8.4	"	"	"	"	"	"	
cis-1,2-Dichloroethene	ND	8.4	"	"	"	"	"	"	
trans-1,2-Dichloroethene	ND	8.4	"	"	"	"	"	"	
1,2-Dichloropropane	ND	8.4	"	"	"	"	"	"	
cis-1,3-Dichloropropene	ND	8.4	"	"	"	"	"	"	
trans-1,3-Dichloropropene	ND	8.4	"	"	"	"	"	"	
1,2-Dichloro-1,1,2,2-tetrafluoroethane	ND	8.4	"	"	"	"	"	"	
Diisopropyl Ether	ND	8.4	"	"	"	"	"	"	
1,4-Dioxane	ND	8.4	"	"	"	"	"	"	CCHI
Ethanol	ND	33	"	"	"	"	"	"	
Ethyl Acetate	ND	8.4	"	"	"	"	"	"	
Ethylbenzene	ND	8.4	"	"	"	"	"	"	
Ethyl t-Butyl Ether	ND	8.4	"	"	"	"	"	"	
4-Ethyltoluene	ND	8.4	"	"	"	"	"	"	

Oilfield Environmental and Compliance, INC.

Sage Environmental Consulting	Project: CARB	
720 West Arapaho Road	Project Number: CARB #1344 Feather River AQMD	**Reported:**
Richardson TX, 75080	Project Manager: David Ranum	20-Aug-15 15:50

TB 047 A & B

1503463-02 (Air)

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes

Oilfield Environmental and Compliance

Volatile Organic Compounds by EPA Method TO-15

Heptane	ND	8.4	ppbv	16.7	B5H0369	13-Aug-15	13-Aug-15	TO-15 mod.	
Hexachlorobutadiene	ND	8.4	"	"	"	"	"	"	
Hexane	ND	8.4	"	"	"	"	"	"	
2-Hexanone	ND	8.4	"	"	"	"	"	"	CCHI
Isopropyl alcohol	ND	8.4	"	"	"	"	"	"	
Methylene chloride	ND	8.4	"	"	"	"	"	"	
Methyl Ethyl Ketone	ND	8.4	"	"	"	"	"	"	
Methyl Isobutyl Ketone	ND	8.4	"	"	"	"	"	"	
Methyl-t-butyl ether	ND	8.4	"	"	"	"	"	"	
Naphthalene	ND	17	"	"	"	"	"	"	CCHI
Propylene	ND	8.4	"	"	"	"	"	"	
Styrene	ND	8.4	"	"	"	"	"	"	
t-Amyl Methyl Ether	ND	8.4	"	"	"	"	"	"	
t-Butyl alcohol	ND	8.4	"	"	"	"	"	"	
1,1,2,2-Tetrachloroethane	ND	8.4	"	"	"	"	"	"	
Tetrachloroethene (PCE)	ND	8.4	"	"	"	"	"	"	
Tetrahydrofuran	ND	8.4	"	"	"	"	"	"	
Toluene	**33**	8.4	"	"	"	"	"	"	
1,2,4-Trichlorobenzene	ND	8.4	"	"	"	"	"	"	CCHI
1,1,1-Trichloroethane	ND	8.4	"	"	"	"	"	"	
1,1,2-Trichloroethane	ND	8.4	"	"	"	"	"	"	
Trichloroethene (TCE)	ND	8.4	"	"	"	"	"	"	
Trichlorofluoromethane	ND	8.4	"	"	"	"	"	"	
1,1,2-Trichlorotrifluoroethane	ND	8.4	"	"	"	"	"	"	
1,2,4-Trimethylbenzene	ND	8.4	"	"	"	"	"	"	
1,3,5-Trimethylbenzene	ND	8.4	"	"	"	"	"	"	
Vinyl acetate	ND	8.4	"	"	"	"	"	"	
Vinyl chloride	ND	8.4	"	"	"	"	"	"	
Xylenes (total)	**24**	8.4	"	"	"	"	"	"	
TPH Gasoline (C4-C12)	ND	3300	"	"	"	"	"	"	

Oilfield Environmental and Compliance, INC.

Sage Environmental Consulting	Project: CARB	
720 West Arapaho Road	Project Number: CARB #1344 Feather River AQMD	**Reported:**
Richardson TX, 75080	Project Manager: David Ranum	20-Aug-15 15:50

TB 048 A & B
1503463-03 (Air)

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes

Oilfield Environmental and Compliance

Volatile Organic Compounds by EPA Method TO-15

Acetone	ND	33	ppbv	16.7	B5H0369	13-Aug-15	13-Aug-15	TO-15 mod.	
Benzene	ND	8.4	"	"	"	"	"	"	
Benzyl chloride	ND	8.4	"	"	"	"	"	"	CCHI
Bromodichloromethane	ND	8.4	"	"	"	"	"	"	
Bromoform	ND	8.4	"	"	"	"	"	"	
Bromomethane	ND	8.4	"	"	"	"	"	"	
1,3-Butadiene	ND	8.4	"	"	"	"	"	"	
Carbon disulfide	ND	8.4	"	"	"	"	"	"	
Carbon tetrachloride	ND	8.4	"	"	"	"	"	"	
Chlorobenzene	ND	8.4	"	"	"	"	"	"	
Chloroethane	ND	8.4	"	"	"	"	"	"	
Chloroform	ND	8.4	"	"	"	"	"	"	
Chloromethane	ND	8.4	"	"	"	"	"	"	
Cyclohexane	**13**	8.4	"	"	"	"	"	"	
Dibromochloromethane	ND	8.4	"	"	"	"	"	"	
1,2-Dibromoethane (EDB)	ND	8.4	"	"	"	"	"	"	
1,2-Dichlorobenzene	ND	8.4	"	"	"	"	"	"	
1,3-Dichlorobenzene	ND	8.4	"	"	"	"	"	"	
1,4-Dichlorobenzene	ND	8.4	"	"	"	"	"	"	
Dichlorodifluoromethane	ND	8.4	"	"	"	"	"	"	
1,1-Dichloroethane	ND	8.4	"	"	"	"	"	"	
1,2-Dichloroethane	ND	8.4	"	"	"	"	"	"	
1,1-Dichloroethene	ND	8.4	"	"	"	"	"	"	
cis-1,2-Dichloroethene	ND	8.4	"	"	"	"	"	"	
trans-1,2-Dichloroethene	ND	8.4	"	"	"	"	"	"	
1,2-Dichloropropane	ND	8.4	"	"	"	"	"	"	
cis-1,3-Dichloropropene	ND	8.4	"	"	"	"	"	"	
trans-1,3-Dichloropropene	ND	8.4	"	"	"	"	"	"	
1,2-Dichloro-1,1,2,2-tetrafluoroethane	ND	8.4	"	"	"	"	"	"	
Diisopropyl Ether	ND	8.4	"	"	"	"	"	"	
1,4-Dioxane	ND	8.4	"	"	"	"	"	"	CCHI
Ethanol	ND	33	"	"	"	"	"	"	
Ethyl Acetate	ND	8.4	"	"	"	"	"	"	
Ethylbenzene	ND	8.4	"	"	"	"	"	"	
Ethyl t-Butyl Ether	ND	8.4	"	"	"	"	"	"	
4-Ethyltoluene	ND	8.4	"	"	"	"	"	"	

Oilfield Environmental and Compliance, INC.

Sage Environmental Consulting	Project: CARB	
720 West Arapaho Road	Project Number: CARB #1344 Feather River AQMD	**Reported:**
Richardson TX, 75080	Project Manager: David Ranum	20-Aug-15 15:50

TB 048 A & B

1503463-03 (Air)

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes

Oilfield Environmental and Compliance

Volatile Organic Compounds by EPA Method TO-15

Heptane	**19**	8.4	ppbv	16.7	B5H0369	13-Aug-15	13-Aug-15	TO-15 mod.	
Hexachlorobutadiene	ND	8.4	"	"	"	"	"	"	
Hexane	**44**	8.4	"	"	"	"	"	"	
2-Hexanone	ND	8.4	"	"	"	"	"	"	CCHI
Isopropyl alcohol	**23**	8.4	"	"	"	"	"	"	
Methylene chloride	ND	8.4	"	"	"	"	"	"	
Methyl Ethyl Ketone	ND	8.4	"	"	"	"	"	"	
Methyl Isobutyl Ketone	ND	8.4	"	"	"	"	"	"	
Methyl-t-butyl ether	ND	8.4	"	"	"	"	"	"	
Naphthalene	ND	17	"	"	"	"	"	"	CCHI
Propylene	ND	8.4	"	"	"	"	"	"	
Styrene	ND	8.4	"	"	"	"	"	"	
t-Amyl Methyl Ether	ND	8.4	"	"	"	"	"	"	
t-Butyl alcohol	ND	8.4	"	"	"	"	"	"	
1,1,2,2-Tetrachloroethane	ND	8.4	"	"	"	"	"	"	
Tetrachloroethene (PCE)	ND	8.4	"	"	"	"	"	"	
Tetrahydrofuran	ND	8.4	"	"	"	"	"	"	
Toluene	ND	8.4	"	"	"	"	"	"	
1,2,4-Trichlorobenzene	ND	8.4	"	"	"	"	"	"	CCHI
1,1,1-Trichloroethane	ND	8.4	"	"	"	"	"	"	
1,1,2-Trichloroethane	ND	8.4	"	"	"	"	"	"	
Trichloroethene (TCE)	ND	8.4	"	"	"	"	"	"	
Trichlorofluoromethane	ND	8.4	"	"	"	"	"	"	
1,1,2-Trichlorotrifluoroethane	ND	8.4	"	"	"	"	"	"	
1,2,4-Trimethylbenzene	ND	8.4	"	"	"	"	"	"	
1,3,5-Trimethylbenzene	ND	8.4	"	"	"	"	"	"	
Vinyl acetate	ND	8.4	"	"	"	"	"	"	
Vinyl chloride	ND	8.4	"	"	"	"	"	"	
Xylenes (total)	**9.4**	8.4	"	"	"	"	"	"	
TPH Gasoline (C4-C12)	ND	3300	"	"	"	"	"	"	

Oilfield Environmental and Compliance, INC.

Sage Environmental Consulting	Project: CARB	
720 West Arapaho Road	Project Number: CARB #1344 Feather River AQMD	**Reported:**
Richardson TX, 75080	Project Manager: David Ranum	24-Aug-15 08:30

TB049A&B

1503485-01 (Air)

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes

Oilfield Environmental and Compliance

Volatile Organic Compounds by EPA Method TO-15

Acetone	ND	33	ppbv	16.7	B5H0387	14-Aug-15	14-Aug-15	TO-15 mod.
Benzene	ND	8.4	"	"	"	"	"	"
Benzyl chloride	ND	8.4	"	"	"	"	"	"
Bromodichloromethane	ND	8.4	"	"	"	"	"	"
Bromoform	ND	8.4	"	"	"	"	"	"
Bromomethane	ND	8.4	"	"	"	"	"	"
1,3-Butadiene	ND	8.4	"	"	"	"	"	"
Carbon disulfide	ND	8.4	"	"	"	"	"	"
Carbon tetrachloride	ND	8.4	"	"	"	"	"	"
Chlorobenzene	ND	8.4	"	"	"	"	"	"
Chloroethane	ND	8.4	"	"	"	"	"	"
Chloroform	ND	8.4	"	"	"	"	"	"
Chloromethane	ND	8.4	"	"	"	"	"	"
Cyclohexane	ND	8.4	"	"	"	"	"	"
Dibromochloromethane	ND	8.4	"	"	"	"	"	"
1,2-Dibromoethane (EDB)	ND	8.4	"	"	"	"	"	"
1,2-Dichlorobenzene	ND	8.4	"	"	"	"	"	"
1,3-Dichlorobenzene	ND	8.4	"	"	"	"	"	"
1,4-Dichlorobenzene	ND	8.4	"	"	"	"	"	"
Dichlorodifluoromethane	ND	8.4	"	"	"	"	"	"
1,1-Dichloroethane	ND	8.4	"	"	"	"	"	"
1,2-Dichloroethane	ND	8.4	"	"	"	"	"	"
1,1-Dichloroethene	ND	8.4	"	"	"	"	"	"
cis-1,2-Dichloroethene	ND	8.4	"	"	"	"	"	"
trans-1,2-Dichloroethene	ND	8.4	"	"	"	"	"	"
1,2-Dichloropropane	ND	8.4	"	"	"	"	"	"
cis-1,3-Dichloropropene	ND	8.4	"	"	"	"	"	"
trans-1,3-Dichloropropene	ND	8.4	"	"	"	"	"	"
1,2-Dichloro-1,1,2,2-tetrafluoroethane	ND	8.4	"	"	"	"	"	"
Diisopropyl Ether	ND	8.4	"	"	"	"	"	"
1,4-Dioxane	ND	8.4	"	"	"	"	"	"
Ethanol	ND	33	"	"	"	"	"	"

Oilfield Environmental and Compliance, INC.

Sage Environmental Consulting	Project: CARB	
720 West Arapaho Road	Project Number: CARB #1344 Feather River AQMD	**Reported:**
Richardson TX, 75080	Project Manager: David Ranum	24-Aug-15 08:30

TB049A&B

1503485-01 (Air)

Oilfield Environmental and Compliance

Volatile Organic Compounds by EPA Method TO-15

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
Ethyl Acetate	ND	8.4	ppbv	16.7	B5H0387	14-Aug-15	14-Aug-15	TO-15 mod.	
Ethylbenzene	ND	8.4	"	"	"	"	"	"	
Ethyl t-Butyl Ether	ND	8.4	"	"	"	"	"	"	
4-Ethyltoluene	ND	8.4	"	"	"	"	"	"	
Heptane	ND	8.4	"	"	"	"	"	"	
Hexachlorobutadiene	ND	8.4	"	"	"	"	"	"	
Hexane	ND	8.4	"	"	"	"	"	"	
2-Hexanone	ND	8.4	"	"	"	"	"	"	
Isopropyl alcohol	ND	8.4	"	"	"	"	"	"	
Methylene chloride	ND	8.4	"	"	"	"	"	"	
Methyl Ethyl Ketone	ND	8.4	"	"	"	"	"	"	
Methyl Isobutyl Ketone	ND	8.4	"	"	"	"	"	"	
Methyl-t-butyl ether	ND	8.4	"	"	"	"	"	"	
Naphthalene	ND	17	"	"	"	"	"	"	CCHI
Propylene	ND	8.4	"	"	"	"	"	"	
Styrene	ND	8.4	"	"	"	"	"	"	
t-Amyl Methyl Ether	ND	8.4	"	"	"	"	"	"	
t-Butyl alcohol	ND	9.7	"	19.4	B5H0491	19-Aug-15	19-Aug-15	"	
1,1,2,2-Tetrachloroethane	ND	8.4	"	16.7	B5H0387	14-Aug-15	14-Aug-15	"	
Tetrachloroethene (PCE)	ND	8.4	"	"	"	"	"	"	
Tetrahydrofuran	ND	8.4	"	"	"	"	"	"	
Toluene	ND	8.4	"	"	"	"	"	"	
1,2,4-Trichlorobenzene	ND	8.4	"	"	"	"	"	"	CCHI
1,1,1-Trichloroethane	ND	8.4	"	"	"	"	"	"	
1,1,2-Trichloroethane	ND	8.4	"	"	"	"	"	"	
Trichloroethene (TCE)	ND	8.4	"	"	"	"	"	"	
Trichlorofluoromethane	ND	8.4	"	"	"	"	"	"	
1,1,2-Trichlorotrifluoroethane	ND	8.4	"	"	"	"	"	"	
1,2,4-Trimethylbenzene	ND	8.4	"	"	"	"	"	"	
1,3,5-Trimethylbenzene	ND	8.4	"	"	"	"	"	"	
Vinyl acetate	ND	8.4	"	"	"	"	"	"	
Vinyl chloride	ND	8.4	"	"	"	"	"	"	
Xylenes (total)	ND	8.4	"	"	"	"	"	"	
TPH Gasoline (C4-C12)	ND	3300	"	"	"	"	"	"	

Oilfield Environmental and Compliance, INC.

Sage Environmental Consulting	Project: CARB	
720 West Arapaho Road	Project Number: CARB #1344 Feather River AQMD	**Reported:**
Richardson TX, 75080	Project Manager: David Ranum	24-Aug-15 08:30

TB050A&B

1503485-02 (Air)

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes

Oilfield Environmental and Compliance

Volatile Organic Compounds by EPA Method TO-15

Acetone	ND	33	ppbv	16.7	B5H0387	14-Aug-15	14-Aug-15	TO-15 mod.
Benzene	ND	8.4	"	"	"	"	"	"
Benzyl chloride	ND	8.4	"	"	"	"	"	"
Bromodichloromethane	ND	8.4	"	"	"	"	"	"
Bromoform	ND	8.4	"	"	"	"	"	"
Bromomethane	ND	8.4	"	"	"	"	"	"
1,3-Butadiene	ND	8.4	"	"	"	"	"	"
Carbon disulfide	ND	8.4	"	"	"	"	"	"
Carbon tetrachloride	ND	8.4	"	"	"	"	"	"
Chlorobenzene	ND	8.4	"	"	"	"	"	"
Chloroethane	ND	8.4	"	"	"	"	"	"
Chloroform	ND	8.4	"	"	"	"	"	"
Chloromethane	ND	8.4	"	"	"	"	"	"
Cyclohexane	ND	8.4	"	"	"	"	"	"
Dibromochloromethane	ND	8.4	"	"	"	"	"	"
1,2-Dibromoethane (EDB)	ND	8.4	"	"	"	"	"	"
1,2-Dichlorobenzene	ND	8.4	"	"	"	"	"	"
1,3-Dichlorobenzene	ND	8.4	"	"	"	"	"	"
1,4-Dichlorobenzene	ND	8.4	"	"	"	"	"	"
Dichlorodifluoromethane	ND	8.4	"	"	"	"	"	"
1,1-Dichloroethane	ND	8.4	"	"	"	"	"	"
1,2-Dichloroethane	ND	8.4	"	"	"	"	"	"
1,1-Dichloroethene	ND	8.4	"	"	"	"	"	"
cis-1,2-Dichloroethene	ND	8.4	"	"	"	"	"	"
trans-1,2-Dichloroethene	ND	8.4	"	"	"	"	"	"
1,2-Dichloropropane	ND	8.4	"	"	"	"	"	"
cis-1,3-Dichloropropene	ND	8.4	"	"	"	"	"	"
trans-1,3-Dichloropropene	ND	8.4	"	"	"	"	"	"
1,2-Dichloro-1,1,2,2-tetrafluoroethane	ND	8.4	"	"	"	"	"	"
Diisopropyl Ether	ND	8.4	"	"	"	"	"	"
1,4-Dioxane	ND	8.4	"	"	"	"	"	"
Ethanol	**61**	33	"	"	"	"	"	"
Ethyl Acetate	**13**	8.4	"	"	"	"	"	"
Ethylbenzene	ND	8.4	"	"	"	"	"	"
Ethyl t-Butyl Ether	ND	8.4	"	"	"	"	"	"
4-Ethyltoluene	ND	8.4	"	"	"	"	"	"

Oilfield Environmental and Compliance, INC.

Sage Environmental Consulting	Project: CARB	
720 West Arapaho Road	Project Number: CARB #1344 Feather River AQMD	**Reported:**
Richardson TX, 75080	Project Manager: David Ranum	24-Aug-15 08:30

TB050A&B

1503485-02 (Air)

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes

Oilfield Environmental and Compliance

Volatile Organic Compounds by EPA Method TO-15

Heptane	ND	8.4	ppbv	16.7	B5H0387	14-Aug-15	14-Aug-15	TO-15 mod.	
Hexachlorobutadiene	ND	8.4	"	"	"	"	"	"	
Hexane	ND	8.4	"	"	"	"	"	"	
2-Hexanone	ND	8.4	"	"	"	"	"	"	
Isopropyl alcohol	**15**	8.4	"	"	"	"	"	"	
Methylene chloride	ND	8.4	"	"	"	"	"	"	
Methyl Ethyl Ketone	ND	8.4	"	"	"	"	"	"	
Methyl Isobutyl Ketone	ND	8.4	"	"	"	"	"	"	
Methyl-t-butyl ether	ND	8.4	"	"	"	"	"	"	
Naphthalene	ND	17	"	"	"	"	"	"	CCHI
Propylene	ND	8.4	"	"	"	"	"	"	
Styrene	ND	8.4	"	"	"	"	"	"	
t-Amyl Methyl Ether	ND	8.4	"	"	"	"	"	"	
t-Butyl alcohol	ND	25	"	50	B5H0491	19-Aug-15	20-Aug-15	"	
1,1,2,2-Tetrachloroethane	ND	8.4	"	16.7	B5H0387	14-Aug-15	14-Aug-15	"	
Tetrachloroethene (PCE)	ND	8.4	"	"	"	"	"	"	
Tetrahydrofuran	ND	8.4	"	"	"	"	"	"	
Toluene	**32**	8.4	"	"	"	"	"	"	
1,2,4-Trichlorobenzene	ND	8.4	"	"	"	"	"	"	CCHI
1,1,1-Trichloroethane	ND	8.4	"	"	"	"	"	"	
1,1,2-Trichloroethane	ND	8.4	"	"	"	"	"	"	
Trichloroethene (TCE)	ND	8.4	"	"	"	"	"	"	
Trichlorofluoromethane	ND	8.4	"	"	"	"	"	"	
1,1,2-Trichlorotrifluoroethane	ND	8.4	"	"	"	"	"	"	
1,2,4-Trimethylbenzene	ND	8.4	"	"	"	"	"	"	
1,3,5-Trimethylbenzene	ND	8.4	"	"	"	"	"	"	
Vinyl acetate	ND	8.4	"	"	"	"	"	"	
Vinyl chloride	ND	8.4	"	"	"	"	"	"	
Xylenes (total)	ND	8.4	"	"	"	"	"	"	
TPH Gasoline (C4-C12)	ND	3300	"	"	"	"	"	"	

Oilfield Environmental and Compliance, INC.

Sage Environmental Consulting	Project: CARB	
720 West Arapaho Road	Project Number: CARB #1344 Feather River AQMD	**Reported:**
Richardson TX, 75080	Project Manager: David Ranum	24-Aug-15 11:20

TB 051 A&B

1503504-01 (Air)

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes

Oilfield Environmental and Compliance

Volatile Organic Compounds by EPA Method TO-15 **TS-3**

Acetone	**39**	34	ppbv	17.2	B5H0537	20-Aug-15	21-Aug-15	TO-15 mod.	
Benzene	ND	8.6	"	"	"	"	"	"	
Benzyl chloride	ND	8.6	"	"	"	"	"	"	
Bromodichloromethane	ND	8.6	"	"	"	"	"	"	
Bromoform	ND	8.6	"	"	"	"	"	"	
Bromomethane	ND	8.6	"	"	"	"	"	"	
1,3-Butadiene	ND	8.6	"	"	"	"	"	"	
Carbon disulfide	ND	8.6	"	"	"	"	"	"	
Carbon tetrachloride	ND	8.6	"	"	"	"	"	"	
Chlorobenzene	ND	8.6	"	"	"	"	"	"	
Chloroethane	ND	8.6	"	"	"	"	"	"	
Chloroform	ND	8.6	"	"	"	"	"	"	
Chloromethane	ND	8.6	"	"	"	"	"	"	
Cyclohexane	ND	8.6	"	"	"	"	"	"	
Dibromochloromethane	ND	8.6	"	"	"	"	"	"	
1,2-Dibromoethane (EDB)	ND	8.6	"	"	"	"	"	"	
1,2-Dichlorobenzene	ND	8.6	"	"	"	"	"	"	
1,3-Dichlorobenzene	ND	8.6	"	"	"	"	"	"	
1,4-Dichlorobenzene	ND	8.6	"	"	"	"	"	"	
Dichlorodifluoromethane	ND	8.6	"	"	"	"	"	"	
1,1-Dichloroethane	ND	8.6	"	"	"	"	"	"	
1,2-Dichloroethane	ND	8.6	"	"	"	"	"	"	
1,1-Dichloroethene	ND	8.6	"	"	"	"	"	"	
cis-1,2-Dichloroethene	ND	8.6	"	"	"	"	"	"	
trans-1,2-Dichloroethene	ND	8.6	"	"	"	"	"	"	
1,2-Dichloropropane	ND	8.6	"	"	"	"	"	"	
cis-1,3-Dichloropropene	ND	8.6	"	"	"	"	"	"	
trans-1,3-Dichloropropene	ND	8.6	"	"	"	"	"	"	
1,2-Dichloro-1,1,2,2-tetrafluoroethane	ND	8.6	"	"	"	"	"	"	
Diisopropyl Ether	ND	8.6	"	"	"	"	"	"	
1,4-Dioxane	ND	8.6	"	"	"	"	"	"	
Ethanol	**70**	34	"	"	"	"	"	"	

Oilfield Environmental and Compliance, INC.

Sage Environmental Consulting	Project: CARB	
720 West Arapaho Road	Project Number: CARB #1344 Feather River AQMD	**Reported:**
Richardson TX, 75080	Project Manager: David Ranum	24-Aug-15 11:20

TB 051 A&B

1503504-01 (Air)

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes

Oilfield Environmental and Compliance

Volatile Organic Compounds by EPA Method TO-15 **TS-3**

Ethyl Acetate	**17**	8.6	ppbv	17.2	B5H0537	20-Aug-15	21-Aug-15	TO-15 mod.	
Ethylbenzene	ND	8.6	"	"	"	"	"	"	
Ethyl t-Butyl Ether	ND	8.6	"	"	"	"	"	"	
4-Ethyltoluene	ND	8.6	"	"	"	"	"	"	
Heptane	ND	8.6	"	"	"	"	"	"	
Hexachlorobutadiene	ND	8.6	"	"	"	"	"	"	
Hexane	ND	8.6	"	"	"	"	"	"	
2-Hexanone	ND	8.6	"	"	"	"	"	"	
Isopropyl alcohol	**26**	8.6	"	"	"	"	"	"	
Methylene chloride	ND	8.6	"	"	"	"	"	"	
Methyl Ethyl Ketone	ND	8.6	"	"	"	"	"	"	
Methyl Isobutyl Ketone	ND	8.6	"	"	"	"	"	"	
Methyl-t-butyl ether	ND	8.6	"	"	"	"	"	"	
Naphthalene	ND	17	"	"	"	"	"	"	
Propylene	ND	8.6	"	"	"	"	"	"	
Styrene	ND	8.6	"	"	"	"	"	"	
t-Amyl Methyl Ether	ND	8.6	"	"	"	"	"	"	
t-Butyl alcohol	ND	8.6	"	"	"	"	"	"	
1,1,2,2-Tetrachloroethane	ND	8.6	"	"	"	"	"	"	
Tetrachloroethene (PCE)	ND	8.6	"	"	"	"	"	"	
Tetrahydrofuran	ND	8.6	"	"	"	"	"	"	
Toluene	**13**	8.6	"	"	"	"	"	"	
1,2,4-Trichlorobenzene	ND	8.6	"	"	"	"	"	"	
1,1,1-Trichloroethane	ND	8.6	"	"	"	"	"	"	
1,1,2-Trichloroethane	ND	8.6	"	"	"	"	"	"	
Trichloroethene (TCE)	ND	8.6	"	"	"	"	"	"	
Trichlorofluoromethane	ND	8.6	"	"	"	"	"	"	
1,1,2-Trichlorotrifluoroethane	ND	8.6	"	"	"	"	"	"	
1,2,4-Trimethylbenzene	ND	8.6	"	"	"	"	"	"	
1,3,5-Trimethylbenzene	ND	8.6	"	"	"	"	"	"	
Vinyl acetate	ND	8.6	"	"	"	"	"	"	
Vinyl chloride	ND	8.6	"	"	"	"	"	"	
Xylenes (total)	ND	8.6	"	"	"	"	"	"	
TPH Gasoline (C4-C12)	ND	3400	"	"	"	"	"	"	

Oilfield Environmental and Compliance, INC.

Sage Environmental Consulting	Project: CARB	
720 West Arapaho Road	Project Number: CARB #1344 Feather River AQMD	**Reported:**
Richardson TX, 75080	Project Manager: David Ranum	24-Aug-15 11:20

TB 052 A&B

1503504-02 (Air)

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes

Oilfield Environmental and Compliance

Volatile Organic Compounds by EPA Method TO-15 **TS-3**

Acetone	ND	40	ppbv	19.8	B5H0537	20-Aug-15	21-Aug-15	TO-15 mod.	
Benzene	ND	9.9	"	"	"	"	"	"	
Benzyl chloride	ND	9.9	"	"	"	"	"	"	
Bromodichloromethane	ND	9.9	"	"	"	"	"	"	
Bromoform	ND	9.9	"	"	"	"	"	"	
Bromomethane	ND	9.9	"	"	"	"	"	"	
1,3-Butadiene	ND	9.9	"	"	"	"	"	"	
Carbon disulfide	ND	9.9	"	"	"	"	"	"	
Carbon tetrachloride	ND	9.9	"	"	"	"	"	"	
Chlorobenzene	ND	9.9	"	"	"	"	"	"	
Chloroethane	ND	9.9	"	"	"	"	"	"	
Chloroform	ND	9.9	"	"	"	"	"	"	
Chloromethane	ND	9.9	"	"	"	"	"	"	
Cyclohexane	**17**	9.9	"	"	"	"	"	"	
Dibromochloromethane	ND	9.9	"	"	"	"	"	"	
1,2-Dibromoethane (EDB)	ND	9.9	"	"	"	"	"	"	
1,2-Dichlorobenzene	ND	9.9	"	"	"	"	"	"	
1,3-Dichlorobenzene	ND	9.9	"	"	"	"	"	"	
1,4-Dichlorobenzene	ND	9.9	"	"	"	"	"	"	
Dichlorodifluoromethane	ND	9.9	"	"	"	"	"	"	
1,1-Dichloroethane	ND	9.9	"	"	"	"	"	"	
1,2-Dichloroethane	ND	9.9	"	"	"	"	"	"	
1,1-Dichloroethene	ND	9.9	"	"	"	"	"	"	
cis-1,2-Dichloroethene	ND	9.9	"	"	"	"	"	"	
trans-1,2-Dichloroethene	ND	9.9	"	"	"	"	"	"	
1,2-Dichloropropane	ND	9.9	"	"	"	"	"	"	
cis-1,3-Dichloropropene	ND	9.9	"	"	"	"	"	"	
trans-1,3-Dichloropropene	ND	9.9	"	"	"	"	"	"	
1,2-Dichloro-1,1,2,2-tetrafluoroethane	ND	9.9	"	"	"	"	"	"	
Diisopropyl Ether	ND	9.9	"	"	"	"	"	"	
1,4-Dioxane	ND	9.9	"	"	"	"	"	"	
Ethanol	ND	40	"	"	"	"	"	"	
Ethyl Acetate	ND	9.9	"	"	"	"	"	"	
Ethylbenzene	**42**	9.9	"	"	"	"	"	"	
Ethyl t-Butyl Ether	ND	9.9	"	"	"	"	"	"	
4-Ethyltoluene	ND	9.9	"	"	"	"	"	"	

Oilfield Environmental and Compliance, INC.

Sage Environmental Consulting	Project: CARB	
720 West Arapaho Road	Project Number: CARB #1344 Feather River AQMD	**Reported:**
Richardson TX, 75080	Project Manager: David Ranum	24-Aug-15 11:20

TB 052 A&B

1503504-02 (Air)

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes

Oilfield Environmental and Compliance

Volatile Organic Compounds by EPA Method TO-15 **TS-3**

Heptane	**69**	9.9	ppbv	19.8	B5H0537	20-Aug-15	21-Aug-15	TO-15 mod.	
Hexachlorobutadiene	ND	9.9	"	"	"	"	"	"	
Hexane	**30**	9.9	"	"	"	"	"	"	
2-Hexanone	ND	9.9	"	"	"	"	"	"	
Isopropyl alcohol	ND	9.9	"	"	"	"	"	"	
Methylene chloride	ND	9.9	"	"	"	"	"	"	
Methyl Ethyl Ketone	ND	9.9	"	"	"	"	"	"	
Methyl Isobutyl Ketone	ND	9.9	"	"	"	"	"	"	
Methyl-t-butyl ether	ND	9.9	"	"	"	"	"	"	
Naphthalene	ND	20	"	"	"	"	"	"	
Propylene	ND	9.9	"	"	"	"	"	"	
Styrene	ND	9.9	"	"	"	"	"	"	
t-Amyl Methyl Ether	ND	9.9	"	"	"	"	"	"	
t-Butyl alcohol	ND	9.9	"	"	"	"	"	"	
1,1,2,2-Tetrachloroethane	ND	9.9	"	"	"	"	"	"	
Tetrachloroethene (PCE)	ND	9.9	"	"	"	"	"	"	
Tetrahydrofuran	ND	9.9	"	"	"	"	"	"	
Toluene	**150**	9.9	"	"	"	"	"	"	
1,2,4-Trichlorobenzene	ND	9.9	"	"	"	"	"	"	
1,1,1-Trichloroethane	ND	9.9	"	"	"	"	"	"	
1,1,2-Trichloroethane	ND	9.9	"	"	"	"	"	"	
Trichloroethene (TCE)	ND	9.9	"	"	"	"	"	"	
Trichlorofluoromethane	ND	9.9	"	"	"	"	"	"	
1,1,2-Trichlorotrifluoroethane	ND	9.9	"	"	"	"	"	"	
1,2,4-Trimethylbenzene	ND	9.9	"	"	"	"	"	"	
1,3,5-Trimethylbenzene	ND	9.9	"	"	"	"	"	"	
Vinyl acetate	ND	9.9	"	"	"	"	"	"	
Vinyl chloride	ND	9.9	"	"	"	"	"	"	
Xylenes (total)	**300**	9.9	"	"	"	"	"	"	
TPH Gasoline (C4-C12)	ND	4000	"	"	"	"	"	"	

Oilfield Environmental and Compliance, INC.

Sage Environmental Consulting	Project: CARB	
720 West Arapaho Road	Project Number: CARB #1344 Feather River AQMD	**Reported:**
Richardson TX, 75080	Project Manager: David Ranum	24-Aug-15 11:20

TB 053 A&B

1503504-03 (Air)

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes

Oilfield Environmental and Compliance

Volatile Organic Compounds by EPA Method TO-15 **R-02, TS-3**

Acetone	ND	150	ppbv	75	B5H0537	20-Aug-15	21-Aug-15	TO-15 mod.
Benzene	ND	38	"	"	"	"	"	"
Benzyl chloride	ND	38	"	"	"	"	"	"
Bromodichloromethane	ND	38	"	"	"	"	"	"
Bromoform	ND	38	"	"	"	"	"	"
Bromomethane	ND	38	"	"	"	"	"	"
1,3-Butadiene	ND	38	"	"	"	"	"	"
Carbon disulfide	ND	38	"	"	"	"	"	"
Carbon tetrachloride	ND	38	"	"	"	"	"	"
Chlorobenzene	ND	38	"	"	"	"	"	"
Chloroethane	ND	38	"	"	"	"	"	"
Chloroform	ND	38	"	"	"	"	"	"
Chloromethane	ND	38	"	"	"	"	"	"
Cyclohexane	**390**	38	"	"	"	"	"	"
Dibromochloromethane	ND	38	"	"	"	"	"	"
1,2-Dibromoethane (EDB)	ND	38	"	"	"	"	"	"
1,2-Dichlorobenzene	ND	38	"	"	"	"	"	"
1,3-Dichlorobenzene	ND	38	"	"	"	"	"	"
1,4-Dichlorobenzene	ND	38	"	"	"	"	"	"
Dichlorodifluoromethane	ND	38	"	"	"	"	"	"
1,1-Dichloroethane	ND	38	"	"	"	"	"	"
1,2-Dichloroethane	ND	38	"	"	"	"	"	"
1,1-Dichloroethene	ND	38	"	"	"	"	"	"
cis-1,2-Dichloroethene	ND	38	"	"	"	"	"	"
trans-1,2-Dichloroethene	ND	38	"	"	"	"	"	"
1,2-Dichloropropane	ND	38	"	"	"	"	"	"
cis-1,3-Dichloropropene	ND	38	"	"	"	"	"	"
trans-1,3-Dichloropropene	ND	38	"	"	"	"	"	"
1,2-Dichloro-1,1,2,2-tetrafluoroethane	ND	38	"	"	"	"	"	"
Diisopropyl Ether	ND	38	"	"	"	"	"	"
1,4-Dioxane	ND	38	"	"	"	"	"	"
Ethanol	ND	150	"	"	"	"	"	"
Ethyl Acetate	ND	38	"	"	"	"	"	"
Ethylbenzene	ND	38	"	"	"	"	"	"
Ethyl t-Butyl Ether	ND	38	"	"	"	"	"	"
4-Ethyltoluene	ND	38	"	"	"	"	"	"

Oilfield Environmental and Compliance, INC.

Sage Environmental Consulting	Project: CARB	
720 West Arapaho Road	Project Number: CARB #1344 Feather River AQMD	**Reported:**
Richardson TX, 75080	Project Manager: David Ranum	24-Aug-15 11:20

TB 053 A&B

1503504-03 (Air)

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes

Oilfield Environmental and Compliance

Volatile Organic Compounds by EPA Method TO-15 **R-02, TS-3**

Heptane	ND	38	ppbv	75	B5H0537	20-Aug-15	21-Aug-15	TO-15 mod.	
Hexachlorobutadiene	ND	38	"	"	"	"	"	"	
Hexane	**74**	38	"	"	"	"	"	"	
2-Hexanone	ND	38	"	"	"	"	"	"	
Isopropyl alcohol	ND	38	"	"	"	"	"	"	
Methylene chloride	ND	38	"	"	"	"	"	"	
Methyl Ethyl Ketone	ND	38	"	"	"	"	"	"	
Methyl Isobutyl Ketone	ND	38	"	"	"	"	"	"	
Methyl-t-butyl ether	ND	38	"	"	"	"	"	"	
Naphthalene	ND	75	"	"	"	"	"	"	
Propylene	ND	38	"	"	"	"	"	"	
Styrene	ND	38	"	"	"	"	"	"	
t-Amyl Methyl Ether	ND	38	"	"	"	"	"	"	
t-Butyl alcohol	ND	38	"	"	"	"	"	"	
1,1,2,2-Tetrachloroethane	ND	38	"	"	"	"	"	"	
Tetrachloroethene (PCE)	ND	38	"	"	"	"	"	"	
Tetrahydrofuran	ND	38	"	"	"	"	"	"	
Toluene	ND	38	"	"	"	"	"	"	
1,2,4-Trichlorobenzene	ND	38	"	"	"	"	"	"	
1,1,1-Trichloroethane	ND	38	"	"	"	"	"	"	
1,1,2-Trichloroethane	ND	38	"	"	"	"	"	"	
Trichloroethene (TCE)	ND	38	"	"	"	"	"	"	
Trichlorofluoromethane	ND	38	"	"	"	"	"	"	
1,1,2-Trichlorotrifluoroethane	ND	38	"	"	"	"	"	"	
1,2,4-Trimethylbenzene	ND	38	"	"	"	"	"	"	
1,3,5-Trimethylbenzene	ND	38	"	"	"	"	"	"	
Vinyl acetate	ND	38	"	"	"	"	"	"	
Vinyl chloride	ND	38	"	"	"	"	"	"	
Xylenes (total)	ND	38	"	"	"	"	"	"	
TPH Gasoline (C4-C12)	**21000**	15000	"	"	"	"	"	"	

OILFIELD ENVIRONMENTAL & COMPLIANCE, INC.

Client:	Sage Environmental Consulting, LP	SAMPLE ID:	1500280-1
	4611 Bee Caves Road Suite 100	Date Sampled:	01/20/15 @ 1051
	Austin, Texas 78746	Date Analyzed:	01/22/15 @ 1538
Attn:	David Ranum	Lab Contact:	J. Carstens
Facility:	Long Beach	Meter:	-
Description:	TB001	Pressure:	- psig
Note:	CARB #1344	Temperature:	- °F

Gas Analysis by Chromatography - ASTM D 1945/3588

Component	MW	Mole %*	Kg-C/Kg-fuel*	Weight %*	G/MCF*
Oxygen	32.00	21.39	N/A	23.72	-
Nitrogen	28.01	78.48	N/A	76.17	-
Hydrogen	2.01	0.00	0.00	0.00	-
Carbon Dioxide	44.01	0.05	0.00	0.07	-
Carbon Monoxide	28.01	0.00	N/A	0.00	-
Methane	16.04	0.08	0.01	0.04	-
Ethane	30.07	0.00	0.00	0.00	0.000
Ethene	28.05	0.00	0.00	0.00	0.000
Propane	44.10	0.00	0.00	0.00	0.000
Propene	42.08	0.00	0.00	0.00	0.000
i-Butane	58.12	0.00	0.00	0.00	0.000
n-Butane	58.12	0.00	0.00	0.00	0.000
neo-Pentane		0.00	0.00	0.00	0.000
i-Pentane	72.15	0.00	0.00	0.00	0.000
n-Pentane	72.15	0.00	0.00	0.00	0.000
n-Hexane	86.18	0.00	0.00	0.00	0.000
Hexanes Plus	86.18	0.00	0.00	0.00	0.000
Totals		100.0	0.0	100.0	0.00

Specific Gravity, Calculated	0.9966	air = 1.0000	
Density, Calculated Kg/m3	1.2009	air − 1.205 Kg/m3	
Compressibility (Z) Factor (60°F, 1ATM)	0.9996		
MW of fuel gas, calculated (60°F, 1ATM)	28.44		
Gross Calorific Value			
BTU/ft^3 dry	0.8		
BTU/ft^3 wet	0.8		
Net Calorific Value			
BTU/ft^3 dry	0.7	EPA 'F' Factor (60°F, 1ATM)	1283158.4
BTU/ft^3 wet	0.7	SDCF/MMBTU	
Hydrogen Sulfide = NA ppm			

CHONS	Mole %	Wt%
Carbon	0.13	0.05
Hydrogen	0.15	0.01
Oxygen	21.39	23.77
Nitrogen	78.32	76.17
Sulfur	0.00	0.00

All results reported at 60°F and 14.696 psia.

* Normalized values — SDCF:Standard dry cubic feet

ND: None Detected — NA: Not Analyzed — G/MCF: Gallons/Thousand Cubic Feet

OILFIELD ENVIRONMENTAL & COMPLIANCE, INC.

Client:	Sage Environmental Consulting, LP	SAMPLE ID:	1500280-2
	4611 Bee Caves Road Suite 100	Date Sampled:	01/20/15 @ 1126
	Austin, Texas 78746	Date Analyzed:	01/22/15 @ 1636
Attn:	David Ranum	Lab Contact:	J. Carstens
Facility:	Long Beach	Meter:	-
Description:	TB002	Pressure:	- psig
Note:	CARB #1344	Temperature:	- °F

Gas Analysis by Chromatography - ASTM D 1945/3588

Component	MW	Mole %*	Kg-C/Kg-fuel*	Weight %*	G/MCF*
Oxygen	32.00	21.41	N/A	23.73	-
Nitrogen	28.01	78.54	N/A	76.20	-
Hydrogen	2.01	0.00	0.00	0.00	-
Carbon Dioxide	44.01	0.05	0.00	0.07	-
Carbon Monoxide	28.01	0.00	N/A	0.00	-
Methane	16.04	0.00	0.00	0.00	-
Ethane	30.07	0.00	0.00	0.00	0.000
Ethene	28.05	0.00	0.00	0.00	0.000
Propane	44.10	0.00	0.00	0.00	0.000
Propene	42.08	0.00	0.00	0.00	0.000
i-Butane	58.12	0.00	0.00	0.00	0.000
n-Butane	58.12	0.00	0.00	0.00	0.000
neo-Pentane		0.00	0.00	0.00	0.000
i-Pentane	72.15	0.00	0.00	0.00	0.000
n-Pentane	72.15	0.00	0.00	0.00	0.000
n-Hexane	86.18	0.00	0.00	0.00	0.000
Hexanes Plus	86.18	0.00	0.00	0.00	0.000
Totals		100.0	0.0	100.0	0.00

Specific Gravity, Calculated	0.9969	air = 1.0000			
Density, Calculated Kg/m3	1.2013	air − 1.205 Kg/m3			
Compressibility (Z) Factor (60°F, 1ATM)	0.9996				
MW of fuel gas, calculated (60°F, 1ATM)	28.45		CHONS	Mole %	Wt%
			Carbon	0.05	0.02
Gross Calorific Value			Hydrogen	0.00	0.00
BTU/ft^3 dry	0.0		Oxygen	21.45	23.78
BTU/ft^3 wet	0.0		Nitrogen	78.50	76.20
			Sulfur	0.00	0.00
Net Calorific Value					
BTU/ft^3 dry	0.0	EPA 'F' Factor (60°F, 1ATM)		#DIV/0!	
BTU/ft^3 wet	0.0	SDCF/MMBTU			
Hydrogen Sulfide = NA ppm					

All results reported at 60°F and 14.696 psia.

* Normalized values — SDCF:Standard dry cubic feet

ND: None Detected — NA: Not Analyzed — G/MCF: Gallons/Thousand Cubic Feet

OILFIELD ENVIRONMENTAL & COMPLIANCE, INC.

Client:	Sage Environmental Consulting, LP	SAMPLE ID:	1500280-3
	4611 Bee Caves Road Suite 100	Date Sampled:	01/20/15 @ 1511
	Austin, Texas 78746	Date Analyzed:	01/22/15 @ 1734
Attn:	David Ranum	Lab Contact:	J. Carstens
Facility:	Long Beach	Meter:	-
Description:	TB003	Pressure:	- psig
Note:	CARB #1344	Temperature:	- °F

Gas Analysis by Chromatography - ASTM D 1945/3588

Component	MW	Mole %*	Kg-C/Kg-fuel*	Weight %*	G/MCF*
Oxygen	32.00	21.35	N/A	23.67	-
Nitrogen	28.01	78.39	N/A	76.07	-
Hydrogen	2.01	0.00	0.00	0.00	-
Carbon Dioxide	44.01	0.12	0.01	0.19	-
Carbon Monoxide	28.01	0.00	N/A	0.00	-
Methane	16.04	0.13	0.01	0.07	-
Ethane	30.07	0.00	0.00	0.00	0.000
Ethene	28.05	0.00	0.00	0.00	0.000
Propane	44.10	0.00	0.00	0.00	0.000
Propene	42.08	0.00	0.00	0.00	0.000
i-Butane	58.12	0.00	0.00	0.00	0.000
n-Butane	58.12	0.00	0.00	0.00	0.000
neo-Pentane		0.00	0.00	0.00	0.000
i-Pentane	72.15	0.00	0.00	0.00	0.000
n-Pentane	72.15	0.00	0.00	0.00	0.000
n-Hexane	86.18	0.00	0.00	0.00	0.000
Hexanes Plus	86.18	0.00	0.00	0.00	0.000
Totals		100.0	0.0	100.0	0.00

Specific Gravity, Calculated	0.9967	air = 1.0000			
Density, Calculated Kg/m3	1.2011	air − 1.205 Kg/m3			
Compressibility (Z) Factor (60°F, 1ATM)	0.9996				
MW of fuel gas, calculated (60°F, 1ATM)	28.45		CHONS	Mole %	Wt%
			Carbon	0.26	0.11
Gross Calorific Value			Hydrogen	0.26	0.02
BTU/ft^3 dry	1.3		Oxygen	21.39	23.81
BTU/ft^3 wet	1.3		Nitrogen	78.08	76.07
			Sulfur	0.00	0.00
Net Calorific Value					
BTU/ft^3 dry	1.2	EPA 'F' Factor (60°F, 1ATM)		758626.8	
BTU/ft^3 wet	1.2	SDCF/MMBTU			
Hydrogen Sulfide = NA ppm					

All results reported at 60°F and 14.696 psia.

* Normalized values — SDCF:Standard dry cubic feet

ND: None Detected — NA: Not Analyzed — G/MCF: Gallons/Thousand Cubic Feet

OILFIELD ENVIRONMENTAL & COMPLIANCE, INC.

Client:	Sage Environmental Consulting, LP	SAMPLE ID:	1500307-1
	4611 Bee Caves Road Suite 100	Date Sampled:	1/21/2015
	Austin, Texas 78746	Date Analyzed:	01/23/15 @ 1336
Attn:	David Ranum	Lab Contact:	J. Carstens
Facility:	CARB	Meter:	-
Description:	TB004	Pressure:	- psig
Note:	CARB #1344	Temperature:	- °F

Gas Analysis by Chromatography - ASTM D 1945/3588

Component	MW	Mole %*	Kg-C/Kg-fuel*	Weight %*	G/MCF*
Oxygen	32.00	21.51	N/A	23.83	-
Nitrogen	28.01	78.46	N/A	76.11	-
Hydrogen	2.01	0.00	0.00	0.00	-
Carbon Dioxide	44.01	0.04	0.00	0.06	-
Carbon Monoxide	28.01	0.00	N/A	0.00	-
Methane	16.04	0.00	0.00	0.00	-
Ethane	30.07	0.00	0.00	0.00	0.000
Ethene	28.05	0.00	0.00	0.00	0.000
Propane	44.10	0.00	0.00	0.00	0.000
Propene	42.08	0.00	0.00	0.00	0.000
i-Butane	58.12	0.00	0.00	0.00	0.000
n-Butane	58.12	0.00	0.00	0.00	0.000
neo-Pentane		0.00	0.00	0.00	0.000
i-Pentane	72.15	0.00	0.00	0.00	0.000
n-Pentane	72.15	0.00	0.00	0.00	0.000
n-Hexane	86.18	0.00	0.00	0.00	0.000
Hexanes Plus	86.18	0.00	0.00	0.00	0.000
Totals		100.0	0.0	100.0	0.00

Specific Gravity, Calculated	0.9970	air = 1.0000	
Density, Calculated Kg/m3	1.2014	air − 1.205 Kg/m3	
Compressibility (Z) Factor (60°F, 1ATM)	0.9996		
MW of fuel gas, calculated (60°F, 1ATM)	28.46		
Gross Calorific Value			
BTU/ft³ dry	0.0		
BTU/ft³ wet	0.0		
Net Calorific Value			
BTU/ft³ dry	0.0	EPA 'F' Factor (60°F, 1ATM)	Not Applicable
BTU/ft³ wet	0.0	SDCF/MMBTU	

CHONS	Mole %	Wt%
Carbon	0.04	0.02
Hydrogen	0.00	0.00
Oxygen	21.53	23.87
Nitrogen	78.42	76.11
Sulfur	0.00	0.00

Hydrogen Sulfide = NA ppm

All results reported at 60°F and 14.696 psia.

* Normalized values — SDCF:Standard dry cubic feet

ND: None Detected — NA: Not Analyzed — G/MCF: Gallons/Thousand Cubic Feet

OILFIELD ENVIRONMENTAL & COMPLIANCE, INC.

Client:	Sage Environmental Consulting, LP	SAMPLE ID:	1500307-2
	4611 Bee Caves Road Suite 100	Date Sampled:	1/21/2015
	Austin, Texas 78746	Date Analyzed:	01/23/15 @ 1405
Attn:	David Ranum	Lab Contact:	J. Carstens
Facility:	CARB	Meter:	-
Description:	TB005	Pressure:	- psig
Note:	CARB #1344	Temperature:	- °F

Gas Analysis by Chromatography - ASTM D 1945/3588

Component	MW	Mole %*	Kg-C/Kg-fuel*	Weight %*	G/MCF*
Oxygen	32.00	21.27	N/A	23.63	-
Nitrogen	28.01	77.58	N/A	75.44	-
Hydrogen	2.01	0.00	0.00	0.00	-
Carbon Dioxide	44.01	0.06	0.01	0.10	-
Carbon Monoxide	28.01	0.00	N/A	0.00	-
Methane	16.04	0.89	0.07	0.49	-
Ethane	30.07	0.05	0.00	0.05	0.012
Ethene	28.05	0.00	0.00	0.00	0.000
Propane	44.10	0.07	0.01	0.10	0.019
Propene	42.08	0.00	0.00	0.00	0.000
i-Butane	58.12	0.02	0.00	0.04	0.007
n-Butane	58.12	0.04	0.00	0.08	0.012
neo-Pentane		0.00	0.00	0.00	0.000
i-Pentane	72.15	0.01	0.00	0.04	0.005
n-Pentane	72.15	0.01	0.00	0.03	0.004
n-Hexane	86.18	0.00	0.00	0.00	0.000
Hexanes Plus	86.18	0.00	0.00	0.00	0.000
Totals		100.0	0.1	100.0	0.06

Specific Gravity, Calculated	0.9946	air = 1.0000			
Density, Calculated Kg/m3	1.1985	air − 1.205 Kg/m3			
Compressibility (Z) Factor (60°F, 1ATM)	0.9996				
MW of fuel gas, calculated (60°F, 1ATM)	28.39		CHONS	Mole %	Wt%
			Carbon	1.57	0.68
Gross Calorific Value			Hydrogen	2.56	0.18
BTU/ft^3 dry	14.5		Oxygen	20.68	23.70
BTU/ft^3 wet	14.2		Nitrogen	75.19	75.44
			Sulfur	0.00	0.00
Net Calorific Value					
BTU/ft^3 dry	13.1	EPA 'F' Factor (60°F, 1ATM)		76986.5	
BTU/ft^3 wet	12.9	SDCF/MMBTU			
Hydrogen Sulfide = NA ppm					

All results reported at 60°F and 14.696 psia.

* Normalized values — SDCF:Standard dry cubic feet

ND: None Detected — NA: Not Analyzed — G/MCF: Gallons/Thousand Cubic Feet

OILFIELD ENVIRONMENTAL & COMPLIANCE, INC.

Client:	Sage Environmental Consulting, LP	SAMPLE ID:	1500307-3
	4611 Bee Caves Road Suite 100	Date Sampled:	1/21/2015
	Austin, Texas 78746	Date Analyzed:	01/23/15 @ 1435
Attn:	David Ranum	Lab Contact:	J. Carstens
Facility:	CARB	Meter:	-
Description:	TB006	Pressure:	- psig
Note:	CARB #1344	Temperature:	- °F

Gas Analysis by Chromatography - ASTM D 1945/3588

Component	MW	Mole %*	Kg-C/Kg-fuel*	Weight %*	G/MCF*
Oxygen	32.00	21.51	N/A	23.83	-
Nitrogen	28.01	78.46	N/A	76.11	-
Hydrogen	2.01	0.00	0.00	0.00	-
Carbon Dioxide	44.01	0.04	0.00	0.06	-
Carbon Monoxide	28.01	0.00	N/A	0.00	-
Methane	16.04	0.00	0.00	0.00	-
Ethane	30.07	0.00	0.00	0.00	0.000
Ethene	28.05	0.00	0.00	0.00	0.000
Propane	44.10	0.00	0.00	0.00	0.000
Propene	42.08	0.00	0.00	0.00	0.000
i-Butane	58.12	0.00	0.00	0.00	0.000
n-Butane	58.12	0.00	0.00	0.00	0.000
neo-Pentane		0.00	0.00	0.00	0.000
i-Pentane	72.15	0.00	0.00	0.00	0.000
n-Pentane	72.15	0.00	0.00	0.00	0.000
n-Hexane	86.18	0.00	0.00	0.00	0.000
Hexanes Plus	86.18	0.00	0.00	0.00	0.000
Totals		100.0	0.0	100.0	0.00

Specific Gravity, Calculated	0.9970	air = 1.0000	
Density, Calculated Kg/m3	1.2014	air − 1.205 Kg/m3	
Compressibility (Z) Factor (60°F, 1ATM)	0.9996		
MW of fuel gas, calculated (60°F, 1ATM)	28.46		
Gross Calorific Value			
BTU/ft³ dry	0.0		
BTU/ft³ wet	0.0		
Net Calorific Value			
BTU/ft³ dry	0.0	EPA 'F' Factor (60°F, 1ATM)	Not Applicable
BTU/ft³ wet	0.0	SDCF/MMBTU	

CHONS	Mole %	Wt%
Carbon	0.05	0.02
Hydrogen	0.00	0.00
Oxygen	21.53	23.87
Nitrogen	78.42	76.11
Sulfur	0.00	0.00

Hydrogen Sulfide = NA ppm

All results reported at 60°F and 14.696 psia.

* Normalized values — SDCF:Standard dry cubic feet

ND: None Detected — NA: Not Analyzed — G/MCF: Gallons/Thousand Cubic Feet

OILFIELD ENVIRONMENTAL & COMPLIANCE, INC.

Client:	Sage Environmental Consulting, LP	SAMPLE ID:	1500306-1
	4611 Bee Caves Road Suite 100	Date Sampled:	1/22/2015
	Austin, Texas 78746	Date Analyzed:	01/23/15 @ 1505
Attn:	David Ranum	Lab Contact:	J. Carstens
Facility:	CARB	Meter:	-
Description:	TB007	Pressure:	- psig
Note:	CARB #1344	Temperature:	- °F

Gas Analysis by Chromatography - ASTM D 1945/3588

Component	MW	Mole %*	Kg-C/Kg-fuel*	Weight %*	G/MCF*
Oxygen	32.00	21.48	N/A	23.81	-
Nitrogen	28.01	78.47	N/A	76.12	-
Hydrogen	2.01	0.00	0.00	0.00	-
Carbon Dioxide	44.01	0.05	0.00	0.07	-
Carbon Monoxide	28.01	0.00	N/A	0.00	-
Methane	16.04	0.00	0.00	0.00	-
Ethane	30.07	0.00	0.00	0.00	0.000
Ethene	28.05	0.00	0.00	0.00	0.000
Propane	44.10	0.00	0.00	0.00	0.000
Propene	42.08	0.00	0.00	0.00	0.000
i-Butane	58.12	0.00	0.00	0.00	0.000
n-Butane	58.12	0.00	0.00	0.00	0.000
neo-Pentane		0.00	0.00	0.00	0.000
i-Pentane	72.15	0.00	0.00	0.00	0.000
n-Pentane	72.15	0.00	0.00	0.00	0.000
n-Hexane	86.18	0.00	0.00	0.00	0.000
Hexanes Plus	86.18	0.00	0.00	0.00	0.000
Totals		100.0	0.0	100.0	0.00

Specific Gravity, Calculated	0.9970	air = 1.0000	
Density, Calculated Kg/m3	1.2014	air − 1.205 Kg/m3	
Compressibility (Z) Factor (60°F, 1ATM)	0.9996		
MW of fuel gas, calculated (60°F, 1ATM)	28.46		
Gross Calorific Value			
BTU/ft³ dry	0.0		
BTU/ft³ wet	0.0		
Net Calorific Value			
BTU/ft³ dry	0.0	EPA 'F' Factor (60°F, 1ATM)	Not Applicable
BTU/ft³ wet	0.0	SDCF/MMBTU	

CHONS	Mole %	Wt%
Carbon	0.05	0.02
Hydrogen	0.00	0.00
Oxygen	21.52	23.86
Nitrogen	78.43	76.12
Sulfur	0.00	0.00

Hydrogen Sulfide = NA ppm

All results reported at 60°F and 14.696 psia.

* Normalized values — SDCF:Standard dry cubic feet

ND: None Detected — NA: Not Analyzed — G/MCF: Gallons/Thousand Cubic Feet

OILFIELD ENVIRONMENTAL & COMPLIANCE, INC.

Client:	Sage Environmental Consulting, LP	SAMPLE ID:	1500306-2
	4611 Bee Caves Road Suite 100	Date Sampled:	1/22/2015
	Austin, Texas 78746	Date Analyzed:	01/23/15 @ 1535
Attn:	David Ranum	Lab Contact:	J. Carstens
Facility:	CARB	Meter:	-
Description:	TB008	Pressure:	- psig
Note:	CARB #1344	Temperature:	- °F

Gas Analysis by Chromatography - ASTM D 1945/3588

Component	MW	Mole %*	Kg-C/Kg-fuel*	Weight %*	G/MCF*
Oxygen	32.00	21.48	N/A	23.81	-
Nitrogen	28.01	78.34	N/A	76.03	-
Hydrogen	2.01	0.00	0.00	0.00	-
Carbon Dioxide	44.01	0.04	0.00	0.07	-
Carbon Monoxide	28.01	0.00	N/A	0.00	-
Methane	16.04	0.12	0.01	0.06	-
Ethane	30.07	0.00	0.00	0.00	0.000
Ethene	28.05	0.00	0.00	0.00	0.000
Propane	44.10	0.01	0.00	0.02	0.004
Propene	42.08	0.00	0.00	0.00	0.000
i-Butane	58.12	0.00	0.00	0.00	0.000
n-Butane	58.12	0.00	0.00	0.00	0.000
neo-Pentane		0.00	0.00	0.00	0.000
i-Pentane	72.15	0.00	0.00	0.00	0.000
n-Pentane	72.15	0.00	0.00	0.00	0.000
n-Hexane	86.18	0.00	0.00	0.00	0.000
Hexanes Plus	86.18	0.00	0.00	0.00	0.000
Totals		100.0	0.0	100.0	0.00

Specific Gravity, Calculated	0.9966	air = 1.0000			
Density, Calculated Kg/m3	1.2009	air − 1.205 Kg/m3			
Compressibility (Z) Factor (60°F, 1ATM)	0.9996				
MW of fuel gas, calculated (60°F, 1ATM)	28.44		CHONS	Mole %	Wt%
			Carbon	0.21	0.09
Gross Calorific Value			Hydrogen	0.28	0.02
BTU/ft^3 dry	1.5		Oxygen	21.45	23.86
BTU/ft^3 wet	1.5		Nitrogen	78.06	76.03
			Sulfur	0.00	0.00
Net Calorific Value					
BTU/ft^3 dry	1.4	EPA 'F' Factor (60°F, 1ATM)		670315.2	
BTU/ft^3 wet	1.3	SDCF/MMBTU			
Hydrogen Sulfide = NA ppm					

All results reported at 60°F and 14.696 psia.

* Normalized values — SDCF:Standard dry cubic feet

ND: None Detected — NA: Not Analyzed — G/MCF: Gallons/Thousand Cubic Feet

OILFIELD ENVIRONMENTAL & COMPLIANCE, INC.

Client:	Sage Environmental Consulting, LP	SAMPLE ID:	1500306-3
	4611 Bee Caves Road Suite 100	Date Sampled:	1/22/2015
	Austin, Texas 78746	Date Analyzed:	01/23/15 @ 1608
Attn:	David Ranum	Lab Contact:	J. Carstens
Facility:	CARB	Meter:	-
Description:	TB009	Pressure:	- psig
Note:	CARB #1344	Temperature:	- °F

Gas Analysis by Chromatography - ASTM D 1945/3588

Component	MW	Mole %*	Kg-C/Kg-fuel*	Weight %*	G/MCF*
Oxygen	32.00	21.34	N/A	23.71	-
Nitrogen	28.01	77.92	N/A	75.82	-
Hydrogen	2.01	0.00	0.00	0.00	-
Carbon Dioxide	44.01	0.05	0.00	0.08	-
Carbon Monoxide	28.01	0.00	N/A	0.00	-
Methane	16.04	0.69	0.06	0.39	-
Ethane	30.07	0.00	0.00	0.00	0.000
Ethene	28.05	0.00	0.00	0.00	0.000
Propane	44.10	0.00	0.00	0.00	0.000
Propene	42.08	0.00	0.00	0.00	0.000
i-Butane	58.12	0.00	0.00	0.00	0.000
n-Butane	58.12	0.00	0.00	0.00	0.000
neo-Pentane		0.00	0.00	0.00	0.000
i-Pentane	72.15	0.00	0.00	0.00	0.000
n-Pentane	72.15	0.00	0.00	0.00	0.000
n-Hexane	86.18	0.00	0.00	0.00	0.000
Hexanes Plus	86.18	0.00	0.00	0.00	0.000
Totals		100.0	0.1	100.0	0.00

Specific Gravity, Calculated	0.9940	air = 1.0000			
Density, Calculated Kg/m3	1.1978	air = 1.205 Kg/m3			
Compressibility (Z) Factor (60°F, 1ATM)	0.9996				
MW of fuel gas, calculated (60°F, 1ATM)	28.37		CHONS	Mole %	Wt%
			Carbon	0.74	0.31
Gross Calorific Value			Hydrogen	1.36	0.10
BTU/ft^3 dry	7.0		Oxygen	21.08	23.77
BTU/ft^3 wet	6.9		Nitrogen	76.81	75.82
			Sulfur	0.00	0.00
Net Calorific Value					
BTU/ft^3 dry	6.3	EPA 'F' Factor (60°F, 1ATM)		150607.6	
BTU/ft^3 wet	6.2	SDCF/MMBTU			
Hydrogen Sulfide = NA ppm					

All results reported at 60°F and 14.696 psia.

* Normalized values — SDCF:Standard dry cubic feet

ND: None Detected — NA: Not Analyzed — G/MCF: Gallons/Thousand Cubic Feet

OILFIELD ENVIRONMENTAL & COMPLIANCE, INC.

Client:	Sage Environmental Consulting, LP	SAMPLE ID:	1500317-1
	4611 Bee Caves Road Suite 100	Date Sampled:	1/23/2015
	Austin, Texas 78746	Date Analyzed:	01/23/15 @ 1639
Attn:	David Ranum	Lab Contact:	J. Carstens
Facility:	CARB	Meter:	-
Description:	TB010	Pressure:	- psig
Note:	CARB #1344	Temperature:	- °F

Gas Analysis by Chromatography - ASTM D 1945/3588

Component	MW	Mole %*	Kg-C/Kg-fuel*	Weight %*	G/MCF*
Oxygen	32.00	21.48	N/A	23.81	-
Nitrogen	28.01	78.48	N/A	76.13	-
Hydrogen	2.01	0.00	0.00	0.00	-
Carbon Dioxide	44.01	0.04	0.00	0.06	-
Carbon Monoxide	28.01	0.00	N/A	0.00	-
Methane	16.04	0.00	0.00	0.00	-
Ethane	30.07	0.00	0.00	0.00	0.000
Ethene	28.05	0.00	0.00	0.00	0.000
Propane	44.10	0.00	0.00	0.00	0.000
Propene	42.08	0.00	0.00	0.00	0.000
i-Butane	58.12	0.00	0.00	0.00	0.000
n-Butane	58.12	0.00	0.00	0.00	0.000
neo-Pentane		0.00	0.00	0.00	0.000
i-Pentane	72.15	0.00	0.00	0.00	0.000
n-Pentane	72.15	0.00	0.00	0.00	0.000
n-Hexane	86.18	0.00	0.00	0.00	0.000
Hexanes Plus	86.18	0.00	0.00	0.00	0.000
Totals		100.0	0.0	100.0	0.00

Specific Gravity, Calculated	0.9970	air = 1.0000	
Density, Calculated Kg/m3	1.2014	air − 1.205 Kg/m3	
Compressibility (Z) Factor (60°F, 1ATM)	0.9996		
MW of fuel gas, calculated (60°F, 1ATM)	28.46		
Gross Calorific Value			
BTU/ft³ dry	0.0		
BTU/ft³ wet	0.0		
Net Calorific Value			
BTU/ft³ dry	0.0	EPA 'F' Factor (60°F, 1ATM)	Not Applicable
BTU/ft³ wet	0.0	SDCF/MMBTU	

CHONS	Mole %	Wt%
Carbon	0.05	0.02
Hydrogen	0.00	0.00
Oxygen	21.51	23.85
Nitrogen	78.44	76.13
Sulfur	0.00	0.00

Hydrogen Sulfide = NA ppm

All results reported at 60°F and 14.696 psia.

* Normalized values — SDCF:Standard dry cubic feet

ND: None Detected — NA: Not Analyzed — G/MCF: Gallons/Thousand Cubic Feet

OILFIELD ENVIRONMENTAL & COMPLIANCE, INC.

Client:	Sage Environmental Consulting, LP	SAMPLE ID:	1500317-2
	4611 Bee Caves Road Suite 100	Date Sampled:	1/23/2015
	Austin, Texas 78746	Date Analyzed:	01/23/15 @ 1705
Attn:	David Ranum	Lab Contact:	J. Carstens
Facility:	CARB	Meter:	-
Description:	TB011	Pressure:	- psig
Note:	CARB #1344	Temperature:	- °F

Gas Analysis by Chromatography - ASTM D 1945/3588

Component	MW	Mole %*	Kg-C/Kg-fuel*	Weight %*	G/MCF*
Oxygen	32.00	21.57	N/A	23.90	-
Nitrogen	28.01	78.41	N/A	76.06	-
Hydrogen	2.01	0.00	0.00	0.00	-
Carbon Dioxide	44.01	0.03	0.00	0.05	-
Carbon Monoxide	28.01	0.00	N/A	0.00	-
Methane	16.04	0.00	0.00	0.00	-
Ethane	30.07	0.00	0.00	0.00	0.000
Ethene	28.05	0.00	0.00	0.00	0.000
Propane	44.10	0.00	0.00	0.00	0.000
Propene	42.08	0.00	0.00	0.00	0.000
i-Butane	58.12	0.00	0.00	0.00	0.000
n-Butane	58.12	0.00	0.00	0.00	0.000
neo-Pentane		0.00	0.00	0.00	0.000
i-Pentane	72.15	0.00	0.00	0.00	0.000
n-Pentane	72.15	0.00	0.00	0.00	0.000
n-Hexane	86.18	0.00	0.00	0.00	0.000
Hexanes Plus	86.18	0.00	0.00	0.00	0.000
Totals		100.0	0.0	100.0	0.00

Specific Gravity, Calculated	0.9970	air = 1.0000	
Density, Calculated Kg/m3	1.2014	air − 1.205 Kg/m3	
Compressibility (Z) Factor (60°F, 1ATM)	0.9996		
MW of fuel gas, calculated (60°F, 1ATM)	28.46		
Gross Calorific Value			
BTU/ft³ dry	0.0		
BTU/ft³ wet	0.0		
Net Calorific Value			
BTU/ft³ dry	0.0	EPA 'F' Factor (60°F, 1ATM)	Not Applicable
BTU/ft³ wet	0.0	SDCF/MMBTU	

CHONS	Mole %	Wt%
Carbon	0.04	0.02
Hydrogen	0.00	0.00
Oxygen	21.59	23.93
Nitrogen	78.38	76.06
Sulfur	0.00	0.00

Hydrogen Sulfide = NA ppm

All results reported at 60°F and 14.696 psia.

* Normalized values — SDCF:Standard dry cubic feet

ND: None Detected — NA: Not Analyzed — G/MCF: Gallons/Thousand Cubic Feet

OILFIELD ENVIRONMENTAL & COMPLIANCE, INC.

Client:	Sage Environmental Consulting, LP	SAMPLE ID:	1500317-3 Rev.
	4611 Bee Caves Road Suite 100	Date Sampled:	1/23/2015
	Austin, Texas 78746	Date Analyzed:	01/23/15 @ 1737
Attn:	David Ranum	Lab Contact:	J. Carstens
Facility:	CARB	Meter:	-
Description:	TB012	Pressure:	- psig
Note:	CARB #1344	Temperature:	- °F

Gas Analysis by Chromatography - ASTM D 1945/3588

Component	MW	Mole %*	Kg-C/Kg-fuel*	Weight %*	G/MCF*
Oxygen	32.00	21.45	N/A	23.77	-
Nitrogen	28.01	78.53	N/A	76.19	-
Hydrogen	2.01	0.00	0.00	0.00	-
Carbon Dioxide	44.01	0.03	0.00	0.04	-
Carbon Monoxide	28.01	0.00	N/A	0.00	-
Methane	16.04	0.00	0.00	0.00	-
Ethane	30.07	0.00	0.00	0.00	0.000
Ethene	28.05	0.00	0.00	0.00	0.000
Propane	44.10	0.00	0.00	0.00	0.000
Propene	42.08	0.00	0.00	0.00	0.000
i-Butane	58.12	0.00	0.00	0.00	0.000
n-Butane	58.12	0.00	0.00	0.00	0.000
neo-Pentane		0.00	0.00	0.00	0.000
i-Pentane	72.15	0.00	0.00	0.00	0.000
n-Pentane	72.15	0.00	0.00	0.00	0.000
n-Hexane	86.18	0.00	0.00	0.00	0.000
Hexanes Plus	86.18	0.00	0.00	0.00	0.000
Totals		100.0	0.0	100.0	0.00

Specific Gravity, Calculated	0.9968	air = 1.0000	
Density, Calculated Kg/m3	1.2012	air − 1.205 Kg/m3	
Compressibility (Z) Factor (60°F, 1ATM)	0.9996		
MW of fuel gas, calculated (60°F, 1ATM)	28.45		
Gross Calorific Value			
BTU/ft³ dry	0.0		
BTU/ft³ wet	0.0		
Net Calorific Value			
BTU/ft³ dry	0.0	EPA 'F' Factor (60°F, 1ATM)	Not Applicable
BTU/ft³ wet	0.0	SDCF/MMBTU	

CHONS	Mole %	Wt%
Carbon	0.03	0.01
Hydrogen	0.00	0.00
Oxygen	21.46	23.80
Nitrogen	78.50	76.19
Sulfur	0.00	0.00

Hydrogen Sulfide = NA ppm

All results reported at 60°F and 14.696 psia.

* Normalized values — SDCF:Standard dry cubic feet

ND: None Detected — NA: Not Analyzed — G/MCF: Gallons/Thousand Cubic Feet

OILFIELD ENVIRONMENTAL & COMPLIANCE, INC.

Client:	Sage Environmental Consulting, LP	SAMPLE ID:	1500343-1
	4611 Bee Caves Road Suite 100	Date Sampled:	1/26/2015
	Austin, Texas 78746	Date Analyzed:	01/27/15 @ 1206
Attn:	David Ranum	Lab Contact:	J. Carstens
Facility:	CARB	Meter:	-
Description:	TB013	Pressure:	- psig
Note:	CARB #1344	Temperature:	- °F

Gas Analysis by Chromatography - ASTM D 1945/3588

Component	MW	Mole %*	Kg-C/Kg-fuel*	Weight %*	G/MCF*
Oxygen	32.00	21.34	N/A	23.67	-
Nitrogen	28.01	78.36	N/A	76.10	-
Hydrogen	2.01	0.00	0.00	0.00	-
Carbon Dioxide	44.01	0.02	0.00	0.03	-
Carbon Monoxide	28.01	0.00	N/A	0.00	-
Methane	16.04	0.24	0.02	0.13	-
Ethane	30.07	0.00	0.00	0.00	0.000
Ethene	28.05	0.00	0.00	0.00	0.000
Propane	44.10	0.03	0.00	0.04	0.007
Propene	42.08	0.00	0.00	0.00	0.000
i-Butane	58.12	0.00	0.00	0.00	0.000
n-Butane	58.12	0.01	0.00	0.03	0.004
neo-Pentane		0.00	0.00	0.00	0.000
i-Pentane	72.15	0.00	0.00	0.00	0.000
n-Pentane	72.15	0.00	0.00	0.00	0.000
n-Hexane	86.18	0.00	0.00	0.00	0.000
Hexanes Plus	86.18	0.00	0.00	0.00	0.000
Totals		100.0	0.0	100.0	0.01

Specific Gravity, Calculated	0.9960	air = 1.0000			
Density, Calculated Kg/m3	1.2002	air − 1.205 Kg/m3			
Compressibility (Z) Factor (60°F, 1ATM)	0.9996				
MW of fuel gas, calculated (60°F, 1ATM)	28.43		CHONS	Mole %	Wt%
			Carbon	0.39	0.17
Gross Calorific Value			Hydrogen	0.64	0.05
BTU/ft^3 dry	3.5		Oxygen	21.20	23.69
BTU/ft^3 wet	3.4		Nitrogen	77.77	76.10
			Sulfur	0.00	0.00
Net Calorific Value					
BTU/ft^3 dry	3.2	EPA 'F' Factor (60°F, 1ATM)		295103.3	
BTU/ft^3 wet	3.1	SDCF/MMBTU			
Hydrogen Sulfide = NA ppm					

All results reported at 60°F and 14.696 psia.

* Normalized values — SDCF:Standard dry cubic feet

ND: None Detected — NA: Not Analyzed — G/MCF: Gallons/Thousand Cubic Feet

OILFIELD ENVIRONMENTAL & COMPLIANCE, INC.

Client:	Sage Environmental Consulting, LP	SAMPLE ID:	1500370-1
	4611 Bee Caves Road Suite 100	Date Sampled:	1/27/2015
	Austin, Texas 78746	Date Analyzed:	01/28/15 @ 1228
Attn:	David Ranum	Lab Contact:	J. Carstens
Facility:	CARB	Meter:	-
Description:	TB014	Pressure:	- psig
Note:	CARB #1344	Temperature:	- °F

Gas Analysis by Chromatography - ASTM D 1945/3588

Component	MW	Mole %*	Kg-C/Kg-fuel*	Weight %*	G/MCF*
Oxygen	32.00	21.16	N/A	23.47	-
Nitrogen	28.01	78.67	N/A	76.39	-
Hydrogen	2.01	0.00	0.00	0.00	-
Carbon Dioxide	44.01	0.05	0.00	0.07	-
Carbon Monoxide	28.01	0.00	N/A	0.00	-
Methane	16.04	0.12	0.01	0.07	-
Ethane	30.07	0.00	0.00	0.00	0.000
Ethene	28.05	0.00	0.00	0.00	0.000
Propane	44.10	0.00	0.00	0.00	0.000
Propene	42.08	0.00	0.00	0.00	0.000
i-Butane	58.12	0.00	0.00	0.00	0.000
n-Butane	58.12	0.00	0.00	0.00	0.000
neo-Pentane		0.00	0.00	0.00	0.000
i-Pentane	72.15	0.00	0.00	0.00	0.000
n-Pentane	72.15	0.00	0.00	0.00	0.000
n-Hexane	86.18	0.00	0.00	0.00	0.000
Hexanes Plus	86.18	0.00	0.00	0.00	0.000
Totals		100.0	0.0	100.0	0.00

Specific Gravity, Calculated	0.9961	air = 1.0000			
Density, Calculated Kg/m3	1.2002	air − 1.205 Kg/m3			
Compressibility (Z) Factor (60°F, 1ATM)	0.9996				
MW of fuel gas, calculated (60°F, 1ATM)	28.43		CHONS	Mole %	Wt%
			Carbon	0.18	0.07
Gross Calorific Value			Hydrogen	0.25	0.02
BTU/ft^3 dry	1.3		Oxygen	21.14	23.52
BTU/ft^3 wet	1.2		Nitrogen	78.43	76.39
			Sulfur	0.00	0.00
Net Calorific Value					
BTU/ft^3 dry	1.1	EPA 'F' Factor (60°F, 1ATM)	800523.4		
BTU/ft^3 wet	1.1		SDCF/MMBTU		
Hydrogen Sulfide = ND ppm					

All results reported at 60°F and 14.696 psia.

* Normalized values — SDCF:Standard dry cubic feet

ND: None Detected — NA: Not Analyzed — G/MCF: Gallons/Thousand Cubic Feet

OILFIELD ENVIRONMENTAL & COMPLIANCE, INC.

Client:	Sage Environmental Consulting, LP	SAMPLE ID:	1500370-2
	4611 Bee Caves Road Suite 100	Date Sampled:	1/27/2015
	Austin, Texas 78746	Date Analyzed:	01/28/15 @ 1256
Attn:	David Ranum	Lab Contact:	J. Carstens
Facility:	CARB	Meter:	-
Description:	TB015	Pressure:	- psig
Note:	CARB #1344	Temperature:	- °F

Gas Analysis by Chromatography - ASTM D 1945/3588

Component	MW	Mole %*	Kg-C/Kg-fuel*	Weight %*	G/MCF*
Oxygen	32.00	21.18	N/A	23.42	-
Nitrogen	28.01	78.62	N/A	76.12	-
Hydrogen	2.01	0.00	0.00	0.00	-
Carbon Dioxide	44.01	0.04	0.00	0.06	-
Carbon Monoxide	28.01	0.00	N/A	0.00	-
Methane	16.04	0.00	0.00	0.00	-
Ethane	30.07	0.00	0.00	0.00	0.000
Ethene	28.05	0.00	0.00	0.00	0.000
Propane	44.10	0.00	0.00	0.00	0.000
Propene	42.08	0.00	0.00	0.00	0.000
i-Butane	58.12	0.00	0.00	0.00	0.000
n-Butane	58.12	0.03	0.00	0.06	0.010
neo-Pentane		0.00	0.00	0.00	0.000
i-Pentane	72.15	0.04	0.00	0.09	0.014
n-Pentane	72.15	0.04	0.00	0.11	0.015
n-Hexane	86.18	0.00	0.00	0.00	0.000
Hexanes Plus	86.18	0.05	0.00	0.14	0.019
Totals		100.0	0.0	100.0	0.06

Specific Gravity, Calculated	0.9990	air = 1.0000			
Density, Calculated Kg/m3	1.2038	air = 1.205 Kg/m3			
Compressibility (Z) Factor (60°F, 1ATM)	0.9996				
MW of fuel gas, calculated (60°F, 1ATM)	28.51		CHONS	Mole %	Wt%
			Carbon	0.83	0.35
Gross Calorific Value			Hydrogen	0.94	0.07
BTU/ft^3 dry	6.4		Oxygen	20.88	23.47
BTU/ft^3 wet	6.3		Nitrogen	77.35	76.12
			Sulfur	0.00	0.00
Net Calorific Value					
BTU/ft^3 dry	5.9	EPA 'F' Factor (60°F, 1ATM)	164421.8		
BTU/ft^3 wet	5.8		SDCF/MMBTU		
Hydrogen Sulfide = ND ppm					

All results reported at 60°F and 14.696 psia.

* Normalized values — SDCF:Standard dry cubic feet

ND: None Detected — NA: Not Analyzed — G/MCF: Gallons/Thousand Cubic Feet

OILFIELD ENVIRONMENTAL & COMPLIANCE, INC.

Client:	Sage Environmental Consulting, LP	SAMPLE ID:	1500370-3
	4611 Bee Caves Road Suite 100	Date Sampled:	1/27/2015
	Austin, Texas 78746	Date Analyzed:	01/28/15 @ 1338
Attn:	David Ranum	Lab Contact:	J. Carstens
Facility:	CARB	Meter:	-
Description:	TB016	Pressure:	- psig
Note:	CARB #1344	Temperature:	- °F

Gas Analysis by Chromatography - ASTM D 1945/3588

Component	MW	Mole %*	Kg-C/Kg-fuel*	Weight %*	G/MCF*
Oxygen	32.00	21.20	N/A	23.50	-
Nitrogen	28.01	78.75	N/A	76.42	-
Hydrogen	2.01	0.00	0.00	0.00	-
Carbon Dioxide	44.01	0.05	0.00	0.08	-
Carbon Monoxide	28.01	0.00	N/A	0.00	-
Methane	16.04	0.00	0.00	0.00	-
Ethane	30.07	0.00	0.00	0.00	0.000
Ethene	28.05	0.00	0.00	0.00	0.000
Propane	44.10	0.00	0.00	0.00	0.000
Propene	42.08	0.00	0.00	0.00	0.000
i-Butane	58.12	0.00	0.00	0.00	0.000
n-Butane	58.12	0.00	0.00	0.00	0.000
neo-Pentane		0.00	0.00	0.00	0.000
i-Pentane	72.15	0.00	0.00	0.00	0.000
n-Pentane	72.15	0.00	0.00	0.00	0.000
n-Hexane	86.18	0.00	0.00	0.00	0.000
Hexanes Plus	86.18	0.00	0.00	0.00	0.000
Totals		100.0	0.0	100.0	0.00

Specific Gravity, Calculated	0.9967	air = 1.0000	
Density, Calculated Kg/m3	1.2010	air − 1.205 Kg/m3	
Compressibility (Z) Factor (60°F, 1ATM)	0.9996		
MW of fuel gas, calculated (60°F, 1ATM)	28.45		
Gross Calorific Value			
BTU/ft³ dry	0.0		
BTU/ft³ wet	0.0		
Net Calorific Value			
BTU/ft³ dry	0.0	EPA 'F' Factor (60°F, 1ATM)	Cannot Calculate
BTU/ft³ wet	0.0		SDCF/MMBTU
Hydrogen Sulfide = ND ppm			

CHONS	Mole %	Wt%
Carbon	0.06	0.03
Hydrogen	0.00	0.00
Oxygen	21.24	23.55
Nitrogen	78.70	76.42
Sulfur	0.00	0.00

All results reported at 60°F and 14.696 psia.

* Normalized values
SDCF:Standard dry cubic feet
ND: None Detected
NA: Not Analyzed
G/MCF: Gallons/Thousand Cubic Feet

OILFIELD ENVIRONMENTAL & COMPLIANCE, INC.

Client:	Sage Environmental Consulting, LP	SAMPLE ID:	1500386-1
	4611 Bee Caves Road Suite 100	Date Sampled:	1/28/2015
	Austin, Texas 78746	Date Analyzed:	01/29/15 @ 1321
Attn:	David Ranum	Lab Contact:	J. Carstens
Facility:	CARB	Meter:	-
Description:	TB017	Pressure:	- psig
Note:	CARB #1344	Temperature:	- °F

Gas Analysis by Chromatography - ASTM D 1945/3588

Component	MW	Mole %*	Kg-C/Kg-fuel*	Weight %*	G/MCF*
Oxygen	32.00	21.25	N/A	23.56	-
Nitrogen	28.01	78.73	N/A	76.40	-
Hydrogen	2.01	0.00	0.00	0.00	-
Carbon Dioxide	44.01	0.02	0.00	0.04	-
Carbon Monoxide	28.01	0.00	N/A	0.00	-
Methane	16.04	0.00	0.00	0.00	-
Ethane	30.07	0.00	0.00	0.00	0.000
Ethene	28.05	0.00	0.00	0.00	0.000
Propane	44.10	0.00	0.00	0.00	0.000
Propene	42.08	0.00	0.00	0.00	0.000
i-Butane	58.12	0.00	0.00	0.00	0.000
n-Butane	58.12	0.00	0.00	0.00	0.000
neo-Pentane		0.00	0.00	0.00	0.000
i-Pentane	72.15	0.00	0.00	0.00	0.000
n-Pentane	72.15	0.00	0.00	0.00	0.000
n-Hexane	86.18	0.00	0.00	0.00	0.000
Hexanes Plus	86.18	0.00	0.00	0.00	0.000
Totals		100.0	0.0	100.0	0.00

Specific Gravity, Calculated	0.9966	air = 1.0000	
Density, Calculated Kg/m3	1.2009	air − 1.205 Kg/m3	
Compressibility (Z) Factor (60°F, 1ATM)	0.9996		
MW of fuel gas, calculated (60°F, 1ATM)	28.44		
Gross Calorific Value			
BTU/ft³ dry	0.0		
BTU/ft³ wet	0.0		
Net Calorific Value			
BTU/ft³ dry	0.0	EPA 'F' Factor (60°F, 1ATM)	Cannot Calculate
BTU/ft³ wet	0.0		SDCF/MMBTU
Hydrogen Sulfide = ND ppm			

CHONS	Mole %	Wt%
Carbon	0.03	0.01
Hydrogen	0.00	0.00
Oxygen	21.27	23.58
Nitrogen	78.70	76.40
Sulfur	0.00	0.00

All results reported at 60°F and 14.696 psia.

* Normalized values
SDCF:Standard dry cubic feet
ND: None Detected
NA: Not Analyzed
G/MCF: Gallons/Thousand Cubic Feet

OILFIELD ENVIRONMENTAL & COMPLIANCE, INC.

Client:	Sage Environmental Consulting, LP	SAMPLE ID:	1500386-2
	4611 Bee Caves Road Suite 100	Date Sampled:	1/28/2015
	Austin, Texas 78746	Date Analyzed:	01/29/15 @ 1356
Attn:	David Ranum	Lab Contact:	J. Carstens
Facility:	CARB	Meter:	-
Description:	TB018	Pressure:	- psig
Note:	CARB #1344	Temperature:	- °F

Gas Analysis by Chromatography - ASTM D 1945/3588

Component	MW	Mole %*	Kg-C/Kg-fuel*	Weight %*	G/MCF*
Oxygen	32.00	21.27	N/A	23.58	-
Nitrogen	28.01	78.69	N/A	76.37	-
Hydrogen	2.01	0.00	0.00	0.00	-
Carbon Dioxide	44.01	0.03	0.00	0.05	-
Carbon Monoxide	28.01	0.00	N/A	0.00	-
Methane	16.04	0.00	0.00	0.00	-
Ethane	30.07	0.00	0.00	0.00	0.000
Ethene	28.05	0.00	0.00	0.00	0.000
Propane	44.10	0.00	0.00	0.00	0.000
Propene	42.08	0.00	0.00	0.00	0.000
i-Butane	58.12	0.00	0.00	0.00	0.000
n-Butane	58.12	0.00	0.00	0.00	0.000
neo-Pentane		0.00	0.00	0.00	0.000
i-Pentane	72.15	0.00	0.00	0.00	0.000
n-Pentane	72.15	0.00	0.00	0.00	0.000
n-Hexane	86.18	0.00	0.00	0.00	0.000
Hexanes Plus	86.18	0.00	0.00	0.00	0.000
Totals		100.0	0.0	100.0	0.00

Specific Gravity, Calculated	0.9966	air = 1.0000			
Density, Calculated Kg/m3	1.2010	air − 1.205 Kg/m3			
Compressibility (Z) Factor (60°F, 1ATM)	0.9996				
MW of fuel gas, calculated (60°F, 1ATM)	28.45		CHONS	Mole %	Wt%
			Carbon	0.04	0.02
Gross Calorific Value			Hydrogen	0.00	0.00
BTU/ft^3 dry	0.0		Oxygen	21.30	23.62
BTU/ft^3 wet	0.0		Nitrogen	78.66	76.37
			Sulfur	0.00	0.00
Net Calorific Value					
BTU/ft^3 dry	0.0	EPA 'F' Factor (60°F, 1ATM)	Cannot Calculate		
BTU/ft^3 wet	0.0		SDCF/MMBTU		
Hydrogen Sulfide = ND ppm					

All results reported at 60°F and 14.696 psia.

* Normalized values — SDCF:Standard dry cubic feet

ND: None Detected — NA: Not Analyzed — G/MCF: Gallons/Thousand Cubic Feet

OILFIELD ENVIRONMENTAL & COMPLIANCE, INC.

Client:	Sage Environmental Consulting, LP	SAMPLE ID:	1500386-3
	4611 Bee Caves Road Suite 100	Date Sampled:	1/28/2015
	Austin, Texas 78746	Date Analyzed:	01/29/15 @ 1428
Attn:	David Ranum	Lab Contact:	J. Carstens
Facility:	CARB	Meter:	-
Description:	TB019	Pressure:	- psig
Note:	CARB #1344	Temperature:	- °F

Gas Analysis by Chromatography - ASTM D 1945/3588

Component	MW	Mole %*	Kg-C/Kg-fuel*	Weight %*	G/MCF*
Oxygen	32.00	21.24	N/A	23.53	-
Nitrogen	28.01	78.68	N/A	76.33	-
Hydrogen	2.01	0.00	0.00	0.00	-
Carbon Dioxide	44.01	0.03	0.00	0.05	-
Carbon Monoxide	28.01	0.00	N/A	0.00	-
Methane	16.04	0.00	0.00	0.00	-
Ethane	30.07	0.00	0.00	0.00	0.000
Ethene	28.05	0.00	0.00	0.00	0.000
Propane	44.10	0.02	0.00	0.03	0.006
Propene	42.08	0.00	0.00	0.00	0.000
i-Butane	58.12	0.00	0.00	0.00	0.000
n-Butane	58.12	0.02	0.00	0.05	0.008
neo-Pentane		0.00	0.00	0.00	0.000
i-Pentane	72.15	0.00	0.00	0.00	0.000
n-Pentane	72.15	0.00	0.00	0.00	0.000
n-Hexane	86.18	0.00	0.00	0.00	0.000
Hexanes Plus	86.18	0.00	0.00	0.00	0.000
Totals		100.0	0.0	100.0	0.01

Specific Gravity, Calculated	0.9970	air = 1.0000	
Density, Calculated Kg/m3	1.2014	air − 1.205 Kg/m3	
Compressibility (Z) Factor (60°F, 1ATM)	0.9996		
MW of fuel gas, calculated (60°F, 1ATM)	28.46		
Gross Calorific Value			
BTU/ft³ dry	1.3		
BTU/ft³ wet	1.3		
Net Calorific Value			
BTU/ft³ dry	1.2	EPA 'F' Factor (60°F, 1ATM)	749210.8
BTU/ft³ wet	1.2		SDCF/MMBTU

CHONS	Mole %	Wt%
Carbon	0.21	0.09
Hydrogen	0.21	0.01
Oxygen	21.19	23.57
Nitrogen	78.39	76.33
Sulfur	0.00	0.00

Hydrogen Sulfide = ND ppm

All results reported at 60°F and 14.696 psia.

* Normalized values

SDCF:Standard dry cubic feet

ND: None Detected NA: Not Analyzed

G/MCF: Gallons/Thousand Cubic Feet

OILFIELD ENVIRONMENTAL & COMPLIANCE, INC.

Client:	Sage Environmental Consulting, LP	SAMPLE ID:	1500406-1
	4611 Bee Caves Road Suite 100	Date Sampled:	1/29/2015
	Austin, Texas 78746	Date Analyzed:	01/30/15 @ 1528
Attn:	David Ranum	Lab Contact:	J. Carstens
Facility:	CARB	Meter:	-
Description:	TB020	Pressure:	- psig
Note:	CARB #1344	Temperature:	- °F

Gas Analysis by Chromatography - ASTM D 1945/3588

Component	MW	Mole %*	Kg-C/Kg-fuel*	Weight %*	G/MCF*
Oxygen	32.00	21.12	N/A	23.42	-
Nitrogen	28.01	78.80	N/A	76.50	-
Hydrogen	2.01	0.00	0.00	0.00	-
Carbon Dioxide	44.01	0.04	0.00	0.06	-
Carbon Monoxide	28.01	0.00	N/A	0.00	-
Methane	16.04	0.04	0.00	0.02	-
Ethane	30.07	0.00	0.00	0.00	0.000
Ethene	28.05	0.00	0.00	0.00	0.000
Propane	44.10	0.00	0.00	0.00	0.000
Propene	42.08	0.00	0.00	0.00	0.000
i-Butane	58.12	0.00	0.00	0.00	0.000
n-Butane	58.12	0.00	0.00	0.00	0.000
neo-Pentane		0.00	0.00	0.00	0.000
i-Pentane	72.15	0.00	0.00	0.00	0.000
n-Pentane	72.15	0.00	0.00	0.00	0.000
n-Hexane	86.18	0.00	0.00	0.00	0.000
Hexanes Plus	86.18	0.00	0.00	0.00	0.000
Totals		100.0	0.0	100.0	0.00

Specific Gravity, Calculated	0.9963	air = 1.0000			
Density, Calculated Kg/m3	1.2006	air − 1.205 Kg/m3			
Compressibility (Z) Factor (60°F, 1ATM)	0.9996				
MW of fuel gas, calculated (60°F, 1ATM)	28.44		CHONS	Mole %	Wt%
			Carbon	0.08	0.03
Gross Calorific Value			Hydrogen	0.07	0.01
BTU/ft^3 dry	0.4		Oxygen	21.13	23.46
BTU/ft^3 wet	0.4		Nitrogen	78.71	76.50
			Sulfur	0.00	0.00
Net Calorific Value					
BTU/ft^3 dry	0.3	EPA 'F' Factor (60°F, 1ATM)	2694361.0		
BTU/ft^3 wet	0.3		SDCF/MMBTU		
Hydrogen Sulfide = ND ppm					

All results reported at 60°F and 14.696 psia.

* Normalized values — SDCF:Standard dry cubic feet

ND: None Detected — NA: Not Analyzed — G/MCF: Gallons/Thousand Cubic Feet

OILFIELD ENVIRONMENTAL & COMPLIANCE, INC.

Client:	Sage Environmental Consulting, LP	SAMPLE ID:	1500406-2
	4611 Bee Caves Road Suite 100	Date Sampled:	1/29/2015
	Austin, Texas 78746	Date Analyzed:	01/30/15 @ 1602
Attn:	David Ranum	Lab Contact:	J. Carstens
Facility:	CARB	Meter:	-
Description:	TB021	Pressure:	- psig
Note:	CARB #1344	Temperature:	- °F

Gas Analysis by Chromatography - ASTM D 1945/3588

Component	MW	Mole %*	Kg-C/Kg-fuel*	Weight %*	G/MCF*
Oxygen	32.00	21.01	N/A	23.34	-
Nitrogen	28.01	78.41	N/A	76.26	-
Hydrogen	2.01	0.00	0.00	0.00	-
Carbon Dioxide	44.01	0.05	0.00	0.08	-
Carbon Monoxide	28.01	0.00	N/A	0.00	-
Methane	16.04	0.49	0.04	0.27	-
Ethane	30.07	0.04	0.00	0.04	0.009
Ethene	28.05	0.00	0.00	0.00	0.000
Propane	44.10	0.00	0.00	0.00	0.000
Propene	42.08	0.00	0.00	0.00	0.000
i-Butane	58.12	0.00	0.00	0.00	0.000
n-Butane	58.12	0.00	0.00	0.00	0.000
neo-Pentane		0.00	0.00	0.00	0.000
i-Pentane	72.15	0.00	0.00	0.00	0.000
n-Pentane	72.15	0.00	0.00	0.00	0.000
n-Hexane	86.18	0.00	0.00	0.00	0.000
Hexanes Plus	86.18	0.00	0.00	0.00	0.000
Totals		100.0	0.0	100.0	0.01

Specific Gravity, Calculated	0.9944	air = 1.0000			
Density, Calculated Kg/m3	1.1983	air − 1.205 Kg/m3			
Compressibility (Z) Factor (60°F, 1ATM)	0.9996				
MW of fuel gas, calculated (60°F, 1ATM)	28.38		CHONS	Mole %	Wt%
			Carbon	0.62	0.26
Gross Calorific Value			Hydrogen	1.07	0.08
BTU/ft^3 dry	5.6		Oxygen	20.82	23.40
BTU/ft^3 wet	5.5		Nitrogen	77.49	76.26
			Sulfur	0.00	0.00
Net Calorific Value					
BTU/ft^3 dry	5.0	EPA 'F' Factor (60°F, 1ATM)	186752.6		
BTU/ft^3 wet	4.9		SDCF/MMBTU		
Hydrogen Sulfide = ND ppm					

All results reported at 60°F and 14.696 psia.

* Normalized values — SDCF:Standard dry cubic feet

ND: None Detected — NA: Not Analyzed — G/MCF: Gallons/Thousand Cubic Feet

OILFIELD ENVIRONMENTAL & COMPLIANCE, INC.

Client:	Sage Environmental Consulting, LP	SAMPLE ID:	1500416-1
	4611 Bee Caves Road Suite 100	Date Sampled:	1/30/2015
	Austin, Texas 78746	Date Analyzed:	01/30/15 @ 1634
Attn:	David Ranum	Lab Contact:	J. Carstens
Facility:	CARB	Meter:	-
Description:	TB022	Pressure:	- psig
Note:	CARB #1344	Temperature:	- °F

Gas Analysis by Chromatography - ASTM D 1945/3588

Component	MW	Mole %*	Kg-C/Kg-fuel*	Weight %*	G/MCF*
Oxygen	32.00	20.58	N/A	22.74	-
Nitrogen	28.01	76.90	N/A	74.39	-
Hydrogen	2.01	0.00	0.00	0.00	-
Carbon Dioxide	44.01	0.07	0.01	0.11	-
Carbon Monoxide	28.01	0.00	N/A	0.00	-
Methane	16.04	0.30	0.03	0.17	-
Ethane	30.07	1.40	0.12	1.45	0.356
Ethene	28.05	0.00	0.00	0.00	0.000
Propane	44.10	0.74	0.06	1.13	0.205
Propene	42.08	0.00	0.00	0.00	0.000
i-Butane	58.12	0.00	0.00	0.00	0.000
n-Butane	58.12	0.00	0.00	0.00	0.000
neo-Pentane		0.00	0.00	0.00	0.000
i-Pentane	72.15	0.00	0.00	0.00	0.000
n-Pentane	72.15	0.00	0.00	0.00	0.000
n-Hexane	86.18	0.00	0.00	0.00	0.000
Hexanes Plus	86.18	0.00	0.00	0.00	0.000
Totals		100.0	0.2	100.0	0.56

Specific Gravity, Calculated	0.9998	air = 1.0000			
Density, Calculated Kg/m3	1.2047	air − 1.205 Kg/m3			
Compressibility (Z) Factor (60°F, 1ATM)	0.9996				
MW of fuel gas, calculated (60°F, 1ATM)	28.53		CHONS	Mole %	Wt%
			Carbon	4.89	2.24
Gross Calorific Value			Hydrogen	7.02	0.54
BTU/ft^3 dry	46.5		Oxygen	18.65	22.83
BTU/ft^3 wet	45.7		Nitrogen	69.44	74.39
			Sulfur	0.00	0.00
Net Calorific Value					
BTU/ft^3 dry	42.6	EPA 'F' Factor (60°F, 1ATM)	29616.8		
BTU/ft^3 wet	41.9		SDCF/MMBTU		
Hydrogen Sulfide = ND ppm					

All results reported at 60°F and 14.696 psia.

* Normalized values — SDCF:Standard dry cubic feet

ND: None Detected — NA: Not Analyzed — G/MCF: Gallons/Thousand Cubic Feet

OILFIELD ENVIRONMENTAL & COMPLIANCE, INC.

Client:	Sage Environmental Consulting, LP	SAMPLE ID:	1500416-2
	4611 Bee Caves Road Suite 100	Date Sampled:	1/30/2015
	Austin, Texas 78746	Date Analyzed:	01/30/15 @ 1706
Attn:	David Ranum	Lab Contact:	J. Carstens
Facility:	CARB	Meter:	-
Description:	TB023	Pressure:	- psig
Note:	CARB #1344	Temperature:	- °F

Gas Analysis by Chromatography - ASTM D 1945/3588

Component	MW	Mole %*	Kg-C/Kg-fuel*	Weight %*	G/MCF*
Oxygen	32.00	21.12	N/A	23.42	-
Nitrogen	28.01	78.84	N/A	76.52	-
Hydrogen	2.01	0.00	0.00	0.00	-
Carbon Dioxide	44.01	0.04	0.00	0.06	-
Carbon Monoxide	28.01	0.00	N/A	0.00	-
Methane	16.04	0.00	0.00	0.00	-
Ethane	30.07	0.00	0.00	0.00	0.000
Ethene	28.05	0.00	0.00	0.00	0.000
Propane	44.10	0.00	0.00	0.00	0.000
Propene	42.08	0.00	0.00	0.00	0.000
i-Butane	58.12	0.00	0.00	0.00	0.000
n-Butane	58.12	0.00	0.00	0.00	0.000
neo-Pentane		0.00	0.00	0.00	0.000
i-Pentane	72.15	0.00	0.00	0.00	0.000
n-Pentane	72.15	0.00	0.00	0.00	0.000
n-Hexane	86.18	0.00	0.00	0.00	0.000
Hexanes Plus	86.18	0.00	0.00	0.00	0.000
Totals		100.0	0.0	100.0	0.00

Specific Gravity, Calculated	0.9965	air = 1.0000	
Density, Calculated Kg/m3	1.2007	air − 1.205 Kg/m3	
Compressibility (Z) Factor (60°F, 1ATM)	0.9996		
MW of fuel gas, calculated (60°F, 1ATM)	28.44		
Gross Calorific Value			
BTU/ft³ dry	0.0		
BTU/ft³ wet	0.0		
Net Calorific Value			
BTU/ft³ dry	0.0	EPA 'F' Factor (60°F, 1ATM)	Cannot Calculate
BTU/ft³ wet	0.0		SDCF/MMBTU
Hydrogen Sulfide = ND ppm			

CHONS	Mole %	Wt%
Carbon	0.05	0.02
Hydrogen	0.00	0.00
Oxygen	21.15	23.46
Nitrogen	78.81	76.52
Sulfur	0.00	0.00

All results reported at 60°F and 14.696 psia.

* Normalized values — SDCF:Standard dry cubic feet

ND: None Detected — NA: Not Analyzed — G/MCF: Gallons/Thousand Cubic Feet

OILFIELD ENVIRONMENTAL & COMPLIANCE, INC.

Client:	Sage Environmental Consulting, LP	SAMPLE ID:	1500806-1
	4611 Bee Caves Road Suite 100	Date Sampled:	2/23/2015
	Austin, Texas 78746	Date Analyzed:	02/24/15 @ 1449
Attn:	David Ranum	Lab Contact:	J. Carstens
Facility:	-	Meter:	-
Description:	TB024A	Pressure:	- psig
Note:	CARB #1344	Temperature:	- °F

Gas Analysis by Chromatography - ASTM D 1945/3588

Component	MW	Mole %*	Kg-C/Kg-fuel*	Weight %*	G/MCF*
Oxygen	32.00	21.53	N/A	23.86	-
Nitrogen	28.01	78.45	N/A	76.10	-
Hydrogen	2.01	0.00	0.00	0.00	-
Carbon Dioxide	44.01	0.02	0.00	0.03	-
Carbon Monoxide	28.01	0.00	N/A	0.00	-
Methane	16.04	0.00	0.00	0.00	-
Ethane	30.07	0.00	0.00	0.00	0.000
Ethene	28.05	0.00	0.00	0.00	0.000
Propane	44.10	0.00	0.00	0.00	0.000
Propene	42.08	0.00	0.00	0.00	0.000
i-Butane	58.12	0.00	0.00	0.00	0.000
n-Butane	58.12	0.00	0.00	0.00	0.000
neo-Pentane		0.00	0.00	0.00	0.000
i-Pentane	72.15	0.00	0.00	0.00	0.000
n-Pentane	72.15	0.00	0.00	0.00	0.000
n-Hexane	86.18	0.00	0.00	0.00	0.000
Hexanes Plus	86.18	0.00	0.00	0.00	0.000
Totals		100.0	0.0	100.0	0.00

Specific Gravity, Calculated	0.9969	air = 1.0000			
Density, Calculated Kg/m3	1.2013	air − 1.205 Kg/m3			
Compressibility (Z) Factor (60°F, 1ATM)	0.9996				
MW of fuel gas, calculated (60°F, 1ATM)	28.45		CHONS	Mole %	Wt%
			Carbon	0.03	0.01
Gross Calorific Value			Hydrogen	0.00	0.00
BTU/ft^3 dry	0.0		Oxygen	21.55	23.88
BTU/ft^3 wet	0.0		Nitrogen	78.43	76.10
			Sulfur	0.00	0.00
Net Calorific Value					
BTU/ft^3 dry	0.0	EPA 'F' Factor (60°F, 1ATM)	Cannot Calculate		
BTU/ft^3 wet	0.0		SDCF/MMBTU		
Hydrogen Sulfide = ND ppm					

All results reported at 60°F and 14.696 psia.

* Normalized values — SDCF:Standard dry cubic feet

ND: None Detected — NA: Not Analyzed — G/MCF: Gallons/Thousand Cubic Feet

OILFIELD ENVIRONMENTAL & COMPLIANCE, INC.

Client:	Sage Environmental Consulting, LP	SAMPLE ID:	1500806-3
	4611 Bee Caves Road Suite 100	Date Sampled:	2/23/2015
	Austin, Texas 78746	Date Analyzed:	02/24/15 @ 1608
Attn:	David Ranum	Lab Contact:	J. Carstens
Facility:	-	Meter:	-
Description:	TB025A	Pressure:	- psig
Note:	CARB #1344	Temperature:	- °F

Gas Analysis by Chromatography - ASTM D 1945/3588

Component	MW	Mole %*	Kg-C/Kg-fuel*	Weight %*	G/MCF*
Oxygen	32.00	20.85	N/A	23.43	-
Nitrogen	28.01	75.97	N/A	74.73	-
Hydrogen	2.01	0.00	0.00	0.00	-
Carbon Dioxide	44.01	0.04	0.00	0.06	-
Carbon Monoxide	28.01	0.00	N/A	0.00	-
Methane	16.04	3.14	0.27	1.77	-
Ethane	30.07	0.00	0.00	0.00	0.000
Ethene	28.05	0.00	0.00	0.00	0.000
Propane	44.10	0.00	0.00	0.00	0.000
Propene	42.08	0.00	0.00	0.00	0.000
i-Butane	58.12	0.00	0.00	0.00	0.000
n-Butane	58.12	0.00	0.00	0.00	0.000
neo-Pentane		0.00	0.00	0.00	0.000
i-Pentane	72.15	0.00	0.00	0.00	0.000
n-Pentane	72.15	0.00	0.00	0.00	0.000
n-Hexane	86.18	0.00	0.00	0.00	0.000
Hexanes Plus	86.18	0.00	0.00	0.00	0.000
Totals		100.0	0.3	100.0	0.00

Specific Gravity, Calculated	0.9831	air = 1.0000			
Density, Calculated Kg/m3	1.1847	air = 1.205 Kg/m3			
Compressibility (Z) Factor (60°F, 1ATM)	0.9996				
MW of fuel gas, calculated (60°F, 1ATM)	28.06		CHONS	Mole %	Wt%
			Carbon	3.00	1.35
Gross Calorific Value			Hydrogen	5.91	0.45
BTU/ft^3 dry	31.8		Oxygen	19.64	23.47
BTU/ft^3 wet	31.2		Nitrogen	71.44	74.73
			Sulfur	0.00	0.00
Net Calorific Value					
BTU/ft^3 dry	28.6	EPA 'F' Factor (60°F, 1ATM)	38989.7		
BTU/ft^3 wet	28.1		SDCF/MMBTU		
Hydrogen Sulfide = ND ppm					

All results reported at 60°F and 14.696 psia.

* Normalized values — SDCF:Standard dry cubic feet

ND: None Detected — NA: Not Analyzed — G/MCF: Gallons/Thousand Cubic Feet

OILFIELD ENVIRONMENTAL & COMPLIANCE, INC.

Client:	Sage Environmental Consulting, LP	SAMPLE ID:	1500835-1
	4611 Bee Caves Road Suite 100	Date Sampled:	2/24/2015
	Austin, Texas 78746	Date Analyzed:	02/25/15 @ 1819
Attn:	David Ranum	Lab Contact:	J. Carstens
Facility:	-	Meter:	-
Description:	TB026A	Pressure:	- psig
Note:	CARB #1344	Temperature:	- °F

Gas Analysis by Chromatography - ASTM D 1945/3588

Component	MW	Mole %*	Kg-C/Kg-fuel*	Weight %*	G/MCF*
Oxygen	32.00	21.52	N/A	23.86	-
Nitrogen	28.01	78.36	N/A	76.04	-
Hydrogen	2.01	0.00	0.00	0.00	-
Carbon Dioxide	44.01	0.04	0.00	0.06	-
Carbon Monoxide	28.01	0.00	N/A	0.00	-
Methane	16.04	0.08	0.01	0.04	-
Ethane	30.07	0.00	0.00	0.00	0.000
Ethene	28.05	0.00	0.00	0.00	0.000
Propane	44.10	0.00	0.00	0.00	0.000
Propene	42.08	0.00	0.00	0.00	0.000
i-Butane	58.12	0.00	0.00	0.00	0.000
n-Butane	58.12	0.00	0.00	0.00	0.000
neo-Pentane		0.00	0.00	0.00	0.000
i-Pentane	72.15	0.00	0.00	0.00	0.000
n-Pentane	72.15	0.00	0.00	0.00	0.000
n-Hexane	86.18	0.00	0.00	0.00	0.000
Hexanes Plus	86.18	0.00	0.00	0.00	0.000
Totals		100.0	0.0	100.0	0.00

Specific Gravity, Calculated	0.9967	air = 1.0000			
Density, Calculated Kg/m3	1.2010	air = 1.205 Kg/m3			
Compressibility (Z) Factor (60°F, 1ATM)	0.9996				
MW of fuel gas, calculated (60°F, 1ATM)	28.45		CHONS	Mole %	Wt%
			Carbon	0.13	0.05
Gross Calorific Value			Hydrogen	0.16	0.01
BTU/ft^3 dry	0.8		Oxygen	21.52	23.90
BTU/ft^3 wet	0.8		Nitrogen	78.20	76.04
			Sulfur	0.00	0.00
Net Calorific Value					
BTU/ft^3 dry	0.7	EPA 'F' Factor (60°F, 1ATM)	1263994.0		
BTU/ft^3 wet	0.7		SDCF/MMBTU		
Hydrogen Sulfide = ND ppm					

All results reported at 60°F and 14.696 psia.

* Normalized values — SDCF:Standard dry cubic feet

ND: None Detected — NA: Not Analyzed — G/MCF: Gallons/Thousand Cubic Feet

OILFIELD ENVIRONMENTAL & COMPLIANCE, INC.

Client:	Sage Environmental Consulting, LP	SAMPLE ID:	1500835-2
	4611 Bee Caves Road Suite 100	Date Sampled:	2/24/2015
	Austin, Texas 78746	Date Analyzed:	02/25/15 @ 1847
Attn:	David Ranum	Lab Contact:	J. Carstens
Facility:	-	Meter:	-
Description:	TB027A	Pressure:	- psig
Note:	CARB #1344	Temperature:	- °F

Gas Analysis by Chromatography - ASTM D 1945/3588

Component	MW	Mole %*	Kg-C/Kg-fuel*	Weight %*	G/MCF*
Oxygen	32.00	21.57	N/A	23.90	-
Nitrogen	28.01	78.39	N/A	76.03	-
Hydrogen	2.01	0.00	0.00	0.00	-
Carbon Dioxide	44.01	0.04	0.00	0.07	-
Carbon Monoxide	28.01	0.00	N/A	0.00	-
Methane	16.04	0.00	0.00	0.00	-
Ethane	30.07	0.00	0.00	0.00	0.000
Ethene	28.05	0.00	0.00	0.00	0.000
Propane	44.10	0.00	0.00	0.00	0.000
Propene	42.08	0.00	0.00	0.00	0.000
i-Butane	58.12	0.00	0.00	0.00	0.000
n-Butane	58.12	0.00	0.00	0.00	0.000
neo-Pentane		0.00	0.00	0.00	0.000
i-Pentane	72.15	0.00	0.00	0.00	0.000
n-Pentane	72.15	0.00	0.00	0.00	0.000
n-Hexane	86.18	0.00	0.00	0.00	0.000
Hexanes Plus	86.18	0.00	0.00	0.00	0.000
Totals		100.0	0.0	100.0	0.00

Specific Gravity, Calculated	0.9971	air = 1.0000	
Density, Calculated Kg/m3	1.2015	air − 1.205 Kg/m3	
Compressibility (Z) Factor (60°F, 1ATM)	0.9996		
MW of fuel gas, calculated (60°F, 1ATM)	28.46		
Gross Calorific Value			
BTU/ft³ dry	0.0		
BTU/ft³ wet	0.0		
Net Calorific Value			
BTU/ft³ dry	0.0	EPA 'F' Factor (60°F, 1ATM)	Cannot Calculate
BTU/ft³ wet	0.0		SDCF/MMBTU
Hydrogen Sulfide = ND ppm			

CHONS	Mole %	Wt%
Carbon	0.05	0.02
Hydrogen	0.00	0.00
Oxygen	21.60	23.95
Nitrogen	78.35	76.03
Sulfur	0.00	0.00

All results reported at 60°F and 14.696 psia.

* Normalized values — SDCF:Standard dry cubic feet

ND: None Detected — NA: Not Analyzed — G/MCF: Gallons/Thousand Cubic Feet

OILFIELD ENVIRONMENTAL & COMPLIANCE, INC.

Client:	Sage Environmental Consulting, LP	SAMPLE ID:	1500853-1
	4611 Bee Caves Road Suite 100	Date Sampled:	2/25/2015
	Austin, Texas 78746	Date Analyzed:	02/26/15 @ 1259
Attn:	David Ranum	Lab Contact:	J. Carstens
Facility:	-	Meter:	-
Description:	TB028A	Pressure:	- psig
Note:	CARB #1344	Temperature:	- °F

Gas Analysis by Chromatography - ASTM D 1945/3588

Component	MW	Mole %*	Kg-C/Kg-fuel*	Weight %*	G/MCF*
Oxygen	32.00	21.46	N/A	23.80	-
Nitrogen	28.01	78.29	N/A	76.03	-
Hydrogen	2.01	0.00	0.00	0.00	-
Carbon Dioxide	44.01	0.02	0.00	0.03	-
Carbon Monoxide	28.01	0.00	N/A	0.00	-
Methane	16.04	0.23	0.02	0.13	-
Ethane	30.07	0.00	0.00	0.00	0.000
Ethene	28.05	0.00	0.00	0.00	0.000
Propane	44.10	0.00	0.00	0.00	0.000
Propene	42.08	0.00	0.00	0.00	0.000
i-Butane	58.12	0.00	0.00	0.00	0.000
n-Butane	58.12	0.00	0.00	0.00	0.000
neo-Pentane		0.00	0.00	0.00	0.000
i-Pentane	72.15	0.00	0.00	0.00	0.000
n-Pentane	72.15	0.00	0.00	0.00	0.000
n-Hexane	86.18	0.00	0.00	0.00	0.000
Hexanes Plus	86.18	0.00	0.00	0.00	0.000
Totals		100.0	0.0	100.0	0.00

Specific Gravity, Calculated	0.9959	air = 1.0000			
Density, Calculated Kg/m3	1.2000	air − 1.205 Kg/m3			
Compressibility (Z) Factor (60°F, 1ATM)	0.9996				
MW of fuel gas, calculated (60°F, 1ATM)	28.42		CHONS	Mole %	Wt%
			Carbon	0.26	0.11
Gross Calorific Value			Hydrogen	0.46	0.03
BTU/ft^3 dry	2.3		Oxygen	21.37	23.83
BTU/ft^3 wet	2.3		Nitrogen	77.91	76.03
			Sulfur	0.00	0.00
Net Calorific Value					
BTU/ft^3 dry	2.1	EPA 'F' Factor (60°F, 1ATM)	438411.3		
BTU/ft^3 wet	2.1		SDCF/MMBTU		
Hydrogen Sulfide = ND ppm					

All results reported at 60°F and 14.696 psia.

* Normalized values — SDCF:Standard dry cubic feet

ND: None Detected — NA: Not Analyzed — G/MCF: Gallons/Thousand Cubic Feet

OILFIELD ENVIRONMENTAL & COMPLIANCE, INC.

Client:	Sage Environmental Consulting, LP	SAMPLE ID:	1500853-2
	4611 Bee Caves Road Suite 100	Date Sampled:	2/25/2015
	Austin, Texas 78746	Date Analyzed:	02/26/15 @ 1352
Attn:	David Ranum	Lab Contact:	J. Carstens
Facility:	-	Meter:	-
Description:	TB029A	Pressure:	- psig
Note:	CARB #1344	Temperature:	- °F

Gas Analysis by Chromatography - ASTM D 1945/3588

Component	MW	Mole %*	Kg-C/Kg-fuel*	Weight %*	G/MCF*
Oxygen	32.00	21.35	N/A	23.76	-
Nitrogen	28.01	77.72	N/A	75.70	-
Hydrogen	2.01	0.00	0.00	0.00	-
Carbon Dioxide	44.01	0.03	0.00	0.04	-
Carbon Monoxide	28.01	0.00	N/A	0.00	-
Methane	16.04	0.90	0.08	0.50	-
Ethane	30.07	0.00	0.00	0.00	0.000
Ethene	28.05	0.00	0.00	0.00	0.000
Propane	44.10	0.00	0.00	0.00	0.000
Propene	42.08	0.00	0.00	0.00	0.000
i-Butane	58.12	0.00	0.00	0.00	0.000
n-Butane	58.12	0.00	0.00	0.00	0.000
neo-Pentane		0.00	0.00	0.00	0.000
i-Pentane	72.15	0.00	0.00	0.00	0.000
n-Pentane	72.15	0.00	0.00	0.00	0.000
n-Hexane	86.18	0.00	0.00	0.00	0.000
Hexanes Plus	86.18	0.00	0.00	0.00	0.000
Totals		100.0	0.1	100.0	0.00

Specific Gravity, Calculated	0.9930	air = 1.0000			
Density, Calculated Kg/m3	1.1966	air − 1.205 Kg/m3			
Compressibility (Z) Factor (60°F, 1ATM)	0.9996				
MW of fuel gas, calculated (60°F, 1ATM)	28.34		CHONS	Mole %	Wt%
			Carbon	0.92	0.39
Gross Calorific Value			Hydrogen	1.76	0.13
BTU/ft^3 dry	9.1		Oxygen	21.00	23.79
BTU/ft^3 wet	8.9		Nitrogen	76.33	75.70
			Sulfur	0.00	0.00
Net Calorific Value					
BTU/ft^3 dry	8.2	EPA 'F' Factor (60°F, 1ATM)	117816.9		
BTU/ft^3 wet	8.0		SDCF/MMBTU		
Hydrogen Sulfide = ND ppm					

All results reported at 60°F and 14.696 psia.

* Normalized values — SDCF:Standard dry cubic feet

ND: None Detected — NA: Not Analyzed — G/MCF: Gallons/Thousand Cubic Feet

OILFIELD ENVIRONMENTAL & COMPLIANCE, INC.

Client:	Sage Environmental Consulting, LP	SAMPLE ID:	1500870-1
	4611 Bee Caves Road Suite 100	Date Sampled:	2/26/2015
	Austin, Texas 78746	Date Analyzed:	02/27/15 @ 1444
Attn:	David Ranum	Lab Contact:	J. Carstens
Facility:	-	Meter:	-
Description:	TB030A	Pressure:	- psig
Note:	CARB #1344	Temperature:	- °F

Gas Analysis by Chromatography - ASTM D 1945/3588

Component	MW	Mole %*	Kg-C/Kg-fuel*	Weight %*	G/MCF*
Oxygen	32.00	21.56	N/A	23.89	-
Nitrogen	28.01	78.40	N/A	76.04	-
Hydrogen	2.01	0.00	0.00	0.00	-
Carbon Dioxide	44.01	0.04	0.00	0.07	-
Carbon Monoxide	28.01	0.00	N/A	0.00	-
Methane	16.04	0.00	0.00	0.00	-
Ethane	30.07	0.00	0.00	0.00	0.000
Ethene	28.05	0.00	0.00	0.00	0.000
Propane	44.10	0.00	0.00	0.00	0.000
Propene	42.08	0.00	0.00	0.00	0.000
i-Butane	58.12	0.00	0.00	0.00	0.000
n-Butane	58.12	0.00	0.00	0.00	0.000
neo-Pentane		0.00	0.00	0.00	0.000
i-Pentane	72.15	0.00	0.00	0.00	0.000
n-Pentane	72.15	0.00	0.00	0.00	0.000
n-Hexane	86.18	0.00	0.00	0.00	0.000
Hexanes Plus	86.18	0.00	0.00	0.00	0.000
Totals		100.0	0.0	100.0	0.00

Specific Gravity, Calculated	0.9971	air = 1.0000	
Density, Calculated Kg/m3	1.2015	air − 1.205 Kg/m3	
Compressibility (Z) Factor (60°F, 1ATM)	0.9996		
MW of fuel gas, calculated (60°F, 1ATM)	28.46		
Gross Calorific Value			
BTU/ft³ dry	0.0		
BTU/ft³ wet	0.0		
Net Calorific Value			
BTU/ft³ dry	0.0	EPA 'F' Factor (60°F, 1ATM)	Cannot Calculate
BTU/ft³ wet	0.0		SDCF/MMBTU
Hydrogen Sulfide = ND ppm			

CHONS	Mole %	Wt%
Carbon	0.05	0.02
Hydrogen	0.00	0.00
Oxygen	21.59	23.93
Nitrogen	78.36	76.04
Sulfur	0.00	0.00

All results reported at 60°F and 14.696 psia.

* Normalized values — SDCF:Standard dry cubic feet

ND: None Detected — NA: Not Analyzed — G/MCF: Gallons/Thousand Cubic Feet

OILFIELD ENVIRONMENTAL & COMPLIANCE, INC.

Client:	Sage Environmental Consulting, LP	SAMPLE ID:	1500870-2
	4611 Bee Caves Road Suite 100	Date Sampled:	2/26/2015
	Austin, Texas 78746	Date Analyzed:	02/27/15 @ 1520
Attn:	David Ranum	Lab Contact:	J. Carstens
Facility:	-	Meter:	-
Description:	TB031A	Pressure:	- psig
Note:	CARB #1344	Temperature:	- °F

Gas Analysis by Chromatography - ASTM D 1945/3588

Component	MW	Mole %*	Kg-C/Kg-fuel*	Weight %*	G/MCF*
Oxygen	32.00	21.35	N/A	23.77	-
Nitrogen	28.01	77.52	N/A	75.56	-
Hydrogen	2.01	0.00	0.00	0.00	-
Carbon Dioxide	44.01	0.03	0.00	0.05	-
Carbon Monoxide	28.01	0.00	N/A	0.00	-
Methane	16.04	1.10	0.09	0.61	-
Ethane	30.07	0.00	0.00	0.00	0.000
Ethene	28.05	0.00	0.00	0.00	0.000
Propane	44.10	0.00	0.00	0.00	0.000
Propene	42.08	0.00	0.00	0.00	0.000
i-Butane	58.12	0.00	0.00	0.00	0.000
n-Butane	58.12	0.00	0.00	0.00	0.000
neo-Pentane		0.00	0.00	0.00	0.000
i-Pentane	72.15	0.00	0.00	0.00	0.000
n-Pentane	72.15	0.00	0.00	0.00	0.000
n-Hexane	86.18	0.00	0.00	0.00	0.000
Hexanes Plus	86.18	0.00	0.00	0.00	0.000
Totals		100.0	0.1	100.0	0.00

Specific Gravity, Calculated	0.9922	air = 1.0000			
Density, Calculated Kg/m3	1.1956	air − 1.205 Kg/m3			
Compressibility (Z) Factor (60°F, 1ATM)	0.9996				
MW of fuel gas, calculated (60°F, 1ATM)	28.32		CHONS	Mole %	Wt%
			Carbon	1.11	0.48
Gross Calorific Value			Hydrogen	2.14	0.15
BTU/ft^3 dry	11.1		Oxygen	20.91	23.81
BTU/ft^3 wet	10.9		Nitrogen	75.83	75.56
			Sulfur	0.00	0.00
Net Calorific Value					
BTU/ft^3 dry	10.0	EPA 'F' Factor (60°F, 1ATM)	97878.4		
BTU/ft^3 wet	9.8		SDCF/MMBTU		
Hydrogen Sulfide = ND ppm					

All results reported at 60°F and 14.696 psia.

* Normalized values — SDCF:Standard dry cubic feet

ND: None Detected — NA: Not Analyzed — G/MCF: Gallons/Thousand Cubic Feet

OILFIELD ENVIRONMENTAL & COMPLIANCE, INC.

Client:	Sage Environmental Consulting, LP	SAMPLE ID:	1500870-3
	4611 Bee Caves Road Suite 100	Date Sampled:	2/26/2015
	Austin, Texas 78746	Date Analyzed:	02/27/15 @ 1551
Attn:	David Ranum	Lab Contact:	J. Carstens
Facility:	-	Meter:	-
Description:	TB032A	Pressure:	- psig
Note:	CARB #1344	Temperature:	- °F

Gas Analysis by Chromatography - ASTM D 1945/3588

Component	MW	Mole %*	Kg-C/Kg-fuel*	Weight %*	G/MCF*
Oxygen	32.00	21.54	N/A	23.89	-
Nitrogen	28.01	78.21	N/A	75.93	-
Hydrogen	2.01	0.00	0.00	0.00	-
Carbon Dioxide	44.01	0.03	0.00	0.05	-
Carbon Monoxide	28.01	0.00	N/A	0.00	-
Methane	16.04	0.22	0.02	0.12	-
Ethane	30.07	0.00	0.00	0.00	0.000
Ethene	28.05	0.00	0.00	0.00	0.000
Propane	44.10	0.00	0.00	0.00	0.000
Propene	42.08	0.00	0.00	0.00	0.000
i-Butane	58.12	0.00	0.00	0.00	0.000
n-Butane	58.12	0.00	0.00	0.00	0.000
neo-Pentane		0.00	0.00	0.00	0.000
i-Pentane	72.15	0.00	0.00	0.00	0.000
n-Pentane	72.15	0.00	0.00	0.00	0.000
n-Hexane	86.18	0.00	0.00	0.00	0.000
Hexanes Plus	86.18	0.00	0.00	0.00	0.000
Totals		100.0	0.0	100.0	0.00

Specific Gravity, Calculated	0.9961	air = 1.0000			
Density, Calculated Kg/m3	1.2003	air − 1.205 Kg/m3			
Compressibility (Z) Factor (60°F, 1ATM)	0.9996				
MW of fuel gas, calculated (60°F, 1ATM)	28.43		CHONS	Mole %	Wt%
			Carbon	0.26	0.11
Gross Calorific Value			Hydrogen	0.44	0.03
BTU/ft^3 dry	2.2		Oxygen	21.47	23.92
BTU/ft^3 wet	2.2		Nitrogen	77.83	75.93
			Sulfur	0.00	0.00
Net Calorific Value					
BTU/ft^3 dry	2.0	EPA 'F' Factor (60°F, 1ATM)	452756.0		
BTU/ft^3 wet	2.0		SDCF/MMBTU		
Hydrogen Sulfide = ND ppm					

All results reported at 60°F and 14.696 psia.

* Normalized values — SDCF:Standard dry cubic feet

ND: None Detected — NA: Not Analyzed — G/MCF: Gallons/Thousand Cubic Feet

OILFIELD ENVIRONMENTAL & COMPLIANCE, INC.

Client:	Sage Environmental Consulting, LP	SAMPLE ID:	1500906-1
	4611 Bee Caves Road Suite 100	Date Sampled:	3/2/2015
	Austin, Texas 78746	Date Analyzed:	03/03/15 @ 1215
Attn:	David Ranum	Lab Contact:	J. Carstens
Facility:	-	Meter:	-
Description:	TB033A	Pressure:	- psig
Note:	CARB #1344	Temperature:	- °F

Gas Analysis by Chromatography - ASTM D 1945/3588

Component	MW	Mole %*	Kg-C/Kg-fuel*	Weight %*	G/MCF*
Oxygen	32.00	20.92	N/A	23.16	-
Nitrogen	28.01	78.95	N/A	76.52	-
Hydrogen	2.01	0.00	0.00	0.00	-
Carbon Dioxide	44.01	0.02	0.00	0.03	-
Carbon Monoxide	28.01	0.00	N/A	0.00	-
Methane	16.04	0.00	0.00	0.00	-
Ethane	30.07	0.00	0.00	0.00	0.000
Ethene	28.05	0.00	0.00	0.00	0.000
Propane	44.10	0.00	0.00	0.00	0.000
Propene	42.08	0.00	0.00	0.00	0.000
i-Butane	58.12	0.00	0.00	0.00	0.000
n-Butane	58.12	0.00	0.00	0.00	0.000
neo-Pentane		0.00	0.00	0.00	0.000
i-Pentane	72.15	0.07	0.01	0.16	0.024
n-Pentane	72.15	0.05	0.00	0.12	0.018
n-Hexane	86.18	0.00	0.00	0.00	0.000
Hexanes Plus	86.18	0.00	0.00	0.00	0.000
Totals		100.0	0.0	100.0	0.04

Specific Gravity, Calculated	0.9978	air = 1.0000			
Density, Calculated Kg/m3	1.2024	air − 1.205 Kg/m3			
Compressibility (Z) Factor (60°F, 1ATM)	0.9996				
MW of fuel gas, calculated (60°F, 1ATM)	28.48		CHONS	Mole %	Wt%
			Carbon	0.59	0.25
Gross Calorific Value			Hydrogen	0.68	0.05
BTU/ft^3 dry	4.6		Oxygen	20.70	23.18
BTU/ft^3 wet	4.5		Nitrogen	78.03	76.52
			Sulfur	0.00	0.00
Net Calorific Value					
BTU/ft^3 dry	4.3	EPA 'F' Factor (60°F, 1ATM)	225357.4		
BTU/ft^3 wet	4.2		SDCF/MMBTU		
Hydrogen Sulfide = ND ppm					

All results reported at 60°F and 14.696 psia.

* Normalized values — SDCF:Standard dry cubic feet

ND: None Detected — NA: Not Analyzed — G/MCF: Gallons/Thousand Cubic Feet

OILFIELD ENVIRONMENTAL & COMPLIANCE, INC.

Client:	Sage Environmental Consulting, LP	SAMPLE ID:	1500906-2
	4611 Bee Caves Road Suite 100	Date Sampled:	3/2/2015
	Austin, Texas 78746	Date Analyzed:	03/03/15 @ 1427
Attn:	David Ranum	Lab Contact:	J. Carstens
Facility:	-	Meter:	-
Description:	TB034A	Pressure:	- psig
Note:	CARB #1344	Temperature:	- °F

Gas Analysis by Chromatography - ASTM D 1945/3588

Component	MW	Mole %*	Kg-C/Kg-fuel*	Weight %*	G/MCF*
Oxygen	32.00	21.04	N/A	23.33	-
Nitrogen	28.01	78.93	N/A	76.62	-
Hydrogen	2.01	0.00	0.00	0.00	-
Carbon Dioxide	44.01	0.03	0.00	0.04	-
Carbon Monoxide	28.01	0.00	N/A	0.00	-
Methane	16.04	0.00	0.00	0.00	-
Ethane	30.07	0.00	0.00	0.00	0.000
Ethene	28.05	0.00	0.00	0.00	0.000
Propane	44.10	0.00	0.00	0.00	0.000
Propene	42.08	0.00	0.00	0.00	0.000
i-Butane	58.12	0.00	0.00	0.00	0.000
n-Butane	58.12	0.00	0.00	0.00	0.000
neo-Pentane		0.00	0.00	0.00	0.000
i-Pentane	72.15	0.00	0.00	0.00	0.000
n-Pentane	72.15	0.00	0.00	0.00	0.000
n-Hexane	86.18	0.00	0.00	0.00	0.000
Hexanes Plus	86.18	0.00	0.00	0.00	0.000
Totals		100.0	0.0	100.0	0.00

Specific Gravity, Calculated	0.9963	air = 1.0000	
Density, Calculated Kg/m3	1.2006	air − 1.205 Kg/m3	
Compressibility (Z) Factor (60°F, 1ATM)	0.9996		
MW of fuel gas, calculated (60°F, 1ATM)	28.44		
Gross Calorific Value			
BTU/ft³ dry	0.0		
BTU/ft³ wet	0.0		
Net Calorific Value			
BTU/ft³ dry	0.0	EPA 'F' Factor (60°F, 1ATM)	Cannot Calculate
BTU/ft³ wet	0.0		SDCF/MMBTU
Hydrogen Sulfide = ND ppm			

CHONS	Mole %	Wt%
Carbon	0.04	0.02
Hydrogen	0.00	0.00
Oxygen	21.06	23.37
Nitrogen	78.90	76.62
Sulfur	0.00	0.00

All results reported at 60°F and 14.696 psia.

* Normalized values — SDCF:Standard dry cubic feet

ND: None Detected — NA: Not Analyzed — G/MCF: Gallons/Thousand Cubic Feet

OILFIELD ENVIRONMENTAL & COMPLIANCE, INC.

Client:	Sage Environmental Consulting, LP	SAMPLE ID:	1500906-3
	4611 Bee Caves Road Suite 100	Date Sampled:	3/2/2015
	Austin, Texas 78746	Date Analyzed:	03/03/15 @ 1508
Attn:	David Ranum	Lab Contact:	J. Carstens
Facility:	-	Meter:	-
Description:	TB035A	Pressure:	- psig
Note:	CARB #1344	Temperature:	- °F

Gas Analysis by Chromatography - ASTM D 1945/3588

Component	MW	Mole %*	Kg-C/Kg-fuel*	Weight %*	G/MCF*
Oxygen	32.00	21.00	N/A	23.28	-
Nitrogen	28.01	78.92	N/A	76.60	-
Hydrogen	2.01	0.00	0.00	0.00	-
Carbon Dioxide	44.01	0.03	0.00	0.05	-
Carbon Monoxide	28.01	0.00	N/A	0.00	-
Methane	16.04	0.00	0.00	0.00	-
Ethane	30.07	0.00	0.00	0.00	0.000
Ethene	28.05	0.00	0.00	0.00	0.000
Propane	44.10	0.05	0.00	0.07	0.013
Propene	42.08	0.00	0.00	0.00	0.000
i-Butane	58.12	0.00	0.00	0.00	0.000
n-Butane	58.12	0.00	0.00	0.00	0.000
neo-Pentane		0.00	0.00	0.00	0.000
i-Pentane	72.15	0.00	0.00	0.00	0.000
n-Pentane	72.15	0.00	0.00	0.00	0.000
n-Hexane	86.18	0.00	0.00	0.00	0.000
Hexanes Plus	86.18	0.00	0.00	0.00	0.000
Totals		100.0	0.0	100.0	0.01

Specific Gravity, Calculated	0.9965	air = 1.0000			
Density, Calculated Kg/m3	1.2008	air − 1.205 Kg/m3			
Compressibility (Z) Factor (60°F, 1ATM)	0.9996				
MW of fuel gas, calculated (60°F, 1ATM)	28.44		CHONS	Mole %	Wt%
			Carbon	0.18	0.08
Gross Calorific Value			Hydrogen	0.19	0.01
BTU/ft^3 dry	1.2		Oxygen	20.96	23.32
BTU/ft^3 wet	1.2		Nitrogen	78.67	76.60
			Sulfur	0.00	0.00
Net Calorific Value					
BTU/ft^3 dry	1.1	EPA 'F' Factor (60°F, 1ATM)	843483.1		
BTU/ft^3 wet	1.1		SDCF/MMBTU		
Hydrogen Sulfide = ND ppm					

All results reported at 60°F and 14.696 psia.

* Normalized values — SDCF:Standard dry cubic feet

ND: None Detected — NA: Not Analyzed — G/MCF: Gallons/Thousand Cubic Feet

OILFIELD ENVIRONMENTAL & COMPLIANCE, INC.

Client:	Sage Environmental Consulting, LP	SAMPLE ID:	1500906-4
	4611 Bee Caves Road Suite 100	Date Sampled:	3/2/2015
	Austin, Texas 78746	Date Analyzed:	03/03/15 @ 1538
Attn:	David Ranum	Lab Contact:	J. Carstens
Facility:	-	Meter:	-
Description:	TB036A	Pressure:	- psig
Note:	CARB #1344	Temperature:	- °F

Gas Analysis by Chromatography - ASTM D 1945/3588

Component	MW	Mole %*	Kg-C/Kg-fuel*	Weight %*	G/MCF*
Oxygen	32.00	20.95	N/A	23.23	-
Nitrogen	28.01	79.04	N/A	76.74	-
Hydrogen	2.01	0.00	0.00	0.00	-
Carbon Dioxide	44.01	0.02	0.00	0.02	-
Carbon Monoxide	28.01	0.00	N/A	0.00	-
Methane	16.04	0.00	0.00	0.00	-
Ethane	30.07	0.00	0.00	0.00	0.000
Ethene	28.05	0.00	0.00	0.00	0.000
Propane	44.10	0.00	0.00	0.00	0.000
Propene	42.08	0.00	0.00	0.00	0.000
i-Butane	58.12	0.00	0.00	0.00	0.000
n-Butane	58.12	0.00	0.00	0.00	0.000
neo-Pentane		0.00	0.00	0.00	0.000
i-Pentane	72.15	0.00	0.00	0.00	0.000
n-Pentane	72.15	0.00	0.00	0.00	0.000
n-Hexane	86.18	0.00	0.00	0.00	0.000
Hexanes Plus	86.18	0.00	0.00	0.00	0.000
Totals		100.0	0.0	100.0	0.00

Specific Gravity, Calculated	0.9961	air = 1.0000			
Density, Calculated Kg/m3	1.2003	air − 1.205 Kg/m3			
Compressibility (Z) Factor (60°F, 1ATM)	0.9996				
MW of fuel gas, calculated (60°F, 1ATM)	28.43		CHONS	Mole %	Wt%
			Carbon	0.02	0.01
Gross Calorific Value			Hydrogen	0.00	0.00
BTU/ft^3 dry	0.0		Oxygen	20.96	23.25
BTU/ft^3 wet	0.0		Nitrogen	79.02	76.74
			Sulfur	0.00	0.00
Net Calorific Value					
BTU/ft^3 dry	0.0	EPA 'F' Factor (60°F, 1ATM)	Cannot Calculate		
BTU/ft^3 wet	0.0		SDCF/MMBTU		
Hydrogen Sulfide = ND ppm					

All results reported at 60°F and 14.696 psia.

* Normalized values — SDCF:Standard dry cubic feet

ND: None Detected — NA: Not Analyzed — G/MCF: Gallons/Thousand Cubic Feet

OILFIELD ENVIRONMENTAL & COMPLIANCE, INC.

Client:	Sage Environmental Consulting, LP	SAMPLE ID:	1500918-1
	4611 Bee Caves Road Suite 100	Date Sampled:	3/3/2015
	Austin, Texas 78746	Date Analyzed:	03/05/15 @ 1026
Attn:	David Ranum	Lab Contact:	J. Carstens
Facility:	-	Meter:	-
Description:	TB037A	Pressure:	- psig
Note:	CARB #1344	Temperature:	- °F

Gas Analysis by Chromatography - ASTM D 1945/3588

Component	MW	Mole %*	Kg-C/Kg-fuel*	Weight %*	G/MCF*
Oxygen	32.00	21.14	N/A	23.43	-
Nitrogen	28.01	78.80	N/A	76.47	-
Hydrogen	2.01	0.00	0.00	0.00	-
Carbon Dioxide	44.01	0.03	0.00	0.05	-
Carbon Monoxide	28.01	0.00	N/A	0.00	-
Methane	16.04	0.00	0.00	0.00	-
Ethane	30.07	0.00	0.00	0.00	0.000
Ethene	28.05	0.00	0.00	0.00	0.000
Propane	44.10	0.04	0.00	0.06	0.010
Propene	42.08	0.00	0.00	0.00	0.000
i-Butane	58.12	0.00	0.00	0.00	0.000
n-Butane	58.12	0.00	0.00	0.00	0.000
neo-Pentane		0.00	0.00	0.00	0.000
i-Pentane	72.15	0.00	0.00	0.00	0.000
n-Pentane	72.15	0.00	0.00	0.00	0.000
n-Hexane	86.18	0.00	0.00	0.00	0.000
Hexanes Plus	86.18	0.00	0.00	0.00	0.000
Totals		100.0	0.0	100.0	0.01

Specific Gravity, Calculated	0.9967	air = 1.0000			
Density, Calculated Kg/m3	1.2010	air − 1.205 Kg/m3			
Compressibility (Z) Factor (60°F, 1ATM)	0.9996				
MW of fuel gas, calculated (60°F, 1ATM)	28.45		CHONS	Mole %	Wt%
			Carbon	0.15	0.06
Gross Calorific Value			Hydrogen	0.14	0.01
BTU/ft^3 dry	0.9		Oxygen	21.11	23.46
BTU/ft^3 wet	0.9		Nitrogen	78.60	76.47
			Sulfur	0.00	0.00
Net Calorific Value					
BTU/ft^3 dry	0.8	EPA 'F' Factor (60°F, 1ATM)	1107207.7		
BTU/ft^3 wet	0.8		SDCF/MMBTU		

Hydrogen Sulfide = ND ppm

All results reported at 60°F and 14.696 psia.

* Normalized values

SDCF:Standard dry cubic feet

ND: None Detected NA: Not Analyzed

G/MCF: Gallons/Thousand Cubic Feet

OILFIELD ENVIRONMENTAL & COMPLIANCE, INC.

Client:	Sage Environmental Consulting, LP	SAMPLE ID:	1500918-2
	4611 Bee Caves Road Suite 100	Date Sampled:	3/3/2015
	Austin, Texas 78746	Date Analyzed:	03/05/15 @ 1100
Attn:	David Ranum	Lab Contact:	J. Carstens
Facility:	-	Meter:	-
Description:	TB038A	Pressure:	- psig
Note:	CARB #1344	Temperature:	- °F

Gas Analysis by Chromatography - ASTM D 1945/3588

Component	MW	Mole %*	Kg-C/Kg-fuel*	Weight %*	G/MCF*
Oxygen	32.00	21.17	N/A	23.47	-
Nitrogen	28.01	78.80	N/A	76.49	-
Hydrogen	2.01	0.00	0.00	0.00	-
Carbon Dioxide	44.01	0.03	0.00	0.04	-
Carbon Monoxide	28.01	0.00	N/A	0.00	-
Methane	16.04	0.00	0.00	0.00	-
Ethane	30.07	0.00	0.00	0.00	0.000
Ethene	28.05	0.00	0.00	0.00	0.000
Propane	44.10	0.00	0.00	0.00	0.000
Propene	42.08	0.00	0.00	0.00	0.000
i-Butane	58.12	0.00	0.00	0.00	0.000
n-Butane	58.12	0.00	0.00	0.00	0.000
neo-Pentane		0.00	0.00	0.00	0.000
i-Pentane	72.15	0.00	0.00	0.00	0.000
n-Pentane	72.15	0.00	0.00	0.00	0.000
n-Hexane	86.18	0.00	0.00	0.00	0.000
Hexanes Plus	86.18	0.00	0.00	0.00	0.000
Totals		100.0	0.0	100.0	0.00

Specific Gravity, Calculated	0.9965	air = 1.0000			
Density, Calculated Kg/m3	1.2008	air − 1.205 Kg/m3			
Compressibility (Z) Factor (60°F, 1ATM)	0.9996				
MW of fuel gas, calculated (60°F, 1ATM)	28.44		CHONS	Mole %	Wt%
			Carbon	0.04	0.01
Gross Calorific Value			Hydrogen	0.00	0.00
BTU/ft^3 dry	0.0		Oxygen	21.19	23.50
BTU/ft^3 wet	0.0		Nitrogen	78.78	76.49
			Sulfur	0.00	0.00
Net Calorific Value					
BTU/ft^3 dry	0.0	EPA 'F' Factor (60°F, 1ATM)	Cannot Calculate		
BTU/ft^3 wet	0.0		SDCF/MMBTU		
Hydrogen Sulfide = ND ppm					

All results reported at 60°F and 14.696 psia.

* Normalized values — SDCF:Standard dry cubic feet

ND: None Detected — NA: Not Analyzed — G/MCF: Gallons/Thousand Cubic Feet

OILFIELD ENVIRONMENTAL & COMPLIANCE, INC.

Client:	Sage Environmental Consulting, LP	SAMPLE ID:	1500918-3
	4611 Bee Caves Road Suite 100	Date Sampled:	3/3/2015
	Austin, Texas 78746	Date Analyzed:	03/05/15 @ 1129
Attn:	David Ranum	Lab Contact:	J. Carstens
Facility:	-	Meter:	-
Description:	TB039A	Pressure:	- psig
Note:	CARB #1344	Temperature:	- °F

Gas Analysis by Chromatography - ASTM D 1945/3588

Component	MW	Mole %*	Kg-C/Kg-fuel*	Weight %*	G/MCF*
Oxygen	32.00	21.17	N/A	23.47	-
Nitrogen	28.01	78.80	N/A	76.48	-
Hydrogen	2.01	0.00	0.00	0.00	-
Carbon Dioxide	44.01	0.03	0.00	0.05	-
Carbon Monoxide	28.01	0.00	N/A	0.00	-
Methane	16.04	0.00	0.00	0.00	-
Ethane	30.07	0.00	0.00	0.00	0.000
Ethene	28.05	0.00	0.00	0.00	0.000
Propane	44.10	0.00	0.00	0.00	0.000
Propene	42.08	0.00	0.00	0.00	0.000
i-Butane	58.12	0.00	0.00	0.00	0.000
n-Butane	58.12	0.00	0.00	0.00	0.000
neo-Pentane		0.00	0.00	0.00	0.000
i-Pentane	72.15	0.00	0.00	0.00	0.000
n-Pentane	72.15	0.00	0.00	0.00	0.000
n-Hexane	86.18	0.00	0.00	0.00	0.000
Hexanes Plus	86.18	0.00	0.00	0.00	0.000
Totals		100.0	0.0	100.0	0.00

Specific Gravity, Calculated	0.9965	air = 1.0000	
Density, Calculated Kg/m3	1.2008	air − 1.205 Kg/m3	
Compressibility (Z) Factor (60°F, 1ATM)	0.9996		
MW of fuel gas, calculated (60°F, 1ATM)	28.44		
Gross Calorific Value			
BTU/ft³ dry	0.0		
BTU/ft³ wet	0.0		
Net Calorific Value			
BTU/ft³ dry	0.0	EPA 'F' Factor (60°F, 1ATM)	Cannot Calculate
BTU/ft³ wet	0.0		SDCF/MMBTU
Hydrogen Sulfide = ND ppm			

CHONS	Mole %	Wt%
Carbon	0.04	0.02
Hydrogen	0.00	0.00
Oxygen	21.19	23.50
Nitrogen	78.77	76.48
Sulfur	0.00	0.00

All results reported at 60°F and 14.696 psia.

* Normalized values
SDCF:Standard dry cubic feet
ND: None Detected
NA: Not Analyzed
G/MCF: Gallons/Thousand Cubic Feet

OILFIELD ENVIRONMENTAL & COMPLIANCE, INC.

Client:	Sage Environmental Consulting, LP	SAMPLE ID:	1503374-2
	4611 Bee Caves Road Suite 100	Date Sampled:	8/6/2015
	Austin, Texas 78746	Date Analyzed:	08/07/15 @ 1230
Attn:	David Ranum	Lab Contact:	J. Carstens
Facility:	GUISTI 20-2, GOU 32-8/32-9	Meter:	-
Description:	TB 040B	Pressure:	- psig
Note:	CARB #1344	Temperature:	- °F

Gas Analysis by Chromatography - ASTM D 1945/3588

Component	MW	Mole %*	Kg-C/Kg-fuel*	Weight %*	G/MCF*
Oxygen	32.00	19.46	N/A	22.32	-
Nitrogen	28.01	72.99	N/A	73.29	-
Hydrogen	2.01	0.00	0.00	0.00	-
Carbon Dioxide	44.01	0.03	0.00	0.05	-
Carbon Monoxide	28.01	0.00	N/A	0.00	-
Methane	16.04	7.50	0.65	4.31	-
Ethane	30.07	0.02	0.00	0.03	0.006
Ethene	28.05	0.00	0.00	0.00	0.000
Propane	44.10	0.00	0.00	0.00	0.000
Propene	42.08	0.00	0.00	0.00	0.000
i-Butane	58.12	0.00	0.00	0.00	0.000
n-Butane	58.12	0.00	0.00	0.00	0.000
neo-Pentane		0.00	0.00	0.00	0.000
i-Pentane	72.15	0.00	0.00	0.00	0.000
n-Pentane	72.15	0.00	0.00	0.00	0.000
n-Hexane	86.18	0.00	0.00	0.00	0.000
Hexanes Plus	86.18	0.00	0.00	0.00	0.000
Totals		100.0	0.7	100.0	0.01

Specific Gravity, Calculated	0.9632	air = 1.0000			
Density, Calculated Kg/m3	1.1606	air = 1.205 Kg/m3			
Compressibility (Z) Factor (60°F, 1ATM)	0.9996				
MW of fuel gas, calculated (60°F, 1ATM)	27.49		CHONS	Mole %	Wt%
			Carbon	6.59	3.26
Gross Calorific Value			Hydrogen	13.08	1.09
BTU/ft³ dry	76.1		Oxygen	16.93	22.35
BTU/ft³ wet	74.8		Nitrogen	63.40	73.29
			Sulfur	0.00	0.00
Net Calorific Value					
BTU/ft³ dry	68.6	EPA 'F' Factor (60°F, 1ATM)	20633.2		
BTU/ft³ wet	67.4		SDCF/MMBTU		
Hydrogen Sulfide = NA ppm					

All results reported at 60°F and 14.696 psia.

* Normalized values — SDCF:Standard dry cubic feet

ND: None Detected — NA: Not Analyzed — G/MCF: Gallons/Thousand Cubic Feet

OILFIELD ENVIRONMENTAL & COMPLIANCE, INC.

Client:	Sage Environmental Consulting, LP	SAMPLE ID:	1503374-4
	4611 Bee Caves Road Suite 100	Date Sampled:	8/6/2015
	Austin, Texas 78746	Date Analyzed:	08/07/15 @ 1258
Attn:	David Ranum	Lab Contact:	J. Carstens
Facility:	GUISTI 20-2, GOU 32-8/32-9	Meter:	-
Description:	TB 041B	Pressure:	- psig
Note:	CARB #1344	Temperature:	- °F

Gas Analysis by Chromatography - ASTM D 1945/3588

Component	MW	Mole %*	Kg-C/Kg-fuel*	Weight %*	G/MCF*
Oxygen	32.00	21.02	N/A	23.34	-
Nitrogen	28.01	78.63	N/A	76.43	-
Hydrogen	2.01	0.00	0.00	0.00	-
Carbon Dioxide	44.01	0.03	0.00	0.05	-
Carbon Monoxide	28.01	0.00	N/A	0.00	-
Methane	16.04	0.31	0.03	0.17	-
Ethane	30.07	0.00	0.00	0.00	0.000
Ethene	28.05	0.00	0.00	0.00	0.000
Propane	44.10	0.00	0.00	0.00	0.000
Propene	42.08	0.00	0.00	0.00	0.000
i-Butane	58.12	0.00	0.00	0.00	0.000
n-Butane	58.12	0.00	0.00	0.00	0.000
neo-Pentane		0.00	0.00	0.00	0.000
i-Pentane	72.15	0.00	0.00	0.00	0.000
n-Pentane	72.15	0.00	0.00	0.00	0.000
n-Hexane	86.18	0.00	0.00	0.00	0.000
Hexanes Plus	86.18	0.00	0.00	0.00	0.000
Totals		100.0	0.0	100.0	0.00

Specific Gravity, Calculated	0.9950	air = 1.0000	
Density, Calculated Kg/m3	1.1990	air = 1.205 Kg/m3	
Compressibility (Z) Factor (60°F, 1ATM)	0.9996		
MW of fuel gas, calculated (60°F, 1ATM)	28.40		
Gross Calorific Value			
BTU/ft³ dry	3.2		
BTU/ft³ wet	3.1		
Net Calorific Value			
BTU/ft³ dry	2.8	EPA 'F' Factor (60°F, 1ATM)	324702.6
BTU/ft³ wet	2.8		SDCF/MMBTU
Hydrogen Sulfide = NA ppm			

CHONS	Mole %	Wt%
Carbon	0.35	0.15
Hydrogen	0.62	0.04
Oxygen	20.91	23.38
Nitrogen	78.12	76.43
Sulfur	0.00	0.00

All results reported at 60°F and 14.696 psia.

* Normalized values — SDCF:Standard dry cubic feet

ND: None Detected — NA: Not Analyzed — G/MCF: Gallons/Thousand Cubic Feet

OILFIELD ENVIRONMENTAL & COMPLIANCE, INC.

Client:	Sage Environmental Consulting, LP	SAMPLE ID:	1503396-2
	4611 Bee Caves Road Suite 100	Date Sampled:	8/7/2015
	Austin, Texas 78746	Date Analyzed:	08/08/15 @ 1059
Attn:	David Ranum	Lab Contact:	J. Carstens
Facility:	SANBORN #4,19-8,19-10,30-10,25-17,30-6	Meter:	-
Description:	TB 042B	Pressure:	- psig
Note:	CARB #1344	Temperature:	- ^{o}F

Gas Analysis by Chromatography - ASTM D 1945/3588

Component	MW	Mole %*	Kg-C/Kg-fuel*	Weight %*	G/MCF*
Oxygen	32.00	21.31	N/A	23.73	-
Nitrogen	28.01	77.61	N/A	75.64	-
Hydrogen	2.01	0.00	0.00	0.00	-
Carbon Dioxide	44.01	0.02	0.00	0.04	-
Carbon Monoxide	28.01	0.00	N/A	0.00	-
Methane	16.04	1.06	0.09	0.59	-
Ethane	30.07	0.00	0.00	0.00	0.000
Ethene	28.05	0.00	0.00	0.00	0.000
Propane	44.10	0.00	0.00	0.00	0.000
Propene	42.08	0.00	0.00	0.00	0.000
i-Butane	58.12	0.00	0.00	0.00	0.000
n-Butane	58.12	0.00	0.00	0.00	0.000
neo-Pentane		0.00	0.00	0.00	0.000
i-Pentane	72.15	0.00	0.00	0.00	0.000
n-Pentane	72.15	0.00	0.00	0.00	0.000
n-Hexane	86.18	0.00	0.00	0.00	0.000
Hexanes Plus	86.18	0.00	0.00	0.00	0.000
Totals		100.0	0.1	100.0	0.00

Specific Gravity, Calculated	0.9923	air = 1.0000	
Density, Calculated Kg/m3	1.1957	air = 1.205 Kg/m3	
Compressibility (Z) Factor (60^{o}F, 1ATM)	0.9996		
MW of fuel gas, calculated (60^{o}F, 1ATM)	28.32		
Gross Calorific Value			
BTU/ft^3 dry	10.7		
BTU/ft^3 wet	10.5		
Net Calorific Value			
BTU/ft^3 dry	9.6	EPA 'F' Factor (60^{o}F, 1ATM)	101128.4
BTU/ft^3 wet	9.4		SDCF/MMBTU
Hydrogen Sulfide = NA ppm			

CHONS	Mole %	Wt%
Carbon	1.07	0.46
Hydrogen	2.07	0.15
Oxygen	20.89	23.76
Nitrogen	75.97	75.64
Sulfur	0.00	0.00

All results reported at 60^{o}F and 14.696 psia.

* Normalized values

SDCF:Standard dry cubic feet

ND: None Detected NA: Not Analyzed

G/MCF: Gallons/Thousand Cubic Feet

OILFIELD ENVIRONMENTAL & COMPLIANCE, INC.

Client:	Sage Environmental Consulting, LP	SAMPLE ID:	1503396-4
	4611 Bee Caves Road Suite 100	Date Sampled:	8/7/2015
	Austin, Texas 78746	Date Analyzed:	08/08/15 @ 1130
Attn:	David Ranum	Lab Contact:	J. Carstens
Facility:	SANBORN #4,19-8,19-10,30-10,25-17,30-6	Meter:	-
Description:	TB 043B	Pressure:	- psig
Note:	CARB #1344	Temperature:	- °F

Gas Analysis by Chromatography - ASTM D 1945/3588

Component	MW	Mole %*	Kg-C/Kg-fuel*	Weight %*	G/MCF*
Oxygen	32.00	21.49	N/A	23.81	-
Nitrogen	28.01	78.49	N/A	76.15	-
Hydrogen	2.01	0.00	0.00	0.00	-
Carbon Dioxide	44.01	0.02	0.00	0.04	-
Carbon Monoxide	28.01	0.00	N/A	0.00	-
Methane	16.04	0.00	0.00	0.00	-
Ethane	30.07	0.00	0.00	0.00	0.000
Ethene	28.05	0.00	0.00	0.00	0.000
Propane	44.10	0.00	0.00	0.00	0.000
Propene	42.08	0.00	0.00	0.00	0.000
i-Butane	58.12	0.00	0.00	0.00	0.000
n-Butane	58.12	0.00	0.00	0.00	0.000
neo-Pentane		0.00	0.00	0.00	0.000
i-Pentane	72.15	0.00	0.00	0.00	0.000
n-Pentane	72.15	0.00	0.00	0.00	0.000
n-Hexane	86.18	0.00	0.00	0.00	0.000
Hexanes Plus	86.18	0.00	0.00	0.00	0.000
Totals		100.0	0.0	100.0	0.00

Specific Gravity, Calculated	0.9969	air = 1.0000	
Density, Calculated Kg/m3	1.2013	air = 1.205 Kg/m3	
Compressibility (Z) Factor (60°F, 1ATM)	0.9996		
MW of fuel gas, calculated (60°F, 1ATM)	28.45		
Gross Calorific Value			
BTU/ft^3 dry	0.0		
BTU/ft^3 wet	0.0		
Net Calorific Value			
BTU/ft^3 dry	0.0	EPA 'F' Factor (60°F, 1ATM)	Cannot Calculate
BTU/ft^3 wet	0.0		SDCF/MMBTU
Hydrogen Sulfide = NA ppm			

CHONS	Mole %	Wt%
Carbon	0.03	0.01
Hydrogen	0.00	0.00
Oxygen	21.50	23.84
Nitrogen	78.46	76.15
Sulfur	0.00	0.00

All results reported at 60°F and 14.696 psia.

* Normalized values

SDCF:Standard dry cubic feet

ND: None Detected NA: Not Analyzed

G/MCF: Gallons/Thousand Cubic Feet

OILFIELD ENVIRONMENTAL & COMPLIANCE, INC.

Client:	Sage Environmental Consulting, LP	SAMPLE ID:	1503434-1
	4611 Bee Caves Road Suite 100	Date Sampled:	8/11/2015
	Austin, Texas 78746	Date Analyzed:	08/12/15 @ 1119
Attn:	David Ranum	Lab Contact:	J. Carstens
Facility:	Feather River AQMD	Meter:	-
Description:	TB 044A	Pressure:	- psig
Note:	CARB #1344	Temperature:	- °F

Gas Analysis by Chromatography - ASTM D 1945/3588

Component	MW	Mole %*	Kg-C/Kg-fuel*	Weight %*	G/MCF*
Oxygen	32.00	21.41	N/A	23.73	-
Nitrogen	28.01	78.56	N/A	76.22	-
Hydrogen	2.01	0.00	0.00	0.00	-
Carbon Dioxide	44.01	0.03	0.00	0.05	-
Carbon Monoxide	28.01	0.00	N/A	0.00	-
Methane	16.04	0.00	0.00	0.00	-
Ethane	30.07	0.00	0.00	0.00	0.000
Ethene	28.05	0.00	0.00	0.00	0.000
Propane	44.10	0.00	0.00	0.00	0.000
Propene	42.08	0.00	0.00	0.00	0.000
i-Butane	58.12	0.00	0.00	0.00	0.000
n-Butane	58.12	0.00	0.00	0.00	0.000
neo-Pentane		0.00	0.00	0.00	0.000
i-Pentane	72.15	0.00	0.00	0.00	0.000
n-Pentane	72.15	0.00	0.00	0.00	0.000
n-Hexane	86.18	0.00	0.00	0.00	0.000
Hexanes Plus	86.18	0.00	0.00	0.00	0.000
Totals		100.0	0.0	100.0	0.00

Specific Gravity, Calculated	0.9968	air = 1.0000	
Density, Calculated Kg/m3	1.2012	air = 1.205 Kg/m3	
Compressibility (Z) Factor (60°F, 1ATM)	0.9996		
MW of fuel gas, calculated (60°F, 1ATM)	28.45		
Gross Calorific Value			
BTU/ft³ dry	0.0		
BTU/ft³ wet	0.0		
Net Calorific Value			
BTU/ft³ dry	0.0	EPA 'F' Factor (60°F, 1ATM)	Cannot Calculate
BTU/ft³ wet	0.0		SDCF/MMBTU
Hydrogen Sulfide = NA ppm			

CHONS	Mole %	Wt%
Carbon	0.04	0.02
Hydrogen	0.00	0.00
Oxygen	21.44	23.77
Nitrogen	78.53	76.22
Sulfur	0.00	0.00

All results reported at 60°F and 14.696 psia.

* Normalized values — SDCF:Standard dry cubic feet

ND: None Detected — NA: Not Analyzed — G/MCF: Gallons/Thousand Cubic Feet

OILFIELD ENVIRONMENTAL & COMPLIANCE, INC.

Client:	Sage Environmental Consulting, LP	SAMPLE ID:	1503434-2
	4611 Bee Caves Road Suite 100	Date Sampled:	8/11/2015
	Austin, Texas 78746	Date Analyzed:	08/12/15 @ 1221
Attn:	David Ranum	Lab Contact:	J. Carstens
Facility:	Feather River AQMD	Meter:	-
Description:	TB 045A	Pressure:	- psig
Note:	CARB #1344	Temperature:	- °F

Gas Analysis by Chromatography - ASTM D 1945/3588

Component	MW	Mole %*	Kg-C/Kg-fuel*	Weight %*	G/MCF*
Oxygen	32.00	21.39	N/A	23.70	-
Nitrogen	28.01	78.58	N/A	76.25	-
Hydrogen	2.01	0.00	0.00	0.00	-
Carbon Dioxide	44.01	0.03	0.00	0.05	-
Carbon Monoxide	28.01	0.00	N/A	0.00	-
Methane	16.04	0.00	0.00	0.00	-
Ethane	30.07	0.00	0.00	0.00	0.000
Ethene	28.05	0.00	0.00	0.00	0.000
Propane	44.10	0.00	0.00	0.00	0.000
Propene	42.08	0.00	0.00	0.00	0.000
i-Butane	58.12	0.00	0.00	0.00	0.000
n-Butane	58.12	0.00	0.00	0.00	0.000
neo-Pentane		0.00	0.00	0.00	0.000
i-Pentane	72.15	0.00	0.00	0.00	0.000
n-Pentane	72.15	0.00	0.00	0.00	0.000
n-Hexane	86.18	0.00	0.00	0.00	0.000
Hexanes Plus	86.18	0.00	0.00	0.00	0.000
Totals		100.0	0.0	100.0	0.00

Specific Gravity, Calculated	0.9968	air = 1.0000	
Density, Calculated Kg/m3	1.2011	air = 1.205 Kg/m3	
Compressibility (Z) Factor (60°F, 1ATM)	0.9996		
MW of fuel gas, calculated (60°F, 1ATM)	28.45		
Gross Calorific Value			
BTU/ft³ dry	0.0		
BTU/ft³ wet	0.0		
Net Calorific Value			
BTU/ft³ dry	0.0	EPA 'F' Factor (60°F, 1ATM)	Cannot Calculate
BTU/ft³ wet	0.0		SDCF/MMBTU
Hydrogen Sulfide = NA ppm			

CHONS	Mole %	Wt%
Carbon	0.04	0.02
Hydrogen	0.00	0.00
Oxygen	21.41	23.74
Nitrogen	78.55	76.25
Sulfur	0.00	0.00

All results reported at 60°F and 14.696 psia.

* Normalized values — SDCF:Standard dry cubic feet

ND: None Detected — NA: Not Analyzed — G/MCF: Gallons/Thousand Cubic Feet

O I L F I E L D E N V I R O N M E N T A L & C O M P L I A N C E , I N C .

Client:	Sage Environmental Consulting, LP	SAMPLE ID:	1503463-1
	4611 Bee Caves Road Suite 100	Date Sampled:	8/12/2015
	Austin, Texas 78746	Date Analyzed:	08/13/15 @ 1013
Attn:	David Ranum	Lab Contact:	J. Carstens
Facility:	Feather River AQMD	Meter:	-
Description:	TB 046A	Pressure:	- psig
Note:	CARB #1344	Temperature:	- °F

Gas Analysis by Chromatography - ASTM D 1945/3588

Component	MW	Mole %*	Kg-C/Kg-fuel*	Weight %*	G/MCF*
Oxygen	32.00	21.19	N/A	23.50	-
Nitrogen	28.01	78.71	N/A	76.40	-
Hydrogen	2.01	0.00	0.00	0.00	-
Carbon Dioxide	44.01	0.04	0.00	0.06	-
Carbon Monoxide	28.01	0.00	N/A	0.00	-
Methane	16.04	0.06	0.00	0.03	-
Ethane	30.07	0.00	0.00	0.00	0.000
Ethene	28.05	0.00	0.00	0.00	0.000
Propane	44.10	0.00	0.00	0.00	0.000
Propene	42.08	0.00	0.00	0.00	0.000
i-Butane	58.12	0.00	0.00	0.00	0.000
n-Butane	58.12	0.00	0.00	0.00	0.000
neo-Pentane		0.00	0.00	0.00	0.000
i-Pentane	72.15	0.00	0.00	0.00	0.000
n-Pentane	72.15	0.00	0.00	0.00	0.000
n-Hexane	86.18	0.00	0.00	0.00	0.000
Hexanes Plus	86.18	0.00	0.00	0.00	0.000
Totals		100.0	0.0	100.0	0.00

Specific Gravity, Calculated	0.9963	air = 1.0000	
Density, Calculated Kg/m3	1.2006	air = 1.205 Kg/m3	
Compressibility (Z) Factor (60°F, 1ATM)	0.9996		
MW of fuel gas, calculated (60°F, 1ATM)	28.44		
Gross Calorific Value			
BTU/ft³ dry	0.6		
BTU/ft³ wet	0.6		
Net Calorific Value			
BTU/ft³ dry	0.5	EPA 'F' Factor (60°F, 1ATM)	1664595.7
BTU/ft³ wet	0.5		SDCF/MMBTU
Hydrogen Sulfide = NA ppm			

CHONS	Mole %	Wt%
Carbon	0.11	0.04
Hydrogen	0.12	0.01
Oxygen	21.20	23.54
Nitrogen	78.58	76.40
Sulfur	0.00	0.00

All results reported at 60°F and 14.696 psia.

* Normalized values — SDCF:Standard dry cubic feet

ND: None Detected — NA: Not Analyzed — G/MCF: Gallons/Thousand Cubic Feet

OILFIELD ENVIRONMENTAL & COMPLIANCE, INC.

Client:	Sage Environmental Consulting, LP	SAMPLE ID:	1503463-2
	4611 Bee Caves Road Suite 100	Date Sampled:	8/12/2015
	Austin, Texas 78746	Date Analyzed:	08/13/15 @ 1039
Attn:	David Ranum	Lab Contact:	J. Carstens
Facility:	Feather River AQMD	Meter:	-
Description:	TB 047A	Pressure:	- psig
Note:	CARB #1344	Temperature:	- °F

Gas Analysis by Chromatography - ASTM D 1945/3588

Component	MW	Mole %*	Kg-C/Kg-fuel*	Weight %*	G/MCF*
Oxygen	32.00	21.19	N/A	23.50	-
Nitrogen	28.01	78.77	N/A	76.45	-
Hydrogen	2.01	0.00	0.00	0.00	-
Carbon Dioxide	44.01	0.03	0.00	0.05	-
Carbon Monoxide	28.01	0.00	N/A	0.00	-
Methane	16.04	0.00	0.00	0.00	-
Ethane	30.07	0.00	0.00	0.00	0.000
Ethene	28.05	0.00	0.00	0.00	0.000
Propane	44.10	0.00	0.00	0.00	0.000
Propene	42.08	0.00	0.00	0.00	0.000
i-Butane	58.12	0.00	0.00	0.00	0.000
n-Butane	58.12	0.00	0.00	0.00	0.000
neo-Pentane		0.00	0.00	0.00	0.000
i-Pentane	72.15	0.00	0.00	0.00	0.000
n-Pentane	72.15	0.00	0.00	0.00	0.000
n-Hexane	86.18	0.00	0.00	0.00	0.000
Hexanes Plus	86.18	0.00	0.00	0.00	0.000
Totals		100.0	0.0	100.0	0.00

Specific Gravity, Calculated	0.9965	air = 1.0000	
Density, Calculated Kg/m3	1.2008	air = 1.205 Kg/m3	
Compressibility (Z) Factor (60°F, 1ATM)	0.9996		
MW of fuel gas, calculated (60°F, 1ATM)	28.44		
Gross Calorific Value			
BTU/ft³ dry	0.0		
BTU/ft³ wet	0.0		
Net Calorific Value			
BTU/ft³ dry	0.0	EPA 'F' Factor (60°F, 1ATM)	Cannot Calculate
BTU/ft³ wet	0.0		SDCF/MMBTU
Hydrogen Sulfide = NA ppm			

CHONS	Mole %	Wt%
Carbon	0.04	0.02
Hydrogen	0.00	0.00
Oxygen	21.22	23.53
Nitrogen	78.74	76.45
Sulfur	0.00	0.00

All results reported at 60°F and 14.696 psia.

* Normalized values — SDCF:Standard dry cubic feet

ND: None Detected — NA: Not Analyzed — G/MCF: Gallons/Thousand Cubic Feet

OILFIELD ENVIRONMENTAL & COMPLIANCE, INC.

Client:	Sage Environmental Consulting, LP	SAMPLE ID:	1503463-3
	4611 Bee Caves Road Suite 100	Date Sampled:	8/12/2015
	Austin, Texas 78746	Date Analyzed:	08/13/15 @ 1058
Attn:	David Ranum	Lab Contact:	J. Carstens
Facility:	Feather River AQMD	Meter:	-
Description:	TB 048A	Pressure:	- psig
Note:	CARB #1344	Temperature:	- ^{o}F

Gas Analysis by Chromatography - ASTM D 1945/3588

Component	MW	Mole %*	Kg-C/Kg-fuel*	Weight %*	G/MCF*
Oxygen	32.00	21.10	N/A	23.43	-
Nitrogen	28.01	78.46	N/A	76.28	-
Hydrogen	2.01	0.00	0.00	0.00	-
Carbon Dioxide	44.01	0.04	0.00	0.07	-
Carbon Monoxide	28.01	0.00	N/A	0.00	-
Methane	16.04	0.40	0.03	0.22	-
Ethane	30.07	0.00	0.00	0.00	0.000
Ethene	28.05	0.00	0.00	0.00	0.000
Propane	44.10	0.00	0.00	0.00	0.000
Propene	42.08	0.00	0.00	0.00	0.000
i-Butane	58.12	0.00	0.00	0.00	0.000
n-Butane	58.12	0.00	0.00	0.00	0.000
neo-Pentane		0.00	0.00	0.00	0.000
i-Pentane	72.15	0.00	0.00	0.00	0.000
n-Pentane	72.15	0.00	0.00	0.00	0.000
n-Hexane	86.18	0.00	0.00	0.00	0.000
Hexanes Plus	86.18	0.00	0.00	0.00	0.000
Totals		100.0	0.0	100.0	0.00

Specific Gravity, Calculated	0.9948	air = 1.0000	
Density, Calculated Kg/m3	1.1988	air = 1.205 Kg/m3	
Compressibility (Z) Factor (60^{o}F, 1ATM)	0.9996		
MW of fuel gas, calculated (60^{o}F, 1ATM)	28.39		
Gross Calorific Value			
BTU/ft^3 dry	4.0		
BTU/ft^3 wet	4.0		
Net Calorific Value			
BTU/ft^3 dry	3.6	EPA 'F' Factor (60^{o}F, 1ATM)	254811.0
BTU/ft^3 wet	3.6		SDCF/MMBTU
Hydrogen Sulfide = NA ppm			

CHONS	Mole %	Wt%
Carbon	0.45	0.19
Hydrogen	0.79	0.06
Oxygen	20.96	23.48
Nitrogen	77.80	76.28
Sulfur	0.00	0.00

All results reported at 60^{o}F and 14.696 psia.

* Normalized values

SDCF:Standard dry cubic feet

ND: None Detected NA: Not Analyzed

G/MCF: Gallons/Thousand Cubic Feet

OILFIELD ENVIRONMENTAL & COMPLIANCE, INC.

Client:	Sage Environmental Consulting, LP	SAMPLE ID:	1503485-1
	4611 Bee Caves Road Suite 100	Date Sampled:	8/13/2015
	Austin, Texas 78746	Date Analyzed:	08/14/15 @ 1130
Attn:	David Ranum	Lab Contact:	J. Carstens
Facility:	Feather River AQMD	Meter:	-
Description:	TB 049A	Pressure:	- psig
Note:	CARB #1344	Temperature:	- ^{o}F

Gas Analysis by Chromatography - ASTM D 1945/3588

Component	MW	Mole %*	Kg-C/Kg-fuel*	Weight %*	G/MCF*
Oxygen	32.00	21.29	N/A	23.61	-
Nitrogen	28.01	78.60	N/A	76.30	-
Hydrogen	2.01	0.00	0.00	0.00	-
Carbon Dioxide	44.01	0.03	0.00	0.05	-
Carbon Monoxide	28.01	0.00	N/A	0.00	-
Methane	16.04	0.08	0.01	0.04	-
Ethane	30.07	0.00	0.00	0.00	0.000
Ethene	28.05	0.00	0.00	0.00	0.000
Propane	44.10	0.00	0.00	0.00	0.000
Propene	42.08	0.00	0.00	0.00	0.000
i-Butane	58.12	0.00	0.00	0.00	0.000
n-Butane	58.12	0.00	0.00	0.00	0.000
neo-Pentane		0.00	0.00	0.00	0.000
i-Pentane	72.15	0.00	0.00	0.00	0.000
n-Pentane	72.15	0.00	0.00	0.00	0.000
n-Hexane	86.18	0.00	0.00	0.00	0.000
Hexanes Plus	86.18	0.00	0.00	0.00	0.000
Totals		100.0	0.0	100.0	0.00

Specific Gravity, Calculated	0.9964	air = 1.0000	
Density, Calculated Kg/m3	1.2006	air = 1.205 Kg/m3	
Compressibility (Z) Factor (60^{o}F, 1ATM)	0.9996		
MW of fuel gas, calculated (60^{o}F, 1ATM)	28.44		
Gross Calorific Value			
BTU/ft^3 dry	0.8		
BTU/ft^3 wet	0.8		
Net Calorific Value			
BTU/ft^3 dry	0.7	EPA 'F' Factor (60^{o}F, 1ATM)	1299805.7
BTU/ft^3 wet	0.7	SDCF/MMBTU	
Hydrogen Sulfide = NA ppm			

CHONS	Mole %	Wt%
Carbon	0.12	0.05
Hydrogen	0.15	0.01
Oxygen	21.28	23.64
Nitrogen	78.45	76.30
Sulfur	0.00	0.00

All results reported at 60^{o}F and 14.696 psia.

* Normalized values

SDCF:Standard dry cubic feet

ND: None Detected NA: Not Analyzed

G/MCF: Gallons/Thousand Cubic Feet

OILFIELD ENVIRONMENTAL & COMPLIANCE, INC.

Client:	Sage Environmental Consulting, LP	SAMPLE ID:	1503485-2
	4611 Bee Caves Road Suite 100	Date Sampled:	8/13/2015
	Austin, Texas 78746	Date Analyzed:	08/14/15 @ 1226
Attn:	David Ranum	Lab Contact:	J. Carstens
Facility:	Feather River AQMD	Meter:	-
Description:	TB 050A	Pressure:	- psig
Note:	CARB #1344	Temperature:	- ^{o}F

Gas Analysis by Chromatography - ASTM D 1945/3588

Component	MW	Mole %*	Kg-C/Kg-fuel*	Weight %*	G/MCF*
Oxygen	32.00	21.31	N/A	23.62	-
Nitrogen	28.01	78.66	N/A	76.32	-
Hydrogen	2.01	0.00	0.00	0.00	-
Carbon Dioxide	44.01	0.03	0.00	0.05	-
Carbon Monoxide	28.01	0.00	N/A	0.00	-
Methane	16.04	0.00	0.00	0.00	-
Ethane	30.07	0.00	0.00	0.00	0.000
Ethene	28.05	0.00	0.00	0.00	0.000
Propane	44.10	0.00	0.00	0.00	0.000
Propene	42.08	0.00	0.00	0.00	0.000
i-Butane	58.12	0.00	0.00	0.00	0.000
n-Butane	58.12	0.00	0.00	0.00	0.000
neo-Pentane		0.00	0.00	0.00	0.000
i-Pentane	72.15	0.00	0.00	0.00	0.000
n-Pentane	72.15	0.00	0.00	0.00	0.000
n-Hexane	86.18	0.00	0.00	0.00	0.000
Hexanes Plus	86.18	0.00	0.00	0.00	0.000
Totals		100.0	0.0	100.0	0.00

Specific Gravity, Calculated	0.9967	air = 1.0000	
Density, Calculated Kg/m3	1.2010	air = 1.205 Kg/m3	
Compressibility (Z) Factor (60^{o}F, 1ATM)	0.9996		
MW of fuel gas, calculated (60^{o}F, 1ATM)	28.45		
Gross Calorific Value			
BTU/ft^3 dry	0.0		
BTU/ft^3 wet	0.0		
Net Calorific Value			
BTU/ft^3 dry	0.0	EPA 'F' Factor (60^{o}F, 1ATM)	Cannot Calculate
BTU/ft^3 wet	0.0		SDCF/MMBTU
Hydrogen Sulfide = NA ppm			

CHONS	Mole %	Wt%
Carbon	0.04	0.02
Hydrogen	0.00	0.00
Oxygen	21.34	23.66
Nitrogen	78.62	76.32
Sulfur	0.00	0.00

All results reported at 60^{o}F and 14.696 psia.

* Normalized values

SDCF:Standard dry cubic feet

ND: None Detected NA: Not Analyzed

G/MCF: Gallons/Thousand Cubic Feet

OILFIELD ENVIRONMENTAL & COMPLIANCE, INC.

Client:	Sage Environmental Consulting, LP	SAMPLE ID:	1503504-1
	4611 Bee Caves Road Suite 100	Date Sampled:	8/14/2015
	Austin, Texas 78746	Date Analyzed:	08/15/15 @ 1132
Attn:	David Ranum	Lab Contact:	J. Carstens
Facility:	Feather River AQMD	Meter:	-
Description:	TB 051A	Pressure:	- psig
Note:	CARB #1344	Temperature:	- °F

Gas Analysis by Chromatography - ASTM D 1945/3588

Component	MW	Mole %*	Kg-C/Kg-fuel*	Weight %*	G/MCF*
Oxygen	32.00	21.39	N/A	23.71	-
Nitrogen	28.01	78.58	N/A	76.25	-
Hydrogen	2.01	0.00	0.00	0.00	-
Carbon Dioxide	44.01	0.03	0.00	0.05	-
Carbon Monoxide	28.01	0.00	N/A	0.00	-
Methane	16.04	0.00	0.00	0.00	-
Ethane	30.07	0.00	0.00	0.00	0.000
Ethene	28.05	0.00	0.00	0.00	0.000
Propane	44.10	0.00	0.00	0.00	0.000
Propene	42.08	0.00	0.00	0.00	0.000
i-Butane	58.12	0.00	0.00	0.00	0.000
n-Butane	58.12	0.00	0.00	0.00	0.000
neo-Pentane		0.00	0.00	0.00	0.000
i-Pentane	72.15	0.00	0.00	0.00	0.000
n-Pentane	72.15	0.00	0.00	0.00	0.000
n-Hexane	86.18	0.00	0.00	0.00	0.000
Hexanes Plus	86.18	0.00	0.00	0.00	0.000
Totals		100.0	0.0	100.0	0.00

Specific Gravity, Calculated	0.9968	air = 1.0000	
Density, Calculated Kg/m3	1.2011	air = 1.205 Kg/m3	
Compressibility (Z) Factor (60°F, 1ATM)	0.9996		
MW of fuel gas, calculated (60°F, 1ATM)	28.45		
Gross Calorific Value			
BTU/ft³ dry	0.0		
BTU/ft³ wet	0.0		
Net Calorific Value			
BTU/ft³ dry	0.0	EPA 'F' Factor (60°F, 1ATM)	Cannot Calculate
BTU/ft³ wet	0.0		SDCF/MMBTU
Hydrogen Sulfide = NA ppm			

CHONS	Mole %	Wt%
Carbon	0.04	0.02
Hydrogen	0.00	0.00
Oxygen	21.41	23.74
Nitrogen	78.55	76.25
Sulfur	0.00	0.00

All results reported at 60°F and 14.696 psia.

* Normalized values — SDCF:Standard dry cubic feet

ND: None Detected — NA: Not Analyzed — G/MCF: Gallons/Thousand Cubic Feet

OILFIELD ENVIRONMENTAL & COMPLIANCE, INC.

Client:	Sage Environmental Consulting, LP	SAMPLE ID:	1503504-2
	4611 Bee Caves Road Suite 100	Date Sampled:	8/14/2015
	Austin, Texas 78746	Date Analyzed:	08/15/15 @ 1201
Attn:	David Ranum	Lab Contact:	J. Carstens
Facility:	Feather River AQMD	Meter:	-
Description:	TB 052A	Pressure:	- psig
Note:	CARB #1344	Temperature:	- °F

Gas Analysis by Chromatography - ASTM D 1945/3588

Component	MW	Mole %*	Kg-C/Kg-fuel*	Weight %*	G/MCF*
Oxygen	32.00	21.16	N/A	23.55	-
Nitrogen	28.01	77.86	N/A	75.88	-
Hydrogen	2.01	0.00	0.00	0.00	-
Carbon Dioxide	44.01	0.02	0.00	0.03	-
Carbon Monoxide	28.01	0.00	N/A	0.00	-
Methane	16.04	0.96	0.08	0.54	-
Ethane	30.07	0.00	0.00	0.00	0.000
Ethene	28.05	0.00	0.00	0.00	0.000
Propane	44.10	0.00	0.00	0.00	0.000
Propene	42.08	0.00	0.00	0.00	0.000
i-Butane	58.12	0.00	0.00	0.00	0.000
n-Butane	58.12	0.00	0.00	0.00	0.000
neo-Pentane		0.00	0.00	0.00	0.000
i-Pentane	72.15	0.00	0.00	0.00	0.000
n-Pentane	72.15	0.00	0.00	0.00	0.000
n-Hexane	86.18	0.00	0.00	0.00	0.000
Hexanes Plus	86.18	0.00	0.00	0.00	0.000
Totals		100.0	0.1	100.0	0.00

Specific Gravity, Calculated	0.9924	air = 1.0000	
Density, Calculated Kg/m3	1.1959	air = 1.205 Kg/m3	
Compressibility (Z) Factor (60°F, 1ATM)	0.9996		
MW of fuel gas, calculated (60°F, 1ATM)	28.33		
Gross Calorific Value			
BTU/ft^3 dry	9.7		
BTU/ft^3 wet	9.5		
Net Calorific Value			
BTU/ft^3 dry	8.7	EPA 'F' Factor (60°F, 1ATM)	110596.4
BTU/ft^3 wet	8.6		SDCF/MMBTU
Hydrogen Sulfide = NA ppm			

CHONS	Mole %	Wt%
Carbon	0.97	0.41
Hydrogen	1.88	0.13
Oxygen	20.77	23.57
Nitrogen	76.38	75.88
Sulfur	0.00	0.00

All results reported at 60°F and 14.696 psia.

* Normalized values

SDCF:Standard dry cubic feet

ND: None Detected NA: Not Analyzed

G/MCF: Gallons/Thousand Cubic Feet

OILFIELD ENVIRONMENTAL & COMPLIANCE, INC.

Client:	Sage Environmental Consulting, LP	SAMPLE ID:	1503504-3
	4611 Bee Caves Road Suite 100	Date Sampled:	8/14/2015
	Austin, Texas 78746	Date Analyzed:	08/15/15 @ 1229
Attn:	David Ranum	Lab Contact:	J. Carstens
Facility:	Feather River AQMD	Meter:	-
Description:	TB 053A	Pressure:	- psig
Note:	CARB #1344	Temperature:	- °F

Gas Analysis by Chromatography - ASTM D 1945/3588

Component	MW	Mole %*	Kg-C/Kg-fuel*	Weight %*	G/MCF*
Oxygen	32.00	21.17	N/A	23.53	-
Nitrogen	28.01	78.28	N/A	76.14	-
Hydrogen	2.01	0.00	0.00	0.00	-
Carbon Dioxide	44.01	0.02	0.00	0.04	-
Carbon Monoxide	28.01	0.00	N/A	0.00	-
Methane	16.04	0.53	0.04	0.29	-
Ethane	30.07	0.00	0.00	0.00	0.000
Ethene	28.05	0.00	0.00	0.00	0.000
Propane	44.10	0.00	0.00	0.00	0.000
Propene	42.08	0.00	0.00	0.00	0.000
i-Butane	58.12	0.00	0.00	0.00	0.000
n-Butane	58.12	0.00	0.00	0.00	0.000
neo-Pentane		0.00	0.00	0.00	0.000
i-Pentane	72.15	0.00	0.00	0.00	0.000
n-Pentane	72.15	0.00	0.00	0.00	0.000
n-Hexane	86.18	0.00	0.00	0.00	0.000
Hexanes Plus	86.18	0.00	0.00	0.00	0.000
Totals		100.0	0.0	100.0	0.00

Specific Gravity, Calculated	0.9943	air = 1.0000	
Density, Calculated Kg/m3	1.1981	air = 1.205 Kg/m3	
Compressibility (Z) Factor (60°F, 1ATM)	0.9996		
MW of fuel gas, calculated (60°F, 1ATM)	28.38		
Gross Calorific Value			
BTU/ft^3 dry	5.3		
BTU/ft^3 wet	5.2		
Net Calorific Value			
BTU/ft^3 dry	4.8	EPA 'F' Factor (60°F, 1ATM)	195886.6
BTU/ft^3 wet	4.7		SDCF/MMBTU
Hydrogen Sulfide = NA ppm			

CHONS	Mole %	Wt%
Carbon	0.55	0.23
Hydrogen	1.04	0.07
Oxygen	20.97	23.55
Nitrogen	77.44	76.14
Sulfur	0.00	0.00

All results reported at 60°F and 14.696 psia.

* Normalized values

SDCF:Standard dry cubic feet

ND: None Detected NA: Not Analyzed

G/MCF: Gallons/Thousand Cubic Feet