



California Air Resources Board

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

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Feather River Air Quality Management District
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LIST OF ACRONYMS

% REC	Percent Recovery
ASTM	American Society for Testing and Materials
C	Degrees Centigrade
C ₂ H 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 ₂ S	Hydrogen Sulfide
ID	Identification
inHg	Inches of Mercury
IR	Infrared
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 the Section 2 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					Sum
	0 - < 100	100 - < 1K	1K - < 10K	10K - < 100K	>= 100K	
Gas Service						
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}
Valves	Leak Rate (kg/hr) = 4.633E-11 x (SV) ^{1.332}
Connectors	Leak Rate (kg/hr) = 9.499E-11 x (SV) ^{1.2397}
Flanges	Leak Rate (kg/hr) = 9.074E-08 x (SV) ^{0.6415}
Connectors & Flanges	Leak Rate (kg/hr) = 1.946E-09 x (SV) ^{0.8989}
OELs	Leak Rate (kg/hr) = 1.492E-10 x (SV) ^{1.4328}
Other	Leak Rate (kg/hr) = 6.351E-12 x (SV) ^{1.7547}

¹ SV = Screening value in ppmv

² These correlations predict methane-equivalent Total Organic Compound (TOC) emission rates.

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:

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

Methane concentrations 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 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.

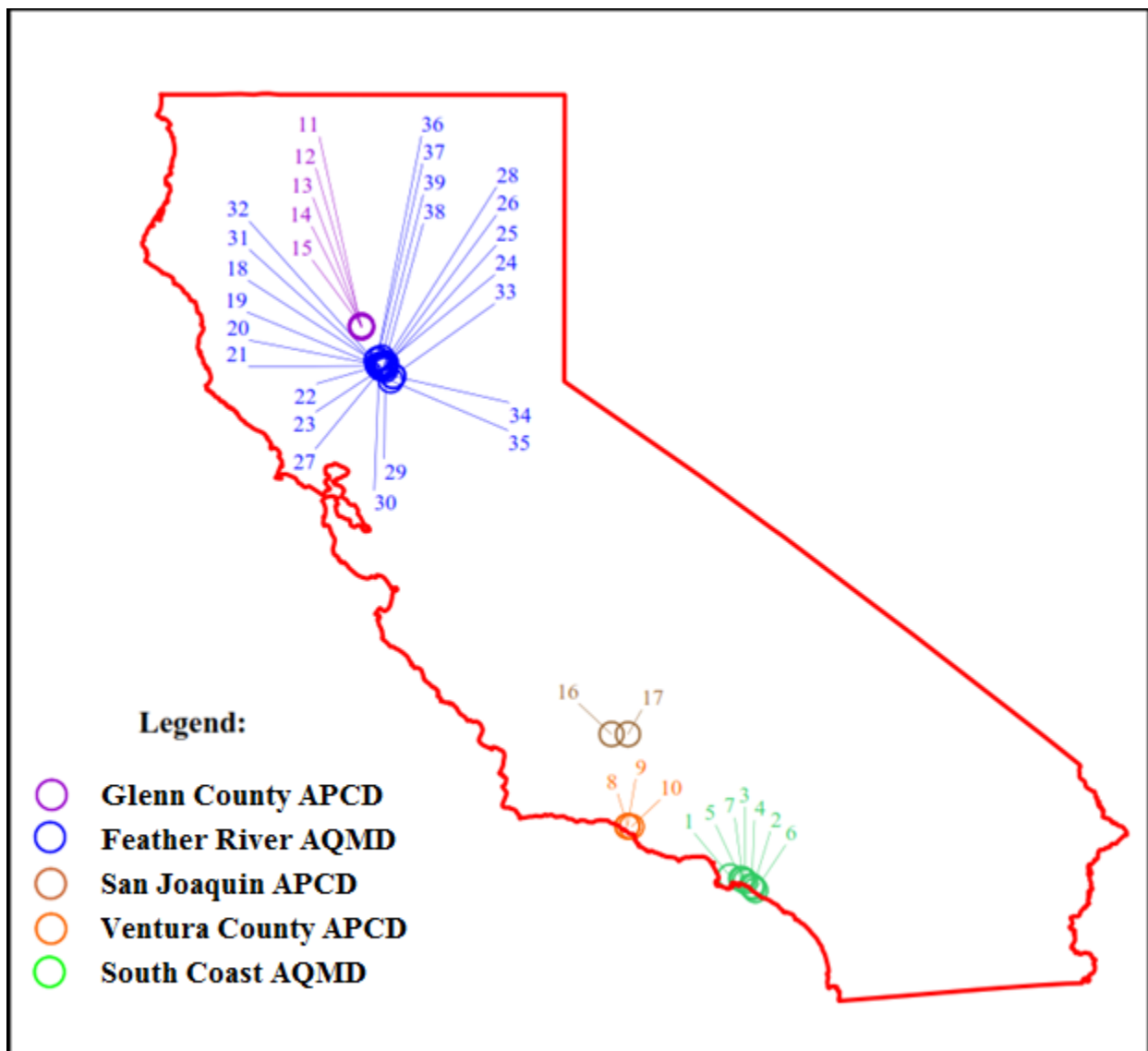
Section 5.0 of this report includes the results of the project's quality control checks.

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 the Section 2 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 ppm¹. 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 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	<ul style="list-style-type: none"> • Date and Time • Battery voltage • Leak rate in cfm • Sampling flow rate in cfm 	<ul style="list-style-type: none"> • 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	<ul style="list-style-type: none"> • Sampling flow rate • Battery voltage 	<ul style="list-style-type: none"> • Sample gas concentration • Background gas concentration
Calculated Values	<ul style="list-style-type: none"> • Leak concentration corrected for background gas level • Leak rate • Percent difference between leak rate measurements #1 and #2 	
Measurable Leak Rate	<ul style="list-style-type: none"> • 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	<ul style="list-style-type: none"> • Maximum • Operating Flow Points • Measurement Method • Accuracy 	<ul style="list-style-type: none"> • 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	<ul style="list-style-type: none"> • Detection Method • Range: Catalytic oxidation • Range: Thermal conductivity • Accuracy 	<ul style="list-style-type: none"> • 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	<ul style="list-style-type: none"> • Voltage4.8 V, max. • Recharge Time8 to 10 hrs. 	<ul style="list-style-type: none"> • 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 Sampler².

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 Sampler test were averaged, except when they differed by more than 10%. In those cases, the higher of the two Hi Flow measurements was used.

Recent studies have shown the Hi-Flow Sampler to give erroneous readings resulting in underestimating natural gas emission rates. A recent article from the Journal of the Air & Waste Management Association (J Air Waste Manag Assoc. 2015 Jul;65(7):856-62. Sensor transition failure in the high flow sampler: Implications for methane emission inventories of natural gas infrastructure) has found that detector switching failure has been observed when calibration is more than two weeks old, firmware is out of date, and when the composition of natural gas is less than 91% methane. To avoid any possible misreading from the Hi Flow Sampler in this study, calibration was performed daily. In addition, the firmware was up to date, and the

² Bacharach, Inc. (2015). *Hi Flow® Sampler for Natural Gas Leak Rate Measurement*. Rev. 7. Heath Consultants.

components tested were at gas processing plants and non-associated gas wells, both of which typically are handling natural gas with above 90% methane.

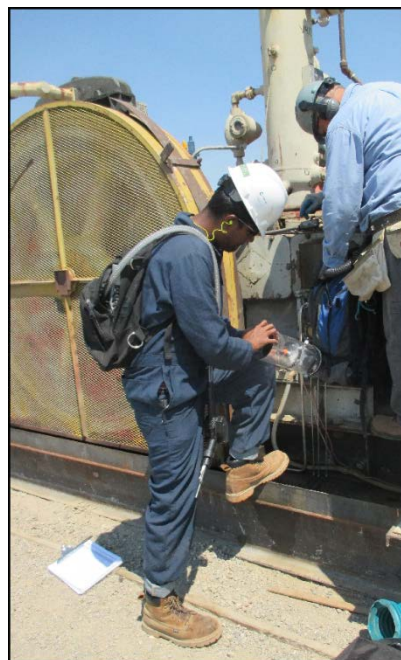
A characteristic of the Hi Flow Sampler is that it only displays leak concentrations in percentages. For example, if the sample stream contains less than one percent (1%) methane, then zero (0) % readings are displayed on the Hi Flow Sampler's controller. In such instances, the TVA was used to record the methane concentration in ppm at the Sampler's exhaust port. The resulting TVA concentration was then converted to a percentage³ 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 (O₂), nitrogen (N₂), carbon monoxide (CO), carbon dioxide (CO₂), methane (CH₄), ethane (C₂H₆) 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

³ 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:

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

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:

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

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)
- 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/m³)
- CFM_{std} = Standardized volumetric flow rate (ft³/min)
- CF = Conversion factor = 3.75E-06 [(1 m³/35.32147 ft³) × 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.

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

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*⁴ (*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.

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

Natural Gas Leak Concentration Ranges →	0<100 ppm	100<1,000 Ppm	1,000<10,000 ppm	10,000<100,000 ppm	≥100,000 ppm
Component Type ↓					
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

⁴ *Protocol for Equipment Leak Emission Estimates*, EPA-453/R-95-017, November 1995.

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:

$$\text{Log}_{10} (\text{Leak Rate, kg/hr, as methane}) = \mathbf{b}_0 + \mathbf{b}_1 \times \text{Log}_{10} (\text{Monitored Leak Concentration, ppmv as methane}).$$

3. This equation is transformed by using the calculated Scale Bias Correction Factor (SBCF), where:

$$\text{Leak Rate, kg/hr, as methane} = \text{SBCF} \times 10^{\mathbf{b}_0} \times (\text{Monitored Leak Concentration, ppmv as methane})^{\mathbf{b}_1}.$$

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

$$\text{Leak Rate, kg/hr, as methane} = C1 \times (\text{Monitored Leak Concentration, ppmv as methane})^{\mathbf{b}_1},$$

$$\text{Where } C1 = \text{SBCF} \times 10^{\mathbf{b}_0}.$$

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 Appendices C1 and C2.

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 were detected in 10% or more of the samples. Table 2-3 identifies these top eleven (11) recurring compounds together with the analytical method used to detect them.

**Table 2-3
Frequently Occurring Compounds⁵**

Recurring Analytes	Analytical Method
Methane	ASTM 1945/3588
Hexane	EPA Method TO-15
Cyclohexane	EPA Method TO-15
Heptane	EPA Method TO-15
Toluene	EPA Method TO-15
Benzene	EPA Method TO-15
Xylenes (total)	EPA Method TO-15
Ethanol	EPA Method TO-15
Ethylbenzene	EPA Method TO-15
Isopropyl alcohol	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. 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 to methane⁶ 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

⁵ Analytes detected in more than 10% of the samples.

⁶ 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).

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 a correlation equation and not for the development of emission factors. As such, they do not account for super-emitters, and once the matrix was full, any additional leaks detected were discarded.

**Table 2-4
Completed Test Matrix**

Component Type in Gas Service	EPA Method 21 TVA Reading, ppmv CH ₄					Sum
	0 - < 100	100 - < 1K	1K - < 10K	10K - < 100K	>= 100K	
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	12	2.991	-10.815	1.332	0.6155
Connectors	37	2.390	-10.403	1.2397	0.6158
Flanges	22	6.470	-7.8531	0.6415	0.2
Connectors & Flanges	59	1.731	-8.9491	0.8989	0.3883
OELs	34	3.204	-10.332	1.4328	0.748
Other	28	3.889	-11.77	1.754	0.6451
N = Number of Samples SBCF = Scale Bias Correction Factor 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 0.2, and the combined group of Connectors and Flanges which had an r^2 value of 0.3883, regression coefficient values for the rest of the component types ranged from 0.6451 for “Other” component types to 0.748 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 0.3883.

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 25°C 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 measurements collected in this study were meant to fill in a matrix in order to develop a correlation equation and not for the development of emission factors. As such, they do not account for super-emitters, and once the matrix was full, any additional leaks detected were discarded.
- 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 facilities.
- 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 equations in this 2015 CARB study predict methane-equivalent total hydrocarbon emission rates for components 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 (kg/hr) ⁴	
	Correlation ^{1,2,3}	< 10,000 ppmv	≥ 10,000 ppmv
Valves	Leak Rate (kg/hr) = 4.633E-11 x (SV) ^{1.332}	3.50E-05	1.39E-01
Connectors	Leak Rate (kg/hr) = 9.499E-11 x (SV) ^{1.2397}	1.20E-05	2.59E-02
Flanges	Leak Rate (kg/hr) = 9.074E-08 x (SV) ^{0.6415}	2.80E-05	6.10E-02
Connectors & Flanges	Leak Rate (kg/hr) = 1.946E-09 x (SV) ^{0.8989}		
OELs	Leak Rate (kg/hr) = 1.492E-10 x (SV) ^{1.4328}	2.40E-05	5.49E-02
Other	Leak Rate (kg/hr) = 6.351E-12 x (SV) ^{1.7547}	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

b⁰ and b¹ are the slope and intercept of the log-log 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.

Using the emission equations and factors in Table 2-6 and the midpoints of the sample plan screening concentrations, the predicted emissions (kg/hr) are provided in Table 2-7 for this study (i.e. 2015 CARB).

Table 2-7
Predicted Emissions for Various Screening Concentrations

Component Type (Gas Service only)	Method 21 Leak Concentration Value (ppmv)	Predicted Total Organic Compounds Emissions from Leaking Equipment, (kg/hr, as methane)
Valves	50	8.49E-09
	500	1.82E-07
	5,000	3.92E-06
	50,000	8.41E-05
	500,000	1.81E-03
Connectors	50	1.21E-08
	500	2.10E-07
	5,000	3.64E-06
	50,000	6.32E-05
	500,000	1.10E-04

Table 2-7 (Continued)
Predicted Emissions for Various Screening Concentrations

Component Type (Gas Service only)	Method 21 Leak Concentration Value (ppmv)	Predicted Total Organic Compounds Emissions from Leaking Equipment, (kg/hr, as methane)
Flanges	50	1.12E-06
	500	4.89E-06
	5,000	2.14E-05
	50,000	9.38E-05
	500,000	4.11E-04
Connectors & Flanges	50	6.55E-08
	500	5.19E-07
	5,000	4.11E-06
	50,000	3.26E-05
	500,000	2.58E-04
OELs	50	4.05E-08
	500	1.10E-07
	5,000	2.98E-05
	50,000	8.06E-04
	500,000	2.18E-02
Other	50	6.31E-09
	500	3.58E-07
	5,000	2.03E-05
	50,000	1.15E-03
	500,000	6.54E-02

Figure 2-7 displays the predicted methane-equivalent emission rate values as a function of the leak concentration for the components monitored in this study (note that connectors and flanges are represented as separate groups and that the flange results are based upon an incomplete test matrix);

Note that the x and y axis of the graph are in log form to better display the results.

Supporting documentation is provided in the Section 2 Appendices A, B, C, D, and E of this report:

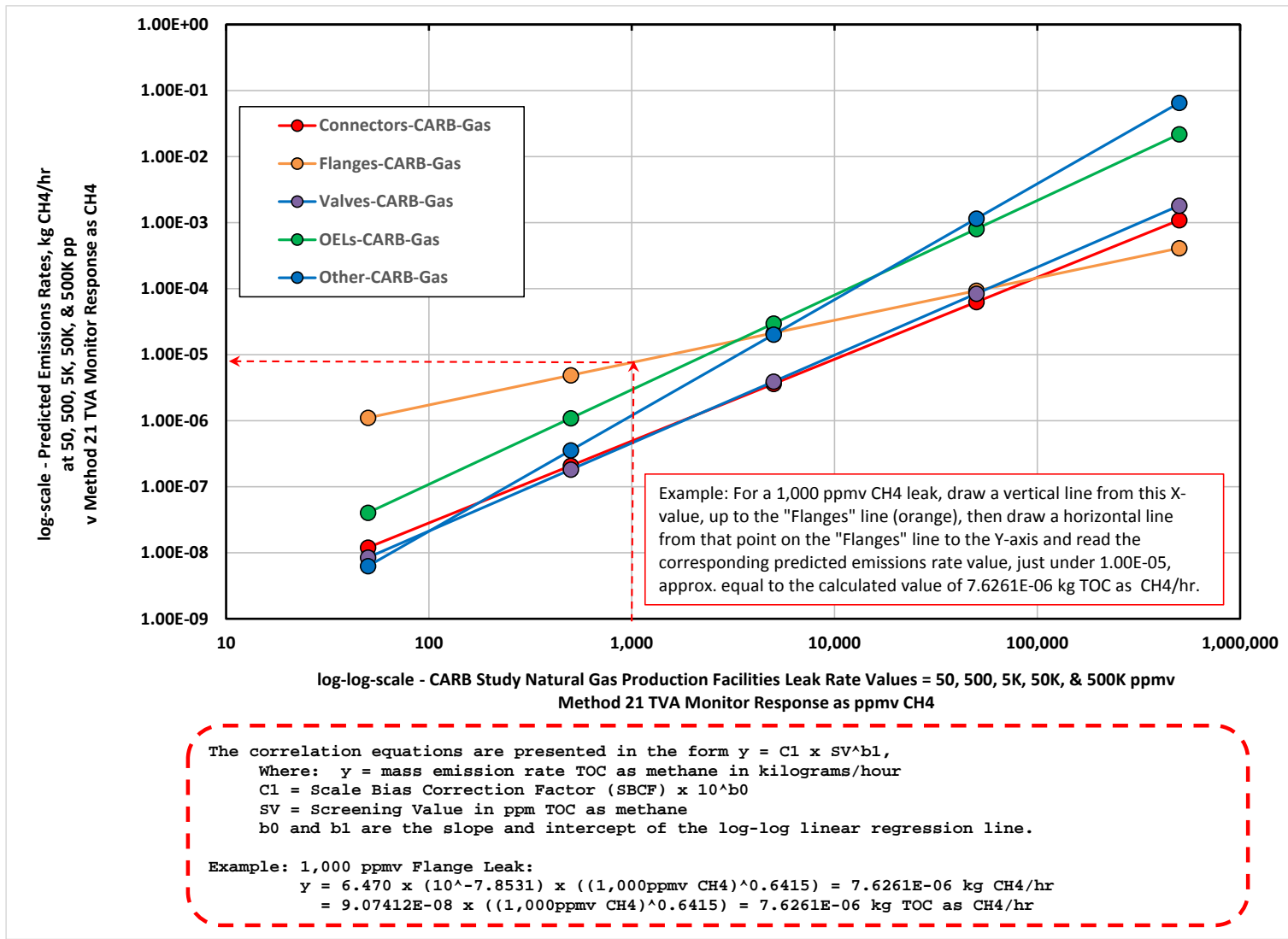
- Section 2 Appendix A
 - Field and Lab Data Calculations;
- Section 2 Appendix B Figures
 - Figure B-1. Log₁₀-Log₁₀ Linear Correlation Plot of Mass Emissions Rates vs. Leaking Equipment Concentrations as Methane for Connectors in Gas Service;
 - Figure B-2. Log₁₀-Log₁₀ Linear Correlation Plot of Mass Emissions Rates vs. Leaking Equipment Concentrations as Methane - Flanges in Gas Service;

- Figure B-3. Log₁₀-Log₁₀ Linear Correlation Plot of Mass Emissions Rates vs. Leaking Equipment Concentrations as Methane for Connectors and Flanges in Gas Service;
- Figure B-4. Log₁₀-Log₁₀ Linear Correlation Plot of Mass Emissions Rates vs. Leaking Equipment Concentrations as Methane - OELs in Gas Service;
- Figure B-5. Log₁₀-Log₁₀ Linear Correlation Plot of Mass Emissions Rates vs. Leaking Equipment Concentrations as Methane - Other Misc. Components in Gas Service; *and*
- Figure B-6. Log₁₀-Log₁₀ Linear Correlation Plot of Mass Emissions Rates vs. Leaking Equipment Concentrations as Methane - Valves in Gas Service.

- Section 2 Appendix C
 - Example Calculation of MSE and SBCF;
- Section 2 Appendix D
 - Frequencies and Descriptive Statistics for Measured Concentrations and Calculated Emissions Rates for Components in Gas Service; *and*
- Section 2 Appendix E
 - Average Emission Rates for Components in Liquid Service.

**Figure 2-7
Project Correlations by Component Type**

Log-Log Scale Plot of Predicted CARB Study Emissions Rates as Methane vs. Monitored Leak Concentrations for Components in Gas Service



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 (O₂), Hydrogen Sulfide (H₂S), Carbon Monoxide (CO) and Methane (CH₄) 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 1 Specifications**

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:
¹Under 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.
²All 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:

- ¹The IR Camera is considered an acceptable alternative to Method 21 by EPA and several states.
- ²The TVA requires calibration with one or more methane standards having a certified accuracy of $\pm 2\%$.
- ³The 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.
- ⁴The RMLD indicates concentration in ppm-meters.
- ⁵For the RMLD, Picarro Surveyor and IR camera, detection is near-instantaneous.
- ⁶500,000 ppm with dilution probe.
- ⁷Flame Ionization Detector/Photo Ionization Detector.
- ⁸Tunable Diode Laser Absorption Spectroscopy
- ⁹Typical for field conditions – lower concentrations are detectable with the camera depending upon operator experience and environmental conditions.
- ¹⁰The TVA's FID uses hydrogen gas for fuel.
- ¹¹The 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 (ppm)	RKI Eagle (ppm)	COSMOS (ppm)	σ (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	>11,000 ¹	1414
	48	Gate Valve	>50,000 ³	>50,000 ²	>11,000 ¹	--
	49	Controller	>50,000 ³	>50,000 ²	>11,000 ¹	--

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

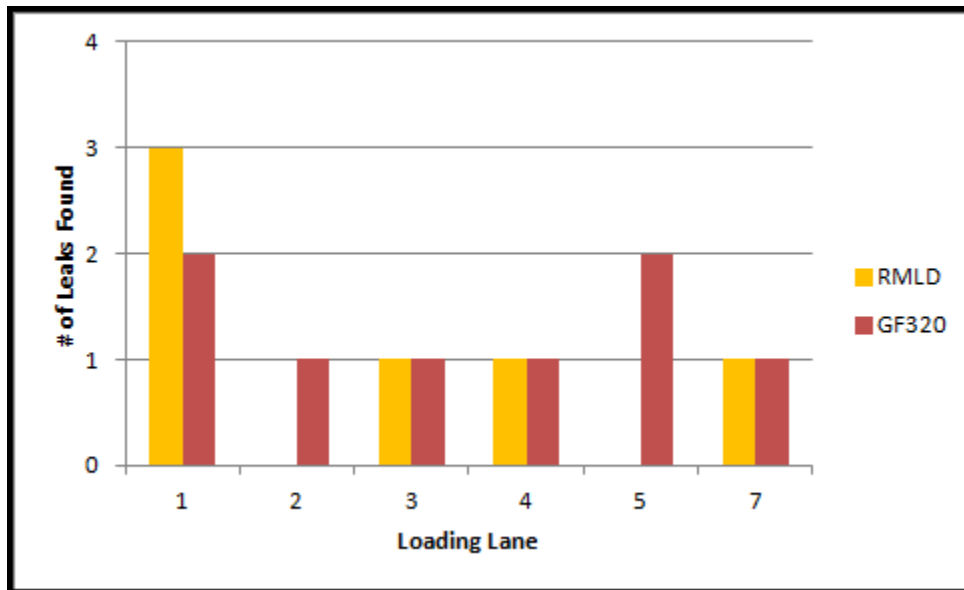
3.8.4 Evaluation #3: Comparative Monitoring (RMLD, IR Camera)

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)

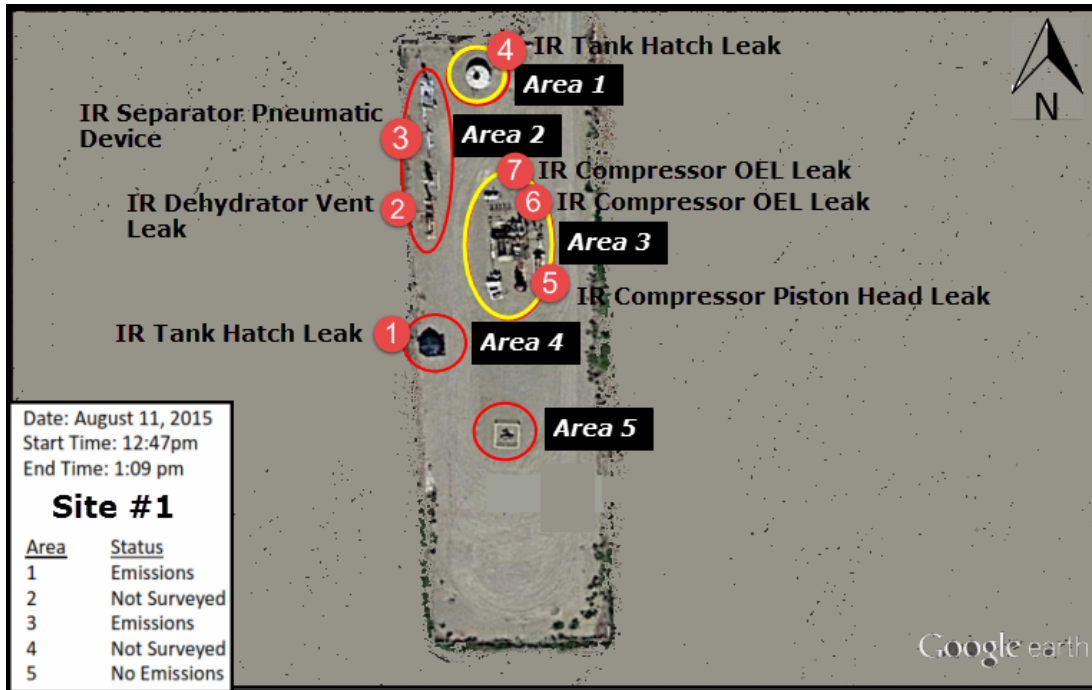
An evaluation of the IR Camera and the Picarro Surveyor was carried out on August 11th, 12th and 13th at four natural gas well sites. The IR Camera operator and the Picarro Surveyor operator conducted VOC monitoring independently and at separate sites with neither informed of the other’s results. Table 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.

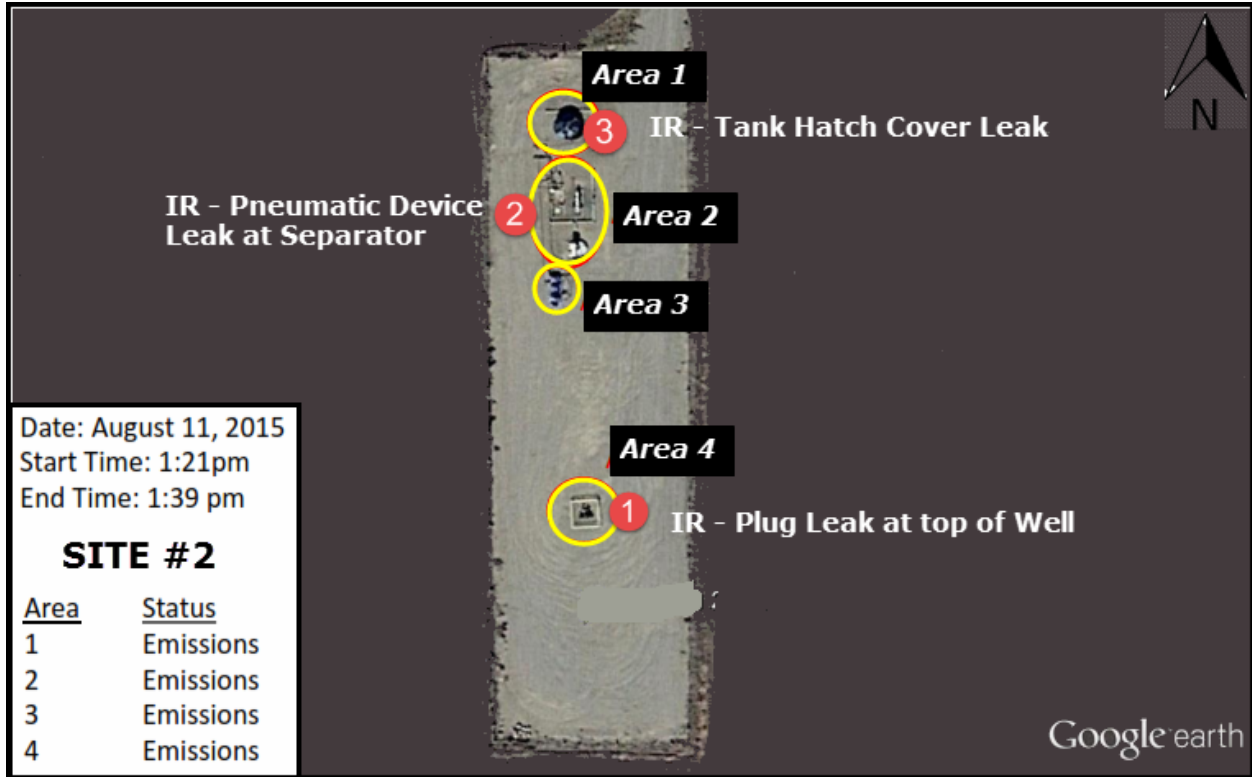
Site #1 was imaged with the IR Camera on the morning of the following day on August 12, 2015, again under low wind conditions. Seven equipment leaks (indicated by numbered red circles) were identified with the IR Camera between 09:21 and 09:40: one from Area #1, two from Area 2, three from Area 3 and 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).

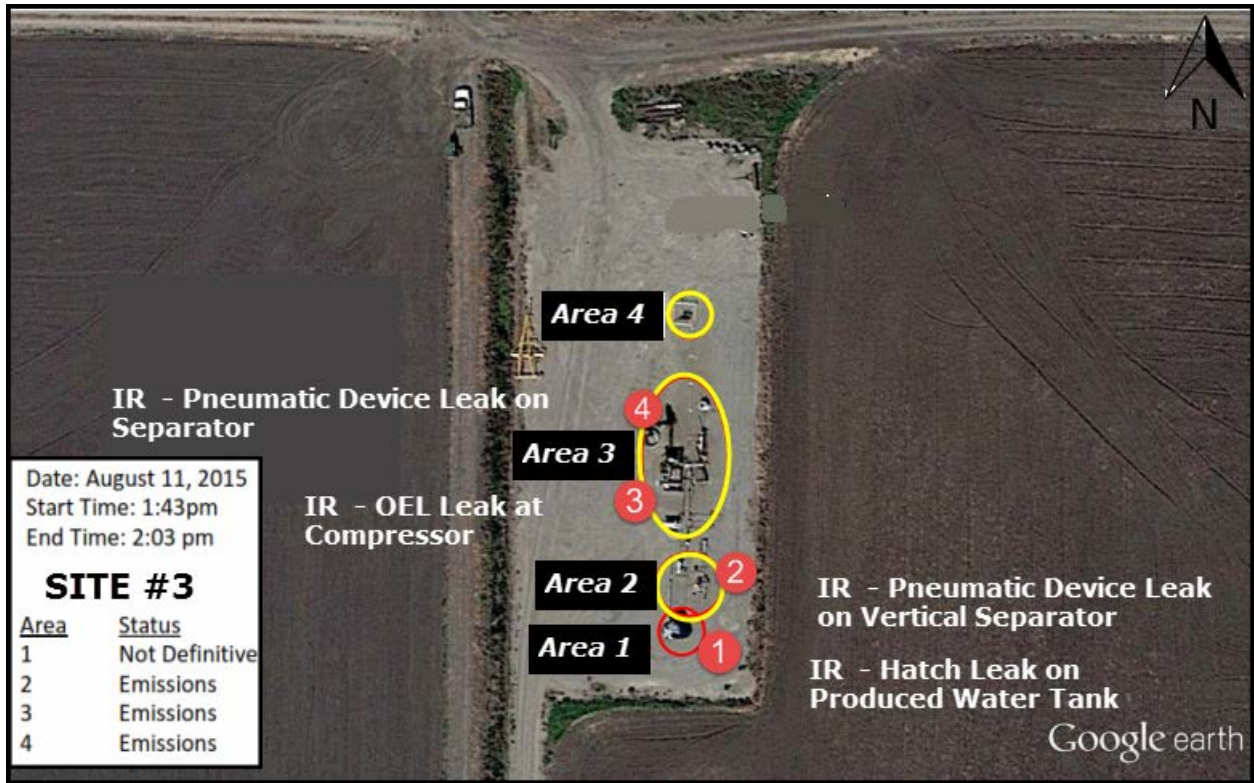
Site #2 was surveyed with the IR Camera in the late morning of August 12, 2015. Three equipment leaks (indicated by numbered red circles) were identified with the IR Camera between 11:25 and 11:37 from Areas #1, #2, and #4.

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).

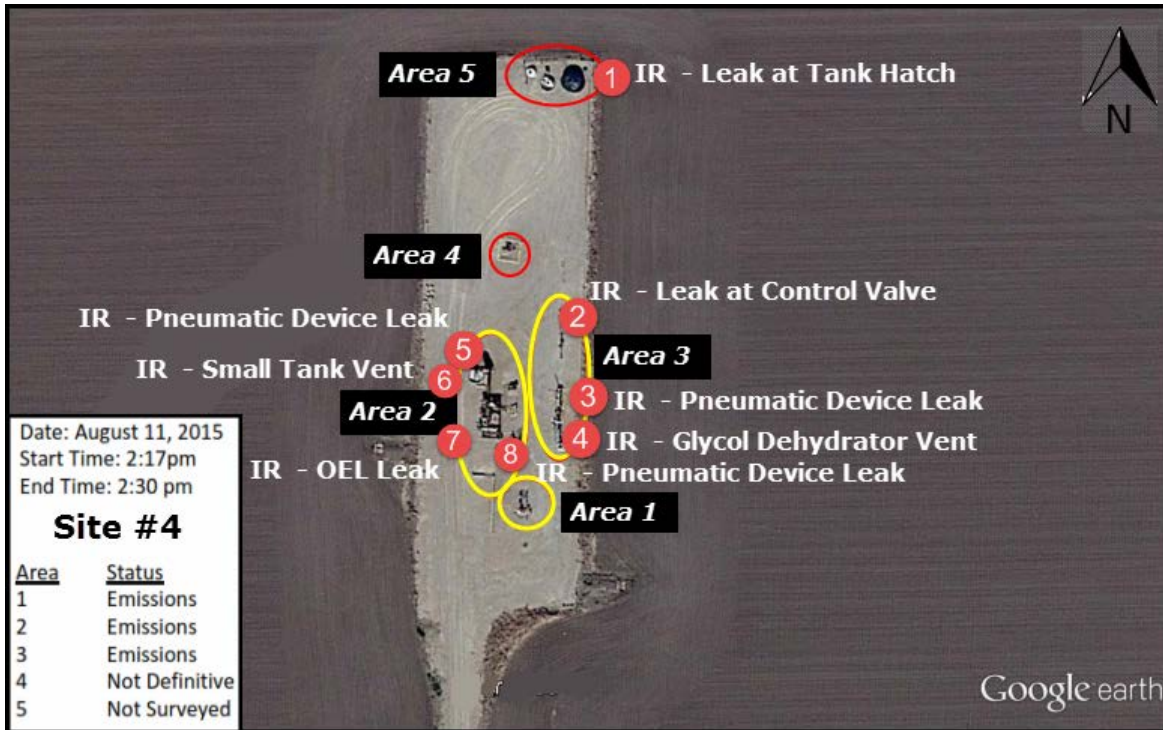
Site #3 was surveyed with the IR Camera in the early afternoon of August 12, 2015. Four equipment leaks (indicated by numbered red circles) were identified with the IR Camera between 12:31 and 12:45 – one each in Areas #1 and #2, and two in Area 3.

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 CH₄ and CO₂ 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:

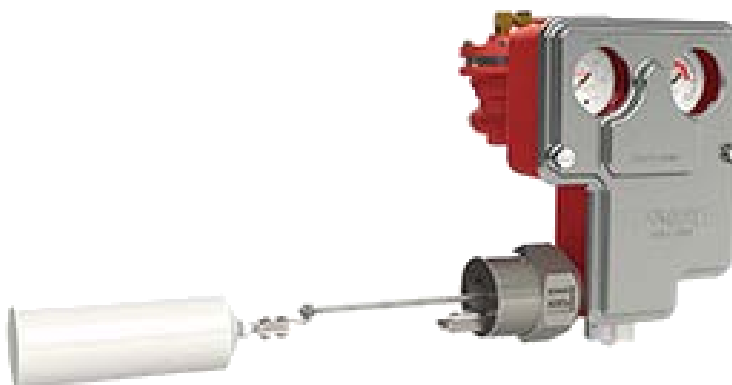
1. High-Bleed Pneumatic Devices *and*
2. Low Bleed Pneumatic Devices.

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. Average methane emissions from six Kimray® controllers were approximately an order of magnitude lower at 0.03 kg/hour or 0.3 tons/year. These results are summarized in Table 4-1. Complete test results are provided in Section 4 Appendix A.

**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

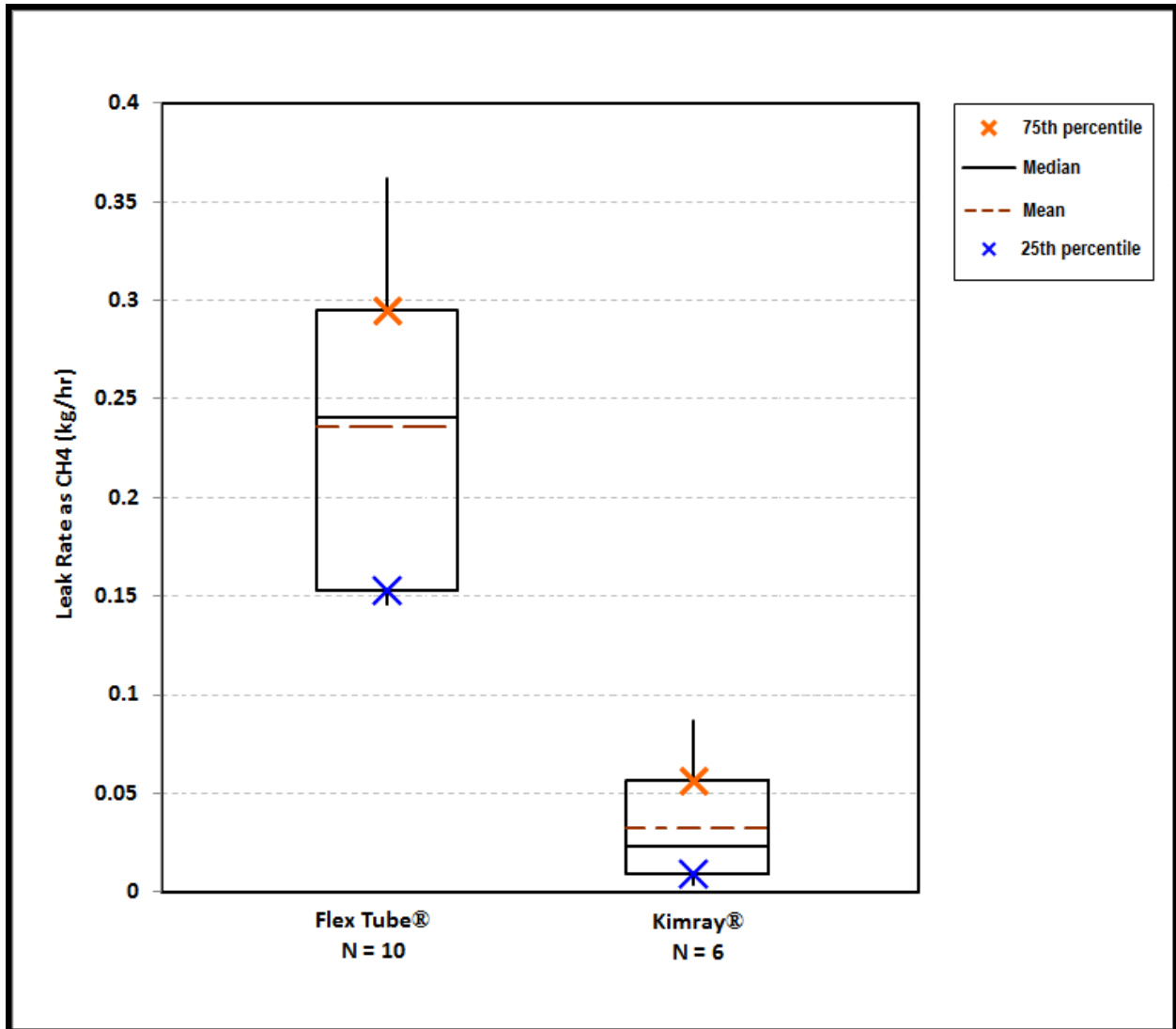


Figure 4-3 plots the mean, median, quartiles, and range of emissions for the two types of pneumatic devices that were tested. The Flex Tube®, being a high-bleed device exhibits variable and high emission rates. The Kimray®, consistent with its design as a low-bleed device, shows much less variability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

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

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).

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

Where:

CFMstd	=	Standardized volumetric flow rate (ft ³ /min)
CFMact	=	Actual volumetric flow rate (ft ³ /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).

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

Where:

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

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

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

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% CH₄ in air (analytical tolerance +2%) *and*
- 99.0% CH₄.

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 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, Sampler #QC 1007 continued to be used for emission testing on February 25 and February 26, but only for sample flow rate measurements. CH₄ 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% CH₄ calibration gas had become depleted so that only a single point calibration verification was possible using the 2.5% CH₄ 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
<i>Phase I Hi Flow Sampler #QX 1007</i>				
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%
<i>Phase II Hi Flow Sampler QX 1007</i>				
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	<i>Verification failed. TVA used to measure CH₄ concentration at Hi Flow Sampler's exhaust port.</i>			
2/26/2015				
<i>Phase II Hi Flow Sampler QX 1002</i>				
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
<i>Phase III Hi Flow Sampler QX 1007</i>				
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
<i>Phase I</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
<i>Phase II</i>					
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
<i>Phase III</i>					
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

¹Ambient 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 Section 5 Appendix 1.

**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				CHAIN OF CUSTODY 101 Adkisson Way, Taft, CA 93268 Phone: (661) 762-9143 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				Project Name#: CARB #1344 Site: _____			
Report To: David Ranum Sampler: David Ranum Report Format(s): FAX- <input type="checkbox"/> PDF (std)- <input checked="" type="checkbox"/> CoILUFT EDF- <input type="checkbox"/> EDD- <input type="checkbox"/> Turnaround Time: 10 Days- <input type="checkbox"/> 5 Days (std)- <input checked="" type="checkbox"/> 3 Days- <input type="checkbox"/> 2 Days- <input type="checkbox"/> 1 Day- <input type="checkbox"/> ASAP- <input type="checkbox"/> NOTE: Samples received after 4:00PM will be considered as received the next business day				Analysis Requested BTU/Carbon Range/Fixed Gases TO-15 Extended List + Naphthalene/PH- Gasoline		Special Instructions:	
OEC Sample ID	Date/Time Sampled	Matrix (See Key)	# of Cont.	Client Sample ID	BTU/Carbon Range/Fixed Gases	TO-15 Extended List + Naphthalene/PH- Gasoline	
100002B-1A	MAR-03	A	1	TB 037 A	✓		
10	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				
		A	1				
Relinquished By: BIJEET MUKHERJEE Date: 03/03/2015 Time: 1630 Received By: _____ Date: 3-3-15 Time: _____ Relinquished By: FedEx Date: 3-4-15 Time: 1040 Received By: David Ranum 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 RFP No. 13-414: Enhanced Inspection & Maintenance for GHG & VOCs at Upstream Facilities – Final (Revised)

APPENDICES

**Prepared by:
Sage ATC Environmental Consulting LLC**

DECEMBER 2016

SECTION 2 – APPENDICES

Section 2 - Appendix A Project Data Workbook

Section 2 - Appendix B Figures

- Figure B-1 Log₁₀-Log₁₀ Linear Correlation Plot of
Mass Emissions Rates vs. Leaking Equipment Concentrations as Methane -
Valves in Gas Service
- Figure B-2 Log₁₀-Log₁₀ Linear Correlation Plot of
Mass Emissions Rates vs. Leaking Equipment Concentrations as Methane for
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- Figure B-3 Log₁₀-Log₁₀ Linear Correlation Plot of
Mass Emissions Rates vs. Leaking Equipment Concentrations as Methane -
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- Figure B-4 Log₁₀-Log₁₀ Linear Correlation Plot of
Mass Emissions Rates vs. Leaking Equipment Concentrations as Methane -
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- 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
- Figure B-6 Log₁₀-Log₁₀ Linear Correlation Plot of
Mass Emissions Rates vs. Leaking Equipment Concentrations as Methane -
"Other", misc. components in Gas Service

Section 2 - Appendix C Tables

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

Section 2 - Appendix D Descriptive Statistics for Measured Concentrations and Calculated Emissions Rates for Components in Gas Service

Section 2 - Appendix E Average Emissions Rates for Components in Liquid Service

MAX =
 AVG =
 MIN =
 RANGE =
 # NON-ZERO =
 % non-zero results =
 total N all results =

THIS SHEET IS PASSWORD PROTECTED

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 Concentrations and Emission Rates.

Sort order, sorted by Component Type, & Method 21 Concentration, ppmv	Component Information		Site Characterization					METEOROLOGY:						
	Component Type	Service	EQUIPMENT/ACTIVITY DESCRIPTION:	Date	DATE:	REGULATORY IDs:	#WELLS:	FACILITY TYPE: (OIL/GAS)	THROUGHPUT(s):	WIND FROM/ SPEED (mph)	WIND SPEED (mph)	AMBIENT TEMPERATURE (F)	% RH:	BAROMETRIC PRESSURE (inHg):
A. Components in Gas Service with TVA, HiFlow, TO-15 & ASTM Data:														
1	Connector	Gas	Natural Gas Well Site	Aug 6-2015	6-Aug-15		1	Gas	0 SCFM	W	5.2	88.5	52.7	20.73
2	Connector	Gas	Gas Wells	Feb-27-2015	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	Feb-26-2015	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	Jan-23-2015	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	Jan-20-2015	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	Jan-23-2015	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	Jan-29-2015	29-Jan-15	TITLE V 041	0	Gas		WSW	4	81.3	34.5	29.5
8	Connector	Gas	Oil Water Gas Separation	Jan-20-2015	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	Jan-20-2015	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	Jan-29-2015	29-Jan-15	TITLE V 041	0	Gas		WSW	4	81.3	34.5	29.5
11	Connector	Gas	Water separation	Jan-29-2015	29-Jan-15	TITLE V 041	0	Gas		WSW	4	81.3	34.5	29.5
12	Connector	Gas	Gas Wells	Feb-26-2015	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	Jan-28-2015	28-Jan-15	TITLE V 041	0	Gas		WSW	1.5	-	-	29.6
14	Connector	Gas	NG Compressor & Transmission	Jan-26-2015	26-Jan-15	TITLE V 041	0	NG	4063 mcf/day	East	3	79.8	21.9	29.37
15	Connector	Gas	Water separation	Jan-29-2015	29-Jan-15	TITLE V 041	0	Gas		WSW	4	81.3	34.5	29.5
16	Connector	Gas	Gas Wells	Feb-26-2015	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	Jan-28-2015	28-Jan-15	TITLE V 041	0	Gas		WSW	1.5	-	-	29.6
18	Connector	Gas	Oil Well with flare	Jan-20-2015	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	Jan-26-2015	26-Jan-15	TITLE V 041	0	NG	4063 mcf/day	East	3	79.8	21.9	29.37
20	Connector	Gas	Water separation	Jan-28-2015	28-Jan-15	TITLE V 041	0	Gas		WSW	1.5	-	-	29.6
21	Connector	Gas	Water separation	Jan-29-2015	29-Jan-15	TITLE V 041	0	Gas		WSW	4	81.3	34.5	29.5
22	Connector	Gas	Natural Gas Well	Aug 7 - 2015	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	Feb-24-2015	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	Aug 14-2015	14-Aug-15		1	Gas	62.5 MCF/D	W	5.7	72.1	52.2	29.97
25	Connector	Gas	NG Compressor & Transmission	Jan-26-2015	26-Jan-15	TITLE V 041	0	NG	4063 mcf/day	East	3	79.8	21.9	29.37
26	Connector	Gas	Water separation	Jan-27-2015	27-Jan-15	TITLE V 041	0	Gas		WSW	1.3	77.8	47.9	29.68
27	Connector	Gas	Gas Wells	Feb-27-2015	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	Jan-26-2015	26-Jan-15	TITLE V 041	0	NG	4063 mcf/day	East	3	79.8	21.9	29.37
29	Connector	Gas	Oil	Jan-22-2015	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	Jan-28-2015	28-Jan-15	TITLE V 041	0	Gas		WSW	1.5	-	-	29.6
31	Connector	Gas	Water separation	Jan-28-2015	28-Jan-15	TITLE V 041	0	Gas		WSW	1.5	-	-	29.6
32	Connector	Gas	Water separation	Jan-28-2015	28-Jan-15	TITLE V 041	0	Gas		WSW	1.5	-	-	29.6
33	Connector	Gas	Oil Well with flare	Jan-20-2015	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	Feb-23-2-15	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	Jan-29-2015	29-Jan-15	TITLE V 041	0	Gas		WSW	4	81.3	34.5	29.5
36	Connector	Gas	Oil Water Gas Separation	Jan-20-2015	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	Aug 12-2015	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	Jan-21-2015	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	Jan-26-2015	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	Jan-26-2015	26-Jan-15	TITLE V 041	0	Gas		SW	4.2	77.8	27.6	29.63
41	Flange	Gas	Gas Wells	Feb-25-2015	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	Feb-26-2015	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	Feb-24-2015	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	Feb-23-2-15	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	Feb-24-2015	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	Jan-27-2015	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	Feb-23-2-15	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	Jan-27-2015	27-Jan-15	TITLE V 041	0	Gas		WSW	1.3	77.8	47.9	29.68
49	Flange	Gas	Natural Gas Well	Aug 12-2015	11-Aug-15		1	Gas	612.5 MCF/D	W	3.4	88	48.7	29.77
50	Flange	Gas	Natural Gas Well	Aug 12-2015	11-Aug-15		1	Gas	612.5 MCF/D	W	3.4	88	48.7	29.77
51	Flange	GAS	Natural Gas Well	Aug 14-2015	14-Aug-15		1	Gas	38.1 MCF/D	SE	2.4	81	49.6	29.97

MAX =
 AVG =
 MIN =
 RANGE =
 # NON-ZERO =
 % non-zero results =
 total N all results =

500,001
4.64E+04
0.06
500,001
160
99%
162

Y [1] = Y, Operator LDAR w. Eagle monthly
 Y [2] = Y, Avanti
 Y [3] = Y, Operator run with Eagle
 Y [4] = Y, Operator run with Eagle quarterly
 Y [5] = Y, Quarterly, Summit

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

Note: results with all values = zero are hidden, see Appendix E for Descriptive Statistics for all leak Concentrations and Emission Rates.

Sort order, sorted by Component Type, & Method 21 Concentration, ppmv	Component Information		Site Characterization					Component Information			IR CAMERA		EPA Method 21 Results		HIGH FLOW SAM		
	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)	Component Type	Service	Description	Date	Time	Date	Time	Method 21 Leak Concentration, ppmv	Date
A. Components in Gas Service with TVA, HiFlow, TO-15 & ASTM Data:																	
1	Connector	Gas	85	Cloudy	2	1	1	N	Connector	Gas	1-inch Plug			6-Aug-15	10:35	4.00	6-Aug-15
2	Connector	Gas	20	Sunny	1	2	2	N	Connector	Gas	3/8" Threaded			Feb-27-2015	10:37	10.00	Feb-27-2015
3	Connector	Gas	10	sunny	4	7	2	N	Connector	Gas	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]	Connector	Gas	Tubing Connector			Jan-23-2015	11:05	37.00	Jan-23-2015
5	Connector	Gas	100	cloudy	0	3	2	Y	Connector	Gas	Plug			Jan-20-2015	9:51	50.00	Jan-20-2015
6	Connector	Gas	0	Sunny	1	3	2	Y [2]	Connector	Gas	Cap			Jan-23-2015	10:43	61.00	Jan-23-2015
7	Connector	Gas	50%	light cloudy				Y [3]	Connector	Gas	2" Threaded Connector			Jan-29-2015	13:57	135.00	Jan-29-2015
8	Connector	Gas	100	cloudy	0	3	2	Y	Connector	Gas	Cap			Jan-20-2015	9:59	200.00	Jan-20-2015
9	Connector	Gas	100	cloudy	4	0	1	Y	Connector	Gas	Gas Compressor connector			Jan-20-2015	14:10	300.00	Jan-20-2015
10	Connector	Gas	50%	light cloudy				Y [3]	Connector	Gas	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]	Connector	Gas	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	Connector	Gas	at wellhead 60-19			Feb-26-2015	13:53	700.00	Feb-26-2015
13	Connector	Gas	90%	cloudy				Y [3]	Connector	Gas	1" Plug			Jan-28-2015	13:45	800.00	Jan-28-2015
14	Connector	Gas	95	Cloudy	0	1	2	Y [1]	Connector	Gas	2" elbow			Jan-26-2015	11:49	994.00	Jan-26-2015
15	Connector	Gas	50%	light cloudy				Y [3]	Connector	Gas	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	Connector	Gas	Threaded 3" on V4016E at compressor			Feb-26-2015	9:07	1,770.00	Feb-26-2015
17	Connector	Gas	90%	cloudy				Y [3]	Connector	Gas	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	Connector	Gas	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]	Connector	Gas	on the top of Sightglass			Jan-26-2015	11:40	2,400.00	Jan-26-2015
20	Connector	Gas	90%	cloudy				Y [3]	Connector	Gas	1" Plug			Jan-28-2015	13:31	2,600.00	Jan-28-2015
21	Connector	Gas	50%	light cloudy				Y [3]	Connector	Gas	Plug on compressor			Jan-29-2015	13:30	4,600.00	Jan-29-2015
22	Connector	Gas	80	Cloudy/overcast	1	5	1	N	Connector	Gas	Swagelok 3/8"			7-Aug-15	11:26	7,700.00	7-Aug-15
23	Connector	Gas	0	sunny	4	5	1	N	Connector	Gas	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	Connector	GAS	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]	Connector	Gas	Qwik disconnect			Jan-26-2015	12:22	16,000.00	Jan-26-2015
26	Connector	Gas	10% / 90% / 50% / 98%	sunny				Y [3]	Connector	Gas	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	Connector	Gas	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]	Connector	Gas	at Sightglass bottom			Jan-26-2015	11:33	56,000.00	Jan-26-2015
29	Connector	Gas	50	Sunny	15	5	4	Y [2]	Connector	Gas	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	0.9	cloudy				Y [3]	Connector	Gas	1/2" Threaded Connector	Jan-28-2015	10:07	Jan-29-2015	12:28	104,501.00	Jan-29-2015
31	Connector	Gas	0.9	cloudy				Y [3]	Connector	Gas	Assorted Compressor Fittings	Jan-28-2015	10:44	Jan-29-2015	13:51	104,501.00	Jan-29-2015
32	Connector	Gas	0.9	cloudy				Y [3]	Connector	Gas	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	Connector	Gas	on a pressure Gauge			Jan-20-2015	14:15	128,960.00	Jan-20-2015
34	Connector	Gas	0.1	sunny	1	1	2	N	Connector	Gas	3" Threaded Connector			Feb-23-2015	11:49	130,001.00	Feb-23-2015
35	Connector	Gas	50%	light cloudy				Y [3]	Connector	Gas	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	Connector	Gas	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	Connector	Gas	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]	Flange	Gas	on Compressor No.350			Jan-21-2015	12:35	0.06	Jan-21-2015
39	Flange	Gas	100	Cloudy	0	0	1	Y [1]	Flange	Gas	2"			Jan-26-2015	14:38	1.31	Jan-26-2015
40	Flange	Gas	100	Cloudy	0	0	1	Y [1]	Flange	Gas	2"			Jan-26-2015	14:20	1.77	Jan-26-2015
41	Flange	Gas	70	Cloudy	4	7	2	N	Flange	Gas	4" on V10749			Feb-25-2015	13:18	15.00	Feb-25-2015
42	Flange	Gas	10	sunny	4	7	2	N	Flange	Gas	on compressor			Feb-26-2015	9:38	40.00	Feb-26-2015
43	Flange	Gas	0	sunny	4	5	1	N	Flange	Gas	at compressor			Feb-24-2015	13:20	40.00	Feb-24-2015
44	Flange	Gas	0.1	sunny	1	1	2	N	Flange	Gas	4" flange on compressor			Feb-23-2015	12:30	49.00	Feb-23-2015
45	Flange	Gas	0	sunny	4	5	1	N	Flange	Gas	at compressor			Feb-24-2015	13:38	111.00	Feb-24-2015
46	Flange	Gas	10% / 90% / 50% / 98%	sunny				Y [3]	Flange	Gas	2"			Jan-27-2015	14:55	300.00	Jan-27-2015
47	Flange	Gas	10%	sunny	1	1	2	N	Flange	Gas	3" at compression			Feb-23-2015	10:56	349.00	Feb-23-2015
48	Flange	Gas	10% / 90% / 50% / 98%	sunny				Y [3]	Flange	Gas	2"			Jan-27-2015	14:42	358.00	Jan-27-2015
49	Flange	Gas	10	Sunny	1	2	1	N	Flange	Gas	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	Flange	Gas	12-inch on compressor			12-Aug-15	10:32	700.00	12-Aug-15
51	Flange	GAS	0	Sunny	1	1	1	N	Flange	GAS	12-inch on compressor			14-Aug-15	12:24	1,100.00	14-Aug-15

MAX =
 AVG =
 MIN =
 RANGE =
 # NON-ZERO =
 % non-zero results =
 total N all results =

5.70E+00	2.19E+00	-3.06E-01
3.30E+00	-5.94E+00	-2.69E+00
-1.23E+00	-1.08E+01	-5.76E+00
6.93E+00	1.30E+01	5.46E+00
160	160	0
100%	100%	0%
160	160	35

3.90E+02	1.60E+02	2.30E+03	2.40E+02	5.70E+02	2.20E+03
1.51E+02	1.45E+02	2.30E+03	1.63E+02	1.72E+02	1.87E+02
1.80E+01	1.30E+02	2.30E+03	4.00E+01	3.40E+01	8.40E+00
3.72E+02	3.00E+01	-	2.00E+02	5.36E+02	2.19E+03
3	2	1	3	4	16
9%	6%	3%	9%	11%	46%
35	35	35	35	35	35

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

Note: results with all values = zero are hidden, see Appendix E for Descriptive Statistics for all leak Concentrations and Emission Rates.

Sort order, sorted by Component Type, & Method 21 Concentration, ppmv	Component Information		ATA			CANISTER DATA					TEDLAR BAG DATA			EPA METHOD TO-15 CONCENTRATION DATA						
	Component Type	Service	CALCULATED	CALCULATED	CALCULATED	Sample #	Date	Time	Can ID	Can I-Vac (in Hg)	Can F-Vac (in Hg)	Sample(s) #	Date	Time	ppmv @ STP	ppmv @ STP	ppmv @ STP	ppmv @ STP	ppmv @ STP	ppmv @ STP
			Log10 TVA as CH4, ppmv	Log10 CH4 EmRate, kg/hr, as methane	Log10 TOC of Linked TOC Emissions Estimates, kg/hr												1,2,4-Trimethylbenzene	1,3,5-Trimethylbenzene	2-Hexanone	4-Ethyltoluene
A. Components in Gas Service with TVA, HiFlow, TO-15 & ASTM Data:																				
1	Connector	Gas	0.60	-9.99																
2	Connector	Gas	1.00	-9.48																
3	Connector	Gas	1.20	-10.79																
4	Connector	Gas	1.57	-8.65																
5	Connector	Gas	1.70	-6.01																
6	Connector	Gas	1.79	-6.26	-2.84	CAN010	Jan-23-2015	10:48	OEC-29-701	28.5	0	TB010	Jan-23-2015	10:52	ND	ND	ND	ND	ND	2.20E+02
7	Connector	Gas	2.13	-4.97																
8	Connector	Gas	2.30	-4.58																
9	Connector	Gas	2.48	-6.82																
10	Connector	Gas	2.70	-8.40																
11	Connector	Gas	2.83	-8.29																
12	Connector	Gas	2.85	-9.11	-5.76							TB030A/TB030B	Feb-26-2015	13:53	ND	ND	ND	ND	ND	ND
13	Connector	Gas	2.90	-7.77																
14	Connector	Gas	3.00	-7.55																
15	Connector	Gas	3.04	-7.32																
16	Connector	Gas	3.25	-8.28																
17	Connector	Gas	3.30	-4.28																
18	Connector	Gas	3.34	-5.96																
19	Connector	Gas	3.38	-5.36																
20	Connector	Gas	3.41	-7.10																
21	Connector	Gas	3.66	-6.04																
22	Connector	Gas	3.89	-6.80																
23	Connector	Gas	3.89	-7.71																
24	Connector	GAS	4.09	-5.22																
25	Connector	Gas	4.20	-6.59																
26	Connector	Gas	4.56	-4.83																
27	Connector	Gas	4.70	-2.89																
28	Connector	Gas	4.75	-4.58																
29	Connector	Gas	4.95	-4.44	-1.91	CAN008	Jan-22-2015	0.484027778	OEC-117-42	28	0	TB008	Jan-22-2015	11:40	ND	ND	ND	ND	ND	ND
30	Connector	Gas	5.02	-4.52																
31	Connector	Gas	5.02	-3.82																
32	Connector	Gas	5.02	-2.68																
33	Connector	Gas	5.11	-4.26	-2.08	CAN003	Jan-20-2015	0.631944444	OEC-29-706	28.25	0	TB003	Jan-20-2015	15:16	3.90E+02	1.60E+02	ND	2.10E+02	5.70E+02	7.80E+01
34	Connector	Gas	5.11	-3.33																
35	Connector	Gas	5.20	-3.69																
36	Connector	Gas	5.24	-3.84																
37	Connector	Gas	5.70	-2.89																
38	Flange	Gas	-1.23	-3.57	-0.89	CAN005	Jan-21-2015	0.527777778	OEC-117-32	28	5.6	TB005	Jan-21-2015	12:42	4.60E+01	ND	ND	4.00E+01	ND	2.20E+03
39	Flange	Gas	0.12	-9.61																
40	Flange	Gas	0.25	-9.55																
41	Flange	Gas	1.18	-9.44																
42	Flange	Gas	1.60	-9.87																
43	Flange	Gas	1.60	-7.22																
44	Flange	Gas	1.69	-7.44																
45	Flange	Gas	2.05	-6.39	-5.72							TB027A/TB027B	Feb-24-2015	13:40	ND	ND	ND	ND	ND	ND
46	Flange	Gas	2.48	-8.63																
47	Flange	Gas	2.54	-4.88								TB024A/TB024B	Feb-23-2015	11:01	ND	ND	ND	ND	ND	ND
48	Flange	Gas	2.55	-5.17																
49	Flange	Gas	2.70	-5.39																
50	Flange	Gas	2.85	-6.23																
51	Flange	GAS	3.04	-5.55																

MAX =
 AVG =
 MIN =
 RANGE =
 # NON-ZERO =
 % non-zero results =
 total N all results =

3.27E-07	4.56E-05	2.27E-04	8.98E-06	6.76E-07	1.78E-05	8.93E-05	4.04E-04	1.92E-05	5.63E-06	6.48E-05	1.62E-02	6.40E-07	5.73E-05	2.16E+01	2.16E+08	7.88E+01	7.88E+08	-	-
1.84E-08	1.30E-06	1.50E-05	8.41E-07	3.34E-08	7.59E-07	6.44E-06	1.95E-05	7.10E-07	1.92E-07	3.09E-06	1.07E-03	1.83E-08	2.88E-06	2.13E+01	2.13E+08	7.81E+01	7.81E+08	-	-
-	-	-	-	-	-	-	-	-	-	-	-	-	-	1.95E+01	1.95E+08	7.30E+01	7.30E+08	-	-
3.27E-07	4.56E-05	2.27E-04	8.98E-06	6.76E-07	1.78E-05	8.93E-05	4.04E-04	1.92E-05	5.63E-06	6.48E-05	1.62E-02	6.40E-07	5.73E-05	2.11E+00	2.11E+07	5.81E+00	5.81E+07	-	-
2	1	21	13	2	5	18	23	8	3	22	12	1	11	35	35	35	35	-	-
6%	3%	60%	37%	6%	14%	51%	66%	23%	9%	63%	34%	3%	31%	100%	100%	100%	100%	0%	0%
35	35	35	35	35	35	35	35	35	35	35	35	35	35	35	35	35	35	35	35

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

Note: results with all values = zero are hidden, see
 Appendix E for Descriptive Statistics for all leak
 Concentrations and Emission Rates.

Sort order, sorted by Component Type, & Method 21 Concentration, ppmv	Component Information		kg/hr														ASTM 1945/3588 Concentration Data				
	Component Type	Service	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 & ASTM Data:																					
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																			

MAX =
 AVG =
 MIN =
 RANGE =
 # NON-ZERO =
 % non-zero results =
 total N all results =

-	1.24E-01	1.24E+06	-	-	7.50E+00	7.50E+07	4.82E-02	4.82E+05	6.81E-02	6.81E+05	2.03E-02	2.03E+05	3.74E-02	3.74E+05	1.47E-02	1.47E+05	1.14E-02	1.14E+05	3.69E+00	1.18E+01	1.46E-02	
-	3.76E-02	3.76E+05	-	-	5.39E-01	5.39E+06	2.07E-03	2.07E+04	3.06E-03	3.06E+04	5.81E-04	5.81E+03	1.46E-03	1.46E+04	4.21E-04	4.21E+03	3.27E-04	3.27E+03	3.07E+00	9.86E+00	7.26E-03	
-	1.95E-02	1.95E+05	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1.83E+00	5.89E+00	3.93E-03
-	1.04E-01	1.04E+06	-	-	7.50E+00	7.50E+07	4.82E-02	4.82E+05	6.81E-02	6.81E+05	2.03E-02	2.03E+05	3.74E-02	3.74E+05	1.47E-02	1.47E+05	1.14E-02	1.14E+05	1.85E+00	5.90E+00	1.07E-02	
-	35	35	-	-	22	22	2	2	3	3	1	1	2	2	1	1	1	1	35	35	35	
0%	100%	100%	0%	0%	63%	63%	6%	6%	9%	9%	3%	3%	6%	6%	3%	3%	3%	3%	100%	100%	100%	
35	35	35	35	35	35	35	35	35	35	35	35	35	35	35	35	35	35	35	35	35	35	

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

Note: results with all values = zero are hidden, see Appendix E for Descriptive Statistics for all leak Concentrations and Emission Rates.

Sort order, sorted by Component Type, & Method 21 Concentration, ppmv	Component Information		ASTM 1945/3588 Concentration Data																	ASTM 1945/3588 Emissions (kg/hr)					
	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	Carbon Dioxide	
A. Components in Gas Service with TVA, HiFlow, TO-15 & ASTM Data:																							31.9988	28.0134	44.01
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																							

MAX =	4.91E-01	6.80E-03	1.41E-02	5.54E-03	1.02E-02	4.99E-03	3.87E-03	4.94E-01
AVG =	3.62E-02	2.79E-04	6.32E-04	1.58E-04	3.94E-04	1.42E-04	1.11E-04	3.90E-02
MIN =	-	-	-	-	-	-	-	-
RANGE =	4.91E-01	6.80E-03	1.41E-02	5.54E-03	1.02E-02	4.99E-03	3.87E-03	4.94E-01
# NON-ZERO =	22	2	3	1	2	1	1	33
% non-zero results =	63%	6%	9%	3%	6%	3%	3%	94%
total N all results =	35	35	35	35	35	35	35	35

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

Note: results with all values = zero are hidden, see Appendix E for Descriptive Statistics for all leak Concentrations and Emission Rates.

Sort order, sorted by Component Type, & Method 21 Concentration, ppmv	Component Information		kg/hr	kg/hr	kg/hr	kg/hr	kg/hr	kg/hr	kg/hr	kg/hr
	Component Type	Service	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)
A. Components in Gas Service with TVA, HiFlow, TO-15 & ASTM Data:										
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 Concentrations and Emission Rates.

Sort order, sorted by Component Type, & Method 21 Concentration, ppmv	Component Information		Site Characterization					METEOROLOGY:						
	Component Type	Service	EQUIPMENT/ACTIVITY DESCRIPTION:	Date	DATE:	REGULATORY IDs:	#WELLS:	FACILITY TYPE: (OIL/GAS)	THROUGHPUT(s):	WIND FROM/ SPEED (mph)	WIND SPEED (mph)	AMBIENT TEMPERATURE (F)	% RH:	BAROMETRIC PRESSURE (inHg):
A. Components in Gas Service with TVA, HiFlow, TO-15 & ASTM Data:														
52	Flange	GAS	Natural Gas Well	Aug 14-2015	14-Aug-15		1	Gas	38.1 MCF/D	SE	2.4	81	49.6	29.97
53	Flange	Gas	Natural Gas Well	Aug 12-2015	11-Aug-15		1	Gas	612.5 MCF/D	W	3.4	88	48.7	29.77
54	Flange	GAS	Natural Gas Well	Aug 14-2015	14-Aug-15		1	Gas	38.1 MCF/D	SE	2.4	81	49.6	29.97
55	Flange	Gas	Natural Gas Well	Aug 12-2015	11-Aug-15		1	Gas	612.5 MCF/D	W	3.4	88	48.7	29.77
56	Flange	Gas	Natural Gas Well	Aug 12-2015	11-Aug-15		1	Gas	612.5 MCF/D	W	3.4	88	48.7	29.77
57	Flange	Gas	Natural Gas Well Site	Aug 6-2015	6-Aug-15		1	Gas	0 SCFM	W	5.2	88.5	52.7	20.73
58	Flange	GAS	Natural Gas Well	Aug 14-2015	14-Aug-15		1	Gas	38.1 MCF/D	SE	2.4	81	49.6	29.97
59	Flange	Gas	Water separation	Jan-29-2015	29-Jan-15	TITLE V 041	0	Gas		WSW	4	81.3	34.5	29.5
60	OEL	Gas	Natural Gas Well	Aug 7 - 2015	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	Feb-24-2015	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	Feb-24-2015	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	Feb-24-2015	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	Feb-23-2-15	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	Feb-24-2015	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	Feb-25-2015	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	Feb-24-2015	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	Feb-25-2015	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	Aug 7 - 2015	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	Aug 13-2015	13-Aug-15		1	Gas	49.1 MCF/D	SE	3.4	82.4	45	29.93
71	OEL	Gas	Gas Wells	Feb-26-2015	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	Aug 11 - 2015	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	Feb-27-2015	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	Aug 11 - 2015	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	Aug 12-2015	12-Aug-15		1	Gas	192.3 MCF/D	SW	3.9	83	44.6	29.96
76	OEL	GAS	Natural Gas Well	Aug 14-2015	14-Aug-15		1	Gas	38.1 MCF/D	SE	2.4	81	49.6	29.97
77	OEL	Gas	Gas Wells	Feb-26-2015	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	Aug 14-2015	14-Aug-15		1	Gas	149.9 MCF/D	SE	3.7	86	38.5	29.95
79	OEL	Gas	Natural Gas Well	Aug 13-2015	13-Aug-15		1	Gas	49.1 MCF/D	SE	3.4	82.4	45	29.93
80	OEL	Gas	Natural Gas Well	Aug 13-2015	13-Aug-15		2	Gas	32-12: 71.8 MCF/D, 32-14: 80 MCF/D,	SE	3.2	89	38.8	29.91
81	OEL	Gas	Natural Gas Well	Aug 12-2015	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	Feb-23-2-15	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	Aug 7 - 2015	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	Aug 14-2015	14-Aug-15		1	Gas	62.5 MCF/D	W	5.7	72.1	52.2	29.97
85	OEL	Gas	Natural Gas Well	Aug 12-2015	12-Aug-15		1	Gas	179 MCF/D	SW	2.5	85.2	42.8	29.94
86	OEL	Gas	Gas Wells	Feb-24-2015	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	Feb-26-2015	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	Feb-27-2015	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	Feb-27-2015	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	Feb-27-2015	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	Aug 7 - 2015	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	Aug 11 - 2015	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	Aug 12-2015	12-Aug-15		1	Gas	612.5 MCF/D	W	3.4	88	48.7	29.77
94	Other	Gas	Gas Wells	Feb-26-2015	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	Feb-27-2015	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	Aug 7 - 2015	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	Aug 12-2015	12-Aug-15		1	Gas	179 MCF/D	SW	2.5	85.2	42.8	29.94
98	Other	Gas	Gas Wells	Feb-25-2015	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	Aug 7 - 2015	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	Feb-26-2015	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	Jan-20-2015	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	Jan-22-2015	22-Jan-15	39632	10	Oil	150 bbbls/day Oil, 1000 bbbls/day Water	ESE	1.7	76.3	41.8	30.14
103	Other	Gas	Gas Wells	Feb-25-2015	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 & Calculatio

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

Note: results with all values = zero are hidden, see
Appendix E for Descriptive Statistics for all leak
Concentrations and Emission Rates.

Sort order, sorted by Component Type, & Method 21 Concentration, ppmv	Component Information		Site Characterization					Component Information		IR CAMERA		EPA Method 21 Results		HIGH FLOW SAM			
	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)	Component Type	Service	Description	Date	Time	Date	Time	Method 21 Leak Concentration, ppmv	Date
A. Components in Gas Service with TVA, HiFlow, TO-15 & ASTM Data:																	
52	Flange	GAS	0	Sunny	1	1	1	N	Flange	GAS	12-INCH ON COMPRESSOR			14-Aug-15	12:21	1,500.00	14-Aug-15
53	Flange	Gas	10	Sunny	1	2	1	N	Flange	Gas	32-inch on compressor			12-Aug-15	10:38	1,700.00	12-Aug-15
54	Flange	GAS	0	Sunny	1	1	1	N	Flange	GAS	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	Flange	Gas	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	Flange	Gas	12-inch on compressor			12-Aug-15	10:27	7,000.00	12-Aug-15
57	Flange	Gas	85	Cloudy	2	1	1	N	Flange	Gas	6-inch			6-Aug-15	14:50	27,000.00	6-Aug-15
58	Flange	GAS	0	Sunny	1	1	1	N	FLANGE	GAS	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]	Flange	Gas	4"		-	Jan-29-2015	11:29	130,000.00	Jan-29-2015
60	OEL	Gas	80	Cloudy/overcast	1	5	1	N	OEL	Gas	3/8-inch			7-Aug-15	10:55	1.13	7-Aug-15
61	OEL	Gas	0	sunny	4	5	1	N	OEL	Gas	1/2"		-	Feb-24-2015	11:02	1.56	Feb-24-2015
62	OEL	Gas	0	sunny	4	5	1	N	OEL	Gas	1/4"		-	Feb-24-2015	10:59	1.82	Feb-24-2015
63	OEL	Gas	0	sunny	4	5	1	N	OEL	Gas	1/2"		-	Feb-24-2015	11:07	1.87	Feb-24-2015
64	OEL	Gas	0.1	sunny	1	1	2	N	OEL	Gas	at Vessel S90 V-11053		-	Feb-23-2015	12:17	3.80	Feb-23-2015
65	OEL	Gas	0	sunny	4	5	1	N	OEL	Gas	1/2"		-	Feb-24-2015	12:58	12.00	Feb-24-2015
66	OEL	Gas	70	Cloudy	4	7	2	N	OEL	Gas	3/8" on P47		-	Feb-25-2015	13:34	20.00	Feb-25-2015
67	OEL	Gas	0	sunny	4	5	1	N	OEL	Gas	at compressor		-	Feb-24-2015	14:29	30.00	Feb-24-2015
68	OEL	Gas	70	Cloudy	4	7	2	N	OEL	Gas	1/4" on P47		-	Feb-25-2015	13:30	30.00	Feb-25-2015
69	OEL	Gas	80	Cloudy/overcast	1	5	1	N	OEL	Gas	1/2" Qwik Disconnect			7-Aug-15	11:00	119.00	7-Aug-15
70	OEL	Gas	0	Sunny	2	1	1	N	OEL	Gas	1-inch OEL @ Separator 3282			13-Aug-15	11:16	200.00	13-Aug-15
71	OEL	Gas	30	sunny	1	2	2	N	OEL	Gas	3/8" at compressor		-	Feb-26-2015	14:58	350.00	Feb-26-2015
72	OEL	Gas	15	Sunny	3	1	1	N	OEL	Gas	3/4" @ METER			11-Aug-15	12:29	350.00	11-Aug-15
73	OEL	Gas	20	Sunny	1	2	2	N	OEL	Gas	Drip Oil Bucket			Feb-27-2015	10:20	350.00	Feb-27-2015
74	OEL	Gas	15	Sunny	3	1	1	N	OEL	Gas	3/4" spherical well tester			11-Aug-15	12:45	450.00	11-Aug-15
75	OEL	Gas	0	Sunny	1	1	1	N	OEL	Gas	Valve Bleeder			12-Aug-15	11:51	1,500.00	12-Aug-15
76	OEL	GAS	0	Sunny	1	1	1	N	OEL	GAS	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	OEL	Gas	at compressor		-	Feb-26-2015	9:28	5,000.00	Feb-26-2015
78	OEL	GAS	5	Sunny	1	1	1	N	OEL	GAS	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	OEL	Gas	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	OEL	Gas	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	OEL	Gas	1-inch on compressor			12-Aug-15	10:19	26,000.00	12-Aug-15
82	OEL	Gas	0.1	sunny	1	1	2	N	OEL	Gas	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	OEL	Gas	1/4" vent			7-Aug-15	11:15	83,160.00	7-Aug-15
84	OEL	GAS	0	Sunny	1	2	1	N	OEL	GAS	AT END OF COMPRESSOR			14-Aug-15	10:32	90,000.00	14-Aug-15
85	OEL	Gas	0	Sunny	2	1	1	N	OEL	Gas	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	OEL	Gas	at compressor		-	Feb-24-2015	13:29	100,000.00	Feb-24-2015
87	OEL	Gas	10	sunny	4	7	2	N	OEL	Gas	on metering pad		-	Feb-26-2015	14:17	100,001.00	Feb-26-2015
88	OEL	Gas	20	Sunny	1	2	2	N	OEL	Gas	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	OEL	Gas	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	OEL	Gas	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	OEL	Gas	1/4" Vent			7-Aug-15	11:33	420,001.00	7-Aug-15
92	OEL	Gas	15	Sunny	3	1	1	N	OEL	Gas	1/2" on meter			11-Aug-15	12:22	500,001.00	11-Aug-15
93	OEL	Gas	10	Sunny	1	2	1	N	OEL	Gas	1-inch on compressor			12-Aug-15	10:05	500,001.00	12-Aug-15
94	Other	Gas	10	sunny	4	7	2	N	Other	Gas	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	Other	Gas	Meter on Small Blue Compressor			Feb-27-2015	11:12	20.00	Feb-27-2015
96	Other	Gas	30	Sunny	3	2	1	N	Other	Gas	Pressure Regulator			7-Aug-15	13:55	30.00	7-Aug-15
97	Other	Gas	0	Sunny	2	1	1	N	Other	Gas	Pressure Regulator Vent			12-Aug-15	12:57	68.00	12-Aug-15
98	Other	Gas	70	Cloudy	4	7	2	N	Other	Gas	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	Other	Gas	Level Controller			7-Aug-15	13:41	90.00	7-Aug-15
100	Other	Gas	10	sunny	4	7	2	N	Other	Gas	level control on compressor		-	Feb-26-2015	10:02	300.00	Feb-26-2015
101	Other	Gas	100	cloudy	0	3	2	Y	Other	Gas	Gas Regulator		-	Jan-20-2015	10:00	300.00	Jan-20-2015
102	Other	Gas	50	Sunny	15	5	4	Y [2]	Other	Gas	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	Other	Gas	Gas regulator on V10749		-	Feb-25-2015	13:07	585.00	Feb-25-2015

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

Note: results with all values = zero are hidden, see Appendix E for Descriptive Statistics for all leak Concentrations and Emission Rates.

Sort order, sorted by Component Type, & Method 21 Concentration, ppmv	Component Information		ATA			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	ppmv @ STP	
			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	1,2,4-Trimethylbenzene	1,3,5-Trimethylbenzene	2-Hexanone	4-Ethyltoluene	Acetone	Benzene
A. Components in Gas Service with TVA, HiFlow, TO-15 & ASTM Data:																				
52	Flange	GAS	3.18	-5.71																
53	Flange	Gas	3.23	-5.20																
54	Flange	GAS	3.30	-5.06																
55	Flange	Gas	3.78	-3.63																
56	Flange	Gas	3.85	-2.04																
57	Flange	Gas	4.43	-8.06																
58	Flange	GAS	5.06	-3.11	-1.16							TB-052A/TB-052B	Aug-14-2015	12:35	ND	ND	ND	ND	ND	ND
59	Flange	Gas	5.11	-5.53																
60	OEL	Gas	0.05	-10.36																
61	OEL	Gas	0.19	-10.64																
62	OEL	Gas	0.26	-10.56																
63	OEL	Gas	0.27	-10.64																
64	OEL	Gas	0.58	-10.18																
65	OEL	Gas	1.08	-8.76																
66	OEL	Gas	1.30	-8.73																
67	OEL	Gas	1.48	-8.15																
68	OEL	Gas	1.48	-7.20																
69	OEL	Gas	2.08	-2.16																
70	OEL	Gas	2.30	-8.43																
71	OEL	Gas	2.54	-8.41																
72	OEL	Gas	2.54	-6.58																
73	OEL	Gas	2.54	-5.60																
74	OEL	Gas	2.65	-4.44																
75	OEL	Gas	3.18	-8.47	-5.55								TB-047A/TB-047B	Aug-12-2015	11:54	ND	ND	ND	ND	ND
76	OEL	GAS	3.48	-4.71																
77	OEL	Gas	3.70	-8.40																
78	OEL	GAS	3.99	-3.53	-1.39								TB-053A/TB-053B	Aug-14-2015	14:09	ND	ND	ND	ND	ND
79	OEL	Gas	4.00	-5.49	-2.28								TB-049A/TB-049B	Aug-13-2015	11:23	ND	ND	ND	ND	ND
80	OEL	Gas	4.00	-5.20	-5.47								TB-050A/TB-050B	Aug-13-2015	13:18	ND	ND	ND	ND	ND
81	OEL	Gas	4.41	-2.57																
82	OEL	Gas	4.76	-2.14																
83	OEL	Gas	4.92	-3.71																
84	OEL	GAS	4.95	-3.25	-5.36								TB-051A/TB-051B	Aug-14-2015	10:33	ND	ND	ND	ND	3.90E+01
85	OEL	Gas	4.95	-1.92	-1.53								TB-048A/TB-048B	Aug-12-2015	13:03	ND	ND	ND	ND	ND
86	OEL	Gas	5.00	-3.94																
87	OEL	Gas	5.00	-2.96	-1.09								TB031A/TB031B	Feb-26-2015	14:20	ND	ND	ND	ND	2.30E+01
88	OEL	Gas	5.00	-0.58																
89	OEL	Gas	5.48	-4.08																
90	OEL	Gas	5.60	-2.44																
91	OEL	Gas	5.62	-2.90	-1.19															
92	OEL	Gas	5.70	-3.41	-5.76								TB-042A/TB-042B	Aug-07-2015	11:35	1.80E+01	ND	ND	ND	3.40E+01
93	OEL	Gas	5.70	-1.99	-2.31								TB045A/TB045B	Aug-11-2015	12:25	ND	ND	ND	ND	ND
94	OEL	Gas	5.70	-1.99	-2.31								TB-046A/TB046B	Aug-12-2015	10:10	ND	ND	ND	ND	1.10E+01
95	Other	Gas	1.04	-10.43																
96	Other	Gas	1.30	-10.08																
97	Other	Gas	1.48	-9.16																
98	Other	Gas	1.83	-8.03																
99	Other	Gas	1.85	-9.05																
99	Other	Gas	1.95	-8.55	-5.56								TB-043A/TB-042B	Aug-07-2015	13:39	ND	ND	ND	ND	4.30E+01
100	Other	Gas	2.48	-6.88																
101	Other	Gas	2.48	-4.98	-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	-5.30																
103	Other	Gas	2.77	-7.17																

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

Note: results with all values = zero are hidden, see Appendix E for Descriptive Statistics for all leak Concentrations and Emission Rates.

Sort order, sorted by Component Type, & Method 21 Concentration, ppmv	Component Information		CONCENTRATION DATA													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									
Carbon disulfide	Chlorobenzene	Cyclohexane	Ethanol	Ethyl Acetate	Ethylbenzene	Heptane	Hexane	Isopropyl alcohol	Methyl Isobutyl Ketone	Toluene	TPH Gasoline (C4-C12)	Trichloroethene (TCE)	Xylenes (total)	1,2,4-Trimethylbenzene	1,3,5-Trimethylbenzene	2-Hexanone	4-Ethyltoluene	Acetone	Benzene						
A. Components in Gas Service with TVA, HiFlow, TO-15 & ASTM Data:																									
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	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	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	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	-	-	-	-	-	-	-	-	
80	OEL	Gas	ND	ND	ND	6.10E+01	1.30E+01	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	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	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	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	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	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	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	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	4.40E+01	ND	ND	ND	4.80E+03	ND	ND	-	-	-	-	-	-	-	-	
102	Other	Gas																							
103	Other	Gas																							

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

Note: results with all values = zero are hidden, see Appendix E for Descriptive Statistics for all leak Concentrations and Emission Rates.

Sort order, sorted by Component Type, & Method 21 Concentration, ppmv	Component Information		kg/hr													ASTM 1945/3588 Concentration Data							
	Component Type	Service	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 & ASTM Data:																							
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 & Calculatio

Note: results with all values = zero are hidden, see Appendix E for Descriptive Statistics for all leak Concentrations and Emission Rates.

Sort order, sorted by Component Type, & Method 21 Concentration, ppmv	Component Information		ASTM 1945/3588 Concentration Data																	ASTM 1945/3588 Emissions (kg/hr)					
	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	Carbon Dioxide	
A. Components in Gas Service with TVA, HiFlow, TO-15 & ASTM Data:																									
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 & Calculatio

Note: results with all values = zero are hidden, see Appendix E for Descriptive Statistics for all leak Concentrations and Emission Rates.

Sort order, sorted by Component Type, & Method 21 Concentration, ppmv	Component Information		kg/hr	kg/hr	kg/hr	kg/hr	kg/hr	kg/hr	kg/hr	kg/hr
	Component Type	Service	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)
A. Components in Gas Service with TVA, HiFlow, TO-15 & ASTM Data:										
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 Concentrations and Emission Rates.

Sort order, sorted by Component Type, & Method 21 Concentration, ppmv	Component Information		Site Characterization					METEOROLOGY:				METEOROLOGY		
	Component Type	Service	EQUIPMENT/ACTIVITY DESCRIPTION:	Date	DATE:	REGULATORY IDs:	#WELLS:	FACILITY TYPE: (OIL/GAS)	THROUGHPUT(s):	WIND FROM/ SPEED (mph)	WIND SPEED (mph)	AMBIENT TEMPERATURE (F)	% RH:	BAROMETRIC PRESSURE (inHg):
A. Components in Gas Service with TVA, HiFlow, TO-15 & ASTM Data:														
104	Other	Gas	Natural Gas Well	Aug 7 - 2015	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	Gas Wells	Feb-25-2015	25-Feb-15	SEC.33 T-20N R-2W	4	Gas	140.9MCF/DAY	N	3	60	31	30.14
106	Other	Gas	Gas Wells	Feb-24-2015	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	Gas Wells	Feb-24-2015	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	Gas Wells	Feb-26-2015	26-Feb-15	SEC.33 T-20N R-2W	4	Gas	140.9MCF/DAY	N	1.3	46	50	29.93
109	Other	Gas	Gas Wells	Feb-26-2015	26-Feb-15	SEC.33 T-20N R-2W	4	Gas	140.9MCF/DAY	N	1.3	46	50	29.93
110	Other	Gas	Water separation	Jan-27-2015	27-Jan-15	TITLE V 041	0	Gas		WSW	1.3	77.8	47.9	29.68
111	Other	Gas	Natural Gas Well with lift compressor and glycol dehydrator	Feb-23-2-15	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	Oil Production Facility	Jan-23-2015	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	Gas Wells	Feb-25-2015	25-Feb-15	SEC.33 T-20N R-2W	4	Gas	140.9MCF/DAY	N	3	60	31	30.14
114	Other	Gas	Gas Wells	Feb-24-2015	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	Gas Wells	Feb-24-2015	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	Oil	Jan-22-2015	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	Gas Wells	Feb-25-2015	25-Feb-15	SEC.33 T-20N R-2W	4	Gas	140.9MCF/DAY	N	3	60	31	30.14
118	Other	Gas	Gas Wells	Feb-24-2015	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	Water separation	Jan-27-2015	27-Jan-15	TITLE V 041	0	Gas		WSW	1.3	77.8	47.9	29.68
120	Other	Gas	Gas Wells	Feb-25-2015	25-Feb-15	SEC.33 T-20N R-2W	4	Gas	140.9MCF/DAY	N	3	60	31	30.14
121	Other	Gas	Water separation	Jan-29-2015	29-Jan-15	TITLE V 041	0	Gas		WSW	4	81.3	34.5	29.5
122	Other	Gas	Water separation	Jan-28-2015	28-Jan-15	TITLE V 041	0	Gas		WSW	1.5	-	-	29.6
123	Other	Gas	Water separation	Jan-27-2015	27-Jan-15	TITLE V 041	0	Gas		WSW	1.3	77.8	47.9	29.68
124	Other	Gas	Natural Gas Well with lift compressor and glycol dehydrator	Feb-23-2-15	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	Natural Gas Well with lift compressor and glycol dehydrator	Feb-23-2-15	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	Natural Gas Well with lift compressor and glycol dehydrator	Feb-23-2-15	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	Natural Gas Well Site	Aug 6-2015	6-Aug-15		2	Gas	96.25 SCFM	W	2.9	89.9	27.7	29.74
128	Valve	Gas	Oil Production Facility	Jan-23-2015	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	Oil Production Facility	Jan-23-2015	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	Testing/Group Gathering Facility, Automatic Well Testing	Jan-26-2015	26-Jan-15	TITLE V 041	0	Gas		SW	4.2	77.8	27.6	29.63
131	Valve	Gas	NG Compressor & Transmission	Jan-26-2015	26-Jan-15	TITLE V 041	0	NG	4063 mcf/day	East	3	79.8	21.9	29.37
132	Valve	Gas	Oil	Jan-22-2015	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	NG Compressor & Transmission	Jan-26-2015	26-Jan-15	TITLE V 041	0	NG	4063 mcf/day	East	3	79.8	21.9	29.37
134	Valve	Gas	Oil	Jan-22-2015	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	Natural Gas Well with lift compressor and glycol dehydrator	Feb-23-2-15	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	Water separation	Jan-27-2015	27-Jan-15	TITLE V 041	0	Gas		WSW	1.3	77.8	47.9	29.68
137	Valve	Gas	Oil Production Facility	Jan-23-2015	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	Water separation	Jan-29-2015	29-Jan-15	TITLE V 041	0	Gas		WSW	4	81.3	34.5	29.5
139	Valve	Gas	Water separation	Jan-29-2015	29-Jan-15	TITLE V 041	0	Gas		WSW	4	81.3	34.5	29.5
140	Valve	Gas	Water separation	Jan-27-2015	27-Jan-15	TITLE V 041	0	Gas		WSW	1.3	77.8	47.9	29.68
141	Valve	Gas	Water separation	Jan-28-2015	28-Jan-15	TITLE V 041	0	Gas		WSW	1.5	-	-	29.6
142	Valve	Gas	Water separation	Jan-28-2015	28-Jan-15	TITLE V 041	0	Gas		WSW	1.5	-	-	29.6
143	Valve	Gas	Water separation	Jan-29-2015	29-Jan-15	TITLE V 041	0	Gas		WSW	4	81.3	34.5	29.5
144	Valve	Gas	Water separation	Jan-28-2015	28-Jan-15	TITLE V 041	0	Gas		WSW	1.5	-	-	29.6
145	Valve	Gas	Water separation	Jan-29-2015	29-Jan-15	TITLE V 041	0	Gas		WSW	4	81.3	34.5	29.5
146	Valve	Gas	Water separation	Jan-28-2015	28-Jan-15	TITLE V 041	0	Gas		WSW	1.5	-	-	29.6
147	Valve	Gas	Gas Wells	Feb-26-2015	26-Feb-15	SEC.33 T-20N R-2W	4	Gas	140.9MCF/DAY	N	1.3	46	50	29.93
148	Valve	Gas	Natural Gas Well	Aug 11 - 2015	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	Water separation	Jan-28-2015	28-Jan-15	TITLE V 041	0	Gas		WSW	1.5	-	-	29.6
150	Valve	Gas	Natural Gas Well	Aug 11 - 2015	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	Gas Wells	Feb-25-2015	25-Feb-15	SEC.33 T-20N R-2W	4	Gas	140.9MCF/DAY	N	3	60	31	30.14
152	Valve	Gas	Gas Wells	Feb-26-2015	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	NG Compressor & Transmission	Jan-26-2015	26-Jan-15	TITLE V 041	0	NG	4063 mcf/day	East	3	79.8	21.9	29.37
154	Valve	Gas	Water separation	Jan-28-2015	28-Jan-15	TITLE V 041	0	Gas		WSW	1.5	-	-	29.6
155	Valve	Gas	Gas Wells	Feb-24-2015	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	Gas Wells	Feb-27-2015	27-Feb-15	Not Posted	2	Gas	Meter Not Available	S	7.5	69.5	38.7	29.64
157	Valve	Gas	Water separation	Jan-28-2015	28-Jan-15	TITLE V 041	0	Gas		WSW	1.5	-	-	29.6
158	Valve	Gas	Water separation	Jan-28-2015	28-Jan-15	TITLE V 041	0	Gas		WSW	1.5	-	-	29.6
159	Valve	Gas	Natural Gas Well Site	Aug 6-2015	6-Aug-15		1	Gas	0 SCFM	W	5.2	88.5	52.7	20.73
160	Valve	Gas	Natural Gas Well Site	Aug 6-2015	6-Aug-15		1	Gas	0 SCFM	W	5.2	88.5	52.7	20.73

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

Note: results with all values = zero are hidden, see Appendix E for Descriptive Statistics for all leak Concentrations and Emission Rates.

Sort order, sorted by Component Type, & Method 21 Concentration, ppmv	Component Information		ATA			CANISTER DATA					TEDLAR BAG DATA			EPA METHOD TO-15 CONCENTRATION DATA				EPA METHOD TO-15 CONCE		
	Component Type	Service	CALCULATED	CALCULATED	CALCULATED									ppmv @ STP	ppmv @ STP	ppmv @ STP	ppmv @ STP	ppmv @ STP	ppmv @ STP	
			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	1,2,4-Trimethylbenzene	1,3,5-Trimethylbenzene	2-Hexanone	4-Ethyltoluene	Acetone	Benzene
A. Components in Gas Service with TVA, HiFlow, TO-15 & ASTM Data:																				
104	Other	Gas	2.83	-5.74																
105	Other	Gas	2.90	-8.41																
106	Other	Gas	3.30	-5.66																
107	Other	Gas	3.54	-4.29																
108	Other	Gas	3.60	-8.91																
109	Other	Gas	3.60	-8.44																
110	Other	Gas	3.89	-4.91	-2.08	CAN014	Jan-27-2015	0.528472222	OEC-39-0339	28.5	0	TB014	Jan-27-2015	12:43	ND	ND	ND	ND	ND	2.80E+01
111	Other	Gas	3.95	-4.35																
112	Other	Gas	4.00	-4.88																
113	Other	Gas	4.03	-4.22																
114	Other	Gas	4.08	-4.30																
115	Other	Gas	4.19	-6.49																
116	Other	Gas	4.26	-3.35	-1.13	CAN009	Jan-22-2015	0.617361111	OEC-39-0296	28.75	0	TB009	Jan-22-2015	14:50	ND	1.30E+02	2.30E+03	2.40E+02	ND	5.60E+01
117	Other	Gas	4.44	-5.02																
118	Other	Gas	4.70	2.19																
119	Other	Gas	4.81	-5.17																
120	Other	Gas	5.00	-3.04	-1.12							TB029A/TB029B	Feb-25-2015	14:51	ND	ND	ND	ND	ND	2.10E+01
121	Other	Gas	5.00	-4.03																
122	Other	Gas	5.02	-4.23	-2.65	CAN020	Jan-29-2015	10:36	OEC-29-708	28.25	0	TB020	Jan-29-2015	10:38	ND	ND	ND	ND	ND	2.00E+01
123	Other	Gas	5.06	-5.03	-3.11	CAN016	Jan-27-2015	14:18	OEC-29-728	27	0	TB016	Jan-27-2015	14:20	ND	ND	ND	ND	ND	4.30E+01
124	Other	Gas	5.11	-1.81																
125	Other	Gas	5.11	-1.73	-0.77							TB025A/TB025B	Feb-23-2015	0.481944444	ND	ND	ND	ND	ND	5.30E+01
126	Other	Gas	5.11	-1.20																
127	Other	Gas	5.70	-1.80	-0.31							TB-40A/TB-40B	Aug-06-2015	0.581944444	ND	ND	ND	ND	ND	8.40E+00
128	Valve	Gas	0.30	-8.67																
129	Valve	Gas	0.51	-9.03																
130	Valve	Gas	1.08	-9.50																
131	Valve	Gas	1.26	-9.16																
132	Valve	Gas	1.70	-8.04																
133	Valve	Gas	1.81	-8.62																
134	Valve	Gas	1.86	-8.60																
135	Valve	Gas	2.48	-7.12																
136	Valve	Gas	2.51	-7.55																
137	Valve	Gas	2.52	-7.60	-3.43	CAN011	Jan-23-2015	12:03	OEC-29-702	28.5	0	TB011	Jan-23-2015	12:04	ND	ND	ND	ND	ND	7.40E+01
138	Valve	Gas	2.79	-8.18																
139	Valve	Gas	2.88	-8.15																
140	Valve	Gas	2.90	-8.14																
141	Valve	Gas	2.97	-8.76		CAN017	Jan-28-2015	14:11	OEC-117-34	28.5	0	TB017	Jan-28-2015	14:16	ND	ND	ND	ND	ND	ND
142	Valve	Gas	3.08	-7.61																
143	Valve	Gas	3.15	-5.31																
144	Valve	Gas	3.26	-9.33																
145	Valve	Gas	3.36	-7.31																
146	Valve	Gas	3.49	-4.74																
147	Valve	Gas	3.52	-8.67																
148	Valve	Gas	4.12	-1.59																
149	Valve	Gas	4.30	-5.90																
150	Valve	Gas	4.37	-2.41	-5.15							TB044A/TB044B	Aug-11-2015	11:50	ND	ND	ND	ND	ND	ND
151	Valve	Gas	4.48	-3.85	-1.71							TB028A/TB028B	Feb-25-2015	14:02	ND	ND	ND	ND	ND	9.80E+00
152	Valve	Gas	4.70	-4.21	-1.76							TB032A/TB032B	Feb-26-2015	15:15	ND	ND	ND	ND	ND	1.10E+01
153	Valve	Gas	4.75	-3.77	-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	ND
154	Valve	Gas	4.78	-5.07																
155	Valve	Gas	5.00	-5.44	-2.19							TB026A/TB026B	Feb-24-2015	10:15	ND	ND	ND	ND	ND	ND
156	Valve	Gas	5.00	-0.63																
157	Valve	Gas	5.02	-4.95																
158	Valve	Gas	5.02	-3.80																
159	Valve	Gas	5.05	-5.22																
160	Valve	Gas	5.43	-4.23	-1.76							TB-041A/TB-041B	Aug-06-2015	14:35	ND	ND	ND	ND	ND	ND

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

Note: results with all values = zero are hidden, see Appendix E for Descriptive Statistics for all leak Concentrations and Emission Rates.

Sort order, sorted by Component Type, & Method 21 Concentration, ppmv	Component Information		CONCENTRATION DATA													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										
		Carbon disulfide	Chlorobenzene	Cyclohexane	Ethanol	Ethyl Acetate	Ethylbenzene	Heptane	Hexane	Isopropyl alcohol	Methyl Isobutyl Ketone	Toluene	TPH Gasoline (C4-C12)	Trichloroethene (TCE)	Xylenes (total)		1,2,4-Trimethylbenzene	1,3,5-Trimethylbenzene	2-Hexanone	4-Ethyltoluene	Acetone	Benzene				
A. Components in Gas Service with TVA, HiFlow, TO-15 & ASTM Data:																										
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	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	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	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	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	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	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	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	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	-	-	-	-	-	-	-	-	-	
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	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	1.60E+01	ND	ND	ND	ND	ND	ND	-	-	-	-	-	-	-	-	-	4.0610E-07
152	Valve	Gas	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	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	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	1.40E+01	ND	-	-	-	-	-	-	-	-	-	-

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

Note: results with all values = zero are hidden, see Appendix E for Descriptive Statistics for all leak Concentrations and Emission Rates.

Sort order, sorted by Component Type, & Method 21 Concentration, ppmv	Component Information		Emission Rates (kg/hr)													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	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 & ASTM Data:																					
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	-	-	-	-	-	-	-	-	-	-	-	-	6.3967E-07	-	2.1021E+01	2.1021E+08	7.8635E+01	7.8635E+08	-

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

Note: results with all values = zero are hidden, see Appendix E for Descriptive Statistics for all leak Concentrations and Emission Rates.

Sort order, sorted by Component Type, & Method 21 Concentration, ppmv	Component Information		ASTM 1945/3588 Concentration Data																	ASTM 1945/3588 Emissions (kg/hr)					
	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	Carbon Dioxide	
A. Components in Gas Service with TVA, HiFlow, TO-15 & ASTM Data:																									
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	-	-	-	-	-	-	-	-	-	-	-	-	-	2.3390E+00	7.6598E+00	4.9192E-03

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

Note: results with all values = zero are hidden, see Appendix E for Descriptive Statistics for all leak Concentrations and Emission Rates.

Sort order, sorted by Component Type, & Method 21 Concentration, ppmv	Component Information		kg/hr	kg/hr	kg/hr	kg/hr	kg/hr	kg/hr	kg/hr	kg/hr
	Component Type	Service	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)
A. Components in Gas Service with TVA, HiFlow, TO-15 & ASTM Data:										
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	1.7412E-02	-	-	-	-	-	-	1.7413E-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 Concentrations and Emission Rates.

Sort order, sorted by Component Type, & Method 21 Concentration, ppmv	Component Information		Site Characterization					METEOROLOGY:						
	Component Type	Service	EQUIPMENT/ACTIVITY DESCRIPTION:	Date	DATE:	REGULATORY IDs:	#WELLS:	FACILITY TYPE: (OIL/GAS)	THROUGHPUT(s):	WIND FROM/ SPEED (mph)	WIND SPEED (mph)	AMBIENT TEMPERATURE (F)	% RH:	BAROMETRIC PRESSURE (inHg):
B. Components in Liquid Service, With TVA and HiFlow Data, 211:259Not used in this report														
MAX =														
AVG =														
MIN =														
RANGE =														
# NON-ZERO =														
% non-zero results =														
total N all results =														
161	Connector	Liquid	Natural Gas Processing	Mar-3-2015	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	Jan-20-2015	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	Mar-3-2015	3-Mar-15		0	Natural Gas Liquids	Multiple Inputs/Outputs	SE	7.1	57.7	70	29.69
164	Connector	Liquid	Gas Plant	Mar-2-2015	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	Mar-3-2015	3-Mar-15		0	Natural Gas Liquids	Multiple Inputs/Outputs	SE	7.1	57.7	70	29.69
166	Connector	Liquid	Gas Plant	Mar-2-2015	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	Mar-2-2015	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	Mar-2-2015	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	Mar-2-2015	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	Jan-30-2015	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	Jan-21-2015	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	Mar-3-2015	3-Mar-15		0	Natural Gas Liquids	Multiple Inputs/Outputs	SE	7.1	57.7	70	29.69
173	OEL	Liquid	Oil Production Facility	Jan-23-2015	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	Jan-22-2015	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	Jan-21-2015	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	Jan-21-2015	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	Jan-21-2015	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	Jan-27-2015	27-Jan-15	TITLE V 041	0	Gas		WSW	1.3	77.8	47.9	29.68
179	OEL	Liquid	Gas Plant	Mar-2-2015	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	Mar-3-2015	3-Mar-15		0	Natural Gas Liquids	Multiple Inputs/Outputs	SE	7.1	57.7	70	29.69
181	Other	Liquid	Oil	Jan-22-2015	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	Jan-22-2015	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	Jan-29-2015	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	Feb-23-2-15	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	Jan-30-2015	30-Jan-15	TITLE V 041	0	Gas		W	3.5	71	44.6	29.41
186	Pump	Liquid	Water separation	Jan-28-2015	28-Jan-15	TITLE V 041	0	Gas		WSW	1.5	-	-	29.6
187	Pump	Liquid	Water separation	Jan-28-2015	28-Jan-15	TITLE V 041	0	Gas		WSW	1.5	-	-	29.6
188	Valve	Liquid	Gas Plant	Mar-2-2015	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	Mar-2-2015	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	Jan-28-2015	28-Jan-15	TITLE V 041	0	Gas		WSW	1.5	-	-	29.6
191	Valve	Liquid	Gas Plant	Mar-2-2015	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	Jan-30-2015	30-Jan-15	TITLE V 041	0	Gas		W	3.5	71	44.6	29.41
193	Valve	Liquid	Water separation	Jan-30-2015	30-Jan-15	TITLE V 041	0	Gas		W	3.5	71	44.6	29.41
194	Valve	Liquid	Gas Plant	Mar-2-2015	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	Jan-27-2015	27-Jan-15	TITLE V 041	0	Gas		WSW	1.3	77.8	47.9	29.68
196	Valve	Liquid	Gas Plant	Mar-2-2015	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	Jan-28-2015	28-Jan-15	TITLE V 041	0	Gas		WSW	1.5	-	-	29.6
198	Valve	Liquid	Water separation	Jan-28-2015	28-Jan-15	TITLE V 041	0	Gas		WSW	1.5	-	-	29.6
199	Valve	Liquid	Gas Plant	Mar-2-2015	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	Mar-2-2015	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	Jan-22-2015	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	Jan-28-2015	28-Jan-15	TITLE V 041	0	Gas		WSW	1.5	-	-	29.6
203	Valve	Liquid	Water separation	Jan-30-2015	30-Jan-15	TITLE V 041	0	Gas		W	3.5	71	44.6	29.41
204	Valve	Liquid	Water separation	Jan-28-2015	28-Jan-15	TITLE V 041	0	Gas		WSW	1.5	-	-	29.6
205	Valve	Liquid	Water separation	Jan-30-2015	30-Jan-15	TITLE V 041	0	Gas		W	3.5	71	44.6	29.41
206	Valve	Liquid	Gas Plant	Mar-2-2015	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	Jan-28-2015	28-Jan-15	TITLE V 041	0	Gas		WSW	1.5	-	-	29.6
208	Valve	Liquid	Water separation	Jan-30-2015	30-Jan-15	TITLE V 041	0	Gas		W	3.5	71	44.6	29.41
209	Valve	Liquid	Water separation	Jan-29-2015	29-Jan-15	TITLE V 041	0	Gas		WSW	4	81.3	34.5	29.5
210	Valve	Liquid	Water separation	Jan-29-2015	29-Jan-15	TITLE V 041	0	Gas		WSW	4	81.3	34.5	29.5
211	Valve	Liquid	Water separation	Jan-28-2015	28-Jan-15	TITLE V 041	0	Gas		WSW	1.5	-	-	29.6

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

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

Note: results with all values = zero are hidden, see Appendix E for Descriptive Statistics for all Leak Concentrations and Emission Rates.

Sort order, sorted by Component Type, & Method 21 Concentration, ppmv	Component Information		Site Characterization					Component Information			IR CAMERA		EPA Method 21 Results		HIGH FLOW SAM		
	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)	Component Type	Service	Description	Date	Time	Date	Time	Method 21 Leak Concentration, ppmv	Date
B. Components in Liquid Service, With TVA and HiFlow Data, 211:259 Not used in this report																	
MAX =															2.90E+05		
AVG =															3.04E+04		
MIN =															1.15E+02		
RANGE =															2.90E+05		
# NON-ZERO =															24		
% non-zero results =															100%		
total N all results =															24		
161	Connector	Liquid	5	Sunny	0	1		Y Quarterly Summit	Connector	Liquid	Threaded, Propane, LDAR Tag 006519	3-Mar-15		3-Mar-15	14:49	200.00	3-Mar-15
162	Connector	Liquid	100	cloudy	0	3	2	Y	Connector	Liquid	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	Connector	Liquid	1.5" Plug Propane LDAR Tag #006312	3-Mar-15	12:01	3-Mar-15	14:30	15000.00	3-Mar-15
164	Connector	Liquid	95	Cloudy	0		Several (electric)	Y Quarterly Paradyne - use Eagle	Connector	Liquid	Plug Butane			Mar-2-2015	14:37	39000.00	Mar-2-2015
165	Connector	Liquid	5	Sunny	0	1		Y Quarterly Summit	Connector	Liquid	1/4" Swagelok Connector Natural Gasoline	3-Mar-15		3-Mar-15	15:21	50001.00	3-Mar-15
166	Connector	Liquid	95	Cloudy	0		Several (electric)	Y Quarterly Paradyne - use Eagle	Connector	Liquid	Plug Propane			Mar-2-2015	14:49	148000.00	Mar-2-2015
167	Connector	Liquid	95	Cloudy	0		Several (electric)	Y Quarterly Paradyne - use Eagle	Connector	Liquid	3/8" Butane			Mar-2-2015	15:00	150000.00	Mar-2-2015
168	Connector	Liquid	95	Cloudy	0		Several (electric)	Y Quarterly Paradyne - use Eagle	Connector	Liquid	3/8" Butane Mix			Mar-2-2026	15:04	150000.00	Mar-2-2015
169	Connector	Liquid	95	Cloudy	0		Several (electric)	Y Quarterly Paradyne - use Eagle	Connector	Liquid	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	Flange	Liquid	on Reflux line to V-504	-	-	Jan-30-2015	10:11	120.00	Jan-30-2015
171	OEL	Liquid	2.3	Sunny	3	11	2	Y, Avanti	OEL	Liquid	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	OEL	Liquid	1/2" Propane	3-Mar-15		3-Mar-15	14:42	0.70	3-Mar-15
173	OEL	Liquid	0	Sunny	1	3	2	Y, Avanti	OEL	Liquid	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	Liquid	OEL at Well #9			Jan-22-2015	10:39	300.00	Jan-22-2015
175	OEL	Liquid	2.3	Sunny	3	11	2	Y, Avanti	OEL	Liquid	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	OEL	Liquid	Christmas Tree at well			Jan-21-2015	15:09	1600.00	Jan-21-2015
177	OEL	Liquid	2.3	Sunny	3	11	2	Y, Avanti	OEL	Liquid	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	OEL	Liquid	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 Paradyne - use Eagle	OEL	Liquid	Natural Gas			Mar-2-2015	14:19	24000.00	Mar-2-2015
180	OEL	Liquid	5	Sunny	0	1		Y Quarterly Summit	OEL	Liquid	National Gasoline Sample Line	3-Mar-15		3-Mar-15	15:30	150000.00	3-Mar-15
181	Other	Liquid	50	Sunny	15	5	4	Y, Avanti	Other	Liquid	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	Other	Liquid	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	Other	Liquid	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	Other	Liquid	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	Pump	Liquid	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	Pump	Liquid	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	Pump	Liquid	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 Paradyne - use Eagle	Valve	Liquid	1" Natural Gasoline			Mar-2-2015	14:33	10.00	Mar-2-2015
189	Valve	Liquid	95	Cloudy	0		Several (electric)	Y Quarterly Paradyne - use Eagle	Valve	Liquid	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	Valve	Liquid	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 Paradyne - use Eagle	Valve	Liquid	4" Propane			Mar-2-2015	14:56	60.00	Mar-2-2015
192	Valve	Liquid	98%	cloudy				Y, Operator run with Eagle	Valve	Liquid	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	Valve	Liquid	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 Paradyne - use Eagle	Valve	Liquid	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	Valve	Liquid	10" valve			Jan-27-2015	13:10	128.00	Jan-27-2015
196	Valve	Liquid	95	Cloudy	0		Several (electric)	Y Quarterly Paradyne - use Eagle	Valve	Liquid	6" Natural Gasoline			Mar-2-2015	14:49	139.00	Mar-2-2015
197	Valve	Liquid	90%	cloudy				Y, Operator run with Eagle	Valve	Liquid	1/2" Gate			Jan-28-2015	12:51	200.00	Jan-28-2015
198	Valve	Liquid	90%	cloudy				Y, Operator run with Eagle	Valve	Liquid	3" Ball Valve			Jan-28-2015	12:35	230.00	Jan-28-2015
199	Valve	Liquid	95	Cloudy	0		Several (electric)	Y Quarterly Paradyne - use Eagle	Valve	Liquid	4" Propane			Mar-2-2015	14:45	350.00	Mar-2-2015
200	Valve	Liquid	95	Cloudy	0		Several (electric)	Y Quarterly Paradyne - use Eagle	Valve	Liquid	6" Depropanizer Liquid			Mar-2-2027	15:13	300.00	Mar-2-2015
201	Valve	Liquid	50	Sunny	15	5	4	Y, Avanti	Valve	Liquid	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	Valve	Liquid	6" Gate			Jan-28-2015	13:20	687.00	Jan-28-2015
203	Valve	Liquid	98%	cloudy				Y, Operator run with Eagle	Valve	Liquid	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	Valve	Liquid	2" Gate			Jan-28-2015	14:45	10200.00	Jan-28-2015
205	Valve	Liquid	98%	cloudy				Y, Operator run with Eagle	Valve	Liquid	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 Paradyne - use Eagle	Valve	Liquid	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	Valve	Liquid	6" Gate			Jan-28-2015	13:50	27500.00	Jan-28-2015
208	Valve	Liquid	98%	cloudy				Y, Operator run with Eagle	Valve	Liquid	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	Valve	Liquid	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	Valve	Liquid	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	Valve	Liquid	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 & Calculatio

Note: results with all values = zero are hidden, see Appendix E for Descriptive Statistics for all leak Concentrations and Emission Rates.

Sort order, sorted by Component Type, & Method 21 Concentration, ppmv	Component Information		ATA			CANISTER DATA					TEDLAR BAG DATA			EPA METHOD TO-15 CONCENTRATION DATA				EPA METHOD TO-15 CONCE		
	Component Type	Service	CALCULATED	CALCULATED	CALCULATED	Sample #	Date	Time	Can ID	Can I-Vac (in Hg)	Can F-Vac (in Hg)	Sample(s) #	Date	Time	ppmv @ STP	ppmv @ STP	ppmv @ STP	ppmv @ STP	ppmv @ STP	ppmv @ STP
			Log10 TVA as CH4, ppmv	Log10 CH4 EmRate, kg/hr, as methane	Log10 TOC of Linked TOC Emissions Estimates, kg/hr										1,2,4-Trimethylbenzene	1,3,5-Trimethylbenzene	2-Hexanone	4-Ethyltoluene	Acetone	Benzene
B. Components in Liquid Service, With TVA and HiFlow Data, 211:259Not used in this report																				
MAX =																				
AVG =																				
MIN =																				
RANGE =																				
# NON-ZERO =																				
% non-zero results =																				
total N all results =																				
161	Connector	Liquid										TB-038A/TB-038B	3-Mar-15	14:53	0	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	ND
163	Connector	Liquid										TB-037A/TB-037B	3-Mar-15	14:35	0	0	0	0	0	0
164	Connector	Liquid										TB034A/TB034B	Mar-2-2015	14:40	0	0	0	0	0	0
165	Connector	Liquid										TB-039A/TB-039B	3-Mar-15	15:33	0	0	0	0	0	0
166	Connector	Liquid										TB035A/TB035B	Mar-2-2015	14:53	0	0	0	0	0	0
167	Connector	Liquid													0	0	0	0	0	0
168	Connector	Liquid													0	0	0	0	0	0
169	Connector	Liquid													0	0	0	0	0	0
170	Flange	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	0
171	OEL	Liquid				-	-	-	-	-	-	-	-	-	ND	ND	ND	ND	ND	ND
172	OEL	Liquid													0	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	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	ND
175	OEL	Liquid				-	-	-	-	-	-	-	-	-	ND	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	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	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	ND
179	OEL	Liquid													0	0	0	0	0	0
180	OEL	Liquid													0	0	0	0	0	0
181	Other	Liquid													ND	ND	ND	ND	ND	ND
182	Other	Liquid													ND	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	ND
184	Other	Liquid													ND	ND	ND	ND	ND	ND
185	Pump	Liquid													ND	ND	ND	ND	ND	ND
186	Pump	Liquid													ND	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	ND
188	Valve	Liquid													0	0	0	0	0	0
189	Valve	Liquid													0	0	0	0	0	0
190	Valve	Liquid													ND	ND	ND	ND	ND	ND
191	Valve	Liquid													0	0	0	0	0	0
192	Valve	Liquid													ND	ND	ND	ND	ND	ND
193	Valve	Liquid													ND	ND	ND	ND	ND	ND
194	Valve	Liquid													0	0	0	0	0	0
195	Valve	Liquid													ND	ND	ND	ND	ND	ND
196	Valve	Liquid													0	0	0	0	0	0
197	Valve	Liquid													ND	ND	ND	ND	ND	ND
198	Valve	Liquid													ND	ND	ND	ND	ND	ND
199	Valve	Liquid													0	0	0	0	0	0
200	Valve	Liquid										TB036A/TB036B	Mar-2-2015	15:18	0	0	0	0	0	0
201	Valve	Liquid													ND	ND	ND	ND	ND	ND
202	Valve	Liquid													ND	ND	ND	ND	ND	ND
203	Valve	Liquid													ND	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	ND
205	Valve	Liquid													ND	ND	ND	ND	ND	ND
206	Valve	Liquid													0	0	0	0	0	0
207	Valve	Liquid													ND	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	ND
209	Valve	Liquid													ND	ND	ND	ND	ND	ND
210	Valve	Liquid													ND	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	ND

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

Note: results with all values = zero are hidden, see Appendix E for Descriptive Statistics for all Leak Concentrations and Emission Rates.

Sort order, sorted by Component Type, & Method 21 Concentration, ppmv	Component Information		CONCENTRATION DATA													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	Hexane	Isopropyl alcohol	Methyl Isobutyl Ketone	Toluene	TPH Gasoline (C4-C12)	Trichloroethene (TCE)	Xylenes (total)	1,2,4-Trimethylbenzene	1,3,5-Trimethylbenzene	2-Hexanone	4-Ethyltoluene	Acetone	Benzene			
B. Components in Liquid Service, With TVA and HiFlow Data, 211:259Not used in this report																									
MAX =																									
AVG =																									
MIN =																									
RANGE =																									
# NON-ZERO =																									
% non-zero results =																									
total N all results =																									
161	Connector	Liquid	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	0.00E+00		
162	Connector	Liquid	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0	0	0	0	0	0	0		
163	Connector	Liquid	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	0.00E+00		
164	Connector	Liquid	0	0	0	0	0	0	0	NT	0	0	0	0	26	0	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	0.00E+00		
166	Connector	Liquid	0	0	0	0	0	NT	0	NT	0	0	0	0	0	0	0	0	0	0	0	0	0		
167	Connector	Liquid	0	0	0	0	0	0	0	NT	0	0	0	0	0	0	0	0	0	0	0	0	0		
168	Connector	Liquid	0	0	0	0	0	NT	0	NT	0	0	0	0	0	0	0	0	0	0	0	0	0		
169	Connector	Liquid	0	0	0	0	0	0	0	NT	0	0	0	0	444,119	0	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	35	68	0.00E+00	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	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	0.00E+00		
173	OEL	Liquid	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	0.00E+00		
174	OEL	Liquid	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	36	0	0	0	0	0	0	0		
175	OEL	Liquid	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	35	68	0	0	0	0	0	0	0		
176	OEL	Liquid	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	0.00E+00		
177	OEL	Liquid	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	0.00E+00		
178	OEL	Liquid	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	0.00E+00		
179	OEL	Liquid	0	0	0	0	0	0	0	NT	0	0	0	0	444,119	0	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	0.00E+00		
181	Other	Liquid	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	0.00E+00		
182	Other	Liquid	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	0.00E+00		
183	Other	Liquid	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	14	ND	0	0	0	0	0	0	0		
184	Other	Liquid	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0	0	0	0	0	0	0		
185	Pump	Liquid	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0	0	0	0	0	0	0		
186	Pump	Liquid	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0	0	0	0	0	0	0		
187	Pump	Liquid	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0	0	0	0	0	0	0		
188	Valve	Liquid	0	0	0	0	0	0	0	NT	0	0	0	0	444,119	0	0	0	0	0	0	0	0		
189	Valve	Liquid	0	0	0	0	0	0	0	NT	0	0	0	0	444,119	0	0	0	0	0	0	0	0		
190	Valve	Liquid	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	5500	150	0	0	0	0	0	0	0		
191	Valve	Liquid	0	0	0	0	0	0	0	NT	0	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	140	ND	77	ND	0	0	0	0	0	0	0		
193	Valve	Liquid	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	140	ND	77	ND	0	0	0	0	0	0	0		
194	Valve	Liquid	0	0	0	0	0	0	0	NT	0	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	1200	ND	13000	ND	0.00E+00	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	0	0	0	0	444,119	0	0	0	0	0	0	0	0		
197	Valve	Liquid	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	0.00E+00		
198	Valve	Liquid	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	5500	150	0	0	0	0	0	0	0		
199	Valve	Liquid	0	0	0	0	0	0	0	NT	0	0	0	0	26	0	0	0	0	0	0	0	0		
200	Valve	Liquid	0	0	0	0	0	0	0	NT	0	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	36	0.00E+00	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	5500	150	0.00E+00	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	140	ND	77	ND	0	0	0	0	0	0	0		
204	Valve	Liquid	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	5500	150	0	0	0	0	0	0	0		
205	Valve	Liquid	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	140	ND	77	ND	0	0	0	0	0	0	0		
206	Valve	Liquid	0	0	0	0	0	0	0	NT	0	0	0	0	444,119	0	0	0	0	0	0	0	0		
207	Valve	Liquid	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	0.00E+00		
208	Valve	Liquid	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	170	ND	0	0	0	0	0	0	0		
209	Valve	Liquid	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	140	ND	77	ND	0	0	0	0	0	0	0		
210	Valve	Liquid	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	140	ND	77	ND	0	0	0	0	0	0	0		
211	Valve	Liquid	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	0.00E+00		

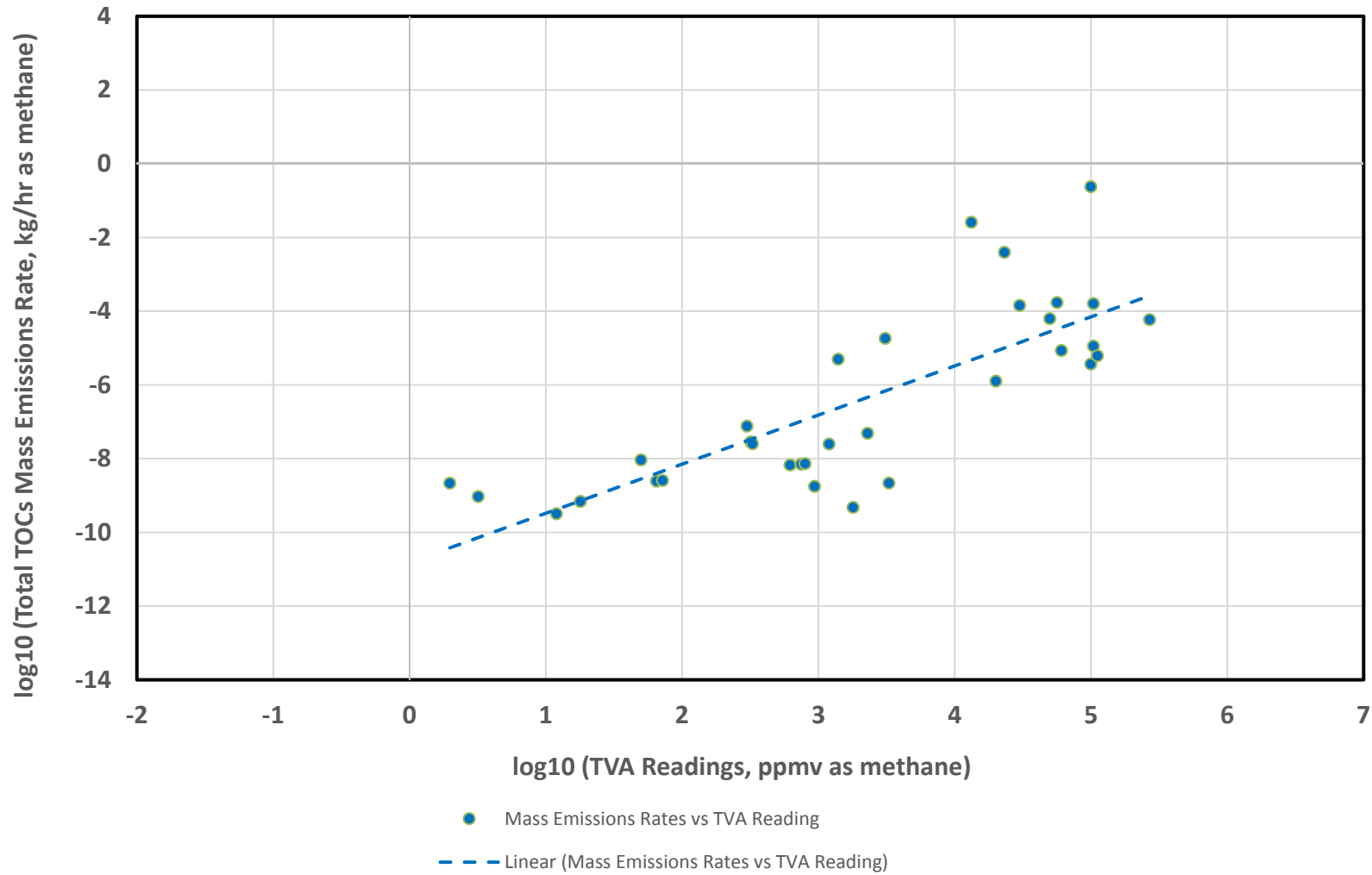
Section 2, Appendix A: Field & Lab Data & Calculatio

Note: results with all values = zero are hidden, see Appendix E for Descriptive Statistics for all leak Concentrations and Emission Rates.

Sort order, sorted by Component Type, & Method 21 Concentration, ppmv	Component Information		kg/hr	kg/hr	kg/hr	kg/hr	kg/hr	kg/hr	kg/hr	kg/hr
	Component Type	Service	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)
B. Components in Liquid Service, With TVA and HiFlow Data, 211:259 Not used in this report										
MAX =										
AVG =										
MIN =										
RANGE =										
# NON-ZERO =										
% non-zero results =										
total N all results =										
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	

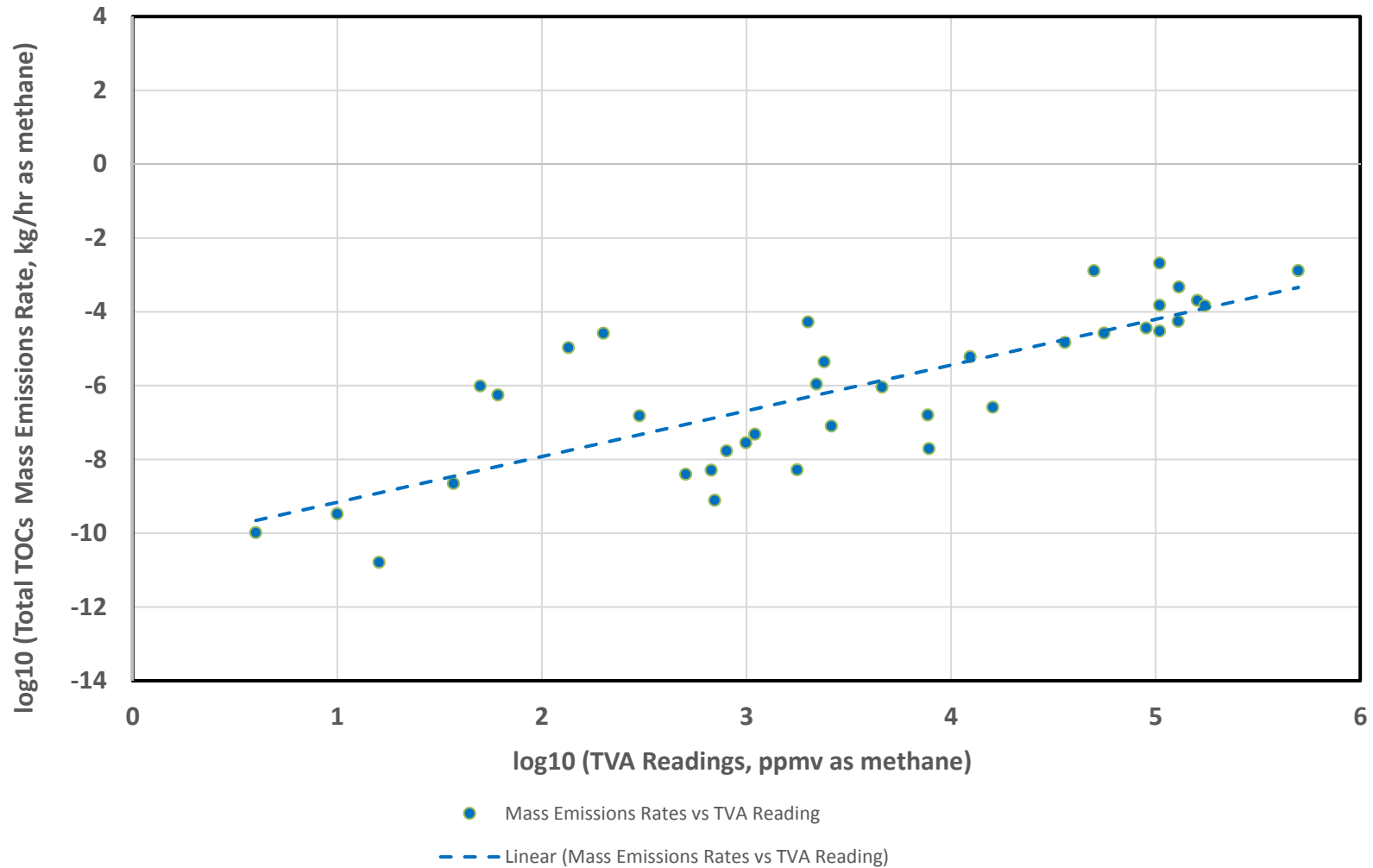
Section 2 - Appendix B
Figure B-1. Log10-Log10 Linear Correlation Plot of
Mass Emissions Rates vs. Leaking Equipment Concentrations.
as Methane - Valves in Gas Service.

$y = 1.332x - 10.815$
 $R^2 = 0.6155$



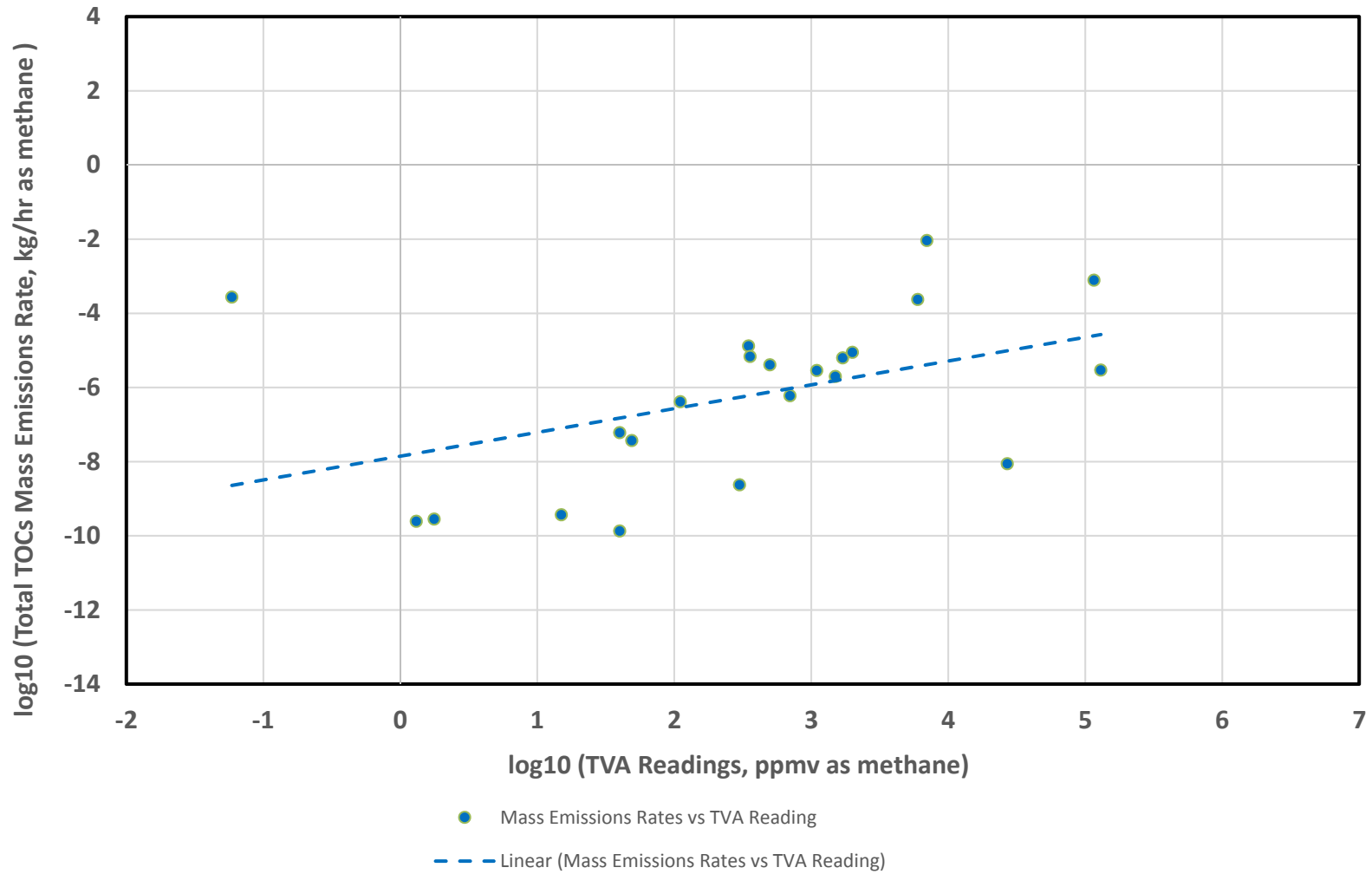
Section 2 - Appendix B
Figure B-2. Log10-Log10 Linear Correlation Plot of
Mass Emissions Rates vs. Leaking Equipment Concentrations
as Methane for Connectors in Gas Service.

$y = 1.2397x - 10.403$
 $R^2 = 0.6158$



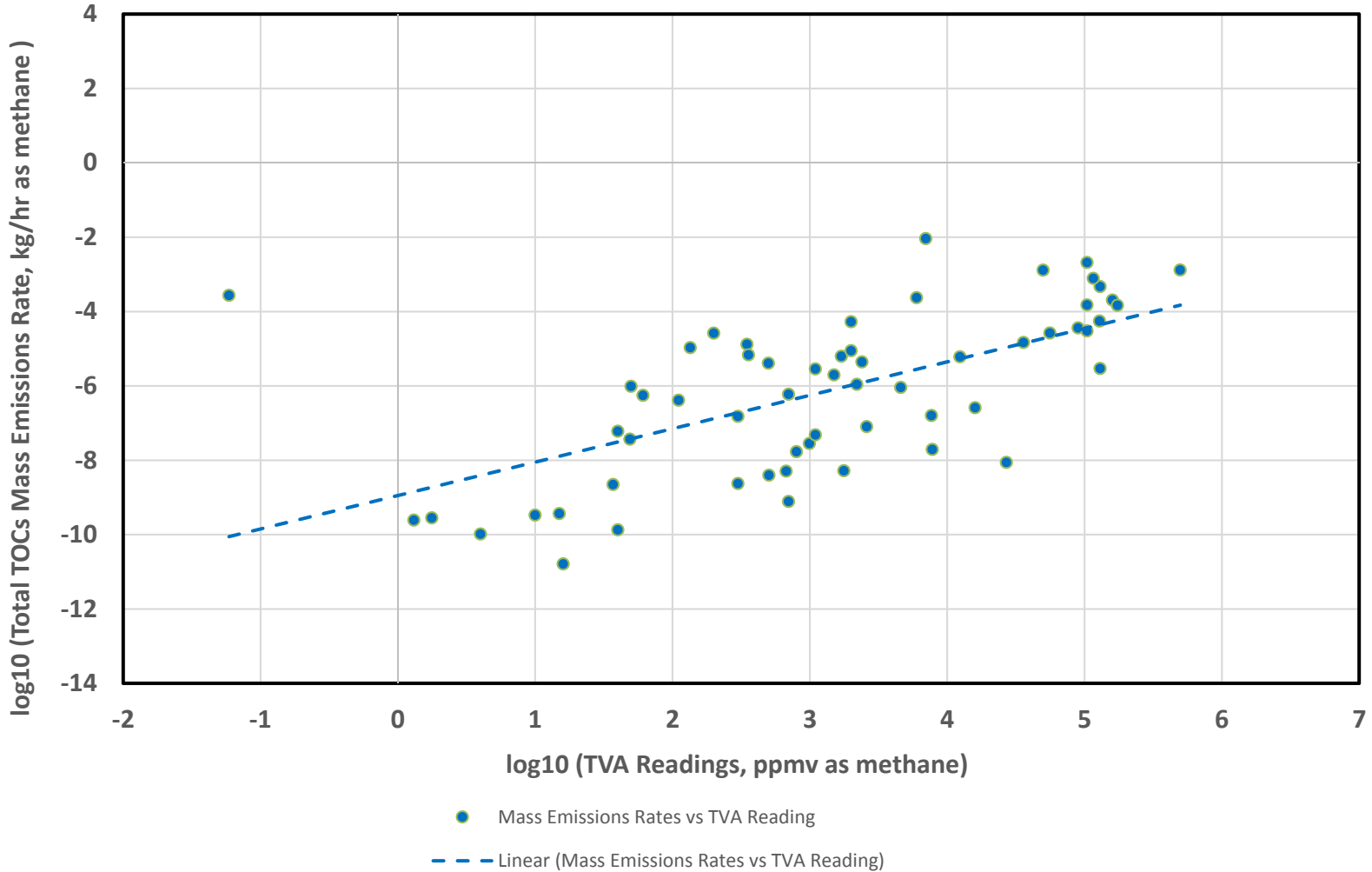
Section 2 Appendix B
Figure B-3. Log10-Log10 Linear Correlation Plot of
Mass Emissions Rates vs. Leaking Equipment Concentrations
as Methane - Flanges in Gas Service.

$y = 0.6415x - 7.8531$
 $R^2 = 0.2$



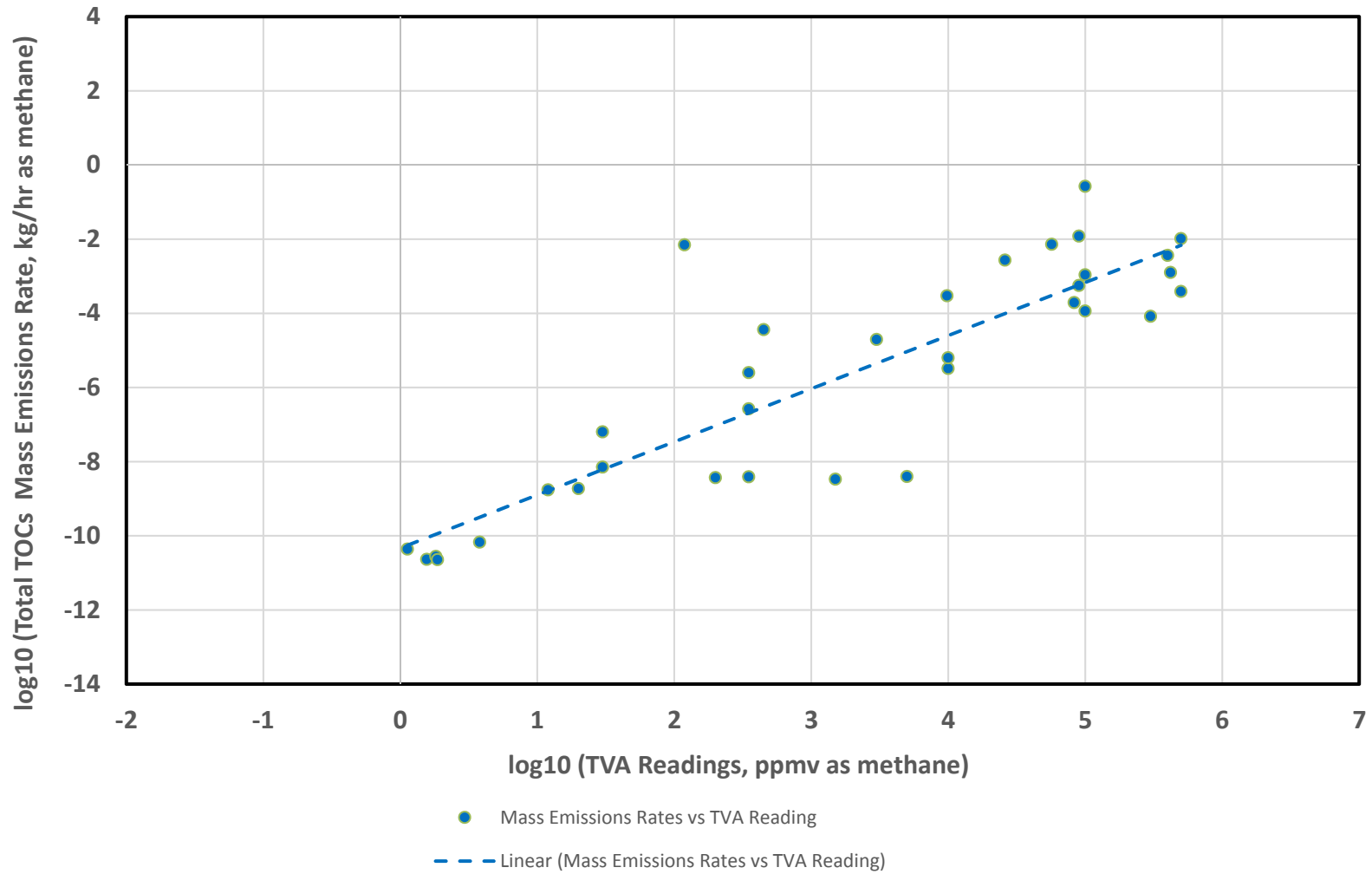
Section 2 - Appendix B
Figure B-4. Log10-Log10 Linear Correlation Plot of
Mass Emissions Rates vs. Leaking Equipment Concentrations
as Methane - Connectors & Flanges in Gas Service.

$y = 0.8989x - 8.9491$
 $R^2 = 0.3883$



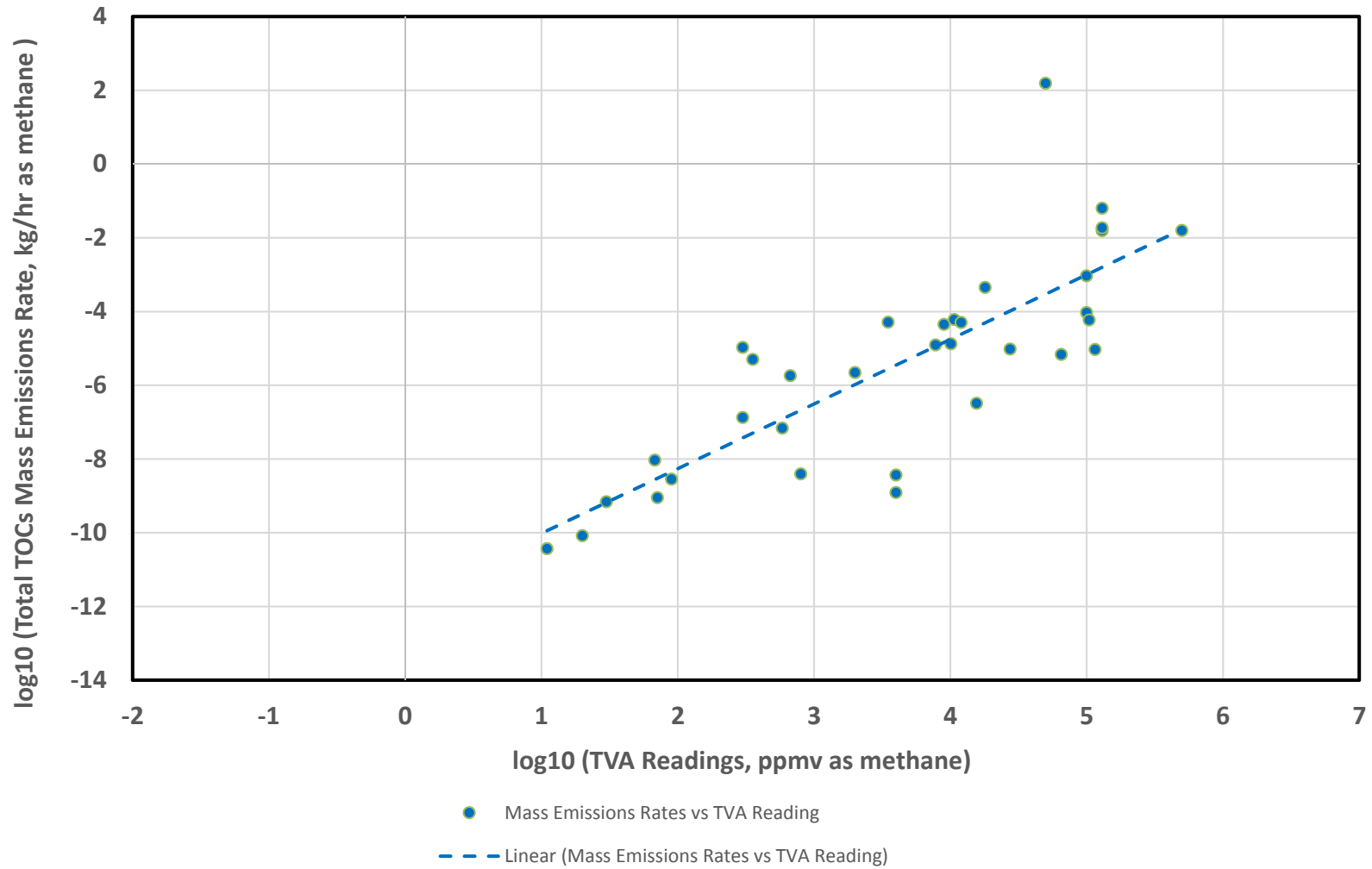
Section 2 - Appendix B
Figure B-5. Log10-Log10 Linear Correlation Plot of
Mass Emissions Rates vs. Leaking Equipment Concentrations
as Methane - Open-Ended Lines (OELs) in Gas Service.

$$y = 1.4328x - 10.332$$
$$R^2 = 0.748$$



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.

$y = 1.754x - 11.77$
 $R^2 = 0.6451$



**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	Y	Calculated Transformation = log10()		Intercept (B0)	Slope (B1)	Count	MSEri	MSE
	Concentration (ppmv)	Mass Emission (kg/hr)	Concentration (ppmv)	Mass Emission (kg/hr)					
1	0.06	2.71E-04	-1.229147988	-3.566523965	-7.853074178	0.641478617	22	25.755852	4.242548883
2	1.31	2.44E-10	0.117271296	-9.612848382				3.367229524	
3	1.77	2.81E-10	0.247973266	-9.550980953				3.448361067	
4	15.00	3.66E-10	1.176091259	-9.436515926				5.465678887	
5	40.00	1.34E-10	1.602059991	-9.872889567				9.287272204	
6	40.00	6.00E-08	1.602059991	-7.221594199				0.156980184	
7	49.00	3.67E-08	1.69019608	-7.435427644				0.444326378	
8	111.00	4.11E-07	2.045322979	-6.386238086				0.02396463	
9	300.00	2.35E-09	2.477121255	-8.628058937				5.58852	
10	349.00	1.31E-05	2.542825427	-4.883582729				1.791109283	
11	358.00	6.81E-06	2.553883027	-5.166822225				1.098284299	
12	500.00	4.07E-06	2.698970004	-5.390934105				0.534081103	
13	700.00	5.92E-07	2.84509804	-6.227406605				0.039761151	
14	1,100.00	2.85E-06	3.041392685	-5.545239228				0.127339479	
15	1,500.00	1.97E-06	3.176091259	-5.70539848				0.012161914	
16	1,700.00	6.27E-06	3.230448921	-5.202916553				0.333961149	
17	2,000.00	8.79E-06	3.301029996	-5.056130932				0.461588557	
18	6,000.00	2.35E-04	3.77815125	-3.628807145				3.242390094	
19	7,000.00	9.13E-03	3.84509804	-2.039384781				11.20335437	
20	27,000.00	8.70E-09	4.431363764	-8.060495737				9.302784623	
21	116,000.00	7.80E-04	5.064457989	-3.107656836				2.24003855	
22	130,000.00	2.92E-06	5.113943352	-5.53484571				0.925938231	

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 base 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.

Formulas	Values	
MSE=;	MSE	4.2425489
n=;	n	22
T=MSE/2;	T	2.1212744
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	6.227E+09
i13=14*13*12*11*10*9*8*7*6*5*4*3*2*1;	i13	8.718E+10
i14=15*14*13*12*11*10*9*8*7*6*5*4*3*2*1;	i14	1.308E+12
	SBCF [1]	6.470

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

Section 2 Appendix D: Descriptive Statistics for Measured Concentrations and Calculated Emissions Rates for Components in Gas Service.

Analytes	Frequency & Concentration Statistics, ppmv as methane							Mass Emission Rate Statistics, kg/hr				Method [1]
	% non-zero results	# NON-ZERO	total N all results	MIN	AVG	MAX	RANGE	MIN	AVG	MAX	RANGE	
Field Leak Concentration & Emission Rate as methane [1]	100%	160	160	5.90E-02	4.64E+04	5.00E+05	5.00E+05	1.62E-11	9.73E-01	1.55E+02	1.55E+02	EPA Method 21 / Hi Flow Sampler
Analytes with Frequencies of Detection > 10% are sorted by Average Mass Emissions Rate, in Decreasing Order												
Methane	63%	22	35	0	5.39E+03	7.50E+04	7.50E+04	0	3.62E-02	4.91E-01	4.91E-01	ASTM 1945/3588
Hexane	66%	23	35	8.40E+00	7.85E+02	1.00E+04	9.99E+03	0	1.95E-05	4.04E-04	4.04E-04	EPA Method TO-15
Cyclohexane	60%	21	35	1.10E+01	6.36E+02	5.00E+03	4.99E+03	0	1.50E-05	2.27E-04	2.27E-04	EPA Method TO-15
Heptane	51%	18	35	1.40E+01	2.70E+02	1.90E+03	1.89E+03	0	6.44E-06	8.93E-05	8.93E-05	EPA Method TO-15
Toluene	63%	22	35	9.00E+00	1.15E+02	1.50E+03	1.49E+03	0	3.09E-06	6.48E-05	6.48E-05	EPA Method TO-15
Benzene	46%	16	35	8.40E+00	1.87E+02	2.20E+03	2.19E+03	0	3.03E-06	8.06E-05	8.06E-05	EPA Method TO-15
Xylenes (total)	31%	11	35	9.40E+00	1.84E+02	1.00E+03	9.91E+02	0	2.88E-06	5.73E-05	5.73E-05	EPA Method TO-15
Ethanol	37%	13	35	3.60E+01	1.05E+02	3.90E+02	3.54E+02	0	8.41E-07	8.98E-06	8.98E-06	EPA Method TO-15
Ethylbenzene	14%	5	35	1.70E+01	1.05E+02	3.10E+02	2.93E+02	0	7.59E-07	1.78E-05	1.78E-05	EPA Method TO-15
Isopropyl alcohol	23%	8	35	1.00E+01	1.18E+02	6.80E+02	6.70E+02	0	7.10E-07	1.92E-05	1.92E-05	EPA Method TO-15
Acetone	11%	4	35	3.40E+01	1.72E+02	5.70E+02	5.36E+02	0	3.36E-07	8.88E-06	8.88E-06	EPA Method TO-15
Analytes with Frequencies of Detection < 10% are sorted by Frequency of Detection, in Decreasing Order												
Propane	9%	3	35	0	3.06E+01	6.81E+02	6.81E+02	0	6.32E-04	1.41E-02	1.41E-02	ASTM 1945/3588
4-Ethyltoluene	9%	3	35	4.00E+01	1.63E+02	2.40E+02	2.00E+02	0	7.03E-07	1.56E-05	1.56E-05	EPA Method TO-15
1,2,4-Trimethylbenzene	9%	3	35	1.80E+01	1.51E+02	3.90E+02	3.72E+02	0	4.57E-07	1.26E-05	1.26E-05	EPA Method TO-15
Methyl Isobutyl Ketone	9%	3	35	1.00E+01	4.87E+01	1.20E+02	1.10E+02	0	1.92E-07	5.63E-06	5.63E-06	EPA Method TO-15
n-Butane	6%	2	35	0	1.46E+01	3.74E+02	3.74E+02	0	3.94E-04	1.02E-02	1.02E-02	ASTM 1945/3588
Ethane	6%	2	35	0	2.07E+01	4.82E+02	4.82E+02	0	2.79E-04	6.80E-03	6.80E-03	ASTM 1945/3588
1,3,5-Trimethylbenzene	6%	2	35	1.30E+02	1.45E+02	1.60E+02	3.00E+01	0	3.88E-07	8.44E-06	8.44E-06	EPA Method TO-15
Ethyl Acetate	6%	2	35	1.30E+01	1.50E+01	1.70E+01	4.00E+00	0	3.34E-08	6.76E-07	6.76E-07	EPA Method TO-15
Carbon disulfide	6%	2	35	8.70E+00	9.20E+00	9.70E+00	1.00E+00	0	1.84E-08	3.27E-07	3.27E-07	EPA Method TO-15
i-Butane	3%	1	35	0	5.81E+00	2.03E+02	2.03E+02	0	1.58E-04	5.54E-03	5.54E-03	ASTM 1945/3588
i-Pentane	3%	1	35	0	4.21E+00	1.47E+02	1.47E+02	0	1.42E-04	4.99E-03	4.99E-03	ASTM 1945/3588
n-Pentane	3%	1	35	0	3.27E+00	1.14E+02	1.14E+02	0	1.11E-04	3.87E-03	3.87E-03	ASTM 1945/3588
2-Hexanone	3%	1	35	2.30E+03	2.30E+03	2.30E+03	0	0	3.55E-06	1.24E-04	1.24E-04	EPA Method TO-15
Chlorobenzene	3%	1	35	7.50E+02	7.50E+02	7.50E+02	0	0	1.30E-06	4.56E-05	4.56E-05	EPA Method TO-15
Trichloroethene (TCE)	3%	1	35	1.40E+01	1.40E+01	1.40E+01	0	0	1.83E-08	6.40E-07	6.40E-07	EPA Method TO-15
Analytes with All Results = zero are sorted by Name, in ascending order												
1,1,1-Trichloroethane	0%	0	35	0	0	0	0	0	0	0	0	EPA Method TO-15
1,1,1,2-Tetrachloroethane	0%	0	35	0	0	0	0	0	0	0	0	EPA Method TO-15
1,1,2-Trichloroethane	0%	0	35	0	0	0	0	0	0	0	0	EPA Method TO-15
1,1,2-Trichlorotrifluoroethane	0%	0	35	0	0	0	0	0	0	0	0	EPA Method TO-15
1,1-Dichloroethane	0%	0	35	0	0	0	0	0	0	0	0	EPA Method TO-15
1,1-Dichloroethene	0%	0	35	0	0	0	0	0	0	0	0	EPA Method TO-15
1,2,4-Trichlorobenzene	0%	0	35	0	0	0	0	0	0	0	0	EPA Method TO-15
1,2-Dibromoethane (EDB)	0%	0	35	0	0	0	0	0	0	0	0	EPA Method TO-15
1,2-Dichloro-1,1,2,2-tetrafluoroethane	0%	0	35	0	0	0	0	0	0	0	0	EPA Method TO-15
1,2-Dichlorobenzene	0%	0	35	0	0	0	0	0	0	0	0	EPA Method TO-15
1,2-Dichloroethane	0%	0	35	0	0	0	0	0	0	0	0	EPA Method TO-15
1,2-Dichloropropane	0%	0	35	0	0	0	0	0	0	0	0	EPA Method TO-15
1,3-Butadiene	0%	0	35	0	0	0	0	0	0	0	0	EPA Method TO-15
1,3-Dichlorobenzene	0%	0	35	0	0	0	0	0	0	0	0	EPA Method TO-15
1,4-Dichlorobenzene	0%	0	35	0	0	0	0	0	0	0	0	EPA Method TO-15

Section 2 Appendix D: Descriptive Statistics for Measured Concentrations and Calculated Emissions Rates for Components in Gas Service.

Analytes	Frequency & Concentration Statistics, ppmv as methane							Mass Emission Rate Statistics, kg/hr				Method [1]
	% non-zero results	# NON-ZERO	total N all results	MIN	AVG	MAX	RANGE	MIN	AVG	MAX	RANGE	
Analytes with All Results = zero are sorted by Name, in ascending order												
1,4-Dioxane	0%	0	35	0	0	0	0	0	0	0	0	EPA Method TO-15
Benzyl chloride	0%	0	35	0	0	0	0	0	0	0	0	EPA Method TO-15
Bromodichloromethane	0%	0	35	0	0	0	0	0	0	0	0	EPA Method TO-15
Bromoform	0%	0	35	0	0	0	0	0	0	0	0	EPA Method TO-15
Bromomethane	0%	0	35	0	0	0	0	0	0	0	0	EPA Method TO-15
Carbon tetrachloride	0%	0	35	0	0	0	0	0	0	0	0	EPA Method TO-15
Chloroethane	0%	0	35	0	0	0	0	0	0	0	0	EPA Method TO-15
Chloroform	0%	0	35	0	0	0	0	0	0	0	0	EPA Method TO-15
Chloromethane	0%	0	35	0	0	0	0	0	0	0	0	EPA Method TO-15
cis-1,2-Dichloroethene	0%	0	35	0	0	0	0	0	0	0	0	EPA Method TO-15
cis-1,3-Dichloropropene	0%	0	35	0	0	0	0	0	0	0	0	EPA Method TO-15
Dibromochloromethane	0%	0	35	0	0	0	0	0	0	0	0	EPA Method TO-15
Dichlorodifluoromethane	0%	0	35	0	0	0	0	0	0	0	0	EPA Method TO-15
Diisopropyl Ether	0%	0	35	0	0	0	0	0	0	0	0	EPA Method TO-15
Ethene	0%	0	35	0	0	0	0	0	0	0	0	ASTM 1945/3588
Ethyl t-Butyl Ether	0%	0	35	0	0	0	0	0	0	0	0	EPA Method TO-15
Hexachlorobutadiene	0%	0	35	0	0	0	0	0	0	0	0	EPA Method TO-15
Hexanes Plus	0%	0	35	0	0	0	0	0	0	0	0	ASTM 1945/3588
Methyl Ethyl Ketone	0%	0	35	0	0	0	0	0	0	0	0	EPA Method TO-15
Methylene chloride	0%	0	35	0	0	0	0	0	0	0	0	EPA Method TO-15
Methyl-t-butyl ether	0%	0	35	0	0	0	0	0	0	0	0	EPA Method TO-15
Naphthalene	0%	0	35	0	0	0	0	0	0	0	0	EPA Method TO-15
neo-Pentane	0%	0	35	0	0	0	0	0	0	0	0	ASTM 1945/3588
n-Hexane	0%	0	35	0	0	0	0	0	0	0	0	ASTM 1945/3588
Propene	0%	0	35	0	0	0	0	0	0	0	0	ASTM 1945/3588
Propylene	0%	0	35	0	0	0	0	0	0	0	0	EPA Method TO-15
Styrene	0%	0	35	0	0	0	0	0	0	0	0	EPA Method TO-15
t-Amyl Methyl Ether	0%	0	35	0	0	0	0	0	0	0	0	EPA Method TO-15
t-Butyl alcohol	0%	0	35	0	0	0	0	0	0	0	0	EPA Method TO-15
Tetrachloroethene (PCE)	0%	0	35	0	0	0	0	0	0	0	0	EPA Method TO-15
Tetrahydrofuran	0%	0	35	0	0	0	0	0	0	0	0	EPA Method TO-15
trans-1,2-Dichloroethene	0%	0	35	0	0	0	0	0	0	0	0	EPA Method TO-15
trans-1,3-Dichloropropene	0%	0	35	0	0	0	0	0	0	0	0	EPA Method TO-15
Trichlorofluoromethane	0%	0	35	0	0	0	0	0	0	0	0	EPA Method TO-15
Vinyl acetate	0%	0	35	0	0	0	0	0	0	0	0	EPA Method TO-15
Vinyl chloride	0%	0	35	0	0	0	0	0	0	0	0	EPA Method TO-15

Other Analytes, in Decreasing Frequency of Occurrence Order								
Analytes	% non-zero results	# NON-ZERO	total N all results	MIN	AVG	MAX	RANGE	Method
Oxygen (Mol%)	100%	35	35	1.95E+01	2.13E+01	2.16E+01	2.11E+00	ASTM 1945/3588
Oxygen (ppb)	100%	35	35	1.95E+08	2.13E+08	2.16E+08	2.11E+07	ASTM 1945/3588
Nitrogen (Mol%)	100%	35	35	7.30E+01	7.81E+01	7.88E+01	5.81E+00	ASTM 1945/3588
Nitrogen (ppb)	100%	35	35	7.30E+08	7.81E+08	7.88E+08	5.81E+07	ASTM 1945/3588
Carbon Dioxide (Mol%)	100%	35	35	1.95E-02	3.76E-02	1.24E-01	1.04E-01	ASTM 1945/3588
Carbon Dioxide (ppb)	100%	35	35	1.95E+05	3.76E+05	1.24E+06	1.04E+06	ASTM 1945/3588
TOC, kg/hr (does not incl. TPH) [2]	94%	33	35	0	3.90E-02	4.94E-01	4.94E-01	ASTM 1945/3588
TPH Gasoline (C4-C12)	34%	12	35	3.40E+03	6.39E+04	3.30E+05	3.27E+05	EPA Method TO-15
TPH Gasoline (C4-C12)	34%	12	35	0	1.07E-03	1.62E-02	1.62E-02	EPA Method TO-15
Hydrogen (Mol%)	0%	0	35	0	0	0	0	ASTM 1945/3588
Hydrogen (ppb)	0%	0	35	0	0	0	0	ASTM 1945/3588
Carbon Monoxide (Mol%)	0%	0	35	0	0	0	0	ASTM 1945/3588
Carbon Monoxide (ppb)	0%	0	35	0	0	0	0	ASTM 1945/3588

[1] Field leak concentrations are expressed as ppmv at actual conditions, as methane
Speciated analytes' concentrations are reported as ppmv at STP.

[2] TOC Mass Emissions Rates = Total Organic Compounds = the sum of all non-zero emissions rates estimated from the EPA Method TO-15 and ASTM 1945/3588 lab results.

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

SECTION 4 – APPENDICES

Section 4 - Appendix A 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

SECTION 5 – APPENDICES

Section 5 - Appendix A **Project Sample Logbook**
Section 5 - Appendix B **Analytical Results**

Section 5 - Appendix A: 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				



Oilfield Environmental and Compliance, INC.

Sage Environmental Consulting 720 West Arapaho Road Richardson TX, 75080	Project: CARB Project Number: CARB #1344 Project Manager: David Ranum	Reported: 04-Feb-15 16:10
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CAN001
1500318-01 (Air)

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
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Oilfield Environmental and Compliance

Volatile Organic Compounds by EPA Method TO-15

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	"	"	"	"	"	"	

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Oilfield Environmental and Compliance, INC.

Sage Environmental Consulting
720 West Arapaho Road
Richardson TX, 75080

Project: CARB
Project Number: CARB #1344
Project Manager: David Ranum

Reported:
04-Feb-15 16:10

CAN001
1500318-01 (Air)

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
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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	"	"	"	"	"	"	

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Sage Environmental Consulting
720 West Arapaho Road
Richardson TX, 75080

Project: CARB
Project Number: CARB #1344
Project Manager: David Ranum

Reported:
04-Feb-15 16:10

CAN002
1500318-02 (Air)

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
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Oilfield Environmental and Compliance

Volatile Organic Compounds by EPA Method TO-15

R-01

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

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Sage Environmental Consulting
720 West Arapaho Road
Richardson TX, 75080

Project: CARB
Project Number: CARB #1344
Project Manager: David Ranum

Reported:
04-Feb-15 16:10

CAN002
1500318-02 (Air)

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
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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	"	"	"	"	"	"	

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Oilfield Environmental and Compliance, INC.

Sage Environmental Consulting 720 West Arapaho Road Richardson TX, 75080	Project: CARB Project Number: CARB #1344 Project Manager: David Ranum	Reported: 04-Feb-15 16:10
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CAN003
1500318-03 (Air)

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
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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	"	"	"	"	"	"	

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Oilfield Environmental and Compliance, INC.

Sage Environmental Consulting
720 West Arapaho Road
Richardson TX, 75080

Project: CARB
Project Number: CARB #1344
Project Manager: David Ranum

Reported:
04-Feb-15 16:10

CAN003
1500318-03 (Air)

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
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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	"	

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Sage Environmental Consulting
720 West Arapaho Road
Richardson TX, 75080

Project: CARB
Project Number: CARB #1344
Project Manager: David Ranum

Reported:
04-Feb-15 16:10

CAN004
1500318-04 (Air)

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
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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	"	"	"	"	"	"	

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Oilfield Environmental and Compliance, INC.

Sage Environmental Consulting
720 West Arapaho Road
Richardson TX, 75080

Project: CARB
Project Number: CARB #1344
Project Manager: David Ranum

Reported:
04-Feb-15 16:10

CAN004
1500318-04 (Air)

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
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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	"	"	"	"	"	"	

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Sage Environmental Consulting 720 West Arapaho Road Richardson TX, 75080	Project: CARB Project Number: CARB #1344 Project Manager: David Ranum	Reported: 04-Feb-15 16:10
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CAN005
1500318-05 (Air)

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
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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	"	77.5	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	"	"	"	"	"	"	

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Sage Environmental Consulting 720 West Arapaho Road Richardson TX, 75080	Project: CARB Project Number: CARB #1344 Project Manager: David Ranum	Reported: 04-Feb-15 16:10
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CAN005
1500318-05 (Air)

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
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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

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Sage Environmental Consulting 720 West Arapaho Road Richardson TX, 75080	Project: CARB Project Number: CARB #1344 Project Manager: David Ranum	Reported: 04-Feb-15 16:10
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CAN006
1500318-06 (Air)

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
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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	"	"	"	"	"	"	"

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Oilfield Environmental and Compliance, INC.

Sage Environmental Consulting
720 West Arapaho Road
Richardson TX, 75080

Project: CARB
Project Number: CARB #1344
Project Manager: David Ranum

Reported:
04-Feb-15 16:10

CAN006
1500318-06 (Air)

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
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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	"	"	"	"	"	"	

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Sage Environmental Consulting 720 West Arapaho Road Richardson TX, 75080	Project: CARB Project Number: CARB #1344 Project Manager: David Ranum	Reported: 04-Feb-15 16:10
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CAN007
1500318-07 (Air)

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
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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	"	"	"	"	"	"	

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Oilfield Environmental and Compliance, INC.

Sage Environmental Consulting
720 West Arapaho Road
Richardson TX, 75080

Project: CARB
Project Number: CARB #1344
Project Manager: David Ranum

Reported:
04-Feb-15 16:10

CAN007
1500318-07 (Air)

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
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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	"	"	"	"	"	"	

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Sage Environmental Consulting 720 West Arapaho Road Richardson TX, 75080	Project: CARB Project Number: CARB #1344 Project Manager: David Ranum	Reported: 04-Feb-15 16:10
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CAN008
1500318-08 (Air)

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
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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	"	"	"	"	"	"	

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Sage Environmental Consulting 720 West Arapaho Road Richardson TX, 75080	Project: CARB Project Number: CARB #1344 Project Manager: David Ranum	Reported: 04-Feb-15 16:10
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CAN008
1500318-08 (Air)

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
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Oilfield Environmental and Compliance

Volatile Organic Compounds by EPA Method TO-15

R-05

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

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Sage Environmental Consulting 720 West Arapaho Road Richardson TX, 75080	Project: CARB Project Number: CARB #1344 Project Manager: David Ranum	Reported: 04-Feb-15 16:10
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CAN009
1500318-09 (Air)

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
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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	"	"	"	"	"	"	

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Oilfield Environmental and Compliance, INC.

Sage Environmental Consulting
720 West Arapaho Road
Richardson TX, 75080

Project: CARB
Project Number: CARB #1344
Project Manager: David Ranum

Reported:
04-Feb-15 16:10

CAN009
1500318-09 (Air)

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
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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	"	

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TEL: (805) 922-4772
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Oilfield Environmental and Compliance, INC.

Sage Environmental Consulting
720 West Arapaho Road
Richardson TX, 75080

Project: CARB
Project Number: CARB #1344
Project Manager: David Ranum

Reported:
04-Feb-15 16:10

CAN010
1500318-10 (Air)

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
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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	"	"	"	"	"	"	

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720 West Arapaho Road
Richardson TX, 75080

Project: CARB
Project Number: CARB #1344
Project Manager: David Ranum

Reported:
04-Feb-15 16:10

CAN010
1500318-10 (Air)

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
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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	"	"	"	"	"	"	

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Sage Environmental Consulting 720 West Arapaho Road Richardson TX, 75080	Project: CARB Project Number: CARB #1344 Project Manager: David Ranum	Reported: 04-Feb-15 16:10
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CAN011
1500318-11 (Air)

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
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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	"	"	"	"	"	"	

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720 West Arapaho Road
Richardson TX, 75080

Project: CARB
Project Number: CARB #1344
Project Manager: David Ranum

Reported:
04-Feb-15 16:10

CAN011
1500318-11 (Air)

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
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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

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Sage Environmental Consulting 720 West Arapaho Road Richardson TX, 75080	Project: CARB Project Number: CARB #1344 Project Manager: David Ranum	Reported: 04-Feb-15 16:10
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CAN012
1500318-12 (Air)

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
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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	"	"	"	"	"	"	"

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Sage Environmental Consulting 720 West Arapaho Road Richardson TX, 75080	Project: CARB Project Number: CARB #1344 Project Manager: David Ranum	Reported: 04-Feb-15 16:10
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CAN012
1500318-12 (Air)

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
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Oilfield Environmental and Compliance

Volatile Organic Compounds by EPA Method TO-15

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

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Oilfield Environmental and Compliance, INC.

Sage Environmental Consulting 720 West Arapaho Road Richardson TX, 75080	Project: CARB Project Number: CARB #1344 Project Manager: David Ranum	Reported: 06-Feb-15 15:41
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CAN013
1500415-01 (Air)

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
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Oilfield Environmental and Compliance

Volatile Organic Compounds by EPA Method TO-15

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

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Oilfield Environmental and Compliance, INC.

Sage Environmental Consulting
720 West Arapaho Road
Richardson TX, 75080

Project: CARB
Project Number: CARB #1344
Project Manager: David Ranum

Reported:
06-Feb-15 15:41

CAN014
1500415-02 (Air)

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
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Oilfield Environmental and Compliance

Volatile Organic Compounds by EPA Method TO-15

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	"	"	"	"	"	"	

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Oilfield Environmental and Compliance, INC.

Sage Environmental Consulting
720 West Arapaho Road
Richardson TX, 75080

Project: CARB
Project Number: CARB #1344
Project Manager: David Ranum

Reported:
06-Feb-15 15:41

CAN014
1500415-02 (Air)

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
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Oilfield Environmental and Compliance

Volatile Organic Compounds by EPA Method TO-15

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	"	"	"	"	"	"	

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Oilfield Environmental and Compliance, INC.

Sage Environmental Consulting
720 West Arapaho Road
Richardson TX, 75080

Project: CARB
Project Number: CARB #1344
Project Manager: David Ranum

Reported:
06-Feb-15 15:41

CAN015
1500415-03 (Air)

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
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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	"	"	"	"	"	"	

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Oilfield Environmental and Compliance, INC.

Sage Environmental Consulting 720 West Arapaho Road Richardson TX, 75080	Project: CARB Project Number: CARB #1344 Project Manager: David Ranum	Reported: 06-Feb-15 15:41
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CAN015
1500415-03 (Air)

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
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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

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Oilfield Environmental and Compliance, INC.

Sage Environmental Consulting
720 West Arapaho Road
Richardson TX, 75080

Project: CARB
Project Number: CARB #1344
Project Manager: David Ranum

Reported:
06-Feb-15 15:41

CAN016
1500415-04 (Air)

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
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Oilfield Environmental and Compliance

Volatile Organic Compounds by EPA Method TO-15

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

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Oilfield Environmental and Compliance, INC.

Sage Environmental Consulting 720 West Arapaho Road Richardson TX, 75080	Project: CARB Project Number: CARB #1344 Project Manager: David Ranum	Reported: 06-Feb-15 15:41
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CAN016
1500415-04 (Air)

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
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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

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Sage Environmental Consulting 720 West Arapaho Road Richardson TX, 75080	Project: CARB Project Number: CARB #1344 Project Manager: David Ranum	Reported: 06-Feb-15 15:41
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CAN017
1500415-05 (Air)

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
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Oilfield Environmental and Compliance

Volatile Organic Compounds by EPA Method TO-15

R-05

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	"	"	"	"	"	"	

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Sage Environmental Consulting 720 West Arapaho Road Richardson TX, 75080	Project: CARB Project Number: CARB #1344 Project Manager: David Ranum	Reported: 06-Feb-15 15:41
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CAN017
1500415-05 (Air)

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
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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	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

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Oilfield Environmental and Compliance, INC.

Sage Environmental Consulting
720 West Arapaho Road
Richardson TX, 75080

Project: CARB
Project Number: CARB #1344
Project Manager: David Ranum

Reported:
06-Feb-15 15:41

CAN018
1500415-06 (Air)

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
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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

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Oilfield Environmental and Compliance, INC.

Sage Environmental Consulting 720 West Arapaho Road Richardson TX, 75080	Project: CARB Project Number: CARB #1344 Project Manager: David Ranum	Reported: 06-Feb-15 15:41
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CAN018
1500415-06 (Air)

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
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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

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Oilfield Environmental and Compliance, INC.

Sage Environmental Consulting
720 West Arapaho Road
Richardson TX, 75080

Project: CARB
Project Number: CARB #1344
Project Manager: David Ranum

Reported:
06-Feb-15 15:41

CAN019
1500415-07 (Air)

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
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Oilfield Environmental and Compliance

Volatile Organic Compounds by EPA Method TO-15

R-05

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	"	"	"	"	"	"	

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Richardson TX, 75080

Project: CARB
Project Number: CARB #1344
Project Manager: David Ranum

Reported:
06-Feb-15 15:41

CAN019
1500415-07 (Air)

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
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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

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Oilfield Environmental and Compliance, INC.

Sage Environmental Consulting
720 West Arapaho Road
Richardson TX, 75080

Project: CARB
Project Number: CARB #1344
Project Manager: David Ranum

Reported:
06-Feb-15 15:41

CAN020
1500415-08 (Air)

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
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Oilfield Environmental and Compliance

Volatile Organic Compounds by EPA Method TO-15

R-05

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

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Sage Environmental Consulting 720 West Arapaho Road Richardson TX, 75080	Project: CARB Project Number: CARB #1344 Project Manager: David Ranum	Reported: 06-Feb-15 15:41
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CAN020
1500415-08 (Air)

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
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Oilfield Environmental and Compliance

Volatile Organic Compounds by EPA Method TO-15

R-05

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

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Oilfield Environmental and Compliance, INC.

Sage Environmental Consulting
720 West Arapaho Road
Richardson TX, 75080

Project: CARB
Project Number: CARB #1344
Project Manager: David Ranum

Reported:
06-Feb-15 15:41

CAN021
1500415-09 (Air)

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
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Oilfield Environmental and Compliance

Volatile Organic Compounds by EPA Method TO-15

R-05

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	"	"	"	"	"	"	

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Oilfield Environmental and Compliance, INC.

Sage Environmental Consulting
720 West Arapaho Road
Richardson TX, 75080

Project: CARB
Project Number: CARB #1344
Project Manager: David Ranum

Reported:
06-Feb-15 15:41

CAN021
1500415-09 (Air)

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
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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	"	"	"	"	"	"	

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Sage Environmental Consulting
720 West Arapaho Road
Richardson TX, 75080

Project: CARB
Project Number: CARB #1344
Project Manager: David Ranum

Reported:
06-Feb-15 15:41

CAN022
1500415-10 (Air)

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
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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	"	"	"	"	"	"	

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Oilfield Environmental and Compliance, INC.

Sage Environmental Consulting
720 West Arapaho Road
Richardson TX, 75080

Project: CARB
Project Number: CARB #1344
Project Manager: David Ranum

Reported:
06-Feb-15 15:41

CAN022
1500415-10 (Air)

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
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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

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Oilfield Environmental and Compliance, INC.

Sage Environmental Consulting
720 West Arapaho Road
Richardson TX, 75080

Project: CARB
Project Number: CARB #1344
Project Manager: David Ranum

Reported:
06-Feb-15 15:41

CAN023
1500415-11 (Air)

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
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Oilfield Environmental and Compliance

Volatile Organic Compounds by EPA Method TO-15

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

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Oilfield Environmental and Compliance, INC.

Sage Environmental Consulting 720 West Arapaho Road Richardson TX, 75080	Project: CARB Project Number: CARB #1344 Project Manager: David Ranum	Reported: 06-Feb-15 15:41
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CAN023
1500415-11 (Air)

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
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Oilfield Environmental and Compliance

Volatile Organic Compounds by EPA Method TO-15

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

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Oilfield Environmental and Compliance, INC.

Sage Environmental Consulting 720 West Arapaho Road Richardson TX, 75080	Project: CARB Project Number: CARB #1344 Project Manager: David Ranum	Reported: 10-Mar-15 14:34
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TB024B
1500806-02 (Air)

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
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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

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Oilfield Environmental and Compliance, INC.

Sage Environmental Consulting
720 West Arapaho Road
Richardson TX, 75080

Project: CARB
Project Number: CARB #1344
Project Manager: David Ranum

Reported:
10-Mar-15 14:34

TB024B
1500806-02 (Air)

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
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Oilfield Environmental and Compliance

Volatile Organic Compounds by EPA Method TO-15

R-02, TS-3

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

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Oilfield Environmental and Compliance, INC.

Sage Environmental Consulting 720 West Arapaho Road Richardson TX, 75080	Project: CARB Project Number: CARB #1344 Project Manager: David Ranum	Reported: 10-Mar-15 14:34
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TB025B
1500806-04 (Air)

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
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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	"	"	"	"	"	"	

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Sage Environmental Consulting 720 West Arapaho Road Richardson TX, 75080	Project: CARB Project Number: CARB #1344 Project Manager: David Ranum	Reported: 10-Mar-15 14:34
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TB025B
1500806-04 (Air)

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
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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	"	"	"	"	"	"	

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Sage Environmental Consulting 720 West Arapaho Road Richardson TX, 75080	Project: CARB Project Number: CARB #1344 Project Manager: David Ranum	Reported: 10-Mar-15 14:08
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TB026A/B
1500835-01 (Air)

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
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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	"	"	"	"	"	"	

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TB026A/B
1500835-01 (Air)

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
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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	"	"	"	"	"	"	

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Oilfield Environmental and Compliance, INC.

Sage Environmental Consulting
720 West Arapaho Road
Richardson TX, 75080

Project: CARB
Project Number: CARB #1344
Project Manager: David Ranum

Reported:
10-Mar-15 14:08

TB027A/B
1500835-02 (Air)

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
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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	"	"	"	"	"	"	

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Sage Environmental Consulting
720 West Arapaho Road
Richardson TX, 75080

Project: CARB
Project Number: CARB #1344
Project Manager: David Ranum

Reported:
10-Mar-15 14:08

TB027A/B
1500835-02 (Air)

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
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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	"	"	"	"	"	"	

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Oilfield Environmental and Compliance, INC.

Sage Environmental Consulting
720 West Arapaho Road
Richardson TX, 75080

Project: CARB
Project Number: CARB #1344
Project Manager: David Ranum

Reported:
10-Mar-15 10:14

TB028A
1500853-01 (Air)

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
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Oilfield Environmental and Compliance

Volatile Organic Compounds by EPA Method TO-15

TS-3

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	"	"	"	"	"	"	

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Sage Environmental Consulting 720 West Arapaho Road Richardson TX, 75080	Project: CARB Project Number: CARB #1344 Project Manager: David Ranum	Reported: 10-Mar-15 10:14
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TB028A
1500853-01 (Air)

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
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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	"	"	"	"	"	"	

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TB029B
1500853-02 (Air)

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
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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	"	"	"	"	"	"	

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TB029B
1500853-02 (Air)

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
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Oilfield Environmental and Compliance

Volatile Organic Compounds by EPA Method TO-15

TS-3

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	"	"	"	"	"	"	

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Sage Environmental Consulting 720 West Arapaho Road Richardson TX, 75080	Project: CARB Project Number: CARB #1344 Project Manager: David Ranum	Reported: 11-Mar-15 16:23
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TB030A/B
1500870-01 (Air)

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
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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	"	"	"	"	"	"	

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Oilfield Environmental and Compliance, INC.

Sage Environmental Consulting
720 West Arapaho Road
Richardson TX, 75080

Project: CARB
Project Number: CARB #1344
Project Manager: David Ranum

Reported:
11-Mar-15 16:23

TB030A/B
1500870-01 (Air)

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
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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	"	"	"	"	"	"	

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Sage Environmental Consulting 720 West Arapaho Road Richardson TX, 75080	Project: CARB Project Number: CARB #1344 Project Manager: David Ranum	Reported: 11-Mar-15 16:23
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TB031A/B
1500870-02 (Air)

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
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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	"	"	"	"	"	"	

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TB031A/B
1500870-02 (Air)

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
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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

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.

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Oilfield Environmental and Compliance, INC.

Sage Environmental Consulting
720 West Arapaho Road
Richardson TX, 75080

Project: CARB
Project Number: CARB #1344
Project Manager: David Ranum

Reported:
11-Mar-15 16:23

TB032A/B
1500870-03 (Air)

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
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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

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Sage Environmental Consulting
720 West Arapaho Road
Richardson TX, 75080

Project: CARB
Project Number: CARB #1344
Project Manager: David Ranum

Reported:
11-Mar-15 16:23

TB032A/B
1500870-03 (Air)

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
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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	"	"	"	"	"	"	

Oilfield Environmental and Compliance

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ANALYTICAL REPORT

EPA Method TO-15 Modified Full Scan GC/MS

Analytical Method: TO-15

SDG: 215096

Laboratory ID: 01

File Name: 1509601B.D
Description: 1500906-01
Can/Tube#: TBAG
QC_Batch: 030415-MA1

Date Sampled: 03/02/15 Time: 00:00
Date Analyzed: 03/04/15 Time: 12:45
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	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 LCL	Limits UCL	Flag
2037-26-5	Toluene-d8	97	70	130	

ANALYTICAL REPORT

EPA Method TO-15 Modified Full Scan GC/MS

Analytical Method: TO-15

SDG: 215096

Laboratory ID: 02

File Name: 1509602B.D
Description: 1500906-02
Can/Tube#: TBAG
QC_Batch: 030415-MA1

Date Sampled: 03/02/15 Time: 00:00
Date Analyzed: 03/04/15 Time: 15:19
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	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	RL	Amount	MDL	RL	Amount	Flag
		PPBV	PPBV	PPBV	UG/M3	UG/M3	UG/M3	
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 LCL	Limits UCL	Flag
2037-26-5	Toluene-d8				99	70	130	

ANALYTICAL REPORT

EPA Method TO-15 Modified Full Scan GC/MS

Analytical Method: TO-15

SDG: 215096

Laboratory ID: 03

File Name: 1509603B.D

Date Sampled: 03/02/15 Time: 00:00

Description: 1500906-03

Date Analyzed: 03/04/15 Time: 16:00

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	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	RL	Amount	MDL	RL	Amount	Flag
		PPBV	PPBV	PPBV	UG/M3	UG/M3	UG/M3	
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 LCL	Limits UCL	Flag
2037-26-5	Toluene-d8				92	70	130	

ANALYTICAL REPORT

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	RL	Amount	MDL	RL	Amount	Flag
		PPBV	PPBV	PPBV	UG/M3	UG/M3	UG/M3	
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 LCL	Limits UCL	Flag
2037-26-5	Toluene-d8				89	70	130	

METHOD BLANK REPORT

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

TPH-Gasoline by GC/MS

Analytical Method: TO-15

SDG: 215096
Laboratory Number: 01

File: 1509601B
Description: 1500906-01
Sam_Type: SA
QC_Batch: 030415-MA1

Date Sampled: 03/02/15 Time: 0:00
Date Analyzed: 03/04/15 Time: 12:45
Can Dilution Factor: 1.00
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

TPH-Gasoline by GC/MS

Analytical Method: TO-15

SDG: 215096
Laboratory Number: 02

File: 1509602B
Description: 1500906-02
Sam_Type: SA
QC_Batch: 030415-MA1

Date Sampled: 03/02/15 Time: 0:00
Date Analyzed: 03/04/15 Time: 15:19
Can Dilution Factor: 1.00
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

TPH-Gasoline by GC/MS

Analytical Method: TO-15

SDG: 215096
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

TPH-Gasoline by GC/MS

Analytical Method: TO-15

SDG: 215096
Laboratory Number: 04

File: 1509604A
Description: 1500906-04
Sam_Type: SA
QC_Batch: 030415-MA1

Date Sampled: 03/02/15 Time: 0:00
Date Analyzed: 03/04/15 Time: 14:40
Can Dilution Factor: 1.00
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

EPA Method TO-15 Modified Full Scan GC/MS

SDG: 215100

Analytical Method: TO-15

Laboratory ID: 01

File Name: 1510001A.D

Date Sampled: 03/03/15 Time: 00:00

Description: 1500918-01

Date Analyzed: 03/05/15 Time: 16:15

Can/Tube#: TBAG

Can Dilution Factor: 1.00

QC_Batch: 030515-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	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	RL	Amount	MDL	RL	Amount	Flag
		PPBV	PPBV	PPBV	UG/M3	UG/M3	UG/M3	
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				117	70	130	

ANALYTICAL REPORT

EPA Method TO-15 Modified Full Scan GC/MS

Analytical Method: TO-15

SDG: 215100

Laboratory ID: 02

File Name: 1510002A.D

Date Sampled: 03/03/15 Time: 00:00

Description: 1500918-02

Date Analyzed: 03/05/15 Time: 16:58

Can/Tube#: TBAG

Can Dilution Factor: 1.00

QC_Batch: 030515-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	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	RL	Amount	MDL	RL	Amount	Flag
		PPBV	PPBV	PPBV	UG/M3	UG/M3	UG/M3	
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

EPA Method TO-15 Modified Full Scan GC/MS

SDG: 215100

Analytical Method: TO-15

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	RL	Amount	MDL	RL	Amount	Flag
		PPBV	PPBV	PPBV	UG/M3	UG/M3	UG/M3	
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	Flag
			LCL	UCL	
2037-26-5	Toluene-d8	93	70	130	

METHOD BLANK REPORT

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
Description: 1500918-01
Sam_Type: SA
QC_Batch: 030515-MA1

Date Sampled: 03/03/15 Time: 0:00
Date Analyzed: 03/05/15 Time: 16:15
Can Dilution Factor: 1.00
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

TPH-Gasoline by GC/MS

Analytical Method: TO-15

SDG: 215100
Laboratory Number: 02

File: 1510002A
Description: 1500918-02
Sam_Type: SA
QC_Batch: 030515-MA1

Date Sampled: 03/03/15 Time: 0:00
Date Analyzed: 03/05/15 Time: 16:58
Can Dilution Factor: 1.00
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

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 720 West Arapaho Road Richardson TX, 75080	Project: CARB Project Number: CARB #1344 Guisti 20-2, Gou 32-8/32-9 Project Manager: David Ranum	Reported: 14-Aug-15 16:15
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TB 040 A
1503374-01 (Air)

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
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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

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Oilfield Environmental and Compliance, INC.

Sage Environmental Consulting 720 West Arapaho Road Richardson TX, 75080	Project: CARB Project Number: CARB #1344 Guisti 20-2, Gou 32-8/32-9 Project Manager: David Ranum	Reported: 14-Aug-15 16:15
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TB 040 A
1503374-01 (Air)

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
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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

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Oilfield Environmental and Compliance, INC.

Sage Environmental Consulting
720 West Arapaho Road
Richardson TX, 75080

Project: CARB
Project Number: CARB #1344 Guisti 20-2, Gou 32-8/32-9
Project Manager: David Ranum

Reported:
14-Aug-15 16:15

TB 041 A
1503374-03 (Air)

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
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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

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Sage Environmental Consulting 720 West Arapaho Road Richardson TX, 75080	Project: CARB Project Number: CARB #1344 Guisti 20-2, Gou 32-8/32-9 Project Manager: David Ranum	Reported: 14-Aug-15 16:15
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TB 041 A
1503374-03 (Air)

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
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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	"	"	"	"	"	"	

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Sage Environmental Consulting 720 West Arapaho Road Richardson TX, 75080	Project: CARB Project Number: Sanborn #4, 19-8, 19-10, 30-10, 25-17, 30-6 Project Manager: David Ranum	Reported: 17-Aug-15 15:13
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TB 042 A
1503396-01 (Air)

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
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Oilfield Environmental and Compliance

Volatile Organic Compounds by EPA Method TO-15

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	"	"	"	"	"	"	

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TB 042 A
1503396-01 (Air)

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
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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	"	"	"	"	"	"	

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Sage Environmental Consulting 720 West Arapaho Road Richardson TX, 75080	Project: CARB Project Number: Sanborn #4, 19-8, 19-10, 30-10, 25-17, 30-6 Project Manager: David Ranum	Reported: 17-Aug-15 15:13
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TB 043 A
1503396-03 (Air)

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
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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	"	"	"	"	"	"	

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TB 043 A
1503396-03 (Air)

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
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Oilfield Environmental and Compliance

Volatile Organic Compounds by EPA Method TO-15

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	"	"	"	"	"	"	

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Oilfield Environmental and Compliance, INC.

Sage Environmental Consulting 720 West Arapaho Road Richardson TX, 75080	Project: CARB Project Number: CARB #1344 Feather River AQMD Project Manager: David Ranum	Reported: 19-Aug-15 14:05
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TB 044
1503434-01 (Air)

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
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Oilfield Environmental and Compliance

Volatile Organic Compounds by EPA Method TO-15

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	"	"	"	"	"	"	

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Sage Environmental Consulting 720 West Arapaho Road Richardson TX, 75080	Project: CARB Project Number: CARB #1344 Feather River AQMD Project Manager: David Ranum	Reported: 19-Aug-15 14:05
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TB 044
1503434-01 (Air)

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
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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	"	"	"	"	"	"	

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Sage Environmental Consulting 720 West Arapaho Road Richardson TX, 75080	Project: CARB Project Number: CARB #1344 Feather River AQMD Project Manager: David Ranum	Reported: 19-Aug-15 14:05
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TB 045
1503434-02 (Air)

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
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Oilfield Environmental and Compliance

Volatile Organic Compounds by EPA Method TO-15

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	"	"	"	"	"	"	

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Oilfield Environmental and Compliance, INC.

Sage Environmental Consulting 720 West Arapaho Road Richardson TX, 75080	Project: CARB Project Number: CARB #1344 Feather River AQMD Project Manager: David Ranum	Reported: 19-Aug-15 14:05
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TB 045
1503434-02 (Air)

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
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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	"	"	"	"	"	"	

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Oilfield Environmental and Compliance, INC.

Sage Environmental Consulting 720 West Arapaho Road Richardson TX, 75080	Project: CARB Project Number: CARB #1344 Feather River AQMD Project Manager: David Ranum	Reported: 20-Aug-15 15:50
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TB 046 A & B
1503463-01 (Air)

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
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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

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Sage Environmental Consulting 720 West Arapaho Road Richardson TX, 75080	Project: CARB Project Number: CARB #1344 Feather River AQMD Project Manager: David Ranum	Reported: 20-Aug-15 15:50
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TB 046 A & B
1503463-01 (Air)

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
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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	"	"	"	"	"	"	

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Oilfield Environmental and Compliance, INC.

Sage Environmental Consulting
720 West Arapaho Road
Richardson TX, 75080

Project: CARB
Project Number: CARB #1344 Feather River AQMD
Project Manager: David Ranum

Reported:
20-Aug-15 15:50

TB 047 A & B
1503463-02 (Air)

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
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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

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Oilfield Environmental and Compliance, INC.

Sage Environmental Consulting
720 West Arapaho Road
Richardson TX, 75080

Project: CARB
Project Number: CARB #1344 Feather River AQMD
Project Manager: David Ranum

Reported:
20-Aug-15 15:50

TB 047 A & B
1503463-02 (Air)

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
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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	"	"	"	"	"	"	

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Sage Environmental Consulting 720 West Arapaho Road Richardson TX, 75080	Project: CARB Project Number: CARB #1344 Feather River AQMD Project Manager: David Ranum	Reported: 20-Aug-15 15:50
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TB 048 A & B
1503463-03 (Air)

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
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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	"	"	"	"	"	"	

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Sage Environmental Consulting 720 West Arapaho Road Richardson TX, 75080	Project: CARB Project Number: CARB #1344 Feather River AQMD Project Manager: David Ranum	Reported: 20-Aug-15 15:50
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TB 048 A & B
1503463-03 (Air)

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
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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	"	"	"	"	"	"	

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Sage Environmental Consulting 720 West Arapaho Road Richardson TX, 75080	Project: CARB Project Number: CARB #1344 Feather River AQMD Project Manager: David Ranum	Reported: 24-Aug-15 08:30
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TB049A&B
1503485-01 (Air)

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
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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	"	"	"	"	"	"	

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Sage Environmental Consulting 720 West Arapaho Road Richardson TX, 75080	Project: CARB Project Number: CARB #1344 Feather River AQMD Project Manager: David Ranum	Reported: 24-Aug-15 08:30
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TB049A&B
1503485-01 (Air)

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
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Oilfield Environmental and Compliance

Volatile Organic Compounds by EPA Method TO-15

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	"	"	"	"	"	"	

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TB050A&B
1503485-02 (Air)

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
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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	"	"	"	"	"	"	

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Oilfield Environmental and Compliance, INC.

Sage Environmental Consulting
720 West Arapaho Road
Richardson TX, 75080

Project: CARB
Project Number: CARB #1344 Feather River AQMD
Project Manager: David Ranum

Reported:
24-Aug-15 08:30

TB050A&B
1503485-02 (Air)

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
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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	"	"	"	"	"	"	

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Sage Environmental Consulting 720 West Arapaho Road Richardson TX, 75080	Project: CARB Project Number: CARB #1344 Feather River AQMD Project Manager: David Ranum	Reported: 24-Aug-15 11:20
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TB 051 A&B
1503504-01 (Air)

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
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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	"	"	"	"	"	"	

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Oilfield Environmental and Compliance, INC.

Sage Environmental Consulting
720 West Arapaho Road
Richardson TX, 75080

Project: CARB
Project Number: CARB #1344 Feather River AQMD
Project Manager: David Ranum

Reported:
24-Aug-15 11:20

TB 051 A&B
1503504-01 (Air)

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
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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

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Oilfield Environmental and Compliance, INC.

Sage Environmental Consulting 720 West Arapaho Road Richardson TX, 75080	Project: CARB Project Number: CARB #1344 Feather River AQMD Project Manager: David Ranum	Reported: 24-Aug-15 11:20
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TB 052 A&B
1503504-02 (Air)

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
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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

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Oilfield Environmental and Compliance, INC.

Sage Environmental Consulting
720 West Arapaho Road
Richardson TX, 75080

Project: CARB
Project Number: CARB #1344 Feather River AQMD
Project Manager: David Ranum

Reported:
24-Aug-15 11:20

TB 052 A&B
1503504-02 (Air)

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
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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

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Oilfield Environmental and Compliance, INC.

Sage Environmental Consulting
720 West Arapaho Road
Richardson TX, 75080

Project: CARB
Project Number: CARB #1344 Feather River AQMD
Project Manager: David Ranum

Reported:
24-Aug-15 11:20

TB 053 A&B
1503504-03 (Air)

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
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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	"	"	"	"	"	"	

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Oilfield Environmental and Compliance, INC.

Sage Environmental Consulting 720 West Arapaho Road Richardson TX, 75080	Project: CARB Project Number: CARB #1344 Feather River AQMD Project Manager: David Ranum	Reported: 24-Aug-15 11:20
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TB 053 A&B
1503504-03 (Air)

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
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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	"	"	"	"	"	"	

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OILFIELD ENVIRONMENTAL & COMPLIANCE, INC.

Client: Sage Environmental Consulting, LP 4611 Bee Caves Road Suite 100 Austin, Texas 78746 Attn: David Ranum	SAMPLE ID: 1500280-1 Date Sampled: 01/20/15 @ 1051 Date Analyzed: 01/22/15 @ 1538 Lab Contact: J. Carstens
Facility: Long Beach Description: TB001 Note: CARB #1344	Meter: - Pressure: - psig 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				CHONS	Mole % Wt%
BTU/ft ³ dry	0.8			Carbon	0.13 0.05
BTU/ft ³ wet	0.8			Hydrogen	0.15 0.01
				Oxygen	21.39 23.77
				Nitrogen	78.32 76.17
				Sulfur	0.00 0.00
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			

All results reported at 60°F and 14.696 psia.

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



OILFIELD ENVIRONMENTAL & COMPLIANCE, INC.

Client: Sage Environmental Consulting, LP 4611 Bee Caves Road Suite 100 Austin, Texas 78746 Attn: David Ranum	SAMPLE ID: 1500280-2 Date Sampled: 01/20/15 @ 1126 Date Analyzed: 01/22/15 @ 1636 Lab Contact: J. Carstens
Facility: Long Beach Description: TB002 Note: CARB #1344	Meter: - Pressure: - psig 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%
Gross Calorific Value				Carbon	0.05 0.02
BTU/ft ³ dry	0.0			Hydrogen	0.00 0.00
BTU/ft ³ wet	0.0			Oxygen	21.45 23.78
Net Calorific Value				Nitrogen	78.50 76.20
BTU/ft ³ dry	0.0	EPA 'F' Factor (60°F, 1ATM)		Sulfur	0.00 0.00
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 4611 Bee Caves Road Suite 100 Austin, Texas 78746 Attn: David Ranum	SAMPLE ID: 1500280-3 Date Sampled: 01/20/15 @ 1511 Date Analyzed: 01/22/15 @ 1734 Lab Contact: J. Carstens
Facility: Long Beach Description: TB003 Note: CARB #1344	Meter: - Pressure: - psig 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%
Gross Calorific Value				Carbon	0.26 0.11
BTU/ft ³ dry	1.3			Hydrogen	0.26 0.02
BTU/ft ³ wet	1.3			Oxygen	21.39 23.81
Net Calorific Value				Nitrogen	78.08 76.07
BTU/ft ³ dry	1.2	EPA 'F' Factor (60°F, 1ATM)		Sulfur	0.00 0.00
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 4611 Bee Caves Road Suite 100 Austin, Texas 78746 Attn: David Ranum	SAMPLE ID: 1500307-1 Date Sampled: 1/21/2015 Date Analyzed: 01/23/15 @ 1336 Lab Contact: J. Carstens
Facility: CARB Description: TB004 Note: CARB #1344	Meter: - Pressure: - psig 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				CHONS	Mole % Wt%
BTU/ft ³ dry	0.0			Carbon	0.04 0.02
BTU/ft ³ wet	0.0			Hydrogen	0.00 0.00
				Oxygen	21.53 23.87
				Nitrogen	78.42 76.11
				Sulfur	0.00 0.00
Net Calorific Value					
BTU/ft ³ dry	0.0	EPA 'F' Factor (60°F, 1ATM)			Not Applicable
BTU/ft ³ wet	0.0	SDCF/MMBTU			
Hydrogen Sulfide =	NA	ppm			

All results reported at 60°F and 14.696 psia.

* Normalized values
ND: None Detected NA: Not Analyzed

SDCF: Standard dry cubic feet
G/MCF: Gallons/Thousand Cubic Feet



OILFIELD ENVIRONMENTAL & COMPLIANCE, INC.

Client: Sage Environmental Consulting, LP 4611 Bee Caves Road Suite 100 Austin, Texas 78746 Attn: David Ranum	SAMPLE ID: 1500307-2 Date Sampled: 1/21/2015 Date Analyzed: 01/23/15 @ 1405 Lab Contact: J. Carstens
Facility: CARB Description: TB005 Note: CARB #1344	Meter: - Pressure: - psig 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				
Gross Calorific Value				CHONS	Mole % Wt%
BTU/ft ³ dry	14.5			Carbon	1.57 0.68
BTU/ft ³ wet	14.2			Hydrogen	2.56 0.18
				Oxygen	20.68 23.70
				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 4611 Bee Caves Road Suite 100 Austin, Texas 78746 Attn: David Ranum	SAMPLE ID: 1500307-3 Date Sampled: 1/21/2015 Date Analyzed: 01/23/15 @ 1435 Lab Contact: J. Carstens
Facility: CARB Description: TB006 Note: CARB #1344	Meter: - Pressure: - psig 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				CHONS	Mole % Wt%
BTU/ft ³ dry	0.0			Carbon	0.05 0.02
BTU/ft ³ wet	0.0			Hydrogen	0.00 0.00
				Oxygen	21.53 23.87
				Nitrogen	78.42 76.11
				Sulfur	0.00 0.00
Net Calorific Value					
BTU/ft ³ dry	0.0	EPA 'F' Factor (60°F, 1ATM)			Not Applicable
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 4611 Bee Caves Road Suite 100 Austin, Texas 78746 Attn: David Ranum	SAMPLE ID: 1500306-1 Date Sampled: 1/22/2015 Date Analyzed: 01/23/15 @ 1505 Lab Contact: J. Carstens
Facility: CARB Description: TB007 Note: CARB #1344	Meter: - Pressure: - psig 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			CHONS	Mole % Wt%
				Carbon	0.05 0.02
				Hydrogen	0.00 0.00
Gross Calorific Value				Oxygen	21.52 23.86
BTU/ft ³ dry	0.0			Nitrogen	78.43 76.12
BTU/ft ³ wet	0.0			Sulfur	0.00 0.00
Net Calorific Value					
BTU/ft ³ dry	0.0	EPA 'F' Factor (60°F, 1ATM)			Not Applicable
BTU/ft ³ wet	0.0	SDCF/MMBTU			
Hydrogen Sulfide =	NA	ppm			

All results reported at 60°F and 14.696 psia.

* Normalized values
ND: None Detected NA: Not Analyzed

SDCF: Standard dry cubic feet
G/MCF: Gallons/Thousand Cubic Feet



OILFIELD ENVIRONMENTAL & COMPLIANCE, INC.

Client: Sage Environmental Consulting, LP 4611 Bee Caves Road Suite 100 Austin, Texas 78746 Attn: David Ranum	SAMPLE ID: 1500306-2 Date Sampled: 1/22/2015 Date Analyzed: 01/23/15 @ 1535 Lab Contact: J. Carstens
Facility: CARB Description: TB008 Note: CARB #1344	Meter: - Pressure: - psig 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				
Gross Calorific Value				CHONS	Mole % Wt%
BTU/ft ³ dry	1.5			Carbon	0.21 0.09
BTU/ft ³ wet	1.5			Hydrogen	0.28 0.02
				Oxygen	21.45 23.86
				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



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 4611 Bee Caves Road Suite 100 Austin, Texas 78746 Attn: David Ranum	SAMPLE ID: 1500306-3 Date Sampled: 1/22/2015 Date Analyzed: 01/23/15 @ 1608 Lab Contact: J. Carstens
Facility: CARB Description: TB009 Note: CARB #1344	Meter: - Pressure: - psig 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			
Gross Calorific Value			CHONS	Mole % Wt%
BTU/ft ³ dry	7.0		Carbon	0.74 0.31
BTU/ft ³ wet	6.9		Hydrogen	1.36 0.10
			Oxygen	21.08 23.77
			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 4611 Bee Caves Road Suite 100 Austin, Texas 78746 Attn: David Ranum	SAMPLE ID: 1500317-1 Date Sampled: 1/23/2015 Date Analyzed: 01/23/15 @ 1639 Lab Contact: J. Carstens
Facility: CARB Description: TB010 Note: CARB #1344	Meter: - Pressure: - psig 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			CHONS	Mole % Wt%
				Carbon	0.05 0.02
				Hydrogen	0.00 0.00
Gross Calorific Value				Oxygen	21.51 23.85
BTU/ft ³ dry	0.0			Nitrogen	78.44 76.13
BTU/ft ³ wet	0.0			Sulfur	0.00 0.00
Net Calorific Value					
BTU/ft ³ dry	0.0	EPA 'F' Factor (60°F, 1ATM)			Not Applicable
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 4611 Bee Caves Road Suite 100 Austin, Texas 78746 Attn: David Ranum	SAMPLE ID: 1500317-2 Date Sampled: 1/23/2015 Date Analyzed: 01/23/15 @ 1705 Lab Contact: J. Carstens
Facility: CARB Description: TB011 Note: CARB #1344	Meter: - Pressure: - psig 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			CHONS	Mole % Wt%
				Carbon	0.04 0.02
				Hydrogen	0.00 0.00
Gross Calorific Value				Oxygen	21.59 23.93
BTU/ft ³ dry	0.0			Nitrogen	78.38 76.06
BTU/ft ³ wet	0.0			Sulfur	0.00 0.00
Net Calorific Value					
BTU/ft ³ dry	0.0	EPA 'F' Factor (60°F, 1ATM)			Not Applicable
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 4611 Bee Caves Road Suite 100 Austin, Texas 78746 Attn: David Ranum	SAMPLE ID: 1500317-3 Rev. Date Sampled: 1/23/2015 Date Analyzed: 01/23/15 @ 1737 Lab Contact: J. Carstens
Facility: CARB Description: TB012 Note: CARB #1344	Meter: - Pressure: - psig 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			CHONS	Mole % Wt%
Gross Calorific Value				Carbon	0.03 0.01
BTU/ft ³ dry	0.0			Hydrogen	0.00 0.00
BTU/ft ³ wet	0.0			Oxygen	21.46 23.80
Net Calorific Value				Nitrogen	78.50 76.19
BTU/ft ³ dry	0.0	EPA 'F' Factor (60°F, 1ATM)		Sulfur	0.00 0.00
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



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 4611 Bee Caves Road Suite 100 Austin, Texas 78746 Attn: David Ranum	SAMPLE ID: 1500343-1 Date Sampled: 1/26/2015 Date Analyzed: 01/27/15 @ 1206 Lab Contact: J. Carstens
Facility: CARB Description: TB013 Note: CARB #1344	Meter: - Pressure: - psig 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				
Gross Calorific Value				CHONS	Mole % Wt%
BTU/ft ³ dry	3.5			Carbon	0.39 0.17
BTU/ft ³ wet	3.4			Hydrogen	0.64 0.05
				Oxygen	21.20 23.69
				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 4611 Bee Caves Road Suite 100 Austin, Texas 78746 Attn: David Ranum	SAMPLE ID: 1500370-2 Date Sampled: 1/27/2015 Date Analyzed: 01/28/15 @ 1256 Lab Contact: J. Carstens
Facility: CARB Description: TB015 Note: CARB #1344	Meter: - Pressure: - psig 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				
Gross Calorific Value				CHONS	Mole % Wt%
BTU/ft ³ dry	6.4			Carbon	0.83 0.35
BTU/ft ³ wet	6.3			Hydrogen	0.94 0.07
				Oxygen	20.88 23.47
				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		

All results reported at 60°F and 14.696 psia.

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



OILFIELD ENVIRONMENTAL & COMPLIANCE, INC.

Client: Sage Environmental Consulting, LP 4611 Bee Caves Road Suite 100 Austin, Texas 78746 Attn: David Ranum	SAMPLE ID: 1500370-3 Date Sampled: 1/27/2015 Date Analyzed: 01/28/15 @ 1338 Lab Contact: J. Carstens
Facility: CARB Description: TB016 Note: CARB #1344	Meter: - Pressure: - psig 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				CHONS	Mole % Wt%
BTU/ft ³ dry	0.0			Carbon	0.06 0.03
BTU/ft ³ wet	0.0			Hydrogen	0.00 0.00
				Oxygen	21.24 23.55
				Nitrogen	78.70 76.42
				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
 ND: None Detected NA: Not Analyzed
 SDCF: Standard dry cubic feet
 G/MCF: Gallons/Thousand Cubic Feet



OILFIELD ENVIRONMENTAL & COMPLIANCE, INC.

Client: Sage Environmental Consulting, LP 4611 Bee Caves Road Suite 100 Austin, Texas 78746 Attn: David Ranum	SAMPLE ID: 1500386-2 Date Sampled: 1/28/2015 Date Analyzed: 01/29/15 @ 1356 Lab Contact: J. Carstens
Facility: CARB Description: TB018 Note: CARB #1344	Meter: - Pressure: - psig 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%
Gross Calorific Value				Carbon	0.04 0.02
BTU/ft ³ dry	0.0			Hydrogen	0.00 0.00
BTU/ft ³ wet	0.0			Oxygen	21.30 23.62
Net Calorific Value				Nitrogen	78.66 76.37
BTU/ft ³ dry	0.0		EPA 'F' Factor (60°F, 1ATM)	Sulfur	0.00 0.00
BTU/ft ³ wet	0.0		Cannot Calculate		
Hydrogen Sulfide =	ND	ppm	SDCF/MMBTU		

All results reported at 60°F and 14.696 psia.

* Normalized values
ND: None Detected NA: Not Analyzed

SDCF: Standard dry cubic feet
G/MCF: Gallons/Thousand Cubic Feet



OILFIELD ENVIRONMENTAL & COMPLIANCE, INC.

Client: Sage Environmental Consulting, LP 4611 Bee Caves Road Suite 100 Austin, Texas 78746 Attn: David Ranum	SAMPLE ID: 1500386-3 Date Sampled: 1/28/2015 Date Analyzed: 01/29/15 @ 1428 Lab Contact: J. Carstens
Facility: CARB Description: TB019 Note: CARB #1344	Meter: - Pressure: - psig 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				CHONS	Mole % Wt%
BTU/ft ³ dry	1.3			Carbon	0.21 0.09
BTU/ft ³ wet	1.3			Hydrogen	0.21 0.01
Net Calorific Value				Oxygen	21.19 23.57
BTU/ft ³ dry	1.2			Nitrogen	78.39 76.33
BTU/ft ³ wet	1.2			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 4611 Bee Caves Road Suite 100 Austin, Texas 78746 Attn: David Ranum	SAMPLE ID: 1500406-1 Date Sampled: 1/29/2015 Date Analyzed: 01/30/15 @ 1528 Lab Contact: J. Carstens
Facility: CARB Description: TB020 Note: CARB #1344	Meter: - Pressure: - psig 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				
Gross Calorific Value				CHONS	Mole % Wt%
BTU/ft ³ dry	0.4			Carbon	0.08 0.03
BTU/ft ³ wet	0.4			Hydrogen	0.07 0.01
				Oxygen	21.13 23.46
				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
 ND: None Detected NA: Not Analyzed
 SDCF: Standard dry cubic feet
 G/MCF: Gallons/Thousand Cubic Feet



OILFIELD ENVIRONMENTAL & COMPLIANCE, INC.

Client: Sage Environmental Consulting, LP 4611 Bee Caves Road Suite 100 Austin, Texas 78746 Attn: David Ranum	SAMPLE ID: 1500406-2 Date Sampled: 1/29/2015 Date Analyzed: 01/30/15 @ 1602 Lab Contact: J. Carstens
Facility: CARB Description: TB021 Note: CARB #1344	Meter: - Pressure: - psig 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				
Gross Calorific Value				CHONS	Mole % Wt%
BTU/ft ³ dry	5.6			Carbon	0.62 0.26
BTU/ft ³ wet	5.5			Hydrogen	1.07 0.08
				Oxygen	20.82 23.40
				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 4611 Bee Caves Road Suite 100 Austin, Texas 78746 Attn: David Ranum	SAMPLE ID: 1500416-1 Date Sampled: 1/30/2015 Date Analyzed: 01/30/15 @ 1634 Lab Contact: J. Carstens
Facility: CARB Description: TB022 Note: CARB #1344	Meter: - Pressure: - psig 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				
Gross Calorific Value				CHONS	Mole % Wt%
BTU/ft ³ dry	46.5			Carbon	4.89 2.24
BTU/ft ³ wet	45.7			Hydrogen	7.02 0.54
				Oxygen	18.65 22.83
				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 4611 Bee Caves Road Suite 100 Austin, Texas 78746 Attn: David Ranum	SAMPLE ID: 1500416-2 Date Sampled: 1/30/2015 Date Analyzed: 01/30/15 @ 1706 Lab Contact: J. Carstens
Facility: CARB Description: TB023 Note: CARB #1344	Meter: - Pressure: - psig 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				CHONS	Mole % Wt%
BTU/ft ³ dry	0.0			Carbon	0.05 0.02
BTU/ft ³ wet	0.0			Hydrogen	0.00 0.00
				Oxygen	21.15 23.46
				Nitrogen	78.81 76.52
				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
 ND: None Detected NA: Not Analyzed
 SDCF: Standard dry cubic feet
 G/MCF: Gallons/Thousand Cubic Feet



OILFIELD ENVIRONMENTAL & COMPLIANCE, INC.

Client: Sage Environmental Consulting, LP 4611 Bee Caves Road Suite 100 Austin, Texas 78746 Attn: David Ranum	SAMPLE ID: 1500806-1 Date Sampled: 2/23/2015 Date Analyzed: 02/24/15 @ 1449 Lab Contact: J. Carstens
Facility: - Description: TB024A Note: CARB #1344	Meter: - Pressure: - psig 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				
Gross Calorific Value				CHONS	Mole % Wt%
BTU/ft ³ dry	0.0			Carbon	0.03 0.01
BTU/ft ³ wet	0.0			Hydrogen	0.00 0.00
				Oxygen	21.55 23.88
				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
 ND: None Detected NA: Not Analyzed
 SDCF: Standard dry cubic feet
 G/MCF: Gallons/Thousand Cubic Feet



OILFIELD ENVIRONMENTAL & COMPLIANCE, INC.

Client: Sage Environmental Consulting, LP 4611 Bee Caves Road Suite 100 Austin, Texas 78746 Attn: David Ranum	SAMPLE ID: 1500806-3 Date Sampled: 2/23/2015 Date Analyzed: 02/24/15 @ 1608 Lab Contact: J. Carstens
Facility: - Description: TB025A Note: CARB #1344	Meter: - Pressure: - psig 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				
Gross Calorific Value				CHONS	Mole % Wt%
BTU/ft ³ dry	31.8			Carbon	3.00 1.35
BTU/ft ³ wet	31.2			Hydrogen	5.91 0.45
				Oxygen	19.64 23.47
				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
ND: None Detected NA: Not Analyzed

SDCF: Standard dry cubic feet
G/MCF: Gallons/Thousand Cubic Feet



OILFIELD ENVIRONMENTAL & COMPLIANCE, INC.

Client: Sage Environmental Consulting, LP 4611 Bee Caves Road Suite 100 Austin, Texas 78746 Attn: David Ranum	SAMPLE ID: 1500835-1 Date Sampled: 2/24/2015 Date Analyzed: 02/25/15 @ 1819 Lab Contact: J. Carstens
Facility: - Description: TB026A Note: CARB #1344	Meter: - Pressure: - psig 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
				Hydrogen	0.16 0.01
Gross Calorific Value				Oxygen	21.52 23.90
BTU/ft ³ dry	0.8			Nitrogen	78.20 76.04
BTU/ft ³ wet	0.8			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
ND: None Detected NA: Not Analyzed

SDCF: Standard dry cubic feet
G/MCF: Gallons/Thousand Cubic Feet



OILFIELD ENVIRONMENTAL & COMPLIANCE, INC.

Client: Sage Environmental Consulting, LP 4611 Bee Caves Road Suite 100 Austin, Texas 78746 Attn: David Ranum	SAMPLE ID: 1500835-2 Date Sampled: 2/24/2015 Date Analyzed: 02/25/15 @ 1847 Lab Contact: J. Carstens
Facility: - Description: TB027A Note: CARB #1344	Meter: - Pressure: - psig 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				CHONS	Mole % Wt%
BTU/ft ³ dry	0.0			Carbon	0.05 0.02
BTU/ft ³ wet	0.0			Hydrogen	0.00 0.00
				Oxygen	21.60 23.95
				Nitrogen	78.35 76.03
				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
 ND: None Detected NA: Not Analyzed
 SDCF: Standard dry cubic feet
 G/MCF: Gallons/Thousand Cubic Feet



OILFIELD ENVIRONMENTAL & COMPLIANCE, INC.

Client: Sage Environmental Consulting, LP 4611 Bee Caves Road Suite 100 Austin, Texas 78746 Attn: David Ranum	SAMPLE ID: 1500853-1 Date Sampled: 2/25/2015 Date Analyzed: 02/26/15 @ 1259 Lab Contact: J. Carstens
Facility: - Description: TB028A Note: CARB #1344	Meter: - Pressure: - psig 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 %
				Carbon	0.26
				Hydrogen	0.46
Gross Calorific Value				Oxygen	21.37
BTU/ft ³ dry	2.3			Nitrogen	77.91
BTU/ft ³ wet	2.3			Sulfur	0.00
Net Calorific Value					0.00
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
 ND: None Detected NA: Not Analyzed
 SDCF: Standard dry cubic feet
 G/MCF: Gallons/Thousand Cubic Feet



OILFIELD ENVIRONMENTAL & COMPLIANCE, INC.

Client: Sage Environmental Consulting, LP 4611 Bee Caves Road Suite 100 Austin, Texas 78746 Attn: David Ranum	SAMPLE ID: 1500853-2 Date Sampled: 2/25/2015 Date Analyzed: 02/26/15 @ 1352 Lab Contact: J. Carstens
Facility: - Description: TB029A Note: CARB #1344	Meter: - Pressure: - psig 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				
Gross Calorific Value				CHONS	Mole % Wt%
BTU/ft ³ dry	9.1			Carbon	0.92 0.39
BTU/ft ³ wet	8.9			Hydrogen	1.76 0.13
				Oxygen	21.00 23.79
				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 4611 Bee Caves Road Suite 100 Austin, Texas 78746 Attn: David Ranum	SAMPLE ID: 1500870-1 Date Sampled: 2/26/2015 Date Analyzed: 02/27/15 @ 1444 Lab Contact: J. Carstens
Facility: - Description: TB030A Note: CARB #1344	Meter: - Pressure: - psig 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				CHONS	Mole % Wt%
BTU/ft ³ dry	0.0			Carbon	0.05 0.02
BTU/ft ³ wet	0.0			Hydrogen	0.00 0.00
				Oxygen	21.59 23.93
				Nitrogen	78.36 76.04
				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
 ND: None Detected NA: Not Analyzed
 SDCF: Standard dry cubic feet
 G/MCF: Gallons/Thousand Cubic Feet



OILFIELD ENVIRONMENTAL & COMPLIANCE, INC.

Client: Sage Environmental Consulting, LP 4611 Bee Caves Road Suite 100 Austin, Texas 78746 Attn: David Ranum	SAMPLE ID: 1500870-2 Date Sampled: 2/26/2015 Date Analyzed: 02/27/15 @ 1520 Lab Contact: J. Carstens
Facility: - Description: TB031A Note: CARB #1344	Meter: - Pressure: - psig 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				
Gross Calorific Value				CHONS	Mole % Wt%
BTU/ft ³ dry	11.1			Carbon	1.11 0.48
BTU/ft ³ wet	10.9			Hydrogen	2.14 0.15
				Oxygen	20.91 23.81
				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 4611 Bee Caves Road Suite 100 Austin, Texas 78746 Attn: David Ranum	SAMPLE ID: 1500870-3 Date Sampled: 2/26/2015 Date Analyzed: 02/27/15 @ 1551 Lab Contact: J. Carstens
Facility: - Description: TB032A Note: CARB #1344	Meter: - Pressure: - psig 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				
Gross Calorific Value				CHONS	Mole % Wt%
BTU/ft ³ dry	2.2			Carbon	0.26 0.11
BTU/ft ³ wet	2.2			Hydrogen	0.44 0.03
				Oxygen	21.47 23.92
				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



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 4611 Bee Caves Road Suite 100 Austin, Texas 78746 Attn: David Ranum	SAMPLE ID: 1500906-1 Date Sampled: 3/2/2015 Date Analyzed: 03/03/15 @ 1215 Lab Contact: J. Carstens
Facility: - Description: TB033A Note: CARB #1344	Meter: - Pressure: - psig 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				
Gross Calorific Value				CHONS	Mole % Wt%
BTU/ft ³ dry	4.6			Carbon	0.59 0.25
BTU/ft ³ wet	4.5			Hydrogen	0.68 0.05
				Oxygen	20.70 23.18
				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 4611 Bee Caves Road Suite 100 Austin, Texas 78746 Attn: David Ranum	SAMPLE ID: 1500906-2 Date Sampled: 3/2/2015 Date Analyzed: 03/03/15 @ 1427 Lab Contact: J. Carstens
Facility: - Description: TB034A Note: CARB #1344	Meter: - Pressure: - psig 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				CHONS	Mole % Wt%
BTU/ft ³ dry	0.0			Carbon	0.04 0.02
BTU/ft ³ wet	0.0			Hydrogen	0.00 0.00
				Oxygen	21.06 23.37
				Nitrogen	78.90 76.62
				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
 ND: None Detected NA: Not Analyzed
 SDCF: Standard dry cubic feet
 G/MCF: Gallons/Thousand Cubic Feet



OILFIELD ENVIRONMENTAL & COMPLIANCE, INC.

Client: Sage Environmental Consulting, LP 4611 Bee Caves Road Suite 100 Austin, Texas 78746 Attn: David Ranum	SAMPLE ID: 1500906-3 Date Sampled: 3/2/2015 Date Analyzed: 03/03/15 @ 1508 Lab Contact: J. Carstens
Facility: - Description: TB035A Note: CARB #1344	Meter: - Pressure: - psig 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/m ³	1.2008	air = 1.205 Kg/m ³			
Compressibility (Z) Factor (60°F, 1ATM)	0.9996				
MW of fuel gas, calculated (60°F, 1ATM)	28.44				
Gross Calorific Value				CHONS	Mole % Wt%
BTU/ft ³ dry	1.2			Carbon	0.18 0.08
BTU/ft ³ wet	1.2			Hydrogen	0.19 0.01
				Oxygen	20.96 23.32
				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 4611 Bee Caves Road Suite 100 Austin, Texas 78746 Attn: David Ranum	SAMPLE ID: 1500918-1 Date Sampled: 3/3/2015 Date Analyzed: 03/05/15 @ 1026 Lab Contact: J. Carstens
Facility: - Description: TB037A Note: CARB #1344	Meter: - Pressure: - psig 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
				Hydrogen	0.14 0.01
Gross Calorific Value				Oxygen	21.11 23.46
BTU/ft ³ dry	0.9			Nitrogen	78.60 76.47
BTU/ft ³ wet	0.9			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 4611 Bee Caves Road Suite 100 Austin, Texas 78746 Attn: David Ranum	SAMPLE ID: 1500918-2 Date Sampled: 3/3/2015 Date Analyzed: 03/05/15 @ 1100 Lab Contact: J. Carstens
Facility: - Description: TB038A Note: CARB #1344	Meter: - Pressure: - psig 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				
Gross Calorific Value				CHONS	Mole % Wt%
BTU/ft ³ dry	0.0			Carbon	0.04 0.01
BTU/ft ³ wet	0.0			Hydrogen	0.00 0.00
				Oxygen	21.19 23.50
				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
 ND: None Detected NA: Not Analyzed SDCF: Standard dry cubic feet
 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 4611 Bee Caves Road Suite 100 Austin, Texas 78746 Attn: David Ranum	SAMPLE ID: 1500918-3 Date Sampled: 3/3/2015 Date Analyzed: 03/05/15 @ 1129 Lab Contact: J. Carstens
Facility: - Description: TB039A Note: CARB #1344	Meter: - Pressure: - psig 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			CHONS	Mole % Wt%
				Carbon	0.04 0.02
				Hydrogen	0.00 0.00
Gross Calorific Value				Oxygen	21.19 23.50
BTU/ft ³ dry	0.0			Nitrogen	78.77 76.48
BTU/ft ³ wet	0.0			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 4611 Bee Caves Road Suite 100 Austin, Texas 78746 Attn: David Ranum	SAMPLE ID: 1503374-4 Date Sampled: 8/6/2015 Date Analyzed: 08/07/15 @ 1258 Lab Contact: J. Carstens
Facility: GUISTI 20-2, GOU 32-8/32-9 Description: TB 041B Note: CARB #1344	Meter: - Pressure: - psig 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			CHONS	Mole % Wt%
				Carbon	0.35 0.15
				Hydrogen	0.62 0.04
Gross Calorific Value				Oxygen	20.91 23.38
BTU/ft ³ dry	3.2			Nitrogen	78.12 76.43
BTU/ft ³ wet	3.1			Sulfur	0.00 0.00
Net Calorific Value					
BTU/ft ³ dry	2.8	EPA 'F' Factor (60°F, 1ATM)	324702.6		
BTU/ft ³ wet	2.8		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 4611 Bee Caves Road Suite 100 Austin, Texas 78746 Attn: David Ranum	SAMPLE ID: 1503396-2 Date Sampled: 8/7/2015 Date Analyzed: 08/08/15 @ 1059 Lab Contact: J. Carstens
Facility: SANBORN #4,19-8,19-10,30-10,25-17,30-6 Description: TB 042B Note: CARB #1344	Meter: - Pressure: - psig Temperature: - °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°F, 1ATM)	0.9996				
MW of fuel gas, calculated (60°F, 1ATM)	28.32				
Gross Calorific Value				CHONS	Mole % Wt%
BTU/ft ³ dry	10.7			Carbon	1.07 0.46
BTU/ft ³ wet	10.5			Hydrogen	2.07 0.15
				Oxygen	20.89 23.76
				Nitrogen	75.97 75.64
				Sulfur	0.00 0.00
Net Calorific Value					
BTU/ft ³ dry	9.6	EPA 'F' Factor (60°F, 1ATM)	101128.4		
BTU/ft ³ wet	9.4		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 4611 Bee Caves Road Suite 100 Austin, Texas 78746 Attn: David Ranum	SAMPLE ID: 1503396-4 Date Sampled: 8/7/2015 Date Analyzed: 08/08/15 @ 1130 Lab Contact: J. Carstens
Facility: SANBORN #4,19-8,19-10,30-10,25-17,30-6 Description: TB 043B Note: CARB #1344	Meter: - Pressure: - psig 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				CHONS	Mole % Wt%
BTU/ft ³ dry	0.0			Carbon	0.03 0.01
BTU/ft ³ wet	0.0			Hydrogen	0.00 0.00
				Oxygen	21.50 23.84
				Nitrogen	78.46 76.15
				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 =	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 4611 Bee Caves Road Suite 100 Austin, Texas 78746 Attn: David Ranum	SAMPLE ID: 1503434-1 Date Sampled: 8/11/2015 Date Analyzed: 08/12/15 @ 1119 Lab Contact: J. Carstens
Facility: Feather River AQMD Description: TB 044A Note: CARB #1344	Meter: - Pressure: - psig 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			CHONS	Mole % Wt%
				Carbon	0.04 0.02
Gross Calorific Value				Hydrogen	0.00 0.00
BTU/ft ³ dry	0.0			Oxygen	21.44 23.77
BTU/ft ³ wet	0.0			Nitrogen	78.53 76.22
				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 =	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 4611 Bee Caves Road Suite 100 Austin, Texas 78746 Attn: David Ranum	SAMPLE ID: 1503434-2 Date Sampled: 8/11/2015 Date Analyzed: 08/12/15 @ 1221 Lab Contact: J. Carstens
Facility: Feather River AQMD Description: TB 045A Note: CARB #1344	Meter: - Pressure: - psig 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			CHONS	Mole % Wt%
				Carbon	0.04 0.02
				Hydrogen	0.00 0.00
Gross Calorific Value				Oxygen	21.41 23.74
BTU/ft ³ dry	0.0			Nitrogen	78.55 76.25
BTU/ft ³ wet	0.0			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 =	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 4611 Bee Caves Road Suite 100 Austin, Texas 78746 Attn: David Ranum	SAMPLE ID: 1503463-1 Date Sampled: 8/12/2015 Date Analyzed: 08/13/15 @ 1013 Lab Contact: J. Carstens
Facility: Feather River AQMD Description: TB 046A Note: CARB #1344	Meter: - Pressure: - psig 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				CHONS	Mole % Wt%
BTU/ft ³ dry	0.6			Carbon	0.11 0.04
BTU/ft ³ wet	0.6			Hydrogen	0.12 0.01
				Oxygen	21.20 23.54
				Nitrogen	78.58 76.40
				Sulfur	0.00 0.00
Net Calorific Value					
BTU/ft ³ dry	0.5	EPA 'F' Factor (60°F, 1ATM)	1664595.7		
BTU/ft ³ wet	0.5		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 4611 Bee Caves Road Suite 100 Austin, Texas 78746 Attn: David Ranum	SAMPLE ID: 1503463-2 Date Sampled: 8/12/2015 Date Analyzed: 08/13/15 @ 1039 Lab Contact: J. Carstens
Facility: Feather River AQMD Description: TB 047A Note: CARB #1344	Meter: - Pressure: - psig 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			CHONS	Mole % Wt%
				Carbon	0.04 0.02
				Hydrogen	0.00 0.00
Gross Calorific Value				Oxygen	21.22 23.53
BTU/ft ³ dry	0.0			Nitrogen	78.74 76.45
BTU/ft ³ wet	0.0			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 =	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 4611 Bee Caves Road Suite 100 Austin, Texas 78746 Attn: David Ranum	SAMPLE ID: 1503463-3 Date Sampled: 8/12/2015 Date Analyzed: 08/13/15 @ 1058 Lab Contact: J. Carstens
Facility: Feather River AQMD Description: TB 048A Note: CARB #1344	Meter: - Pressure: - psig Temperature: - °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°F, 1ATM)	0.9996				
MW of fuel gas, calculated (60°F, 1ATM)	28.39				
Gross Calorific Value				CHONS	Mole % Wt%
BTU/ft ³ dry	4.0			Carbon	0.45 0.19
BTU/ft ³ wet	4.0			Hydrogen	0.79 0.06
				Oxygen	20.96 23.48
				Nitrogen	77.80 76.28
				Sulfur	0.00 0.00
Net Calorific Value					
BTU/ft ³ dry	3.6		EPA 'F' Factor (60°F, 1ATM)	254811.0	
BTU/ft ³ wet	3.6			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 4611 Bee Caves Road Suite 100 Austin, Texas 78746 Attn: David Ranum	SAMPLE ID: 1503485-1 Date Sampled: 8/13/2015 Date Analyzed: 08/14/15 @ 1130 Lab Contact: J. Carstens
Facility: Feather River AQMD Description: TB 049A Note: CARB #1344	Meter: - Pressure: - psig Temperature: - °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°F, 1ATM)	0.9996				
MW of fuel gas, calculated (60°F, 1ATM)	28.44				
Gross Calorific Value				CHONS	Mole % Wt%
BTU/ft ³ dry	0.8			Carbon	0.12 0.05
BTU/ft ³ wet	0.8			Hydrogen	0.15 0.01
				Oxygen	21.28 23.64
				Nitrogen	78.45 76.30
				Sulfur	0.00 0.00
Net Calorific Value					
BTU/ft ³ dry	0.7	EPA 'F' Factor (60°F, 1ATM)	1299805.7		
BTU/ft ³ wet	0.7		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 4611 Bee Caves Road Suite 100 Austin, Texas 78746 Attn: David Ranum	SAMPLE ID: 1503485-2 Date Sampled: 8/13/2015 Date Analyzed: 08/14/15 @ 1226 Lab Contact: J. Carstens
Facility: Feather River AQMD Description: TB 050A Note: CARB #1344	Meter: - Pressure: - psig Temperature: - °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°F, 1ATM)	0.9996				
MW of fuel gas, calculated (60°F, 1ATM)	28.45			CHONS	Mole % Wt%
				Carbon	0.04 0.02
				Hydrogen	0.00 0.00
Gross Calorific Value				Oxygen	21.34 23.66
BTU/ft ³ dry	0.0			Nitrogen	78.62 76.32
BTU/ft ³ wet	0.0			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 =	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 4611 Bee Caves Road Suite 100 Austin, Texas 78746 Attn: David Ranum	SAMPLE ID: 1503504-1 Date Sampled: 8/14/2015 Date Analyzed: 08/15/15 @ 1132 Lab Contact: J. Carstens
Facility: Feather River AQMD Description: TB 051A Note: CARB #1344	Meter: - Pressure: - psig 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			CHONS	Mole % Wt%
				Carbon	0.04 0.02
Gross Calorific Value				Hydrogen	0.00 0.00
BTU/ft ³ dry	0.0			Oxygen	21.41 23.74
BTU/ft ³ wet	0.0			Nitrogen	78.55 76.25
				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 =	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 4611 Bee Caves Road Suite 100 Austin, Texas 78746 Attn: David Ranum	SAMPLE ID: 1503504-2 Date Sampled: 8/14/2015 Date Analyzed: 08/15/15 @ 1201 Lab Contact: J. Carstens
Facility: Feather River AQMD Description: TB 052A Note: CARB #1344	Meter: - Pressure: - psig 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				CHONS	Mole % Wt%
BTU/ft ³ dry	9.7			Carbon	0.97 0.41
BTU/ft ³ wet	9.5			Hydrogen	1.88 0.13
				Oxygen	20.77 23.57
				Nitrogen	76.38 75.88
				Sulfur	0.00 0.00
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			

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 4611 Bee Caves Road Suite 100 Austin, Texas 78746 Attn: David Ranum	SAMPLE ID: 1503504-3 Date Sampled: 8/14/2015 Date Analyzed: 08/15/15 @ 1229 Lab Contact: J. Carstens
Facility: Feather River AQMD Description: TB 053A Note: CARB #1344	Meter: - Pressure: - psig 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				CHONS	Mole % Wt%
BTU/ft ³ dry	5.3			Carbon	0.55 0.23
BTU/ft ³ wet	5.2			Hydrogen	1.04 0.07
				Oxygen	20.97 23.55
				Nitrogen	77.44 76.14
				Sulfur	0.00 0.00
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			

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