



The following analytical results were produced using the strictest quality control and most current methods:

COC #: N/A

Lab #: 109-161215P001-161215P004

Quality Control #: 4454

Report Contents:

Pages 2-9: analytical results

Pages 10-12: QA/QC analysis

Approved by:

Neil Ray

Neil Ray

Date: 12/22/16



Sample Matrix: Gas  
 Sample Type: Spot  
 Preservative: N/A  
 Sample Container: 300 ml Cyl.  
 # 1827

Method(s): ASTM D 1945  
 Gas Analysis by Gas  
 Chromatography  
 GPA 2145-09 - Calculations/  
 Physical Constants  
 GPA 2172 – Calculation of  
 Gross Heating Value

Client: Kinder Morgan  
 Project Location: N/A  
 Sample Id.: Cow Canyon

Sample Temp.: N/A  
 Atmospheric Temp.: N/A  
 Pressure: N/A  
 Field Data: N/A  
 Sample Date: 12/13/16 Time: 3:15 pm  
 Sampled By: N/A  
 Analysis Date: 12/20/16 – 12/21/16  
 Analysis By: Stephanie McDonald

Lab #: 109-161215P001  
 Quality Control Report: 4454

### Analytical Results

<u>Gas Composition</u>	<u>Mol %</u>	<u>GPM</u>
Nitrogen (N2):	1.6363	0.1810
Carbon Dioxide (CO2):	98.0389	16.7076
<u>Hydrocarbon Composition</u>	<u>Mol %</u>	<u>GPM</u>
Methane (CH4):	0.2514	0.0431
Ethane (C2H6):	0.0191	0.0051
Propane (C3H8):	0.0154	0.0043
Iso-Butane (C4H10):	0.0082	0.0027
N-Butane (C4H10):	0.0106	0.0034
Iso-Pentane (C5H12):	0.0050	0.0018
N-Pentane (C5H12):	0.0061	0.0022
Hexanes+ (C6H14):	0.0090	0.0039
<b>Totals</b>	100.0000	16.9551

### Comments - Additional Data

BTU -dry ( BTU/ft <sup>3</sup> ):	4.8	Z-Comp. Factor-dry:	0.99454
BTU -water vapor sat.( BTU/ft <sup>3</sup> ):	4.7	Z-Comp. Factor-water vapor sat.:	0.99408
Specific Gravity -dry:	1.5159	14.73 psi Pressure Base	
Specific Gravity-water vapor sat.:	1.5010		
<u>Gasoline Content (GPM)</u>			
Ethane & Heavier	0.0234	Butane & Heavier	0.0141
Propane & Heavier	0.0183	Pentane & Heavier	0.0080



Lab#: 109-161215P001  
Sample Id.: Cow Canyon

### Analytical Results

<u>Gas Composition</u>		
	<u>ppm vol.</u>	<u>Grains/100 ft<sup>3</sup></u>
Hydrogen Sulfide	0.88	0.056
Carbonyl Sulfide	0.20	0.012
Methyl Mercaptan	0.35	0.022
Ethyl Mercaptan	0.03	0.002
Dimethyl Sulfide	0.06	0.004
Carbon Disulfide	0.04	0.002
2-Propanethiol	0.00	0.000
Tert-butyl Mercaptan	0.11	0.007
1-Propanethiol	0.02	0.001
Thiophene	0.04	0.003
N-Butanethiol+Diethyl Sulfide	0.04	0.003
Methyl Ethyl Sulfide	0.04	0.002
2-Methyl-1-Propanethiol	0.07	0.005
1-Methyl-1-Propanethiol	0.06	0.004
<b>Total Sulfur</b>	1.95	0.124

<u>BTEX Analysis</u>	<u>ppm mol</u>
Benzene:	0.4
Toluene:	0.7
Ethylbenzene:	<0.2
Total Xylenes (M+P):	<0.2

### Comments - Additional Data



Sample Matrix: Gas  
 Sample Type: Spot  
 Preservative: N/A  
 Sample Container: 300 ml Cyl.  
 # 1620

Method(s): ASTM D 1945  
 Gas Analysis by Gas  
 Chromatography  
 GPA 2145-09 - Calculations/  
 Physical Constants  
 GPA 2172 – Calculation of  
 Gross Heating Value

Client: Kinder Morgan  
 Project Location: N/A  
 Sample Id.: Doe Canyon

Sample Temp.: N/A  
 Atmospheric Temp.: N/A  
 Pressure: N/A  
 Field Data: N/A  
 Sample Date: 12/13/16 Time: 1:20 pm  
 Sampled By: N/A  
 Analysis Date: 12/20/16 – 12/21/16  
 Analysis By: Stephanie McDonald

Lab #: 109-161215P002  
 Quality Control Report: 4454

### Analytical Results

<u>Gas Composition</u>	<u>Mol %</u>	<u>GPM</u>
Nitrogen (N2):	3.1670	0.3502
Carbon Dioxide (CO2):	95.9515	16.3493
<u>Hydrocarbon Composition</u>	<u>Mol %</u>	<u>GPM</u>
Methane (CH4):	0.8094	0.1388
Ethane (C2H6):	0.0160	0.0043
Propane (C3H8):	0.0138	0.0038
Iso-Butane (C4H10):	0.0073	0.0024
N-Butane (C4H10):	0.0106	0.0033
Iso-Pentane (C5H12):	0.0061	0.0022
N-Pentane (C5H12):	0.0078	0.0028
Hexanes+ (C6H14):	0.0106	0.0046
<b>Totals</b>	100.0000	16.8619

### Comments - Additional Data

BTU -dry ( BTU/ft <sup>3</sup> ):	10.6	Z-Comp. Factor-dry:	0.99469
BTU -water vapor sat.( BTU/ft <sup>3</sup> ):	10.4	Z-Comp. Factor-water vapor sat.:	0.99424
Specific Gravity -dry:	1.5019	14.73 psi Pressure Base	
Specific Gravity-water vapor sat.:	1.4872		
<u>Gasoline Content (GPM)</u>			
Ethane & Heavier	0.0236	Butane & Heavier	0.0154
Propane & Heavier	0.0192	Pentane & Heavier	0.0097



Lab#: 109-161215P002

Sample Id.: Doe Canyon

### Analytical Results

<u>Gas Composition</u>		
	<u>ppm vol.</u>	<u>Grains/100 ft<sup>3</sup></u>
Hydrogen Sulfide	0.25	0.016
Carbonyl Sulfide	0.66	0.042
Methyl Mercaptan	0.13	0.008
Ethyl Mercaptan	0.03	0.002
Dimethyl Sulfide	0.04	0.002
Carbon Disulfide	0.00	0.000
2-Propanethiol	0.04	0.002
Tert-butyl Mercaptan	0.04	0.002
1-Propanethiol	0.04	0.003
Thiophene	0.04	0.003
N-Butanethiol+Diethyl Sulfide	0.01	0.001
Methyl Ethyl Sulfide	0.07	0.005
2-Methyl-1-Propanethiol	0.04	0.003
1-Methyl-1-Propanethiol	0.02	0.002
<b>Total Sulfur</b>	1.42	0.090

<u>BTEX Analysis</u>	<u>ppm mol</u>
Benzene:	<0.2
Toluene:	0.2
Ethylbenzene:	<0.2
Total Xylenes (M+P):	<0.2

### Comments - Additional Data



Sample Matrix: Gas  
 Sample Type: Spot  
 Preservative: N/A  
 Sample Container: 300 ml Cyl.  
 # 1624

Method(s): ASTM D 1945  
 Gas Analysis by Gas  
 Chromatography  
 GPA 2145-09 - Calculations/  
 Physical Constants  
 GPA 2172 – Calculation of  
 Gross Heating Value

Client: Kinder Morgan  
 Project Location: N/A  
 Sample Id.: Hoven Weep

Sample Temp.: N/A  
 Atmospheric Temp.: N/A  
 Pressure: N/A  
 Field Data: N/A  
 Sample Date: 12/13/16 Time: 4:15 pm  
 Sampled By: N/A  
 Analysis Date: 12/20/16 – 12/21/16  
 Analysis By: Stephanie McDonald

Lab #: 109-161215P003  
 Quality Control Report: 4454

### Analytical Results

<u>Gas Composition</u>	<u>Mol %</u>	<u>GPM</u>
Nitrogen (N2):	1.4803	0.1637
Carbon Dioxide (CO2):	98.3372	16.7587
<u>Hydrocarbon Composition</u>	<u>Mol %</u>	<u>GPM</u>
Methane (CH4):	0.1384	0.0238
Ethane (C2H6):	0.0083	0.0022
Propane (C3H8):	0.0079	0.0022
Iso-Butane (C4H10):	0.0038	0.0013
N-Butane (C4H10):	0.0062	0.0020
Iso-Pentane (C5H12):	0.0044	0.0016
N-Pentane (C5H12):	0.0049	0.0018
Hexanes+ (C6H14):	0.0085	0.0037
<b>Totals</b>	100.0000	16.9609

### Comments - Additional Data

BTU -dry ( BTU/ft <sup>3</sup> ):	2.9	Z-Comp. Factor-dry:	0.99452
BTU -water vapor sat.( BTU/ft <sup>3</sup> ):	2.9	Z-Comp. Factor-water vapor sat.:	0.99407
Specific Gravity -dry:	1.5179	14.73 psi Pressure Base	
Specific Gravity-water vapor sat.:	1.5030		
<u>Gasoline Content (GPM)</u>			
Ethane & Heavier	0.0148	Butane & Heavier	0.0104
Propane & Heavier	0.0125	Pentane & Heavier	0.0071



Lab#: 109-161215P003  
Sample Id.: Hoven Weep

### Analytical Results

<u>Gas Composition</u>		
	<u>ppm vol.</u>	<u>Grains/100 ft<sup>3</sup></u>
Hydrogen Sulfide	0.80	0.051
Carbonyl Sulfide	0.13	0.008
Methyl Mercaptan	0.16	0.010
Ethyl Mercaptan	0.05	0.003
Dimethyl Sulfide	0.04	0.003
Carbon Disulfide	0.03	0.002
2-Propanethiol	0.05	0.003
Tert-butyl Mercaptan	0.04	0.003
1-Propanethiol	0.03	0.002
Thiophene	0.03	0.002
N-Butanethiol+Diethyl Sulfide	0.05	0.003
Methyl Ethyl Sulfide	0.04	0.003
2-Methyl-1-Propanethiol	0.04	0.002
1-Methyl-1-Propanethiol	0.05	0.003
<b>Total Sulfur</b>	1.53	0.098

<u>BTEX Analysis</u>	<u>ppm mol</u>
Benzene:	0.5
Toluene:	0.3
Ethylbenzene:	0.2
Total Xylenes (M+P):	<0.2

### Comments - Additional Data



Sample Matrix: Gas  
 Sample Type: Spot  
 Preservative: N/A  
 Sample Container: 300 ml Cyl.  
 # 1607

Method(s): ASTM D 1945  
 Gas Analysis by Gas  
 Chromatography  
 GPA 2145-09 - Calculations/  
 Physical Constants  
 GPA 2172 – Calculation of  
 Gross Heating Value

Client: Kinder Morgan  
 Project Location: N/A  
 Sample Id.: Yellow Jacket

Sample Temp.: N/A  
 Atmospheric Temp.: N/A  
 Pressure: N/A  
 Field Data: N/A  
 Sample Date: 12/13/16 Time: 5:10 pm  
 Sampled By: N/A  
 Analysis Date: 12/20/16 – 12/21/16  
 Analysis By: Stephanie McDonald

Lab #: 109-161215P004  
 Quality Control Report: 4454

### Analytical Results

<u>Gas Composition</u>	<u>Mol %</u>	<u>GPM</u>
Nitrogen (N2):	1.9143	0.2117
Carbon Dioxide (CO2):	97.9380	16.6900
<u>Hydrocarbon Composition</u>	<u>Mol %</u>	<u>GPM</u>
Methane (CH4):	0.1159	0.0199
Ethane (C2H6):	0.0062	0.0017
Propane (C3H8):	0.0054	0.0015
Iso-Butane (C4H10):	0.0022	0.0007
N-Butane (C4H10):	0.0030	0.0010
Iso-Pentane (C5H12):	0.0034	0.0013
N-Pentane (C5H12):	0.0044	0.0016
Hexanes+ (C6H14):	0.0071	0.0031
<b>Totals</b>	100.0000	16.9324

### Comments - Additional Data

BTU -dry ( BTU/ft <sup>3</sup> ):	2.3	Z-Comp. Factor-dry:	0.99456
BTU -water vapor sat.( BTU/ft <sup>3</sup> ):	2.2	Z-Comp. Factor-water vapor sat.:	0.99411
Specific Gravity -dry:	1.5156	14.73 psi Pressure Base	
Specific Gravity-water vapor sat.:	1.5007		
<u>Gasoline Content (GPM)</u>			
Ethane & Heavier	0.0108	Butane & Heavier	0.0077
Propane & Heavier	0.0092	Pentane & Heavier	0.0060





Lab#: 109-161215P004  
Sample Id.: Yellow Jacket

### Analytical Results

<b><u>Gas Composition</u></b>		
	<b><u>ppm vol.</u></b>	<b><u>Grains/100 ft<sup>3</sup></u></b>
Hydrogen Sulfide	0.38	0.024
Carbonyl Sulfide	0.10	0.006
Methyl Mercaptan	0.27	0.017
Ethyl Mercaptan	0.03	0.002
Dimethyl Sulfide	0.06	0.004
Carbon Disulfide	0.00	0.000
2-Propanethiol	0.12	0.008
Tert-butyl Mercaptan	0.08	0.005
1-Propanethiol	0.03	0.002
Thiophene	0.05	0.003
N-Butanethiol+Diethyl Sulfide	0.07	0.004
Methyl Ethyl Sulfide	0.10	0.006
2-Methyl-1-Propanethiol	0.03	0.002
1-Methyl-1-Propanethiol	0.05	0.003
<b>Total Sulfur</b>	1.37	0.087

<b><u>BTEX Analysis</u></b>	<b><u>ppm mol</u></b>
Benzene:	0.5
Toluene:	0.3
Ethylbenzene:	<0.2
Total Xylenes (M+P):	0.3

### Comments - Additional Data



### QUALITY CONTROL ANALYSIS

Sample Matrix: Gas  
 Sample Type: Standard  
 Preservative: N/A  
 Sample Container: Industrial  
 Cylinder

Sample Id.: DCG  
 Reference Std. 53619AW  
 Sample Temp.: 120° F  
 Analysis Date: 12/20/16  
 Analysis By: Stephanie McDonald

Method(s): ASTM D 1945  
 Gas Analysis by Gas  
 Chromatography

GPA 2145-09 - Calculations/  
 Physical Constants  
 GPA 2172-09 – Calculation of  
 Gross Heating Value

Quality Control Report#: 4454

### Analytical Results

RESULTS	ACTUAL	ANALYSIS			
<u>Gas Composition</u>			MDL	RL	% Deviation
	Mol %	Mol %	Mol %	ppm mol	(90-100%)
Nitrogen (N2):	4.926	4.9038	0.0010	10	99.5
Carbon Dioxide (CO2):	1.489	1.4860	0.0010	10	99.8
			MDL	RL	% Deviation
<u>Hydrocarbon Composition</u>	Mol %	Mol %	Mol %	ppm mol	(90-100%)
Methane (CH4):	69.955	69.6359	0.0001	1	99.5
Ethane (C2H6):	9.138	9.2047	0.0001	1	99.3
Propane (C3H8):	5.947	6.0071	0.0001	1	99.0
Iso-Butane (C4H10):	3.018	3.0652	0.0001	1	98.4
N-Butane (C4H10):	3.021	3.0936	0.0001	1	97.6
Iso-Pentane (C5H12):	1.001	1.0370	0.0001	1	96.4
N-Pentane (C5H12):	1.007	1.0448	0.0001	1	96.2
Hexane+ (C6H14):	0.498	0.5219	0.0001	1	95.2
<b>Totals</b>	100.000	100.000			

### Comments - Additional Data

ACTUAL		ANALYSIS	
BTU -dry (BTU/ft3):	1329.4	BTU -dry (BTU/ft3):	1329.8
BTU -water vapor sat. (BTU/ft3):	1306.8	BTU -water vapor sat. (BTU/ft3):	1307.2
Specific Gravity -dry:	0.8337	Specific Gravity -dry:	0.8383
Specific Gravity -water vapor sat.:	0.8304	Specific Gravity -water vapor sat.:	0.8350
Z-Comp. Factor -dry:	0.99563	Z-Comp. Factor -dry:	0.99559
Z-Comp. Factor -water vapor sat.:	0.99520	Z-Comp. Factor -water vapor sat.:	0.99516



Sample Matrix: Methanol  
Sample Type: Standard  
Preservative: Ice  
Sample Container: 100 ml Glass Bottle

Sample Id.: O2SI - BTEX in Unleaded  
Gasoline Composite  
Analysis Date: 12/21/16  
Analysis By: Neil Ray

Method(s): ASTM D 1945  
Gas Analysis by Gas  
Chromatography

Quality Control Report#: 4454

### **Analytical Results**

<b>RESULTS</b>	<b>ACTUAL</b>	<b>ANALYSIS</b>			
			<b>MDL</b>	<b>RL</b>	
<b><u>BTEX Composition</u></b>	<b><u>mg/l</u></b>	<b><u>mg/l</u></b>	<b><u>mg/l</u></b>	<b><u>mg/l</u></b>	<b><u>% Deviation</u></b>
Benzene	204.60	236.52	0.08	0.01	84.4
Toluene	1354.00	1489.43	0.08	0.01	90.0
Ethylbenzene	303.90	271.21	0.08	0.01	89.2
Xlyenes (o+m+p)	1575.20	1423.61	0.08	0.01	90.4
BTEX:	3437.70	3420.77	0.08	0.01	99.5

### **Comments - Additional Data**



Sample Matrix: Gas  
 Sample Type: Standard  
 Preservative: Aluminum Inert Cylinder  
 Sample Container: Industrial Cylinder

Sample Id.: Matheson Tri Gas  
 Reference Std.SX048765  
 Sample Temp.: 74° F  
 Analysis Date: 12/21/16  
 Analysis By: Neil Ray

Method(s): ASTM D 6228  
 Sulfur Compounds by Gas  
 Chromatography /Flame  
 Photometric Detector

Quality Control Report#: 4454

### Analytical Results

RESULTS	ACTUAL	ANALYSIS			
<u>Gas Composition</u>			MDL	RL	
	ppm vol.	ppm vol.	ppm vol.	ppb vol.	% Deviation
Hydrogen Sulfide	1.03	1.17	0.01	10	86.4
Carbonyl Sulfide	0.91	0.83	0.01	10	91.2
Methyl Mercaptan	1.08	1.21	0.01	10	88.0
Ethyl Mercaptan	1.05	0.94	0.01	10	89.5
Dimethyl Sulfide	1.07	1.02	0.01	10	95.3
Carbon Disulfide	1.10	1.26	0.01	10	85.5
2-Propanethiol	1.14	1.34	0.01	10	82.5
Tert-butyl Mercaptan	1.11	0.96	0.01	10	86.5
1-Propanethiol	1.15	1.02	0.01	10	88.7
Thiophene	1.02	0.86	0.01	10	84.3
N-Butanethiol+Diethyl Sulfide	2.21	2.03	0.01	10	91.9
Methyl Ethyl Sulfide	1.20	1.04	0.01	10	86.7
2-Methyl-1-Propanethiol	1.14	1.35	0.01	10	81.6
1-Methyl-1-Propanethiol	1.20	1.03	0.01	10	85.8

### Comments - Additional Data