



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

COC #: N/A

Lab #: 48779-48784

Quality Control #: 4393

Report Contents:

Pages 2-13: analytical results

Pages 14-16: QA/QC analysis

Approved by:

Neil Ray

Neil Ray

Date: 10/07/16



Sample Matrix: Gas
 Sample Type: Spot
 Preservative: N/A
 Sample Container: 150 ml Cyl.
 #1609

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.: DC13
 Sample Temp.: N/A
 Atmospheric Temp.: N/A
 Pressure: 460 psig
 Field Data: N/A
 Sample Date: 9/28/16 Time: 6:30 am
 Sampled By: L.H.
 Analysis Date: 10/05/16
 Analysis By: Trey Rogers

Lab #: 48782
 Quality Control Report: 4393

Analytical Results

<u>Gas Composition</u>	<u>Mol %</u>	<u>GPM</u>
Nitrogen (N2):	3.5588	0.3935
Carbon Dioxide (CO2):	94.9963	16.1853
Helium (He):	0.3718	0.0380
Argon (Ar):	0.0828	0.0075
<u>Hydrocarbon Composition</u>	<u>Mol %</u>	<u>GPM</u>
Methane (CH4):	0.8034	0.1378
Ethane (C2H6):	0.0804	0.0216
Propane (C3H8):	0.0362	0.0100
Iso-Butane (C4H10):	0.0195	0.0064
N-Butane (C4H10):	0.0148	0.0047
Iso-Pentane (C5H12):	0.0128	0.0047
N-Pentane (C5H12):	0.0120	0.0044
Hexane+ (C6H14):	0.0112	0.0049
Totals	100.0000	16.8188

BTU -dry (BTU/ft ³):	13.3	Z-Comp. Factor-dry:	0.99477
BTU -water vapor sat.(BTU/ft ³):	13.1	Z-Comp. Factor-water vapor sat.:	0.99431
Specific Gravity -dry:	1.4942	14.73 psi Pressure Base	
Specific Gravity-water vapor sat.:	1.4797		
<u>Gasoline Content (GPM)</u>			
Ethane & Heavier	0.0567	Butane & Heavier	0.0251
Propane & Heavier	0.0351	Pentane & Heavier	0.0140



Lab: 48782 – DC13

Gas Composition	ppm vol.	Grains/100 ft³
Hydrogen Sulfide	0.85	0.054
Carbonyl Sulfide	0.24	0.015
Methyl Mercaptan	0.21	0.014
Ethyl Mercaptan	0.08	0.005
Dimethyl Sulfide	0.02	0.001
Carbon Disulfide	0.00	0.000
2-Propanethiol	0.03	0.002
Tert-butyl Mercaptan	0.05	0.003
1-Propanethiol	0.01	0.001
Thiophene	0.02	0.001
N-Butanethiol+Diethyl Sulfide	0.04	0.003
Methyl Ethyl Sulfide	0.04	0.003
2-Methyl-1-Propanethiol	0.04	0.003
1-Methyl-1-Propanethiol	0.03	0.002
Total Sulfur	1.68	0.107

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: 10/05/16
 Analysis By: Trey Rogers

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#: 4393

Analytical Results

RESULTS	ACTUAL	ANALYSIS			
<u>Gas Composition</u>			MDL	RL	% Deviation
	Mol %	Mol %	Mol %	ppm mol	(90-100%)
Nitrogen (N2):	4.918	4.9422	0.0010	10	99.5
Carbon Dioxide (CO2):	1.499	1.4830	0.0010	10	98.9
			MDL	RL	% Deviation
<u>Hydrocarbon Composition</u>	Mol %	Mol %	Mol %	ppm mol	(90-100%)
Methane (CH4):	69.891	69.8740	0.0001	1	100.0
Ethane (C2H6):	9.111	9.0133	0.0001	1	98.9
Propane (C3H8):	5.984	6.0987	0.0001	1	98.1
Iso-Butane (C4H10):	3.024	3.0437	0.0001	1	99.3
N-Butane (C4H10):	3.040	3.0259	0.0001	1	99.5
Iso-Pentane (C5H12):	1.012	0.9970	0.0001	1	98.5
N-Pentane (C5H12):	1.018	1.0251	0.0001	1	99.3
Hexane+ (C6H14):	0.503	0.4971	0.0001	1	98.8
Totals	100.000	100.000			

Comments - Additional Data

ACTUAL		ANALYSIS	
BTU -dry (BTU/ft3):	1324.0	BTU -dry (BTU/ft ³):	1331.8
BTU -water vapor sat. (BTU/ft3):	1318.4	BTU -water vapor sat. (BTU/ft ³):	1309.2
Specific Gravity -dry:	0.8349	Specific Gravity -dry:	0.8353
Specific Gravity -water vapor sat.:	0.8419	Specific Gravity -water vapor sat.:	0.8320
Z-Comp. Factor -dry:	0.99564	Z-Comp. Factor -dry:	0.99561
Z-Comp. Factor -water vapor sat.:	0.98306	Z-Comp. Factor -water vapor sat.:	0.99518



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

Sample Id.: Matheson Tri Gas
 Reference Std. SX42424
 Sample Temp.: 120° F
 Analysis Date: 10/05/16
 Analysis By: Trey Rogers

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#: 4393

Analytical Results

RESULTS	ACTUAL	ANALYSIS			
<u>Gas Composition</u>			MDL	RL	% Deviation
	Mol %	Mol %	Mol %	ppm mol	(90-100%)
Helium (He):	0.510	0.4896	0.0010	10	96.0
Argon (Ar):	87.560	88.1236	0.0010	10	99.4
Nitrogen (N2)	3.050	3.0569	0.0010	10	99.8



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: 10/05/16
 Analysis By: Neil Ray

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

Quality Control Report#: 4393

Analytical Results

RESULTS	ACTUAL	ANALYSIS			
<u>Gas Composition</u>			MDL	RL	
	ppm vol.	ppm vol.	ppm vol.	ppb vol.	% Deviation
Hydrogen Sulfide	1.03	1.11	0.01	10	92.2
Carbonyl Sulfide	0.91	0.84	0.01	10	92.3
Methyl Mercaptan	1.08	1.23	0.01	10	86.1
Ethyl Mercaptan	1.05	0.96	0.01	10	91.4
Dimethyl Sulfide	1.07	1.01	0.01	10	94.4
Carbon Disulfide	1.10	1.19	0.01	10	91.8
2-Propanethiol	1.14	0.94	0.01	10	82.5
Tert-butyl Mercaptan	1.11	0.97	0.01	10	87.4
1-Propanethiol	1.15	1.03	0.01	10	89.6
Thiophene	1.02	1.19	0.01	10	83.3
N-Butanethiol+Diethyl Sulfide	2.21	2.06	0.01	10	93.2
Methyl Ethyl Sulfide	1.20	1.11	0.01	10	92.5
2-Methyl-1-Propanethiol	1.14	1.28	0.01	10	87.7
1-Methyl-1-Propanethiol	1.20	1.35	0.01	10	87.5