



**EXTENDED NATURAL GAS ANALYSIS (*DHA)
GLYCALC INFORMATION**

PROJECT NO. :	202409054	ANALYSIS NO. :	02
COMPANY NAME :	QB ENERGY OPERATING, LLC	ANALYSIS DATE :	SEPTEMBER 18, 2024 12:07
ACCOUNT NO. :		SAMPLE DATE :	AUGUST 29, 2024 14:30
PRODUCER :	QB ENERGY OPERATING, LLC	CYLINDER NO. :	ECA-796
LEASE NO. :	COC - 57286	SAMPLED BY :	DOAK MANTLE
NAME/DESCRIP :	PICEANCE CREEK 4603 INTERMEDIATE CASING		

FIELD DATA		SAMPLE TEMP. :	80
SAMPLE PRES. :	1063	AMBIENT TEMP.:	
H2S BY STAIN TUBE:	—		
COMMENTS :	<i>SPOT</i>		

<u>Componet</u>	<u>Mole %</u>	<u>Wt %</u>
Helium	0.01	0.00
Hydrogen	0.01	0.00
Carbon Dioxide	0.01	0.02
Nitrogen	0.19	0.30
Methane	93.4712	84.8451
Ethane	3.6389	6.1911
Propane	1.3308	3.3203
Isobutane	0.2760	0.9077
n-Butane	0.4040	1.3286
Isopentane	0.1624	0.6630
n-Pentane	0.1545	0.6307
Cyclopentane	0.0058	0.0230
n-Hexane	0.0663	0.3233
Cyclohexane	0.0128	0.0609
Other Hexanes	0.1099	0.5344
Heptanes	0.0713	0.4034
Methylcyclohexane	0.0168	0.0934
2,2,4 Trimethylpentane	0.0000	0.0000
Benzene	0.0159	0.0703
Toluene	0.0021	0.0109
Ethylbenzene	0.0005	0.0030
Xylenes	0.0015	0.0090
C8+ Heavies	0.0393	0.2619
<u>Subtotal</u>	<u>100.00000</u>	<u>100.00000</u>
<u>Oxygen/Argon</u>	<u>0.00</u>	<u>0.00</u>
Total	100.00000	100.00000

	Total	C6+	C8+	C10+
Calculated Values BTU @	Sample	Fraction	Fraction	Fraction
14.65				
LHV Net Dry Real:	986.8	4717.0	5867.8	6998.0 Btu/scf
Net Wet Real:	969.5	4634.5	5765.2	6875.7 Btu/scf
HHV Gross Dry Real:	1092.9	5078.6	6314.3	7526.7 Btu/scf
Gross Wet Real:	1073.8	4989.8	6203.9	7395.1 Btu/scf

Other Calculated Values

Regualr Wobbe Index*	1400.9	2818.5	3138.2	3412.1 Btu/scf
Net Heating Value (60 °F ideal reaction):	21214.7	19287.7	19504.5	19094.4 Btu/lbm
Gross Heating Value (60°F ideal reaction):	23492.9	20766.3	20990.6	20539.2 Btu/lbm
Molar Mass (MW):	17.67523	92.952	117.454	141.663 g/mol
Relative Density (AIR=1):	0.6095	3.2093	4.0545	4.8912 SG
Density:	0.04657	0.24494	0.30950	0.37330 lbm/scf
Compressibility Factor:	0.9976	0.9911	0.9976	0.9995 Z
Liquid Volume real gas @:	14.65	17.5808	0.1346	0.014
				0 gal/1000 scf

* The Wobbe pressure base in the number considered is based upon the given Pb of the HHV above.

#DIV/0 or 0 (zero) will appear in the Calculated Value Section when there is no C6+, C8+ or C10+ in the sample to calculate these factors.

BDL - Below Detection Limit. The H2S LOS has a detection limit of 0.25 ppm. A _ (an underscore) indicates there was no tube pulled for H2S.

The data presented herein has been acquired by means of current analytical techniques and represents the judicious conclusion EMPACT Analytical Systems, Inc. Results of the analysis can be affected by the sampling conditions, therefore, are only warranted through proper lab protocol. EMPACT assumes no responsibility for interpretation or any consequences from application of the reported information and is the sole liability of the user. The reproduction in any media of this reported information may not be made, in portion or as a whole, without the written permission of EMPACT Analytical Systems, Inc.



EXTENDED NATURAL GAS ANALYSIS (*DHA)

DHA COMPONENT LIST

PRIMARY DB KEY: **05-103-09998** NAME/DESCRIP : **PICEANCE CREEK 4603**
 LEASE #: **COC - 57286** INTERMEDIATE CASING
 FIELD/AREA:
 PROJECT NO. : **202409054** ANALYSIS NO. : **02**
 COMPANY NAME : **QB ENERGY OPERATING, LLC** ANALYSIS DATE: **SEPTEMBER 18, 2024 12:07**
 OFFICE / BRANCH: **PARACHUTE, CO** SAMPLE DATE : **AUGUST 29, 2024 14:30**
 CUSTOMER REF: TO:
 PRODUCER : **QB ENERGY OPERATING, LLC** EFFECTIVE DATE:

*****FIELD DATA*****

SAMPLE CYCLE: SAMPLE TYPE: **SPOT**
 SAMPLE PRES. : 1063 psig PROBE :
 FLOW PRES. : psig CYLINDER NO. : **ECA-796**
 LAB PRES: psig SAMPLED BY : **DOAK MANTLE**
 SAMPLE TEMP. : 80 °f SAMPLING COMPANY: **QB ENERGY OPERATING, LLC**
 AMBIENT TEMP.: °f H2S BY STAIN TUBE: **-** ppm mol
 H2O BY STAIN TUBE: **-** #/mmcf CO2 BY STAIN TUBE: **-** Mol %
 FIELD COMMENTS:
 LAB COMMENTS:

COMPONENT	PIANO #	MOLE %	MASS %	GPM @ 14.65	GPM @ 14.73
Helium	---	0.01	0.00	---	---
Hydrogen	---	0.01	0.00	---	---
Oxygen/Argon	---	0.00	0.00	---	---
Nitrogen	---	0.19	0.30	---	---
Carbon Dioxide	---	0.01	0.02	---	---
Carbon Monoxide	---	0.00	0.00	---	---
Methane	P1	93.4712	84.8451	---	---
Ethane	P2	3.6389	6.1911	0.970	0.976
Propane	P3	1.3308	3.3203	0.366	0.368
i-Butane	I4	0.2760	0.9077	0.090	0.090
n-Butane	P4	0.4040	1.3286	0.127	0.128
2,2-Dimethylpropane	I5	0.0062	0.0253	0.002	0.002
i-Pentane	I5	0.1562	0.6377	0.057	0.057
n-Pentane	P5	0.1531	0.6250	0.055	0.055
2,2-Dimethylbutane	I6	0.0072	0.0351	0.003	0.003
Cyclopentane	N5	0.0058	0.0230	0.002	0.002
2,3-Dimethylbutane	I6	0.0091	0.0444	0.004	0.004
2-Methylpentane	I6	0.0541	0.2638	0.022	0.022
3-Methylpentane	I6	0.0267	0.1302	0.011	0.011
UnknownC5s	U5	0.0014	0.0057	0.001	0.001
n-Hexane	P6	0.0663	0.3233	0.027	0.027
2,2-Dimethylpentane	I7	0.0019	0.0108	0.001	0.001
Methylcyclopentane	N6	0.0128	0.0609	0.005	0.005
2,4-Dimethylpentane	I7	0.0028	0.0159	0.001	0.001
2,2,3-Trimethylbutane	I7	0.0006	0.0034	0.000	0.000
Benzene	A6	0.0159	0.0703	0.004	0.004
3,3-Dimethylpentane	I7	0.0012	0.0068	0.001	0.001
Cyclohexane	N6	0.0128	0.0609	0.004	0.004
2-Methylhexane	I7	0.0128	0.0726	0.006	0.006
2,3-Dimethylpentane	I7	0.0034	0.0193	0.002	0.002

1,1-Dimethylcyclopentane	N7	0.0017	0.0095	0.001	0.001
3-Methylhexane	I7	0.0113	0.0640	0.005	0.005
1c,3-Dimethylcyclopentane	N7	0.0019	0.0106	0.001	0.001
1t,3-Dimethylcyclopentane	N7	0.0017	0.0095	0.001	0.001
3-Ethylpentane	I7	0.0007	0.0040	0.000	0.000
1t,2-Dimethylcyclopentane	N7	0.0031	0.0172	0.001	0.001
n-Heptane	P7	0.0267	0.1514	0.012	0.012
1c,2-Dimethylcyclopentane	N7	0.0009	0.0050	0.000	0.000
Methylcyclohexane	N7	0.0168	0.0934	0.007	0.007
2,2-Dimethylhexane	I8	0.0011	0.0071	0.001	0.001
1,1,3-Trimethylcyclopentane	N7	0.0001	0.0006	0.000	0.000
Ethylcyclopentane	N7	0.0005	0.0028	0.000	0.000
2,5-Dimethylhexane	I8	0.0010	0.0065	0.001	0.001
2,2,3-Trimethylpentane	I8	0.0009	0.0058	0.000	0.000
1c,2t,4-Trimethylcyclopentane	N8	0.0006	0.0038	0.000	0.000
3,3-Dimethylhexane	I8	0.0003	0.0019	0.000	0.000
Toluene	A7	0.0021	0.0109	0.001	0.001
2,3-Dimethylhexane	I8	0.0007	0.0045	0.000	0.000
2-Methyl-3-ethylpentane	I8	0.0001	0.0006	0.000	0.000
2-Methylheptane	I8	0.0041	0.0265	0.002	0.002
4-Methylheptane	I8	0.0011	0.0071	0.001	0.001
3-Methyl-3-ethylpentane	I8	0.0002	0.0013	0.000	0.000
3,4-Dimethylhexane	I8	0.0001	0.0006	0.000	0.000
3-Methylheptane	I8	0.0025	0.0162	0.001	0.001
1c,2t,3-Trimethylcyclopentane	N8	0.0020	0.0127	0.001	0.001
3-Ethylhexane	I8	0.0002	0.0013	0.000	0.000
1t,4-Dimethylcyclohexane	N8	0.0009	0.0057	0.000	0.000
1,1-Dimethylcyclohexane	N8	0.0005	0.0032	0.000	0.000
2,2,5-Trimethylhexane	I9	0.0001	0.0007	0.000	0.000
3c-Ethylmethylcyclopentane	N8	0.0001	0.0006	0.000	0.000
3t-Ethylmethylcyclopentane	N8	0.0001	0.0006	0.000	0.000
2t-Ethylmethylcyclopentane	N8	0.0002	0.0012	0.000	0.000
1t,2-Dimethylcyclohexane	N8	0.0008	0.0051	0.000	0.000
1t,3-Dimethylcyclohexane	N8	0.0002	0.0012	0.000	0.000
n-Octane	P8	0.0081	0.0523	0.004	0.004
1c,4-Dimethylcyclohexane	N8	0.0003	0.0019	0.000	0.000
i-Propylcyclopentane	I8	0.0001	0.0006	0.000	0.000
2,3,5-Trimethylhexane	I9	0.0001	0.0007	0.000	0.000
2,2,3,4-Tetramethylpentane	I9	0.0001	0.0007	0.000	0.000
2,3,4-Trimethylhexane	I9	0.0001	0.0007	0.000	0.000
2,2-Dimethylheptane	I9	0.0003	0.0022	0.000	0.000
1,1,4-Trimethylcyclohexane	N9	0.0010	0.0071	0.001	0.001
2,2,3-Trimethylhexane	I9	0.0002	0.0015	0.000	0.000
4,4-Dimethylheptane	I9	0.0001	0.0007	0.000	0.000
Ethylcyclohexane	N8	0.0014	0.0089	0.001	0.001
n-Propylcyclopentane	N8	0.0005	0.0032	0.000	0.000
1c,3c,5-Trimethylcyclohexane	N9	0.0002	0.0014	0.000	0.000
2,5-Dimethylheptane	I9	0.0008	0.0058	0.000	0.000
3,3-Dimethylheptane	I9	0.0002	0.0015	0.000	0.000
3,5-Dimethylheptane	I9	0.0001	0.0007	0.000	0.000
2,6-Dimethylheptane	I9	0.0001	0.0007	0.000	0.000
1,1,3-Trimethylcyclohexane	N9	0.0001	0.0007	0.000	0.000
Ethylbenzene	I8	0.0005	0.0030	0.000	0.000
1,3-Dimethylbenzene (m-Xylene)	A8	0.0010	0.0060	0.000	0.000
1,4-Dimethylbenzene (p-Xylene)	A8	0.0002	0.0012	0.000	0.000
3,4-Dimethylheptane	I9	0.0001	0.0007	0.000	0.000
3,4-Dimethylheptane (2)	I9	0.0001	0.0007	0.000	0.000
4-Ethylheptane	I9	0.0001	0.0007	0.000	0.000
4-Methyloctane	I9	0.0004	0.0029	0.000	0.000
2-Methyloctane	I9	0.0007	0.0051	0.000	0.000
1c,2t,3-Trimethylcyclohexane	N9	0.0001	0.0007	0.000	0.000
3-Ethylheptane	I9	0.0001	0.0007	0.000	0.000
3-Methyloctane	I9	0.0001	0.0007	0.000	0.000

1c,2t,4c-Trimethylcyclohexane	I9	0.0007	0.0050	0.000	0.000
3,3-Diethylpentane	I9	0.0001	0.0007	0.000	0.000
1,2-Dimethylbenzene (o-Xylene)	A8	0.0003	0.0018	0.000	0.000
i-Butylcyclopentane	N9	0.0003	0.0022	0.000	0.000
n-Nonane	P9	0.0020	0.0145	0.001	0.001
1,1-Methylethylcyclohexane	N9	0.0002	0.0014	0.000	0.000
i-Propylbenzene	A9	0.0001	0.0007	0.000	0.000
i-Propylcyclohexane	N9	0.0001	0.0007	0.000	0.000
2,4-Dimethyloctane	I10	0.0001	0.0008	0.000	0.000
n-Butylcyclopentane	N9	0.0002	0.0014	0.000	0.000
3,3-Dimethyloctane	I10	0.0001	0.0008	0.000	0.000
n-Propylbenzene	A9	0.0002	0.0014	0.000	0.000
3,6-Dimethyloctane	I10	0.0001	0.0008	0.000	0.000
3-Methyl-5-ethylheptane	I10	0.0001	0.0008	0.000	0.000
1,3-Methylethylbenzene	A9	0.0001	0.0007	0.000	0.000
1,3,5-Trimethylbenzene	A9	0.0001	0.0007	0.000	0.000
t-Butylbenzene	A10	0.0001	0.0007	0.000	0.000
UnknownC9s	U9	0.0006	0.0044	0.000	0.000
n-Decane	P10	0.0001	0.0008	0.000	0.000
UnknownC10s	U10	0.0007	0.0057	0.000	0.000
TOTAL		100.00000	100.00000	1.8038	1.8133

CALCULATED VALUES**

BTEX COMPONENTS	MOLE%	WT%	BTU @	14.65	14.73
BENZENE	0.0159	0.0703	LHV NET DRY REAL :	986.8 /scf	992.2 /scf
TOLUENE	0.0021	0.0109	NET WET REAL :	969.5 /scf	974.9 /scf
ETHYLBENZENE	0.0005	0.0030	HHV GROSS DRY REAL :	1092.9 /scf	1098.9 /scf
XYLENES	0.0015	0.0090	GROSS WET REAL :	1073.8 /scf	1079.8 /scf
TOTAL BTEX	0.0200	0.0932	NET HEATING VALUE (60 °F ideal reaction):		21214.7 Btu/lbm
			GROSS HEATING VALUE (60°F ideal reaction):		23492.9 Btu/lbm
			RELATIVE DENSITY (AIR=1):		0.6095
			DENSITY		0.04657 lb/scf
			COMPRESSIBILITY FACTOR :		0.9976
			REGULAR WOBBE INDEX		1400.9

*(DETAILED HYDROCARBON ANALYSIS/NJ 1993)

Mod ASTM D6730,GPA 2261 & GPA 2286.

** (CALC: GPA 2172, GPA 2145 & TP-17 @14.696 & 60 F)

C6+ Fraction of DHA Gas Analysis @60°F, 14.696 psia

Net Dry Ideal BTU	4689.7 /scf	Relative Density - SG (Air=1)	3.2093	C6+ factors
Gross Dry Ideal BTU	5049.2 /scf	Z Compressibility Factor	0.99109	0.9905
Net Dry Ideal BTU	19287.7 /lb	Density Factor	244.937 lbm/1000 ft3	
Gross Dry Ideal BTU	20766.3 /lb	Molar Mass or MW	92.952 g/mol	
		Volume Liquid Ideal gas	0.135 scf/gal	23.4

**This hexanes plus fraction may be applied in place of published C6+ factors. The Z & GPM need additional calc for C6+ factors.
#DIV/0 or 0 (zero) will appear in this section when there is no hexanes plus in the sample to calculate C6+ factors.**

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