



EXTENDED NATURAL GAS ANALYSIS (*DHA)

MAIN PAGE

PRIMARY DB KEY: **05-103-09998** NAME/DESCRIP : **PICEANCE CREEK 4603**
 LEASE #: **COC - 57286** **PRODUCTION CASING**
 FIELD/AREA:

PROJECT NO. : **202409054** ANALYSIS NO. : **01**
 COMPANY NAME : **QB ENERGY OPERATING, LLC** ANALYSIS DATE: **SEPTEMBER 18, 2024 10:18**
 OFFICE / BRANCH: **PARACHUTE, CO** SAMPLE DATE : **AUGUST 29, 2024 14:00**
 CUSTOMER REF: TO:
 PRODUCER : **QB ENERGY OPERATING, LLC** EFFECTIVE DATE:

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

SAMPLE CYCLE: SAMPLE TYPE: SPOT
 SAMPLE PRES. : 1413 psig PROBE :
 FLOW PRES. : psig CYLINDER NO. : ECA-817
 LAB PRES: psig SAMPLED BY : PAUL HACKING
 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	MOLE %	MASS %	GPM @	
			14.65	14.73
ALCOHOLS	0.0015	0.0020	0.0000	0.0000
HELIUM	0.00	0.00	---	---
HYDROGEN	0.00	0.00	---	---
OXYGEN/ARGON	0.01	0.01	---	---
NITROGEN	0.08	0.09	---	---
CARBON DIOXIDE	3.61	6.53	---	---
METHANE	78.7182	51.9396	---	---
ETHANE	6.8111	8.4234	1.8172	1.8271
PROPANE	2.7059	4.9074	0.7441	0.7481
I-BUTANE	0.9769	2.3353	0.3190	0.3208
N-BUTANE	1.1277	2.6958	0.3550	0.3570
I-PENTANE	0.6823	2.0221	0.2470	0.2484
N-PENTANE	0.4816	1.4291	0.1740	0.1750
HEXANES PLUS	4.7948	19.6153	2.0560	2.0675
TOTALS	100.00000	100.00000	5.7123	5.7439

BTEX COMPONENTS	MOLE%	WT%	CALCULATED VALUES**	
			BTU @	
BENZENE	0.1640	0.5269		
TOLUENE	0.4586	1.7380		
ETHYLBENZENE	0.0324	0.1415		
XYLENES	0.1249	0.5453		
TOTAL BTEX	0.7799	2.9517		
			14.65	14.73
LHV NET DRY REAL :			1232.9 /scf	1239.7 /scf
NET WET REAL :			1211.3 /scf	1218.1 /scf
HHV GROSS DRY REAL :			1353.6 /scf	1361.0 /scf
GROSS WET REAL :			1329.9 /scf	1337.3 /scf
NET HEATING VALUE (60 °F ideal reaction):				19294.4 Btu/lbm
GROSS HEATING VALUE (60°F ideal reaction):				21187.9 Btu/lbm
RELATIVE DENSITY (AIR=1):				0.8396
DENSITY				0.06407 lbm/scf
COMPRESSIBILITY FACTOR :				0.9968
REGULAR WOBBE INDEX				1477.1

*(DETAILED HYDROCARBON ANALYSIS/NJ 1993)

Mod ASTM D6730, GPA 2261 & GPA 2286.

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

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)
GLYCALC INFORMATION**

PROJECT NO. :	202409054	ANALYSIS NO. :	01
COMPANY NAME :	QB ENERGY OPERATING, LLC	ANALYSIS DATE:	SEPTEMBER 18, 2024 10:18
ACCOUNT NO. :		SAMPLE DATE :	AUGUST 29, 2024 14:00
PRODUCER :	QB ENERGY OPERATING, LLC	CYLINDER NO. :	ECA-817
LEASE NO. :	COC - 57286	SAMPLED BY :	PAUL HACKING
NAME/DESCRIP :	PICEANCE CREEK 4603 PRODUCTION CASING		

FIELD DATA

SAMPLE PRES. :	1413	SAMPLE TEMP. :	80
H2S BY STAIN TUBE:	— ppm mol	AMBIENT TEMP.:	
COMMENTS :	SPOT		

<u>Componet</u>	<u>Mole %</u>	<u>Wt %</u>
Helium	0.00	0.00
Hydrogen	0.00	0.00
Carbon Dioxide	3.61	6.53
Nitrogen	0.08	0.09
Methane	78.7182	51.9396
Ethane	6.8111	8.4234
Propane	2.7059	4.9074
Isobutane	0.9769	2.3353
n-Butane	1.1277	2.6958
Isopentane	0.6510	1.9318
n-Pentane	0.4816	1.4291
Cyclopentane	0.0313	0.0903
n-Hexane	0.2969	1.0523
Cyclohexane	0.2086	0.7221
Other Hexanes	0.5992	2.1112
Heptanes	0.8937	3.6689
Methylcyclohexane	0.6531	2.6374
2,2,4 Trimethylpentane	0.0005	0.0023
Benzene	0.1640	0.5269
Toluene	0.4586	1.7380
Ethylbenzene	0.0324	0.1415
Xylenes	0.1249	0.5453
C8+ Heavies	1.3629	6.4694
<u>Subtotal</u>	<u>99.98850</u>	<u>99.98800</u>
Oxygen/Argon	0.01	0.01
Alcohols	0.0015	0.0020
<u>Total</u>	<u>100.00000</u>	<u>100.00000</u>

	<u>Total</u>	<u>C6+</u>	<u>C8+</u>	<u>C10+</u>
Calculated Values BTU @ <u>14.65</u>	Sample	Fraction	Fraction	Fraction
LHV Net Dry Real:	1232.9	4963.2	5713.5	6543.8 Btu/scf
Net Wet Real:	1211.3	4876.4	5613.6	6429.4 Btu/scf
HHV Gross Dry Real:	1353.6	5324.4	6143.0	6945.1 Btu/scf
Gross Wet Real:	1329.9	5231.3	6035.6	6823.7 Btu/scf
Other Calculated Values				
Regualr Wobbe Index*	1477.1	2866.8	3091.8	3210.7 Btu/scf
Net Heating Value (60 °F ideal reaction):	19294.4	19190.4	19548.6	18275.9 Btu/lbm
Gross Heating Value (60°F ideal reaction):	21187.9	20588.0	21018.4	19396.4 Btu/lbm
Molar Mass (MW):	24.31598	99.464	114.451	136.236 g/mol
Relative Density (AIR=1):	0.8396	3.4343	3.9515	4.7039 SG
Density:	0.06407	0.26211	0.30160	0.35900 lbm/scf
Compressibility Factor:	0.9968	0.9947	0.9974	0.9995 Z
Liquid Volume real gas @: <u>14.65</u>	19.5865	2.0496	0.7516	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.

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DHA COMPONENT LIST

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

SAMPLE CYCLE:
 SAMPLE PRES. : 1413 psig
 FLOW PRES. : psig
 LAB PRES: psig
 SAMPLE TEMP. : 80 °f
 AMBIENT TEMP.: °f
 H2O BY STAIN TUBE: - #/mmcf
 FIELD COMMENTS:
 LAB COMMENTS:

SAMPLE TYPE: SPOT
 PROBE :
 CYLINDER NO. : ECA-817
 SAMPLED BY : PAUL HACKING
 SAMPLING COMPANY: QB ENERGY OPERATING, LLC
 H2S BY STAIN TUBE: - ppm mol
 CO2 BY STAIN TUBE: - Mol %

COMPONENT	PIANO #	MOLE %	MASS %	GPM @ 14.65	GPM @ 14.73
Helium	---	0.00	0.00	---	---
Hydrogen	---	0.00	0.00	---	---
Oxygen/Argon	---	0.01	0.01	---	---
Nitrogen	---	0.08	0.09	---	---
Carbon Dioxide	---	3.61	6.53	---	---
Methane	P1	78.7182	51.9396	---	---
Ethane	P2	6.8111	8.4234	1.817	1.827
Propane	P3	2.7059	4.9074	0.744	0.748
i-Butane	I4	0.9769	2.3353	0.319	0.321
Methanol	X1	0.0015	0.0020	0.000	0.000
n-Butane	P4	1.1277	2.6958	0.355	0.357
2,2-Dimethylpropane	I5	0.0185	0.0549	0.007	0.007
i-Pentane	I5	0.6325	1.8769	0.231	0.232
n-Pentane	P5	0.4816	1.4291	0.174	0.175
2,2-Dimethylbutane	I6	0.0363	0.1287	0.015	0.015
Cyclopentane	N5	0.0313	0.0903	0.009	0.009
2,3-Dimethylbutane	I6	0.0508	0.1801	0.021	0.021
2-Methylpentane	I6	0.2270	0.8046	0.094	0.095
3-Methylpentane	I6	0.1319	0.4675	0.054	0.054
n-Hexane	P6	0.2969	1.0523	0.122	0.123
2,2-Dimethylpentane	I7	0.0144	0.0593	0.007	0.007
Methylcyclopentane	N6	0.1532	0.5303	0.054	0.054
2,4-Dimethylpentane	I7	0.0218	0.0898	0.010	0.010
2,2,3-Trimethylbutane	I7	0.0060	0.0247	0.003	0.003
Benzene	A6	0.1640	0.5269	0.046	0.046
3,3-Dimethylpentane	I7	0.0105	0.0433	0.005	0.005
Cyclohexane	N6	0.2086	0.7221	0.071	0.071
2-Methylhexane	I7	0.1372	0.5654	0.064	0.064
2,3-Dimethylpentane	I7	0.0339	0.1397	0.015	0.015
1,1-Dimethylcyclopentane	N7	0.0251	0.1014	0.010	0.010

3-Methylhexane	I7	0.1303	0.5370	0.060	0.060
1c,3-Dimethylcyclopentane	N7	0.0391	0.1579	0.018	0.018
1t,3-Dimethylcyclopentane	N7	0.0366	0.1478	0.017	0.017
3-Ethylpentane	I7	0.0070	0.0288	0.003	0.003
1t,2-Dimethylcyclopentane	N7	0.0604	0.2439	0.028	0.028
2,2,4-Trimethylpentane	I8	0.0005	0.0023	0.000	0.000
n-Heptane	P7	0.3365	1.3868	0.155	0.156
1c,2-Dimethylcyclopentane	N7	0.0081	0.0327	0.004	0.004
Methylcyclohexane	N7	0.6531	2.6374	0.262	0.264
2,2-Dimethylhexane	I8	0.0213	0.1001	0.010	0.010
1,1,3-Trimethylcyclopentane	N7	0.0037	0.0171	0.002	0.002
Ethylcyclopentane	N7	0.0231	0.0933	0.009	0.009
2,5-Dimethylhexane	I8	0.0236	0.1109	0.012	0.012
2,2,3-Trimethylpentane	I8	0.0222	0.1043	0.011	0.011
2,4-Dimethylhexane	I8	0.0012	0.0056	0.001	0.001
1c,2t,4-Trimethylcyclopentane	N8	0.0165	0.0761	0.008	0.008
3,3-Dimethylhexane	I8	0.0075	0.0352	0.003	0.003
2,3,4-Trimethylpentane	I8	0.0007	0.0033	0.000	0.000
2,3,3-Trimethylpentane	I8	0.0012	0.0056	0.001	0.001
Toluene	A7	0.4586	1.7380	0.153	0.154
2,3-Dimethylhexane	I8	0.0219	0.1029	0.011	0.011
2-Methyl-3-ethylpentane	I8	0.0021	0.0099	0.001	0.001
2-Methylheptane	I8	0.1365	0.6413	0.070	0.070
4-Methylheptane	I8	0.0422	0.1983	0.021	0.021
3-Methyl-3-ethylpentane	I8	0.0038	0.0179	0.002	0.002
3,4-Dimethylhexane	I8	0.0035	0.0165	0.002	0.002
1c,2c,4-Trimethylcyclopentane	N8	0.0014	0.0065	0.001	0.001
1c,3-Dimethylcyclohexane	N8	0.0010	0.0046	0.001	0.001
3-Methylheptane	I8	0.1073	0.5041	0.055	0.055
1c,2t,3-Trimethylcyclopentane	N8	0.1447	0.6678	0.074	0.074
3-Ethylhexane	I8	0.0057	0.0268	0.003	0.003
1t,4-Dimethylcyclohexane	N8	0.0587	0.2709	0.030	0.030
1,1-Dimethylcyclohexane	N8	0.0229	0.1057	0.010	0.010
2,2,5-Trimethylhexane	I9	0.0032	0.0169	0.002	0.002
3c-Ethylmethylcyclopentane	N8	0.0055	0.0254	0.003	0.003
3t-Ethylmethylcyclopentane	N8	0.0050	0.0231	0.003	0.003
2t-Ethylmethylcyclopentane	N8	0.0069	0.0318	0.004	0.004
1,1-Methylethylcyclopentane	N8	0.0008	0.0037	0.000	0.000
2,2,4-Trimethylhexane	I9	0.0020	0.0106	0.001	0.001
1t,2-Dimethylcyclohexane	N8	0.0481	0.2220	0.025	0.025
1t,3-Dimethylcyclohexane	N8	0.0017	0.0079	0.001	0.001
n-Octane	P8	0.3615	1.6984	0.185	0.186
1c,4-Dimethylcyclohexane	N8	0.0282	0.1301	0.014	0.014
i-Propylcyclopentane	I8	0.0028	0.0129	0.001	0.001
2,3,5-Trimethylhexane	I9	0.0085	0.0448	0.005	0.005
2,2,3,4-Tetramethylpentane	I9	0.0014	0.0074	0.001	0.001
2,3,4-Trimethylhexane	I9	0.0027	0.0142	0.001	0.001
1c,2-Dimethylcyclohexane	N8	0.0010	0.0046	0.001	0.001
2,2-Dimethylheptane	I9	0.0261	0.1377	0.013	0.013
1,1,4-Trimethylcyclohexane	N9	0.0716	0.3718	0.037	0.037
2,2,3-Trimethylhexane	I9	0.0125	0.0659	0.006	0.006
2,4-Dimethylheptane	I9	0.0014	0.0074	0.001	0.001
4,4-Dimethylheptane	I9	0.0014	0.0074	0.001	0.001
Ethylcyclohexane	N8	0.0525	0.2423	0.024	0.024
n-Propylcyclopentane	N8	0.0175	0.0808	0.008	0.008
1c,3c,5-Trimethylcyclohexane	N9	0.0051	0.0265	0.003	0.003
2,5-Dimethylheptane	I9	0.0342	0.1804	0.019	0.019
3,3-Dimethylheptane	I9	0.0063	0.0332	0.003	0.003
3,5-Dimethylheptane	I9	0.0013	0.0069	0.001	0.001
2,6-Dimethylheptane	I9	0.0025	0.0132	0.001	0.001
1,1,3-Trimethylcyclohexane	N9	0.0012	0.0062	0.001	0.001
Ethylbenzene	I8	0.0324	0.1415	0.012	0.012
1c,2t,4t-Trimethylcyclohexane	N9	0.0002	0.0010	0.000	0.000

2,3-Dimethylheptane	I9	0.0001	0.0005	0.000	0.000
1,3-Dimethylbenzene (m-Xylene)	A8	0.0855	0.3733	0.033	0.033
1,4-Dimethylbenzene (p-Xylene)	A8	0.0394	0.1720	0.015	0.015
3,4-Dimethylheptane (2)	I9	0.0012	0.0063	0.001	0.001
1,3-Methylethylbenzene	A9	0.0001	0.0005	0.000	0.000
1,4-Methylethylbenzene	A9	0.0002	0.0010	0.000	0.000
1,3,5-Trimethylbenzene	A9	0.0001	0.0005	0.000	0.000
t-Butylbenzene	A10	0.0003	0.0017	0.000	0.000
UnknownC9s	U9	0.0018	0.0095	0.001	0.001
UnknownC10s	U10	0.0001	0.0006	0.000	0.000
TOTAL		100.00000	100.00000	5.7123	5.7439

BTEX COMPONENTS	MOLE%	WT%
BENZENE	0.1640	0.5269
TOLUENE	0.4586	1.7380
ETHYLBENZENE	0.0324	0.1415
XYLENES	0.1249	0.5453
TOTAL BTEX	0.7799	2.9517

*(DETAILED HYDROCARBON ANALYSIS/NJ 1993)

Mod ASTM D6730, GPA 2261 & GPA 2286.

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

CALCULATED VALUES**		
BTU @	14.65	14.73
LHV NET DRY REAL :	1232.9 /scf	1239.7 /scf
NET WET REAL :	1211.3 /scf	1218.1 /scf
HHV GROSS DRY REAL :	1353.6 /scf	1361.0 /scf
GROSS WET REAL :	1329.9 /scf	1337.3 /scf
NET HEATING VALUE (60 °F ideal reaction):		19294.4 Btu/lbm
GROSS HEATING VALUE (60°F ideal reaction):		21187.9 Btu/lbm
RELATIVE DENSITY (AIR=1):		0.8396
DENSITY		0.06407 lb/scf
COMPRESSIBILITY FACTOR :		0.9968
REGULAR WOBBE INDEX		1477.1

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

Net Dry Ideal BTU	4952.3 /scf	Relative Density - SG (Air=1)	3.4343	C6+ factors
Gross Dry Ideal BTU	5312.8 /scf	Z Compressibility Factor	0.99469	0.99409
Net Dry Ideal BTU	19190.4 /lb	Density Factor	262.11 lbm/1000 ft3	
Gross Dry Ideal BTU	20588 /lb	Molar Mass or MW	99.464 g/mol	
		Volume Liquid Ideal gas	2.056 scf/gal	23.7

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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