



EXTENDED NATURAL GAS ANALYSIS (*DHA)

MAIN PAGE

PRIMARY DB KEY: **05-103-11262** NAME/DESCRIP : **FREEDOM UNIT 297-28C1**
 LEASE #: INTERMEDIATE CASING
 FIELD/AREA:

PROJECT NO. : **202509088** ANALYSIS NO. : **02**
 COMPANY NAME : **QB ENERGY OPERATING, LLC** ANALYSIS DATE: **SEPTEMBER 26, 2025 14:31**
 OFFICE / BRANCH: **PARACHUTE, CO** SAMPLE DATE : **SEPTEMBER 05, 2025**
 CUSTOMER REF: TO:
 PRODUCER : EFFECTIVE DATE:

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

SAMPLE CYCLE: SAMPLE TYPE:
 SAMPLE PRES. : 472 psig PROBE :
 FLOW PRES. : psig CYLINDER NO. : 0054
 LAB PRES: psig SAMPLED BY : NICK CROY
 SAMPLE TEMP. : °f SAMPLING COMPANY: **QB ENERGY**
 AMBIENT TEMP.: °f H2S BY STAIN TUBE: — ppm mol
 H2O BY STAIN TUBE: - #/mmcf CO2 BY STAIN TUBE: - Mol %
 FIELD COMMENTS:
 LAB COMMENTS:

<u>COMPONENT</u>	<u>MOLE %</u>	<u>MASS %</u>	<u>GPM @</u>	
			<u>14.65</u>	<u>14.73</u>
ALCOHOLS	0.0001	0.0002	0.0000	0.0000
HELIUM	0.00	0.00	---	---
HYDROGEN	0.02	0.00	---	---
OXYGEN/ARGON	0.00	0.00	---	---
NITROGEN	0.08	0.12	---	---
CARBON DIOXIDE	0.01	0.02	---	---
METHANE	90.3744	79.8107	---	---
ETHANE	6.3165	10.4554	1.6841	1.6932
PROPANE	1.9552	4.7460	0.5367	0.5396
I-BUTANE	0.3328	1.0648	0.1089	0.1095
N-BUTANE	0.3117	0.9973	0.0979	0.0985
I-PENTANE	0.1652	0.6554	0.0600	0.0603
N-PENTANE	0.1018	0.4043	0.0370	0.0372
HEXANES PLUS	0.3323	1.7259	0.1270	0.1273
TOTALS	100.0000	100.0000	2.6516	2.6656

<u>BTEX COMPONENTS</u>	<u>MOLE%</u>	<u>WT%</u>
BENZENE	0.0122	0.0525
TOLUENE	0.0193	0.0979
ETHYLBENZENE	0.0011	0.0064
XYLENES	0.0088	0.0515
TOTAL BTEX	0.0414	0.2083

	<u>CALCULATED VALUES**</u>	
	<u>BTU @</u>	<u>BTU @</u>
	<u>14.65</u>	<u>14.73</u>
LHV NET DRY REAL :	1013.1 /scf	1018.7 /scf
NET WET REAL :	995.4 /scf	1001.0 /scf
HHV GROSS DRY REAL :	1120.9 /scf	1127.0 /scf
GROSS WET REAL :	1101.3 /scf	1107.4 /scf
NET HEATING VALUE (60 °F ideal reaction):		21191.5 Btu/lbm
GROSS HEATING VALUE (60°F ideal reaction):		23447.7 Btu/lbm
RELATIVE DENSITY (AIR=1):		0.6265
DENSITY		0.04787 lbm/scf
COMPRESSIBILITY FACTOR :		0.9974
REGULAR WOBBE INDEX		1416.9

**(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. :	202509088	ANALYSIS NO. :	02
COMPANY NAME :	QB ENERGY OPERATING, LLC	ANALYSIS DATE:	SEPTEMBER 26, 2025 14:31
ACCOUNT NO. :		SAMPLE DATE :	SEPTEMBER 05, 2025
PRODUCER :		CYLINDER NO. :	0054
LEASE NO. :		SAMPLED BY :	NICK CROY
NAME/DESCRIP :	FREEDOM UNIT 297-28C1 INTERMEDIATE CASING		

FIELD DATA		SAMPLE TEMP. :	
SAMPLE PRES. :	472	AMBIENT TEMP.:	
H2S BY STAIN TUBE:	—		
COMMENTS :	—		

<u>Componet</u>	<u>Mole %</u>	<u>Wt %</u>
Helium	0.00	0.00
Hydrogen	0.02	0.00
Carbon Dioxide	0.01	0.02
Nitrogen	0.08	0.12
Methane	90.3744	79.8107
Ethane	6.3165	10.4554
Propane	1.9552	4.7460
Isobutane	0.3328	1.0648
n-Butane	0.3117	0.9973
Isopentane	0.1589	0.6311
n-Pentane	0.1018	0.4043
Cyclopentane	0.0063	0.0243
n-Hexane	0.0376	0.1784
Cyclohexane	0.0275	0.1274
Other Hexanes	0.0945	0.4457
Heptanes	0.0486	0.2666
Methylcyclohexane	0.0375	0.2027
2,2,4 Trimethylpentane	0.0000	0.0000
Benzene	0.0122	0.0525
Toluene	0.0193	0.0979
Ethylbenzene	0.0011	0.0064
Xylenes	0.0088	0.0515
C8+ Heavies	0.0452	0.2968
<u>Subtotal</u>	<u>99.99990</u>	<u>99.99980</u>
Oxygen/Argon	0.00	0.00
Alcohols	0.0001	0.0002
<u>Total</u>	<u>100.00000</u>	<u>100.00000</u>

Calculated Values BTU @		Total Sample	C6+ Fraction	C8+ Fraction	C10+ Fraction
	14.65				
LHV	Net Dry Real:	1013.1	4735.6	5797.7	6997.3 Btu/scf
	Net Wet Real:	995.4	4652.8	5696.3	6875.0 Btu/scf
HHV	Gross Dry Real:	1120.9	5084.3	6220.7	7523.9 Btu/scf
	Gross Wet Real:	1101.3	4995.4	6112.0	7392.4 Btu/scf

Other Calculated Values					
Regualr Wobbe Index*		1416.9	2805.2	3099.2	3405.5 Btu/scf
Net Heating Value (60 °F ideal reaction):		21191.5	19161.5	19401.4	19132.7 Btu/lbm
Gross Heating Value (60 °F ideal reaction):		23447.7	20572.0	20817.8	20573.7 Btu/lbm
Molar Mass (MW):		18.16764	94.367	116.944	142.108 g/mol
Relative Density (AIR=1):		0.6265	3.2579	4.0374	4.9068 SG
Density:		0.04787	0.24866	0.30817	0.37448 lbm/scf
Compressibility Factor:		0.9974	0.9927	0.9979	0.9995 Z
Liquid Volume real gas @:	14.65	17.8918	0.1266	0.0199	0.001 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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EXTENDED NATURAL GAS ANALYSIS (*DHA)

DHA COMPONENT LIST

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 FLOW PRES. : psig CYLINDER NO. : 0054
 LAB PRES: psig SAMPLED BY : NICK CROY
 SAMPLE TEMP. : °f SAMPLING COMPANY: QB ENERGY
 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
Hydrogen	---	0.02	0.00	---	---
Nitrogen	---	0.08	0.12	---	---
Carbon Dioxide	---	0.01	0.02	---	---
Methane	P1	90.3744	79.8107	---	---
Ethane	P2	6.3165	10.4554	1.684	1.693
Propane	P3	1.9552	4.7460	0.537	0.540
i-Butane	I4	0.3328	1.0648	0.109	0.110
Methanol	X1	0.0001	0.0002	0.000	0.000
n-Butane	P4	0.3116	0.9970	0.098	0.099
2,2-Dimethylpropane	I5	0.0046	0.0183	0.002	0.002
i-Pentane	I5	0.1543	0.6128	0.056	0.056
UnknownC4s	U4	0.0001	0.0003	0.000	0.000
n-Pentane	P5	0.1018	0.4043	0.037	0.037
2,2-Dimethylbutane	I6	0.0066	0.0313	0.003	0.003
Cyclopentane	N5	0.0063	0.0243	0.002	0.002
2,3-Dimethylbutane	I6	0.0097	0.0460	0.004	0.004
2-Methylpentane	I6	0.0365	0.1731	0.015	0.015
3-Methylpentane	I6	0.0194	0.0920	0.008	0.008
n-Hexane	P6	0.0376	0.1784	0.015	0.015
2,2-Dimethylpentane	I7	0.0012	0.0066	0.001	0.001
Methylcyclopentane	N6	0.0223	0.1033	0.008	0.008
2,4-Dimethylpentane	I7	0.0019	0.0105	0.001	0.001
2,2,3-Trimethylbutane	I7	0.0005	0.0028	0.000	0.000
Benzene	A6	0.0122	0.0525	0.003	0.003
3,3-Dimethylpentane	I7	0.0007	0.0039	0.000	0.000
Cyclohexane	N6	0.0275	0.1274	0.009	0.009
2-Methylhexane	I7	0.0074	0.0408	0.003	0.003
2,3-Dimethylpentane	I7	0.0020	0.0110	0.001	0.001

1,1-Dimethylcyclopentane	N7	0.0018	0.0097	0.001	0.001
3-Methylhexane	I7	0.0068	0.0375	0.003	0.003
1c,3-Dimethylcyclopentane	N7	0.0028	0.0151	0.001	0.001
1t,3-Dimethylcyclopentane	N7	0.0025	0.0135	0.001	0.001
3-Ethylpentane	I7	0.0003	0.0017	0.000	0.000
1t,2-Dimethylcyclopentane	N7	0.0040	0.0216	0.002	0.002
n-Heptane	P7	0.0152	0.0838	0.007	0.007
1c,2-Dimethylcyclopentane	N7	0.0003	0.0016	0.000	0.000
Methylcyclohexane	N7	0.0375	0.2027	0.015	0.015
2,2-Dimethylhexane	I8	0.0007	0.0044	0.000	0.000
1,1,3-Trimethylcyclopentane	N7	0.0001	0.0006	0.000	0.000
Ethylcyclopentane	N7	0.0011	0.0059	0.000	0.000
2,5-Dimethylhexane	I8	0.0007	0.0044	0.000	0.000
2,2,3-Trimethylpentane	I8	0.0006	0.0038	0.000	0.000
2,4-Dimethylhexane	I8	0.0001	0.0006	0.000	0.000
1c,2t,4-Trimethylcyclopentane	N8	0.0005	0.0031	0.000	0.000
3,3-Dimethylhexane	I8	0.0003	0.0019	0.000	0.000
Toluene	A7	0.0193	0.0979	0.006	0.006
2,3-Dimethylhexane	I8	0.0006	0.0038	0.000	0.000
2-Methyl-3-ethylpentane	I8	0.0001	0.0006	0.000	0.000
2-Methylheptane	I8	0.0030	0.0189	0.002	0.002
4-Methylheptane	I8	0.0010	0.0063	0.001	0.001
3-Methyl-3-ethylpentane	I8	0.0001	0.0006	0.000	0.000
3,4-Dimethylhexane	I8	0.0001	0.0006	0.000	0.000
3-Methylheptane	I8	0.0023	0.0145	0.001	0.001
1c,2t,3-Trimethylcyclopentane	N8	0.0046	0.0284	0.002	0.002
3-Ethylhexane	I8	0.0002	0.0013	0.000	0.000
1t,4-Dimethylcyclohexane	N8	0.0020	0.0123	0.001	0.001
1,1-Dimethylcyclohexane	N8	0.0007	0.0044	0.000	0.000
2,2,5-Trimethylhexane	I9	0.0001	0.0007	0.000	0.000
3c-Ethylmethylcyclopentane	N8	0.0002	0.0012	0.000	0.000
3t-Ethylmethylcyclopentane	N8	0.0002	0.0012	0.000	0.000
2t-Ethylmethylcyclopentane	N8	0.0002	0.0012	0.000	0.000
2,2,4-Trimethylhexane	I9	0.0001	0.0007	0.000	0.000
1t,2-Dimethylcyclohexane	N8	0.0014	0.0086	0.001	0.001
1t,3-Dimethylcyclohexane	N8	0.0002	0.0012	0.000	0.000
n-Octane	P8	0.0070	0.0440	0.004	0.004
1c,4-Dimethylcyclohexane	N8	0.0011	0.0068	0.001	0.001
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-Dimethylheptane	I9	0.0004	0.0028	0.000	0.000
1,1,4-Trimethylcyclohexane	N9	0.0013	0.0090	0.001	0.001
2,2,3-Trimethylhexane	I9	0.0004	0.0028	0.000	0.000
2,4-Dimethylheptane	I9	0.0001	0.0007	0.000	0.000
Ethylcyclohexane	N8	0.0009	0.0056	0.000	0.000
n-Propylcyclopentane	N8	0.0004	0.0025	0.000	0.000
1c,3c,5-Trimethylcyclohexane	N9	0.0002	0.0014	0.000	0.000
2,5-Dimethylheptane	I9	0.0006	0.0042	0.000	0.000
3,3-Dimethylheptane	I9	0.0002	0.0014	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	0.0011	0.0064	0.000	0.000
1,3-Dimethylbenzene (m-Xylene)	A8	0.0059	0.0345	0.002	0.002
1,4-Dimethylbenzene (p-Xylene)	A8	0.0020	0.0117	0.001	0.001
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	0.0005	0.0035	0.000	0.000
2-Methyloctane	I9	0.0007	0.0050	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	0.0048	0.000	0.000
1,2-Dimethylbenzene (o-Xylene)	A8	0.0009	0.0053	0.000	0.000
i-Butylcyclopentane	N9	0.0005	0.0035	0.000	0.000
n-Nonane	P9	0.0030	0.0212	0.002	0.002
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	0.0004	0.0028	0.000	0.000
n-Propylbenzene	A9	0.0003	0.0020	0.000	0.000
3,6-Dimethyloctane	I10	0.0001	0.0008	0.000	0.000
3-Methyl-5-ethylheptane	I10	0.0006	0.0047	0.000	0.000
1,3-Methylethylbenzene	A9	0.0003	0.0020	0.000	0.000
1,4-Methylethylbenzene	A9	0.0001	0.0007	0.000	0.000
1,3,5-Trimethylbenzene	A9	0.0004	0.0026	0.000	0.000
2,3-Dimethyloctane	I10	0.0001	0.0008	0.000	0.000
5-Methylnonane	I10	0.0001	0.0008	0.000	0.000
1,2-Methylethylbenzene	A9	0.0002	0.0013	0.000	0.000
2-Methylnonane	I10	0.0001	0.0008	0.000	0.000
3-Methylnonane	I10	0.0001	0.0008	0.000	0.000
t-Butylbenzene	A10	0.0003	0.0022	0.000	0.000
i-Butylcyclohexane	N10	0.0001	0.0008	0.000	0.000
UnknownC9s	U9	0.0006	0.0042	0.000	0.000
n-Decane	P10	0.0007	0.0055	0.000	0.000
1,3-Diethylbenzene	A10	0.0001	0.0007	0.000	0.000
UnknownC10s	U10	0.0010	0.0078	0.001	0.001
n-Undecane	P11	0.0001	0.0009	0.000	0.000
UnknownC11s	U11	0.0001	0.0009	0.000	0.000
TOTAL		100.00000	100.00000	2.6516	2.6656

CALCULATED VALUES**

BTEX COMPONENTS	MOLE%	WT%	BTU @	14.65	14.73
BENZENE	0.0122	0.0525	LHV NET DRY REAL :	1013.1 /scf	1018.7 /scf
TOLUENE	0.0193	0.0979	NET WET REAL :	995.4 /scf	1001.0 /scf
ETHYLBENZENE	0.0011	0.0064	HHV GROSS DRY REAL :	1120.9 /scf	1127.0 /scf
XYLENES	0.0088	0.0515	GROSS WET REAL :	1101.3 /scf	1107.4 /scf
TOTAL BTEX	0.0414	0.2083	NET HEATING VALUE (60 °F ideal reaction):		21191.5 Btu/lbm
			GROSS HEATING VALUE (60°F ideal reaction):		23447.7 Btu/lbm
			RELATIVE DENSITY (AIR=1):		0.6265
			DENSITY		0.04787 lb/scf
			COMPRESSIBILITY FACTOR :		0.9974
			REGULAR WOBBE INDEX		1416.9

*(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	4716 /scf	Relative Density - SG (Air=1)	3.2579	C6+ factors
Gross Dry Ideal BTU	5063.2 /scf	Z Compressibility Factor	0.99274	0.99189
Net Dry Ideal BTU	19161.5 /lb	Density Factor	248.662 lbm/1000 ft3	
Gross Dry Ideal BTU	20572 /lb	Molar Mass or MW	94.367 g/mol	
		Volume Liquid Ideal gas	0.127 scf/gal	24
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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