EXTENDED NATURAL GAS ANALYSIS (*DHA)

MAIN PAGE

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

PROJECT NO. : **202509088** ANALYSIS NO. : **01**
COMPANY NAME : **QB ENERGY OPERATING, LLC** ANALYSIS DATE: SEPTEMBER 26, 2025 12:48
OFFICE / BRANCH: PARACHUTE, CO SAMPLE DATE : SEPTEMBER 05, 2025
CUSTOMER REF: TO:
PRODUCER : EFFECTIVE DATE:

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

SAMPLE CYCLE: SAMPLE TYPE:
SAMPLE PRES. : 1150 psig PROBE :
FLOW PRES. : psig CYLINDER NO. : 0163
LAB PRES: psig SAMPLED BY : NICK CROY
SAMPLE TEMP. : ºf SAMPLING COMPANY: QB ENERGY
AMBIENT TEMP.: ºf 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	GPM @ 14.73
ALCOHOLS	0.1061	0.1920	0.0130	0.0131
HELIUM	0.01	0.00	---	---
HYDROGEN	0.09	0.01	---	---
OXYGEN/ARGON	0.00	0.00	---	---
NITROGEN	0.08	0.13	---	---
CARBON DIOXIDE	2.96	7.35	---	---
METHANE	92.4381	83.6574	---	---
ETHANE	3.2779	5.5602	0.8733	0.8780
PROPANE	0.6241	1.5525	0.1709	0.1718
I-BUTANE	0.1515	0.4968	0.0490	0.0492
N-BUTANE	0.1081	0.3544	0.0340	0.0342
I-PENTANE	0.0615	0.2502	0.0220	0.0221
N-PENTANE	0.0313	0.1274	0.0110	0.0111
HEXANES PLUS	0.0614	0.3191	0.0200	0.0200
TOTALS	100.00000	100.00000	1.1932	1.1995

BTEX COMPONENTS	MOLE%	WT%
BENZENE	0.0001	0.0004
TOLUENE	0.0003	0.0016
ETHYLBENZENE	0.0000	0.0000
XYLENES	0.0003	0.0018
TOTAL BTEX	0.0007	0.0038

**(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 :	921.7 **/scf**	926.8 **/scf**
	NET WET REAL :	905.6 **/scf**	910.7 **/scf**
HHV	GROSS DRY REAL :	1022.2 **/scf**	1027.8 **/scf**
	GROSS WET REAL :	1004.3 **/scf**	1009.9 **/scf**

NET HEATING VALUE (60 °F ideal reaction):	19765.3 **Btu/lbm**
GROSS HEATING VALUE (60°F ideal reaction):	21918.0 **Btu/lbm**
RELATIVE DENSITY (AIR=1):	0.6118
DENSITY	0.04671 **lbm/scf**
COMPRESSIBILITY FACTOR :	0.9977
REGULAR WOBBE INDEX	1308.0

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EXTENDED NATURAL GAS ANALYSIS (*DHA)

GLYCALC INFORMATION

PROJECT NO. :	202509088	ANALYSIS NO. :	01
COMPANY NAME :	QB ENERGY OPERATING, LLC	ANALYSIS DATE:	SEPTEMBER 26, 2025 12:48
ACCOUNT NO. :		SAMPLE DATE :	SEPTEMBER 05, 2025
PRODUCER :		CYLINDER NO. :	0163
LEASE NO. :		SAMPLED BY :	NICK CROY
NAME/DESCRIP :	FREEDOM UNIT 297-28C1 PRODUCTION CASING		
FIELD DATA		SAMPLE TEMP. :	
SAMPLE PRES. :	1150	AMBIENT TEMP.:	
H2S BY STAIN TUBE:	_ *ppm mol*		
COMMENTS :			

Componet	Mole %	Wt %
Helium	0.01	0.00
Hydrogen	0.09	0.01
Carbon Dioxide	2.96	7.35
Nitrogen	0.08	0.13
Methane	92.4381	83.6574
Ethane	3.2779	5.5602
Propane	0.6241	1.5525
Isobutane	0.1515	0.4968
n-Butane	0.1081	0.3544
Isopentane	0.0605	0.2463
n-Pentane	0.0313	0.1274
Cyclopentane	0.0010	0.0039
n-Hexane	0.0108	0.0525
Cyclohexane	0.0020	0.0095
Other Hexanes	0.0277	0.1342
Heptanes	0.0122	0.0687
Methylcyclohexane	0.0028	0.0155
2,2,4 Trimethylpentane	0.0000	0.0000
Benzene	0.0001	0.0004
Toluene	0.0003	0.0016
Ethylbenzene	0.0000	0.0000
Xylenes	0.0003	0.0018
C8+ Heavies	0.0052	0.0349
Subtotal	99.89390	99.80800
Oxygen/Argon	0.00	0.00
Alcohols	0.1061	0.1920
Total	100.00000	100.00000

Calculated Values BTU @ **14.65**		**Total Sample**	**C6+ Fraction**	**C8+ Fraction**	**C10+ Fraction**	
LHV	Net Dry Real:	921.7	4712.7	6005.5	7644.2	**Btu/scf**
	Net Wet Real:	905.6	4630.3	5900.5	7510.6	**Btu/scf**
HHV	Gross Dry Real:	1022.2	5081.3	6461.7	8210.2	**Btu/scf**
	Gross Wet Real:	1004.3	4992.5	6348.7	8066.7	**Btu/scf**
Other Calculated Values						
Regualr Wobbe Index*		1308.0	2826.6	3179.4	3594.1	**Btu/scf**
Net Heating Value (60 °F ideal reaction):		19765.3	19351.9	19422.2	19002.0	**Btu/lbm**
Gross Heating Value (60°F ideal reaction):		21918.0	20863.5	20898.7	20410.9	**Btu/lbm**
Molar Mass (MW):		17.726	92.303	119.831	152.003	**g/mol**
Relative Density (AIR=1):		0.6118	3.1864	4.1373	5.2482	**SG**
Density:		0.04671	0.24323	0.31578	0.40055	**lbm/scf**
Compressiblity Factor:		0.9977	0.9899	0.9977	0.9997	**Z**
Liquid Volume real gas @:	**14.65**	17.2927	0.0199	0	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 uderscore) indicates there was no tube pulled for H2S.

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EXTENDED NATURAL GAS ANALYSIS (*DHA)

DHA COMPONENT LIST

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AMBIENT TEMP.: ºf 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	---	0.09	0.01	---	---
Nitrogen	---	0.08	0.13	---	---
Carbon Dioxide	---	2.96	7.35	---	---
Methane	P1	92.4381	83.6574	---	---
Ethane	P2	3.2779	5.5602	0.873	0.878
Propane	P3	0.6241	1.5525	0.171	0.172
i-Butane	I4	0.1515	0.4968	0.049	0.049
Methanol	X1	0.1060	0.1916	0.013	0.013
n-Butane	P4	0.1081	0.3544	0.034	0.034
2,2-Dimethylpropane	I5	0.0029	0.0118	0.001	0.001
i-Pentane	I5	0.0576	0.2345	0.021	0.021
n-Pentane	P5	0.0313	0.1274	0.011	0.011
t-Butanol	X4	0.0001	0.0004	0.000	0.000
2,2-Dimethylbutane	I6	0.0027	0.0131	0.001	0.001
Cyclopentane	N5	0.0010	0.0039	0.000	0.000
2,3-Dimethylbutane	I6	0.0032	0.0156	0.001	0.001
2-Methylpentane	I6	0.0121	0.0588	0.005	0.005
3-Methylpentane	I6	0.0063	0.0306	0.003	0.003
n-Hexane	P6	0.0108	0.0525	0.004	0.004
2,2-Dimethylpentane	I7	0.0005	0.0028	0.000	0.000
Methylcyclopentane	N6	0.0034	0.0161	0.001	0.001
2,4-Dimethylpentane	I7	0.0008	0.0045	0.000	0.000
2,2,3-Trimethylbutane	I7	0.0002	0.0011	0.000	0.000
Benzene	A6	0.0001	0.0004	0.000	0.000
3,3-Dimethylpentane	I7	0.0002	0.0011	0.000	0.000
Cyclohexane	N6	0.0020	0.0095	0.001	0.001
2-Methylhexane	I7	0.0025	0.0142	0.001	0.001
2,3-Dimethylpentane	I7	0.0006	0.0034	0.000	0.000

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1,1-Dimethylcyclopentane	N7	0.0004	0.0022	0.000	0.000
3-Methylhexane	I7	0.0021	0.0118	0.001	0.001
1c,3-Dimethylcyclopentane	N7	0.0004	0.0022	0.000	0.000
1t,3-Dimethylcyclopentane	N7	0.0004	0.0022	0.000	0.000
3-Ethylpentane	I7	0.0001	0.0006	0.000	0.000
1t,2-Dimethylcyclopentane	N7	0.0006	0.0033	0.000	0.000
n-Heptane	P7	0.0032	0.0181	0.001	0.001
1c,2-Dimethylcyclopentane	N7	0.0001	0.0006	0.000	0.000
Methylcyclohexane	N7	0.0028	0.0155	0.001	0.001
2,2-Dimethylhexane	I8	0.0002	0.0013	0.000	0.000
Ethylcyclopentane	N7	0.0001	0.0006	0.000	0.000
2,5-Dimethylhexane	I8	0.0002	0.0013	0.000	0.000
2,2,3-Trimethylpentane	I8	0.0002	0.0013	0.000	0.000
1c,2t,4-Trimethylcyclopentane	N8	0.0001	0.0006	0.000	0.000
3,3-Dimethylhexane	I8	0.0001	0.0006	0.000	0.000
Toluene	A7	0.0003	0.0016	0.000	0.000
2,3-Dimethylhexane	I8	0.0001	0.0006	0.000	0.000
2-Methylheptane	I8	0.0006	0.0039	0.000	0.000
4-Methylheptane	I8	0.0002	0.0013	0.000	0.000
3-Methylheptane	I8	0.0005	0.0032	0.000	0.000
1c,2t,3-Trimethylcyclopentane	N8	0.0003	0.0019	0.000	0.000
1t,4-Dimethylcyclohexane	N8	0.0001	0.0006	0.000	0.000
1,1-Dimethylcyclohexane	N8	0.0001	0.0006	0.000	0.000
1t,2-Dimethylcyclohexane	N8	0.0001	0.0006	0.000	0.000
n-Octane	P8	0.0008	0.0051	0.000	0.000
1c,4-Dimethylcyclohexane	N8	0.0001	0.0006	0.000	0.000
1,1,4-Trimethylcyclohexane	N9	0.0001	0.0007	0.000	0.000
Ethylcyclohexane	N8	0.0001	0.0006	0.000	0.000
2,5-Dimethylheptane	I9	0.0001	0.0007	0.000	0.000
1,3-Dimethylbenzene (m-Xylene)	A8	0.0002	0.0012	0.000	0.000
1,4-Dimethylbenzene (p-Xylene)	A8	0.0001	0.0006	0.000	0.000
4-Methyloctane	I9	0.0001	0.0007	0.000	0.000
2-Methyloctane	I9	0.0001	0.0007	0.000	0.000
1c,2t,4c-Trimethylcyclohexane	I9	0.0001	0.0007	0.000	0.000
n-Nonane	P9	0.0001	0.0007	0.000	0.000
1,3-Methylethylbenzene	A9	0.0001	0.0007	0.000	0.000
3-Methylnonane	I10	0.0001	0.0008	0.000	0.000
t-Butylbenzene	A10	0.0001	0.0007	0.000	0.000
n-Decane	P10	0.0001	0.0008	0.000	0.000
1,3-Methyl-i-propylbenzene	A10	0.0001	0.0007	0.000	0.000
UnknownC10s	U10	0.0001	0.0008	0.000	0.000
n-Undecane	P11	0.0001	0.0009	0.000	0.000
n-Pentadecane	P15	0.0001	0.0012	0.000	0.000
TOTAL		100.00000	100.00000	1.1932	1.1995

BTEX COMPONENTS	MOLE%	WT%
BENZENE	0.0001	0.0004
TOLUENE	0.0003	0.0016
ETHYLBENZENE	0.0000	0.0000
XYLENES	0.0003	0.0018
TOTAL BTEX	0.0007	0.0038

**(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 :	921.7 /scf	926.8 /scf
	NET WET REAL :	905.6 /scf	910.7 /scf
HHV	GROSS DRY REAL :	1022.2 /scf	1027.8 /scf
	GROSS WET REAL :	1004.3 /scf	1009.9 /scf
	NET HEATING VALUE (60 °F ideal reaction):		19765.3 Btu/lbm
	GROSS HEATING VALUE (60°F ideal reaction):		21918.0 Btu/lbm
	RELATIVE DENSITY (AIR=1):		0.6118
	DENSITY		0.04671 lb/scf
	COMPRESSIBILITY FACTOR :		0.9977
	REGULAR WOBBE INDEX		1308.0

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

						C6+factors
Net Dry Ideal BTU	4679.7 /scf	Relative Density - SG (Air=1)	3.1864			0.9892
Gross Dry Ideal BTU	5045.7 /scf	**Z** Compressiblity Factor	0.98988			
Net Dry Ideal BTU	19351.9 /lb	Density Factor	243.229	lbm/1000 ft3		
Gross Dry Ideal BTU	20863.5 /lb	Molar Mass or MW	92.303	g/mol		
		Volume Liquid Ideal gas	0.02	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.