EMPACT

EXTENDED NATURAL GAS ANALYSIS (*DHA)

MAIN PAGE

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

PROJECT NO. : **202509088** ANALYSIS NO. : **03**
COMPANY NAME : **QB ENERGY OPERATING, LLC** ANALYSIS DATE: SEPTEMBER 27, 2025 09:58
OFFICE / BRANCH: PARACHUTE, CO SAMPLE DATE : SEPTEMBER 05, 2025
CUSTOMER REF: TO:
PRODUCER : EFFECTIVE DATE:

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

SAMPLE CYCLE: SAMPLE TYPE:
SAMPLE PRES. : 661 psig PROBE :
FLOW PRES. : psig CYLINDER NO. : 1734
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	0.0002	0.0004	0.0000	0.0000
HELIUM	0.01	0.00	---	---
HYDROGEN	0.02	0.00	---	---
OXYGEN/ARGON	0.00	0.00	---	---
NITROGEN	0.13	0.22	---	---
CARBON DIOXIDE	0.01	0.03	---	---
METHANE	97.0584	93.2738	---	---
ETHANE	1.9299	3.4762	0.5145	0.5173
PROPANE	0.4184	1.1052	0.1149	0.1155
I-BUTANE	0.0897	0.3123	0.0290	0.0291
N-BUTANE	0.0972	0.3384	0.0300	0.0301
I-PENTANE	0.0450	0.1943	0.0170	0.0171
N-PENTANE	0.0393	0.1698	0.0140	0.0141
HEXANES PLUS	0.1519	0.8796	0.0540	0.0540
TOTALS	100.00000	100.00000	0.7734	0.7772

BTEX COMPONENTS	MOLE%	WT%
BENZENE	0.0056	0.0262
TOLUENE	0.0029	0.0160
ETHYLBENZENE	0.0003	0.0019
XYLENES	0.0009	0.0057
TOTAL BTEX	0.0097	0.0498

**(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 :	938.3 /scf	943.4 /scf
	NET WET REAL :	921.9 /scf	927.0 /scf
HHV	GROSS DRY REAL :	1040.7 /scf	1046.4 /scf
	GROSS WET REAL :	1022.5 /scf	1028.2 /scf
	NET HEATING VALUE (60 °F ideal reaction):		21363.6 Btu/lbm
	GROSS HEATING VALUE (60°F ideal reaction):		23698.9 Btu/lbm
	RELATIVE DENSITY (AIR=1):		0.5755
	DENSITY		0.04399 lbm/scf
	COMPRESSIBILITY FACTOR :		0.9979
	REGULAR WOBBE INDEX		1373.2

EMPACT

EXTENDED NATURAL GAS ANALYSIS (*DHA)

GLYCALC INFORMATION

PROJECT NO. :	202509088	ANALYSIS NO. :	03
COMPANY NAME :	QB ENERGY OPERATING, LLC	ANALYSIS DATE:	SEPTEMBER 27, 2025 09:58
ACCOUNT NO. :		SAMPLE DATE :	SEPTEMBER 05, 2025
PRODUCER :		CYLINDER NO. :	1734
LEASE NO. :		SAMPLED BY :	NICK CROY
NAME/DESCRIP :	FREEDOM UNIT 297-28C1 SURFACE CASING		
FIELD DATA		SAMPLE TEMP. :	
SAMPLE PRES. :	661	AMBIENT TEMP.:	
H2S BY STAIN TUBE:	_ *ppm mol*		
COMMENTS :			

Componet	Mole %	Wt %
Helium	0.01	0.00
Hydrogen	0.02	0.00
Carbon Dioxide	0.01	0.03
Nitrogen	0.13	0.22
Methane	97.0584	93.2738
Ethane	1.9299	3.4762
Propane	0.4184	1.1052
Isobutane	0.0897	0.3123
n-Butane	0.0972	0.3384
Isopentane	0.0431	0.1863
n-Pentane	0.0393	0.1698
Cyclopentane	0.0019	0.0080
n-Hexane	0.0195	0.1006
Cyclohexane	0.0098	0.0494
Other Hexanes	0.0343	0.1762
Heptanes	0.0313	0.1872
Methylcyclohexane	0.0157	0.0924
2,2,4 Trimethylpentane	0.0000	0.0000
Benzene	0.0056	0.0262
Toluene	0.0029	0.0160
Ethylbenzene	0.0003	0.0019
Xylenes	0.0009	0.0057
C8+ Heavies	0.0316	0.2240
Subtotal	99.99980	99.99960
Oxygen/Argon	0.00	0.00
Alcohols	0.0002	0.0004
Total	100.00000	100.00000

Calculated Values BTU @ **14.65**		**Total Sample**	**C6+ Fraction**	**C8+ Fraction**	**C10+ Fraction**	
LHV	Net Dry Real:	938.3	4878.6	5905.5	7116.8	**Btu/scf**
	Net Wet Real:	921.9	4793.3	5802.3	6992.4	**Btu/scf**
HHV	Gross Dry Real:	1040.7	5247.2	6357.2	7664.5	**Btu/scf**
	Gross Wet Real:	1022.5	5155.5	6246.1	7530.5	**Btu/scf**
Other Calculated Values						
Regualr Wobbe Index*		1373.2	2861.6	3156.4	3461.6	**Btu/scf**
Net Heating Value (60 °F ideal reaction):		21363.6	19303.1	19626.5	19330.0	**Btu/lbm**
Gross Heating Value (60°F ideal reaction):		23698.9	20764.1	21127.4	20817.7	**Btu/lbm**
Molar Mass (MW):		16.69326	96.637	117.666	142.742	**g/mol**
Relative Density (AIR=1):		0.5755	3.3364	4.0626	4.9286	**SG**
Density:		0.04399	0.25466	0.31008	0.37614	**lbm/scf**
Compressiblity Factor:		0.9979	0.9930	0.9976	0.9995	**Z**
Liquid Volume real gas @:	**14.65**	17.1511	0.0538	0.009	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	---	0.02	0.00	---	---
Nitrogen	---	0.13	0.22	---	---
Carbon Dioxide	---	0.01	0.03	---	---
Methane	P1	97.0584	93.2738	---	---
Ethane	P2	1.9299	3.4762	0.515	0.517
Propane	P3	0.4184	1.1052	0.115	0.116
i-Butane	I4	0.0897	0.3123	0.029	0.029
Methanol	X1	0.0002	0.0004	0.000	0.000
n-Butane	P4	0.0968	0.3370	0.030	0.030
2,2-Dimethylpropane	I5	0.0018	0.0078	0.001	0.001
i-Pentane	I5	0.0413	0.1785	0.015	0.015
UnknownC4s	U4	0.0004	0.0014	0.000	0.000
n-Pentane	P5	0.0393	0.1698	0.014	0.014
2,2-Dimethylbutane	I6	0.0021	0.0108	0.001	0.001
Cyclopentane	N5	0.0019	0.0080	0.001	0.001
2,3-Dimethylbutane	I6	0.0030	0.0155	0.001	0.001
2-Methylpentane	I6	0.0143	0.0738	0.006	0.006
3-Methylpentane	I6	0.0082	0.0423	0.003	0.003
n-Hexane	P6	0.0195	0.1006	0.008	0.008
2,2-Dimethylpentane	I7	0.0006	0.0036	0.000	0.000
Methylcyclopentane	N6	0.0067	0.0338	0.002	0.002
2,4-Dimethylpentane	I7	0.0010	0.0060	0.000	0.000
2,2,3-Trimethylbutane	I7	0.0002	0.0012	0.000	0.000
Benzene	A6	0.0056	0.0262	0.002	0.002
3,3-Dimethylpentane	I7	0.0003	0.0018	0.000	0.000
Cyclohexane	N6	0.0098	0.0494	0.003	0.003
2-Methylhexane	I7	0.0052	0.0312	0.002	0.002
2,3-Dimethylpentane	I7	0.0015	0.0090	0.001	0.001

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1,1-Dimethylcyclopentane	N7	0.0009	0.0053	0.000	0.000
3-Methylhexane	I7	0.0051	0.0306	0.002	0.002
1c,3-Dimethylcyclopentane	N7	0.0011	0.0065	0.001	0.001
1t,3-Dimethylcyclopentane	N7	0.0010	0.0059	0.000	0.000
3-Ethylpentane	I7	0.0003	0.0018	0.000	0.000
1t,2-Dimethylcyclopentane	N7	0.0017	0.0100	0.001	0.001
n-Heptane	P7	0.0115	0.0690	0.005	0.005
1c,2-Dimethylcyclopentane	N7	0.0003	0.0017	0.000	0.000
Methylcyclohexane	N7	0.0157	0.0924	0.006	0.006
2,2-Dimethylhexane	I8	0.0006	0.0041	0.000	0.000
1,1,3-Trimethylcyclopentane	N7	0.0001	0.0007	0.000	0.000
Ethylcyclopentane	N7	0.0005	0.0029	0.000	0.000
2,5-Dimethylhexane	I8	0.0006	0.0041	0.000	0.000
2,2,3-Trimethylpentane	I8	0.0006	0.0041	0.000	0.000
2,4-Dimethylhexane	I8	0.0001	0.0007	0.000	0.000
1c,2t,4-Trimethylcyclopentane	N8	0.0004	0.0027	0.000	0.000
3,3-Dimethylhexane	I8	0.0002	0.0014	0.000	0.000
Toluene	A7	0.0029	0.0160	0.001	0.001
2,3-Dimethylhexane	I8	0.0006	0.0041	0.000	0.000
2-Methyl-3-ethylpentane	I8	0.0001	0.0007	0.000	0.000
2-Methylheptane	I8	0.0032	0.0219	0.002	0.002
4-Methylheptane	I8	0.0009	0.0062	0.000	0.000
3-Methyl-3-ethylpentane	I8	0.0001	0.0007	0.000	0.000
3,4-Dimethylhexane	I8	0.0001	0.0007	0.000	0.000
3-Methylheptane	I8	0.0021	0.0144	0.001	0.001
1c,2t,3-Trimethylcyclopentane	N8	0.0023	0.0155	0.001	0.001
3-Ethylhexane	I8	0.0002	0.0014	0.000	0.000
1t,4-Dimethylcyclohexane	N8	0.0010	0.0067	0.001	0.001
1,1-Dimethylcyclohexane	N8	0.0003	0.0020	0.000	0.000
3c-Ethylmethylcyclopentane	N8	0.0001	0.0007	0.000	0.000
3t-Ethylmethylcyclopentane	N8	0.0001	0.0007	0.000	0.000
1,1-Methylethylcyclopentane	N8	0.0001	0.0007	0.000	0.000
1t,2-Dimethylcyclohexane	N8	0.0009	0.0060	0.000	0.000
1t,3-Dimethylcyclohexane	N8	0.0001	0.0007	0.000	0.000
n-Octane	P8	0.0060	0.0410	0.003	0.003
1c,4-Dimethylcyclohexane	N8	0.0005	0.0033	0.000	0.000
2,3,5-Trimethylhexane	I9	0.0001	0.0008	0.000	0.000
2,2-Dimethylheptane	I9	0.0003	0.0023	0.000	0.000
1,1,4-Trimethylcyclohexane	N9	0.0007	0.0053	0.000	0.000
2,2,3-Trimethylhexane	I9	0.0002	0.0016	0.000	0.000
2,4-Dimethylheptane	I9	0.0001	0.0008	0.000	0.000
Ethylcyclohexane	N8	0.0010	0.0067	0.000	0.000
n-Propylcyclopentane	N8	0.0004	0.0027	0.000	0.000
1c,3c,5-Trimethylcyclohexane	N9	0.0001	0.0008	0.000	0.000
2,5-Dimethylheptane	I9	0.0006	0.0046	0.000	0.000
3,3-Dimethylheptane	I9	0.0001	0.0008	0.000	0.000
2,6-Dimethylheptane	I9	0.0001	0.0008	0.000	0.000
1,1,3-Trimethylcyclohexane	N9	0.0001	0.0008	0.000	0.000
Ethylbenzene	I8	0.0003	0.0019	0.000	0.000
1,3-Dimethylbenzene (m-Xylene)	A8	0.0007	0.0044	0.000	0.000
1,4-Dimethylbenzene (p-Xylene)	A8	0.0002	0.0013	0.000	0.000
3,4-Dimethylheptane	I9	0.0001	0.0008	0.000	0.000
4-Ethylheptane	I9	0.0001	0.0008	0.000	0.000
4-Methyloctane	I9	0.0004	0.0031	0.000	0.000
2-Methyloctane	I9	0.0006	0.0046	0.000	0.000
3-Ethylheptane	I9	0.0001	0.0008	0.000	0.000
3-Methyloctane	I9	0.0001	0.0008	0.000	0.000
1c,2t,4c-Trimethylcyclohexane	I9	0.0006	0.0045	0.000	0.000
i-Butylcyclopentane	N9	0.0002	0.0015	0.000	0.000
n-Nonane	P9	0.0020	0.0154	0.001	0.001
1,1-Methylethylcyclohexane	N9	0.0001	0.0008	0.000	0.000

2,4-Dimethyloctane	I10	0.0001	0.0008	0.000	0.000
n-Butylcyclopentane	N9	0.0002	0.0015	0.000	0.000
n-Propylbenzene	A9	0.0003	0.0022	0.000	0.000
3-Methyl-5-ethylheptane	I10	0.0001	0.0008	0.000	0.000
1,3,5-Trimethylbenzene	A9	0.0001	0.0007	0.000	0.000
5-Methylnonane	I10	0.0001	0.0008	0.000	0.000
1,2-Methylethylbenzene	A9	0.0001	0.0007	0.000	0.000
3-Methylnonane	I10	0.0001	0.0008	0.000	0.000
UnknownC9s	U9	0.0003	0.0023	0.000	0.000
n-Decane	P10	0.0003	0.0026	0.000	0.000
1,3-Diethylbenzene	A10	0.0001	0.0008	0.000	0.000
UnknownC10s	U10	0.0004	0.0034	0.000	0.000
n-Undecane	P11	0.0001	0.0010	0.000	0.000
TOTAL		100.00000	100.00000	0.7734	0.7772

BTEX COMPONENTS	MOLE%	WT%
BENZENE	0.0056	0.0262
TOLUENE	0.0029	0.0160
ETHYLBENZENE	0.0003	0.0019
XYLENES	0.0009	0.0057
TOTAL BTEX	0.0097	0.0498

**(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 :	938.3 /scf	943.4 /scf
	NET WET REAL :	921.9 /scf	927.0 /scf
HHV	GROSS DRY REAL :	1040.7 /scf	1046.4 /scf
	GROSS WET REAL :	1022.5 /scf	1028.2 /scf
	NET HEATING VALUE (60 °F ideal reaction):		21363.6 Btu/lbm
	GROSS HEATING VALUE (60°F ideal reaction):		23698.9 Btu/lbm
	RELATIVE DENSITY (AIR=1):		0.5755
	DENSITY		0.04399 lb/scf
	COMPRESSIBILITY FACTOR :		0.9979
	REGULAR WOBBE INDEX		1373.2

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

Net Dry Ideal BTU	4859.8 /scf	Relative Density - SG (Air=1)	3.3364		***C6+factors***
Gross Dry Ideal BTU	5227 /scf	**Z** Compressiblity Factor	0.99303		0.99225
Net Dry Ideal BTU	19303.1 /lb	Density Factor	254.665	lbm/1000 ft3	
Gross Dry Ideal BTU	20764.1 /lb	Molar Mass or MW	96.637	g/mol	
		Volume Liquid Ideal gas	0.054	scf/gal	22.9

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.