EMPACT

EXTENDED NATURAL GAS ANALYSIS (*DHA)

MAIN PAGE

PRIMARY DB KEY:	**05-103-11165**	NAME/DESCRIP :	**PCU 297-12A8**
LEASE #:			**SURFACE CASING**
FIELD/AREA:			

PROJECT NO. :	**202507028**	ANALYSIS NO. :	**03**
COMPANY NAME :	**QB ENERGY OPERATING, LLC**	ANALYSIS DATE:	JULY 14, 2025 14:46
OFFICE / BRANCH:	PARACHUTE, CO	SAMPLE DATE :	JULY 1, 2025
CUSTOMER REF:		TO:	
PRODUCER :	QB ENERGY OPERATING, LLC	EFFECTIVE DATE:	

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

SAMPLE CYCLE:		SAMPLE TYPE:	
SAMPLE PRES. :	228 psig	PROBE :	
FLOW PRES. :	psig	CYLINDER NO. :	ECA-761
LAB PRES:	psig	SAMPLED BY :	NICK CROY
SAMPLE TEMP. :	ºf	SAMPLING COMPANY:	QB ENERGY OPERATING, LLC
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	0.0001	0.0004	0.0000	0.0000
HELIUM	0.01	0.00	---	---
HYDROGEN	0.00	0.00	---	---
OXYGEN/ARGON	0.00	0.00	---	---
NITROGEN	0.33	0.52	---	---
CARBON DIOXIDE	0.61	1.52	---	---
METHANE	93.2325	84.4081	---	---
ETHANE	3.4775	5.9011	0.9273	0.9324
PROPANE	1.1618	2.8911	0.3188	0.3205
I-BUTANE	0.2281	0.7482	0.0739	0.0743
N-BUTANE	0.3457	1.1339	0.1089	0.1095
I-PENTANE	0.1385	0.5632	0.0500	0.0502
N-PENTANE	0.1157	0.4711	0.0420	0.0422
HEXANES PLUS	0.3501	1.8429	0.1420	0.1424
TOTALS	100.00000	100.00000	1.6629	1.6715

BTEX COMPONENTS	MOLE%	WT%
BENZENE	0.0183	0.0806
TOLUENE	0.0139	0.0723
ETHYLBENZENE	0.0004	0.0024
XYLENES	0.0005	0.0030
TOTAL BTEX	0.0331	0.1583

**(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 :	973.2 **/scf**	978.5 **/scf**
	NET WET REAL :	956.2 **/scf**	961.5 **/scf**
HHV	GROSS DRY REAL :	1077.6 **/scf**	1083.5 **/scf**
	GROSS WET REAL :	1058.8 **/scf**	1064.7 **/scf**

NET HEATING VALUE (60 °F ideal reaction):	20864.3 **Btu/lbm**
GROSS HEATING VALUE (60°F ideal reaction):	23110.3 **Btu/lbm**
RELATIVE DENSITY (AIR=1):	0.6111
DENSITY	0.04669 **lbm/scf**
COMPRESSIBILITY FACTOR :	0.9976
REGULAR WOBBE INDEX	1379.5

EMPACT

EXTENDED NATURAL GAS ANALYSIS (*DHA)

GLYCALC INFORMATION

PROJECT NO. :	202507028	ANALYSIS NO. :	03
COMPANY NAME :	QB ENERGY OPERATING, LLC	ANALYSIS DATE:	JULY 14, 2025 14:46
ACCOUNT NO. :		SAMPLE DATE :	JULY 1, 2025
PRODUCER :	QB ENERGY OPERATING, LLC	CYLINDER NO. :	ECA-761
LEASE NO. :		SAMPLED BY :	NICK CROY
NAME/DESCRIP :	PCU 297-12A8 SURFACE CASING		
FIELD DATA		SAMPLE TEMP. :	
SAMPLE PRES. :	228	AMBIENT TEMP.:	
H2S BY STAIN TUBE:	_ *ppm mol*		
COMMENTS :			

Componet	Mole %	Wt %
Helium	0.01	0.00
Hydrogen	0.00	0.00
Carbon Dioxide	0.61	1.52
Nitrogen	0.33	0.52
Methane	93.2325	84.4081
Ethane	3.4775	5.9011
Propane	1.1618	2.8911
Isobutane	0.2281	0.7482
n-Butane	0.3457	1.1339
Isopentane	0.1324	0.5391
n-Pentane	0.1157	0.4711
Cyclopentane	0.0061	0.0241
n-Hexane	0.0518	0.2519
Cyclohexane	0.0212	0.1007
Other Hexanes	0.0886	0.4288
Heptanes	0.0765	0.4308
Methylcyclohexane	0.0384	0.2128
2,2,4 Trimethylpentane	0.0000	0.0000
Benzene	0.0183	0.0806
Toluene	0.0139	0.0723
Ethylbenzene	0.0004	0.0024
Xylenes	0.0005	0.0030
C8+ Heavies	0.0405	0.2596
Subtotal	99.99990	99.99960
Oxygen/Argon	0.00	0.00
Alcohols	0.0001	0.0004
Total	100.00000	100.00000

Calculated Values BTU @ **14.65**		**Total Sample**	**C6+ Fraction**	**C8+ Fraction**	**C10+ Fraction**	
LHV	Net Dry Real:	973.2	4709.4	5726.9	#DIV/0!	**Btu/scf**
	Net Wet Real:	956.2	4627.1	5626.8	#DIV/0!	**Btu/scf**
HHV	Gross Dry Real:	1077.6	5061.8	6171.2	#DIV/0!	**Btu/scf**
	Gross Wet Real:	1058.8	4973.3	6063.3	#DIV/0!	**Btu/scf**
Other Calculated Values						
Regualr Wobbe Index*		1379.5	2806.4	3112.5	#DIV/0!	**Btu/scf**
Net Heating Value (60 °F ideal reaction):		20864.3	19266.5	19942.3	#DIV/0!	**Btu/lbm**
Gross Heating Value (60°F ideal reaction):		23110.3	20711.4	21487.6	#DIV/0!	**Btu/lbm**
Molar Mass (MW):		17.7197	93.34	113.83	#DIV/0!	**g/mol**
Relative Density (AIR=1):		0.6111	3.2227	3.9304	#DIV/0!	**SG**
Density:		0.04669	0.24597	0.29995	#DIV/0!	**lbm/scf**
Compressiblity Factor:		0.9976	0.9922	0.9968	#DIV/0!	**Z**
Liquid Volume real gas @:	**14.65**	17.515	0.1416	0.0189	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.

EMPACT Analytical Systems Inc. 365 S Main St Brighton, CO 80601 303-637-0150

EXTENDED NATURAL GAS ANALYSIS (*DHA)

DHA COMPONENT LIST

PRIMARY DB KEY: **05-103-11165** NAME/DESCRIP : **PCU 297-12A8**
LEASE #: **SURFACE CASING**
FIELD/AREA:

PROJECT NO. : **202507028** ANALYSIS NO. : **03**
COMPANY NAME : **QB ENERGY OPERATING, LLC** ANALYSIS DATE: JULY 14, 2025 14:46
OFFICE / BRANCH: PARACHUTE, CO SAMPLE DATE : JULY 1, 2025
CUSTOMER REF: TO:
PRODUCER : QB ENERGY OPERATING, LLC EFFECTIVE DATE:
FIELD DATA
SAMPLE CYCLE: SAMPLE TYPE:
SAMPLE PRES. : 228 psig PROBE :
FLOW PRES. : psig CYLINDER NO. : ECA-761
LAB PRES: psig SAMPLED BY : NICK CROY
SAMPLE TEMP. : ºf SAMPLING COMPANY: QB ENERGY OPERATING, LLC
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	---	---
Nitrogen	---	0.33	0.52	---	---
Carbon Dioxide	---	0.61	1.52	---	---
Methane	P1	93.2325	84.4081	---	---
Ethane	P2	3.4775	5.9011	0.927	0.932
Propane	P3	1.1618	2.8911	0.319	0.321
i-Butane	I4	0.2281	0.7482	0.074	0.074
n-Butane	P4	0.3457	1.1339	0.109	0.110
2,2-Dimethylpropane	I5	0.0038	0.0155	0.001	0.001
i-Pentane	I5	0.1286	0.5236	0.047	0.047
n-Pentane	P5	0.1156	0.4707	0.042	0.042
t-Butanol	X4	0.0001	0.0004	0.000	0.000
2,2-Dimethylbutane	I6	0.0047	0.0229	0.002	0.002
Cyclopentane	N5	0.0061	0.0241	0.002	0.002
2,3-Dimethylbutane	I6	0.0070	0.0340	0.003	0.003
2-Methylpentane	I6	0.0386	0.1877	0.016	0.016
3-Methylpentane	I6	0.0209	0.1016	0.009	0.009
UnknownC5s	U5	0.0001	0.0004	0.000	0.000
n-Hexane	P6	0.0518	0.2519	0.021	0.021
2,2-Dimethylpentane	I7	0.0015	0.0085	0.001	0.001
Methylcyclopentane	N6	0.0174	0.0826	0.006	0.006
2,4-Dimethylpentane	I7	0.0023	0.0130	0.001	0.001
2,2,3-Trimethylbutane	I7	0.0005	0.0028	0.000	0.000
Benzene	A6	0.0183	0.0806	0.005	0.005
3,3-Dimethylpentane	I7	0.0009	0.0051	0.000	0.000
Cyclohexane	N6	0.0212	0.1007	0.007	0.007
2-Methylhexane	I7	0.0120	0.0678	0.006	0.006
2,3-Dimethylpentane	I7	0.0035	0.0198	0.002	0.002

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1,1-Dimethylcyclopentane	N7	0.0022	0.0122	0.001	0.001
3-Methylhexane	I7	0.0114	0.0644	0.005	0.005
1c,3-Dimethylcyclopentane	N7	0.0030	0.0166	0.001	0.001
1t,3-Dimethylcyclopentane	N7	0.0028	0.0155	0.001	0.001
3-Ethylpentane	I7	0.0007	0.0039	0.000	0.000
1t,2-Dimethylcyclopentane	N7	0.0050	0.0277	0.002	0.002
n-Heptane	P7	0.0284	0.1606	0.013	0.013
1c,2-Dimethylcyclopentane	N7	0.0006	0.0033	0.000	0.000
Methylcyclohexane	N7	0.0384	0.2128	0.015	0.015
2,2-Dimethylhexane	I8	0.0015	0.0096	0.001	0.001
1,1,3-Trimethylcyclopentane	N7	0.0003	0.0019	0.000	0.000
Ethylcyclopentane	N7	0.0014	0.0077	0.001	0.001
2,5-Dimethylhexane	I8	0.0013	0.0084	0.001	0.001
2,2,3-Trimethylpentane	I8	0.0012	0.0077	0.001	0.001
2,4-Dimethylhexane	I8	0.0001	0.0006	0.000	0.000
1c,2t,4-Trimethylcyclopentane	N8	0.0011	0.0069	0.001	0.001
3,3-Dimethylhexane	I8	0.0005	0.0032	0.000	0.000
2,3,4-Trimethylpentane	I8	0.0001	0.0006	0.000	0.000
2,3,3-Trimethylpentane	I8	0.0001	0.0006	0.000	0.000
Toluene	A7	0.0139	0.0723	0.005	0.005
2,3-Dimethylhexane	I8	0.0012	0.0077	0.001	0.001
2-Methyl-3-ethylpentane	I8	0.0002	0.0013	0.000	0.000
2-Methylheptane	I8	0.0063	0.0406	0.003	0.003
4-Methylheptane	I8	0.0017	0.0109	0.001	0.001
3-Methyl-3-ethylpentane	I8	0.0002	0.0013	0.000	0.000
3,4-Dimethylhexane	I8	0.0002	0.0013	0.000	0.000
1c,2c,4-Trimethylcyclopentane	N8	0.0001	0.0006	0.000	0.000
1c,3-Dimethylcyclohexane	N8	0.0001	0.0006	0.000	0.000
3-Methylheptane	I8	0.0038	0.0245	0.002	0.002
1c,2t,3-Trimethylcyclopentane	N8	0.0055	0.0348	0.003	0.003
3-Ethylhexane	I8	0.0002	0.0013	0.000	0.000
1t,4-Dimethylcyclohexane	N8	0.0023	0.0146	0.001	0.001
1,1-Dimethylcyclohexane	N8	0.0010	0.0063	0.000	0.000
2,2,5-Trimethylhexane	I9	0.0001	0.0007	0.000	0.000
3c-Ethylmethylcyclopentane	N8	0.0003	0.0019	0.000	0.000
3t-Ethylmethylcyclopentane	N8	0.0002	0.0012	0.000	0.000
2t-Ethylmethylcyclopentane	N8	0.0004	0.0025	0.000	0.000
1,1-Methylethylcyclopentane	N8	0.0001	0.0006	0.000	0.000
2,2,4-Trimethylhexane	I9	0.0001	0.0007	0.000	0.000
1t,2-Dimethylcyclohexane	N8	0.0019	0.0120	0.001	0.001
1t,3-Dimethylcyclohexane	N8	0.0001	0.0006	0.000	0.000
n-Octane	P8	0.0061	0.0393	0.003	0.003
1c,4-Dimethylcyclohexane	N8	0.0008	0.0051	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
1c,2-Dimethylcyclohexane	N8	0.0001	0.0006	0.000	0.000
1,1,4-Trimethylcyclohexane	N9	0.0006	0.0043	0.000	0.000
2,2,3-Trimethylhexane	I9	0.0001	0.0007	0.000	0.000
2,4-Dimethylheptane	I9	0.0001	0.0007	0.000	0.000
Ethylcyclohexane	N8	0.0001	0.0006	0.000	0.000
n-Propylcyclopentane	N8	0.0001	0.0006	0.000	0.000
2,5-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	0.0004	0.0024	0.000	0.000
1,3-Dimethylbenzene (m-Xylene)	A8	0.0004	0.0024	0.000	0.000
1,4-Dimethylbenzene (p-Xylene)	A8	0.0001	0.0006	0.000	0.000
n-Butylcyclopentane	N9	0.0001	0.0007	0.000	0.000
UnknownC9s	U9	0.0001	0.0007	0.000	0.000
TOTAL		100.00000	100.00000	1.6629	1.6715

BTEX COMPONENTS	MOLE%	WT%
BENZENE	0.0183	0.0806
TOLUENE	0.0139	0.0723
ETHYLBENZENE	0.0004	0.0024
XYLENES	0.0005	0.0030
TOTAL BTEX	0.0331	0.1583

*(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 :	973.2 /scf	978.5 /scf
	NET WET REAL :	956.2 /scf	961.5 /scf
HHV	GROSS DRY REAL :	1077.6 /scf	1083.5 /scf
	GROSS WET REAL :	1058.8 /scf	1064.7 /scf

NET HEATING VALUE (60 °F ideal reaction):	20864.3 Btu/lbm
GROSS HEATING VALUE (60°F ideal reaction):	23110.3 Btu/lbm
RELATIVE DENSITY (AIR=1):	0.6111
DENSITY	0.04669 lb/scf
COMPRESSIBILITY FACTOR :	0.9976
REGULAR WOBBE INDEX	1379.5

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

Net Dry Ideal BTU	4687.2 /scf	Relative Density - SG (Air=1)	3.2227	*C6+factors*
Gross Dry Ideal BTU	5038 /scf	Z Compressiblity Factor	0.99218	0.99163
Net Dry Ideal BTU	19266.5 /lb	Density Factor	245.971 lbm/1000 ft3	
Gross Dry Ideal BTU	20711.4 /lb	Molar Mass or MW	93.34 g/mol	
		Volume Liquid Ideal gas	0.142 scf/gal	24.3

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.