EXTENDED NATURAL GAS ANALYSIS (*DHA)

MAIN PAGE

PRIMARY DB KEY: **05-045-18091** NAME/DESCRIP : **110180056 596-29A 18**
LEASE #: **BRAIDEN HEAD**
FIELD/AREA:

PROJECT NO. : **202502080** ANALYSIS NO. : **01**
COMPANY NAME : **QB ENERGY OPERATING, LLC** ANALYSIS DATE: FEBRUARY 27, 2025 09:34
OFFICE / BRANCH: PARACHUTE, CO SAMPLE DATE : FEBRUARY 18, 2025
CUSTOMER REF: TO:
PRODUCER : QB ENERGY OPERATING, LLC EFFECTIVE DATE:

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

SAMPLE CYCLE: SAMPLE TYPE: SPOT
SAMPLE PRES. : 208 psig PROBE : NO
FLOW PRES. : psig CYLINDER NO. : ECA-796
LAB PRES: psig SAMPLED BY : MIKE KELLEY
SAMPLE TEMP. : 33 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	0.0001	0.0002	0.0000	0.0000
HELIUM	0.00	0.00	---	---
HYDROGEN	0.38	0.04	---	---
OXYGEN/ARGON	0.00	0.00	---	---
NITROGEN	0.07	0.11	---	---
CARBON DIOXIDE	2.87	6.88	---	---
METHANE	89.6444	78.2690	---	---
ETHANE	4.9068	8.0301	1.3081	1.3152
PROPANE	1.1106	2.6653	0.3048	0.3065
I-BUTANE	0.2867	0.9069	0.0939	0.0944
N-BUTANE	0.2082	0.6586	0.0650	0.0653
I-PENTANE	0.1313	0.5151	0.0480	0.0482
N-PENTANE	0.0678	0.2662	0.0250	0.0251
HEXANES PLUS	0.3241	1.6586	0.1290	0.1293
TOTALS	100.00000	100.00000	1.9738	1.9840

BTEX COMPONENTS	MOLE%	WT%
BENZENE	0.0128	0.0544
TOLUENE	0.0092	0.0461
ETHYLBENZENE	0.0002	0.0011
XYLENES	0.0007	0.0041
TOTAL BTEX	0.0229	0.1057

**(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 :	958.0 /scf	963.3 /scf
	NET WET REAL :	941.3 /scf	946.6 /scf
HHV	GROSS DRY REAL :	1060.8 /scf	1066.5 /scf
	GROSS WET REAL :	1042.3 /scf	1048.0 /scf

NET HEATING VALUE (60 °F ideal reaction):	19807.7 Btu/lbm
GROSS HEATING VALUE (60°F ideal reaction):	21935.7 Btu/lbm
RELATIVE DENSITY (AIR=1):	0.6338
DENSITY	0.04841 lbm/scf
COMPRESSIBILITY FACTOR :	0.9976
REGULAR WOBBE INDEX	1333.3

EMPACT

EXTENDED NATURAL GAS ANALYSIS (*DHA)

GLYCALC INFORMATION

PROJECT NO. :	202502080	ANALYSIS NO. :	01
COMPANY NAME :	QB ENERGY OPERATING, LLC	ANALYSIS DATE:	FEBRUARY 27, 2025 09:34
ACCOUNT NO. :		SAMPLE DATE :	FEBRUARY 18, 2025
PRODUCER :	QB ENERGY OPERATING, LLC	CYLINDER NO. :	ECA-796
LEASE NO. :		SAMPLED BY :	MIKE KELLEY
NAME/DESCRIP :	110180056 596-29A 18 BRAIDEN HEAD		
FIELD DATA		SAMPLE TEMP. :	33
SAMPLE PRES. :	208	AMBIENT TEMP.:	
H2S BY STAIN TUBE:	_ *ppm mol*		
COMMENTS :	*SPOT* *NO PROBE*		

Componet	Mole %	Wt %
Helium	0.00	0.00
Hydrogen	0.38	0.04
Carbon Dioxide	2.87	6.88
Nitrogen	0.07	0.11
Methane	89.6444	78.2690
Ethane	4.9068	8.0301
Propane	1.1106	2.6653
Isobutane	0.2867	0.9069
n-Butane	0.2082	0.6586
Isopentane	0.1271	0.4990
n-Pentane	0.0678	0.2662
Cyclopentane	0.0042	0.0161
n-Hexane	0.0374	0.1754
Cyclohexane	0.0191	0.0875
Other Hexanes	0.0909	0.4241
Heptanes	0.0756	0.4108
Methylcyclohexane	0.0384	0.2052
2,2,4 Trimethylpentane	0.0002	0.0012
Benzene	0.0128	0.0544
Toluene	0.0092	0.0461
Ethylbenzene	0.0002	0.0011
Xylenes	0.0007	0.0041
C8+ Heavies	0.0396	0.2487
Subtotal	99.99990	99.99980
Oxygen/Argon	0.00	0.00
Alcohols	0.0001	0.0002
Total	100.00000	100.00000

Calculated Values BTU @ **14.65**		**Total Sample**	**C6+ Fraction**	**C8+ Fraction**	**C10+ Fraction**	
LHV	Net Dry Real:	958.0	4751.2	5794.7	8000.5	**Btu/scf**
	Net Wet Real:	941.3	4668.1	5693.4	7860.6	**Btu/scf**
HHV	Gross Dry Real:	1060.8	5109.8	6242.8	8577.5	**Btu/scf**
	Gross Wet Real:	1042.3	5020.5	6133.7	8427.6	**Btu/scf**
Other Calculated Values						
Regualr Wobbe Index*		1333.3	2822.1	3129.5	3645.4	**Btu/scf**
Net Heating Value (60 °F ideal reaction):		19807.7	19295.7	19817.5	18887.5	**Btu/lbm**
Gross Heating Value (60°F ideal reaction):		21935.7	20753.0	21348.2	20252.3	**Btu/lbm**
Molar Mass (MW):		18.37288	94.054	115.286	161.309	**g/mol**
Relative Density (AIR=1):		0.6338	3.2476	3.9807	5.5696	**SG**
Density:		0.04841	0.24784	0.30380	0.42507	**lbm/scf**
Compressiblity Factor:		0.9976	0.9922	0.9970	0.9999	**Z**
Liquid Volume real gas @:	**14.65**	17.6087	0.1286	0.0159	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:	**05-045-18091**	NAME/DESCRIP :	**110180056 596-29A 18**
LEASE #:			**BRAIDEN HEAD**
FIELD/AREA:			
PROJECT NO. :	**202502080**	ANALYSIS NO. :	**01**
COMPANY NAME :	**QB ENERGY OPERATING, LLC**	ANALYSIS DATE:	FEBRUARY 27, 2025 09:34
OFFICE / BRANCH:	PARACHUTE, CO	SAMPLE DATE :	FEBRUARY 18, 2025
CUSTOMER REF:		TO:	
PRODUCER :	QB ENERGY OPERATING, LLC	EFFECTIVE DATE:	
FIELD DATA			
SAMPLE CYCLE:		SAMPLE TYPE:	SPOT
SAMPLE PRES. :	208 psig	PROBE :	NO
FLOW PRES. :	psig	CYLINDER NO. :	ECA-796
LAB PRES:	psig	SAMPLED BY :	MIKE KELLEY
SAMPLE TEMP. :	33 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	PIANO #	MOLE %	MASS %	GPM @ **14.65**	GPM @ **14.73**
Hydrogen	---	0.38	0.04	---	---
Nitrogen	---	0.07	0.11	---	---
Carbon Dioxide	---	2.87	6.88	---	---
Methane	P1	89.6444	78.2690	---	---
Ethane	P2	4.9068	8.0301	1.308	1.315
Propane	P3	1.1106	2.6653	0.305	0.307
i-Butane	I4	0.2867	0.9069	0.094	0.094
Methanol	X1	0.0001	0.0002	0.000	0.000
n-Butane	P4	0.2082	0.6586	0.065	0.065
2,2-Dimethylpropane	I5	0.0044	0.0172	0.002	0.002
i-Pentane	I5	0.1227	0.4818	0.045	0.045
n-Pentane	P5	0.0678	0.2662	0.025	0.025
2,2-Dimethylbutane	I6	0.0060	0.0281	0.002	0.002
Cyclopentane	N5	0.0042	0.0161	0.001	0.001
2,3-Dimethylbutane	I6	0.0093	0.0436	0.004	0.004
2-Methylpentane	I6	0.0354	0.1660	0.015	0.015
3-Methylpentane	I6	0.0203	0.0952	0.008	0.008
n-Hexane	P6	0.0374	0.1754	0.015	0.015
2,2-Dimethylpentane	I7	0.0012	0.0065	0.001	0.001
Methylcyclopentane	N6	0.0199	0.0912	0.007	0.007
2,4-Dimethylpentane	I7	0.0031	0.0169	0.001	0.001
2,2,3-Trimethylbutane	I7	0.0009	0.0049	0.000	0.000
Benzene	A6	0.0128	0.0544	0.004	0.004
3,3-Dimethylpentane	I7	0.0011	0.0060	0.000	0.000
Cyclohexane	N6	0.0191	0.0875	0.006	0.006
2-Methylhexane	I7	0.0142	0.0774	0.007	0.007

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

2,3-Dimethylpentane	I7	0.0034	0.0186	0.002	0.002
1,1-Dimethylcyclopentane	N7	0.0025	0.0133	0.001	0.001
3-Methylhexane	I7	0.0129	0.0704	0.006	0.006
1c,3-Dimethylcyclopentane	N7	0.0034	0.0182	0.002	0.002
1t,3-Dimethylcyclopentane	N7	0.0030	0.0161	0.001	0.001
3-Ethylpentane	I7	0.0005	0.0027	0.000	0.000
1t,2-Dimethylcyclopentane	N7	0.0050	0.0267	0.002	0.002
2,2,4-Trimethylpentane	I8	0.0002	0.0012	0.000	0.000
n-Heptane	P7	0.0225	0.1227	0.010	0.010
1c,2-Dimethylcyclopentane	N7	0.0003	0.0016	0.000	0.000
Methylcyclohexane	N7	0.0384	0.2052	0.015	0.015
2,2-Dimethylhexane	I8	0.0011	0.0069	0.001	0.001
1,1,3-Trimethylcyclopentane	N7	0.0003	0.0018	0.000	0.000
Ethylcyclopentane	N7	0.0013	0.0070	0.001	0.001
2,5-Dimethylhexane	I8	0.0015	0.0093	0.001	0.001
2,2,3-Trimethylpentane	I8	0.0013	0.0081	0.001	0.001
2,4-Dimethylhexane	I8	0.0002	0.0012	0.000	0.000
1c,2t,4-Trimethylcyclopentane	N8	0.0007	0.0043	0.000	0.000
3,3-Dimethylhexane	I8	0.0004	0.0025	0.000	0.000
2,3,3-Trimethylpentane	I8	0.0001	0.0006	0.000	0.000
Toluene	A7	0.0092	0.0461	0.003	0.003
2,3-Dimethylhexane	I8	0.0009	0.0056	0.000	0.000
2-Methyl-3-ethylpentane	I8	0.0002	0.0012	0.000	0.000
2-Methylheptane	I8	0.0049	0.0305	0.003	0.003
4-Methylheptane	I8	0.0016	0.0100	0.001	0.001
3-Methyl-3-ethylpentane	I8	0.0002	0.0012	0.000	0.000
3,4-Dimethylhexane	I8	0.0002	0.0012	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	0.0236	0.002	0.002
1c,2t,3-Trimethylcyclopentane	N8	0.0045	0.0275	0.002	0.002
3-Ethylhexane	I8	0.0003	0.0018	0.000	0.000
1t,4-Dimethylcyclohexane	N8	0.0018	0.0110	0.001	0.001
1,1-Dimethylcyclohexane	N8	0.0007	0.0043	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	0.0003	0.0018	0.000	0.000
1,1-Methylethylcyclopentane	N8	0.0001	0.0006	0.000	0.000
1t,2-Dimethylcyclohexane	N8	0.0012	0.0073	0.001	0.001
1t,3-Dimethylcyclohexane	N8	0.0001	0.0006	0.000	0.000
n-Octane	P8	0.0063	0.0392	0.003	0.003
1c,4-Dimethylcyclohexane	N8	0.0009	0.0055	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
2,3,4-Trimethylhexane	I9	0.0001	0.0007	0.000	0.000
1c,2-Dimethylcyclohexane	N8	0.0001	0.0006	0.000	0.000
2,2-Dimethylheptane	I9	0.0002	0.0014	0.000	0.000
1,1,4-Trimethylcyclohexane	N9	0.0005	0.0034	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	0.0004	0.0024	0.000	0.000
n-Propylcyclopentane	N8	0.0005	0.0030	0.000	0.000
1c,3c,5-Trimethylcyclohexane	N9	0.0002	0.0014	0.000	0.000
2,5-Dimethylheptane	I9	0.0005	0.0035	0.000	0.000
3,3-Dimethylheptane	I9	0.0002	0.0014	0.000	0.000
3,5-Dimethylheptane	I9	0.0001	0.0007	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	0.0002	0.0011	0.000	0.000
1,3-Dimethylbenzene (m-Xylene)	A8	0.0005	0.0029	0.000	0.000
1,4-Dimethylbenzene (p-Xylene)	A8	0.0001	0.0006	0.000	0.000
4-Ethylheptane	I9	0.0001	0.0007	0.000	0.000
4-Methyloctane	I9	0.0002	0.0014	0.000	0.000
2-Methyloctane	I9	0.0003	0.0021	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	0.0003	0.0021	0.000	0.000
1,2-Dimethylbenzene (o-Xylene)	A8	0.0001	0.0006	0.000	0.000
i-Butylcyclopentane	N9	0.0001	0.0007	0.000	0.000
n-Nonane	P9	0.0003	0.0021	0.000	0.000
1,3,5-Trimethylbenzene	A9	0.0001	0.0006	0.000	0.000
t-Butylbenzene	A10	0.0001	0.0007	0.000	0.000
UnknownC9s	U9	0.0002	0.0014	0.000	0.000
UnknownC11s	U11	0.0001	0.0009	0.000	0.000
n-Dodecane	P12	0.0001	0.0009	0.000	0.000
n-Tridecane	P13	0.0001	0.0010	0.000	0.000
TOTAL		100.00000	100.00000	1.9738	1.9840

BTEX COMPONENTS	MOLE%	WT%
BENZENE	0.0128	0.0544
TOLUENE	0.0092	0.0461
ETHYLBENZENE	0.0002	0.0011
XYLENES	0.0007	0.0041
TOTAL BTEX	0.0229	0.1057

**(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 :	958.0 /scf	963.3 /scf
	NET WET REAL :	941.3 /scf	946.6 /scf
HHV	GROSS DRY REAL :	1060.8 /scf	1066.5 /scf
	GROSS WET REAL :	1042.3 /scf	1048.0 /scf
	NET HEATING VALUE (60 °F ideal reaction):		19807.7 Btu/lbm
	GROSS HEATING VALUE (60°F ideal reaction):		21935.7 Btu/lbm
	RELATIVE DENSITY (AIR=1):		0.6338
	DENSITY		0.04841 lb/scf
	COMPRESSIBILITY FACTOR :		0.9976
	REGULAR WOBBE INDEX		1333.3

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

Net Dry Ideal BTU	4728.9 /scf	Relative Density - SG (Air=1)	3.2476		***C6+factors***
Gross Dry Ideal BTU	5085.8 /scf	**Z** Compressiblity Factor	0.99219		0.99162
Net Dry Ideal BTU	19295.7 /lb	Density Factor	247.845	lbm/1000 ft3	
Gross Dry Ideal BTU	20753 /lb	Molar Mass or MW	94.054	g/mol	
		Volume Liquid Ideal gas	0.129	scf/gal	23.6

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.