



EXTENDED NATURAL GAS ANALYSIS (*DHA)

MAIN PAGE

PRIMARY DB KEY: 05-045-10894	NAME/DESCRIP : 110165200 NP O23 WF16B 596
LEASE #:	BRADEN HEAD
FIELD/AREA:	
PROJECT NO. : 202503052	ANALYSIS NO. : 01
COMPANY NAME : QB ENERGY OPERATING, LLC	ANALYSIS DATE: MARCH 14, 2025 13:10
OFFICE / BRANCH: PARACHUTE, CO	SAMPLE DATE : FEBRUARY 28, 2025 12:00
CUSTOMER REF:	TO:
PRODUCER : QB ENERGY OPERATING, LLC	EFFECTIVE DATE:

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

SAMPLE CYCLE:	SAMPLE TYPE:	SPOT
SAMPLE PRES. : 275 psig	PROBE :	NO
FLOW PRES. : psig	CYLINDER NO. :	TBI-566
LAB PRES: psig	SAMPLED BY :	ELDON KING
SAMPLE TEMP. : 51 °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 @ 14.65</u>	<u>GPM @ 14.73</u>
ALCOHOLS	0.0004	0.0006	0.0000	0.0000
HELIUM	0.00	0.00	---	---
HYDROGEN	0.00	0.00	---	---
OXYGEN/ARGON	4.80	7.33	---	---
NITROGEN	17.79	23.79	---	---
CARBON DIOXIDE	3.22	6.77	---	---
METHANE	68.9397	52.7908	---	---
ETHANE	3.8516	5.5284	1.0257	1.0313
PROPANE	0.7314	1.5396	0.2007	0.2018
I-BUTANE	0.1922	0.5333	0.0629	0.0633
N-BUTANE	0.1605	0.4453	0.0499	0.0502
I-PENTANE	0.0951	0.3273	0.0340	0.0341
N-PENTANE	0.0520	0.1791	0.0190	0.0191
HEXANES PLUS	0.1671	0.7656	0.0620	0.0620
TOTALS	100.00000	100.00000	1.4542	1.4618

<u>BTEX COMPONENTS</u>	<u>MOLE%</u>	<u>WT%</u>
BENZENE	0.0089	0.0332
TOLUENE	0.0079	0.0348
ETHYLBENZENE	0.0004	0.0020
XYLENES	0.0023	0.0116
TOTAL BTEX	0.0195	0.0816

	<u>CALCULATED VALUES**</u>	
	<u>14.65</u>	<u>14.73</u>
LHV NET DRY REAL :	728.2 /scf	732.1 /scf
NET WET REAL :	715.5 /scf	719.4 /scf
HHV GROSS DRY REAL :	806.8 /scf	811.3 /scf
GROSS WET REAL :	792.7 /scf	797.2 /scf
NET HEATING VALUE (60 °F ideal reaction):		13228.5 Btu/lbm
GROSS HEATING VALUE (60°F ideal reaction):		14652.3 Btu/lbm
RELATIVE DENSITY (AIR=1):		0.7225
DENSITY		0.05520 lbm/scf
COMPRESSIBILITY FACTOR :		0.9982
REGULAR WOBBE INDEX		950.5

*(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. :	202503052	ANALYSIS NO. :	01
COMPANY NAME :	QB ENERGY OPERATING, LLC	ANALYSIS DATE:	MARCH 14, 2025 13:10
ACCOUNT NO. :		SAMPLE DATE :	FEBRUARY 28, 2025 12:00
PRODUCER :	QB ENERGY OPERATING, LLC	CYLINDER NO. :	TBI-566
LEASE NO. :		SAMPLED BY :	ELDON KING
NAME/DESCRIP :	110165200 NP O23 WF16B 596 BRADEN HEAD		

FIELD DATA		SAMPLE TEMP. :	51
SAMPLE PRES. :	275	AMBIENT TEMP.:	
H2S BY STAIN TUBE:	—		
COMMENTS :	<i>SPOT ppm mol NO PROBE Low sample volume.</i>		

<u>Componet</u>	<u>Mole %</u>	<u>Wt %</u>
Helium	0.00	0.00
Hydrogen	0.00	0.00
Carbon Dioxide	3.22	6.77
Nitrogen	17.79	23.79
Methane	68.9397	52.7908
Ethane	3.8516	5.5284
Propane	0.7314	1.5396
Isobutane	0.1922	0.5333
n-Butane	0.1605	0.4453
Isopentane	0.0938	0.3230
n-Pentane	0.0520	0.1791
Cyclopentane	0.0013	0.0043
n-Hexane	0.0188	0.0773
Cyclohexane	0.0083	0.0334
Other Hexanes	0.0545	0.2233
Heptanes	0.0284	0.1354
Methylcyclohexane	0.0140	0.0656
2,2,4 Trimethylpentane	0.0000	0.0000
Benzene	0.0089	0.0332
Toluene	0.0079	0.0348
Ethylbenzene	0.0004	0.0020
Xylenes	0.0023	0.0116
C8+ Heavies	0.0236	0.1490
<u>Subtotal</u>	<u>95.19960</u>	<u>92.66940</u>
Oxygen/Argon	4.80	7.33
Alcohols	0.0004	0.0006
<u>Total</u>	<u>100.00000</u>	<u>100.00000</u>

	<u>Total</u>	<u>C6+</u>	<u>C8+</u>	<u>C10+</u>
Calculated Values BTU @ <u>14.65</u>	Sample	Fraction	Fraction	Fraction
LHV Net Dry Real:	728.2	4822.9	6416.3	8508.9 Btu/scf
Net Wet Real:	715.5	4738.6	6304.1	8360.2 Btu/scf
HHV Gross Dry Real:	806.8	5182.9	6902.6	9191.0 Btu/scf
Gross Wet Real:	792.7	5092.3	6781.9	9030.3 Btu/scf
Other Calculated Values				
Regualr Wobbe Index*	950.5	2834.1	3265.2	3792.9 Btu/scf
Net Heating Value (60 °F ideal reaction):	13228.5	19105.8	19007.0	18285.3 Btu/lbm
Gross Heating Value (60°F ideal reaction):	14652.3	20530.3	20445.5	19741.1 Btu/lbm
Molar Mass (MW):	20.94899	95.998	129.867	171.11 g/mol
Relative Density (AIR=1):	0.7225	3.3143	4.4839	5.9078 SG
Density:	0.05520	0.25297	0.34221	0.45090 lbm/scf
Compressibility Factor:	0.9982	0.9924	0.9985	0.9999 Z
Liquid Volume real gas @: <u>14.65</u>	15.9878	0.0618	0.005	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 underscore) indicates there was no tube pulled for H2S.

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EXTENDED NATURAL GAS ANALYSIS (*DHA)

DHA COMPONENT LIST

PRIMARY DB KEY: **05-045-10894** NAME/DESCRIP : **110165200 NP O23 WF16B 596**
 LEASE #: **BRADEN HEAD**
 FIELD/AREA:
 PROJECT NO. : **202503052** ANALYSIS NO. : **01**
 COMPANY NAME : **QB ENERGY OPERATING, LLC** ANALYSIS DATE: **MARCH 14, 2025 13:10**
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 CUSTOMER REF: **TO:**
 PRODUCER : **QB ENERGY OPERATING, LLC** EFFECTIVE DATE:

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

SAMPLE CYCLE: SAMPLE TYPE: **SPOT**
 SAMPLE PRES. : **275** psig PROBE : **NO**
 FLOW PRES. : psig CYLINDER NO. : **TBI-566**
 LAB PRES: psig SAMPLED BY : **ELDON KING**
 SAMPLE TEMP. : **51** °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: **Low sample volume.**

COMPONENT	PIANO #	MOLE %	MASS %	GPM @ 14.65	GPM @ 14.73
Oxygen/Argon	---	4.80	7.33	---	---
Nitrogen	---	17.79	23.79	---	---
Carbon Dioxide	---	3.22	6.77	---	---
Methane	P1	68.9397	52.7908	---	---
Ethane	P2	3.8516	5.5284	1.026	1.031
Propane	P3	0.7314	1.5396	0.201	0.202
i-Butane	I4	0.1922	0.5333	0.063	0.063
Methanol	X1	0.0004	0.0006	0.000	0.000
n-Butane	P4	0.1605	0.4453	0.050	0.050
2,2-Dimethylpropane	I5	0.0034	0.0117	0.001	0.001
i-Pentane	I5	0.0904	0.3113	0.033	0.033
n-Pentane	P5	0.0520	0.1791	0.019	0.019
2,2-Dimethylbutane	I6	0.0045	0.0185	0.002	0.002
Cyclopentane	N5	0.0013	0.0043	0.000	0.000
2,3-Dimethylbutane	I6	0.0059	0.0243	0.002	0.002
2-Methylpentane	I6	0.0219	0.0901	0.009	0.009
3-Methylpentane	I6	0.0121	0.0498	0.005	0.005
n-Hexane	P6	0.0188	0.0773	0.008	0.008
2,2-Dimethylpentane	I7	0.0005	0.0024	0.000	0.000
Methylcyclopentane	N6	0.0101	0.0406	0.004	0.004
2,4-Dimethylpentane	I7	0.0015	0.0072	0.001	0.001
2,2,3-Trimethylbutane	I7	0.0005	0.0024	0.000	0.000
Benzene	A6	0.0089	0.0332	0.002	0.002
3,3-Dimethylpentane	I7	0.0005	0.0024	0.000	0.000
Cyclohexane	N6	0.0083	0.0334	0.003	0.003
2-Methylhexane	I7	0.0054	0.0258	0.003	0.003

2,3-Dimethylpentane	I7	0.0015	0.0072	0.001	0.001
1,1-Dimethylcyclopentane	N7	0.0011	0.0052	0.000	0.000
3-Methylhexane	I7	0.0046	0.0220	0.002	0.002
1c,3-Dimethylcyclopentane	N7	0.0014	0.0065	0.001	0.001
1t,3-Dimethylcyclopentane	N7	0.0013	0.0061	0.001	0.001
3-Ethylpentane	I7	0.0002	0.0010	0.000	0.000
1t,2-Dimethylcyclopentane	N7	0.0020	0.0094	0.001	0.001
n-Heptane	P7	0.0070	0.0335	0.003	0.003
1c,2-Dimethylcyclopentane	N7	0.0004	0.0019	0.000	0.000
Methylcyclohexane	N7	0.0140	0.0656	0.006	0.006
2,2-Dimethylhexane	I8	0.0004	0.0022	0.000	0.000
1,1,3-Trimethylcyclopentane	N7	0.0001	0.0005	0.000	0.000
Ethylcyclopentane	N7	0.0004	0.0019	0.000	0.000
2,5-Dimethylhexane	I8	0.0004	0.0022	0.000	0.000
2,2,3-Trimethylpentane	I8	0.0003	0.0016	0.000	0.000
1c,2t,4-Trimethylcyclopentane	N8	0.0002	0.0011	0.000	0.000
3,3-Dimethylhexane	I8	0.0001	0.0005	0.000	0.000
Toluene	A7	0.0079	0.0348	0.003	0.003
2,3-Dimethylhexane	I8	0.0002	0.0011	0.000	0.000
2-Methyl-3-ethylpentane	I8	0.0001	0.0005	0.000	0.000
2-Methylheptane	I8	0.0013	0.0071	0.001	0.001
4-Methylheptane	I8	0.0004	0.0022	0.000	0.000
3-Methyl-3-ethylpentane	I8	0.0001	0.0005	0.000	0.000
3-Methylheptane	I8	0.0011	0.0060	0.001	0.001
1c,2t,3-Trimethylcyclopentane	N8	0.0014	0.0075	0.001	0.001
3-Ethylhexane	I8	0.0002	0.0011	0.000	0.000
1t,4-Dimethylcyclohexane	N8	0.0007	0.0038	0.000	0.000
1,1-Dimethylcyclohexane	N8	0.0004	0.0022	0.000	0.000
2,2,5-Trimethylhexane	I9	0.0001	0.0006	0.000	0.000
3c-Ethylmethylcyclopentane	N8	0.0001	0.0005	0.000	0.000
3t-Ethylmethylcyclopentane	N8	0.0001	0.0005	0.000	0.000
2t-Ethylmethylcyclopentane	N8	0.0001	0.0005	0.000	0.000
1t,2-Dimethylcyclohexane	N8	0.0004	0.0022	0.000	0.000
1t,3-Dimethylcyclohexane	N8	0.0001	0.0005	0.000	0.000
n-Octane	P8	0.0019	0.0104	0.001	0.001
1c,4-Dimethylcyclohexane	N8	0.0003	0.0016	0.000	0.000
2,2-Dimethylheptane	I9	0.0003	0.0018	0.000	0.000
1,1,4-Trimethylcyclohexane	N9	0.0007	0.0042	0.000	0.000
2,2,3-Trimethylhexane	I9	0.0004	0.0024	0.000	0.000
2,4-Dimethylheptane	I9	0.0001	0.0006	0.000	0.000
4,4-Dimethylheptane	I9	0.0003	0.0018	0.000	0.000
Ethylcyclohexane	N8	0.0007	0.0038	0.000	0.000
n-Propylcyclopentane	N8	0.0005	0.0027	0.000	0.000
1c,3c,5-Trimethylcyclohexane	N9	0.0003	0.0018	0.000	0.000
2,5-Dimethylheptane	I9	0.0004	0.0024	0.000	0.000
3,3-Dimethylheptane	I9	0.0002	0.0012	0.000	0.000
3,5-Dimethylheptane	I9	0.0001	0.0006	0.000	0.000
2,6-Dimethylheptane	I9	0.0001	0.0006	0.000	0.000
Ethylbenzene	I8	0.0004	0.0020	0.000	0.000
1,3-Dimethylbenzene (m-Xylene)	A8	0.0015	0.0076	0.001	0.001
1,4-Dimethylbenzene (p-Xylene)	A8	0.0004	0.0020	0.000	0.000
4-Methyloctane	I9	0.0001	0.0006	0.000	0.000
2-Methyloctane	I9	0.0002	0.0012	0.000	0.000
3-Ethylheptane	I9	0.0001	0.0006	0.000	0.000
1c,2t,4c-Trimethylcyclohexane	I9	0.0002	0.0012	0.000	0.000
1,2-Dimethylbenzene (o-Xylene)	A8	0.0004	0.0020	0.000	0.000
i-Butylcyclopentane	N9	0.0001	0.0006	0.000	0.000
n-Nonane	P9	0.0008	0.0049	0.000	0.000
1,1-Methylethylcyclohexane	N9	0.0001	0.0006	0.000	0.000

n-Butylcyclopentane	N9	0.0001	0.0006	0.000	0.000
3,3-Dimethyloctane	I10	0.0001	0.0007	0.000	0.000
n-Propylbenzene	A9	0.0001	0.0006	0.000	0.000
3,6-Dimethyloctane	I10	0.0001	0.0007	0.000	0.000
1,3-Methylethylbenzene	A9	0.0001	0.0006	0.000	0.000
1,4-Methylethylbenzene	A9	0.0001	0.0006	0.000	0.000
1,3,5-Trimethylbenzene	A9	0.0003	0.0017	0.000	0.000
5-Methylnonane	I10	0.0001	0.0007	0.000	0.000
1,2-Methylethylbenzene	A9	0.0001	0.0006	0.000	0.000
3-Methylnonane	I10	0.0001	0.0007	0.000	0.000
t-Butylbenzene	A10	0.0002	0.0013	0.000	0.000
n-Decane	P10	0.0002	0.0013	0.000	0.000
1,2,3-Trimethylbenzene	A9	0.0001	0.0006	0.000	0.000
1,3-Dimethyl-4-ethylbenzene	A10	0.0001	0.0006	0.000	0.000
1,2-Dimethyl-4-ethylbenzene	A10	0.0001	0.0006	0.000	0.000
1,3-Dimethyl-2-ethylbenzene	A10	0.0001	0.0006	0.000	0.000
UnknownC10s	U10	0.0001	0.0007	0.000	0.000
n-Undecane	P11	0.0002	0.0015	0.000	0.000
1,4-Ethyl-i-propylbenzene	A11	0.0002	0.0014	0.000	0.000
1,2,4,5-Tetramethylbenzene	A11	0.0005	0.0032	0.000	0.000
1,2-Methyl-n-butylbenzene	A11	0.0001	0.0007	0.000	0.000
1,2,3,5-Tetramethylbenzene	A11	0.0001	0.0006	0.000	0.000
1,3-Methyl-n-butylbenzene	A11	0.0001	0.0007	0.000	0.000
sec-Pentylbenzene	A11	0.0002	0.0014	0.000	0.000
UnknownC11s	U11	0.0003	0.0022	0.000	0.000
n-Dodecane	P12	0.0002	0.0016	0.000	0.000
1,3,5-Triethylbenzene	A12	0.0001	0.0008	0.000	0.000
1,2,4-Triethylbenzene	A12	0.0002	0.0015	0.000	0.000
1,4-Methyl-n-pentylbenzene	A12	0.0002	0.0015	0.000	0.000
n-Hexylbenzene	A12	0.0002	0.0015	0.000	0.000
1,2,3,4,5-Pentamethylbenzene	A13	0.0001	0.0007	0.000	0.000
UnknownC12s	U12	0.0001	0.0008	0.000	0.000
n-Tridecane	P13	0.0002	0.0018	0.000	0.000
UnknownC13s	U13	0.0005	0.0044	0.000	0.000
n-Tetradecane	P14	0.0002	0.0019	0.000	0.000
UnknownC14s	U14	0.0005	0.0047	0.000	0.000
n-Pentadecane	P15	0.0001	0.0010	0.000	0.000
UnknownC15s	U15	0.0005	0.0051	0.000	0.000
n-Hexadecane	P16	0.0001	0.0011	0.000	0.000
UnknownC16s	U16	0.0003	0.0033	0.000	0.000
UnknownC18s	U18	0.0002	0.0024	0.000	0.000
TOTAL		100.00000	100.00000	1.4542	1.4618

BTEX COMPONENTS	MOLE%	WT%
BENZENE	0.0089	0.0332
TOLUENE	0.0079	0.0348
ETHYLBENZENE	0.0004	0.0020
XYLENES	0.0023	0.0116
TOTAL BTEX	0.0195	0.0816

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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 :	728.2 /scf	732.1 /scf
NET WET REAL :	715.5 /scf	719.4 /scf
HHV GROSS DRY REAL :	806.8 /scf	811.3 /scf
GROSS WET REAL :	792.7 /scf	797.2 /scf
NET HEATING VALUE (60 °F ideal reaction):		13228.5 Btu/lbm
GROSS HEATING VALUE (60°F ideal reaction):		14652.3 Btu/lbm
RELATIVE DENSITY (AIR=1):		0.7225
DENSITY		0.05520 lb/scf
COMPRESSIBILITY FACTOR :		0.9982
REGULAR WOBBE INDEX		950.5

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

Net Dry Ideal BTU	<u>4801.1</u> /scf	Relative Density - SG (Air=1)	<u>3.3143</u>	C6+ factors
Gross Dry Ideal BTU	<u>5159.5</u> /scf	Z Compressibility Factor	<u>0.99237</u>	<u>0.99145</u>
Net Dry Ideal BTU	<u>19105.8</u> /lb	Density Factor	<u>252.975</u> lbm/1000 ft3	
Gross Dry Ideal BTU	<u>20530.3</u> /lb	Molar Mass or MW	<u>95.998</u> g/mol	
		Volume Liquid Ideal gas	<u>0.062</u> scf/gal	<u>23.8</u>

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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