



EXTENDED NATURAL GAS ANALYSIS (*DHA)

MAIN PAGE

PRIMARY DB KEY: **05-045-12096** NAME/DESCRIP : **300115174 07D FEDERAL 7-11D**
 LEASE #: **COC-23443** BRAIDEN HEAD
 FIELD/AREA:
 PROJECT NO. : **202501101** ANALYSIS NO. : **02**
 COMPANY NAME : **QB ENERGY OPERATING, LLC** ANALYSIS DATE: **FEBRUARY 01, 2025 16:00**
 OFFICE / BRANCH: **PARACHUTE, CO** SAMPLE DATE : **JANUARY 15, 2025**
 CUSTOMER REF: TO:
 PRODUCER : **QB ENERGY OPERATING, LLC** EFFECTIVE DATE:

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

SAMPLE CYCLE: SAMPLE TYPE: **SPOT**
 SAMPLE PRES. : **88** psig PROBE : **NO**
 FLOW PRES. : psig CYLINDER NO. : **608TBI/CO**
 LAB PRES: psig SAMPLED BY : **MIKE KELLEY**
 SAMPLE TEMP. : **20** °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>
HELIUM	0.01	0.00	---	---
HYDROGEN	0.01	0.00	---	---
OXYGEN/ARGON	0.00	0.00	---	---
NITROGEN	0.26	0.43	---	---
CARBON DIOXIDE	0.12	0.31	---	---
METHANE	95.4097	90.0589	---	---
ETHANE	3.0210	5.3448	0.8053	0.8097
PROPANE	0.6755	1.7527	0.1858	0.1868
I-BUTANE	0.1415	0.4839	0.0460	0.0462
N-BUTANE	0.1206	0.4125	0.0380	0.0382
I-PENTANE	0.0538	0.2282	0.0190	0.0191
N-PENTANE	0.0339	0.1439	0.0120	0.0121
HEXANES PLUS	0.1440	0.8351	0.0540	0.0540
TOTALS	100.00000	100.00000	1.1601	1.1661

<u>BTEX COMPONENTS</u>	<u>MOLE%</u>	<u>WT%</u>
BENZENE	0.0030	0.0138
TOLUENE	0.0027	0.0147
ETHYLBENZENE	0.0004	0.0025
XYLENES	0.0014	0.0086
TOTAL BTEX	0.0075	0.0396

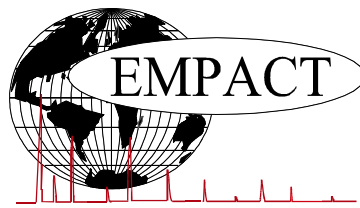
	<u>CALCULATED VALUES**</u>	
<u>BTU @</u>	<u>14.65</u>	<u>14.73</u>
LHV NET DRY REAL :	948.6 /scf	953.8 /scf
NET WET REAL :	932.0 /scf	937.2 /scf
HHV GROSS DRY REAL :	1052.0 /scf	1057.8 /scf
GROSS WET REAL :	1033.6 /scf	1039.4 /scf
NET HEATING VALUE (60 °F ideal reaction):		21224.5 Btu/lbm
GROSS HEATING VALUE (60°F ideal reaction):		23533.4 Btu/lbm
RELATIVE DENSITY (AIR=1):		0.5859
DENSITY		0.04478 lbm/scf
COMPRESSIBILITY FACTOR :		0.9978
REGULAR WOBBE INDEX		1375.7

*(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. :	202501101	ANALYSIS NO. :	02
COMPANY NAME :	QB ENERGY OPERATING, LLC	ANALYSIS DATE :	FEBRUARY 01, 2025 16:00
ACCOUNT NO. :		SAMPLE DATE :	JANUARY 15, 2025
PRODUCER :	QB ENERGY OPERATING, LLC	CYLINDER NO. :	608TBI/CO
LEASE NO. :	COC-23443	SAMPLED BY :	MIKE KELLEY
NAME/DESCRIP :	300115174 07D FEDERAL 7-11D BRAIDEN HEAD		

FIELD DATA		SAMPLE TEMP. :	20
SAMPLE PRES. :	88	AMBIENT TEMP.:	
H2S BY STAIN TUBE:	—		
COMMENTS :	<i>SPOT</i> <i>ppm mol</i> <i>NO PROBE</i>		

<u>Componet</u>	<u>Mole %</u>	<u>Wt %</u>
Helium	0.01	0.00
Hydrogen	0.01	0.00
Carbon Dioxide	0.12	0.31
Nitrogen	0.26	0.43
Methane	95.4097	90.0589
Ethane	3.0210	5.3448
Propane	0.6755	1.7527
Isobutane	0.1415	0.4839
n-Butane	0.1206	0.4125
Isopentane	0.0526	0.2233
n-Pentane	0.0339	0.1439
Cyclopentane	0.0012	0.0049
n-Hexane	0.0164	0.0831
Cyclohexane	0.0079	0.0391
Other Hexanes	0.0326	0.1645
Heptanes	0.0290	0.1706
Methylcyclohexane	0.0177	0.1023
2,2,4 Trimethylpentane	0.0001	0.0007
Benzene	0.0030	0.0138
Toluene	0.0027	0.0147
Ethylbenzene	0.0004	0.0025
Xylenes	0.0014	0.0086
C8+ Heavies	0.0328	0.2352
<u>Subtotal</u>	<u>100.00000</u>	<u>100.00000</u>
<u>Oxygen/Argon</u>	<u>0.00</u>	<u>0.00</u>
Total	100.00000	100.00000

	Total	C6+	C8+	C10+	
	Sample	Fraction	Fraction	Fraction	
Calculated Values BTU @ 14.65					
LHV Net Dry Real:	948.6	4969.5	6043.7	7568.2	Btu/scf
Net Wet Real:	932.0	4882.6	5938.0	7435.9	Btu/scf
HHV Gross Dry Real:	1052.0	5346.9	6503.3	8144.2	Btu/scf
Gross Wet Real:	1033.6	5253.4	6389.6	8001.8	Btu/scf
Other Calculated Values					
Regualr Wobbe Index*	1375.7	2889.8	3190.5	3570.4	Btu/scf
Net Heating Value (60 °F ideal reaction):	21224.5	19340.8	19641.5	19365.9	Btu/lbm
Gross Heating Value (60°F ideal reaction):	23533.4	20808.9	21135.2	20840.1	Btu/lbm
Molar Mass (MW):	16.9959	98.438	120.537	151.528	g/mol
Relative Density (AIR=1):	0.5859	3.3991	4.1630	5.2321	SG
Density:	0.04478	0.25940	0.31764	0.39930	lbm/scf
Compressibility Factor:	0.9978	0.9933	0.9979	0.9997	Z
Liquid Volume real gas @:	14.65	17.2907	0.0538	0.009	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: **05-045-12096** NAME/DESCRIP : **300115174 07D FEDERAL 7-11D**
 LEASE #: **COC-23443** BRAIDEN HEAD
 FIELD/AREA:

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 PRODUCER : **QB ENERGY OPERATING, LLC** EFFECTIVE DATE:

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

SAMPLE CYCLE: SAMPLE TYPE: SPOT
 SAMPLE PRES. : 88 psig PROBE : NO
 FLOW PRES. : psig CYLINDER NO. : 608TBI/CO
 LAB PRES: psig SAMPLED BY : MIKE KELLEY
 SAMPLE TEMP. : 20 °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:

COMPONENT	PIANO #	MOLE %	MASS %	GPM @ 14.65	GPM @ 14.73
Helium	---	0.01	0.00	---	---
Hydrogen	---	0.01	0.00	---	---
Nitrogen	---	0.26	0.43	---	---
Carbon Dioxide	---	0.12	0.31	---	---
Methane	P1	95.4097	90.0589	---	---
Ethane	P2	3.0210	5.3448	0.805	0.810
Propane	P3	0.6755	1.7527	0.186	0.187
i-Butane	I4	0.1415	0.4839	0.046	0.046
n-Butane	P4	0.1206	0.4125	0.038	0.038
2,2-Dimethylpropane	I5	0.0028	0.0119	0.001	0.001
i-Pentane	I5	0.0498	0.2114	0.018	0.018
n-Pentane	P5	0.0339	0.1439	0.012	0.012
2,2-Dimethylbutane	I6	0.0027	0.0137	0.001	0.001
Cyclopentane	N5	0.0012	0.0049	0.000	0.000
2,3-Dimethylbutane	I6	0.0032	0.0162	0.001	0.001
2-Methylpentane	I6	0.0133	0.0674	0.006	0.006
3-Methylpentane	I6	0.0074	0.0375	0.003	0.003
n-Hexane	P6	0.0164	0.0831	0.007	0.007
2,2-Dimethylpentane	I7	0.0006	0.0035	0.000	0.000
Methylcyclopentane	N6	0.0060	0.0297	0.002	0.002
2,4-Dimethylpentane	I7	0.0011	0.0065	0.001	0.001
2,2,3-Trimethylbutane	I7	0.0003	0.0018	0.000	0.000
Benzene	A6	0.0030	0.0138	0.001	0.001
3,3-Dimethylpentane	I7	0.0004	0.0024	0.000	0.000
Cyclohexane	N6	0.0079	0.0391	0.003	0.003
2-Methylhexane	I7	0.0050	0.0295	0.002	0.002
2,3-Dimethylpentane	I7	0.0012	0.0071	0.001	0.001
1,1-Dimethylcyclopentane	N7	0.0009	0.0052	0.000	0.000
3-Methylhexane	I7	0.0045	0.0265	0.002	0.002

1c,3-Dimethylcyclopentane	N7	0.0011	0.0064	0.001	0.001
1t,3-Dimethylcyclopentane	N7	0.0010	0.0058	0.000	0.000
3-Ethylpentane	I7	0.0002	0.0012	0.000	0.000
1t,2-Dimethylcyclopentane	N7	0.0017	0.0098	0.001	0.001
2,2,4-Trimethylpentane	I8	0.0001	0.0007	0.000	0.000
n-Heptane	P7	0.0103	0.0607	0.005	0.005
1c,2-Dimethylcyclopentane	N7	0.0001	0.0006	0.000	0.000
Methylcyclohexane	N7	0.0177	0.1023	0.007	0.007
2,2-Dimethylhexane	I8	0.0005	0.0034	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	0.0005	0.0034	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	0.0027	0.0147	0.001	0.001
2,3-Dimethylhexane	I8	0.0005	0.0034	0.000	0.000
2-Methyl-3-ethylpentane	I8	0.0001	0.0007	0.000	0.000
2-Methylheptane	I8	0.0026	0.0175	0.001	0.001
4-Methylheptane	I8	0.0008	0.0054	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	0.0019	0.0128	0.001	0.001
1c,2t,3-Trimethylcyclopentane	N8	0.0028	0.0185	0.001	0.001
3-Ethylhexane	I8	0.0001	0.0007	0.000	0.000
1t,4-Dimethylcyclohexane	N8	0.0012	0.0079	0.001	0.001
1,1-Dimethylcyclohexane	N8	0.0005	0.0033	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
2t-Ethylmethylcyclopentane	N8	0.0001	0.0007	0.000	0.000
1t,2-Dimethylcyclohexane	N8	0.0009	0.0059	0.000	0.000
1t,3-Dimethylcyclohexane	N8	0.0001	0.0007	0.000	0.000
n-Octane	P8	0.0049	0.0330	0.003	0.003
1c,4-Dimethylcyclohexane	N8	0.0006	0.0039	0.000	0.000
2,3,5-Trimethylhexane	I9	0.0001	0.0008	0.000	0.000
2,2,3,4-Tetramethylpentane	I9	0.0001	0.0008	0.000	0.000
2,3,4-Trimethylhexane	I9	0.0001	0.0008	0.000	0.000
1c,2-Dimethylcyclohexane	N8	0.0001	0.0007	0.000	0.000
2,2-Dimethylheptane	I9	0.0001	0.0008	0.000	0.000
1,1,4-Trimethylcyclohexane	N9	0.0007	0.0052	0.000	0.000
2,2,3-Trimethylhexane	I9	0.0002	0.0015	0.000	0.000
Ethylcyclohexane	N8	0.0006	0.0039	0.000	0.000
n-Propylcyclopentane	N8	0.0003	0.0020	0.000	0.000
1c,3c,5-Trimethylcyclohexane	N9	0.0002	0.0015	0.000	0.000
2,5-Dimethylheptane	I9	0.0005	0.0038	0.000	0.000
3,3-Dimethylheptane	I9	0.0002	0.0015	0.000	0.000
3,5-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	0.0004	0.0025	0.000	0.000
1c,2t,4t-Trimethylcyclohexane	N9	0.0001	0.0008	0.000	0.000
2,3-Dimethylheptane	I9	0.0001	0.0008	0.000	0.000
1,3-Dimethylbenzene (m-Xylene)	A8	0.0010	0.0062	0.000	0.000
1,4-Dimethylbenzene (p-Xylene)	A8	0.0002	0.0012	0.000	0.000
4-Methyloctane	I9	0.0004	0.0030	0.000	0.000
2-Methyloctane	I9	0.0005	0.0038	0.000	0.000
1c,2t,3-Trimethylcyclohexane	N9	0.0001	0.0008	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	0.0005	0.0037	0.000	0.000

3,3-Diethylpentane	I9	0.0001	0.0008	0.000	0.000
1,2-Dimethylbenzene (o-Xylene)	A8	0.0002	0.0012	0.000	0.000
i-Butylcyclopentane	N9	0.0003	0.0022	0.000	0.000
n-Nonane	P9	0.0016	0.0121	0.001	0.001
1,1-Methylethylcyclohexane	N9	0.0002	0.0015	0.000	0.000
i-Propylbenzene	A9	0.0001	0.0007	0.000	0.000
i-Propylcyclohexane	N9	0.0001	0.0008	0.000	0.000
2,4-Dimethyloctane	I10	0.0001	0.0008	0.000	0.000
2,6-Dimethyloctane	I10	0.0001	0.0008	0.000	0.000
n-Butylcyclopentane	N9	0.0002	0.0015	0.000	0.000
3,3-Dimethyloctane	I10	0.0001	0.0008	0.000	0.000
n-Propylbenzene	A9	0.0002	0.0014	0.000	0.000
3,6-Dimethyloctane	I10	0.0001	0.0008	0.000	0.000
1,3-Methylethylbenzene	A9	0.0001	0.0007	0.000	0.000
1,3,5-Trimethylbenzene	A9	0.0001	0.0007	0.000	0.000
2,3-Dimethyloctane	I10	0.0001	0.0008	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
2-Methylnonane	I10	0.0001	0.0008	0.000	0.000
3-Ethylloctane	I10	0.0001	0.0008	0.000	0.000
3-Methylnonane	I10	0.0002	0.0017	0.000	0.000
t-Butylbenzene	A10	0.0001	0.0008	0.000	0.000
i-Butylcyclohexane	N10	0.0001	0.0008	0.000	0.000
UnknownC9s	U9	0.0006	0.0045	0.000	0.000
n-Decane	P10	0.0011	0.0092	0.001	0.001
1,2-Methyl-i-propylbenzene	A10	0.0001	0.0008	0.000	0.000
3-Ethylnonane	I10	0.0001	0.0009	0.000	0.000
UnknownC10s	U10	0.0008	0.0067	0.000	0.000
UnknownC11s	U11	0.0001	0.0009	0.000	0.000
n-Tridecane	P13	0.0001	0.0011	0.000	0.000
n-Tetradecane	P14	0.0001	0.0012	0.000	0.000
n-Pentadecane	P15	0.0001	0.0012	0.000	0.000
n-Hexadecane	P16	0.0001	0.0014	0.000	0.000
n-Heptadecane	P17	0.0001	0.0014	0.000	0.000
TOTAL		100.00000	100.00000	1.1601	1.1661

CALCULATED VALUES**

BTEX COMPONENTS	MOLE%	WT%	BTU @	14.65	14.73
BENZENE	0.0030	0.0138	LHV NET DRY REAL :	948.6 /scf	953.8 /scf
TOLUENE	0.0027	0.0147	NET WET REAL :	932.0 /scf	937.2 /scf
ETHYLBENZENE	0.0004	0.0025	HHV GROSS DRY REAL :	1052.0 /scf	1057.8 /scf
XYLENES	0.0014	0.0086	GROSS WET REAL :	1033.6 /scf	1039.4 /scf
TOTAL BTEX	0.0075	0.0396	NET HEATING VALUE (60 °F ideal reaction):		21224.5 Btu/lbm
			GROSS HEATING VALUE (60°F ideal reaction):		23533.4 Btu/lbm
			RELATIVE DENSITY (AIR=1):		0.5859
			DENSITY		0.04478 lb/scf
			COMPRESSIBILITY FACTOR :		0.9978
			REGULAR WOBBE INDEX		1375.7

*(DETAILED HYDROCARBON ANALYSIS/NJ 1993)

Mod ASTM D6730, GPA 2261 & GPA 2286.

** (CALC: GPA 2172, GPA 2145 & TP-17 @14.696 & 60 F)

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

Net Dry Ideal BTU	4951.8 /scf	Relative Density - SG (Air=1)	3.3991	C6+ factors
Gross Dry Ideal BTU	5327.8 /scf	Z Compressibility Factor	0.99331	0.9923
Net Dry Ideal BTU	19340.8 /lb	Density Factor	259.405 lbm/1000 ft3	
Gross Dry Ideal BTU	20808.9 /lb	Molar Mass or MW	98.438 g/mol	
		Volume Liquid Ideal gas	0.054 scf/gal	23.3

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.

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