



EXTENDED NATURAL GAS ANALYSIS (*DHA)

MAIN PAGE

PRIMARY DB KEY: 05-045-11795	NAME/DESCRIP: 300115023 1D CASS-KNOXS 1-21C
LEASE #: _____	BRAIDEN HEAD
FIELD/AREA: _____	
PROJECT NO. : 202501048	ANALYSIS NO. : 03
COMPANY NAME : QB ENERGY OPERATING, LLC	ANALYSIS DATE: JANUARY 27, 2025 15:24
OFFICE / BRANCH: PARACHUTE, CO	SAMPLE DATE : JANUARY 2, 2025
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. : ECA-772
LAB PRES: _____ psig	SAMPLED BY : MIKE KELLEY
SAMPLE TEMP. : 38 °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	0.0010	0.0000	0.0000
HELIUM	0.01	0.00	---	---
HYDROGEN	0.01	0.00	---	---
OXYGEN/ARGON	0.00	0.00	---	---
NITROGEN	0.17	0.28	---	---
CARBON DIOXIDE	0.01	0.03	---	---
METHANE	94.7440	88.6589	---	---
ETHANE	3.5625	6.2484	0.9492	0.9544
PROPANE	0.8821	2.2689	0.2418	0.2431
I-BUTANE	0.1666	0.5648	0.0540	0.0542
N-BUTANE	0.1746	0.5919	0.0550	0.0553
I-PENTANE	0.0699	0.2939	0.0260	0.0261
N-PENTANE	0.0482	0.2029	0.0170	0.0171
HEXANES PLUS	0.1517	0.8593	0.0540	0.0540
TOTALS	100.00000	100.00000	1.3970	1.4042

<u>BTEX COMPONENTS</u>	<u>MOLE%</u>	<u>WT%</u>
BENZENE	0.0024	0.0109
TOLUENE	0.0034	0.0183
ETHYLBENZENE	0.0005	0.0031
XYLENES	0.0027	0.0168
TOTAL BTEX	0.0090	0.0491

	<u>CALCULATED VALUES**</u>	
	<u>14.65</u>	<u>14.73</u>
LHV NET DRY REAL :	960.3 /scf	965.5 /scf
NET WET REAL :	943.5 /scf	948.7 /scf
HHV GROSS DRY REAL :	1064.0 /scf	1069.8 /scf
GROSS WET REAL :	1045.4 /scf	1051.2 /scf
NET HEATING VALUE (60 °F ideal reaction):		21290.1 Btu/lbm
GROSS HEATING VALUE (60°F ideal reaction):		23598.8 Btu/lbm
RELATIVE DENSITY (AIR=1):		0.5909
DENSITY		0.04517 lbm/scf
COMPRESSIBILITY FACTOR :		0.9977
REGULAR WOBBE INDEX		1385.3

*(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. :	202501048	ANALYSIS NO. :	03
COMPANY NAME :	QB ENERGY OPERATING, LLC	ANALYSIS DATE:	JANUARY 27, 2025 15:24
ACCOUNT NO. :		SAMPLE DATE :	JANUARY 2, 2025
PRODUCER :	QB ENERGY OPERATING, LLC	CYLINDER NO. :	ECA-772
LEASE NO. :		SAMPLED BY :	MIKE KELLEY
NAME/DESCRIP :	300115023 1D CASS-KNOXS 1-21C BRAIDEN HEAD		

FIELD DATA		SAMPLE TEMP. :	38
SAMPLE PRES. :	275	AMBIENT TEMP.:	
H2S BY STAIN TUBE:	—		
COMMENTS :	<i>SPOT</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	0.01	0.03
Nitrogen	0.17	0.28
Methane	94.7440	88.6589
Ethane	3.5625	6.2484
Propane	0.8821	2.2689
Isobutane	0.1666	0.5648
n-Butane	0.1746	0.5919
Isopentane	0.0682	0.2870
n-Pentane	0.0482	0.2029
Cyclopentane	0.0017	0.0069
n-Hexane	0.0182	0.0915
Cyclohexane	0.0092	0.0451
Other Hexanes	0.0385	0.1924
Heptanes	0.0264	0.1534
Methylcyclohexane	0.0199	0.1140
2,2,4 Trimethylpentane	0.0001	0.0006
Benzene	0.0024	0.0109
Toluene	0.0034	0.0183
Ethylbenzene	0.0005	0.0031
Xylenes	0.0027	0.0168
C8+ Heavies	0.0304	0.2132
<u>Subtotal</u>	<u>99.99960</u>	<u>99.99900</u>
Oxygen/Argon	0.00	0.00
Alcohols	0.0004	0.0010
<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:	960.3	4901.9	5949.3	7097.8 Btu/scf
Net Wet Real:	943.5	4816.2	5845.3	6973.7 Btu/scf
HHV Gross Dry Real:	1064.0	5271.8	6396.9	7661.9 Btu/scf
Gross Wet Real:	1045.4	5179.6	6285.1	7528.0 Btu/scf
Other Calculated Values				
Regualr Wobbe Index*	1385.3	2867.0	3158.5	3459.5 Btu/scf
Net Heating Value (60 °F ideal reaction):	21290.1	19311.0	19547.4	18964.5 Btu/lbm
Gross Heating Value (60°F ideal reaction):	23598.8	20770.4	21018.7	20468.9 Btu/lbm
Molar Mass (MW):	17.14314	97.186	119.074	142.841 g/mol
Relative Density (AIR=1):	0.5909	3.3558	4.1107	4.9322 SG
Density:	0.04517	0.25610	0.31376	0.37641 lbm/scf
Compressibility Factor:	0.9977	0.9931	0.9980	0.9996 Z
Liquid Volume real gas @:	<u>14.65</u>	17.3874	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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DHA COMPONENT LIST

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 LEASE #: BRAIDEN HEAD
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FIELD DATA

SAMPLE CYCLE: SAMPLE TYPE: SPOT
 SAMPLE PRES. : 275 psig PROBE : NO
 FLOW PRES. : psig CYLINDER NO. : ECA-772
 LAB PRES: psig SAMPLED BY : MIKE KELLEY
 SAMPLE TEMP. : 38 °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	---	0.17	0.28	---	---
Carbon Dioxide	---	0.01	0.03	---	---
Methane	P1	94.7440	88.6589	---	---
Ethane	P2	3.5625	6.2484	0.949	0.954
Propane	P3	0.8821	2.2689	0.242	0.243
i-Butane	I4	0.1666	0.5648	0.054	0.054
Methanol	X1	0.0003	0.0006	0.000	0.000
n-Butane	P4	0.1746	0.5919	0.055	0.055
2,2-Dimethylpropane	I5	0.0030	0.0126	0.001	0.001
i-Pentane	I5	0.0652	0.2744	0.024	0.024
n-Pentane	P5	0.0482	0.2029	0.017	0.017
t-Butanol	X4	0.0001	0.0004	0.000	0.000
2,2-Dimethylbutane	I6	0.0027	0.0136	0.001	0.001
Cyclopentane	N5	0.0017	0.0069	0.001	0.001
2,3-Dimethylbutane	I6	0.0036	0.0181	0.001	0.001
2-Methylpentane	I6	0.0150	0.0754	0.006	0.006
3-Methylpentane	I6	0.0080	0.0402	0.003	0.003
n-Hexane	P6	0.0182	0.0915	0.007	0.007
2,2-Dimethylpentane	I7	0.0004	0.0023	0.000	0.000
Methylcyclopentane	N6	0.0092	0.0451	0.003	0.003
2,4-Dimethylpentane	I7	0.0010	0.0058	0.000	0.000
2,2,3-Trimethylbutane	I7	0.0003	0.0017	0.000	0.000
Benzene	A6	0.0024	0.0109	0.001	0.001
3,3-Dimethylpentane	I7	0.0003	0.0017	0.000	0.000
Cyclohexane	N6	0.0092	0.0451	0.003	0.003
2-Methylhexane	I7	0.0042	0.0246	0.002	0.002

2,3-Dimethylpentane	I7	0.0010	0.0058	0.000	0.000
1,1-Dimethylcyclopentane	N7	0.0008	0.0046	0.000	0.000
3-Methylhexane	I7	0.0037	0.0216	0.002	0.002
1c,3-Dimethylcyclopentane	N7	0.0014	0.0080	0.001	0.001
1t,3-Dimethylcyclopentane	N7	0.0013	0.0075	0.001	0.001
3-Ethylpentane	I7	0.0002	0.0012	0.000	0.000
1t,2-Dimethylcyclopentane	N7	0.0020	0.0114	0.001	0.001
2,2,4-Trimethylpentane	I8	0.0001	0.0006	0.000	0.000
n-Heptane	P7	0.0088	0.0514	0.004	0.004
1c,2-Dimethylcyclopentane	N7	0.0002	0.0012	0.000	0.000
Methylcyclohexane	N7	0.0199	0.1140	0.008	0.008
2,2-Dimethylhexane	I8	0.0005	0.0033	0.000	0.000
1,1,3-Trimethylcyclopentane	N7	0.0001	0.0006	0.000	0.000
Ethylcyclopentane	N7	0.0007	0.0040	0.000	0.000
2,5-Dimethylhexane	I8	0.0004	0.0027	0.000	0.000
2,2,3-Trimethylpentane	I8	0.0004	0.0027	0.000	0.000
1c,2t,4-Trimethylcyclopentane	N8	0.0003	0.0020	0.000	0.000
3,3-Dimethylhexane	I8	0.0001	0.0006	0.000	0.000
Toluene	A7	0.0034	0.0183	0.001	0.001
2,3-Dimethylhexane	I8	0.0003	0.0020	0.000	0.000
2-Methyl-3-ethylpentane	I8	0.0001	0.0006	0.000	0.000
2-Methylheptane	I8	0.0019	0.0127	0.001	0.001
4-Methylheptane	I8	0.0006	0.0040	0.000	0.000
3-Methyl-3-ethylpentane	I8	0.0001	0.0006	0.000	0.000
3,4-Dimethylhexane	I8	0.0001	0.0006	0.000	0.000
3-Methylheptane	I8	0.0014	0.0093	0.001	0.001
1c,2t,3-Trimethylcyclopentane	N8	0.0031	0.0203	0.002	0.002
3-Ethylhexane	I8	0.0001	0.0006	0.000	0.000
1t,4-Dimethylcyclohexane	N8	0.0013	0.0085	0.001	0.001
1,1-Dimethylcyclohexane	N8	0.0004	0.0026	0.000	0.000
2,2,5-Trimethylhexane	I9	0.0001	0.0008	0.000	0.000
3c-Ethylmethylcyclopentane	N8	0.0001	0.0006	0.000	0.000
3t-Ethylmethylcyclopentane	N8	0.0001	0.0006	0.000	0.000
2t-Ethylmethylcyclopentane	N8	0.0001	0.0006	0.000	0.000
1t,2-Dimethylcyclohexane	N8	0.0009	0.0059	0.000	0.000
1t,3-Dimethylcyclohexane	N8	0.0001	0.0006	0.000	0.000
n-Octane	P8	0.0044	0.0293	0.002	0.002
1c,4-Dimethylcyclohexane	N8	0.0006	0.0039	0.000	0.000
i-Propylcyclopentane	I8	0.0001	0.0006	0.000	0.000
2,3,5-Trimethylhexane	I9	0.0001	0.0008	0.000	0.000
2,3,4-Trimethylhexane	I9	0.0001	0.0008	0.000	0.000
2,2-Dimethylheptane	I9	0.0002	0.0015	0.000	0.000
1,1,4-Trimethylcyclohexane	N9	0.0009	0.0066	0.000	0.000
2,2,3-Trimethylhexane	I9	0.0002	0.0015	0.000	0.000
2,4-Dimethylheptane	I9	0.0001	0.0008	0.000	0.000
Ethylcyclohexane	N8	0.0006	0.0039	0.000	0.000
n-Propylcyclopentane	N8	0.0004	0.0026	0.000	0.000
1c,3c,5-Trimethylcyclohexane	N9	0.0002	0.0015	0.000	0.000
2,5-Dimethylheptane	I9	0.0005	0.0037	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	0.0005	0.0031	0.000	0.000
1,3-Dimethylbenzene (m-Xylene)	A8	0.0019	0.0118	0.001	0.001
1,4-Dimethylbenzene (p-Xylene)	A8	0.0005	0.0031	0.000	0.000
4-Methyloctane	I9	0.0003	0.0022	0.000	0.000
2-Methyloctane	I9	0.0005	0.0037	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	0.0003	0.0019	0.000	0.000
i-Butylcyclopentane	N9	0.0003	0.0022	0.000	0.000
n-Nonane	P9	0.0019	0.0142	0.001	0.001
1,1-Methylethylcyclohexane	N9	0.0001	0.0008	0.000	0.000
i-Propylbenzene	A9	0.0001	0.0007	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
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	0.0002	0.0014	0.000	0.000
1,3,5-Trimethylbenzene	A9	0.0003	0.0021	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-Methylnonane	I10	0.0001	0.0008	0.000	0.000
t-Butylbenzene	A10	0.0003	0.0023	0.000	0.000
i-Butylcyclohexane	N10	0.0001	0.0008	0.000	0.000
UnknownC9s	U9	0.0004	0.0030	0.000	0.000
n-Decane	P10	0.0005	0.0041	0.000	0.000
1,2,3-Trimethylbenzene	A9	0.0001	0.0007	0.000	0.000
Sec-Butylcyclohexane	A10	0.0002	0.0016	0.000	0.000
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
1,4-Diethylbenzene	A10	0.0001	0.0008	0.000	0.000
1,4-Methyl-n-propylbenzene	A10	0.0001	0.0008	0.000	0.000
n-Butylbenzene	A10	0.0001	0.0008	0.000	0.000
UnknownC10s	U10	0.0006	0.0050	0.000	0.000
n-Undecane	P11	0.0001	0.0009	0.000	0.000
1,4-Ethyl-i-propylbenzene	A11	0.0001	0.0009	0.000	0.000
1,2,4,5-Tetramethylbenzene	A11	0.0001	0.0008	0.000	0.000
UnknownC11s	U11	0.0002	0.0018	0.000	0.000
UnknownC12s	U12	0.0002	0.0018	0.000	0.000
TOTAL		100.00000	100.00000	1.3970	1.4042

CALCULATED VALUES**

BTEX COMPONENTS	MOLE%	WT%	BTU @	14.65	14.73
BENZENE	0.0024	0.0109	LHV NET DRY REAL :	960.3 /scf	965.5 /scf
TOLUENE	0.0034	0.0183	NET WET REAL :	943.5 /scf	948.7 /scf
ETHYLBENZENE	0.0005	0.0031	HHV GROSS DRY REAL :	1064.0 /scf	1069.8 /scf
XYLENES	0.0027	0.0168	GROSS WET REAL :	1045.4 /scf	1051.2 /scf
TOTAL BTEX	0.0090	0.0491	NET HEATING VALUE (60 °F ideal reaction):		21290.1 Btu/lbm
			GROSS HEATING VALUE (60°F ideal reaction):		23598.8 Btu/lbm
			RELATIVE DENSITY (AIR=1):		0.5909
			DENSITY		0.04517 lb/scf
			COMPRESSIBILITY FACTOR :		0.9977
			REGULAR WOBBE INDEX		1385.3

*(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	4883.5 /scf	Relative Density - SG (Air=1)	3.3558	C6+ factors
Gross Dry Ideal BTU	5252 /scf	Z Compressibility Factor	0.99313	0.99233
Net Dry Ideal BTU	19311 /lb	Density Factor	256.098 lbm/1000 ft3	
Gross Dry Ideal BTU	20770.4 /lb	Molar Mass or MW	97.186 g/mol	
		Volume Liquid Ideal gas	0.054 scf/gal	23.2

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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