EXTENDED NATURAL GAS ANALYSIS (*DHA)

MAIN PAGE

PRIMARY DB KEY:	**05-045-10944**	NAME/DESCRIP :	**1B CASS-GARBER 1-31B**
LEASE #:	**300115019**		**BRAIDEN HEAD**
FIELD/AREA:			

PROJECT NO. :	**202409058**	ANALYSIS NO. :	**01**
COMPANY NAME :	**QB ENERGY OPERATING, LLC**	ANALYSIS DATE:	SEPTEMBER 20, 2024 15:29
OFFICE / BRANCH:	PARACHUTE, CO	SAMPLE DATE :	AUGUST 28, 2024 14:30
CUSTOMER REF:		TO:	
PRODUCER :	QB ENERGY OPERATING, LLC	EFFECTIVE DATE:	

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

SAMPLE CYCLE:			SAMPLE TYPE:	SPOT
SAMPLE PRES. :	280	psig	PROBE :	NO
FLOW PRES. :		psig	CYLINDER NO. :	ECA-818
LAB PRES:		psig	SAMPLED BY :	MIKE KELLEY
SAMPLE TEMP. :	79	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	0.14	0.23	---	---
CARBON DIOXIDE	0.01	0.03	---	---
METHANE	94.6837	88.5972	---	---
ETHANE	3.6591	6.4175	0.9752	0.9805
PROPANE	0.8814	2.2669	0.2418	0.2431
I-BUTANE	0.1955	0.6628	0.0639	0.0643
N-BUTANE	0.1722	0.5838	0.0540	0.0542
I-PENTANE	0.0736	0.3094	0.0270	0.0271
N-PENTANE	0.0476	0.2003	0.0170	0.0171
HEXANES PLUS	0.1268	0.7017	0.0500	0.0500
TOTALS	100.00000	100.00000	1.4289	1.4363

BTEX COMPONENTS	MOLE%	WT%
BENZENE	0.0025	0.0114
TOLUENE	0.0004	0.0022
ETHYLBENZENE	0.0003	0.0019
XYLENES	0.0007	0.0042
TOTAL BTEX	0.0039	0.0197

**(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 :	960.8	**/scf**	966.0	**/scf**
	NET WET REAL :	944.0	**/scf**	949.2	**/scf**
HHV	GROSS DRY REAL :	1065.1	**/scf**	1070.9	**/scf**
	GROSS WET REAL :	1046.5	**/scf**	1052.3	**/scf**
	NET HEATING VALUE (60 °F ideal reaction):			21300.7	**Btu/lbm**
	GROSS HEATING VALUE (60°F ideal reaction):			23610.7	**Btu/lbm**
	RELATIVE DENSITY (AIR=1):			0.5914	
	DENSITY			0.04517	**lbm/scf**
	COMPRESSIBILITY FACTOR :			0.9977	
	REGULAR WOBBE INDEX			1386.2	

EMPACT

EXTENDED NATURAL GAS ANALYSIS (*DHA)

GLYCALC INFORMATION

PROJECT NO. :	202409058	ANALYSIS NO. :	01
COMPANY NAME :	QB ENERGY OPERATING, LLC	ANALYSIS DATE:	SEPTEMBER 20, 2024 15:29
ACCOUNT NO. :		SAMPLE DATE :	AUGUST 28, 2024 14:30
PRODUCER :	QB ENERGY OPERATING, LLC	CYLINDER NO. :	ECA-818
LEASE NO. :	300115019	SAMPLED BY :	MIKE KELLEY
NAME/DESCRIP :	1B CASS-GARBER 1-31B BRAIDEN HEAD		
FIELD DATA		SAMPLE TEMP. :	79
SAMPLE PRES. :	280	AMBIENT TEMP.:	
H2S BY STAIN TUBE:	_ *ppm mol*		
COMMENTS :	*SPOT* *NO PROBE*		

Componet	Mole %	Wt %
Helium	0.01	0.00
Hydrogen	0.00	0.00
Carbon Dioxide	0.01	0.03
Nitrogen	0.14	0.23
Methane	94.6837	88.5972
Ethane	3.6591	6.4175
Propane	0.8814	2.2669
Isobutane	0.1955	0.6628
n-Butane	0.1722	0.5838
Isopentane	0.0718	0.3021
n-Pentane	0.0476	0.2003
Cyclopentane	0.0018	0.0073
n-Hexane	0.0189	0.0950
Cyclohexane	0.0081	0.0398
Other Hexanes	0.0396	0.1981
Heptanes	0.0245	0.1426
Methylcyclohexane	0.0133	0.0762
2,2,4 Trimethylpentane	0.0000	0.0000
Benzene	0.0025	0.0114
Toluene	0.0004	0.0022
Ethylbenzene	0.0003	0.0019
Xylenes	0.0007	0.0042
C8+ Heavies	0.0185	0.1303
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:	960.8	4811.5	6016.1	7373.4	**Btu/scf**
	Net Wet Real:	944.0	4727.4	5910.9	7244.5	**Btu/scf**
HHV	Gross Dry Real:	1065.1	5180.0	6470.9	7933.6	**Btu/scf**
	Gross Wet Real:	1046.5	5089.4	6357.8	7794.9	**Btu/scf**
Other Calculated Values						
Regualr Wobbe Index*		1386.2	2847.1	3180.5	3530.4	**Btu/scf**
Net Heating Value (60 °F ideal reaction):		21300.7	19339.5	19616.6	19196.4	**Btu/lbm**
Gross Heating Value (60°F ideal reaction):		23610.7	20821.1	21103.4	20654.8	**Btu/lbm**
Molar Mass (MW):		17.14411	94.915	120.116	147.071	**g/mol**
Relative Density (AIR=1):		0.5914	3.2774	4.1478	5.0782	**SG**
Density:		0.04517	0.25012	0.31653	0.38755	**lbm/scf**
Compressiblity Factor:		0.9977	0.9919	0.9979	0.9996	**Z**
Liquid Volume real gas @:	**14.65**	17.4044	0.0498	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 uderscore) indicates there was no tube pulled for H2S.

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EXTENDED NATURAL GAS ANALYSIS (*DHA)

DHA COMPONENT LIST

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FLOW PRES. :	psig	CYLINDER NO. :	ECA-818
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SAMPLE TEMP. :	79 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	---	0.14	0.23	---	---
Carbon Dioxide	---	0.01	0.03	---	---
Methane	P1	94.6837	88.5972	---	---
Ethane	P2	3.6591	6.4175	0.975	0.981
Propane	P3	0.8814	2.2669	0.242	0.243
i-Butane	I4	0.1955	0.6628	0.064	0.064
n-Butane	P4	0.1722	0.5838	0.054	0.054
2,2-Dimethylpropane	I5	0.0039	0.0164	0.001	0.001
i-Pentane	I5	0.0679	0.2857	0.025	0.025
n-Pentane	P5	0.0476	0.2003	0.017	0.017
t-Butanol	X4	0.0001	0.0004	0.000	0.000
2,2-Dimethylbutane	I6	0.0031	0.0156	0.001	0.001
Cyclopentane	N5	0.0018	0.0073	0.001	0.001
2,3-Dimethylbutane	I6	0.0040	0.0201	0.002	0.002
2-Methylpentane	I6	0.0165	0.0829	0.007	0.007
3-Methylpentane	I6	0.0088	0.0442	0.004	0.004
n-Hexane	P6	0.0189	0.0950	0.008	0.008
2,2-Dimethylpentane	I7	0.0007	0.0041	0.000	0.000
Methylcyclopentane	N6	0.0072	0.0353	0.003	0.003
2,4-Dimethylpentane	I7	0.0011	0.0064	0.001	0.001
2,2,3-Trimethylbutane	I7	0.0003	0.0017	0.000	0.000
Benzene	A6	0.0025	0.0114	0.001	0.001
3,3-Dimethylpentane	I7	0.0004	0.0023	0.000	0.000
Cyclohexane	N6	0.0081	0.0398	0.003	0.003
2-Methylhexane	I7	0.0043	0.0251	0.002	0.002
2,3-Dimethylpentane	I7	0.0011	0.0064	0.000	0.000
1,1-Dimethylcyclopentane	N7	0.0008	0.0046	0.000	0.000
3-Methylhexane	I7	0.0036	0.0211	0.002	0.002
1c,3-Dimethylcyclopentane	N7	0.0011	0.0063	0.001	0.001

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1t,3-Dimethylcyclopentane	N7	0.0010	0.0057	0.000	0.000
3-Ethylpentane	I7	0.0001	0.0006	0.000	0.000
1t,2-Dimethylcyclopentane	N7	0.0015	0.0086	0.001	0.001
n-Heptane	P7	0.0078	0.0456	0.004	0.004
1c,2-Dimethylcyclopentane	N7	0.0002	0.0012	0.000	0.000
Methylcyclohexane	N7	0.0133	0.0762	0.005	0.005
2,2-Dimethylhexane	I8	0.0004	0.0027	0.000	0.000
1,1,3-Trimethylcyclopentane	N7	0.0001	0.0006	0.000	0.000
Ethylcyclopentane	N7	0.0004	0.0023	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	0.0002	0.0013	0.000	0.000
3,3-Dimethylhexane	I8	0.0001	0.0006	0.000	0.000
Toluene	A7	0.0004	0.0022	0.000	0.000
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	0.0014	0.0093	0.001	0.001
4-Methylheptane	I8	0.0004	0.0027	0.000	0.000
3-Methyl-3-ethylpentane	I8	0.0001	0.0006	0.000	0.000
3-Methylheptane	I8	0.0010	0.0066	0.001	0.001
1c,2t,3-Trimethylcyclopentane	N8	0.0016	0.0105	0.001	0.001
3-Ethylhexane	I8	0.0001	0.0006	0.000	0.000
1t,4-Dimethylcyclohexane	N8	0.0007	0.0046	0.000	0.000
1,1-Dimethylcyclohexane	N8	0.0003	0.0020	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	0.0005	0.0033	0.000	0.000
1t,3-Dimethylcyclohexane	N8	0.0001	0.0006	0.000	0.000
n-Octane	P8	0.0025	0.0167	0.001	0.001
1c,4-Dimethylcyclohexane	N8	0.0003	0.0020	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	0.0006	0.0044	0.000	0.000
2,2,3-Trimethylhexane	I9	0.0001	0.0008	0.000	0.000
Ethylcyclohexane	N8	0.0004	0.0026	0.000	0.000
n-Propylcyclopentane	N8	0.0001	0.0006	0.000	0.000
2,5-Dimethylheptane	I9	0.0003	0.0022	0.000	0.000
3,3-Dimethylheptane	I9	0.0001	0.0008	0.000	0.000
Ethylbenzene	I8	0.0003	0.0019	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
4-Methyloctane	I9	0.0002	0.0015	0.000	0.000
2-Methyloctane	I9	0.0003	0.0022	0.000	0.000
3-Methyloctane	I9	0.0001	0.0008	0.000	0.000
1c,2t,4c-Trimethylcyclohexane	I9	0.0003	0.0022	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	0.0001	0.0008	0.000	0.000
n-Nonane	P9	0.0011	0.0082	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
i-Propylcyclohexane	N9	0.0001	0.0008	0.000	0.000
2,4-Dimethyloctane	I10	0.0001	0.0008	0.000	0.000
n-Butylcyclopentane	N9	0.0001	0.0008	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
5-Methylnonane	I10	0.0001	0.0008	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	0.0001	0.0008	0.000	0.000
UnknownC9s	U9	0.0001	0.0008	0.000	0.000
n-Decane	P10	0.0005	0.0041	0.000	0.000
1,2-Methyl-i-propylbenzene	A10	0.0001	0.0008	0.000	0.000
UnknownC10s	U10	0.0003	0.0025	0.000	0.000
n-Undecane	P11	0.0003	0.0027	0.000	0.000
UnknownC11s	U11	0.0001	0.0009	0.000	0.000
n-Dodecane	P12	0.0002	0.0020	0.000	0.000
UnknownC12s	U12	0.0001	0.0009	0.000	0.000
TOTAL		100.00000	100.00000	1.4289	1.4363

BTEX COMPONENTS	MOLE%	WT%
BENZENE	0.0025	0.0114
TOLUENE	0.0004	0.0022
ETHYLBENZENE	0.0003	0.0019
XYLENES	0.0007	0.0042
TOTAL BTEX	0.0039	0.0197

**(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 :	960.8	**/scf**	966.0	**/scf**
	NET WET REAL :	944.0	**/scf**	949.2	**/scf**
HHV	GROSS DRY REAL :	1065.1	**/scf**	1070.9	**/scf**
	GROSS WET REAL :	1046.5	**/scf**	1052.3	**/scf**
	NET HEATING VALUE (60 °F ideal reaction):			21300.7	**Btu/lbm**
	GROSS HEATING VALUE (60°F ideal reaction):			23610.7	**Btu/lbm**
	RELATIVE DENSITY (AIR=1):			0.5914	
	DENSITY			0.04517	**lb/scf**
	COMPRESSIBILITY FACTOR :			0.9977	
	REGULAR WOBBE INDEX			1386.2	

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

Net Dry Ideal BTU	4787.6 **/scf**	Relative Density - SG (Air=1)	3.2774	***C6+factors***
Gross Dry Ideal BTU	5154.3 **/scf**	**Z** Compressiblity Factor	0.99192	0.99115
Net Dry Ideal BTU	19339.5 **/lb**	Density Factor	250.119 **lbm/1000 ft3**	
Gross Dry Ideal BTU	20821.1 **/lb**	Molar Mass or MW	94.915 **g/mol**	
		Volume Liquid Ideal gas	0.05 **scf/gal**	23.4

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.