EXTENDED NATURAL GAS ANALYSIS (*DHA)

MAIN PAGE

PRIMARY DB KEY:	**05-045-11718**	NAME/DESCRIP :	**D27 EF12B-22**
LEASE #:	**110165700**		**BRAIDEN HEAD**
FIELD/AREA:			

PROJECT NO. :	**202409055**	ANALYSIS NO. :	**06**
COMPANY NAME :	**QB ENERGY OPERATING, LLC**	ANALYSIS DATE:	SEPTEMBER 19, 2024 11:56
OFFICE / BRANCH:	PARACHUTE, CO	SAMPLE DATE :	SEPTEMBER 4, 2024 9:30
CUSTOMER REF:		TO:	
PRODUCER :	QB ENERGY OPERATING, LLC	EFFECTIVE DATE:	

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

SAMPLE CYCLE:			SAMPLE TYPE:	SPOT
SAMPLE PRES. :	203	psig	PROBE :	NO
FLOW PRES. :		psig	CYLINDER NO. :	TBI/UT-042
LAB PRES:		psig	SAMPLED BY :	MIKE KELLEY
SAMPLE TEMP. :	57	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
HELIUM	0.01	0.00	---	---
HYDROGEN	0.00	0.00	---	---
OXYGEN/ARGON	0.00	0.00	---	---
NITROGEN	0.38	0.60	---	---
CARBON DIOXIDE	0.02	0.05	---	---
METHANE	93.7267	85.2403	---	---
ETHANE	3.1094	5.3004	0.8284	0.8329
PROPANE	1.3436	3.3587	0.3687	0.3707
I-BUTANE	0.2896	0.9542	0.0949	0.0954
N-BUTANE	0.5307	1.7486	0.1669	0.1678
I-PENTANE	0.1691	0.6911	0.0620	0.0623
N-PENTANE	0.1417	0.5795	0.0510	0.0512
HEXANES PLUS	0.2792	1.4772	0.1130	0.1133
TOTALS	100.00000	100.00000	1.6849	1.6936

BTEX COMPONENTS	MOLE%	WT%
BENZENE	0.0111	0.0492
TOLUENE	0.0147	0.0768
ETHYLBENZENE	0.0004	0.0024
XYLENES	0.0027	0.0162
TOTAL BTEX	0.0289	0.1446

CALCULATED VALUES**

	BTU @	14.65	14.73
LHV	NET DRY REAL :	981.9 /scf	987.2 /scf
	NET WET REAL :	964.7 /scf	970.0 /scf
HHV	GROSS DRY REAL :	1087.3 /scf	1093.2 /scf
	GROSS WET REAL :	1068.3 /scf	1074.2 /scf

NET HEATING VALUE (60 °F ideal reaction):	21150.0	**Btu/lbm**
GROSS HEATING VALUE (60°F ideal reaction):	23424.1	**Btu/lbm**
RELATIVE DENSITY (AIR=1):	0.6087	
DENSITY	0.04648	**lbm/scf**
COMPRESSIBILITY FACTOR :	0.9976	
REGULAR WOBBE INDEX	1394.7	

**(DETAILED HYDROCARBON ANALYSIS/NJ 1993)*

Mod ASTM D6730,GPA 2261 & GPA 2286.

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

EMPACT

EXTENDED NATURAL GAS ANALYSIS (*DHA)

GLYCALC INFORMATION

PROJECT NO. :	202409055	ANALYSIS NO. :	06
COMPANY NAME :	QB ENERGY OPERATING, LLC	ANALYSIS DATE:	SEPTEMBER 19, 2024 11:56
ACCOUNT NO. :		SAMPLE DATE :	SEPTEMBER 4, 2024 9:30
PRODUCER :	QB ENERGY OPERATING, LLC	CYLINDER NO. :	TBI/UT-042
LEASE NO. :	110165700	SAMPLED BY :	MIKE KELLEY
NAME/DESCRIP :	D27 EF12B-22 BRAIDEN HEAD		
FIELD DATA		SAMPLE TEMP. :	57
SAMPLE PRES. :	203	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	0.02	0.05
Nitrogen	0.38	0.60
Methane	93.7267	85.2403
Ethane	3.1094	5.3004
Propane	1.3436	3.3587
Isobutane	0.2896	0.9542
n-Butane	0.5307	1.7486
Isopentane	0.1637	0.6696
n-Pentane	0.1417	0.5795
Cyclopentane	0.0054	0.0215
n-Hexane	0.0347	0.1695
Cyclohexane	0.0158	0.0754
Other Hexanes	0.0839	0.4079
Heptanes	0.0547	0.3095
Methylcyclohexane	0.0292	0.1625
2,2,4 Trimethylpentane	0.0001	0.0006
Benzene	0.0111	0.0492
Toluene	0.0147	0.0768
Ethylbenzene	0.0004	0.0024
Xylenes	0.0027	0.0162
C8+ Heavies	0.0319	0.2072
Subtotal	100.00000	100.00000
Oxygen/Argon	0.00	0.00
Total	100.00000	100.00000

Calculated Values BTU @ **14.65**		**Total Sample**	**C6+ Fraction**	**C8+ Fraction**	**C10+ Fraction**	
LHV	Net Dry Real:	981.9	4705.2	5702.0	7170.4	**Btu/scf**
	Net Wet Real:	964.7	4622.9	5602.3	7045.1	**Btu/scf**
HHV	Gross Dry Real:	1087.3	5055.9	6133.8	7721.8	**Btu/scf**
	Gross Wet Real:	1068.3	4967.5	6026.6	7586.8	**Btu/scf**
Other Calculated Values						
Regualr Wobbe Index*		1394.7	2802.1	3092.3	3493.4	**Btu/scf**
Net Heating Value (60 °F ideal reaction):		21150.0	19224.9	19672.3	19176.4	**Btu/lbm**
Gross Heating Value (60°F ideal reaction):		23424.1	20661.3	21163.1	20651.0	**Btu/lbm**
Molar Mass (MW):		17.64073	93.361	114.013	142.282	**g/mol**
Relative Density (AIR=1):		0.6087	3.2242	3.9361	4.9126	**SG**
Density:		0.04648	0.24603	0.30045	0.37493	**lbm/scf**
Compressiblity Factor:		0.9976	0.9920	0.9971	0.9996	**Z**
Liquid Volume real gas @:	**14.65**	17.526	0.1126	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:	**05-045-11718**	NAME/DESCRIP :	**D27 EF12B-22**
LEASE #:	**110165700**		**BRAIDEN HEAD**
FIELD/AREA:			
PROJECT NO. :	**202409055**	ANALYSIS NO. :	**06**
COMPANY NAME :	**QB ENERGY OPERATING, LLC**	ANALYSIS DATE:	SEPTEMBER 19, 2024 11:56
OFFICE / BRANCH:	PARACHUTE, CO	SAMPLE DATE :	SEPTEMBER 4, 2024 9:30
CUSTOMER REF:		TO:	
PRODUCER :	QB ENERGY OPERATING, LLC	EFFECTIVE DATE:	
FIELD DATA			
SAMPLE CYCLE:		SAMPLE TYPE:	SPOT
SAMPLE PRES. :	203 psig	PROBE :	NO
FLOW PRES. :	psig	CYLINDER NO. :	TBI/UT-042
LAB PRES:	psig	SAMPLED BY :	MIKE KELLEY
SAMPLE TEMP. :	57 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	---	---
Hydrogen	---	0.00	0.00	---	---
Oxygen/Argon	---	0.00	0.00	---	---
Nitrogen	---	0.38	0.60	---	---
Carbon Dioxide	---	0.02	0.05	---	---
Methane	P1	93.7267	85.2403	---	---
Ethane	P2	3.1094	5.3004	0.828	0.833
Propane	P3	1.3436	3.3587	0.369	0.371
i-Butane	I4	0.2896	0.9542	0.095	0.095
n-Butane	P4	0.5306	1.7483	0.167	0.168
2,2-Dimethylpropane	I5	0.0027	0.0111	0.001	0.001
i-Pentane	I5	0.1610	0.6585	0.059	0.059
UnknownC4s	U4	0.0001	0.0003	0.000	0.000
n-Pentane	P5	0.1417	0.5795	0.051	0.051
2,2-Dimethylbutane	I6	0.0044	0.0215	0.002	0.002
Cyclopentane	N5	0.0054	0.0215	0.002	0.002
2,3-Dimethylbutane	I6	0.0080	0.0391	0.003	0.003
2-Methylpentane	I6	0.0357	0.1744	0.015	0.015
3-Methylpentane	I6	0.0188	0.0918	0.008	0.008
n-Hexane	P6	0.0347	0.1695	0.014	0.014
2,2-Dimethylpentane	I7	0.0015	0.0085	0.001	0.001
Methylcyclopentane	N6	0.0170	0.0811	0.006	0.006
2,4-Dimethylpentane	I7	0.0023	0.0130	0.001	0.001
2,2,3-Trimethylbutane	I7	0.0007	0.0040	0.000	0.000
Benzene	A6	0.0111	0.0492	0.003	0.003
3,3-Dimethylpentane	I7	0.0009	0.0051	0.000	0.000
Cyclohexane	N6	0.0158	0.0754	0.005	0.005

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

2-Methylhexane	I7	0.0102	0.0579	0.005	0.005
2,3-Dimethylpentane	I7	0.0028	0.0159	0.001	0.001
1,1-Dimethylcyclopentane	N7	0.0018	0.0100	0.001	0.001
3-Methylhexane	I7	0.0092	0.0523	0.004	0.004
1c,3-Dimethylcyclopentane	N7	0.0025	0.0139	0.001	0.001
1t,3-Dimethylcyclopentane	N7	0.0023	0.0128	0.001	0.001
3-Ethylpentane	I7	0.0004	0.0023	0.000	0.000
1t,2-Dimethylcyclopentane	N7	0.0036	0.0200	0.002	0.002
2,2,4-Trimethylpentane	I8	0.0001	0.0006	0.000	0.000
n-Heptane	P7	0.0151	0.0858	0.007	0.007
1c,2-Dimethylcyclopentane	N7	0.0002	0.0011	0.000	0.000
Methylcyclohexane	N7	0.0292	0.1625	0.012	0.012
2,2-Dimethylhexane	I8	0.0011	0.0071	0.001	0.001
1,1,3-Trimethylcyclopentane	N7	0.0002	0.0013	0.000	0.000
Ethylcyclopentane	N7	0.0010	0.0056	0.000	0.000
2,5-Dimethylhexane	I8	0.0012	0.0078	0.001	0.001
2,2,3-Trimethylpentane	I8	0.0011	0.0071	0.001	0.001
2,4-Dimethylhexane	I8	0.0001	0.0006	0.000	0.000
1c,2t,4-Trimethylcyclopentane	N8	0.0005	0.0032	0.000	0.000
3,3-Dimethylhexane	I8	0.0004	0.0026	0.000	0.000
Toluene	A7	0.0147	0.0768	0.005	0.005
2,3-Dimethylhexane	I8	0.0007	0.0045	0.000	0.000
2-Methyl-3-ethylpentane	I8	0.0001	0.0006	0.000	0.000
2-Methylheptane	I8	0.0040	0.0259	0.002	0.002
4-Methylheptane	I8	0.0013	0.0085	0.001	0.001
3-Methyl-3-ethylpentane	I8	0.0002	0.0013	0.000	0.000
3,4-Dimethylhexane	I8	0.0001	0.0006	0.000	0.000
1c,2c,4-Trimethylcyclopentane	N8	0.0001	0.0006	0.000	0.000
3-Methylheptane	I8	0.0033	0.0214	0.002	0.002
1c,2t,3-Trimethylcyclopentane	N8	0.0038	0.0242	0.002	0.002
3-Ethylhexane	I8	0.0001	0.0006	0.000	0.000
1t,4-Dimethylcyclohexane	N8	0.0016	0.0102	0.001	0.001
1,1-Dimethylcyclohexane	N8	0.0007	0.0045	0.000	0.000
2,2,5-Trimethylhexane	I9	0.0001	0.0007	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
2,2,4-Trimethylhexane	I9	0.0001	0.0007	0.000	0.000
1t,2-Dimethylcyclohexane	N8	0.0011	0.0070	0.001	0.001
1t,3-Dimethylcyclohexane	N8	0.0001	0.0006	0.000	0.000
n-Octane	P8	0.0060	0.0388	0.003	0.003
1c,4-Dimethylcyclohexane	N8	0.0007	0.0045	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
2,2-Dimethylheptane	I9	0.0003	0.0022	0.000	0.000
1,1,4-Trimethylcyclohexane	N9	0.0007	0.0050	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	0.0026	0.000	0.000
n-Propylcyclopentane	N8	0.0001	0.0006	0.000	0.000
1c,3c,5-Trimethylcyclohexane	N9	0.0001	0.0007	0.000	0.000
2,5-Dimethylheptane	I9	0.0003	0.0022	0.000	0.000
3,3-Dimethylheptane	I9	0.0001	0.0007	0.000	0.000
Ethylbenzene	I8	0.0004	0.0024	0.000	0.000
1,3-Dimethylbenzene (m-Xylene)	A8	0.0018	0.0108	0.001	0.001
1,4-Dimethylbenzene (p-Xylene)	A8	0.0007	0.0042	0.000	0.000
4-Methyloctane	I9	0.0001	0.0007	0.000	0.000
2-Methyloctane	I9	0.0001	0.0007	0.000	0.000
1c,2t,4c-Trimethylcyclohexane	I9	0.0001	0.0007	0.000	0.000
1,2-Dimethylbenzene (o-Xylene)	A8	0.0002	0.0012	0.000	0.000

n-Nonane	P9	0.0002	0.0015	0.000	0.000
1,3,5-Trimethylbenzene	A9	0.0001	0.0007	0.000	0.000
n-Decane	P10	0.0001	0.0008	0.000	0.000
TOTAL		100.00000	100.00000	1.6849	1.6936

BTEX COMPONENTS	MOLE%	WT%
BENZENE	0.0111	0.0492
TOLUENE	0.0147	0.0768
ETHYLBENZENE	0.0004	0.0024
XYLENES	0.0027	0.0162
TOTAL BTEX	0.0289	0.1446

**(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 :	981.9 /scf	987.2 /scf
	NET WET REAL :	964.7 /scf	970.0 /scf
HHV	GROSS DRY REAL :	1087.3 /scf	1093.2 /scf
	GROSS WET REAL :	1068.3 /scf	1074.2 /scf

NET HEATING VALUE (60 °F ideal reaction):	21150.0 Btu/lbm
GROSS HEATING VALUE (60°F ideal reaction):	23424.1 Btu/lbm
RELATIVE DENSITY (AIR=1):	0.6087
DENSITY	0.04648 lb/scf
COMPRESSIBILITY FACTOR :	0.9976
REGULAR WOBBE INDEX	1394.7

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

Net Dry Ideal BTU	4682.4 /scf	Relative Density - SG (Air=1)	3.2242	***C6+factors***
Gross Dry Ideal BTU	5031.4 /scf	**Z** Compressiblity Factor	0.99204	0.99143
Net Dry Ideal BTU	19224.9 /lb	Density Factor	246.029 lbm/1000 ft3	
Gross Dry Ideal BTU	20661.3 /lb	Molar Mass or MW	93.361 g/mol	
		Volume Liquid Ideal gas	0.113 scf/gal	24.5

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.

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