EXTENDED NATURAL GAS ANALYSIS (*DHA)

MAIN PAGE

PRIMARY DB KEY:	**05-045-11795**	NAME/DESCRIP :	**300115023 1D CASS-KNOXS 1-21C CASING**
LEASE #:			
FIELD/AREA:			

PROJECT NO. :	**202501048**	ANALYSIS NO. :	**04**
COMPANY NAME :	**QB ENERGY OPERATING, LLC**	ANALYSIS DATE:	JANUARY 27, 2025 17:05
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. :	95	psig	PROBE :	NO
FLOW PRES. :		psig	CYLINDER NO. :	ECA-819
LAB PRES:		psig	SAMPLED BY :	MIKE KELLEY
SAMPLE TEMP. :	38	ºf	SAMPLING COMPANY:	QB ENERGY
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	0.0009	0.0021	0.0000	0.0000
HELIUM	0.00	0.00	---	---
HYDROGEN	0.11	0.01	---	---
OXYGEN/ARGON	0.00	0.00	---	---
NITROGEN	0.13	0.20	---	---
CARBON DIOXIDE	0.72	1.71	---	---
METHANE	90.8750	78.7522	---	---
ETHANE	4.5293	7.3570	1.2073	1.2139
PROPANE	1.5031	3.5804	0.4128	0.4150
I-BUTANE	0.3596	1.1291	0.1169	0.1176
N-BUTANE	0.4595	1.4427	0.1439	0.1447
I-PENTANE	0.2846	1.1070	0.1019	0.1025
N-PENTANE	0.2349	0.9155	0.0850	0.0854
HEXANES PLUS	0.7931	3.7940	0.3080	0.3092
TOTALS	100.00000	100.00000	2.3758	2.3883

BTEX COMPONENTS	MOLE%	WT%
BENZENE	0.0542	0.2287
TOLUENE	0.0208	0.1036
ETHYLBENZENE	0.0000	0.0000
XYLENES	0.0000	0.0000
TOTAL BTEX	0.0750	0.3323

**(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 :	1012.8 /scf	1018.4 /scf
	NET WET REAL :	995.1 /scf	1000.7 /scf
HHV	GROSS DRY REAL :	1120.5 /scf	1126.6 /scf
	GROSS WET REAL :	1100.9 /scf	1107.0 /scf

NET HEATING VALUE (60 °F ideal reaction):	20787.1	**Btu/lbm**
GROSS HEATING VALUE (60°F ideal reaction):	22993.9	**Btu/lbm**
RELATIVE DENSITY (AIR=1):	0.6387	
DENSITY	0.04878	**lbm/scf**
COMPRESSIBILITY FACTOR :	0.9974	
REGULAR WOBBE INDEX	1402.8	

EMPACT

EXTENDED NATURAL GAS ANALYSIS (*DHA)

GLYCALC INFORMATION

PROJECT NO. :	202501048	ANALYSIS NO. :	04
COMPANY NAME :	QB ENERGY OPERATING, LLC	ANALYSIS DATE:	JANUARY 27, 2025 17:05
ACCOUNT NO. :		SAMPLE DATE :	JANUARY 2, 2025
PRODUCER :	QB ENERGY OPERATING, LLC	CYLINDER NO. :	ECA-819
LEASE NO. :		SAMPLED BY :	MIKE KELLEY
NAME/DESCRIP :	300115023 1D CASS-KNOXS 1-21C CASING		
FIELD DATA		SAMPLE TEMP. :	38
SAMPLE PRES. :	95	AMBIENT TEMP.:	
H2S BY STAIN TUBE:	_ *ppm mol*		
COMMENTS :	*SPOT* *NO PROBE*		

Componet	Mole %	Wt %
Helium	0.00	0.00
Hydrogen	0.11	0.01
Carbon Dioxide	0.72	1.71
Nitrogen	0.13	0.20
Methane	90.8750	78.7522
Ethane	4.5293	7.3570
Propane	1.5031	3.5804
Isobutane	0.3596	1.1291
n-Butane	0.4595	1.4427
Isopentane	0.2636	1.0274
n-Pentane	0.2349	0.9155
Cyclopentane	0.0210	0.0796
n-Hexane	0.1523	0.7090
Cyclohexane	0.0871	0.3960
Other Hexanes	0.2916	1.3478
Heptanes	0.1198	0.6448
Methylcyclohexane	0.0626	0.3320
2,2,4 Trimethylpentane	0.0002	0.0012
Benzene	0.0542	0.2287
Toluene	0.0208	0.1036
Ethylbenzene	0.0000	0.0000
Xylenes	0.0000	0.0000
C8+ Heavies	0.0045	0.0309
Subtotal	99.99910	99.99790
Oxygen/Argon	0.00	0.00
Alcohols	0.0009	0.0021
Total	100.00000	100.00000

Calculated Values BTU @ **14.65**		**Total Sample**	**C6+ Fraction**	**C8+ Fraction**	**C10+ Fraction**	
LHV	Net Dry Real:	1012.8	4473.0	6335.2	10735.1	**Btu/scf**
	Net Wet Real:	995.1	4394.8	6224.5	10547.4	**Btu/scf**
HHV	Gross Dry Real:	1120.5	4806.7	6826.9	11545.6	**Btu/scf**
	Gross Wet Real:	1100.9	4722.7	6707.6	11343.8	**Btu/scf**
Other Calculated Values						
Regualr Wobbe Index*		1402.8	2731.8	3241.2	4256.6	**Btu/scf**
Net Heating Value (60 °F ideal reaction):		20787.1	19159.6	19850.9	19844.1	**Btu/lbm**
Gross Heating Value (60°F ideal reaction):		22993.9	20588.0	21391.8	21342.7	**Btu/lbm**
Molar Mass (MW):		18.5121	88.563	128.504	214.423	**g/mol**
Relative Density (AIR=1):		0.6387	3.0578	4.4371	7.4035	**SG**
Density:		0.04878	0.23338	0.33864	0.56503	**lbm/scf**
Compressiblity Factor:		0.9974	0.9907	0.9969	1.0000	**Z**
Liquid Volume real gas @:	**14.65**	17.835	0.307	0	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.

EXTENDED NATURAL GAS ANALYSIS (*DHA)

DHA COMPONENT LIST

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PRODUCER :	QB ENERGY OPERATING, LLC	EFFECTIVE DATE:	
FIELD DATA			
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SAMPLE PRES. :	95 psig	PROBE :	NO
FLOW PRES. :	psig	CYLINDER NO. :	ECA-819
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**
Hydrogen	---	0.11	0.01	---	---
Nitrogen	---	0.13	0.20	---	---
Carbon Dioxide	---	0.72	1.71	---	---
Methane	P1	90.8750	78.7522	---	---
Ethane	P2	4.5293	7.3570	1.207	1.214
Propane	P3	1.5031	3.5804	0.413	0.415
i-Butane	I4	0.3596	1.1291	0.117	0.118
Methanol	X1	0.0006	0.0010	0.000	0.000
n-Butane	P4	0.4594	1.4424	0.144	0.145
2,2-Dimethylpropane	I5	0.0059	0.0230	0.002	0.002
Ethanol	X2	0.0001	0.0003	0.000	0.000
i-Pentane	I5	0.2577	1.0044	0.094	0.095
UnknownC4s	U4	0.0001	0.0003	0.000	0.000
n-Pentane	P5	0.2347	0.9147	0.085	0.085
t-Butanol	X4	0.0001	0.0004	0.000	0.000
2,2-Dimethylbutane	I6	0.0115	0.0535	0.005	0.005
Cyclopentane	N5	0.0210	0.0796	0.006	0.006
2,3-Dimethylbutane	I6	0.0238	0.1108	0.010	0.010
2-Methylpentane	I6	0.1070	0.4981	0.044	0.044
3-Methylpentane	I6	0.0608	0.2831	0.025	0.025
UnknownC5s	U5	0.0002	0.0008	0.000	0.000
n-Hexane	P6	0.1523	0.7090	0.062	0.062
2,2-Dimethylpentane	I7	0.0031	0.0168	0.001	0.001
Methylcyclopentane	N6	0.0883	0.4014	0.031	0.031
2,4-Dimethylpentane	I7	0.0061	0.0330	0.003	0.003
2,2,3-Trimethylbutane	I7	0.0014	0.0076	0.001	0.001
n-Butanol	X4	0.0001	0.0004	0.000	0.000
Benzene	A6	0.0542	0.2287	0.015	0.015
3,3-Dimethylpentane	I7	0.0018	0.0097	0.001	0.001
Cyclohexane	N6	0.0871	0.3960	0.030	0.030
2-Methylhexane	I7	0.0211	0.1142	0.010	0.010
2,3-Dimethylpentane	I7	0.0059	0.0319	0.003	0.003
1,1-Dimethylcyclopentane	N7	0.0056	0.0297	0.002	0.002
3-Methylhexane	I7	0.0177	0.0958	0.008	0.008
1c,3-Dimethylcyclopentane	N7	0.0084	0.0446	0.004	0.004
1t,3-Dimethylcyclopentane	N7	0.0072	0.0382	0.003	0.003
3-Ethylpentane	I7	0.0007	0.0038	0.000	0.000

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1t,2-Dimethylcyclopentane	N7	0.0111	0.0589	0.005	0.005
2,2,4-Trimethylpentane	I8	0.0002	0.0012	0.000	0.000
UnknownC6s	U6	0.0002	0.0009	0.000	0.000
n-Heptane	P7	0.0269	0.1456	0.012	0.012
1c,2-Dimethylcyclopentane	N7	0.0007	0.0037	0.000	0.000
Methylcyclohexane	N7	0.0626	0.3320	0.025	0.025
2,2-Dimethylhexane	I8	0.0008	0.0049	0.000	0.000
1,1,3-Trimethylcyclopentane	N7	0.0002	0.0012	0.000	0.000
Ethylcyclopentane	N7	0.0015	0.0079	0.001	0.001
2,5-Dimethylhexane	I8	0.0003	0.0018	0.000	0.000
2,2,3-Trimethylpentane	I8	0.0003	0.0018	0.000	0.000
2,4-Dimethylhexane	I8	0.0001	0.0006	0.000	0.000
1c,2t,4-Trimethylcyclopentane	N8	0.0004	0.0024	0.000	0.000
3,3-Dimethylhexane	I8	0.0001	0.0006	0.000	0.000
Toluene	A7	0.0208	0.1036	0.007	0.007
2,3-Dimethylhexane	I8	0.0001	0.0006	0.000	0.000
2-Methylheptane	I8	0.0003	0.0018	0.000	0.000
4-Methylheptane	I8	0.0001	0.0006	0.000	0.000
3-Methylheptane	I8	0.0001	0.0006	0.000	0.000
1c,2t,3-Trimethylcyclopentane	N8	0.0005	0.0030	0.000	0.000
1t,4-Dimethylcyclohexane	N8	0.0003	0.0018	0.000	0.000
1,1-Dimethylcyclohexane	N8	0.0001	0.0006	0.000	0.000
1t,2-Dimethylcyclohexane	N8	0.0001	0.0006	0.000	0.000
UnknownC7s	U7	0.0004	0.0022	0.000	0.000
n-Octane	P8	0.0001	0.0006	0.000	0.000
1c,4-Dimethylcyclohexane	N8	0.0001	0.0006	0.000	0.000
n-Tridecane	P13	0.0001	0.0010	0.000	0.000
n-Tetradecane	P14	0.0001	0.0011	0.000	0.000
n-Pentadecane	P15	0.0001	0.0011	0.000	0.000
UnknownC15s	U15	0.0001	0.0011	0.000	0.000
n-Hexadecane	P16	0.0001	0.0012	0.000	0.000
UnknownC16s	U16	0.0001	0.0012	0.000	0.000
UnknownC17s	U17	0.0001	0.0013	0.000	0.000
TOTAL		100.00000	100.00000	2.3758	2.3883

BTEX COMPONENTS	MOLE%	WT%
BENZENE	0.0542	0.2287
TOLUENE	0.0208	0.1036
ETHYLBENZENE	0.0000	0.0000
XYLENES	0.0000	0.0000
TOTAL BTEX	0.0750	0.3323

(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 :	1012.8 /scf	1018.4 /scf
	NET WET REAL :	995.1 /scf	1000.7 /scf
HHV	GROSS DRY REAL :	1120.5 /scf	1126.6 /scf
	GROSS WET REAL :	1100.9 /scf	1107.0 /scf
	NET HEATING VALUE (60 °F ideal reaction):		20787.1 Btu/lbm
	GROSS HEATING VALUE (60°F ideal reaction):		22993.9 Btu/lbm
	RELATIVE DENSITY (AIR=1):		0.6387
	DENSITY		0.04878 lb/scf
	COMPRESSIBILITY FACTOR :		0.9974
	REGULAR WOBBE INDEX		1402.8

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

Net Dry Ideal BTU	4445.2 /scf	Relative Density - SG (Air=1)	3.0578	***C6+factors***
Gross Dry Ideal BTU	4776.9 /scf	**Z** Compressiblity Factor	0.99068	0.99027
Net Dry Ideal BTU	19159.6 /lb	Density Factor	233.385 lbm/1000 ft3	
Gross Dry Ideal BTU	20588 /lb	Molar Mass or MW	88.563 g/mol	
		Volume Liquid Ideal gas	0.308 scf/gal	25.7

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.*