EXTENDED NATURAL GAS ANALYSIS (*DHA)

MAIN PAGE

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

PROJECT NO. :	**202409055**	ANALYSIS NO. :	**05**
COMPANY NAME :	**QB ENERGY OPERATING, LLC**	ANALYSIS DATE:	SEPTEMBER 19, 2024 10:06
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. :	271	psig	PROBE :	NO
FLOW PRES. :		psig	CYLINDER NO. :	ECA-812
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
ALCOHOLS	0.0005	0.0016	0.0000	0.0000
HELIUM	0.00	0.00	---	---
HYDROGEN	0.01	0.00	---	---
OXYGEN/ARGON	0.00	0.00	---	---
NITROGEN	0.09	0.14	---	---
CARBON DIOXIDE	2.30	5.53	---	---
METHANE	90.4424	79.3052	---	---
ETHANE	5.0454	8.2922	1.3451	1.3524
PROPANE	1.0523	2.5363	0.2888	0.2904
I-BUTANE	0.3312	1.0522	0.1079	0.1085
N-BUTANE	0.2060	0.6544	0.0650	0.0653
I-PENTANE	0.1313	0.5175	0.0480	0.0482
N-PENTANE	0.0596	0.2350	0.0220	0.0221
HEXANES PLUS	0.3313	1.7356	0.1330	0.1333
TOTALS	100.00000	100.00000	2.0098	2.0202

BTEX COMPONENTS	MOLE%	WT%
BENZENE	0.0147	0.0628
TOLUENE	0.0242	0.1219
ETHYLBENZENE	0.0009	0.0053
XYLENES	0.0055	0.0319
TOTAL BTEX	0.0453	0.2219

**(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 :	966.3	/scf	971.6	/scf
	NET WET REAL :	949.4	/scf	954.7	/scf
HHV	GROSS DRY REAL :	1070.1	/scf	1075.9	/scf
	GROSS WET REAL :	1051.4	/scf	1057.2	/scf
	NET HEATING VALUE (60 °F ideal reaction):			20073.1	Btu/lbm
	GROSS HEATING VALUE (60°F ideal reaction):			22227.3	Btu/lbm
	RELATIVE DENSITY (AIR=1):			0.6311	
	DENSITY			0.04821	lbm/scf
	COMPRESSIBILITY FACTOR :			0.9976	
	REGULAR WOBBE INDEX			1347.9	

EMPACT

EXTENDED NATURAL GAS ANALYSIS (*DHA)

GLYCALC INFORMATION

PROJECT NO. :	202409055	ANALYSIS NO. :	05
COMPANY NAME :	QB ENERGY OPERATING, LLC	ANALYSIS DATE:	SEPTEMBER 19, 2024 10:06
ACCOUNT NO. :		SAMPLE DATE :	SEPTEMBER 4, 2024 9:30
PRODUCER :	QB ENERGY OPERATING, LLC	CYLINDER NO. :	ECA-812
LEASE NO. :	110165700	SAMPLED BY :	MIKE KELLEY
NAME/DESCRIP :	D27 EF12B-22 CASING		
FIELD DATA		SAMPLE TEMP. :	57
SAMPLE PRES. :	271	AMBIENT TEMP.:	
H2S BY STAIN TUBE:	_ *ppm mol*		
COMMENTS :	*SPOT* *NO PROBE*		

Componet	Mole %	Wt %
Helium	0.00	0.00
Hydrogen	0.01	0.00
Carbon Dioxide	2.30	5.53
Nitrogen	0.09	0.14
Methane	90.4424	79.3052
Ethane	5.0454	8.2922
Propane	1.0523	2.5363
Isobutane	0.3312	1.0522
n-Butane	0.2060	0.6544
Isopentane	0.1283	0.5060
n-Pentane	0.0596	0.2350
Cyclopentane	0.0030	0.0115
n-Hexane	0.0281	0.1324
Cyclohexane	0.0161	0.0741
Other Hexanes	0.0824	0.3863
Heptanes	0.0647	0.3531
Methylcyclohexane	0.0377	0.2023
2,2,4 Trimethylpentane	0.0002	0.0013
Benzene	0.0147	0.0628
Toluene	0.0242	0.1219
Ethylbenzene	0.0009	0.0053
Xylenes	0.0055	0.0319
C8+ Heavies	0.0568	0.3642
Subtotal	99.99950	99.99840
Oxygen/Argon	0.00	0.00
Alcohols	0.0005	0.0016
Total	100.00000	100.00000

Calculated Values BTU @ **14.65**		**Total Sample**	**C6+ Fraction**	**C8+ Fraction**	**C10+ Fraction**	
LHV	Net Dry Real:	966.3	4807.2	5798.3	9630.4	**Btu/scf**
	Net Wet Real:	949.4	4723.2	5696.9	9462.0	**Btu/scf**
HHV	Gross Dry Real:	1070.1	5161.0	6235.8	10351.8	**Btu/scf**
	Gross Wet Real:	1051.4	5070.8	6126.8	10170.8	**Btu/scf**
Other Calculated Values						
Regualr Wobbe Index*		1347.9	2827.0	3117.8	4031.8	**Btu/scf**
Net Heating Value (60 °F ideal reaction):		20073.1	19190.2	19595.3	18491.4	**Btu/lbm**
Gross Heating Value (60°F ideal reaction):		22227.3	20605.8	21072.3	19876.4	**Btu/lbm**
Molar Mass (MW):		18.29555	95.794	115.972	192.124	**g/mol**
Relative Density (AIR=1):		0.6311	3.3073	4.0038	6.6335	**SG**
Density:		0.04821	0.25244	0.30560	0.50627	**lbm/scf**
Compressiblity Factor:		0.9976	0.9930	0.9973	1.0000	**Z**
Liquid Volume real gas @:	**14.65**	17.6516	0.1326	0.0269	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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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	---	0.00	0.00	---	---
Hydrogen	---	0.01	0.00	---	---
Oxygen/Argon	---	0.00	0.00	---	---
Nitrogen	---	0.09	0.14	---	---
Carbon Dioxide	---	2.30	5.53	---	---
Methane	P1	90.4424	79.3052	---	---
Ethane	P2	5.0454	8.2922	1.345	1.352
Propane	P3	1.0523	2.5363	0.289	0.290
i-Butane	I4	0.3312	1.0522	0.108	0.109
n-Butane	P4	0.2060	0.6544	0.065	0.065
2,2-Dimethylpropane	I5	0.0061	0.0241	0.002	0.002
i-Pentane	I5	0.1222	0.4819	0.045	0.045
Acetone	X3	0.0005	0.0016	0.000	0.000
n-Pentane	P5	0.0596	0.2350	0.022	0.022
2,2-Dimethylbutane	I6	0.0082	0.0386	0.003	0.003
Cyclopentane	N5	0.0030	0.0115	0.001	0.001
2,3-Dimethylbutane	I6	0.0089	0.0419	0.004	0.004
2-Methylpentane	I6	0.0313	0.1474	0.013	0.013
3-Methylpentane	I6	0.0179	0.0843	0.007	0.007
n-Hexane	P6	0.0281	0.1324	0.012	0.012
2,2-Dimethylpentane	I7	0.0020	0.0109	0.001	0.001
Methylcyclopentane	N6	0.0161	0.0741	0.006	0.006
2,4-Dimethylpentane	I7	0.0029	0.0159	0.001	0.001
2,2,3-Trimethylbutane	I7	0.0011	0.0060	0.001	0.001
Benzene	A6	0.0147	0.0628	0.004	0.004
3,3-Dimethylpentane	I7	0.0012	0.0066	0.001	0.001
Cyclohexane	N6	0.0161	0.0741	0.005	0.005
2-Methylhexane	I7	0.0117	0.0641	0.005	0.005

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2,3-Dimethylpentane	I7	0.0032	0.0176	0.001	0.001
1,1-Dimethylcyclopentane	N7	0.0022	0.0118	0.001	0.001
3-Methylhexane	I7	0.0106	0.0581	0.005	0.005
1c,3-Dimethylcyclopentane	N7	0.0028	0.0150	0.001	0.001
1t,3-Dimethylcyclopentane	N7	0.0026	0.0139	0.001	0.001
3-Ethylpentane	I7	0.0005	0.0027	0.000	0.000
1t,2-Dimethylcyclopentane	N7	0.0040	0.0215	0.002	0.002
2,2,4-Trimethylpentane	I8	0.0002	0.0013	0.000	0.000
n-Heptane	P7	0.0179	0.0981	0.008	0.008
1c,2-Dimethylcyclopentane	N7	0.0004	0.0021	0.000	0.000
Methylcyclohexane	N7	0.0377	0.2023	0.015	0.015
2,2-Dimethylhexane	I8	0.0013	0.0081	0.001	0.001
1,1,3-Trimethylcyclopentane	N7	0.0002	0.0012	0.000	0.000
Ethylcyclopentane	N7	0.0013	0.0070	0.001	0.001
2,5-Dimethylhexane	I8	0.0018	0.0113	0.001	0.001
2,2,3-Trimethylpentane	I8	0.0016	0.0100	0.001	0.001
2,4-Dimethylhexane	I8	0.0001	0.0006	0.000	0.000
1c,2t,4-Trimethylcyclopentane	N8	0.0007	0.0043	0.000	0.000
3,3-Dimethylhexane	I8	0.0005	0.0031	0.000	0.000
2,3,3-Trimethylpentane	I8	0.0001	0.0006	0.000	0.000
Toluene	A7	0.0242	0.1219	0.008	0.008
2,3-Dimethylhexane	I8	0.0011	0.0069	0.001	0.001
2-Methyl-3-ethylpentane	I8	0.0001	0.0006	0.000	0.000
2-Methylheptane	I8	0.0063	0.0394	0.003	0.003
4-Methylheptane	I8	0.0021	0.0131	0.001	0.001
3-Methyl-3-ethylpentane	I8	0.0003	0.0019	0.000	0.000
3,4-Dimethylhexane	I8	0.0002	0.0013	0.000	0.000
1c,2c,4-Trimethylcyclopentane	N8	0.0001	0.0006	0.000	0.000
3-Methylheptane	I8	0.0056	0.0350	0.003	0.003
1c,2t,3-Trimethylcyclopentane	N8	0.0063	0.0386	0.003	0.003
3-Ethylhexane	I8	0.0002	0.0013	0.000	0.000
1t,4-Dimethylcyclohexane	N8	0.0026	0.0160	0.001	0.001
1,1-Dimethylcyclohexane	N8	0.0012	0.0074	0.001	0.001
2,2,5-Trimethylhexane	I9	0.0003	0.0021	0.000	0.000
3c-Ethylmethylcyclopentane	N8	0.0003	0.0019	0.000	0.000
3t-Ethylmethylcyclopentane	N8	0.0003	0.0019	0.000	0.000
2t-Ethylmethylcyclopentane	N8	0.0003	0.0019	0.000	0.000
1,1-Methylethylcyclopentane	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	0.0019	0.0116	0.001	0.001
1t,3-Dimethylcyclohexane	N8	0.0003	0.0019	0.000	0.000
UnknownC7s	U7	0.0001	0.0006	0.000	0.000
n-Octane	P8	0.0119	0.0743	0.006	0.006
1c,4-Dimethylcyclohexane	N8	0.0013	0.0080	0.001	0.001
i-Propylcyclopentane	I8	0.0001	0.0006	0.000	0.000
2,3,5-Trimethylhexane	I9	0.0003	0.0021	0.000	0.000
2,2,3,4-Tetramethylpentane	I9	0.0001	0.0007	0.000	0.000
2,3,4-Trimethylhexane	I9	0.0001	0.0007	0.000	0.000
2,2-Dimethylheptane	I9	0.0006	0.0042	0.000	0.000
1,1,4-Trimethylcyclohexane	N9	0.0015	0.0103	0.001	0.001
2,2,3-Trimethylhexane	I9	0.0003	0.0021	0.000	0.000
2,4-Dimethylheptane	I9	0.0001	0.0007	0.000	0.000
Ethylcyclohexane	N8	0.0006	0.0037	0.000	0.000
n-Propylcyclopentane	N8	0.0004	0.0025	0.000	0.000
1c,3c,5-Trimethylcyclohexane	N9	0.0003	0.0021	0.000	0.000
2,5-Dimethylheptane	I9	0.0006	0.0042	0.000	0.000
3,3-Dimethylheptane	I9	0.0002	0.0014	0.000	0.000
Ethylbenzene	I8	0.0009	0.0053	0.000	0.000
1,3-Dimethylbenzene (m-Xylene)	A8	0.0038	0.0220	0.001	0.001
1,4-Dimethylbenzene (p-Xylene)	A8	0.0015	0.0087	0.001	0.001
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	0.0014	0.000	0.000
1,1-Methylethylcyclohexane	N9	0.0001	0.0007	0.000	0.000
n-Propylbenzene	A9	0.0001	0.0007	0.000	0.000
1,3,5-Trimethylbenzene	A9	0.0001	0.0007	0.000	0.000
1,2-Methylethylbenzene	A9	0.0001	0.0007	0.000	0.000
t-Butylbenzene	A10	0.0001	0.0007	0.000	0.000
UnknownC9s	U9	0.0001	0.0007	0.000	0.000
n-Decane	P10	0.0001	0.0008	0.000	0.000
n-Undecane	P11	0.0001	0.0009	0.000	0.000
n-Dodecane	P12	0.0001	0.0009	0.000	0.000
1,4-Methyl-n-pentylbenzene	A12	0.0001	0.0009	0.000	0.000
n-Tridecane	P13	0.0002	0.0020	0.000	0.000
n-Tetradecane	P14	0.0003	0.0033	0.000	0.000
n-Pentadecane	P15	0.0002	0.0023	0.000	0.000
n-Hexadecane	P16	0.0002	0.0025	0.000	0.000
UnknownC16s	U16	0.0001	0.0013	0.000	0.000
n-Heptadecane	P17	0.0001	0.0013	0.000	0.000
TOTAL		100.00000	100.00000	2.0098	2.0202

BTEX COMPONENTS	MOLE%	WT%
BENZENE	0.0147	0.0628
TOLUENE	0.0242	0.1219
ETHYLBENZENE	0.0009	0.0053
XYLENES	0.0055	0.0319
TOTAL BTEX	0.0453	0.2219

**(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 :	966.3 /scf	971.6 /scf
	NET WET REAL :	949.4 /scf	954.7 /scf
HHV	GROSS DRY REAL :	1070.1 /scf	1075.9 /scf
	GROSS WET REAL :	1051.4 /scf	1057.2 /scf
	NET HEATING VALUE (60 °F ideal reaction):		20073.1 Btu/lbm
	GROSS HEATING VALUE (60°F ideal reaction):		22227.3 Btu/lbm
	RELATIVE DENSITY (AIR=1):		0.6311
	DENSITY		0.04821 lb/scf
	COMPRESSIBILITY FACTOR :		0.9976
	REGULAR WOBBE INDEX		1347.9

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

Net Dry Ideal BTU	4788.6 /scf	Relative Density - SG (Air=1)	3.3073	***C6+factors***
Gross Dry Ideal BTU	5141.1 /scf	**Z** Compressiblity Factor	0.99302	0.99216
Net Dry Ideal BTU	19190.2 /lb	Density Factor	252.436 lbm/1000 ft3	
Gross Dry Ideal BTU	20605.8 /lb	Molar Mass or MW	95.794 g/mol	
		Volume Liquid Ideal gas	0.133 scf/gal	24.2

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.