EMPACT

EXTENDED NATURAL GAS ANALYSIS (*DHA)

MAIN PAGE

PRIMARY DB KEY: **05-103-10863** NAME/DESCRIP : **PICEANCE CREEK UNIT 297-11A1 SURFACE CASING**
LEASE #:
FIELD/AREA:

PROJECT NO. : **202411074** ANALYSIS NO. : **03**
COMPANY NAME : **QB ENERGY OPERATING, LLC** ANALYSIS DATE: DECEMBER 07, 2024 06:50
OFFICE / BRANCH: PARACHUTE, CO SAMPLE DATE : NOVEMBER 19, 2024 12:07
CUSTOMER REF: TO:
PRODUCER : QB ENERGY OPERATING, LLC EFFECTIVE DATE:

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

SAMPLE CYCLE: SAMPLE TYPE: SPOT
SAMPLE PRES. : 363 psig PROBE :
FLOW PRES. : psig CYLINDER NO. : ECA-724
LAB PRES: psig SAMPLED BY : ANDREW TERRAZAS
SAMPLE TEMP. : 29 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
HELIUM	0.01	0.00	---	---
HYDROGEN	0.00	0.00	---	---
OXYGEN/ARGON	0.01	0.02	---	---
NITROGEN	0.37	0.56	---	---
CARBON DIOXIDE	0.36	0.85	---	---
METHANE	91.4447	78.9174	---	---
ETHANE	3.9129	6.3294	1.0433	1.0490
PROPANE	1.7098	4.0558	0.4697	0.4723
I-BUTANE	0.3192	0.9981	0.1039	0.1045
N-BUTANE	0.5367	1.6781	0.1689	0.1698
I-PENTANE	0.1938	0.7510	0.0690	0.0693
N-PENTANE	0.1739	0.6750	0.0630	0.0633
HEXANES PLUS	0.9590	5.1652	0.4090	0.4107
TOTALS	100.00000	100.00000	2.3268	2.3389

BTEX COMPONENTS	MOLE%	WT%
BENZENE	0.0337	0.1416
TOLUENE	0.0484	0.2399
ETHYLBENZENE	0.0055	0.0314
XYLENES	0.0119	0.0679
TOTAL BTEX	0.0995	0.4808

**(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 :	1020.9 /scf	1026.4 /scf
	NET WET REAL :	1003.1 /scf	1008.6 /scf
HHV	GROSS DRY REAL :	1128.7 /scf	1134.9 /scf
	GROSS WET REAL :	1109.0 /scf	1115.2 /scf
	NET HEATING VALUE (60 °F ideal reaction):		20877.3 Btu/lbm
	GROSS HEATING VALUE (60°F ideal reaction):		23087.3 Btu/lbm
	RELATIVE DENSITY (AIR=1):		0.6406
	DENSITY		0.04898 lbm/scf
	COMPRESSIBILITY FACTOR :		0.9975
	REGULAR WOBBE INDEX		1411.1

EMPACT

EXTENDED NATURAL GAS ANALYSIS (*DHA)

GLYCALC INFORMATION

PROJECT NO. :	202411074	ANALYSIS NO. :	03
COMPANY NAME :	QB ENERGY OPERATING, LLC	ANALYSIS DATE:	DECEMBER 07, 2024 06:50
ACCOUNT NO. :		SAMPLE DATE :	NOVEMBER 19, 2024 12:07
PRODUCER :	QB ENERGY OPERATING, LLC	CYLINDER NO. :	ECA-724
LEASE NO. :		SAMPLED BY :	ANDREW TERRAZAS
NAME/DESCRIP :	PICEANCE CREEK UNIT 297-11A1 SURFACE CASING		
FIELD DATA		SAMPLE TEMP. :	29
SAMPLE PRES. :	363	AMBIENT TEMP.:	
H2S BY STAIN TUBE:	_ *ppm mol*		
COMMENTS :	*SPOT*		

Componet	Mole %	Wt %
Helium	0.01	0.00
Hydrogen	0.00	0.00
Carbon Dioxide	0.36	0.85
Nitrogen	0.37	0.56
Methane	91.4447	78.9174
Ethane	3.9129	6.3294
Propane	1.7098	4.0558
Isobutane	0.3192	0.9981
n-Butane	0.5367	1.6781
Isopentane	0.1825	0.7083
n-Pentane	0.1739	0.6750
Cyclopentane	0.0113	0.0427
n-Hexane	0.0837	0.3880
Cyclohexane	0.0430	0.1947
Other Hexanes	0.1400	0.6451
Heptanes	0.1886	1.0129
Methylcyclohexane	0.1086	0.5736
2,2,4 Trimethylpentane	0.0005	0.0031
Benzene	0.0337	0.1416
Toluene	0.0484	0.2399
Ethylbenzene	0.0055	0.0314
Xylenes	0.0119	0.0679
C8+ Heavies	0.2951	1.8670
Subtotal	99.99000	99.98000
Oxygen/Argon	0.01	0.02
Total	100.00000	100.00000

Calculated Values BTU @ **14.65**		**Total Sample**	**C6+ Fraction**	**C8+ Fraction**	**C10+ Fraction**	
LHV	Net Dry Real:	1020.9	5026.9	5865.1	7131.2	**Btu/scf**
	Net Wet Real:	1003.1	4939.0	5762.6	7006.5	**Btu/scf**
HHV	Gross Dry Real:	1128.7	5401.7	6311.9	7687.4	**Btu/scf**
	Gross Wet Real:	1109.0	5307.3	6201.6	7553.0	**Btu/scf**
Other Calculated Values						
Regualr Wobbe Index*		1411.1	2897.6	3142.0	3467.4	**Btu/scf**
Net Heating Value (60 °F ideal reaction):		20877.3	19309.8	19621.5	19282.7	**Btu/lbm**
Gross Heating Value (60°F ideal reaction):		23087.3	20749.7	21115.5	20783.4	**Btu/lbm**
Molar Mass (MW):		18.5891	100.148	117.05	143.131	**g/mol**
Relative Density (AIR=1):		0.6406	3.4584	4.0415	4.9418	**SG**
Density:		0.04898	0.26392	0.30845	0.37717	**lbm/scf**
Compressiblity Factor:		0.9975	0.9945	0.9976	0.9995	**Z**
Liquid Volume real gas @:	**14.65**	17.839	0.4077	0.1465	0.004	**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

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EXTENDED NATURAL GAS ANALYSIS (*DHA)

DHA COMPONENT LIST

PRIMARY DB KEY: **05-103-10863** NAME/DESCRIP : **PICEANCE CREEK UNIT 297-11A1**
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FIELD/AREA:

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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	---	---
Oxygen/Argon	---	0.01	0.02	---	---
Nitrogen	---	0.37	0.56	---	---
Carbon Dioxide	---	0.36	0.85	---	---
Methane	P1	91.4447	78.9174	---	---
Ethane	P2	3.9129	6.3294	1.043	1.049
Propane	P3	1.7098	4.0558	0.470	0.472
i-Butane	I4	0.3192	0.9981	0.104	0.105
n-Butane	P4	0.5367	1.6781	0.169	0.170
2,2-Dimethylpropane	I5	0.0036	0.0140	0.001	0.001
i-Pentane	I5	0.1789	0.6943	0.065	0.065
n-Pentane	P5	0.1739	0.6750	0.063	0.063
2,2-Dimethylbutane	I6	0.0044	0.0204	0.002	0.002
Cyclopentane	N5	0.0113	0.0427	0.003	0.003
2,3-Dimethylbutane	I6	0.0094	0.0436	0.004	0.004
2-Methylpentane	I6	0.0584	0.2707	0.024	0.024
3-Methylpentane	I6	0.0319	0.1479	0.013	0.013
n-Hexane	P6	0.0837	0.3880	0.034	0.034
2,2-Dimethylpentane	I7	0.0016	0.0086	0.001	0.001
Methylcyclopentane	N6	0.0359	0.1625	0.013	0.013
2,4-Dimethylpentane	I7	0.0036	0.0194	0.002	0.002
2,2,3-Trimethylbutane	I7	0.0006	0.0032	0.000	0.000
Benzene	A6	0.0337	0.1416	0.009	0.009
3,3-Dimethylpentane	I7	0.0012	0.0065	0.001	0.001
Cyclohexane	N6	0.0430	0.1947	0.015	0.015
2-Methylhexane	I7	0.0271	0.1461	0.013	0.013
2,3-Dimethylpentane	I7	0.0081	0.0437	0.004	0.004
1,1-Dimethylcyclopentane	N7	0.0042	0.0222	0.002	0.002

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3-Methylhexane	I7	0.0266	0.1434	0.012	0.012
1c,3-Dimethylcyclopentane	N7	0.0081	0.0428	0.004	0.004
1t,3-Dimethylcyclopentane	N7	0.0075	0.0396	0.003	0.003
3-Ethylpentane	I7	0.0013	0.0070	0.001	0.001
1t,2-Dimethylcyclopentane	N7	0.0131	0.0692	0.006	0.006
2,2,4-Trimethylpentane	I8	0.0005	0.0031	0.000	0.000
n-Heptane	P7	0.0784	0.4226	0.036	0.036
1c,2-Dimethylcyclopentane	N7	0.0014	0.0074	0.001	0.001
Methylcyclohexane	N7	0.1086	0.5736	0.044	0.044
2,2-Dimethylhexane	I8	0.0046	0.0282	0.002	0.002
1,1,3-Trimethylcyclopentane	N7	0.0009	0.0054	0.000	0.000
Ethylcyclopentane	N7	0.0048	0.0253	0.002	0.002
2,5-Dimethylhexane	I8	0.0041	0.0252	0.002	0.002
2,2,3-Trimethylpentane	I8	0.0037	0.0228	0.002	0.002
2,4-Dimethylhexane	I8	0.0005	0.0031	0.000	0.000
1c,2t,4-Trimethylcyclopentane	N8	0.0045	0.0272	0.002	0.002
3,3-Dimethylhexane	I8	0.0013	0.0080	0.001	0.001
2,3,4-Trimethylpentane	I8	0.0003	0.0018	0.000	0.000
2,3,3-Trimethylpentane	I8	0.0002	0.0012	0.000	0.000
Toluene	A7	0.0484	0.2399	0.016	0.016
2,3-Dimethylhexane	I8	0.0048	0.0295	0.002	0.002
2-Methyl-3-ethylpentane	I8	0.0013	0.0080	0.001	0.001
2-Methylheptane	I8	0.0303	0.1862	0.016	0.016
4-Methylheptane	I8	0.0073	0.0449	0.004	0.004
3-Methyl-3-ethylpentane	I8	0.0008	0.0049	0.000	0.000
3,4-Dimethylhexane	I8	0.0010	0.0061	0.000	0.000
1c,2c,4-Trimethylcyclopentane	N8	0.0003	0.0018	0.000	0.000
1c,3-Dimethylcyclohexane	N8	0.0002	0.0012	0.000	0.000
3-Methylheptane	I8	0.0172	0.1057	0.009	0.009
1c,2t,3-Trimethylcyclopentane	N8	0.0245	0.1479	0.013	0.013
3-Ethylhexane	I8	0.0015	0.0092	0.001	0.001
1t,4-Dimethylcyclohexane	N8	0.0098	0.0592	0.005	0.005
1,1-Dimethylcyclohexane	N8	0.0033	0.0199	0.001	0.001
2,2,5-Trimethylhexane	I9	0.0004	0.0027	0.000	0.000
3c-Ethylmethylcyclopentane	N8	0.0015	0.0090	0.001	0.001
3t-Ethylmethylcyclopentane	N8	0.0013	0.0078	0.001	0.001
2t-Ethylmethylcyclopentane	N8	0.0024	0.0145	0.001	0.001
1,1-Methylethylcyclopentane	N8	0.0004	0.0024	0.000	0.000
2,2,4-Trimethylhexane	I9	0.0004	0.0027	0.000	0.000
1t,2-Dimethylcyclohexane	N8	0.0096	0.0579	0.005	0.005
1t,3-Dimethylcyclohexane	N8	0.0009	0.0054	0.000	0.000
UnknownC7s	U7	0.0001	0.0005	0.000	0.000
n-Octane	P8	0.0618	0.3797	0.032	0.032
1c,4-Dimethylcyclohexane	N8	0.0068	0.0410	0.003	0.003
i-Propylcyclopentane	I8	0.0007	0.0042	0.000	0.000
2,3,5-Trimethylhexane	I9	0.0008	0.0055	0.000	0.000
2,2,3,4-Tetramethylpentane	I9	0.0003	0.0020	0.000	0.000
2,3,4-Trimethylhexane	I9	0.0003	0.0020	0.000	0.000
1c,2-Dimethylcyclohexane	N8	0.0002	0.0012	0.000	0.000
2,2-Dimethylheptane	I9	0.0025	0.0173	0.001	0.001
1,1,4-Trimethylcyclohexane	N9	0.0093	0.0632	0.005	0.005
2,2,3-Trimethylhexane	I9	0.0027	0.0186	0.001	0.001
2,4-Dimethylheptane	I9	0.0006	0.0041	0.000	0.000
4,4-Dimethylheptane	I9	0.0001	0.0007	0.000	0.000
Ethylcyclohexane	N8	0.0088	0.0531	0.004	0.004
n-Propylcyclopentane	N8	0.0033	0.0199	0.001	0.001
1c,3c,5-Trimethylcyclohexane	N9	0.0006	0.0041	0.000	0.000
2,5-Dimethylheptane	I9	0.0044	0.0303	0.002	0.002
3,3-Dimethylheptane	I9	0.0008	0.0055	0.000	0.000
3,5-Dimethylheptane	I9	0.0003	0.0020	0.000	0.000
2,6-Dimethylheptane	I9	0.0006	0.0041	0.000	0.000

1,1,3-Trimethylcyclohexane	N9	0.0007	0.0047	0.000	0.000
Ethylbenzene	I8	0.0055	0.0314	0.002	0.002
1c,2t,4t-Trimethylcyclohexane	N9	0.0001	0.0007	0.000	0.000
2,3-Dimethylheptane	I9	0.0001	0.0007	0.000	0.000
1,3-Dimethylbenzene (m-Xylene)	A8	0.0088	0.0502	0.003	0.003
1,4-Dimethylbenzene (p-Xylene)	A8	0.0020	0.0114	0.001	0.001
3,4-Dimethylheptane	I9	0.0002	0.0014	0.000	0.000
3,4-Dimethylheptane (2)	I9	0.0006	0.0041	0.000	0.000
4-Ethylheptane	I9	0.0004	0.0027	0.000	0.000
4-Methyloctane	I9	0.0024	0.0166	0.001	0.001
2-Methyloctane	I9	0.0039	0.0269	0.002	0.002
1c,2t,3-Trimethylcyclohexane	N9	0.0002	0.0013	0.000	0.000
3-Ethylheptane	I9	0.0002	0.0014	0.000	0.000
3-Methyloctane	I9	0.0006	0.0041	0.000	0.000
1c,2t,4c-Trimethylcyclohexane	I9	0.0037	0.0251	0.002	0.002
1,1,2-Trimethylcyclohexane	N9	0.0001	0.0007	0.000	0.000
3,3-Diethylpentane	I9	0.0004	0.0027	0.000	0.000
1,2-Dimethylbenzene (o-Xylene)	A8	0.0011	0.0063	0.000	0.000
i-Butylcyclopentane	N9	0.0015	0.0102	0.001	0.001
n-Nonane	P9	0.0168	0.1159	0.009	0.009
1,1-Methylethylcyclohexane	N9	0.0009	0.0061	0.001	0.001
i-Propylbenzene	A9	0.0002	0.0013	0.000	0.000
i-Propylcyclohexane	N9	0.0003	0.0020	0.000	0.000
2,2-Dimethyloctane	I10	0.0001	0.0007	0.000	0.000
2,4-Dimethyloctane	I10	0.0005	0.0038	0.000	0.000
2,6-Dimethyloctane	I10	0.0002	0.0015	0.000	0.000
n-Butylcyclopentane	N9	0.0013	0.0088	0.001	0.001
3,3-Dimethyloctane	I10	0.0004	0.0031	0.000	0.000
n-Propylbenzene	A9	0.0017	0.0110	0.001	0.001
3,6-Dimethyloctane	I10	0.0001	0.0007	0.000	0.000
3-Methyl-5-ethylheptane	I10	0.0006	0.0046	0.000	0.000
1,3-Methylethylbenzene	A9	0.0001	0.0006	0.000	0.000
1,4-Methylethylbenzene	A9	0.0001	0.0006	0.000	0.000
1,3,5-Trimethylbenzene	A9	0.0004	0.0026	0.000	0.000
2,3-Dimethyloctane	I10	0.0002	0.0015	0.000	0.000
5-Methylnonane	I10	0.0007	0.0054	0.000	0.000
1,2-Methylethylbenzene	A9	0.0002	0.0013	0.000	0.000
2-Methylnonane	I10	0.0006	0.0046	0.000	0.000
3-Ethyloctane	I10	0.0001	0.0007	0.000	0.000
3-Methylnonane	I10	0.0006	0.0046	0.000	0.000
t-Butylbenzene	A10	0.0004	0.0029	0.000	0.000
i-Butylcyclohexane	N10	0.0002	0.0015	0.000	0.000
1t-Methyl-2-n-propylcyclohexane	I10	0.0001	0.0007	0.000	0.000
UnknownC9s	U9	0.0026	0.0179	0.001	0.001
n-Decane	P10	0.0029	0.0222	0.002	0.002
1,2,3-Trimethylbenzene	A9	0.0001	0.0006	0.000	0.000
Sec-Butylcyclohexane	A10	0.0001	0.0007	0.000	0.000
1,2-Methyl-i-propylbenzene	A10	0.0003	0.0021	0.000	0.000
3-Ethylnonane	I10	0.0001	0.0009	0.000	0.000
1,2-Methyl-n-propylbenzene	A10	0.0001	0.0007	0.000	0.000
1,3-Dimethyl-4-ethylbenzene	A10	0.0001	0.0007	0.000	0.000
UnknownC10s	U10	0.0029	0.0222	0.002	0.002
n-Undecane	P11	0.0003	0.0025	0.000	0.000
UnknownC11s	U11	0.0001	0.0009	0.000	0.000
n-Dodecane	P12	0.0001	0.0009	0.000	0.000
n-Tridecane	P13	0.0001	0.0010	0.000	0.000
UnknownC13s	U13	0.0001	0.0010	0.000	0.000
TOTAL		100.00000	100.00000	2.3268	2.3389

BTEX COMPONENTS	MOLE%	WT%
BENZENE	0.0337	0.1416
TOLUENE	0.0484	0.2399
ETHYLBENZENE	0.0055	0.0314
XYLENES	0.0119	0.0679
TOTAL BTEX	0.0995	0.4808

*(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 :	1020.9 /scf	1026.4 /scf
	NET WET REAL :	1003.1 /scf	1008.6 /scf
HHV	GROSS DRY REAL :	1128.7 /scf	1134.9 /scf
	GROSS WET REAL :	1109.0 /scf	1115.2 /scf

NET HEATING VALUE (60 °F ideal reaction):	20877.3 Btu/lbm
GROSS HEATING VALUE (60°F ideal reaction):	23087.3 Btu/lbm
RELATIVE DENSITY (AIR=1):	0.6406
DENSITY	0.04898 lb/scf
COMPRESSIBILITY FACTOR :	0.9975
REGULAR WOBBE INDEX	1411.1

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

Net Dry Ideal BTU	5014.7 /scf	Relative Density - SG (Air=1)	3.4584	***C6+factors***
Gross Dry Ideal BTU	5388.6 /scf	**Z** Compressiblity Factor	0.99446	0.9937
Net Dry Ideal BTU	19309.8 /lb	Density Factor	263.924 lbm/1000 ft3	
Gross Dry Ideal BTU	20749.7 /lb	Molar Mass or MW	100.148 g/mol	
		Volume Liquid Ideal gas	0.409 scf/gal	22.6

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