



**EXTENDED NATURAL GAS ANALYSIS (\*DHA)**

**MAIN PAGE**

PRIMARY DB KEY: <b>05-103-10859</b>	NAME/DESCRIP :	<b>PICEANCE CREEK UNIT 297-11A7</b>
LEASE #:		<b>SURFACE CASING</b>
FIELD/AREA:		
PROJECT NO. :	<b>202411075</b>	ANALYSIS NO. : <b>03</b>
COMPANY NAME :	<b>QB ENERGY OPERATING, LLC</b>	ANALYSIS DATE: <b>DECEMBER 07, 2024 12:37</b>
OFFICE / BRANCH:	<b>PARACHUTE, CO</b>	SAMPLE DATE : <b>NOVEMBER 19, 2024 13:02</b>
CUSTOMER REF:		TO:
PRODUCER :	<b>QB ENERGY OPERATING, LLC</b>	EFFECTIVE DATE:

**\*\*\*FIELD DATA\*\*\***

SAMPLE CYCLE:		SAMPLE TYPE:	<b>SPOT</b>
SAMPLE PRES. :	724 psig	PROBE :	
FLOW PRES. :	psig	CYLINDER NO. :	<b>ECA-823</b>
LAB PRES:	psig	SAMPLED BY :	<b>ANDREW TERRAZAS</b>
SAMPLE TEMP. :	29 °f	SAMPLING COMPANY:	<b>QB ENERGY</b>
AMBIENT TEMP.:	°f	H2S BY STAIN TUBE:	<b>- ppm mol</b>
H2O BY STAIN TUBE:	<b>- #/mmcf</b>	CO2 BY STAIN TUBE:	<b>- Mol %</b>
FIELD COMMENTS:			
LAB COMMENTS:			

<u>COMPONENT</u>	<u>MOLE %</u>	<u>MASS %</u>	<u>GPM @ 14.65</u>	<u>GPM @ 14.73</u>
HELIUM	0.02	0.00	---	---
HYDROGEN	0.00	0.00	---	---
OXYGEN/ARGON	0.00	0.00	---	---
NITROGEN	0.68	1.12	---	---
CARBON DIOXIDE	0.02	0.05	---	---
METHANE	95.8188	90.1171	---	---
ETHANE	2.1670	3.8200	0.5774	0.5806
PROPANE	0.5136	1.3277	0.1409	0.1416
I-BUTANE	0.0956	0.3257	0.0310	0.0311
N-BUTANE	0.1861	0.6342	0.0589	0.0593
I-PENTANE	0.0842	0.3560	0.0300	0.0301
N-PENTANE	0.0876	0.3705	0.0320	0.0321
HEXANES PLUS	0.3271	1.8788	0.1360	0.1364
<b>TOTALS</b>	<b>100.0000</b>	<b>100.0000</b>	<b>1.0062</b>	<b>1.0112</b>

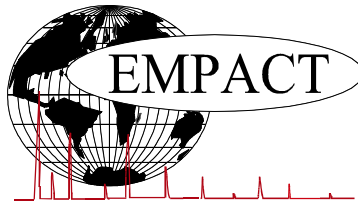
<u>BTEX COMPONENTS</u>	<u>MOLE%</u>	<u>WT%</u>	<u>CALCULATED VALUES**</u>	
			<u>BTU @ 14.65</u>	<u>14.73</u>
BENZENE	0.0022	0.0101		
TOLUENE	0.0002	0.0011	<b>LHV NET DRY REAL :</b>	<b>947.7 /scf</b>
ETHYLBENZENE	0.0006	0.0038		<b>952.9 /scf</b>
XYLENES	0.0008	0.0050	<b>NET WET REAL :</b>	<b>931.1 /scf</b>
<b>TOTAL BTEX</b>	<b>0.0038</b>	<b>0.0200</b>	<b>HHV GROSS DRY REAL :</b>	<b>1050.5 /scf</b>
				<b>1056.2 /scf</b>
			<b>GROSS WET REAL :</b>	<b>1032.1 /scf</b>
			<b>NET HEATING VALUE (60 °F ideal reaction):</b>	<b>21124.8 Btu/lbm</b>
			<b>GROSS HEATING VALUE (60°F ideal reaction):</b>	<b>23421.9 Btu/lbm</b>
			<b>RELATIVE DENSITY (AIR=1):</b>	<b>0.5883</b>
			<b>DENSITY</b>	<b>0.04495 lbm/scf</b>
			<b>COMPRESSIBILITY FACTOR :</b>	<b>0.9978</b>
			<b>REGULAR WOBBE INDEX</b>	<b>1370.9</b>

\*(DETAILED HYDROCARBON ANALYSIS/NJ 1993)

Mod ASTM D6730, GPA 2261 & GPA 2286.

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

The data presented herein has been acquired by means of current analytical techniques and represents the judicious conclusion EMPACT Analytical Systems, Inc. Results of the analysis can be affected by the sampling conditions, therefore, are only warranted through proper lab protocol. EMPACT assumes no responsibility for interpretation or any consequences from application of the reported information and is the sole liability of the user. The reproduction in any media of this reported information may not be made, in portion or as a whole, without the written permission of EMPACT Analytical Systems, Inc.



**EXTENDED NATURAL GAS ANALYSIS (\*DHA)  
GLYCALC INFORMATION**

PROJECT NO. :	202411075	ANALYSIS NO. :	03
COMPANY NAME :	QB ENERGY OPERATING, LLC	ANALYSIS DATE :	DECEMBER 07, 2024 12:37
ACCOUNT NO. :		SAMPLE DATE :	NOVEMBER 19, 2024 13:02
PRODUCER :	QB ENERGY OPERATING, LLC	CYLINDER NO. :	ECA-823
LEASE NO. :		SAMPLED BY :	ANDREW TERRAZAS
NAME/DESCRIP :	PICEANCE CREEK UNIT 297-11A7 SURFACE CASING		

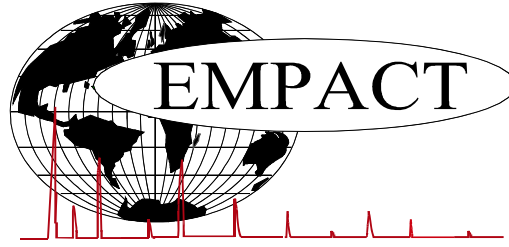
***FIELD DATA***		SAMPLE TEMP. :	29
SAMPLE PRES. :	724	AMBIENT TEMP.:	
H2S BY STAIN TUBE:	—		
COMMENTS :	<i>ppm mol</i> <i>SPOT</i>		

<u>Componet</u>	<u>Mole %</u>	<u>Wt %</u>
Helium	0.02	0.00
Hydrogen	0.00	0.00
Carbon Dioxide	0.02	0.05
Nitrogen	0.68	1.12
Methane	95.8188	90.1171
Ethane	2.1670	3.8200
Propane	0.5136	1.3277
Isobutane	0.0956	0.3257
n-Butane	0.1861	0.6342
Isopentane	0.0834	0.3527
n-Pentane	0.0876	0.3705
Cyclopentane	0.0008	0.0033
n-Hexane	0.0545	0.2754
Cyclohexane	0.0116	0.0572
Other Hexanes	0.0687	0.3468
Heptanes	0.0814	0.4776
Methylcyclohexane	0.0318	0.1830
2,2,4 Trimethylpentane	0.0001	0.0006
Benzene	0.0022	0.0101
Toluene	0.0002	0.0011
Ethylbenzene	0.0006	0.0038
Xylenes	0.0008	0.0050
C8+ Heavies	0.0752	0.5182
<u>Subtotal</u>	<u>100.00000</u>	<u>100.00000</u>
<u>Oxygen/Argon</u>	<u>0.00</u>	<u>0.00</u>
<b>Total</b>	<b>100.00000</b>	<b>100.00000</b>

	<b>Total</b>	<b>C6+</b>	<b>C8+</b>	<b>C10+</b>
<b>Calculated Values BTU @</b>	<b>Sample</b>	<b>Fraction</b>	<b>Fraction</b>	<b>Fraction</b>
<b>14.65</b>				
LHV Net Dry Real:	947.7	4973.2	5897.3	7097.6 Btu/scf
Net Wet Real:	931.1	4886.3	5794.2	6973.5 Btu/scf
HHV Gross Dry Real:	1050.5	5358.5	6349.1	7637.4 Btu/scf
Gross Wet Real:	1032.1	5264.8	6238.1	7503.9 Btu/scf
<b>Other Calculated Values</b>				
Regualr Wobbe Index*	1370.9	2900.7	3155.0	3456.9 Btu/scf
Net Heating Value (60 °F ideal reaction):	21124.8	19390.1	19681.4	19272.7 Btu/lbm
Gross Heating Value (60°F ideal reaction):	23421.9	20894.0	21195.5	20737.8 Btu/lbm
Molar Mass (MW):	17.05808	97.99	117.447	142.116 g/mol
Relative Density (AIR=1):	0.5883	3.3840	4.0549	4.9069 SG
Density:	0.04495	0.25822	0.30948	0.37450 lbm/scf
Compressibility Factor:	0.9978	0.9927	0.9975	0.9995 Z
Liquid Volume real gas @:	<b>14.65</b>	17.2359	0.1356	0.0329 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 underscore) indicates there was no tube pulled for H2S.

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**EXTENDED NATURAL GAS ANALYSIS (\*DHA)**  
**DHA COMPONENT LIST**

PRIMARY DB KEY: **05-103-10859** NAME/DESCRIP : **PICEANCE CREEK UNIT 297-11A7**  
 LEASE #: SURFACE CASING  
 FIELD/AREA:

PROJECT NO. : **202411075** ANALYSIS NO. : **03**  
 COMPANY NAME : **QB ENERGY OPERATING, LLC** ANALYSIS DATE: **DECEMBER 07, 2024 12:37**  
 OFFICE / BRANCH: **PARACHUTE, CO** SAMPLE DATE : **NOVEMBER 19, 2024 13:02**  
 CUSTOMER REF: TO:  
 PRODUCER : **QB ENERGY OPERATING, LLC** EFFECTIVE DATE:

**\*\*\*FIELD DATA\*\*\***

SAMPLE CYCLE: SAMPLE TYPE: **SPOT**  
 SAMPLE PRES. : 724 psig PROBE :  
 FLOW PRES. : psig CYLINDER NO. : **ECA-823**  
 LAB PRES: psig SAMPLED BY : **ANDREW TERRAZAS**  
 SAMPLE TEMP. : 29 °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
Helium	---	0.02	0.00	---	---
Nitrogen	---	0.68	1.12	---	---
Carbon Dioxide	---	0.02	0.05	---	---
Methane	P1	95.8188	90.1171	---	---
Ethane	P2	2.1670	3.8200	0.577	0.581
Propane	P3	0.5136	1.3277	0.141	0.142
i-Butane	I4	0.0956	0.3257	0.031	0.031
n-Butane	P4	0.1861	0.6342	0.059	0.059
2,2-Dimethylpropane	I5	0.0058	0.0245	0.002	0.002
i-Pentane	I5	0.0776	0.3282	0.028	0.028
n-Pentane	P5	0.0876	0.3705	0.032	0.032
2,2-Dimethylbutane	I6	0.0071	0.0359	0.003	0.003
Cyclopentane	N5	0.0008	0.0033	0.000	0.000
2,3-Dimethylbutane	I6	0.0059	0.0298	0.002	0.002
2-Methylpentane	I6	0.0336	0.1698	0.014	0.014
3-Methylpentane	I6	0.0190	0.0960	0.008	0.008
n-Hexane	P6	0.0545	0.2754	0.022	0.022
2,2-Dimethylpentane	I7	0.0020	0.0117	0.001	0.001
Methylcyclopentane	N6	0.0031	0.0153	0.001	0.001
2,4-Dimethylpentane	I7	0.0026	0.0153	0.001	0.001
2,2,3-Trimethylbutane	I7	0.0008	0.0047	0.000	0.000
Benzene	A6	0.0022	0.0101	0.001	0.001
3,3-Dimethylpentane	I7	0.0013	0.0076	0.001	0.001
Cyclohexane	N6	0.0116	0.0572	0.004	0.004
2-Methylhexane	I7	0.0140	0.0823	0.006	0.006
2,3-Dimethylpentane	I7	0.0034	0.0200	0.002	0.002
1,1-Dimethylcyclopentane	N7	0.0025	0.0144	0.001	0.001
3-Methylhexane	I7	0.0135	0.0793	0.006	0.006
1c,3-Dimethylcyclopentane	N7	0.0008	0.0046	0.000	0.000
1t,3-Dimethylcyclopentane	N7	0.0007	0.0041	0.000	0.000

3-Ethylpentane	I7	0.0007	0.0041	0.000	0.000
1t,2-Dimethylcyclopentane	N7	0.0027	0.0155	0.001	0.001
2,2,4-Trimethylpentane	I8	0.0001	0.0006	0.000	0.000
n-Heptane	P7	0.0350	0.2056	0.016	0.016
1c,2-Dimethylcyclopentane	N7	0.0003	0.0017	0.000	0.000
Methylcyclohexane	N7	0.0318	0.1830	0.013	0.013
2,2-Dimethylhexane	I8	0.0014	0.0094	0.001	0.001
1,1,3-Trimethylcyclopentane	N7	0.0003	0.0020	0.000	0.000
Ethylcyclopentane	N7	0.0007	0.0041	0.000	0.000
2,5-Dimethylhexane	I8	0.0016	0.0107	0.001	0.001
2,2,3-Trimethylpentane	I8	0.0015	0.0100	0.001	0.001
2,4-Dimethylhexane	I8	0.0002	0.0014	0.000	0.000
1c,2t,4-Trimethylcyclopentane	N8	0.0004	0.0026	0.000	0.000
3,3-Dimethylhexane	I8	0.0006	0.0041	0.000	0.000
2,3,4-Trimethylpentane	I8	0.0001	0.0006	0.000	0.000
2,3,3-Trimethylpentane	I8	0.0001	0.0006	0.000	0.000
Toluene	A7	0.0002	0.0011	0.000	0.000
2,3-Dimethylhexane	I8	0.0013	0.0087	0.001	0.001
2-Methyl-3-ethylpentane	I8	0.0004	0.0027	0.000	0.000
1,1,2-Trimethylcyclopentane	N8	0.0001	0.0006	0.000	0.000
2-Methylheptane	I8	0.0079	0.0529	0.004	0.004
4-Methylheptane	I8	0.0023	0.0154	0.001	0.001
3-Methyl-3-ethylpentane	I8	0.0003	0.0020	0.000	0.000
3,4-Dimethylhexane	I8	0.0003	0.0020	0.000	0.000
1c,2c,4-Trimethylcyclopentane	N8	0.0001	0.0006	0.000	0.000
3-Methylheptane	I8	0.0052	0.0348	0.003	0.003
1c,2t,3-Trimethylcyclopentane	N8	0.0061	0.0401	0.003	0.003
3-Ethylhexane	I8	0.0003	0.0020	0.000	0.000
1t,4-Dimethylcyclohexane	N8	0.0025	0.0165	0.001	0.001
1,1-Dimethylcyclohexane	N8	0.0015	0.0099	0.001	0.001
2,2,5-Trimethylhexane	I9	0.0002	0.0015	0.000	0.000
3c-Ethylmethylcyclopentane	N8	0.0002	0.0013	0.000	0.000
3t-Ethylmethylcyclopentane	N8	0.0001	0.0006	0.000	0.000
2t-Ethylmethylcyclopentane	N8	0.0003	0.0020	0.000	0.000
1,1-Methylethylcyclopentane	N8	0.0001	0.0006	0.000	0.000
2,2,4-Trimethylhexane	I9	0.0002	0.0015	0.000	0.000
1t,2-Dimethylcyclohexane	N8	0.0023	0.0151	0.001	0.001
1t,3-Dimethylcyclohexane	N8	0.0001	0.0006	0.000	0.000
UnknownC7s	U7	0.0001	0.0006	0.000	0.000
n-Octane	P8	0.0141	0.0944	0.007	0.007
1c,4-Dimethylcyclohexane	N8	0.0009	0.0059	0.000	0.000
i-Propylcyclopentane	I8	0.0001	0.0006	0.000	0.000
2,3,5-Trimethylhexane	I9	0.0003	0.0022	0.000	0.000
2,2,3,4-Tetramethylpentane	I9	0.0002	0.0015	0.000	0.000
2,3,4-Trimethylhexane	I9	0.0002	0.0015	0.000	0.000
1c,2-Dimethylcyclohexane	N8	0.0001	0.0006	0.000	0.000
2,2-Dimethylheptane	I9	0.0004	0.0030	0.000	0.000
1,1,4-Trimethylcyclohexane	N9	0.0019	0.0141	0.001	0.001
2,2,3-Trimethylhexane	I9	0.0006	0.0045	0.000	0.000
2,4-Dimethylheptane	I9	0.0002	0.0015	0.000	0.000
4,4-Dimethylheptane	I9	0.0001	0.0008	0.000	0.000
Ethylcyclohexane	N8	0.0022	0.0145	0.001	0.001
n-Propylcyclopentane	N8	0.0009	0.0059	0.000	0.000
1c,3c,5-Trimethylcyclohexane	N9	0.0003	0.0022	0.000	0.000
2,5-Dimethylheptane	I9	0.0013	0.0098	0.001	0.001
3,3-Dimethylheptane	I9	0.0003	0.0022	0.000	0.000
3,5-Dimethylheptane	I9	0.0001	0.0008	0.000	0.000
2,6-Dimethylheptane	I9	0.0001	0.0008	0.000	0.000
1,1,3-Trimethylcyclohexane	N9	0.0002	0.0015	0.000	0.000
Ethylbenzene	I8	0.0006	0.0038	0.000	0.000
1c,2t,4t-Trimethylcyclohexane	N9	0.0001	0.0008	0.000	0.000

2,3-Dimethylheptane	I9	0.0001	0.0008	0.000	0.000
1,3-Dimethylbenzene (m-Xylene)	A8	0.0006	0.0038	0.000	0.000
1,4-Dimethylbenzene (p-Xylene)	A8	0.0001	0.0006	0.000	0.000
3,4-Dimethylheptane	I9	0.0001	0.0008	0.000	0.000
3,4-Dimethylheptane (2)	I9	0.0001	0.0008	0.000	0.000
4-Ethylheptane	I9	0.0001	0.0008	0.000	0.000
4-Methyloctane	I9	0.0008	0.0060	0.000	0.000
2-Methyloctane	I9	0.0011	0.0083	0.001	0.001
1c,2t,3-Trimethylcyclohexane	N9	0.0001	0.0008	0.000	0.000
3-Ethylheptane	I9	0.0001	0.0008	0.000	0.000
3-Methyloctane	I9	0.0002	0.0015	0.000	0.000
1c,2t,4c-Trimethylcyclohexane	I9	0.0012	0.0089	0.001	0.001
3,3-Diethylpentane	I9	0.0001	0.0008	0.000	0.000
1,2-Dimethylbenzene (o-Xylene)	A8	0.0001	0.0006	0.000	0.000
i-Butylcyclopentane	N9	0.0005	0.0037	0.000	0.000
UnknownC8s	U8	0.0001	0.0006	0.000	0.000
n-Nonane	P9	0.0037	0.0279	0.002	0.002
1,1-Methylethylcyclohexane	N9	0.0003	0.0022	0.000	0.000
2,4-Dimethyloctane	I10	0.0001	0.0008	0.000	0.000
n-Butylcyclopentane	N9	0.0004	0.0029	0.000	0.000
3,3-Dimethyloctane	I10	0.0002	0.0016	0.000	0.000
n-Propylbenzene	A9	0.0004	0.0028	0.000	0.000
3,6-Dimethyloctane	I10	0.0001	0.0008	0.000	0.000
3-Methyl-5-ethylheptane	I10	0.0001	0.0008	0.000	0.000
1,3,5-Trimethylbenzene	A9	0.0001	0.0007	0.000	0.000
2,3-Dimethyloctane	I10	0.0001	0.0008	0.000	0.000
5-Methylnonane	I10	0.0002	0.0016	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
i-Butylcyclohexane	N10	0.0001	0.0008	0.000	0.000
UnknownC9s	U9	0.0009	0.0067	0.001	0.001
n-Decane	P10	0.0004	0.0033	0.000	0.000
1,2-Methyl-i-propylbenzene	A10	0.0001	0.0008	0.000	0.000
UnknownC10s	U10	0.0007	0.0059	0.000	0.000
n-Undecane	P11	0.0001	0.0009	0.000	0.000
<b>TOTAL</b>		<b>100.00000</b>	<b>100.00000</b>	<b>1.0062</b>	<b>1.0112</b>

**CALCULATED VALUES\*\***

BTEX COMPONENTS	MOLE%	WT%	BTU @	14.65	14.73
BENZENE	0.0022	0.0101	LHV NET DRY REAL :	947.7 /scf	952.9 /scf
TOLUENE	0.0002	0.0011	NET WET REAL :	931.1 /scf	936.3 /scf
ETHYLBENZENE	0.0006	0.0038	HHV GROSS DRY REAL :	1050.5 /scf	1056.2 /scf
XYLENES	0.0008	0.0050	GROSS WET REAL :	1032.1 /scf	1037.8 /scf
TOTAL BTEX	0.0038	0.0200	NET HEATING VALUE (60 °F ideal reaction):		21124.8 Btu/lbm
			GROSS HEATING VALUE (60°F ideal reaction):		23421.9 Btu/lbm
			RELATIVE DENSITY (AIR=1):		0.5883
			DENSITY		0.04495 lb/scf
			COMPRESSIBILITY FACTOR :		0.9978
			REGULAR WOBBE INDEX		1370.9

\*(DETAILED HYDROCARBON ANALYSIS/NJ 1993)

Mod ASTM D6730,GPA 2261 & GPA 2286.

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

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

Net Dry Ideal BTU	4952.3 /scf	Relative Density - SG (Air=1)	3.384	<b>C6+ factors</b>
Gross Dry Ideal BTU	5336 /scf	Z Compressibility Factor	0.99269	0.99197
Net Dry Ideal BTU	19390.1 /lb	Density Factor	258.218 lbm/1000 ft3	
Gross Dry Ideal BTU	20894 /lb	Molar Mass or MW	97.99 g/mol	
		Volume Liquid Ideal gas	0.136 scf/gal	22

**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.**

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