



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

**MAIN PAGE**

PRIMARY DB KEY: <b>05-103-10975</b>	NAME/DESCRIP :	<b>YELLOW CREEK FEDERAL 2-22-1</b>
LEASE #:		<b>PRODUCTION CASING</b>
FIELD/AREA:		
PROJECT NO. :	<b>202502021</b>	ANALYSIS NO. : <b>02</b>
COMPANY NAME :	<b>QB ENERGY OPERATING, LLC</b>	ANALYSIS DATE: <b>FEBRUARY 05, 2025 20:22</b>
OFFICE / BRANCH:	<b>PARACHUTE, CO</b>	SAMPLE DATE : <b>JANUARY 29, 2025 15:00</b>
CUSTOMER REF:		TO:
PRODUCER :	<b>QB ENERGY OPERATING, LLC</b>	EFFECTIVE DATE:

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

SAMPLE CYCLE:		SAMPLE TYPE:	<b>SPOT</b>
SAMPLE PRES. :	<b>1953</b> psig	PROBE :	
FLOW PRES. :	psig	CYLINDER NO. :	<b>ECA-744</b>
LAB PRES:	psig	SAMPLED BY :	<b>NICK CROY</b>
SAMPLE TEMP. :	<b>25</b> °f	SAMPLING COMPANY:	<b>QB ENERGY</b>
AMBIENT TEMP.:	°f	H2S BY STAIN TUBE:	<b>-</b> ppm mol
H2O BY STAIN TUBE:	<b>-</b> #/mmcf	CO2 BY STAIN TUBE:	<b>-</b> Mol %
FIELD COMMENTS:			
LAB COMMENTS:			

<u>COMPONENT</u>	<u>MOLE %</u>	<u>MASS %</u>	<u>GPM @ 14.65</u>	<u>GPM @ 14.73</u>
HELIUM	0.00	0.00	---	---
HYDROGEN	0.00	0.00	---	---
OXYGEN/ARGON	21.83	23.94	---	---
NITROGEN	76.18	73.14	---	---
CARBON DIOXIDE	0.11	0.17	---	---
METHANE	0.8027	0.4414	---	---
ETHANE	0.2382	0.2455	0.0638	0.0642
PROPANE	0.1881	0.2843	0.0519	0.0521
I-BUTANE	0.0849	0.1691	0.0279	0.0281
N-BUTANE	0.1053	0.2098	0.0329	0.0331
I-PENTANE	0.0854	0.2110	0.0309	0.0311
N-PENTANE	0.0705	0.1743	0.0249	0.0251
HEXANES PLUS	0.3040	1.0153	0.1180	0.1180
<b>TOTALS</b>	<b>100.0000</b>	<b>100.0000</b>	<b>0.3503</b>	<b>0.3517</b>

<u>BTEX COMPONENTS</u>	<u>MOLE%</u>	<u>WT%</u>
BENZENE	0.0119	0.0319
TOLUENE	0.0141	0.0445
ETHYLBENZENE	0.0011	0.0040
XYLENES	0.0084	0.0305
<b>TOTAL BTEX</b>	<b>0.0355</b>	<b>0.1109</b>

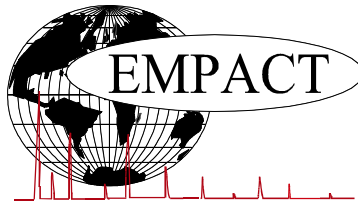
	<u>CALCULATED VALUES**</u>	
<u>BTU @</u>	<u>14.65</u>	<u>14.73</u>
<b>LHV NET DRY REAL :</b>	<b>41.1 /scf</b>	<b>41.3 /scf</b>
<b>NET WET REAL :</b>	<b>40.4 /scf</b>	<b>40.6 /scf</b>
<b>HHV GROSS DRY REAL :</b>	<b>44.5 /scf</b>	<b>44.7 /scf</b>
<b>GROSS WET REAL :</b>	<b>43.7 /scf</b>	<b>43.9 /scf</b>
<b>NET HEATING VALUE (60 °F ideal reaction):</b>		<b>546.0 Btu/lbm</b>
<b>GROSS HEATING VALUE (60°F ideal reaction):</b>		<b>592.7 Btu/lbm</b>
<b>RELATIVE DENSITY (AIR=1):</b>		<b>1.0065</b>
<b>DENSITY</b>		<b>0.07688 lbm/scf</b>
<b>COMPRESSIBILITY FACTOR :</b>		<b>0.9996</b>
<b>REGULAR WOBBE INDEX</b>		<b>44.5</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. :	202502021	ANALYSIS NO. :	02
COMPANY NAME :	QB ENERGY OPERATING, LLC	ANALYSIS DATE:	FEBRUARY 05, 2025 20:22
ACCOUNT NO. :		SAMPLE DATE :	JANUARY 29, 2025 15:00
PRODUCER :	QB ENERGY OPERATING, LLC	CYLINDER NO.:	ECA-744
LEASE NO. :		SAMPLED BY :	NICK CROY
NAME/DESCRIP :	YELLOW CREEK FEDERAL 2-22-1 PRODUCTION CASING		

***FIELD DATA***		SAMPLE TEMP. :	25
SAMPLE PRES. :	1953	AMBIENT TEMP.:	
H2S BY STAIN TUBE:	—		
COMMENTS :	<i>SPOT</i>		

<u>Componet</u>	<u>Mole %</u>	<u>Wt %</u>
Helium	0.00	0.00
Hydrogen	0.00	0.00
Carbon Dioxide	0.11	0.17
Nitrogen	76.18	73.14
Methane	0.8027	0.4414
Ethane	0.2382	0.2455
Propane	0.1881	0.2843
Isobutane	0.0849	0.1691
n-Butane	0.1053	0.2098
Isopentane	0.0820	0.2028
n-Pentane	0.0705	0.1743
Cyclopentane	0.0034	0.0082
n-Hexane	0.0328	0.0969
Cyclohexane	0.0227	0.0655
Other Hexanes	0.0657	0.1929
Heptanes	0.0496	0.1696
Methylcyclohexane	0.0376	0.1265
2,2,4 Trimethylpentane	0.0001	0.0004
Benzene	0.0119	0.0319
Toluene	0.0141	0.0445
Ethylbenzene	0.0011	0.0040
Xylenes	0.0084	0.0305
C8+ Heavies	0.0600	0.2526
<u>Subtotal</u>	<u>78.17000</u>	<u>76.06000</u>
<u>Oxygen/Argon</u>	<u>21.83</u>	<u>23.94</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:	41.1	4879.8	5965.7	7172.3 Btu/scf
Net Wet Real:	40.4	4794.5	5861.4	7046.9 Btu/scf
HHV Gross Dry Real:	44.5	5240.5	6406.9	7723.0 Btu/scf
Gross Wet Real:	43.7	5148.9	6294.9	7588.0 Btu/scf
<b>Other Calculated Values</b>				
Regualr Wobbe Index*	44.5	2849.8	3152.8	3478.4 Btu/scf
Net Heating Value (60 °F ideal reaction):	546.0	19174.1	19357.4	19142.9 Btu/lbm
Gross Heating Value (60°F ideal reaction):	592.7	20591.2	20790.5	20613.2 Btu/lbm
Molar Mass (MW):	29.17649	97.31	119.888	143.565 g/mol
Relative Density (AIR=1):	1.0065	3.3599	4.1404	4.9568 SG
Density:	0.07688	0.25641	0.31594	0.37831 lbm/scf
Compressibility Factor:	0.9996	0.9937	0.9982	0.9996 Z
Liquid Volume real gas @:	<b>14.65</b>	10.7652	0.1176	0.0249 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: **05-103-10975** NAME/DESCRIP : **YELLOW CREEK FEDERAL 2-22-1**  
 LEASE #: **PRODUCTION CASING**  
 FIELD/AREA:

PROJECT NO. : **202502021** ANALYSIS NO. : **02**  
 COMPANY NAME : **QB ENERGY OPERATING, LLC** ANALYSIS DATE: **FEBRUARY 05, 2025 20:22**  
 OFFICE / BRANCH: **PARACHUTE, CO** SAMPLE DATE : **JANUARY 29, 2025 15:00**  
 CUSTOMER REF: **TO:**  
 PRODUCER : **QB ENERGY OPERATING, LLC** EFFECTIVE DATE:

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

SAMPLE CYCLE: SAMPLE TYPE: **SPOT**  
 SAMPLE PRES. : **1953** psig PROBE :  
 FLOW PRES. : psig CYLINDER NO. : **ECA-744**  
 LAB PRES: psig SAMPLED BY : **NICK CROY**  
 SAMPLE TEMP. : **25** °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
Oxygen/Argon	---	21.83	23.94	---	---
Nitrogen	---	76.1809	73.1393	---	---
Carbon Dioxide	---	0.11	0.17	---	---
Methane	P1	0.8027	0.4414	---	---
Ethane	P2	0.2382	0.2455	0.064	0.064
Propane	P3	0.1881	0.2843	0.052	0.052
i-Butane	I4	0.0849	0.1691	0.028	0.028
n-Butane	P4	0.1053	0.2098	0.033	0.033
2,2-Dimethylpropane	I5	0.0022	0.0055	0.001	0.001
i-Pentane	I5	0.0798	0.1973	0.029	0.029
n-Pentane	P5	0.0705	0.1743	0.025	0.025
2,2-Dimethylbutane	I6	0.0037	0.0109	0.002	0.002
Cyclopentane	N5	0.0034	0.0082	0.001	0.001
2,3-Dimethylbutane	I6	0.0061	0.0180	0.002	0.002
2-Methylpentane	I6	0.0255	0.0753	0.011	0.011
3-Methylpentane	I6	0.0142	0.0420	0.006	0.006
n-Hexane	P6	0.0328	0.0969	0.013	0.013
2,2-Dimethylpentane	I7	0.0010	0.0034	0.000	0.000
Methylcyclopentane	N6	0.0162	0.0467	0.006	0.006
2,4-Dimethylpentane	I7	0.0017	0.0058	0.001	0.001
2,2,3-Trimethylbutane	I7	0.0004	0.0014	0.000	0.000
Benzene	A6	0.0119	0.0319	0.003	0.003
3,3-Dimethylpentane	I7	0.0006	0.0021	0.000	0.000
Cyclohexane	N6	0.0227	0.0655	0.008	0.008
2-Methylhexane	I7	0.0076	0.0261	0.004	0.004
2,3-Dimethylpentane	I7	0.0022	0.0075	0.001	0.001
1,1-Dimethylcyclopentane	N7	0.0016	0.0054	0.001	0.001

3-Methylhexane	I7	0.0070	0.0240	0.003	0.003
1c,3-Dimethylcyclopentane	N7	0.0025	0.0084	0.001	0.001
1t,3-Dimethylcyclopentane	N7	0.0023	0.0078	0.001	0.001
3-Ethylpentane	I7	0.0003	0.0010	0.000	0.000
1t,2-Dimethylcyclopentane	N7	0.0036	0.0121	0.002	0.002
2,2,4-Trimethylpentane	I8	0.0001	0.0004	0.000	0.000
n-Heptane	P7	0.0174	0.0598	0.008	0.008
1c,2-Dimethylcyclopentane	N7	0.0002	0.0007	0.000	0.000
Methylcyclohexane	N7	0.0376	0.1265	0.015	0.015
2,2-Dimethylhexane	I8	0.0008	0.0031	0.000	0.000
1,1,3-Trimethylcyclopentane	N7	0.0001	0.0004	0.000	0.000
Ethylcyclopentane	N7	0.0011	0.0037	0.000	0.000
2,5-Dimethylhexane	I8	0.0008	0.0031	0.000	0.000
2,2,3-Trimethylpentane	I8	0.0007	0.0027	0.000	0.000
2,4-Dimethylhexane	I8	0.0001	0.0004	0.000	0.000
1c,2t,4-Trimethylcyclopentane	N8	0.0006	0.0023	0.000	0.000
3,3-Dimethylhexane	I8	0.0003	0.0012	0.000	0.000
Toluene	A7	0.0141	0.0445	0.005	0.005
2,3-Dimethylhexane	I8	0.0006	0.0024	0.000	0.000
2-Methyl-3-ethylpentane	I8	0.0001	0.0004	0.000	0.000
2-Methylheptane	I8	0.0036	0.0141	0.002	0.002
4-Methylheptane	I8	0.0011	0.0043	0.001	0.001
3-Methyl-3-ethylpentane	I8	0.0001	0.0004	0.000	0.000
3,4-Dimethylhexane	I8	0.0001	0.0004	0.000	0.000
3-Methylheptane	I8	0.0026	0.0102	0.001	0.001
1c,2t,3-Trimethylcyclopentane	N8	0.0047	0.0181	0.002	0.002
3-Ethylhexane	I8	0.0003	0.0012	0.000	0.000
1t,4-Dimethylcyclohexane	N8	0.0020	0.0077	0.001	0.001
1,1-Dimethylcyclohexane	N8	0.0007	0.0027	0.000	0.000
2,2,5-Trimethylhexane	I9	0.0001	0.0005	0.000	0.000
3c-Ethylmethylcyclopentane	N8	0.0002	0.0008	0.000	0.000
3t-Ethylmethylcyclopentane	N8	0.0001	0.0004	0.000	0.000
2t-Ethylmethylcyclopentane	N8	0.0002	0.0008	0.000	0.000
2,2,4-Trimethylhexane	I9	0.0001	0.0005	0.000	0.000
1t,2-Dimethylcyclohexane	N8	0.0016	0.0062	0.001	0.001
1t,3-Dimethylcyclohexane	N8	0.0001	0.0004	0.000	0.000
n-Octane	P8	0.0086	0.0337	0.004	0.004
1c,4-Dimethylcyclohexane	N8	0.0014	0.0054	0.001	0.001
i-Propylcyclopentane	I8	0.0001	0.0004	0.000	0.000
2,3,5-Trimethylhexane	I9	0.0001	0.0005	0.000	0.000
2,2-Dimethylheptane	I9	0.0004	0.0018	0.000	0.000
1,1,4-Trimethylcyclohexane	N9	0.0016	0.0069	0.001	0.001
2,2,3-Trimethylhexane	I9	0.0004	0.0018	0.000	0.000
2,4-Dimethylheptane	I9	0.0001	0.0005	0.000	0.000
Ethylcyclohexane	N8	0.0011	0.0042	0.000	0.000
n-Propylcyclopentane	N8	0.0004	0.0015	0.000	0.000
1c,3c,5-Trimethylcyclohexane	N9	0.0002	0.0009	0.000	0.000
2,5-Dimethylheptane	I9	0.0008	0.0035	0.000	0.000
3,3-Dimethylheptane	I9	0.0001	0.0005	0.000	0.000
1,1,3-Trimethylcyclohexane	N9	0.0001	0.0005	0.000	0.000
Ethylbenzene	I8	0.0011	0.0040	0.000	0.000
1,3-Dimethylbenzene (m-Xylene)	A8	0.0057	0.0207	0.002	0.002
1,4-Dimethylbenzene (p-Xylene)	A8	0.0017	0.0062	0.001	0.001
3,4-Dimethylheptane (2)	I9	0.0001	0.0005	0.000	0.000
4-Ethylheptane	I9	0.0001	0.0005	0.000	0.000
4-Methyloctane	I9	0.0007	0.0031	0.000	0.000
2-Methyloctane	I9	0.0010	0.0044	0.001	0.001

3-Methyloctane	I9	0.0001	0.0005	0.000	0.000
1c,2t,4c-Trimethylcyclohexane	I9	0.0010	0.0043	0.001	0.001
3,3-Diethylpentane	I9	0.0001	0.0005	0.000	0.000
1,2-Dimethylbenzene (o-Xylene)	A8	0.0010	0.0036	0.000	0.000
i-Butylcyclopentane	N9	0.0006	0.0026	0.000	0.000
n-Nonane	P9	0.0051	0.0224	0.003	0.003
1,1-Methylethylcyclohexane	N9	0.0003	0.0013	0.000	0.000
i-Propylbenzene	A9	0.0001	0.0004	0.000	0.000
i-Propylcyclohexane	N9	0.0001	0.0005	0.000	0.000
2,4-Dimethyloctane	I10	0.0002	0.0010	0.000	0.000
n-Butylcyclopentane	N9	0.0004	0.0017	0.000	0.000
3,3-Dimethyloctane	I10	0.0002	0.0010	0.000	0.000
n-Propylbenzene	A9	0.0006	0.0025	0.000	0.000
3,6-Dimethyloctane	I10	0.0002	0.0010	0.000	0.000
3-Methyl-5-ethylheptane	I10	0.0001	0.0005	0.000	0.000
1,3-Methylethylbenzene	A9	0.0006	0.0025	0.000	0.000
1,4-Methylethylbenzene	A9	0.0002	0.0008	0.000	0.000
1,3,5-Trimethylbenzene	A9	0.0007	0.0029	0.000	0.000
2,3-Dimethyloctane	I10	0.0001	0.0005	0.000	0.000
5-Methylnonane	I10	0.0004	0.0020	0.000	0.000
1,2-Methylethylbenzene	A9	0.0004	0.0017	0.000	0.000
2-Methylnonane	I10	0.0002	0.0010	0.000	0.000
3-Ethylloctane	I10	0.0001	0.0005	0.000	0.000
3-Methylnonane	I10	0.0004	0.0020	0.000	0.000
t-Butylbenzene	A10	0.0008	0.0037	0.000	0.000
i-Butylcyclohexane	N10	0.0001	0.0005	0.000	0.000
UnknownC9s	U9	0.0008	0.0035	0.000	0.000
n-Decane	P10	0.0027	0.0132	0.002	0.002
1,2,3-Trimethylbenzene	A9	0.0002	0.0008	0.000	0.000
Sec-Butylcyclohexane	A10	0.0001	0.0005	0.000	0.000
1,2-Methyl-i-propylbenzene	A10	0.0004	0.0019	0.000	0.000
3-Ethylnonane	I10	0.0002	0.0011	0.000	0.000
1,4-Diethylbenzene	A10	0.0001	0.0005	0.000	0.000
n-Butylbenzene	A10	0.0001	0.0005	0.000	0.000
1,2-Methyl-n-propylbenzene	A10	0.0001	0.0005	0.000	0.000
1,3-Dimethyl-4-ethylbenzene	A10	0.0001	0.0005	0.000	0.000
1,3-Dimethyl-2-ethylbenzene	A10	0.0001	0.0005	0.000	0.000
UnknownC10s	U10	0.0015	0.0073	0.001	0.001
n-Undecane	P11	0.0007	0.0037	0.000	0.000
UnknownC11s	U11	0.0006	0.0032	0.000	0.000
n-Dodecane	P12	0.0001	0.0006	0.000	0.000
UnknownC12s	U12	0.0002	0.0011	0.000	0.000
<b>TOTAL</b>		<b>100.00000</b>	<b>100.00000</b>	<b>0.3503</b>	<b>0.3517</b>

BTEX COMPONENTS	MOLE%	WT%
BENZENE	0.0119	0.0319
TOLUENE	0.0141	0.0445
ETHYLBENZENE	0.0011	0.0040
XYLENES	0.0084	0.0305
TOTAL BTEX	0.0355	0.1109

\*(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 :	41.1 /scf	41.3 /scf
NET WET REAL :	40.4 /scf	40.6 /scf
HHV GROSS DRY REAL :	44.5 /scf	44.7 /scf
GROSS WET REAL :	43.7 /scf	43.9 /scf
NET HEATING VALUE (60 °F ideal reaction):		546.0 Btu/lbm
GROSS HEATING VALUE (60°F ideal reaction):		592.7 Btu/lbm
RELATIVE DENSITY (AIR=1):		1.0065
DENSITY		0.07688 lb/scf
COMPRESSIBILITY FACTOR :		0.9996
REGULAR WOBBE INDEX		44.5

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

Net Dry Ideal BTU	<u>4864.2 /scf</u>	Relative Density - SG (Air=1)	<u>3.3599</u>	<b>C6+ factors</b>
Gross Dry Ideal BTU	<u>5223.7 /scf</u>	Z Compressibility Factor	<u>0.99368</u>	<u>0.9929</u>
Net Dry Ideal BTU	<u>19174.1 /lb</u>	Density Factor	<u>256.412 lbm/1000 ft3</u>	
Gross Dry Ideal BTU	<u>20591.2 /lb</u>	Molar Mass or MW	<u>97.31 g/mol</u>	
		Volume Liquid Ideal gas	<u>0.118 scf/gal</u>	<u>23.5</u>

**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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