



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

**MAIN PAGE**

PRIMARY DB KEY: **05-045-13236**      NAME/DESCRIP : **110170178 UNOCAL 23B-4D**  
 LEASE #:      CASING  
 FIELD/AREA:

PROJECT NO. : **202506106**      ANALYSIS NO. : **03**  
 COMPANY NAME : **QB ENERGY OPERATING, LLC**      ANALYSIS DATE: **JUNE 25, 2025 12:41**  
 OFFICE / BRANCH: **PARACHUTE, CO**      SAMPLE DATE : **JUNE 10, 2025**  
 CUSTOMER REF:      TO:  
 PRODUCER : **QB ENERGY OPERATING, LLC**      EFFECTIVE DATE:

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

SAMPLE CYCLE:      SAMPLE TYPE:      SPOT  
 SAMPLE PRES. :      448      psig      PROBE :      NO PROBE  
 FLOW PRES. :      psig      CYLINDER NO. :      ECA-810  
 LAB PRES:      psig      SAMPLED BY :      MIKE KELLEY  
 SAMPLE TEMP. :      63      °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:

<u>COMPONENT</u>	<u>MOLE %</u>	<u>MASS %</u>	<u>GPM @</u>	
			<u>14.65</u>	<u>14.73</u>
ALCOHOLS	0.0463	0.0854	0.0060	0.0060
HELIUM	0.01	0.00	---	---
HYDROGEN	0.05	0.01	---	---
OXYGEN/ARGON	0.00	0.00	---	---
NITROGEN	0.12	0.19	---	---
CARBON DIOXIDE	0.37	0.94	---	---
METHANE	93.7749	86.5816	---	---
ETHANE	4.1083	7.1096	1.0951	1.1011
PROPANE	0.8080	2.0505	0.2218	0.2230
I-BUTANE	0.1622	0.5426	0.0530	0.0532
N-BUTANE	0.1502	0.5024	0.0470	0.0472
I-PENTANE	0.0750	0.3111	0.0270	0.0271
N-PENTANE	0.0461	0.1914	0.0170	0.0171
HEXANES PLUS	0.2792	1.4855	0.1100	0.1101
<b>TOTALS</b>	<b>100.0000</b>	<b>100.0000</b>	<b>1.5769</b>	<b>1.5848</b>

<u>BTEX COMPONENTS</u>	<u>MOLE%</u>	<u>WT%</u>
BENZENE	0.0125	0.0562
TOLUENE	0.0262	0.1389
ETHYLBENZENE	0.0000	0.0000
XYLENES	0.0000	0.0000
<b>TOTAL BTEX</b>	<b>0.0387</b>	<b>0.1951</b>

	<u>CALCULATED VALUES**</u>	
	<u>BTU @</u>	<u>BTU @</u>
	<u>14.65</u>	<u>14.73</u>
LHV NET DRY REAL :	964.0 /scf	969.3 /scf
NET WET REAL :	947.1 /scf	952.4 /scf
HHV GROSS DRY REAL :	1068.5 /scf	1074.4 /scf
GROSS WET REAL :	1049.8 /scf	1055.7 /scf
NET HEATING VALUE (60 °F ideal reaction):		21084.7 Btu/lbm
GROSS HEATING VALUE (60°F ideal reaction):		23364.5 Btu/lbm
RELATIVE DENSITY (AIR=1):		0.5996
DENSITY		0.04578 lbm/scf
COMPRESSIBILITY FACTOR :		0.9977
REGULAR WOBBE INDEX		1381.0

*\*(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. :	202506106	ANALYSIS NO. :	03
COMPANY NAME :	QB ENERGY OPERATING, LLC	ANALYSIS DATE:	JUNE 25, 2025 12:41
ACCOUNT NO. :		SAMPLE DATE :	JUNE 10, 2025
PRODUCER :	QB ENERGY OPERATING, LLC	CYLINDER NO. :	ECA-810
LEASE NO. :		SAMPLED BY :	MIKE KELLEY
NAME/DESCRIP :	110170178 UNOCAL 23B-4D CASING		

***FIELD DATA***		SAMPLE TEMP. :	63
SAMPLE PRES. :	448	AMBIENT TEMP.:	
H2S BY STAIN TUBE:	—		
COMMENTS :	—		

—                      ppm mol  
**SPOT                      NO PROBE**

<u>Componet</u>	<u>Mole %</u>	<u>Wt %</u>
Helium	0.01	0.00
Hydrogen	0.05	0.01
Carbon Dioxide	0.37	0.94
Nitrogen	0.12	0.19
Methane	93.7749	86.5816
Ethane	4.1083	7.1096
Propane	0.8080	2.0505
Isobutane	0.1622	0.5426
n-Butane	0.1502	0.5024
Isopentane	0.0720	0.2990
n-Pentane	0.0461	0.1914
Cyclopentane	0.0030	0.0121
n-Hexane	0.0236	0.1171
Cyclohexane	0.0239	0.1157
Other Hexanes	0.0644	0.3169
Heptanes	0.0673	0.3862
Methylcyclohexane	0.0517	0.2921
2,2,4 Trimethylpentane	0.0001	0.0006
Benzene	0.0125	0.0562
Toluene	0.0262	0.1389
Ethylbenzene	0.0000	0.0000
Xylenes	0.0000	0.0000
C8+ Heavies	0.0095	0.0618
<u>Subtotal</u>	<u>99.95370</u>	<u>99.91460</u>
Oxygen/Argon	0.00	0.00
Alcohols	0.0463	0.0854
<u>Total</u>	<u>100.00000</u>	<u>100.00000</u>

	<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:	964.0	4629.5	5655.3	#DIV/0!	Btu/scf
Net Wet Real:	947.1	4548.6	5556.4	#DIV/0!	Btu/scf
HHV Gross Dry Real:	1068.5	4965.9	6097.8	#DIV/0!	Btu/scf
Gross Wet Real:	1049.8	4879.1	5991.2	#DIV/0!	Btu/scf
<b>Other Calculated Values</b>					
Regualr Wobbe Index*	1381.0	2767.4	3074.6	#DIV/0!	Btu/scf
Net Heating Value (60 °F ideal reaction):	21084.7	19076.5	19796.6	#DIV/0!	Btu/lbm
Gross Heating Value (60 °F ideal reaction):	23364.5	20464.8	21346.7	#DIV/0!	Btu/lbm
Molar Mass (MW):	17.37513	92.488	113.726	#DIV/0!	g/mol
Relative Density (AIR=1):	0.5996	3.1936	3.9267	#DIV/0!	SG
Density:	0.04578	0.24372	0.29969	#DIV/0!	lbm/scf
Compressibility Factor:	0.9977	0.9928	0.9960	#DIV/0!	Z
Liquid Volume real gas @:	<b>14.65</b>	17.4612	0.1097	0.004	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: 05-045-13236 NAME/DESCRIP : 110170178 UNOCAL 23B-4D  
 LEASE #: CASING  
 FIELD/AREA:  
 PROJECT NO. : 202506106 ANALYSIS NO. : 03  
 COMPANY NAME : QB ENERGY OPERATING, LLC ANALYSIS DATE: JUNE 25, 2025 12:41  
 OFFICE / BRANCH: PARACHUTE, CO SAMPLE DATE : JUNE 10, 2025  
 CUSTOMER REF: TO:  
 PRODUCER : QB ENERGY OPERATING, LLC EFFECTIVE DATE:

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

SAMPLE CYCLE: SAMPLE TYPE: SPOT  
 SAMPLE PRES. : 448 psig PROBE : NO PROBE  
 FLOW PRES. : psig CYLINDER NO. : ECA-810  
 LAB PRES: psig SAMPLED BY : MIKE KELLEY  
 SAMPLE TEMP. : 63 °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
2,2,4-Trimethylpentane	I8	0.0001	0.0006	0.000	0.000
1,1,3-Trimethylcyclopentane	N7	0.0001	0.0006	0.000	0.000
2,4-Dimethylhexane	I8	0.0001	0.0006	0.000	0.000
2-Methyl-3-ethylpentane	I8	0.0001	0.0006	0.000	0.000
3-Methyl-3-ethylpentane	I8	0.0001	0.0006	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
n-Octane	P8	0.0001	0.0006	0.000	0.000
3-Ethylhexane	I8	0.0002	0.0013	0.000	0.000
3-Ethylpentane	I7	0.0004	0.0023	0.000	0.000
3,3-Dimethylhexane	I8	0.0004	0.0026	0.000	0.000
2,3-Dimethylhexane	I8	0.0004	0.0026	0.000	0.000
1c,2-Dimethylcyclopentane	N7	0.0005	0.0028	0.000	0.000
1t,4-Dimethylcyclohexane	N8	0.0005	0.0032	0.000	0.000
4-Methylheptane	I8	0.0005	0.0033	0.000	0.000
1c,2t,4-Trimethylcyclopentane	N8	0.0006	0.0039	0.000	0.000
3-Methylheptane	I8	0.0006	0.0040	0.000	0.000
2,2-Dimethylpentane	I7	0.0007	0.0040	0.000	0.000
2,2,3-Trimethylbutane	I7	0.0008	0.0046	0.000	0.000
UnknownC7s	U7	0.0008	0.0046	0.000	0.000
2,2-Dimethylhexane	I8	0.0008	0.0052	0.000	0.000
3,3-Dimethylpentane	I7	0.0010	0.0058	0.000	0.000
1c,2t,3-Trimethylcyclopentane	N8	0.0011	0.0071	0.001	0.001
2,5-Dimethylhexane	I8	0.0012	0.0079	0.001	0.001
2,2,3-Trimethylpentane	I8	0.0012	0.0079	0.001	0.001
Helium	---	0.01	0.00	---	---
Ethylcyclopentane	N7	0.0016	0.0090	0.001	0.001
2-Methylheptane	I8	0.0014	0.0092	0.001	0.001

2,4-Dimethylpentane	I7	0.0020	0.0115	0.001	0.001
Cyclopentane	N5	0.0030	0.0121	0.001	0.001
1,1-Dimethylcyclopentane	N7	0.0023	0.0130	0.001	0.001
2,2-Dimethylpropane	I5	0.0039	0.0162	0.001	0.001
1t,3-Dimethylcyclopentane	N7	0.0031	0.0175	0.001	0.001
1c,3-Dimethylcyclopentane	N7	0.0033	0.0186	0.002	0.002
2,2-Dimethylbutane	I6	0.0045	0.0223	0.002	0.002
2,3-Dimethylpentane	I7	0.0040	0.0231	0.002	0.002
2,3-Dimethylbutane	I6	0.0054	0.0268	0.002	0.002
1t,2-Dimethylcyclopentane	N7	0.0050	0.0283	0.002	0.002
Hydrogen	---	0.05	0.01	---	---
2-Methylhexane	I7	0.0095	0.0548	0.004	0.004
Benzene	A6	0.0125	0.0562	0.003	0.003
3-Methylhexane	I7	0.0104	0.0600	0.005	0.005
3-Methylpentane	I6	0.0120	0.0595	0.005	0.005
2-Methylpentane	I6	0.0206	0.1022	0.009	0.009
Methylcyclopentane	N6	0.0219	0.1061	0.008	0.008
Methanol	X1	0.0463	0.0854	0.006	0.006
Cyclohexane	N6	0.0239	0.1157	0.008	0.008
n-Hexane	P6	0.0236	0.1171	0.010	0.010
n-Heptane	P7	0.0218	0.1257	0.010	0.010
Toluene	A7	0.0262	0.1389	0.009	0.009
n-Pentane	P5	0.0461	0.1914	0.017	0.017
Nitrogen	---	0.12	0.19	---	---
Methylcyclohexane	N7	0.0517	0.2921	0.021	0.021
i-Pentane	I5	0.0681	0.2828	0.025	0.025
n-Butane	P4	0.1502	0.5024	0.047	0.047
i-Butane	I4	0.1622	0.5426	0.053	0.053
Carbon Dioxide	---	0.37	0.94	---	---
Propane	P3	0.8080	2.0505	0.222	0.223
Ethane	P2	4.1083	7.1096	1.095	1.101
Methane	P1	93.7749	86.5816	---	---
<b>TOTAL</b>		<b>100.0000</b>	<b>100.0000</b>	<b>1.5769</b>	<b>1.5848</b>

**CALCULATED VALUES\*\***

BTEX COMPONENTS	MOLE%	WT%	BTU @	14.65	14.73
BENZENE	0.0125	0.0562	LHV NET DRY REAL :	964.0 /scf	969.3 /scf
TOLUENE	0.0262	0.1389	NET WET REAL :	947.1 /scf	952.4 /scf
ETHYLBENZENE	0.0000	0.0000	HHV GROSS DRY REAL :	1068.5 /scf	1074.4 /scf
XYLENES	0.0000	0.0000	GROSS WET REAL :	1049.8 /scf	1055.7 /scf
TOTAL BTEX	0.0387	0.1951	NET HEATING VALUE (60 °F ideal reaction):		21084.7 Btu/lbm
			GROSS HEATING VALUE (60°F ideal reaction):		23364.5 Btu/lbm
			RELATIVE DENSITY (AIR=1):		0.5996
			DENSITY		0.04578 lb/scf
			COMPRESSIBILITY FACTOR :		0.9977
			REGULAR WOBBE INDEX		1381.0

\*(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	<u>4610.6</u> /scf	Relative Density - SG (Air=1)	<u>3.1936</u>	<b>C6+ factors</b>
Gross Dry Ideal BTU	<u>4945.6</u> /scf	Z Compressibility Factor	<u>0.9928</u>	<u>0.99236</u>
Net Dry Ideal BTU	<u>19076.5</u> /lb	Density Factor	<u>243.721</u> lbm/1000 ft3	
Gross Dry Ideal BTU	<u>20464.8</u> /lb	Molar Mass or MW	<u>92.488</u> g/mol	
		Volume Liquid Ideal gas	<u>0.11</u> scf/gal	<u>25.4</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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