EMPACT

EXTENDED NATURAL GAS ANALYSIS (*DHA)

MAIN PAGE

PRIMARY DB KEY:	**05-045-13001**	NAME/DESCRIP :	**110170179 UNOCAL 23D-4D**
LEASE #:			**BRADEN HEAD**
FIELD/AREA:			

PROJECT NO. :	**202506106**	ANALYSIS NO. :	**02**
COMPANY NAME :	**QB ENERGY OPERATING, LLC**	ANALYSIS DATE:	JUNE 25, 2025 10:57
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. :	26	psig	PROBE :	NO PROBE
FLOW PRES. :		psig	CYLINDER NO. :	ECA-760
LAB PRES:		psig	SAMPLED BY :	MIKE KELLEY
SAMPLE TEMP. :	67	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
ALCOHOLS	0.0016	0.0028	0.0000	0.0000
HELIUM	0.01	0.00	---	---
HYDROGEN	0.24	0.03	---	---
OXYGEN/ARGON	0.04	0.07	---	---
NITROGEN	2.86	4.38	---	---
CARBON DIOXIDE	0.03	0.07	---	---
METHANE	88.3840	77.4549	---	---
ETHANE	4.4428	7.2976	1.1842	1.1907
PROPANE	2.7987	6.7414	0.7685	0.7727
I-BUTANE	0.4308	1.3678	0.1409	0.1417
N-BUTANE	0.5778	1.8345	0.1819	0.1829
I-PENTANE	0.0996	0.3925	0.0360	0.0362
N-PENTANE	0.0598	0.2357	0.0220	0.0221
HEXANES PLUS	0.0250	0.1230	0.0080	0.0080
TOTALS	100.00000	100.00000	2.3415	2.3543

BTEX COMPONENTS	MOLE%	WT%
BENZENE	0.0004	0.0017
TOLUENE	0.0003	0.0015
ETHYLBENZENE	0.0000	0.0000
XYLENES	0.0001	0.0006
TOTAL BTEX	0.0008	0.0038

**(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 :	977.7 **/scf**	983.0 **/scf**
	NET WET REAL :	960.6 **/scf**	965.9 **/scf**
HHV	GROSS DRY REAL :	1081.9 **/scf**	1087.8 **/scf**
	GROSS WET REAL :	1063.0 **/scf**	1068.9 **/scf**

NET HEATING VALUE (60 °F ideal reaction):	20285.5 **Btu/lbm**
GROSS HEATING VALUE (60°F ideal reaction):	22452.4 **Btu/lbm**
RELATIVE DENSITY (AIR=1):	0.6318
DENSITY	0.04823 **lbm/scf**
COMPRESSIBILITY FACTOR :	0.9975
REGULAR WOBBE INDEX	1362.0

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EXTENDED NATURAL GAS ANALYSIS (*DHA)

GLYCALC INFORMATION

PROJECT NO. :	202506106	ANALYSIS NO. :	02
COMPANY NAME :	QB ENERGY OPERATING, LLC	ANALYSIS DATE:	JUNE 25, 2025 10:57
ACCOUNT NO. :		SAMPLE DATE :	JUNE 10, 2025
PRODUCER :	QB ENERGY OPERATING, LLC	CYLINDER NO. :	ECA-760
LEASE NO. :		SAMPLED BY :	MIKE KELLEY
NAME/DESCRIP :	110170179 UNOCAL 23D-4D BRADEN HEAD		
FIELD DATA		SAMPLE TEMP. :	67
SAMPLE PRES. :	26	AMBIENT TEMP.:	
H2S BY STAIN TUBE:	_ *ppm mol*		
COMMENTS :	*SPOT* *NO PROBE*		

Componet	Mole %	Wt %
Helium	0.01	0.00
Hydrogen	0.24	0.03
Carbon Dioxide	0.03	0.07
Nitrogen	2.86	4.38
Methane	88.3840	77.4549
Ethane	4.4428	7.2976
Propane	2.7987	6.7414
Isobutane	0.4308	1.3678
n-Butane	0.5778	1.8345
Isopentane	0.0990	0.3902
n-Pentane	0.0598	0.2357
Cyclopentane	0.0006	0.0023
n-Hexane	0.0044	0.0207
Cyclohexane	0.0005	0.0023
Other Hexanes	0.0159	0.0747
Heptanes	0.0015	0.0080
Methylcyclohexane	0.0006	0.0032
2,2,4 Trimethylpentane	0.0000	0.0000
Benzene	0.0004	0.0017
Toluene	0.0003	0.0015
Ethylbenzene	0.0000	0.0000
Xylenes	0.0001	0.0006
C8+ Heavies	0.0013	0.0103
Subtotal	99.95840	99.92720
Oxygen/Argon	0.04	0.07
Alcohols	0.0016	0.0028
Total	100.00000	100.00000

Calculated Values BTU @ **14.65**		**Total Sample**	**C6+ Fraction**	**C8+ Fraction**	**C10+ Fraction**	
LHV	Net Dry Real:	977.7	4616.6	7092.6	8436.4	**Btu/scf**
	Net Wet Real:	960.6	4535.9	6968.6	8288.9	**Btu/scf**
HHV	Gross Dry Real:	1081.9	4976.1	7608.9	9060.2	**Btu/scf**
	Gross Wet Real:	1063.0	4889.1	7475.9	8901.8	**Btu/scf**
Other Calculated Values						
Regualr Wobbe Index*		1362.0	2793.8	3441.1	3760.0	**Btu/scf**
Net Heating Value (60 °F ideal reaction):		20285.5	19297.1	19515.0	19489.8	**Btu/lbm**
Gross Heating Value (60°F ideal reaction):		22452.4	20800.9	20936.9	20933.8	**Btu/lbm**
Molar Mass (MW):		18.30569	90.269	142.27	169.185	**g/mol**
Relative Density (AIR=1):		0.6318	3.1170	4.9121	5.8415	**SG**
Density:		0.04823	0.23788	0.37491	0.44583	**lbm/scf**
Compressiblity Factor:		0.9975	0.9881	0.9992	0.9999	**Z**
Liquid Volume real gas @:	**14.65**	17.5788	0.008	0	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

PRIMARY DB KEY:	**05-045-13001**	NAME/DESCRIP :	**110170179 UNOCAL 23D-4D**
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PRODUCER :	QB ENERGY OPERATING, LLC	EFFECTIVE DATE:	
FIELD DATA			
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FLOW PRES. :	psig	CYLINDER NO. :	ECA-760
LAB PRES:	psig	SAMPLED BY :	MIKE KELLEY
SAMPLE TEMP. :	67 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	PIANO #	MOLE %	MASS %	GPM @ **14.65**	GPM @ **14.73**
Helium	---	0.01	0.00	---	---
Hydrogen	---	0.24	0.03	---	---
Oxygen/Argon	---	0.04	0.07	---	---
Nitrogen	---	2.86	4.38	---	---
Carbon Dioxide	---	0.03	0.07	---	---
Methane	P1	88.3840	77.4549	---	---
Ethane	P2	4.4428	7.2976	1.184	1.191
Propane	P3	2.7987	6.7414	0.769	0.773
i-Butane	I4	0.4308	1.3678	0.141	0.142
Methanol	X1	0.0016	0.0028	0.000	0.000
n-Butane	P4	0.5778	1.8345	0.182	0.183
2,2-Dimethylpropane	I5	0.0017	0.0067	0.001	0.001
i-Pentane	I5	0.0973	0.3835	0.035	0.035
n-Pentane	P5	0.0598	0.2357	0.022	0.022
2,2-Dimethylbutane	I6	0.0007	0.0033	0.000	0.000
Cyclopentane	N5	0.0006	0.0023	0.000	0.000
2,3-Dimethylbutane	I6	0.0018	0.0085	0.001	0.001
2-Methylpentane	I6	0.0089	0.0419	0.004	0.004
3-Methylpentane	I6	0.0036	0.0169	0.001	0.001
n-Hexane	P6	0.0044	0.0207	0.002	0.002
2,2-Dimethylpentane	I7	0.0001	0.0005	0.000	0.000
Methylcyclopentane	N6	0.0009	0.0041	0.000	0.000
2,4-Dimethylpentane	I7	0.0002	0.0011	0.000	0.000
Benzene	A6	0.0004	0.0017	0.000	0.000
Cyclohexane	N6	0.0005	0.0023	0.000	0.000
2-Methylhexane	I7	0.0004	0.0022	0.000	0.000
2,3-Dimethylpentane	I7	0.0001	0.0005	0.000	0.000
3-Methylhexane	I7	0.0003	0.0016	0.000	0.000

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1t,2-Dimethylcyclopentane	N7	0.0001	0.0005	0.000	0.000
n-Heptane	P7	0.0003	0.0016	0.000	0.000
Methylcyclohexane	N7	0.0006	0.0032	0.000	0.000
Toluene	A7	0.0003	0.0015	0.000	0.000
2-Methylheptane	I8	0.0001	0.0006	0.000	0.000
1c,2t,3-Trimethylcyclopentane	N8	0.0001	0.0006	0.000	0.000
2t-Ethylmethylcyclopentane	N8	0.0001	0.0006	0.000	0.000
n-Octane	P8	0.0001	0.0006	0.000	0.000
1,3-Dimethylbenzene (m-Xylene)	A8	0.0001	0.0006	0.000	0.000
n-Nonane	P9	0.0001	0.0007	0.000	0.000
n-Propylbenzene	A9	0.0001	0.0007	0.000	0.000
t-Butylbenzene	A10	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
UnknownC12s	U12	0.0001	0.0009	0.000	0.000
n-Tridecane	P13	0.0001	0.0010	0.000	0.000
UnknownC17s	U17	0.0001	0.0013	0.000	0.000
TOTAL		100.00000	100.00000	2.3415	2.3543

BTEX COMPONENTS	MOLE%	WT%
BENZENE	0.0004	0.0017
TOLUENE	0.0003	0.0015
ETHYLBENZENE	0.0000	0.0000
XYLENES	0.0001	0.0006
TOTAL BTEX	0.0008	0.0038

**(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 :	977.7 /scf	983.0 /scf
	NET WET REAL :	960.6 /scf	965.9 /scf
HHV	GROSS DRY REAL :	1081.9 /scf	1087.8 /scf
	GROSS WET REAL :	1063.0 /scf	1068.9 /scf

NET HEATING VALUE (60 °F ideal reaction):	20285.5	Btu/lbm
GROSS HEATING VALUE (60°F ideal reaction):	22452.4	Btu/lbm
RELATIVE DENSITY (AIR=1):	0.6318	
DENSITY	0.04823	lb/scf
COMPRESSIBILITY FACTOR :	0.9975	
REGULAR WOBBE INDEX	1362.0	

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

Net Dry Ideal BTU	4576.1 /scf	Relative Density - SG (Air=1)	3.117		***C6+factors***
Gross Dry Ideal BTU	4932.5 /scf	**Z** Compressiblity Factor	0.98813		0.98743
Net Dry Ideal BTU	19297.1 /lb	Density Factor	237.877	lbm/1000 ft3	
Gross Dry Ideal BTU	20800.9 /lb	Molar Mass or MW	90.269	g/mol	
		Volume Liquid Ideal gas	0.008	scf/gal	24.8

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.