EMPACT

EXTENDED NATURAL GAS ANALYSIS (*DHA)

MAIN PAGE

PRIMARY DB KEY:	**05-045-13000**	NAME/DESCRIP :	**110170167 UNOCAL 13D-9D**
LEASE #:			**PRODUCTION CASING**
FIELD/AREA:			

PROJECT NO. :	**202507061**	ANALYSIS NO. :	**02**
COMPANY NAME :	**QB ENERGY OPERATING, LLC**	ANALYSIS DATE:	AUGUST 05, 2025 11:51
OFFICE / BRANCH:	PARACHUTE, CO	SAMPLE DATE :	JUNE 25, 2025
CUSTOMER REF:		TO:	
PRODUCER :	QB ENERGY OPERATING, LLC	EFFECTIVE DATE:	

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

SAMPLE CYCLE:			SAMPLE TYPE:	SPOT
SAMPLE PRES. :	295	psig	PROBE :	
FLOW PRES. :		psig	CYLINDER NO. :	ECA-728
LAB PRES:		psig	SAMPLED BY :	MIKE KELLEY
SAMPLE TEMP. :	75	ºf	SAMPLING COMPANY:	QB ENERGY OPERATING, LLC
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
GLYCOLS	0.0001	0.0004	0.0000	0.0000
ALCOHOLS	0.0663	0.1148	0.0080	0.0080
HELIUM	0.00	0.00	---	---
HYDROGEN	0.41	0.04	---	---
OXYGEN/ARGON	0.00	0.00	---	---
NITROGEN	0.07	0.11	---	---
CARBON DIOXIDE	2.68	6.35	---	---
METHANE	88.5024	76.3963	---	---
ETHANE	5.6457	9.1344	1.5051	1.5133
PROPANE	1.4556	3.4537	0.3998	0.4019
I-BUTANE	0.3627	1.1343	0.1179	0.1186
N-BUTANE	0.2723	0.8516	0.0859	0.0864
I-PENTANE	0.1584	0.6145	0.0580	0.0583
N-PENTANE	0.0825	0.3203	0.0300	0.0301
HEXANES PLUS	0.2938	1.4799	0.1170	0.1172
TOTALS	100.00000	100.00000	2.3217	2.3338

BTEX COMPONENTS	MOLE%	WT%
BENZENE	0.0089	0.0374
TOLUENE	0.0018	0.0089
ETHYLBENZENE	0.0000	0.0000
XYLENES	0.0004	0.0023
TOTAL BTEX	0.0111	0.0486

**(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 :	972.3	**/scf**	977.6	**/scf**
	NET WET REAL :	955.3	**/scf**	960.6	**/scf**
HHV	GROSS DRY REAL :	1076.0	**/scf**	1081.9	**/scf**
	GROSS WET REAL :	1057.2	**/scf**	1063.1	**/scf**

NET HEATING VALUE (60 °F ideal reaction):	19873.8	**Btu/lbm**
GROSS HEATING VALUE (60°F ideal reaction):	22001.5	**Btu/lbm**
RELATIVE DENSITY (AIR=1):	0.6410	
DENSITY	0.04897	**lbm/scf**
COMPRESSIBILITY FACTOR :	0.9975	
REGULAR WOBBE INDEX	1344.8	

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EXTENDED NATURAL GAS ANALYSIS (*DHA)

GLYCALC INFORMATION

PROJECT NO. :	202507061	ANALYSIS NO. :	02
COMPANY NAME :	QB ENERGY OPERATING, LLC	ANALYSIS DATE:	AUGUST 05, 2025 11:51
ACCOUNT NO. :		SAMPLE DATE :	JUNE 25, 2025
PRODUCER :	QB ENERGY OPERATING, LLC	CYLINDER NO. :	ECA-728
LEASE NO. :		SAMPLED BY :	MIKE KELLEY
NAME/DESCRIP :	110170167 UNOCAL 13D-9D PRODUCTION CASING		
FIELD DATA		SAMPLE TEMP. :	75
SAMPLE PRES. :	295	AMBIENT TEMP.:	
H2S BY STAIN TUBE:	_ *ppm mol*		
COMMENTS :	*SPOT*		

Componet	Mole %	Wt %
Helium	0.00	0.00
Hydrogen	0.41	0.04
Carbon Dioxide	2.68	6.35
Nitrogen	0.07	0.11
Methane	88.5024	76.3963
Ethane	5.6457	9.1344
Propane	1.4556	3.4537
Isobutane	0.3627	1.1343
n-Butane	0.2723	0.8516
Isopentane	0.1544	0.5994
n-Pentane	0.0825	0.3203
Cyclopentane	0.0040	0.0151
n-Hexane	0.0439	0.2036
Cyclohexane	0.0188	0.0851
Other Hexanes	0.1071	0.4942
Heptanes	0.0668	0.3587
Methylcyclohexane	0.0225	0.1189
2,2,4 Trimethylpentane	0.0000	0.0000
Benzene	0.0089	0.0374
Toluene	0.0018	0.0089
Ethylbenzene	0.0000	0.0000
Xylenes	0.0004	0.0023
C8+ Heavies	0.0236	0.1708
Subtotal	99.93360	99.88480
Oxygen/Argon	0.00	0.00
Glycols	0.0001	0.0004
Alcohols	0.0663	0.1148
Total	100.00000	100.00000

Calculated Values BTU @ **14.65**		**Total Sample**	**C6+ Fraction**	**C8+ Fraction**	**C10+ Fraction**	
LHV	Net Dry Real:	972.3	4731.3	6441.4	7887.6	**Btu/scf**
	Net Wet Real:	955.3	4648.6	6328.8	7749.7	**Btu/scf**
HHV	Gross Dry Real:	1076.0	5092.3	6908.1	8442.0	**Btu/scf**
	Gross Wet Real:	1057.2	5003.3	6787.3	8294.4	**Btu/scf**
Other Calculated Values						
Regualr Wobbe Index*		1344.8	2815.9	3213.1	3573.8	**Btu/scf**
Net Heating Value (60 °F ideal reaction):		19873.8	19189.7	18506.9	19693.0	**Btu/lbm**
Gross Heating Value (60°F ideal reaction):		22001.5	20652.7	19849.3	21079.7	**Btu/lbm**
Molar Mass (MW):		18.58422	93.657	134.46	162.54	**g/mol**
Relative Density (AIR=1):		0.6410	3.2336	4.6423	5.6118	**SG**
Density:		0.04897	0.24681	0.35432	0.42831	**lbm/scf**
Compressiblity Factor:		0.9975	0.9913	0.9990	0.9997	**Z**
Liquid Volume real gas @:	**14.65**	17.7333	0.1166	0.009	0.003	**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: **05-045-13000** NAME/DESCRIP : **110170167 UNOCAL 13D-9D**
LEASE #: **PRODUCTION CASING**
FIELD/AREA:

PROJECT NO. : **202507061** ANALYSIS NO. : **02**
COMPANY NAME : **QB ENERGY OPERATING, LLC** ANALYSIS DATE: AUGUST 05, 2025 11:51
OFFICE / BRANCH: PARACHUTE, CO SAMPLE DATE : JUNE 25, 2025
CUSTOMER REF: TO:
PRODUCER : QB ENERGY OPERATING, LLC EFFECTIVE DATE:
FIELD DATA
SAMPLE CYCLE: SAMPLE TYPE: SPOT
SAMPLE PRES. : 295 psig PROBE :
FLOW PRES. : psig CYLINDER NO. : ECA-728
LAB PRES: psig SAMPLED BY : MIKE KELLEY
SAMPLE TEMP. : 75 ºf SAMPLING COMPANY: QB ENERGY OPERATING, LLC
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**
Hydrogen	---	0.41	0.04	---	---
Nitrogen	---	0.07	0.11	---	---
Carbon Dioxide	---	2.68	6.35	---	---
Methane	P1	88.5024	76.3963	---	---
Ethane	P2	5.6457	9.1344	1.505	1.513
Propane	P3	1.4556	3.4537	0.400	0.402
i-Butane	I4	0.3627	1.1343	0.118	0.119
Methanol	X1	0.0660	0.1138	0.008	0.008
n-Butane	P4	0.2723	0.8516	0.086	0.086
2,2-Dimethylpropane	I5	0.0044	0.0171	0.002	0.002
i-Pentane	I5	0.1500	0.5823	0.055	0.055
i-Propanol	X3	0.0003	0.0010	0.000	0.000
n-Pentane	P5	0.0825	0.3203	0.030	0.030
2,2-Dimethylbutane	I6	0.0070	0.0324	0.003	0.003
Cyclopentane	N5	0.0040	0.0151	0.001	0.001
2,3-Dimethylbutane	I6	0.0117	0.0542	0.005	0.005
2-Methylpentane	I6	0.0431	0.1998	0.018	0.018
3-Methylpentane	I6	0.0245	0.1136	0.010	0.010
n-Hexane	P6	0.0439	0.2036	0.018	0.018
2,2-Dimethylpentane	I7	0.0023	0.0124	0.001	0.001
Methylcyclopentane	N6	0.0208	0.0942	0.007	0.007
2,4-Dimethylpentane	I7	0.0034	0.0183	0.002	0.002
2,2,3-Trimethylbutane	I7	0.0010	0.0054	0.000	0.000
Benzene	A6	0.0089	0.0374	0.002	0.002
3,3-Dimethylpentane	I7	0.0011	0.0059	0.000	0.000
Cyclohexane	N6	0.0188	0.0851	0.006	0.006
2-Methylhexane	I7	0.0132	0.0712	0.006	0.006
2,3-Dimethylpentane	I7	0.0033	0.0178	0.001	0.001

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1,1-Dimethylcyclopentane	N7	0.0023	0.0122	0.001	0.001
3-Methylhexane	I7	0.0112	0.0604	0.005	0.005
1c,3-Dimethylcyclopentane	N7	0.0030	0.0159	0.001	0.001
1t,3-Dimethylcyclopentane	N7	0.0026	0.0137	0.001	0.001
3-Ethylpentane	I7	0.0006	0.0032	0.000	0.000
1t,2-Dimethylcyclopentane	N7	0.0040	0.0211	0.002	0.002
n-Heptane	P7	0.0169	0.0911	0.008	0.008
1c,2-Dimethylcyclopentane	N7	0.0012	0.0063	0.001	0.001
Methylcyclohexane	N7	0.0225	0.1189	0.009	0.009
2,2-Dimethylhexane	I8	0.0007	0.0043	0.000	0.000
1,1,3-Trimethylcyclopentane	N7	0.0001	0.0006	0.000	0.000
Propylene Glycol	GL3	0.0001	0.0004	0.000	0.000
Ethylcyclopentane	N7	0.0006	0.0032	0.000	0.000
2,5-Dimethylhexane	I8	0.0007	0.0043	0.000	0.000
2,2,3-Trimethylpentane	I8	0.0005	0.0031	0.000	0.000
2,4-Dimethylhexane	I8	0.0002	0.0012	0.000	0.000
1c,2t,4-Trimethylcyclopentane	N8	0.0003	0.0018	0.000	0.000
3,3-Dimethylhexane	I8	0.0001	0.0006	0.000	0.000
Toluene	A7	0.0018	0.0089	0.001	0.001
2,3-Dimethylhexane	I8	0.0002	0.0012	0.000	0.000
2-Methylheptane	I8	0.0008	0.0049	0.000	0.000
4-Methylheptane	I8	0.0003	0.0018	0.000	0.000
3-Methylheptane	I8	0.0005	0.0031	0.000	0.000
1c,2t,3-Trimethylcyclopentane	N8	0.0004	0.0024	0.000	0.000
3-Ethylhexane	I8	0.0001	0.0006	0.000	0.000
1t,4-Dimethylcyclohexane	N8	0.0002	0.0012	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
1t,3-Dimethylcyclohexane	N8	0.0001	0.0006	0.000	0.000
n-Octane	P8	0.0003	0.0018	0.000	0.000
1c,4-Dimethylcyclohexane	N8	0.0001	0.0006	0.000	0.000
1c,2-Dimethylcyclohexane	N8	0.0001	0.0006	0.000	0.000
1,3-Dimethylbenzene (m-Xylene)	A8	0.0001	0.0006	0.000	0.000
1,4-Dimethylbenzene (p-Xylene)	A8	0.0001	0.0006	0.000	0.000
1,2-Dimethylbenzene (o-Xylene)	A8	0.0002	0.0011	0.000	0.000
i-Propylbenzene	A9	0.0002	0.0013	0.000	0.000
3-Methyl-5-ethylheptane	I10	0.0009	0.0069	0.001	0.001
1,3-Methylethylbenzene	A9	0.0029	0.0188	0.002	0.002
1,4-Methylethylbenzene	A9	0.0014	0.0090	0.001	0.001
1,3,5-Trimethylbenzene	A9	0.0013	0.0084	0.001	0.001
1,2-Methylethylbenzene	A9	0.0011	0.0071	0.001	0.001
2-Methylnonane	I10	0.0001	0.0007	0.000	0.000
t-Butylbenzene	A10	0.0040	0.0289	0.002	0.002
i-Butylbenzene	A10	0.0001	0.0007	0.000	0.000
sec-Butylbenzene	A10	0.0001	0.0007	0.000	0.000
n-Decane	P10	0.0001	0.0007	0.000	0.000
1,2,3-Trimethylbenzene	A9	0.0018	0.0116	0.001	0.001
1,3-Methyl-i-propylbenzene	A10	0.0002	0.0014	0.000	0.000
1,4-Methyl-n-propylbenzene	A10	0.0001	0.0007	0.000	0.000
n-Butylbenzene	A10	0.0002	0.0014	0.000	0.000
1,3-Dimethyl-5-ethylbenzene	A10	0.0001	0.0007	0.000	0.000
1,2-Diethylbenzene	A10	0.0001	0.0007	0.000	0.000
1,2-Dimethyl-4-ethylbenzene	A10	0.0001	0.0007	0.000	0.000
n-Undecane	P11	0.0001	0.0009	0.000	0.000
1,4-Ethyl-i-propylbenzene	A11	0.0001	0.0008	0.000	0.000
sec-Pentylbenzene	A11	0.0001	0.0008	0.000	0.000
UnknownC11s	U11	0.0002	0.0017	0.000	0.000
n-Dodecane	P12	0.0001	0.0009	0.000	0.000
1,3,5-Triethylbenzene	A12	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

n-Tetradecane	P14	0.0003	0.0032	0.000	0.000
n-Pentadecane	P15	0.0003	0.0034	0.000	0.000
UnknownC15s	U15	0.0002	0.0023	0.000	0.000
n-Hexadecane	P16	0.0002	0.0024	0.000	0.000
UnknownC16s	U16	0.0001	0.0012	0.000	0.000
n-Heptadecane	P17	0.0001	0.0013	0.000	0.000
UnknownC17s	U17	0.0001	0.0013	0.000	0.000
UnknownC18s	U18	0.0001	0.0013	0.000	0.000
n-Nonadecane	P19	0.0003	0.0044	0.000	0.000
UnknownC20s	U20	0.0001	0.0015	0.000	0.000
n-Heneicosane	P21	0.0001	0.0016	0.000	0.000
n-Docosane	P22	0.0002	0.0033	0.000	0.000
TOTAL		100.00000	100.00000	2.3217	2.3338

BTEX COMPONENTS	MOLE%	WT%
BENZENE	0.0089	0.0374
TOLUENE	0.0018	0.0089
ETHYLBENZENE	0.0000	0.0000
XYLENES	0.0004	0.0023
TOTAL BTEX	0.0111	0.0486

**(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 :	972.3 /scf	977.6 /scf
NET WET REAL :	955.3 /scf	960.6 /scf
HHV GROSS DRY REAL :	1076.0 /scf	1081.9 /scf
GROSS WET REAL :	1057.2 /scf	1063.1 /scf
NET HEATING VALUE (60 °F ideal reaction):		19873.8 Btu/lbm
GROSS HEATING VALUE (60°F ideal reaction):		22001.5 Btu/lbm
RELATIVE DENSITY (AIR=1):		0.6410
DENSITY		0.04897 lb/scf
COMPRESSIBILITY FACTOR :		0.9975
REGULAR WOBBE INDEX		1344.8

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

Net Dry Ideal BTU	4704.8 /scf	Relative Density - SG (Air=1)	3.2336		***C6+factors***
Gross Dry Ideal BTU	5063.7 /scf	**Z** Compressiblity Factor	0.99128		0.9904
Net Dry Ideal BTU	19189.7 /lb	Density Factor	246.808	lbm/1000 ft3	
Gross Dry Ideal BTU	20652.7 /lb	Molar Mass or MW	93.657	g/mol	
		Volume Liquid Ideal gas	0.117	scf/gal	23.9

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.