EMPACT

EXTENDED NATURAL GAS ANALYSIS (*DHA)

MAIN PAGE

PRIMARY DB KEY:	**05-045-05130**	NAME/DESCRIP :	**120286008 DOUBLE WILLOW 8610A J19 497 CASING**
LEASE #:	**COC-50268**		
FIELD/AREA:	**WILLOW CREEK**		
PROJECT NO. :	**202603103**	ANALYSIS NO. :	**01**
COMPANY NAME :	**QB ENERGY OPERATING, LLC**	ANALYSIS DATE:	APRIL 11, 2026 12:28
OFFICE / BRANCH:	PARACHUTE, CO	SAMPLE DATE :	MARCH 8, 2026
CUSTOMER REF:		TO:	
PRODUCER :	QB ENERGY OPERATING LLC	EFFECTIVE DATE:	

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

SAMPLE CYCLE:			SAMPLE TYPE:	SPOT
SAMPLE PRES. :	1	psig	PROBE :	NO
FLOW PRES. :		psig	CYLINDER NO. :	ECA-822
LAB PRES:		psig	SAMPLED BY :	MIKE KELLEY
SAMPLE TEMP. :	48	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	0.0156	0.0384	0.0030	0.0030
HELIUM	0.00	0.00	---	---
HYDROGEN	0.17	0.02	---	---
OXYGEN/ARGON	0.02	0.04	---	---
NITROGEN	0.80	1.36	---	---
CARBON DIOXIDE	0.86	2.30	---	---
METHANE	97.8391	95.4821	---	---
ETHANE	0.1619	0.2961	0.0430	0.0432
PROPANE	0.0706	0.1893	0.0190	0.0191
I-BUTANE	0.0152	0.0537	0.0050	0.0050
N-BUTANE	0.0192	0.0679	0.0060	0.0060
I-PENTANE	0.0096	0.0421	0.0030	0.0030
N-PENTANE	0.0051	0.0224	0.0020	0.0020
HEXANES PLUS	0.0137	0.0880	0.0000	0.0000
TOTALS	100.00000	100.00000	0.0810	0.0813

BTEX COMPONENTS	MOLE%	WT%
BENZENE	0.0001	0.0005
TOLUENE	0.0004	0.0023
ETHYLBENZENE	0.0001	0.0007
XYLENES	0.0002	0.0014
TOTAL BTEX	0.0008	0.0049

**(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 :	895.4	/scf	900.3	/scf
	NET WET REAL :	879.7	/scf	884.6	/scf
HHV	GROSS DRY REAL :	994.6	/scf	1000.0	/scf
	GROSS WET REAL :	977.2	/scf	982.6	/scf

NET HEATING VALUE (60 °F ideal reaction):	20707.0	Btu/lbm
GROSS HEATING VALUE (60°F ideal reaction):	22995.9	Btu/lbm
RELATIVE DENSITY (AIR=1):	0.5670	
DENSITY	0.04332	lbm/scf
COMPRESSIBILITY FACTOR :	0.9980	
REGULAR WOBBE INDEX	1322.3	

EMPACT

EXTENDED NATURAL GAS ANALYSIS (*DHA)

GLYCALC INFORMATION

PROJECT NO. :	202603103	ANALYSIS NO. :	01
COMPANY NAME :	QB ENERGY OPERATING, LLC	ANALYSIS DATE:	APRIL 11, 2026 12:28
ACCOUNT NO. :		SAMPLE DATE :	MARCH 8, 2026
PRODUCER :	QB ENERGY OPERATING LLC	CYLINDER NO. :	ECA-822
LEASE NO. :	COC-50268	SAMPLED BY :	MIKE KELLEY
NAME/DESCRIP :	120286008 DOUBLE WILLOW 8610A J19 497 CASING		
FIELD DATA		SAMPLE TEMP. :	48
SAMPLE PRES. :	1	AMBIENT TEMP.:	
H2S BY STAIN TUBE:	_ *ppm mol*		
COMMENTS :	*SPOT* *NO PROBE*		

Componet	Mole %	Wt %
Helium	0.00	0.00
Hydrogen	0.17	0.02
Carbon Dioxide	0.86	2.30
Nitrogen	0.80	1.36
Methane	97.8391	95.4821
Ethane	0.1619	0.2961
Propane	0.0706	0.1893
Isobutane	0.0152	0.0537
n-Butane	0.0192	0.0679
Isopentane	0.0094	0.0412
n-Pentane	0.0051	0.0224
Cyclopentane	0.0002	0.0009
n-Hexane	0.0010	0.0052
Cyclohexane	0.0006	0.0030
Other Hexanes	0.0027	0.0141
Heptanes	0.0022	0.0133
Methylcyclohexane	0.0012	0.0072
2,2,4 Trimethylpentane	0.0000	0.0000
Benzene	0.0001	0.0005
Toluene	0.0004	0.0023
Ethylbenzene	0.0001	0.0007
Xylenes	0.0002	0.0014
C8+ Heavies	0.0052	0.0403
Subtotal	99.96440	99.92160
Oxygen/Argon	0.02	0.04
Alcohols	0.0156	0.0384
Total	100.00000	100.00000

Calculated Values BTU @ **14.65**		**Total Sample**	**C6+ Fraction**	**C8+ Fraction**	**C10+ Fraction**	
LHV	Net Dry Real:	895.4	5205.7	6068.5	7177.8	**Btu/scf**
	Net Wet Real:	879.7	5114.7	5962.4	7052.3	**Btu/scf**
HHV	Gross Dry Real:	994.6	5592.4	6510.3	7690.1	**Btu/scf**
	Gross Wet Real:	977.2	5494.6	6396.5	7555.7	**Btu/scf**
Other Calculated Values						
Regualr Wobbe Index*		1322.3	2931.6	3136.3	3448.2	**Btu/scf**
Net Heating Value (60 °F ideal reaction):		20707.0	18927.0	18583.3	18833.8	**Btu/lbm**
Gross Heating Value (60°F ideal reaction):		22995.9	20331.8	19935.4	20176.7	**Btu/lbm**
Molar Mass (MW):		16.43932	105.046	125.281	144.839	**g/mol**
Relative Density (AIR=1):		0.5670	3.6273	4.3252	5.0009	**SG**
Density:		0.04332	0.27682	0.33015	0.38168	**lbm/scf**
Compressiblity Factor:		0.9980	0.9952	0.9988	0.9996	**Z**
Liquid Volume real gas @:	**14.65**	16.8232	0	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.

EXTENDED NATURAL GAS ANALYSIS (*DHA)

DHA COMPONENT LIST

PRIMARY DB KEY:	**05-045-05130**	NAME/DESCRIP :	**120286008 DOUBLE WILLOW 8610A J19 497**
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FIELD/AREA:	**WILLOW CREEK**		
PROJECT NO. :	**202603103**	ANALYSIS NO. :	**01**
COMPANY NAME :	**QB ENERGY OPERATING, LLC**	ANALYSIS DATE:	APRIL 11, 2026 12:28
OFFICE / BRANCH:	PARACHUTE, CO	SAMPLE DATE :	MARCH 8, 2026
CUSTOMER REF:		TO:	
PRODUCER :	QB ENERGY OPERATING LLC	EFFECTIVE DATE:	
FIELD DATA			
SAMPLE CYCLE:		SAMPLE TYPE:	SPOT
SAMPLE PRES. :	1 psig	PROBE :	NO
FLOW PRES. :	psig	CYLINDER NO. :	ECA-822
LAB PRES:	psig	SAMPLED BY :	MIKE KELLEY
SAMPLE TEMP. :	48 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**
Hydrogen	---	0.17	0.02	---	---
Oxygen/Argon	---	0.02	0.04	---	---
Nitrogen	---	0.80	1.36	---	---
Carbon Dioxide	---	0.86	2.30	---	---
Methane	P1	97.8391	95.4821	---	---
Ethane	P2	0.1619	0.2961	0.043	0.043
Propane	P3	0.0698	0.1872	0.019	0.019
i-Butane	I4	0.0152	0.0537	0.005	0.005
Methanol	X1	0.0108	0.0211	0.001	0.001
UnknownC3s	U3	0.0008	0.0021	0.000	0.000
n-Butane	P4	0.0192	0.0679	0.006	0.006
2,2-Dimethylpropane	I5	0.0013	0.0057	0.000	0.000
i-Pentane	I5	0.0081	0.0355	0.003	0.003
Acetone	X3	0.0019	0.0067	0.001	0.001
i-Propanol	X3	0.0029	0.0106	0.001	0.001
n-Pentane	P5	0.0051	0.0224	0.002	0.002
2,2-Dimethylbutane	I6	0.0001	0.0006	0.000	0.000
Cyclopentane	N5	0.0002	0.0009	0.000	0.000
2,3-Dimethylbutane	I6	0.0002	0.0010	0.000	0.000
2-Methylpentane	I6	0.0011	0.0058	0.000	0.000
3-Methylpentane	I6	0.0007	0.0037	0.000	0.000
n-Hexane	P6	0.0010	0.0052	0.000	0.000
Methylcyclopentane	N6	0.0006	0.0030	0.000	0.000
Benzene	A6	0.0001	0.0005	0.000	0.000
Cyclohexane	N6	0.0006	0.0030	0.000	0.000
2-Methylhexane	I7	0.0003	0.0018	0.000	0.000
2,3-Dimethylpentane	I7	0.0001	0.0006	0.000	0.000

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3-Methylhexane	I7	0.0004	0.0024	0.000	0.000
1c,3-Dimethylcyclopentane	N7	0.0001	0.0006	0.000	0.000
1t,3-Dimethylcyclopentane	N7	0.0001	0.0006	0.000	0.000
1t,2-Dimethylcyclopentane	N7	0.0002	0.0012	0.000	0.000
n-Heptane	P7	0.0009	0.0055	0.000	0.000
Methylcyclohexane	N7	0.0012	0.0072	0.000	0.000
2,2-Dimethylhexane	I8	0.0001	0.0007	0.000	0.000
Ethylcyclopentane	N7	0.0001	0.0006	0.000	0.000
1c,2t,4-Trimethylcyclopentane	N8	0.0001	0.0007	0.000	0.000
Toluene	A7	0.0004	0.0023	0.000	0.000
2-Methylheptane	I8	0.0002	0.0014	0.000	0.000
3-Methylheptane	I8	0.0001	0.0007	0.000	0.000
1c,2t,3-Trimethylcyclopentane	N8	0.0002	0.0013	0.000	0.000
1t,4-Dimethylcyclohexane	N8	0.0001	0.0007	0.000	0.000
1t,2-Dimethylcyclohexane	N8	0.0001	0.0007	0.000	0.000
n-Octane	P8	0.0004	0.0028	0.000	0.000
1c,4-Dimethylcyclohexane	N8	0.0001	0.0007	0.000	0.000
1,1,4-Trimethylcyclohexane	N9	0.0001	0.0008	0.000	0.000
2,2,3-Trimethylhexane	I9	0.0001	0.0008	0.000	0.000
n-Propylcyclopentane	N8	0.0001	0.0007	0.000	0.000
2,5-Dimethylheptane	I9	0.0001	0.0008	0.000	0.000
Ethylbenzene	I8	0.0001	0.0007	0.000	0.000
1,3-Dimethylbenzene (m-Xylene)	A8	0.0001	0.0007	0.000	0.000
4-Methyloctane	I9	0.0001	0.0008	0.000	0.000
1c,2t,4c-Trimethylcyclohexane	I9	0.0001	0.0008	0.000	0.000
1,2-Dimethylbenzene (o-Xylene)	A8	0.0001	0.0007	0.000	0.000
n-Nonane	P9	0.0004	0.0031	0.000	0.000
1,1-Methylethylcyclohexane	N9	0.0001	0.0008	0.000	0.000
n-Butylcyclopentane	N9	0.0001	0.0008	0.000	0.000
n-Propylbenzene	A9	0.0002	0.0015	0.000	0.000
3,6-Dimethyloctane	I10	0.0002	0.0017	0.000	0.000
3-Methyl-5-ethylheptane	I10	0.0001	0.0009	0.000	0.000
1,3-Methylethylbenzene	A9	0.0004	0.0029	0.000	0.000
1,4-Methylethylbenzene	A9	0.0002	0.0015	0.000	0.000
1,3,5-Trimethylbenzene	A9	0.0002	0.0015	0.000	0.000
1,2-Methylethylbenzene	A9	0.0002	0.0015	0.000	0.000
t-Butylbenzene	A10	0.0004	0.0033	0.000	0.000
n-Decane	P10	0.0002	0.0017	0.000	0.000
1,3-Methyl-i-propylbenzene	A10	0.0001	0.0008	0.000	0.000
1,3-Diethylbenzene	A10	0.0001	0.0008	0.000	0.000
n-Undecane	P11	0.0001	0.0010	0.000	0.000
n-Dodecane	P12	0.0001	0.0010	0.000	0.000
n-Tridecane	P13	0.0001	0.0011	0.000	0.000
TOTAL		100.00000	100.00000	0.0810	0.0813

BTEX COMPONENTS	MOLE%	WT%
BENZENE	0.0001	0.0005
TOLUENE	0.0004	0.0023
ETHYLBENZENE	0.0001	0.0007
XYLENES	0.0002	0.0014
TOTAL BTEX	0.0008	0.0049

**(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 :	895.4	/scf	900.3	/scf
	NET WET REAL :	879.7	/scf	884.6	/scf
HHV	GROSS DRY REAL :	994.6	/scf	1000.0	/scf
	GROSS WET REAL :	977.2	/scf	982.6	/scf
	NET HEATING VALUE (60 °F ideal reaction):			20707.0	Btu/lbm
	GROSS HEATING VALUE (60°F ideal reaction):			22995.9	Btu/lbm
	RELATIVE DENSITY (AIR=1):			0.5670	
	DENSITY			0.04332	lb/scf
	COMPRESSIBILITY FACTOR :			0.9980	
	REGULAR WOBBE INDEX			1322.3	

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

Net Dry Ideal BTU	5197.2 **/scf**	Relative Density - SG (Air=1)	3.6273	***C6+factors***
Gross Dry Ideal BTU	5583.3 **/scf**	**Z** Compressiblity Factor	0.99524	0.99401
Net Dry Ideal BTU	18927 **/lb**	Density Factor	276.815 **lbm/1000 ft3**	
Gross Dry Ideal BTU	20331.8 **/lb**	Molar Mass or MW	105.046 **g/mol**	
		Volume Liquid Ideal gas	0 **scf/gal**	22.4

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.