



**EXTENDED NATURAL GAS ANALYSIS (*DHA)
GLYCALC INFORMATION**

PROJECT NO. :	202506058	ANALYSIS NO. :	05
COMPANY NAME :	QB ENERGY OPERATING, LLC	ANALYSIS DATE:	JUNE 20, 2025 07:44
ACCOUNT NO. :		SAMPLE DATE :	MAY 29, 2025
PRODUCER :	QB ENERGY OPERATING, LLC	CYLINDER NO. :	ECA-725
LEASE NO. :	COC-46029	SAMPLED BY :	MIKE KELLEY
NAME/DESCRIP :	RULISON FEDERAL 01-42 TUBING		

FIELD DATA

SAMPLE PRES. :	210	SAMPLE TEMP. :	57
H2S BY STAIN TUBE:	—	AMBIENT TEMP.:	
COMMENTS :	—		

ppm mol
SPOT NO

Componet	Mole %	Wt %
Helium	0.01	0.00
Hydrogen	0.01	0.00
Carbon Dioxide	0.33	0.80
Nitrogen	0.09	0.14
Methane	90.0907	79.1461
Ethane	6.2940	10.3639
Propane	1.8565	4.4830
Isobutane	0.3731	1.1875
n-Butane	0.4109	1.3078
Isopentane	0.1542	0.6093
n-Pentane	0.0696	0.2750
Cyclopentane	0.0022	0.0084
n-Hexane	0.0277	0.1307
Cyclohexane	0.0186	0.0857
Other Hexanes	0.0479	0.2245
Heptanes	0.0572	0.3127
Methylcyclohexane	0.0435	0.2339
2,2,4 Trimethylpentane	0.0000	0.0000
Benzene	0.0077	0.0329
Toluene	0.0212	0.1069
Ethylbenzene	0.0011	0.0064
Xylenes	0.0106	0.0615
C8+ Heavies	0.0731	0.4832
Subtotal	99.99980	99.99930
Oxygen/Argon	0.00	0.00
Alcohols	0.0002	0.0007
Total	100.00000	100.00000

Calculated Values BTU @		Total	C6+	C8+	C10+
	14.65				
LHV	Net Dry Real:	1009.8	4972.2	5921.3	7271.6 Btu/scf
	Net Wet Real:	992.1	4885.3	5817.8	7144.5 Btu/scf
HHV	Gross Dry Real:	1117.2	5337.9	6360.4	7852.6 Btu/scf
	Gross Wet Real:	1097.7	5244.6	6249.2	7715.3 Btu/scf

Other Calculated Values					
Regualr Wobbe Index*		1408.9	2874.8	3143.4	3532.2 Btu/scf
Net Heating Value (60 °F ideal reaction):		21021.2	19185.2	19403.5	18975.3 Btu/lbm
Gross Heating Value (60 °F ideal reaction):		23259.6	20595.7	20845.1	20481.3 Btu/lbm
Molar Mass (MW):		18.26035	99.371	118.838	143.947 g/mol
Relative Density (AIR=1):		0.6295	3.4312	4.1041	4.9697 SG
Density:		0.04812	0.26186	0.31317	0.37931 lbm/scf
Compressibility Factor:		0.9974	0.9945	0.9981	0.9996 Z
Liquid Volume real gas @:	14.65	17.8878	0.1186	0.0309	0.002 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: **05-045-07185** NAME/DESCRIP : **RULISON FEDERAL 01-42**
 LEASE #: **COC-46029** TUBING
 FIELD/AREA:

PROJECT NO. : **202506058** ANALYSIS NO. : **05**
 COMPANY NAME : **QB ENERGY OPERATING, LLC** ANALYSIS DATE: **JUNE 20, 2025 07:44**
 OFFICE / BRANCH: **PARACHUTE, CO** SAMPLE DATE : **MAY 29, 2025**
 CUSTOMER REF: TO:
 PRODUCER : **QB ENERGY OPERATING, LLC** EFFECTIVE DATE:

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

SAMPLE CYCLE: SAMPLE TYPE: SPOT
 SAMPLE PRES. : 210 psig PROBE : NO
 FLOW PRES. : psig CYLINDER NO. : ECA-725
 LAB PRES: psig SAMPLED BY : MIKE KELLEY
 SAMPLE TEMP. : 57 °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
Helium	---	0.01	0.00	---	---
Hydrogen	---	0.01	0.00	---	---
Nitrogen	---	0.09	0.14	---	---
Carbon Dioxide	---	0.33	0.80	---	---
Methane	P1	90.0907	79.1461	---	---
Ethane	P2	6.2940	10.3639	1.678	1.687
Propane	P3	1.8565	4.4830	0.510	0.513
i-Butane	I4	0.3731	1.1875	0.122	0.123
n-Butane	P4	0.4109	1.3078	0.129	0.130
2,2-Dimethylpropane	I5	0.0040	0.0158	0.002	0.002
Ethanol	X2	0.0001	0.0003	0.000	0.000
i-Pentane	I5	0.1502	0.5935	0.055	0.055
n-Pentane	P5	0.0696	0.2750	0.025	0.025
t-Butanol	X4	0.0001	0.0004	0.000	0.000
2,2-Dimethylbutane	I6	0.0019	0.0090	0.001	0.001
Cyclopentane	N5	0.0022	0.0084	0.001	0.001
2,3-Dimethylbutane	I6	0.0039	0.0184	0.002	0.002
2-Methylpentane	I6	0.0174	0.0821	0.007	0.007
3-Methylpentane	I6	0.0103	0.0486	0.004	0.004
n-Hexane	P6	0.0277	0.1307	0.011	0.011
2,2-Dimethylpentane	I7	0.0007	0.0038	0.000	0.000
Methylcyclopentane	N6	0.0144	0.0664	0.005	0.005
2,4-Dimethylpentane	I7	0.0016	0.0088	0.001	0.001
2,2,3-Trimethylbutane	I7	0.0004	0.0022	0.000	0.000
Benzene	A6	0.0077	0.0329	0.002	0.002
3,3-Dimethylpentane	I7	0.0005	0.0027	0.000	0.000
Cyclohexane	N6	0.0186	0.0857	0.006	0.006
2-Methylhexane	I7	0.0057	0.0313	0.003	0.003

2,3-Dimethylpentane	I7	0.0048	0.0263	0.002	0.002
1,1-Dimethylcyclopentane	N7	0.0019	0.0102	0.001	0.001
3-Methylhexane	I7	0.0079	0.0434	0.004	0.004
1c,3-Dimethylcyclopentane	N7	0.0028	0.0151	0.001	0.001
1t,3-Dimethylcyclopentane	N7	0.0025	0.0134	0.001	0.001
3-Ethylpentane	I7	0.0002	0.0011	0.000	0.000
1t,2-Dimethylcyclopentane	N7	0.0042	0.0226	0.002	0.002
n-Heptane	P7	0.0217	0.1191	0.010	0.010
1c,2-Dimethylcyclopentane	N7	0.0003	0.0016	0.000	0.000
Methylcyclohexane	N7	0.0435	0.2339	0.017	0.017
2,2-Dimethylhexane	I8	0.0008	0.0050	0.000	0.000
1,1,3-Trimethylcyclopentane	N7	0.0005	0.0031	0.000	0.000
Ethylcyclopentane	N7	0.0015	0.0080	0.001	0.001
2,5-Dimethylhexane	I8	0.0010	0.0062	0.001	0.001
2,2,3-Trimethylpentane	I8	0.0009	0.0056	0.000	0.000
2,4-Dimethylhexane	I8	0.0001	0.0006	0.000	0.000
1c,2t,4-Trimethylcyclopentane	N8	0.0009	0.0055	0.000	0.000
3,3-Dimethylhexane	I8	0.0003	0.0019	0.000	0.000
Toluene	A7	0.0212	0.1069	0.007	0.007
2,3-Dimethylhexane	I8	0.0008	0.0050	0.000	0.000
2-Methyl-3-ethylpentane	I8	0.0002	0.0013	0.000	0.000
2-Methylheptane	I8	0.0049	0.0307	0.003	0.003
4-Methylheptane	I8	0.0013	0.0082	0.001	0.001
3-Methyl-3-ethylpentane	I8	0.0003	0.0019	0.000	0.000
3,4-Dimethylhexane	I8	0.0001	0.0006	0.000	0.000
1c,2c,4-Trimethylcyclopentane	N8	0.0001	0.0006	0.000	0.000
3-Methylheptane	I8	0.0028	0.0175	0.001	0.001
1c,2t,3-Trimethylcyclopentane	N8	0.0068	0.0418	0.003	0.003
3-Ethylhexane	I8	0.0009	0.0056	0.000	0.000
1t,4-Dimethylcyclohexane	N8	0.0032	0.0197	0.002	0.002
1,1-Dimethylcyclohexane	N8	0.0009	0.0055	0.000	0.000
2,2,5-Trimethylhexane	I9	0.0001	0.0007	0.000	0.000
3c-Ethylmethylcyclopentane	N8	0.0003	0.0019	0.000	0.000
3t-Ethylmethylcyclopentane	N8	0.0002	0.0012	0.000	0.000
2t-Ethylmethylcyclopentane	N8	0.0002	0.0012	0.000	0.000
1,1-Methylethylcyclopentane	N8	0.0001	0.0006	0.000	0.000
2,2,4-Trimethylhexane	I9	0.0001	0.0007	0.000	0.000
1t,2-Dimethylcyclohexane	N8	0.0022	0.0135	0.001	0.001
1t,3-Dimethylcyclohexane	N8	0.0001	0.0006	0.000	0.000
n-Octane	P8	0.0106	0.0663	0.005	0.005
1c,4-Dimethylcyclohexane	N8	0.0018	0.0111	0.001	0.001
i-Propylcyclopentane	I8	0.0001	0.0006	0.000	0.000
2,3,5-Trimethylhexane	I9	0.0001	0.0007	0.000	0.000
2,2-Dimethylheptane	I9	0.0003	0.0021	0.000	0.000
1,1,4-Trimethylcyclohexane	N9	0.0020	0.0138	0.001	0.001
2,2,3-Trimethylhexane	I9	0.0007	0.0049	0.000	0.000
2,4-Dimethylheptane	I9	0.0004	0.0028	0.000	0.000
4,4-Dimethylheptane	I9	0.0001	0.0007	0.000	0.000
Ethylcyclohexane	N8	0.0016	0.0099	0.001	0.001
n-Propylcyclopentane	N8	0.0006	0.0037	0.000	0.000
1c,3c,5-Trimethylcyclohexane	N9	0.0002	0.0014	0.000	0.000
2,5-Dimethylheptane	I9	0.0009	0.0063	0.001	0.001
3,3-Dimethylheptane	I9	0.0001	0.0007	0.000	0.000
2,6-Dimethylheptane	I9	0.0001	0.0007	0.000	0.000
1,1,3-Trimethylcyclohexane	N9	0.0004	0.0027	0.000	0.000
Ethylbenzene	I8	0.0011	0.0064	0.000	0.000
2,3-Dimethylheptane	I9	0.0001	0.0007	0.000	0.000
1,3-Dimethylbenzene (m-Xylene)	A8	0.0074	0.0430	0.003	0.003
1,4-Dimethylbenzene (p-Xylene)	A8	0.0020	0.0116	0.001	0.001
3,4-Dimethylheptane	I9	0.0004	0.0028	0.000	0.000
3,4-Dimethylheptane (2)	I9	0.0002	0.0014	0.000	0.000

4-Ethylheptane	I9	0.0001	0.0007	0.000	0.000
4-Methyloctane	I9	0.0005	0.0035	0.000	0.000
2-Methyloctane	I9	0.0009	0.0063	0.001	0.001
1c,2t,3-Trimethylcyclohexane	N9	0.0001	0.0007	0.000	0.000
3-Ethylheptane	I9	0.0001	0.0007	0.000	0.000
3-Methyloctane	I9	0.0001	0.0007	0.000	0.000
1c,2t,4c-Trimethylcyclohexane	I9	0.0008	0.0055	0.000	0.000
1,1,2-Trimethylcyclohexane	N9	0.0001	0.0007	0.000	0.000
3,3-Diethylpentane	I9	0.0001	0.0007	0.000	0.000
1,2-Dimethylbenzene (o-Xylene)	A8	0.0012	0.0069	0.000	0.000
i-Butylcyclopentane	N9	0.0007	0.0048	0.000	0.000
UnknownC8s	U8	0.0001	0.0006	0.000	0.000
n-Nonane	P9	0.0036	0.0253	0.002	0.002
1,1-Methylethylcyclohexane	N9	0.0007	0.0048	0.000	0.000
i-Propylbenzene	A9	0.0002	0.0013	0.000	0.000
i-Propylcyclohexane	N9	0.0002	0.0014	0.000	0.000
2,2-Dimethyloctane	I10	0.0001	0.0008	0.000	0.000
2,4-Dimethyloctane	I10	0.0001	0.0008	0.000	0.000
2,6-Dimethyloctane	I10	0.0001	0.0008	0.000	0.000
2,5-Dimethyloctane	I10	0.0001	0.0008	0.000	0.000
n-Butylcyclopentane	N9	0.0005	0.0034	0.000	0.000
3,3-Dimethyloctane	I10	0.0002	0.0015	0.000	0.000
n-Propylbenzene	A9	0.0006	0.0039	0.000	0.000
3,6-Dimethyloctane	I10	0.0002	0.0015	0.000	0.000
3-Methyl-5-ethylheptane	I10	0.0001	0.0008	0.000	0.000
1,3-Methylethylbenzene	A9	0.0006	0.0039	0.000	0.000
1,4-Methylethylbenzene	A9	0.0002	0.0013	0.000	0.000
1,3,5-Trimethylbenzene	A9	0.0008	0.0053	0.000	0.000
2,3-Dimethyloctane	I10	0.0001	0.0008	0.000	0.000
5-Methylnonane	I10	0.0003	0.0023	0.000	0.000
1,2-Methylethylbenzene	A9	0.0001	0.0007	0.000	0.000
2-Methylnonane	I10	0.0003	0.0023	0.000	0.000
3-Ethylheptane	I10	0.0001	0.0008	0.000	0.000
3-Methylnonane	I10	0.0002	0.0015	0.000	0.000
1,2,4-Trimethylbenzene	A9	0.0001	0.0007	0.000	0.000
t-Butylbenzene	A10	0.0007	0.0051	0.000	0.000
i-Butylcyclohexane	N10	0.0001	0.0008	0.000	0.000
1t-Methyl-2-n-propylcyclohexane	I10	0.0001	0.0008	0.000	0.000
i-Butylbenzene	A10	0.0001	0.0007	0.000	0.000
UnknownC9s	U9	0.0018	0.0126	0.001	0.001
n-Decane	P10	0.0016	0.0125	0.001	0.001
1,2,3-Trimethylbenzene	A9	0.0001	0.0007	0.000	0.000
1,3-Methyl-i-propylbenzene	A10	0.0002	0.0015	0.000	0.000
1,4-Methyl-i-propylbenzene	A10	0.0001	0.0007	0.000	0.000
Sec-Butylcyclohexane	A10	0.0001	0.0008	0.000	0.000
1,2-Methyl-i-propylbenzene	A10	0.0003	0.0022	0.000	0.000
3-Ethylnonane	I10	0.0001	0.0009	0.000	0.000
1,3-Methyl-n-propylbenzene	A10	0.0001	0.0007	0.000	0.000
1,4-Diethylbenzene	A10	0.0001	0.0007	0.000	0.000
1,4-Methyl-n-propylbenzene	A10	0.0001	0.0007	0.000	0.000
1,3-Dimethyl-5-ethylbenzene	A10	0.0001	0.0007	0.000	0.000
1,2-Methyl-n-propylbenzene	A10	0.0001	0.0007	0.000	0.000
1,3-Dimethyl-4-ethylbenzene	A10	0.0001	0.0007	0.000	0.000
1,3-Dimethyl-2-ethylbenzene	A10	0.0001	0.0007	0.000	0.000
UnknownC10s	U10	0.0016	0.0125	0.001	0.001
n-Undecane	P11	0.0006	0.0051	0.000	0.000
1,2,3,5-Tetramethylbenzene	A11	0.0001	0.0007	0.000	0.000
Tetrahydronaphthalene	A10	0.0001	0.0007	0.000	0.000
Naphthalene	A10	0.0001	0.0007	0.000	0.000
1,4-Ethyl-t-butylbenzene	A11	0.0001	0.0009	0.000	0.000
UnknownC11s	U11	0.0002	0.0017	0.000	0.000
n-Dodecane	P12	0.0003	0.0028	0.000	0.000

1,3,5-Triethylbenzene	A12	0.0001	0.0009	0.000	0.000
1,2,3,4,5-Pentamethylbenzene	A13	0.0001	0.0008	0.000	0.000
UnknownC12s	U12	0.0002	0.0017	0.000	0.000
n-Tridecane	P13	0.0001	0.0010	0.000	0.000
UnknownC13s	U13	0.0001	0.0010	0.000	0.000
TOTAL		100.00000	100.00000	2.6406	2.6545

CALCULATED VALUES**

BTEX COMPONENTS	MOLE%	WT%	BTU @	14.65	14.73
BENZENE	0.0077	0.0329	LHV NET DRY REAL :	1009.8 /scf	1015.3 /scf
TOLUENE	0.0212	0.1069	NET WET REAL :	992.1 /scf	997.6 /scf
ETHYLBENZENE	0.0011	0.0064	HHV GROSS DRY REAL :	1117.2 /scf	1123.3 /scf
XYLENES	0.0106	0.0615	GROSS WET REAL :	1097.7 /scf	1103.8 /scf
TOTAL BTEX	0.0406	0.2077	NET HEATING VALUE (60 °F ideal reaction):		21021.2 Btu/lbm
			GROSS HEATING VALUE (60°F ideal reaction):		23259.6 Btu/lbm
			RELATIVE DENSITY (AIR=1):		0.6295
			DENSITY		0.04812 lb/scf
			COMPRESSIBILITY FACTOR :		0.9974
			REGULAR WOBBE INDEX		1408.9

*(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>4960.3</u> /scf	Relative Density - SG (Air=1)	<u>3.4312</u>	C6+factors
Gross Dry Ideal BTU	<u>5325.1</u> /scf	Z Compressibility Factor	<u>0.99448</u>	<u>0.99352</u>
Net Dry Ideal BTU	<u>19185.2</u> /lb	Density Factor	<u>261.861</u> lbm/1000 ft3	
Gross Dry Ideal BTU	<u>20595.7</u> /lb	Molar Mass or MW	<u>99.371</u> g/mol	
		Volume Liquid Ideal gas	<u>0.119</u> scf/gal	<u>23.1</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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