



EXTENDED NATURAL GAS ANALYSIS (*DHA)

MAIN PAGE

PRIMARY DB KEY: **05-045-07185** NAME/DESCRIP : **RULISON FEDERAL 01-42**
 LEASE #: **COC-46029** **BRADEN HEAD**
 FIELD/AREA:

PROJECT NO. : **202506058** ANALYSIS NO. : **03**
 COMPANY NAME : **QB ENERGY OPERATING, LLC** ANALYSIS DATE: **JUNE 19, 2025 16:48**
 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. : 158 psig PROBE : NO
 FLOW PRES. : psig CYLINDER NO. : ECA-723
 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:

<u>COMPONENT</u>	<u>MOLE %</u>	<u>MASS %</u>	<u>GPM @</u>	
			<u>14.65</u>	<u>14.73</u>
ALCOHOLS	0.0004	0.0010	0.0000	0.0000
HELIUM	0.01	0.00	---	---
HYDROGEN	0.00	0.00	---	---
OXYGEN/ARGON	0.00	0.00	---	---
NITROGEN	0.27	0.44	---	---
CARBON DIOXIDE	0.02	0.05	---	---
METHANE	94.9929	88.8859	---	---
ETHANE	3.2353	5.6742	0.8622	0.8670
PROPANE	0.7966	2.0488	0.2188	0.2200
I-BUTANE	0.1693	0.5739	0.0550	0.0553
N-BUTANE	0.1653	0.5604	0.0520	0.0522
I-PENTANE	0.0767	0.3225	0.0280	0.0281
N-PENTANE	0.0508	0.2138	0.0180	0.0181
HEXANES PLUS	0.2127	1.2295	0.0810	0.0810
TOTALS	100.00000	100.00000	1.3150	1.3217

<u>BTEX COMPONENTS</u>	<u>MOLE%</u>	<u>WT%</u>
BENZENE	0.0043	0.0196
TOLUENE	0.0037	0.0199
ETHYLBENZENE	0.0002	0.0012
XYLENES	0.0021	0.0131
TOTAL BTEX	0.0103	0.0538

	<u>CALCULATED VALUES**</u>	
	<u>BTU @</u>	<u>BTU @</u>
	<u>14.65</u>	<u>14.73</u>
LHV NET DRY REAL :	958.5 /scf	963.7 /scf
NET WET REAL :	941.7 /scf	946.9 /scf
HHV GROSS DRY REAL :	1062.2 /scf	1068.0 /scf
GROSS WET REAL :	1043.6 /scf	1049.4 /scf
NET HEATING VALUE (60 °F ideal reaction):		21252.7 Btu/lbm
GROSS HEATING VALUE (60°F ideal reaction):		23558.2 Btu/lbm
RELATIVE DENSITY (AIR=1):		0.5907
DENSITY		0.04518 lbm/scf
COMPRESSIBILITY FACTOR :		0.9977
REGULAR WOBBE INDEX		1383.2

**(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. :	202506058	ANALYSIS NO. :	03
COMPANY NAME :	QB ENERGY OPERATING, LLC	ANALYSIS DATE:	JUNE 19, 2025 16:48
ACCOUNT NO. :		SAMPLE DATE :	MAY 29, 2025
PRODUCER :	QB ENERGY OPERATING, LLC	CYLINDER NO. :	ECA-723
LEASE NO. :	COC-46029	SAMPLED BY :	MIKE KELLEY
NAME/DESCRIP :	RULISON FEDERAL 01-42 BRADEN HEAD		

FIELD DATA

SAMPLE PRES. :	158	SAMPLE TEMP. :	57
H2S BY STAIN TUBE:	—	AMBIENT TEMP.:	
COMMENTS :	—		

ppm mol
SPOT NO

Componet	Mole %	Wt %
Helium	0.01	0.00
Hydrogen	0.00	0.00
Carbon Dioxide	0.02	0.05
Nitrogen	0.27	0.44
Methane	94.9929	88.8859
Ethane	3.2353	5.6742
Propane	0.7966	2.0488
Isobutane	0.1693	0.5739
n-Butane	0.1653	0.5604
Isopentane	0.0743	0.3127
n-Pentane	0.0508	0.2138
Cyclopentane	0.0024	0.0098
n-Hexane	0.0250	0.1256
Cyclohexane	0.0136	0.0668
Other Hexanes	0.0502	0.2511
Heptanes	0.0376	0.2192
Methylcyclohexane	0.0242	0.1386
2,2,4 Trimethylpentane	0.0001	0.0006
Benzene	0.0043	0.0196
Toluene	0.0037	0.0199
Ethylbenzene	0.0002	0.0012
Xylenes	0.0021	0.0131
C8+ Heavies	0.0517	0.3738
Subtotal	99.99960	99.99900
Oxygen/Argon	0.00	0.00
Alcohols	0.0004	0.0010
Total	100.00000	100.00000

Calculated Values BTU @		Total	C6+	C8+	C10+
			Sample	Fraction	Fraction
	14.65				
LHV	Net Dry Real:	958.5	4997.5	6162.0	7548.9 Btu/scf
	Net Wet Real:	941.7	4910.1	6054.3	7416.9 Btu/scf
HHV	Gross Dry Real:	1062.2	5375.5	6627.4	8126.4 Btu/scf
	Gross Wet Real:	1043.6	5281.5	6511.5	7984.3 Btu/scf

Other Calculated Values					
Regualr Wobbe Index*	1383.2	2895.7	3215.1	3566.9	Btu/scf
Net Heating Value (60 °F ideal reaction):	21252.7	19317.0	19537.8	19497.2	Btu/lbm
Gross Heating Value (60°F ideal reaction):	23558.2	20779.9	21014.6	20985.7	Btu/lbm
Molar Mass (MW):	17.14556	99.136	123.366	151.158	g/mol
Relative Density (AIR=1):	0.5907	3.4229	4.2606	5.2192	SG
Density:	0.04518	0.26124	0.32510	0.39832	lbm/scf
Compressibility Factor:	0.9977	0.9935	0.9982	0.9996	Z
Liquid Volume real gas @:	14.65	17.3585	0.0807	0.0179	0.001 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

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

SAMPLE CYCLE: SAMPLE TYPE: **SPOT**
 SAMPLE PRES. : **158** **psig** PROBE : **NO**
 FLOW PRES. : **psig** CYLINDER NO. : **ECA-723**
 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	---	---
Nitrogen	---	0.27	0.44	---	---
Carbon Dioxide	---	0.02	0.05	---	---
Methane	P1	94.9929	88.8859	---	---
Ethane	P2	3.2353	5.6742	0.862	0.867
Propane	P3	0.7966	2.0488	0.219	0.220
i-Butane	I4	0.1693	0.5739	0.055	0.055
Methanol	X1	0.0003	0.0006	0.000	0.000
n-Butane	P4	0.1653	0.5604	0.052	0.052
2,2-Dimethylpropane	I5	0.0036	0.0152	0.001	0.001
i-Pentane	I5	0.0707	0.2975	0.026	0.026
n-Pentane	P5	0.0508	0.2138	0.018	0.018
t-Butanol	X4	0.0001	0.0004	0.000	0.000
2,2-Dimethylbutane	I6	0.0035	0.0176	0.001	0.001
Cyclopentane	N5	0.0024	0.0098	0.001	0.001
2,3-Dimethylbutane	I6	0.0048	0.0242	0.002	0.002
2-Methylpentane	I6	0.0197	0.0990	0.008	0.008
3-Methylpentane	I6	0.0112	0.0563	0.005	0.005
n-Hexane	P6	0.0250	0.1256	0.010	0.010
2,2-Dimethylpentane	I7	0.0004	0.0023	0.000	0.000
Methylcyclopentane	N6	0.0110	0.0540	0.004	0.004
2,4-Dimethylpentane	I7	0.0014	0.0082	0.001	0.001
2,2,3-Trimethylbutane	I7	0.0005	0.0029	0.000	0.000
Benzene	A6	0.0043	0.0196	0.001	0.001
3,3-Dimethylpentane	I7	0.0005	0.0029	0.000	0.000
Cyclohexane	N6	0.0136	0.0668	0.005	0.005
2-Methylhexane	I7	0.0047	0.0275	0.002	0.002
2,3-Dimethylpentane	I7	0.0029	0.0170	0.001	0.001

1,1-Dimethylcyclopentane	N7	0.0012	0.0069	0.000	0.000
3-Methylhexane	I7	0.0056	0.0327	0.003	0.003
1c,3-Dimethylcyclopentane	N7	0.0016	0.0092	0.001	0.001
1t,3-Dimethylcyclopentane	N7	0.0015	0.0086	0.001	0.001
3-Ethylpentane	I7	0.0002	0.0012	0.000	0.000
1t,2-Dimethylcyclopentane	N7	0.0025	0.0143	0.001	0.001
2,2,4-Trimethylpentane	I8	0.0001	0.0006	0.000	0.000
n-Heptane	P7	0.0134	0.0783	0.006	0.006
1c,2-Dimethylcyclopentane	N7	0.0002	0.0012	0.000	0.000
Methylcyclohexane	N7	0.0242	0.1386	0.010	0.010
2,2-Dimethylhexane	I8	0.0005	0.0033	0.000	0.000
1,1,3-Trimethylcyclopentane	N7	0.0003	0.0020	0.000	0.000
Ethylcyclopentane	N7	0.0007	0.0040	0.000	0.000
2,5-Dimethylhexane	I8	0.0007	0.0047	0.000	0.000
2,2,3-Trimethylpentane	I8	0.0006	0.0040	0.000	0.000
2,4-Dimethylhexane	I8	0.0001	0.0006	0.000	0.000
1c,2t,4-Trimethylcyclopentane	N8	0.0004	0.0026	0.000	0.000
3,3-Dimethylhexane	I8	0.0002	0.0013	0.000	0.000
2,3,3-Trimethylpentane	I8	0.0001	0.0006	0.000	0.000
Toluene	A7	0.0037	0.0199	0.001	0.001
2,3-Dimethylhexane	I8	0.0005	0.0033	0.000	0.000
2-Methyl-3-ethylpentane	I8	0.0001	0.0006	0.000	0.000
2-Methylheptane	I8	0.0029	0.0193	0.001	0.001
4-Methylheptane	I8	0.0008	0.0053	0.000	0.000
3-Methyl-3-ethylpentane	I8	0.0002	0.0013	0.000	0.000
3,4-Dimethylhexane	I8	0.0001	0.0006	0.000	0.000
3-Methylheptane	I8	0.0004	0.0027	0.000	0.000
1c,2t,3-Trimethylcyclopentane	N8	0.0047	0.0307	0.002	0.002
3-Ethylhexane	I8	0.0005	0.0033	0.000	0.000
1t,4-Dimethylcyclohexane	N8	0.0016	0.0105	0.001	0.001
1,1-Dimethylcyclohexane	N8	0.0006	0.0039	0.000	0.000
2,2,5-Trimethylhexane	I9	0.0001	0.0008	0.000	0.000
3c-Ethylmethylcyclopentane	N8	0.0001	0.0006	0.000	0.000
3t-Ethylmethylcyclopentane	N8	0.0001	0.0006	0.000	0.000
2t-Ethylmethylcyclopentane	N8	0.0001	0.0006	0.000	0.000
2,2,4-Trimethylhexane	I9	0.0001	0.0008	0.000	0.000
1t,2-Dimethylcyclohexane	N8	0.0011	0.0072	0.001	0.001
n-Octane	P8	0.0057	0.0380	0.003	0.003
1c,4-Dimethylcyclohexane	N8	0.0010	0.0065	0.001	0.001
2,3,5-Trimethylhexane	I9	0.0001	0.0008	0.000	0.000
2,2-Dimethylheptane	I9	0.0001	0.0008	0.000	0.000
1,1,4-Trimethylcyclohexane	N9	0.0010	0.0074	0.001	0.001
2,2,3-Trimethylhexane	I9	0.0005	0.0037	0.000	0.000
2,4-Dimethylheptane	I9	0.0003	0.0022	0.000	0.000
4,4-Dimethylheptane	I9	0.0001	0.0008	0.000	0.000
Ethylcyclohexane	N8	0.0010	0.0065	0.000	0.000
n-Propylcyclopentane	N8	0.0004	0.0026	0.000	0.000
1c,3c,5-Trimethylcyclohexane	N9	0.0001	0.0008	0.000	0.000
2,5-Dimethylheptane	I9	0.0006	0.0045	0.000	0.000
3,3-Dimethylheptane	I9	0.0001	0.0008	0.000	0.000
2,6-Dimethylheptane	I9	0.0001	0.0008	0.000	0.000
1,1,3-Trimethylcyclohexane	N9	0.0003	0.0022	0.000	0.000
Ethylbenzene	I8	0.0002	0.0012	0.000	0.000
1,3-Dimethylbenzene (m-Xylene)	A8	0.0015	0.0093	0.001	0.001
1,4-Dimethylbenzene (p-Xylene)	A8	0.0003	0.0019	0.000	0.000
3,4-Dimethylheptane	I9	0.0001	0.0008	0.000	0.000
3,4-Dimethylheptane (2)	I9	0.0001	0.0008	0.000	0.000
4-Ethylheptane	I9	0.0001	0.0008	0.000	0.000
4-Methyloctane	I9	0.0005	0.0037	0.000	0.000
2-Methyloctane	I9	0.0009	0.0067	0.001	0.001

3-Methyloctane	I9	0.0001	0.0008	0.000	0.000
1c,2t,4c-Trimethylcyclohexane	I9	0.0008	0.0059	0.000	0.000
1,1,2-Trimethylcyclohexane	N9	0.0001	0.0008	0.000	0.000
1,2-Dimethylbenzene (o-Xylene)	A8	0.0003	0.0019	0.000	0.000
i-Butylcyclopentane	N9	0.0005	0.0037	0.000	0.000
UnknownC8s	U8	0.0001	0.0006	0.000	0.000
n-Nonane	P9	0.0051	0.0381	0.003	0.003
1,1-Methylethylcyclohexane	N9	0.0007	0.0051	0.000	0.000
i-Propylbenzene	A9	0.0002	0.0014	0.000	0.000
i-Propylcyclohexane	N9	0.0003	0.0022	0.000	0.000
2,2-Dimethyloctane	I10	0.0002	0.0016	0.000	0.000
2,4-Dimethyloctane	I10	0.0003	0.0025	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	0.0007	0.0051	0.000	0.000
3,3-Dimethyloctane	I10	0.0004	0.0033	0.000	0.000
n-Propylbenzene	A9	0.0011	0.0077	0.000	0.000
3,6-Dimethyloctane	I10	0.0003	0.0025	0.000	0.000
3-Methyl-5-ethylheptane	I10	0.0001	0.0008	0.000	0.000
1,3-Methylethylbenzene	A9	0.0003	0.0021	0.000	0.000
1,4-Methylethylbenzene	A9	0.0002	0.0014	0.000	0.000
1,3,5-Trimethylbenzene	A9	0.0005	0.0035	0.000	0.000
2,3-Dimethyloctane	I10	0.0002	0.0016	0.000	0.000
5-Methylnonane	I10	0.0004	0.0033	0.000	0.000
1,2-Methylethylbenzene	A9	0.0001	0.0007	0.000	0.000
2-Methylnonane	I10	0.0004	0.0033	0.000	0.000
3-Ethyl-octane	I10	0.0002	0.0016	0.000	0.000
3-Methylnonane	I10	0.0003	0.0025	0.000	0.000
1,2,4-Trimethylbenzene	A9	0.0001	0.0007	0.000	0.000
t-Butylbenzene	A10	0.0004	0.0032	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	0.0008	0.000	0.000
sec-Butylbenzene	A10	0.0001	0.0008	0.000	0.000
UnknownC9s	U9	0.0029	0.0217	0.002	0.002
n-Decane	P10	0.0007	0.0058	0.000	0.000
1,2,3-Trimethylbenzene	A9	0.0001	0.0007	0.000	0.000
1,3-Methyl-i-propylbenzene	A10	0.0003	0.0023	0.000	0.000
1,2-Methyl-i-propylbenzene	A10	0.0001	0.0008	0.000	0.000
UnknownC10s	U10	0.0020	0.0166	0.001	0.001
2-Methylindan	A11	0.0001	0.0008	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
n-Tetradecane	P14	0.0002	0.0023	0.000	0.000
n-Pentadecane	P15	0.0002	0.0025	0.000	0.000
UnknownC15s	U15	0.0001	0.0012	0.000	0.000
n-Hexadecane	P16	0.0002	0.0026	0.000	0.000
n-Heptadecane	P17	0.0001	0.0014	0.000	0.000
n-Heneicosane	P21	0.0001	0.0018	0.000	0.000
<u>TOTAL</u>		<u>100.00000</u>	<u>100.00000</u>	<u>1.3150</u>	<u>1.3217</u>

BTEX COMPONENTS	MOLE%	WT%	CALCULATED VALUES**		
			BTU @	14.65	14.73
BENZENE	0.0043	0.0196	LHV NET DRY REAL :	958.5 /scf	963.7 /scf
TOLUENE	0.0037	0.0199	NET WET REAL :	941.7 /scf	946.9 /scf
ETHYLBENZENE	0.0002	0.0012	HHV GROSS DRY REAL :	1062.2 /scf	1068.0 /scf
XYLENES	0.0021	0.0131	GROSS WET REAL :	1043.6 /scf	1049.4 /scf
TOTAL BTEX	0.0103	0.0538	NET HEATING VALUE (60 °F ideal reaction):		21252.7 Btu/lbm
			GROSS HEATING VALUE (60°F ideal reaction):		23558.2 Btu/lbm
			RELATIVE DENSITY (AIR=1):		0.5907
			DENSITY		0.04518 lb/scf
			COMPRESSIBILITY FACTOR :		0.9977
			REGULAR WOBBE INDEX		1383.2

*(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>4980.7</u> /scf	Relative Density - SG (Air=1)	<u>3.4229</u>	C6+ factors
Gross Dry Ideal BTU	<u>5357.4</u> /scf	Z Compressibility Factor	<u>0.99351</u>	<u>0.99258</u>
Net Dry Ideal BTU	<u>19317</u> /lb	Density Factor	<u>261.236</u> lbm/1000 ft3	
Gross Dry Ideal BTU	<u>20779.9</u> /lb	Molar Mass or MW	<u>99.136</u> g/mol	
		Volume Liquid Ideal gas	<u>0.081</u> scf/gal	<u>22.8</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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