



EXTENDED NATURAL GAS ANALYSIS (*DHA)

MAIN PAGE

PRIMARY DB KEY:	NAME/DESCRIP :	300115019 1B CASS-GARBER 1-31B
LEASE #:		PRODUCTION CASING
FIELD/AREA:		
PROJECT NO. :	ANALYSIS NO. :	02
COMPANY NAME :	ANALYSIS DATE:	SEPTEMBER 12, 2025 09:16
OFFICE / BRANCH:	SAMPLE DATE :	AUGUST 27, 2025
CUSTOMER REF:	TO:	AUGUST 27, 2025
PRODUCER :	EFFECTIVE DATE:	AUGUST 27, 2025

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

SAMPLE CYCLE:	SAMPLE TYPE:	SPOT
SAMPLE PRES. : 583 psig	PROBE :	NO
FLOW PRES. : psig	CYLINDER NO. :	ECA-4
LAB PRES: psig	SAMPLED BY :	MIKE KELLEY
SAMPLE TEMP. : 63 °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 @ 14.65</u>	<u>GPM @ 14.73</u>
ALCOHOLS	0.0074	0.0165	0.0010	0.0010
HELIUM	0.01	0.00	---	---
HYDROGEN	0.00	0.00	---	---
OXYGEN/ARGON	0.00	0.00	---	---
NITROGEN	0.15	0.24	---	---
CARBON DIOXIDE	0.03	0.08	---	---
METHANE	94.6031	88.2452	---	---
ETHANE	3.6461	6.3748	0.9722	0.9775
PROPANE	0.8735	2.2396	0.2398	0.2411
I-BUTANE	0.1970	0.6658	0.0639	0.0643
N-BUTANE	0.1721	0.5816	0.0540	0.0542
I-PENTANE	0.0809	0.3391	0.0300	0.0301
N-PENTANE	0.0478	0.2005	0.0170	0.0171
HEXANES PLUS	0.1821	1.0169	0.0670	0.0670
TOTALS	100.0000	100.0000	1.4449	1.4523

<u>BTEX COMPONENTS</u>	<u>MOLE%</u>	<u>WT%</u>
BENZENE	0.0045	0.0205
TOLUENE	0.0028	0.0150
ETHYLBENZENE	0.0006	0.0037
XYLENES	0.0011	0.0068
TOTAL BTEX	0.0090	0.0460

	<u>CALCULATED VALUES**</u>	
<u>BTU @</u>	<u>14.65</u>	<u>14.73</u>
LHV NET DRY REAL :	962.8 /scf	968.0 /scf
NET WET REAL :	946.0 /scf	951.2 /scf
HHV GROSS DRY REAL :	1066.8 /scf	1072.6 /scf
GROSS WET REAL :	1048.2 /scf	1054.0 /scf
NET HEATING VALUE (60 °F ideal reaction):		21279.1 Btu/lbm
GROSS HEATING VALUE (60°F ideal reaction):		23584.3 Btu/lbm
RELATIVE DENSITY (AIR=1):		0.5933
DENSITY		0.04532 lbm/scf
COMPRESSIBILITY FACTOR :		0.9977
REGULAR WOBBE INDEX		1386.2

**(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. :	202509022	ANALYSIS NO. :	02
COMPANY NAME :	QB ENERGY OPERATING, LLC	ANALYSIS DATE:	SEPTEMBER 12, 2025 09:16
ACCOUNT NO. :		SAMPLE DATE :	AUGUST 27, 2025
PRODUCER :		CYLINDER NO. :	ECA-4
LEASE NO. :	05-045-10944	SAMPLED BY :	MIKE KELLEY
NAME/DESCRIP :	300115019 1B CASS-GARBER 1-31B PRODUCTION CASING		

FIELD DATA

SAMPLE PRES. :	583	SAMPLE TEMP. :	63
H2S BY STAIN TUBE:	—	AMBIENT TEMP.:	
COMMENTS :	—		

ppm mol
SPOT NO PROBE

<u>Componet</u>	<u>Mole %</u>	<u>Wt %</u>
Helium	0.01	0.00
Hydrogen	0.00	0.00
Carbon Dioxide	0.03	0.08
Nitrogen	0.15	0.24
Methane	94.6031	88.2452
Ethane	3.6461	6.3748
Propane	0.8735	2.2396
Isobutane	0.1970	0.6658
n-Butane	0.1721	0.5816
Isopentane	0.0788	0.3305
n-Pentane	0.0478	0.2005
Cyclopentane	0.0021	0.0086
n-Hexane	0.0229	0.1147
Cyclohexane	0.0114	0.0558
Other Hexanes	0.0478	0.2385
Heptanes	0.0356	0.2063
Methylcyclohexane	0.0219	0.1250
2,2,4 Trimethylpentane	0.0000	0.0000
Benzene	0.0045	0.0205
Toluene	0.0028	0.0150
Ethylbenzene	0.0006	0.0037
Xylenes	0.0011	0.0068
C8+ Heavies	0.0335	0.2306
<u>Subtotal</u>	<u>99.99260</u>	<u>99.98350</u>
Oxygen/Argon	0.00	0.00
Alcohols	0.0074	0.0165
<u>Total</u>	<u>100.00000</u>	<u>100.00000</u>

Calculated Values BTU @		Total	C6+	C8+	C10+
			Sample	Fraction	Fraction
LHV	Net Dry Real:	962.8	4837.3	5814.1	6681.2 Btu/scf
	Net Wet Real:	946.0	4752.7	5712.5	6564.4 Btu/scf
HHV	Gross Dry Real:	1066.8	5203.3	6252.7	7135.9 Btu/scf
	Gross Wet Real:	1048.2	5112.3	6143.4	7011.2 Btu/scf

Other Calculated Values

Regualr Wobbe Index*	1386.2	2845.3	3104.1	3269.1 Btu/scf
Net Heating Value (60 °F ideal reaction):	21279.1	19244.6	19309.4	18649.5 Btu/lbm
Gross Heating Value (60 °F ideal reaction):	23584.3	20704.1	20767.6	19920.3 Btu/lbm
Molar Mass (MW):	17.19886	96.032	117.712	138.702 g/mol
Relative Density (AIR=1):	0.5933	3.3162	4.0646	4.7889 SG
Density:	0.04532	0.25307	0.31019	0.36550 lbm/scf
Compressibility Factor:	0.9977	0.9927	0.9978	0.9994 Z
Liquid Volume real gas @:	14.65	17.4103	0.0668	0.009

* 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: NAME/DESCRIP : **300115019 1B CASS-GARBER 1-31B**
 LEASE #: **05-045-10944** PRODUCTION CASING
 FIELD/AREA:

PROJECT NO. : **202509022** ANALYSIS NO. : **02**
 COMPANY NAME : **QB ENERGY OPERATING, LLC** ANALYSIS DATE: **SEPTEMBER 12, 2025 09:16**
 OFFICE / BRANCH: **PARACHUTE, CO** SAMPLE DATE : **AUGUST 27, 2025**
 CUSTOMER REF: TO: **AUGUST 27, 2025**
 PRODUCER : EFFECTIVE DATE: **AUGUST 27, 2025**

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

SAMPLE CYCLE: SAMPLE TYPE: **SPOT**
 SAMPLE PRES. : **583** psig PROBE : **NO**
 FLOW PRES. : psig CYLINDER NO. : **ECA-4**
 LAB PRES: psig SAMPLED BY : **MIKE KELLEY**
 SAMPLE TEMP. : **63** °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	---	0.15	0.24	---	---
Carbon Dioxide	---	0.03	0.08	---	---
Methane	P1	94.6031	88.2452	---	---
Ethane	P2	3.6461	6.3748	0.972	0.978
Propane	P3	0.8735	2.2396	0.240	0.241
i-Butane	I4	0.1970	0.6658	0.064	0.064
Methanol	X1	0.0058	0.0108	0.001	0.001
n-Butane	P4	0.1721	0.5816	0.054	0.054
2,2-Dimethylpropane	I5	0.0042	0.0176	0.002	0.002
Ethanol	X2	0.0001	0.0003	0.000	0.000
i-Pentane	I5	0.0746	0.3129	0.027	0.027
Acetone	X3	0.0001	0.0004	0.000	0.000
i-Propanol	X3	0.0012	0.0042	0.000	0.000
n-Pentane	P5	0.0477	0.2001	0.017	0.017
t-Butanol	X4	0.0001	0.0004	0.000	0.000
2,2-Dimethylbutane	I6	0.0037	0.0186	0.002	0.002
n-Propanol	X3	0.0001	0.0004	0.000	0.000
Cyclopentane	N5	0.0021	0.0086	0.001	0.001
2,3-Dimethylbutane	I6	0.0048	0.0241	0.002	0.002
2-Methylpentane	I6	0.0192	0.0962	0.008	0.008
3-Methylpentane	I6	0.0106	0.0531	0.004	0.004
UnknownC5s	U5	0.0001	0.0004	0.000	0.000
n-Hexane	P6	0.0229	0.1147	0.009	0.009
2,2-Dimethylpentane	I7	0.0009	0.0052	0.000	0.000
Methylcyclopentane	N6	0.0094	0.0460	0.003	0.003
2,4-Dimethylpentane	I7	0.0014	0.0081	0.001	0.001
2,2,3-Trimethylbutane	I7	0.0004	0.0023	0.000	0.000

Benzene	A6	0.0045	0.0205	0.001	0.001
3,3-Dimethylpentane	I7	0.0005	0.0029	0.000	0.000
Cyclohexane	N6	0.0114	0.0558	0.004	0.004
2-Methylhexane	I7	0.0058	0.0338	0.003	0.003
2,3-Dimethylpentane	I7	0.0016	0.0093	0.001	0.001
1,1-Dimethylcyclopentane	N7	0.0011	0.0063	0.000	0.000
3-Methylhexane	I7	0.0052	0.0303	0.002	0.002
1c,3-Dimethylcyclopentane	N7	0.0016	0.0091	0.001	0.001
1t,3-Dimethylcyclopentane	N7	0.0014	0.0080	0.001	0.001
3-Ethylpentane	I7	0.0003	0.0017	0.000	0.000
1t,2-Dimethylcyclopentane	N7	0.0022	0.0126	0.001	0.001
UnknownC6s	U6	0.0001	0.0005	0.000	0.000
n-Heptane	P7	0.0118	0.0687	0.005	0.005
1c,2-Dimethylcyclopentane	N7	0.0003	0.0017	0.000	0.000
Methylcyclohexane	N7	0.0219	0.1250	0.009	0.009
2,2-Dimethylhexane	I8	0.0006	0.0040	0.000	0.000
1,1,3-Trimethylcyclopentane	N7	0.0001	0.0006	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
Toluene	A7	0.0028	0.0150	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	0.0026	0.0173	0.001	0.001
4-Methylheptane	I8	0.0008	0.0053	0.000	0.000
3-Methyl-3-ethylpentane	I8	0.0001	0.0006	0.000	0.000
3,4-Dimethylhexane	I8	0.0001	0.0006	0.000	0.000
3-Methylheptane	I8	0.0018	0.0120	0.001	0.001
1c,2t,3-Trimethylcyclopentane	N8	0.0033	0.0215	0.002	0.002
3-Ethylhexane	I8	0.0001	0.0006	0.000	0.000
1t,4-Dimethylcyclohexane	N8	0.0014	0.0091	0.001	0.001
1,1-Dimethylcyclohexane	N8	0.0005	0.0033	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
1t,2-Dimethylcyclohexane	N8	0.0009	0.0059	0.000	0.000
1t,3-Dimethylcyclohexane	N8	0.0002	0.0013	0.000	0.000
UnknownC7s	U7	0.0003	0.0017	0.000	0.000
n-Octane	P8	0.0045	0.0299	0.002	0.002
1c,4-Dimethylcyclohexane	N8	0.0007	0.0046	0.000	0.000
2,3,5-Trimethylhexane	I9	0.0001	0.0008	0.000	0.000
2,2-Dimethylheptane	I9	0.0002	0.0015	0.000	0.000
1,1,4-Trimethylcyclohexane	N9	0.0008	0.0059	0.000	0.000
2,2,3-Trimethylhexane	I9	0.0002	0.0015	0.000	0.000
2,4-Dimethylheptane	I9	0.0001	0.0008	0.000	0.000
4,4-Dimethylheptane	I9	0.0001	0.0008	0.000	0.000
Ethylcyclohexane	N8	0.0007	0.0046	0.000	0.000
n-Propylcyclopentane	N8	0.0004	0.0026	0.000	0.000
1c,3c,5-Trimethylcyclohexane	N9	0.0004	0.0029	0.000	0.000
3,3-Dimethylheptane	I9	0.0001	0.0008	0.000	0.000
3,5-Dimethylheptane	I9	0.0001	0.0008	0.000	0.000
2,6-Dimethylheptane	I9	0.0001	0.0008	0.000	0.000
Ethylbenzene	I8	0.0006	0.0037	0.000	0.000
1,3-Dimethylbenzene (m-Xylene)	A8	0.0006	0.0037	0.000	0.000
1,4-Dimethylbenzene (p-Xylene)	A8	0.0002	0.0012	0.000	0.000
4-Methyloctane	I9	0.0003	0.0022	0.000	0.000
2-Methyloctane	I9	0.0005	0.0037	0.000	0.000

3-Ethylheptane	I9	0.0001	0.0008	0.000	0.000
1c,2t,4c-Trimethylcyclohexane	I9	0.0005	0.0037	0.000	0.000
3,3-Diethylpentane	I9	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	0.0003	0.0022	0.000	0.000
n-Nonane	P9	0.0015	0.0112	0.001	0.001
1,1-Methylethylcyclohexane	N9	0.0002	0.0015	0.000	0.000
i-Propylbenzene	A9	0.0001	0.0007	0.000	0.000
i-Propylcyclohexane	N9	0.0001	0.0008	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	0.0002	0.0015	0.000	0.000
n-Propylbenzene	A9	0.0001	0.0007	0.000	0.000
3,6-Dimethyloctane	I10	0.0003	0.0025	0.000	0.000
1,3-Methylethylbenzene	A9	0.0014	0.0098	0.001	0.001
1,4-Methylethylbenzene	A9	0.0006	0.0042	0.000	0.000
1,3,5-Trimethylbenzene	A9	0.0005	0.0035	0.000	0.000
1,2-Methylethylbenzene	A9	0.0005	0.0035	0.000	0.000
t-Butylbenzene	A10	0.0008	0.0062	0.000	0.000
UnknownC9s	U9	0.0007	0.0052	0.000	0.000
1,2,3-Trimethylbenzene	A9	0.0001	0.0007	0.000	0.000
UnknownC10s	U10	0.0003	0.0025	0.000	0.000
TOTAL		100.00000	100.00000	1.4449	1.4523

CALCULATED VALUES**

BTEX COMPONENTS	MOLE%	WT%	BTU @	14.65	14.73
BENZENE	0.0045	0.0205	LHV NET DRY REAL :	962.8 /scf	968.0 /scf
TOLUENE	0.0028	0.0150	NET WET REAL :	946.0 /scf	951.2 /scf
ETHYLBENZENE	0.0006	0.0037	HHV GROSS DRY REAL :	1066.8 /scf	1072.6 /scf
XYLENES	0.0011	0.0068	GROSS WET REAL :	1048.2 /scf	1054.0 /scf
TOTAL BTEX	0.0090	0.0460	NET HEATING VALUE (60 °F ideal reaction):		21279.1 Btu/lbm
			GROSS HEATING VALUE (60°F ideal reaction):		23584.3 Btu/lbm
			RELATIVE DENSITY (AIR=1):		0.5933
			DENSITY		0.04532 lb/scf
			COMPRESSIBILITY FACTOR :		0.9977
			REGULAR WOBBE INDEX		1386.2

*(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	4817.1 /scf	Relative Density - SG (Air=1)	3.3162	C6+ factors
Gross Dry Ideal BTU	5181.5 /scf	Z Compressibility Factor	0.9927	0.99199
Net Dry Ideal BTU	19244.6 /lb	Density Factor	253.071 lbm/1000 ft3	
Gross Dry Ideal BTU	20704.1 /lb	Molar Mass or MW	96.032 g/mol	
		Volume Liquid Ideal gas	0.067 scf/gal	23.4

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.

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