



EXTENDED NATURAL GAS ANALYSIS (*DHA)

MAIN PAGE

PRIMARY DB KEY: 05-045-09537	NAME/DESCRIP : 110220114 GASAWAY CNR 6243 699
LEASE #:	BRADENHEAD
FIELD/AREA:	
PROJECT NO. : 202411018	ANALYSIS NO. : 01
COMPANY NAME : QB ENERGY OPERATING, LLC	ANALYSIS DATE: NOVEMBER 14, 2024 07:06
OFFICE / BRANCH: PARACHUTE, CO	SAMPLE DATE : OCTOBER 31, 2024
CUSTOMER REF:	TO:
PRODUCER : QB ENERGY OPERATING, LLC	EFFECTIVE DATE:

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

SAMPLE CYCLE:	SAMPLE TYPE:	SPOT
SAMPLE PRES. : 220 psig	PROBE :	NO
FLOW PRES. : psig	CYLINDER NO. :	ECA-732
LAB PRES: psig	SAMPLED BY :	ELDON KING
SAMPLE TEMP. : 42 °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	0.0014	0.0027	0.0000	0.0000
HELIUM	0.01	0.00	---	---
HYDROGEN	0.00	0.00	---	---
OXYGEN/ARGON	0.00	0.00	---	---
NITROGEN	0.19	0.31	---	---
CARBON DIOXIDE	0.10	0.26	---	---
METHANE	95.8476	90.8117	---	---
ETHANE	2.6555	4.7158	0.7073	0.7112
PROPANE	0.6956	1.8116	0.1908	0.1919
I-BUTANE	0.1472	0.5053	0.0480	0.0482
N-BUTANE	0.1412	0.4847	0.0440	0.0442
I-PENTANE	0.0627	0.2670	0.0220	0.0221
N-PENTANE	0.0325	0.1385	0.0120	0.0121
HEXANES PLUS	0.1163	0.6927	0.0410	0.0410
<u>TOTALS</u>	<u>100.00000</u>	<u>100.00000</u>	<u>1.0651</u>	<u>1.0707</u>

<u>BTEX COMPONENTS</u>	<u>MOLE%</u>	<u>WT%</u>
BENZENE	0.0006	0.0028
TOLUENE	0.0003	0.0017
ETHYLBENZENE	0.0003	0.0019
XYLENES	0.0009	0.0055
<u>TOTAL BTEX</u>	<u>0.0021</u>	<u>0.0119</u>

	<u>CALCULATED VALUES**</u>	
	<u>14.65</u>	<u>14.73</u>
LHV NET DRY REAL :	946.6 /scf	951.8 /scf
NET WET REAL :	930.1 /scf	935.3 /scf
HHV GROSS DRY REAL :	1049.9 /scf	1055.7 /scf
GROSS WET REAL :	1031.5 /scf	1037.3 /scf
NET HEATING VALUE (60 °F ideal reaction):		21267.2 Btu/lbm
GROSS HEATING VALUE (60°F ideal reaction):		23583.7 Btu/lbm
RELATIVE DENSITY (AIR=1):		0.5833
DENSITY		0.04462 lbm/scf
COMPRESSIBILITY FACTOR :		0.9978
REGULAR WOBBE INDEX		1376.0

*(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. :	202411018	ANALYSIS NO. :	01
COMPANY NAME :	QB ENERGY OPERATING, LLC	ANALYSIS DATE:	NOVEMBER 14, 2024 07:06
ACCOUNT NO. :		SAMPLE DATE :	OCTOBER 31, 2024
PRODUCER :	QB ENERGY OPERATING, LLC	CYLINDER NO. :	ECA-732
LEASE NO. :		SAMPLED BY :	ELDON KING
NAME/DESCRIP :	110220114 GASAWAY CNR 6243 699 BRADENHEAD		

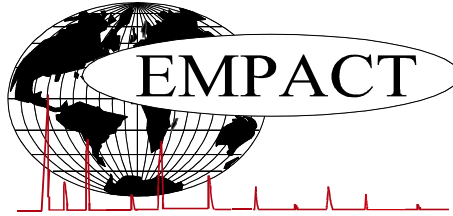
FIELD DATA		SAMPLE TEMP. :	42
SAMPLE PRES. :	220	AMBIENT TEMP.:	
H2S BY STAIN TUBE:	—		
COMMENTS :	<i>SPOT</i>		<i>NO PROBE</i>

<u>Componet</u>	<u>Mole %</u>	<u>Wt %</u>
Helium	0.01	0.00
Hydrogen	0.00	0.00
Carbon Dioxide	0.10	0.26
Nitrogen	0.19	0.31
Methane	95.8476	90.8117
Ethane	2.6555	4.7158
Propane	0.6956	1.8116
Isobutane	0.1472	0.5053
n-Butane	0.1412	0.4847
Isopentane	0.0618	0.2633
n-Pentane	0.0325	0.1385
Cyclopentane	0.0009	0.0037
n-Hexane	0.0126	0.0641
Cyclohexane	0.0046	0.0229
Other Hexanes	0.0319	0.1618
Heptanes	0.0219	0.1295
Methylcyclohexane	0.0112	0.0650
2,2,4 Trimethylpentane	0.0000	0.0000
Benzene	0.0006	0.0028
Toluene	0.0003	0.0017
Ethylbenzene	0.0003	0.0019
Xylenes	0.0009	0.0055
C8+ Heavies	0.0320	0.2375
<u>Subtotal</u>	<u>99.99860</u>	<u>99.99730</u>
Oxygen/Argon	0.00	0.00
Alcohols	0.0014	0.0027
<u>Total</u>	<u>100.00000</u>	<u>100.00000</u>

	<u>Total</u>	<u>C6+</u>	<u>C8+</u>	<u>C10+</u>
Calculated Values BTU @ <u>14.65</u>	Sample	Fraction	Fraction	Fraction
LHV Net Dry Real:	946.6	5098.5	6237.3	7905.5 Btu/scf
Net Wet Real:	930.1	5009.4	6128.3	7767.3 Btu/scf
HHV Gross Dry Real:	1049.9	5490.8	6712.4	8525.3 Btu/scf
Gross Wet Real:	1031.5	5394.8	6595.1	8376.3 Btu/scf
Other Calculated Values				
Regualr Wobbe Index*	1376.0	2935.2	3243.6	3693.8 Btu/scf
Net Heating Value (60 °F ideal reaction):	21267.2	19369.2	19473.1	18982.7 Btu/lbm
Gross Heating Value (60°F ideal reaction):	23583.7	20862.4	20961.0	20468.3 Btu/lbm
Molar Mass (MW):	16.93293	100.628	124.349	155.175 g/mol
Relative Density (AIR=1):	0.5833	3.4735	4.2939	5.3581 SG
Density:	0.04462	0.26517	0.32769	0.40892 lbm/scf
Compressibility Factor:	0.9978	0.9932	0.9982	0.9998 Z
Liquid Volume real gas @:	<u>14.65</u>	17.2578	0.0409	0.008 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:	05-045-09537	NAME/DESCRIP :	110220114 GASAWAY CNR 6243 699
LEASE #:			BRADENHEAD
FIELD/AREA:			
PROJECT NO. :	202411018	ANALYSIS NO. :	01
COMPANY NAME :	QB ENERGY OPERATING, LLC	ANALYSIS DATE:	NOVEMBER 14, 2024 07:06
OFFICE / BRANCH:	PARACHUTE, CO	SAMPLE DATE :	OCTOBER 31, 2024
CUSTOMER REF:		TO:	
PRODUCER :	QB ENERGY OPERATING, LLC	EFFECTIVE DATE:	
FIELD DATA			
SAMPLE CYCLE:		SAMPLE TYPE:	SPOT
SAMPLE PRES. :	220 psig	PROBE :	NO
FLOW PRES. :	psig	CYLINDER NO. :	ECA-732
LAB PRES:	psig	SAMPLED BY :	ELDON KING
SAMPLE TEMP. :	42 °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 @	GPM @
				14.65	14.73
Helium	---	0.01	0.00	---	---
Hydrogen	---	0.00	0.00	---	---
Oxygen/Argon	---	0.00	0.00	---	---
Nitrogen	---	0.19	0.31	---	---
Carbon Dioxide	---	0.10	0.26	---	---
Methane	P1	95.8476	90.8117	---	---
Ethane	P2	2.6555	4.7158	0.707	0.711
Propane	P3	0.6956	1.8116	0.191	0.192
i-Butane	I4	0.1472	0.5053	0.048	0.048
Methanol	X1	0.0014	0.0027	0.000	0.000
n-Butane	P4	0.1412	0.4847	0.044	0.044
2,2-Dimethylpropane	I5	0.0039	0.0166	0.001	0.001
i-Pentane	I5	0.0579	0.2467	0.021	0.021
n-Pentane	P5	0.0325	0.1385	0.012	0.012
2,2-Dimethylbutane	I6	0.0032	0.0163	0.001	0.001
Cyclopentane	N5	0.0009	0.0037	0.000	0.000
2,3-Dimethylbutane	I6	0.0036	0.0183	0.001	0.001
2-Methylpentane	I6	0.0130	0.0661	0.005	0.005
3-Methylpentane	I6	0.0078	0.0397	0.003	0.003
n-Hexane	P6	0.0126	0.0641	0.005	0.005
2,2-Dimethylpentane	I7	0.0005	0.0030	0.000	0.000
Methylcyclopentane	N6	0.0043	0.0214	0.002	0.002
2,4-Dimethylpentane	I7	0.0011	0.0065	0.001	0.001
2,2,3-Trimethylbutane	I7	0.0005	0.0030	0.000	0.000
Benzene	A6	0.0006	0.0028	0.000	0.000
3,3-Dimethylpentane	I7	0.0005	0.0030	0.000	0.000
Cyclohexane	N6	0.0046	0.0229	0.002	0.002
2-Methylhexane	I7	0.0039	0.0231	0.002	0.002
2,3-Dimethylpentane	I7	0.0015	0.0089	0.001	0.001
1,1-Dimethylcyclopentane	N7	0.0008	0.0047	0.000	0.000
3-Methylhexane	I7	0.0036	0.0213	0.002	0.002
1c,3-Dimethylcyclopentane	N7	0.0010	0.0058	0.000	0.000
1t,3-Dimethylcyclopentane	N7	0.0008	0.0047	0.000	0.000
3-Ethylpentane	I7	0.0002	0.0012	0.000	0.000
1t,2-Dimethylcyclopentane	N7	0.0012	0.0070	0.001	0.001

n-Heptane	P7	0.0056	0.0331	0.003	0.003
1c,2-Dimethylcyclopentane	N7	0.0002	0.0012	0.000	0.000
Methylcyclohexane	N7	0.0112	0.0650	0.004	0.004
2,2-Dimethylhexane	I8	0.0006	0.0041	0.000	0.000
1,1,3-Trimethylcyclopentane	N7	0.0001	0.0007	0.000	0.000
Ethylcyclopentane	N7	0.0004	0.0023	0.000	0.000
2,5-Dimethylhexane	I8	0.0006	0.0041	0.000	0.000
2,2,3-Trimethylpentane	I8	0.0005	0.0034	0.000	0.000
2,4-Dimethylhexane	I8	0.0001	0.0007	0.000	0.000
1c,2t,4-Trimethylcyclopentane	N8	0.0003	0.0020	0.000	0.000
3,3-Dimethylhexane	I8	0.0002	0.0014	0.000	0.000
2,3,4-Trimethylpentane	I8	0.0001	0.0007	0.000	0.000
2,3,3-Trimethylpentane	I8	0.0001	0.0007	0.000	0.000
Toluene	A7	0.0003	0.0017	0.000	0.000
2,3-Dimethylhexane	I8	0.0004	0.0027	0.000	0.000
2-Methyl-3-ethylpentane	I8	0.0001	0.0007	0.000	0.000
2-Methylheptane	I8	0.0021	0.0142	0.001	0.001
4-Methylheptane	I8	0.0007	0.0047	0.000	0.000
3-Methyl-3-ethylpentane	I8	0.0001	0.0007	0.000	0.000
3,4-Dimethylhexane	I8	0.0001	0.0007	0.000	0.000
1c,2c,4-Trimethylcyclopentane	N8	0.0001	0.0007	0.000	0.000
3-Methylheptane	I8	0.0015	0.0101	0.001	0.001
1c,2t,3-Trimethylcyclopentane	N8	0.0023	0.0152	0.001	0.001
3-Ethylhexane	I8	0.0001	0.0007	0.000	0.000
1t,4-Dimethylcyclohexane	N8	0.0010	0.0066	0.001	0.001
1,1-Dimethylcyclohexane	N8	0.0003	0.0020	0.000	0.000
3c-Ethylmethylcyclopentane	N8	0.0001	0.0007	0.000	0.000
3t-Ethylmethylcyclopentane	N8	0.0001	0.0007	0.000	0.000
2t-Ethylmethylcyclopentane	N8	0.0001	0.0007	0.000	0.000
1t,2-Dimethylcyclohexane	N8	0.0007	0.0047	0.000	0.000
1t,3-Dimethylcyclohexane	N8	0.0001	0.0007	0.000	0.000
n-Octane	P8	0.0025	0.0169	0.001	0.001
1c,4-Dimethylcyclohexane	N8	0.0006	0.0040	0.000	0.000
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	0.0002	0.0015	0.000	0.000
4,4-Dimethylheptane	I9	0.0002	0.0015	0.000	0.000
Ethylcyclohexane	N8	0.0011	0.0073	0.000	0.000
n-Propylcyclopentane	N8	0.0004	0.0027	0.000	0.000
1c,3c,5-Trimethylcyclohexane	N9	0.0002	0.0015	0.000	0.000
2,5-Dimethylheptane	I9	0.0006	0.0046	0.000	0.000
3,3-Dimethylheptane	I9	0.0002	0.0015	0.000	0.000
3,5-Dimethylheptane	I9	0.0001	0.0008	0.000	0.000
1,1,3-Trimethylcyclohexane	N9	0.0001	0.0008	0.000	0.000
Ethylbenzene	I8	0.0003	0.0019	0.000	0.000
1,3-Dimethylbenzene (m-Xylene)	A8	0.0005	0.0031	0.000	0.000
1,4-Dimethylbenzene (p-Xylene)	A8	0.0002	0.0012	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	0.0038	0.000	0.000
2-Methyloctane	I9	0.0006	0.0046	0.000	0.000
1c,2t,3-Trimethylcyclohexane	N9	0.0001	0.0008	0.000	0.000
3-Ethylheptane	I9	0.0001	0.0008	0.000	0.000
3-Methyloctane	I9	0.0001	0.0008	0.000	0.000
1c,2t,4c-Trimethylcyclohexane	I9	0.0006	0.0045	0.000	0.000
3,3-Diethylpentane	I9	0.0001	0.0008	0.000	0.000
1,2-Dimethylbenzene (o-Xylene)	A8	0.0002	0.0012	0.000	0.000
i-Butylcyclopentane	N9	0.0003	0.0022	0.000	0.000
n-Nonane	P9	0.0014	0.0106	0.001	0.001
1,1-Methylethylcyclohexane	N9	0.0001	0.0008	0.000	0.000
i-Propylcyclohexane	N9	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

n-Butylcyclopentane	N9	0.0002	0.0015	0.000	0.000
3,3-Dimethyloctane	I10	0.0002	0.0017	0.000	0.000
n-Propylbenzene	A9	0.0005	0.0035	0.000	0.000
3,6-Dimethyloctane	I10	0.0001	0.0008	0.000	0.000
1,3-Methylethylbenzene	A9	0.0001	0.0007	0.000	0.000
1,4-Methylethylbenzene	A9	0.0001	0.0007	0.000	0.000
1,3,5-Trimethylbenzene	A9	0.0002	0.0014	0.000	0.000
2,3-Dimethyloctane	I10	0.0001	0.0008	0.000	0.000
5-Methylnonane	I10	0.0002	0.0017	0.000	0.000
1,2-Methylethylbenzene	A9	0.0001	0.0007	0.000	0.000
2-Methylnonane	I10	0.0002	0.0017	0.000	0.000
3-Ethylloctane	I10	0.0001	0.0008	0.000	0.000
3-Methylnonane	I10	0.0002	0.0017	0.000	0.000
t-Butylbenzene	A10	0.0002	0.0016	0.000	0.000
i-Butylcyclohexane	N10	0.0001	0.0008	0.000	0.000
UnknownC9s	U9	0.0006	0.0046	0.000	0.000
n-Decane	P10	0.0006	0.0050	0.000	0.000
1,2,3-Trimethylbenzene	A9	0.0001	0.0007	0.000	0.000
1,2-Methyl-i-propylbenzene	A10	0.0002	0.0016	0.000	0.000
1,3-Methyl-n-propylbenzene	A10	0.0001	0.0008	0.000	0.000
1,4-Diethylbenzene	A10	0.0001	0.0008	0.000	0.000
n-Butylbenzene	A10	0.0001	0.0008	0.000	0.000
1,2-Methyl-n-propylbenzene	A10	0.0001	0.0008	0.000	0.000
1,3-Dimethyl-4-ethylbenzene	A10	0.0001	0.0008	0.000	0.000
UnknownC10s	U10	0.0009	0.0076	0.001	0.001
n-Undecane	P11	0.0003	0.0028	0.000	0.000
UnknownC11s	U11	0.0002	0.0018	0.000	0.000
n-Dodecane	P12	0.0002	0.0020	0.000	0.000
1,2,3,4,5-Pentamethylbenzene	A13	0.0001	0.0009	0.000	0.000
2-Methylnaphthalene	A11	0.0001	0.0008	0.000	0.000
1-Methylnaphthalene	A11	0.0002	0.0017	0.000	0.000
n-Tridecane	P13	0.0003	0.0033	0.000	0.000
n-Tetradecane	P14	0.0004	0.0047	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	0.0001	0.0014	0.000	0.000
UnknownC16s	U16	0.0001	0.0014	0.000	0.000
TOTAL		100.00000	100.00000	1.0651	1.0707

BTX COMPONENTS	MOLE%	WT%	CALCULATED VALUES**		
			BTU @	14.65	14.73
BENZENE	0.0006	0.0028	LHV NET DRY REAL :	946.6 /scf	951.8 /scf
TOLUENE	0.0003	0.0017	NET WET REAL :	930.1 /scf	935.3 /scf
ETHYLBENZENE	0.0003	0.0019	HHV GROSS DRY REAL :	1049.9 /scf	1055.7 /scf
XYLENES	0.0009	0.0055	GROSS WET REAL :	1031.5 /scf	1037.3 /scf
TOTAL BTX	0.0021	0.0119	NET HEATING VALUE (60 °F ideal reaction):		21267.2 Btu/lbm
			GROSS HEATING VALUE (60°F ideal reaction):		23583.7 Btu/lbm
			RELATIVE DENSITY (AIR=1):		0.5833
			DENSITY		0.04462 lb/scf
			COMPRESSIBILITY FACTOR :		0.9978
			REGULAR WOBBE INDEX		1376.0

*(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>5079.6</u> /scf	Relative Density - SG (Air=1)	<u>3.4735</u>	C6+ factors
Gross Dry Ideal BTU	<u>5470.5</u> /scf	Z Compressibility Factor	<u>0.99318</u>	0.99218
Net Dry Ideal BTU	<u>19369.2</u> /lb	Density Factor	<u>265.175</u> lbm/1000 ft3	
Gross Dry Ideal BTU	<u>20862.4</u> /lb	Molar Mass or MW	<u>100.628</u> g/mol	
		Volume Liquid Ideal gas	<u>0.041</u> scf/gal	<u>21.7</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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