EMPACT

EXTENDED NATURAL GAS ANALYSIS (*DHA)

MAIN PAGE

PRIMARY DB KEY:	**05-045-09537**	NAME/DESCRIP :	**110220114 GASAWAY CNR 6243 699 CASING**
LEASE #:			
FIELD/AREA:			

PROJECT NO. :	**202411018**	ANALYSIS NO. :	**02**
COMPANY NAME :	**QB ENERGY OPERATING, LLC**	ANALYSIS DATE:	NOVEMBER 14, 2024 09:09
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. :	998	psig	PROBE :	NO
FLOW PRES. :		psig	CYLINDER NO. :	ECA-817
LAB PRES:		psig	SAMPLED BY :	ELDON KING
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
HELIUM	0.01	0.00	---	---
HYDROGEN	0.07	0.01	---	---
OXYGEN/ARGON	0.00	0.00	---	---
NITROGEN	0.12	0.18	---	---
CARBON DIOXIDE	1.16	2.77	---	---
METHANE	88.7340	77.2212	---	---
ETHANE	6.7580	11.0233	1.8021	1.8119
PROPANE	2.0484	4.8999	0.5627	0.5658
I-BUTANE	0.3207	1.0112	0.1049	0.1055
N-BUTANE	0.4052	1.2776	0.1269	0.1276
I-PENTANE	0.1472	0.5758	0.0530	0.0533
N-PENTANE	0.0825	0.3229	0.0300	0.0301
HEXANES PLUS	0.1440	0.7081	0.0530	0.0530
TOTALS	100.00000	100.00000	2.7326	2.7472

BTEX COMPONENTS	MOLE%	WT%
BENZENE	0.0059	0.0250
TOLUENE	0.0064	0.0320
ETHYLBENZENE	0.0001	0.0006
XYLENES	0.0014	0.0080
TOTAL BTEX	0.0138	0.0656

CALCULATED VALUES**

	BTU @	14.65		14.73	
LHV	NET DRY REAL :	1000.0	**/scf**	1005.4	**/scf**
	NET WET REAL :	982.5	**/scf**	987.9	**/scf**
HHV	GROSS DRY REAL :	1106.3	**/scf**	1112.4	**/scf**
	GROSS WET REAL :	1087.0	**/scf**	1093.1	**/scf**

NET HEATING VALUE (60 °F ideal reaction):	20603.9	**Btu/lbm**
GROSS HEATING VALUE (60°F ideal reaction):	22799.9	**Btu/lbm**
RELATIVE DENSITY (AIR=1):	0.6360	
DENSITY	0.04857	**lbm/scf**
COMPRESSIBILITY FACTOR :	0.9974	
REGULAR WOBBE INDEX	1388.0	

**(DETAILED HYDROCARBON ANALYSIS/NJ 1993)*

Mod ASTM D6730,GPA 2261 & GPA 2286.

***(CALC: GPA 2172, GPA 2145 & TP-17 @14.696 & 60 F)*

EMPACT

EXTENDED NATURAL GAS ANALYSIS (*DHA)

GLYCALC INFORMATION

PROJECT NO. :	202411018	ANALYSIS NO. :	02
COMPANY NAME :	QB ENERGY OPERATING, LLC	ANALYSIS DATE:	NOVEMBER 14, 2024 09:09
ACCOUNT NO. :		SAMPLE DATE :	OCTOBER 31, 2024
PRODUCER :	QB ENERGY OPERATING, LLC	CYLINDER NO. :	ECA-817
LEASE NO. :		SAMPLED BY :	ELDON KING
NAME/DESCRIP :	110220114 GASAWAY CNR 6243 699 CASING		
FIELD DATA		SAMPLE TEMP. :	48
SAMPLE PRES. :	998	AMBIENT TEMP.:	
H2S BY STAIN TUBE:	_ *ppm mol*		
COMMENTS :	***SPOT*** ***NO PROBE***		

Componet	Mole %	Wt %
Helium	0.01	0.00
Hydrogen	0.07	0.01
Carbon Dioxide	1.16	2.77
Nitrogen	0.12	0.18
Methane	88.7340	77.2212
Ethane	6.7580	11.0233
Propane	2.0484	4.8999
Isobutane	0.3207	1.0112
n-Butane	0.4052	1.2776
Isopentane	0.1441	0.5640
n-Pentane	0.0825	0.3229
Cyclopentane	0.0031	0.0118
n-Hexane	0.0204	0.0954
Cyclohexane	0.0112	0.0512
Other Hexanes	0.0588	0.2735
Heptanes	0.0211	0.1143
Methylcyclohexane	0.0105	0.0559
2,2,4 Trimethylpentane	0.0001	0.0006
Benzene	0.0059	0.0250
Toluene	0.0064	0.0320
Ethylbenzene	0.0001	0.0006
Xylenes	0.0014	0.0080
C8+ Heavies	0.0081	0.0516
Subtotal	100.00000	100.00000
Oxygen/Argon	0.00	0.00
Total	100.00000	100.00000

Calculated Values BTU @ **14.65**		**Total Sample**	**C6+ Fraction**	**C8+ Fraction**	**C10+ Fraction**	
LHV	Net Dry Real:	1000.0	4575.5	5734.8	6752.7	**Btu/scf**
	Net Wet Real:	982.5	4495.5	5634.5	6634.7	**Btu/scf**
HHV	Gross Dry Real:	1106.3	4917.9	6155.0	7204.0	**Btu/scf**
	Gross Wet Real:	1087.0	4831.9	6047.4	7078.1	**Btu/scf**
Other Calculated Values						
Regualr Wobbe Index*		1388.0	2763.6	3085.2	3306.2	**Btu/scf**
Net Heating Value (60 °F ideal reaction):		20603.9	19150.6	19245.1	18607.9	**Btu/lbm**
Gross Heating Value (60°F ideal reaction):		22799.9	20583.1	20660.0	19859.0	**Btu/lbm**
Molar Mass (MW):		18.43445	90.618	115.475	138.252	**g/mol**
Relative Density (AIR=1):		0.6360	3.1288	3.9872	4.7735	**SG**
Density:		0.04857	0.23879	0.30430	0.36431	**lbm/scf**
Compressiblity Factor:		0.9974	0.9909	0.9978	0.9996	**Z**
Liquid Volume real gas @:	**14.65**	17.8998	0.0528	0.001	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.

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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 CASING**
LEASE #:
FIELD/AREA:

PROJECT NO. : **202411018** ANALYSIS NO. : **02**
COMPANY NAME : **QB ENERGY OPERATING, LLC** ANALYSIS DATE: NOVEMBER 14, 2024 09:09
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. : 998 psig PROBE : NO
FLOW PRES. : psig CYLINDER NO. : ECA-817
LAB PRES: psig SAMPLED BY : ELDON KING
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**
Helium	---	0.01	0.00	---	---
Hydrogen	---	0.07	0.01	---	---
Nitrogen	---	0.12	0.18	---	---
Carbon Dioxide	---	1.16	2.77	---	---
Methane	P1	88.7340	77.2212	---	---
Ethane	P2	6.7580	11.0233	1.802	1.812
Propane	P3	2.0484	4.8999	0.563	0.566
i-Butane	I4	0.3207	1.0112	0.105	0.106
n-Butane	P4	0.4052	1.2776	0.127	0.128
2,2-Dimethylpropane	I5	0.0036	0.0141	0.001	0.001
i-Pentane	I5	0.1405	0.5499	0.051	0.051
n-Pentane	P5	0.0825	0.3229	0.030	0.030
2,2-Dimethylbutane	I6	0.0053	0.0248	0.002	0.002
Cyclopentane	N5	0.0031	0.0118	0.001	0.001
2,3-Dimethylbutane	I6	0.0058	0.0271	0.002	0.002
2-Methylpentane	I6	0.0221	0.1033	0.009	0.009
3-Methylpentane	I6	0.0124	0.0580	0.005	0.005
n-Hexane	P6	0.0204	0.0954	0.008	0.008
Methylcyclopentane	N6	0.0132	0.0603	0.005	0.005
2,4-Dimethylpentane	I7	0.0011	0.0060	0.001	0.001
2,2,3-Trimethylbutane	I7	0.0002	0.0011	0.000	0.000
Benzene	A6	0.0059	0.0250	0.002	0.002
3,3-Dimethylpentane	I7	0.0004	0.0022	0.000	0.000
Cyclohexane	N6	0.0112	0.0512	0.004	0.004
2-Methylhexane	I7	0.0040	0.0218	0.002	0.002
2,3-Dimethylpentane	I7	0.0012	0.0065	0.001	0.001
1,1-Dimethylcyclopentane	N7	0.0010	0.0053	0.000	0.000

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3-Methylhexane	I7	0.0038	0.0207	0.002	0.002
1c,3-Dimethylcyclopentane	N7	0.0010	0.0053	0.000	0.000
1t,3-Dimethylcyclopentane	N7	0.0009	0.0048	0.000	0.000
3-Ethylpentane	I7	0.0002	0.0011	0.000	0.000
1t,2-Dimethylcyclopentane	N7	0.0014	0.0074	0.001	0.001
2,2,4-Trimethylpentane	I8	0.0001	0.0006	0.000	0.000
n-Heptane	P7	0.0054	0.0294	0.002	0.002
1c,2-Dimethylcyclopentane	N7	0.0001	0.0005	0.000	0.000
Methylcyclohexane	N7	0.0105	0.0559	0.004	0.004
2,2-Dimethylhexane	I8	0.0003	0.0018	0.000	0.000
1,1,3-Trimethylcyclopentane	N7	0.0001	0.0006	0.000	0.000
Ethylcyclopentane	N7	0.0003	0.0016	0.000	0.000
2,5-Dimethylhexane	I8	0.0002	0.0013	0.000	0.000
2,2,3-Trimethylpentane	I8	0.0002	0.0013	0.000	0.000
1c,2t,4-Trimethylcyclopentane	N8	0.0001	0.0006	0.000	0.000
Toluene	A7	0.0064	0.0320	0.002	0.002
2,3-Dimethylhexane	I8	0.0002	0.0013	0.000	0.000
2-Methylheptane	I8	0.0008	0.0049	0.000	0.000
4-Methylheptane	I8	0.0003	0.0018	0.000	0.000
3-Methyl-3-ethylpentane	I8	0.0001	0.0006	0.000	0.000
3-Methylheptane	I8	0.0007	0.0043	0.000	0.000
3-Ethylhexane	I8	0.0001	0.0006	0.000	0.000
1t,4-Dimethylcyclohexane	N8	0.0004	0.0024	0.000	0.000
1,1-Dimethylcyclohexane	N8	0.0001	0.0006	0.000	0.000
1t,2-Dimethylcyclohexane	N8	0.0003	0.0018	0.000	0.000
n-Octane	P8	0.0010	0.0062	0.001	0.001
1c,4-Dimethylcyclohexane	N8	0.0001	0.0006	0.000	0.000
2,2-Dimethylheptane	I9	0.0001	0.0007	0.000	0.000
1,1,4-Trimethylcyclohexane	N9	0.0003	0.0021	0.000	0.000
2,2,3-Trimethylhexane	I9	0.0001	0.0007	0.000	0.000
Ethylcyclohexane	N8	0.0002	0.0012	0.000	0.000
n-Propylcyclopentane	N8	0.0001	0.0006	0.000	0.000
1c,3c,5-Trimethylcyclohexane	N9	0.0001	0.0007	0.000	0.000
2,5-Dimethylheptane	I9	0.0001	0.0007	0.000	0.000
1,1,3-Trimethylcyclohexane	N9	0.0001	0.0007	0.000	0.000
Ethylbenzene	I8	0.0001	0.0006	0.000	0.000
1,3-Dimethylbenzene (m-Xylene)	A8	0.0009	0.0052	0.000	0.000
1,4-Dimethylbenzene (p-Xylene)	A8	0.0003	0.0017	0.000	0.000
4-Methyloctane	I9	0.0001	0.0007	0.000	0.000
2-Methyloctane	I9	0.0001	0.0007	0.000	0.000
1c,2t,4c-Trimethylcyclohexane	I9	0.0001	0.0007	0.000	0.000
1,2-Dimethylbenzene (o-Xylene)	A8	0.0002	0.0011	0.000	0.000
i-Butylcyclopentane	N9	0.0001	0.0007	0.000	0.000
UnknownC8s	U8	0.0009	0.0056	0.000	0.000
n-Nonane	P9	0.0002	0.0014	0.000	0.000
n-Butylcyclopentane	N9	0.0001	0.0007	0.000	0.000
1,3,5-Trimethylbenzene	A9	0.0001	0.0007	0.000	0.000
t-Butylbenzene	A10	0.0001	0.0007	0.000	0.000
UnknownC9s	U9	0.0001	0.0007	0.000	0.000
n-Decane	P10	0.0001	0.0008	0.000	0.000
1,2,3-Trimethylbenzene	A9	0.0001	0.0007	0.000	0.000
TOTAL		100.00000	100.00000	2.7326	2.7472

BTEX COMPONENTS	MOLE%	WT%
BENZENE	0.0059	0.0250
TOLUENE	0.0064	0.0320
ETHYLBENZENE	0.0001	0.0006
XYLENES	0.0014	0.0080
TOTAL BTEX	0.0138	0.0656

**(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 :	1000.0 /scf	1005.4 /scf
	NET WET REAL :	982.5 /scf	987.9 /scf
HHV	GROSS DRY REAL :	1106.3 /scf	1112.4 /scf
	GROSS WET REAL :	1087.0 /scf	1093.1 /scf
	NET HEATING VALUE (60 °F ideal reaction):		20603.9 Btu/lbm
	GROSS HEATING VALUE (60°F ideal reaction):		22799.9 Btu/lbm
	RELATIVE DENSITY (AIR=1):		0.6360
	DENSITY		0.04857 lb/scf
	COMPRESSIBILITY FACTOR :		0.9974
	REGULAR WOBBE INDEX		1388.0

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

Net Dry Ideal BTU	4548.1 /scf	Relative Density - SG (Air=1)	3.1288		***C6+factors***
Gross Dry Ideal BTU	4888.4 /scf	**Z** Compressiblity Factor	0.99089		0.99012
Net Dry Ideal BTU	19150.6 /lb	Density Factor	238.79	lbm/1000 ft3	
Gross Dry Ideal BTU	20583.1 /lb	Molar Mass or MW	90.618	g/mol	
		Volume Liquid Ideal gas	0.053	scf/gal	24.8

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.

EMPACT Analytical Systems, Inc 365 S. Main Street, Brighton, CO 80601 303-637-0150