EXTENDED NATURAL GAS ANALYSIS (*DHA)

MAIN PAGE

PRIMARY DB KEY:	**05-103-10122**	NAME/DESCRIP :	**RIO BLANCO #103; PICEANCE CREEK - #68800**
LEASE #:	**05-103-10122**		**PICEANCE CREEK UNIT #T21X-19G**
FIELD/AREA:			**CASING SAMPLE**
PROJECT NO. :	**202305047**	ANALYSIS NO. :	**01**
COMPANY NAME :	**CAERUS OIL & GAS LLC**	ANALYSIS DATE:	MAY 09, 2023 15:35
OFFICE / BRANCH:	PARACHUTE, CO	SAMPLE DATE :	APRIL 26, 2023
CUSTOMER REF:		TO:	
PRODUCER :	CAERUS PICEANCE LLC	EFFECTIVE DATE:	
FIELD DATA			
SAMPLE CYCLE:		SAMPLE TYPE:	SPOT
SAMPLE PRES. :	900 psig	PROBE :	NO
FLOW PRES. :	psig	CYLINDER NO. :	ECA-812
LAB PRES:	psig	SAMPLED BY :	PAUL HACKING
SAMPLE TEMP. :	50 ºf	SAMPLING COMPANY:	CAERUS OIL & GAS LLC
AMBIENT TEMP.:	ºf	H2S BY STAIN TUBE:	ppm mol
H2O BY STAIN TUBE:	#/mmcf	CO2 BY STAIN TUBE:	Mol %
FIELD COMMENTS:			
LAB COMMENTS:	***Possible moisture in sample***		

COMPONENT	MOLE %	MASS %	GPM @ 14.65	GPM @ 14.73
ALCOHOLS	0.0010	0.0019	0.0000	0.0000
HELIUM	0.01	0.00	---	---
HYDROGEN	0.09	0.01	---	---
OXYGEN/ARGON	0.88	1.65	---	---
NITROGEN	5.80	9.51	---	---
CARBON DIOXIDE	0.05	0.13	---	---
METHANE	92.0109	86.4252	---	---
ETHANE	1.0907	1.9202	0.2906	0.2922
PROPANE	0.0312	0.0806	0.0090	0.0090
I-BUTANE	0.0023	0.0079	0.0010	0.0010
N-BUTANE	0.0015	0.0051	0.0000	0.0000
I-PENTANE	0.0010	0.0042	0.0000	0.0000
N-PENTANE	0.0007	0.0030	0.0000	0.0000
HEXANES PLUS	0.0307	0.2519	0.0110	0.0110
TOTALS	100.00000	100.00000	0.3116	0.3132

BTEX COMPONENTS	MOLE%	WT%
BENZENE	0.0006	0.0028
TOLUENE	0.0015	0.0081
ETHYLBENZENE	0.0001	0.0006
XYLENES	0.0006	0.0037
TOTAL BTEX	0.0028	0.0152

*(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 :	855.5 /scf	860.2 /scf
	NET WET REAL :	840.5 /scf	845.2 /scf
HHV	GROSS DRY REAL :	950.1 /scf	955.3 /scf
	GROSS WET REAL :	933.5 /scf	938.7 /scf

NET HEATING VALUE (60 °F ideal reaction):	19057.8	Btu/lbm
GROSS HEATING VALUE (60°F ideal reaction):	21158.1	Btu/lbm
RELATIVE DENSITY (AIR=1):	0.5890	
DENSITY	0.04500	lbm/scf
COMPRESSIBILITY FACTOR :	0.9981	
REGULAR WOBBE INDEX	1239.5	

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EXTENDED NATURAL GAS ANALYSIS (*DHA)

GLYCALC INFORMATION

PROJECT NO. :	202305047	ANALYSIS NO. :	01
COMPANY NAME :	CAERUS OIL & GAS LLC	ANALYSIS DATE:	MAY 09, 2023 15:35
ACCOUNT NO. :		SAMPLE DATE :	APRIL 26, 2023
PRODUCER :	CAERUS PICEANCE LLC	CYLINDER NO. :	ECA-812
LEASE NO. :	05-103-10122	SAMPLED BY :	PAUL HACKING
NAME/DESCRIP :	RIO BLANCO #103; PICEANCE CREEK - #68800 PICEANCE CREEK UNIT #T21X-19G CASING SAMPLE		
FIELD DATA		SAMPLE TEMP. :	50
SAMPLE PRES. :	900	AMBIENT TEMP.:	
H2S BY STAIN TUBE:	_ *ppm mol*		
COMMENTS :	***SPOT*** ***NO PROBE*** ***Possible moisture in sample***		

Componet	Mole %	Wt %
Helium	0.01	0.00
Hydrogen	0.09	0.01
Carbon Dioxide	0.05	0.13
Nitrogen	5.80	9.51
Methane	92.0109	86.4252
Ethane	1.0907	1.9202
Propane	0.0312	0.0806
Isobutane	0.0023	0.0079
n-Butane	0.0015	0.0051
Isopentane	0.0009	0.0038
n-Pentane	0.0007	0.0030
Cyclopentane	0.0001	0.0004
n-Hexane	0.0011	0.0056
Cyclohexane	0.0009	0.0045
Other Hexanes	0.0019	0.0094
Heptanes	0.0054	0.0317
Methylcyclohexane	0.0030	0.0173
2,2,4 Trimethylpentane	0.0000	0.0000
Benzene	0.0006	0.0028
Toluene	0.0015	0.0081
Ethylbenzene	0.0001	0.0006
Xylenes	0.0006	0.0037
C8+ Heavies	0.0156	0.1682
Subtotal	99.11900	98.34810
Oxygen/Argon	0.88	1.65
Alcohols	0.0010	0.0019
Total	100.00000	100.00000

Calculated Values BTU @ **14.65**		**Total Sample**	**C6+ Fraction**	**C8+ Fraction**	**C10+ Fraction**	
LHV	Net Dry Real:	855.5	7030.9	9091.0	10546.9	**Btu/scf**
	Net Wet Real:	840.5	6908.0	8932.1	10362.5	**Btu/scf**
HHV	Gross Dry Real:	950.1	7553.3	9772.1	11340.2	**Btu/scf**
	Gross Wet Real:	933.5	7421.3	9601.3	11142.0	**Btu/scf**
Other Calculated Values						
Regualr Wobbe Index*		1239.5	3436.8	3918.9	4226.6	**Btu/scf**
Net Heating Value (60 °F ideal reaction):		19057.8	19544.3	19749.9	19815.1	**Btu/lbm**
Gross Heating Value (60°F ideal reaction):		21158.1	20996.3	21230.7	21305.0	**Btu/lbm**
Molar Mass (MW):		17.07996	140.18	181.111	209.81	**g/mol**
Relative Density (AIR=1):		0.5890	4.8393	6.2535	7.2442	**SG**
Density:		0.04500	0.36939	0.47726	0.55289	**lbm/scf**
Compressiblity Factor:		0.9981	0.9978	0.9997	1.0000	**Z**
Liquid Volume real gas @:	**14.65**	16.552	0.011	0.008	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 uderscore) indicates there was no tube pulled for H2S.

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EXTENDED NATURAL GAS ANALYSIS (*DHA)

DHA COMPONENT LIST

PRIMARY DB KEY:	**05-103-10122**	NAME/DESCRIP :	**RIO BLANCO #103; PICEANCE CREEK - #68800**
LEASE #:	**05-103-10122**		**PICEANCE CREEK UNIT #T21X-19G**
FIELD/AREA:			**CASING SAMPLE**
PROJECT NO. :	**202305047**	ANALYSIS NO. :	**01**
COMPANY NAME :	**CAERUS OIL & GAS LLC**	ANALYSIS DATE:	MAY 09, 2023 15:35
OFFICE / BRANCH:	PARACHUTE, CO	SAMPLE DATE :	APRIL 26, 2023
CUSTOMER REF:		TO:	
PRODUCER :	CAERUS PICEANCE LLC	EFFECTIVE DATE:	
FIELD DATA			
SAMPLE CYCLE:		SAMPLE TYPE:	SPOT
SAMPLE PRES. :	900 psig	PROBE :	NO
FLOW PRES. :	psig	CYLINDER NO. :	ECA-812
LAB PRES:	psig	SAMPLED BY :	PAUL HACKING
SAMPLE TEMP. :	50 ºf	SAMPLING COMPANY:	CAERUS OIL & GAS LLC
AMBIENT TEMP.:	ºf	H2S BY STAIN TUBE:	_ ppm mol
H2O BY STAIN TUBE:	- #/mmcf	CO2 BY STAIN TUBE:	- Mol %
FIELD COMMENTS:			
LAB COMMENTS:	***Possible moisture in sample***		

COMPONENT	PIANO #	MOLE %	MASS %	GPM @ **14.65**	GPM @ **14.73**
Helium	---	0.01	0.00	---	---
Hydrogen	---	0.09	0.01	---	---
Oxygen/Argon	---	0.88	1.65	---	---
Nitrogen	---	5.80	9.51	---	---
Carbon Dioxide	---	0.05	0.13	---	---
Methane	P1	92.0109	86.4252	---	---
Ethane	P2	1.0907	1.9202	0.291	0.292
Propane	P3	0.0312	0.0806	0.009	0.009
i-Butane	I4	0.0023	0.0079	0.001	0.001
Methanol	X1	0.0010	0.0019	0.000	0.000
n-Butane	P4	0.0015	0.0051	0.000	0.000
i-Pentane	I5	0.0009	0.0038	0.000	0.000
n-Pentane	P5	0.0007	0.0030	0.000	0.000
2,2-Dimethylbutane	I6	0.0001	0.0005	0.000	0.000
Cyclopentane	N5	0.0001	0.0004	0.000	0.000
2,3-Dimethylbutane	I6	0.0002	0.0010	0.000	0.000
2-Methylpentane	I6	0.0006	0.0030	0.000	0.000
3-Methylpentane	I6	0.0004	0.0020	0.000	0.000
n-Hexane	P6	0.0011	0.0056	0.000	0.000
Methylcyclopentane	N6	0.0006	0.0029	0.000	0.000
2,4-Dimethylpentane	I7	0.0001	0.0006	0.000	0.000
Benzene	A6	0.0006	0.0028	0.000	0.000
Cyclohexane	N6	0.0009	0.0045	0.000	0.000
2-Methylhexane	I7	0.0009	0.0053	0.000	0.000
2,3-Dimethylpentane	I7	0.0003	0.0018	0.000	0.000
1,1-Dimethylcyclopentane	N7	0.0002	0.0012	0.000	0.000
3-Methylhexane	I7	0.0008	0.0047	0.000	0.000
1c,3-Dimethylcyclopentane	N7	0.0003	0.0017	0.000	0.000
1t,3-Dimethylcyclopentane	N7	0.0002	0.0012	0.000	0.000
3-Ethylpentane	I7	0.0001	0.0006	0.000	0.000

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1t,2-Dimethylcyclopentane	N7	0.0003	0.0017	0.000	0.000
n-Heptane	P7	0.0020	0.0117	0.001	0.001
1c,2-Dimethylcyclopentane	N7	0.0001	0.0006	0.000	0.000
Methylcyclohexane	N7	0.0030	0.0173	0.001	0.001
2,2-Dimethylhexane	I8	0.0001	0.0006	0.000	0.000
Ethylcyclopentane	N7	0.0001	0.0006	0.000	0.000
2,5-Dimethylhexane	I8	0.0001	0.0006	0.000	0.000
2,4-Dimethylhexane	I8	0.0002	0.0014	0.000	0.000
1c,2t,4-Trimethylcyclopentane	N8	0.0001	0.0006	0.000	0.000
Toluene	A7	0.0015	0.0081	0.001	0.001
2,3-Dimethylhexane	I8	0.0001	0.0006	0.000	0.000
2-Methylheptane	I8	0.0005	0.0033	0.000	0.000
4-Methylheptane	I8	0.0002	0.0014	0.000	0.000
3-Methylheptane	I8	0.0003	0.0020	0.000	0.000
1c,2t,3-Trimethylcyclopentane	N8	0.0005	0.0033	0.000	0.000
1t,4-Dimethylcyclohexane	N8	0.0002	0.0013	0.000	0.000
1,1-Dimethylcyclohexane	N8	0.0001	0.0006	0.000	0.000
1t,2-Dimethylcyclohexane	N8	0.0001	0.0006	0.000	0.000
n-Octane	P8	0.0008	0.0053	0.000	0.000
1c,4-Dimethylcyclohexane	N8	0.0001	0.0006	0.000	0.000
1,1,4-Trimethylcyclohexane	N9	0.0001	0.0008	0.000	0.000
Ethylcyclohexane	N8	0.0001	0.0006	0.000	0.000
2,5-Dimethylheptane	I9	0.0001	0.0008	0.000	0.000
Ethylbenzene	I8	0.0001	0.0006	0.000	0.000
1,3-Dimethylbenzene (m-Xylene)	A8	0.0004	0.0025	0.000	0.000
1,4-Dimethylbenzene (p-Xylene)	A8	0.0001	0.0006	0.000	0.000
2-Methyloctane	I9	0.0001	0.0008	0.000	0.000
1c,2t,4c-Trimethylcyclohexane	I9	0.0001	0.0008	0.000	0.000
1,2-Dimethylbenzene (o-Xylene)	A8	0.0001	0.0006	0.000	0.000
n-Nonane	P9	0.0002	0.0015	0.000	0.000
1,3,5-Trimethylbenzene	A9	0.0001	0.0007	0.000	0.000
t-Butylbenzene	A10	0.0001	0.0008	0.000	0.000
n-Decane	P10	0.0002	0.0016	0.000	0.000
n-Undecane	P11	0.0003	0.0028	0.000	0.000
n-Dodecane	P12	0.0005	0.0050	0.000	0.000
1,3,5-Triethylbenzene	A12	0.0001	0.0009	0.000	0.000
1,2,4-Triethylbenzene	A12	0.0001	0.0009	0.000	0.000
1,4-Methyl-n-pentylbenzene	A12	0.0001	0.0009	0.000	0.000
1,2,3,4,5-Pentamethylbenzene	A13	0.0003	0.0026	0.000	0.000
2-Methylnaphthalene	A11	0.0001	0.0008	0.000	0.000
UnknownC12s	U12	0.0001	0.0009	0.000	0.000
n-Tridecane	P13	0.0010	0.0108	0.001	0.001
UnknownC13s	U13	0.0001	0.0011	0.000	0.000
n-Tetradecane	P14	0.0016	0.0186	0.001	0.001
UnknownC14s	U14	0.0001	0.0012	0.000	0.000
n-Pentadecane	P15	0.0013	0.0162	0.001	0.001
UnknownC15s	U15	0.0009	0.0112	0.001	0.001
n-Hexadecane	P16	0.0008	0.0106	0.001	0.001
UnknownC16s	U16	0.0011	0.0146	0.001	0.001
n-Heptadecane	P17	0.0004	0.0056	0.000	0.000
UnknownC17s	U17	0.0006	0.0084	0.001	0.001
n-Octadecane	P18	0.0002	0.0030	0.000	0.000
UnknownC18s	U18	0.0010	0.0149	0.001	0.001
n-Nonadecane	P19	0.0001	0.0016	0.000	0.000
UnknownC19s	U19	0.0001	0.0016	0.000	0.000
UnknownC20s	U20	0.0001	0.0016	0.000	0.000
UnknownC21s	U21	0.0001	0.0018	0.000	0.000
TOTAL		100.00000	100.00000	0.3116	0.3132

BTEX COMPONENTS	MOLE%	WT%
BENZENE	0.0006	0.0028
TOLUENE	0.0015	0.0081
ETHYLBENZENE	0.0001	0.0006
XYLENES	0.0006	0.0037
TOTAL BTEX	0.0028	0.0152

*(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 :	855.5 /scf	860.2 /scf
	NET WET REAL :	840.5 /scf	845.2 /scf
HHV	GROSS DRY REAL :	950.1 /scf	955.3 /scf
	GROSS WET REAL :	933.5 /scf	938.7 /scf
	NET HEATING VALUE (60 °F ideal reaction):		19057.8 Btu/lbm
	GROSS HEATING VALUE (60°F ideal reaction):		21158.1 Btu/lbm
	RELATIVE DENSITY (AIR=1):		0.5890
	DENSITY		0.04500 lb/scf
	COMPRESSIBILITY FACTOR :		0.9981
	REGULAR WOBBE INDEX		1239.5

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

					C6+factors
Net Dry Ideal BTU	7037.6 /scf	Relative Density - SG (Air=1)	4.8393		
Gross Dry Ideal BTU	7560.5 /scf	Z Compressiblity Factor	0.99782		0.99635
Net Dry Ideal BTU	19544.3 /lb	Density Factor	369.395	lbm/1000 ft3	
Gross Dry Ideal BTU	20996.3 /lb	Molar Mass or MW	140.18	g/mol	
		Volume Liquid Ideal gas	0.011	scf/gal	19.7

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.

ISOTOPIC NATURAL GAS ANALYSIS

PRIMARY DB KEY:	**05-103-10122**	NAME/DESCRIP :	**RIO BLANCO #103; PICEANCE CREEK - #68800**
LEASE #:	**05-103-10122**		**PICEANCE CREEK UNIT #T21X-19G**
FIELD/AREA:			**CASING SAMPLE**
PROJECT NO. :	**202305047**	ANALYSIS NO. :	**01**
COMPANY NAME :	**CAERUS OIL & GAS LLC**	ANALYSIS DATE:	MAY 24, 2023 00:00
OFFICE / BRANCH:	PARACHUTE, CO	SAMPLE DATE :	APRIL 26, 2023
CUSTOMER REF:		TO:	
PRODUCER :	CAERUS PICEANCE LLC	EFFECTIVE DATE:	
FIELD DATA			
SAMPLE CYCLE:		SAMPLE TYPE:	SPOT
SAMPLE PRES. :	900 psig	PROBE :	NO
FLOW PRES. :	psig	CYLINDER NO. :	ECA-812
LAB PRES:	psig	SAMPLED BY :	PAUL HACKING
SAMPLE TEMP. :	50 °f	SAMPLING COMPANY:	CAERUS OIL & GAS LLC
AMBIENT TEMP.:	°f	H2S BY STAIN TUBE:	ppm mol
H2O BY STAIN TUBE:	#/mmcf	CO2 BY STAIN TUBE:	Mol %
FIELD COMMENTS:			
LAB COMMENTS:	***Possible moisture in sample***		

COMPONENTS	NORM. MOLE%	GPM @ 14.65	d13C ‰ VPDB	dD ‰ VSMOW
HELIUM	0.01	-	-	-
HYDROGEN	0.09	-	-	-
OXYGEN/ARGON	0.88	-	-	-
NITROGEN	5.80	-	-	-
CO2	0.05	-	-11.1	-
METHANE	92.01	-	-37.1	-169
ETHANE	1.09	0.2906	-25.8	-
PROPANE	0.03	0.0080	-24.5	-
ISOBUTANE	0.00	0.0000	0.0	-
N-BUTANE	0.00	0.0000	0.0	-
ISOPENTANE	0.00	0.0000	0.0	-
N-PENTANE	0.00	0.0000	0.0	-
HEXANES+	0.03	0.0350	-	-
TOTAL	100.00	0.3336		

BTU @ 60 DEG F		**14.65**	
	GROSS DRY REAL =	952.1	**/scf**
	GROSS SATURATED REAL =	935.5	**/scf**
RELATIVE DENSITY (AIR=1 @14.696 PSIA 60F)		0.5906	
GRAVITY (LB/SCF)		0.04506	
COMPRESSIBILITY FACTOR :		0.99810	

NOTE: REFERENCE GPA 2261(ASTM D1945 & ASME-PTC), 2145, & 2172 CURRENT PUBLICATIONS

Reference: Per GPA 2172-14 sec 9 ***The C6+ is derived from the following ratios of C6, C7 & C8+ respectively:*** **60% 30% 10%**

The NG Composition File #: **202305047-01-A-780**
The Isotopic Data File #: **DIG-032013**

Note:Stable isotope results based on multi-point laboratory calibration
Presicion $\delta^{13}C$ < 0.5 ‰ **Precision δD < 5.0 ‰**
Values in red represent low peak heights. Interpret with caution.