CRUDE OIL ASSAY

PROJECT NO. :	201310129	ANALYSIS NO. :	13
COMPANY NAME :	CARRIZO OIL & GAS, INC.	ANALYSIS DATE:	OCTOBER 28, 2013
ACCOUNT NO. :		SAMPLE DATE :	OCTOBER 18, 2013
PRODUCER :		CYLINDER NO. :	1L GLASS JAR
LEASE NO. :		SAMPLED BY :	GALE MCENDREE
NAME/DESCRIP :	TANK BATTERY @ 17:25 CASTOR 3-36-11-9-59; TK #115856		EMPACT
FIELD DATA		SAMPLE TEMP. :	92
SAMPLE PRES. :		AMBIENT TEMP.:	
VAPOR PRES. :		GRAVITY :	
COMMENTS :	SPOT		

SPECIFICATION	TEST METHOD	UNITS	RESULTS
API GRAVITY		API 60/60	33.5
RVP @100 DEG F	D323	PSIG	7
TOTAL SULFUR	D2622	WT %	0.471
TOTAL CHLORIDE	D4929	ug/g	N/A
ORGANIC CHLORIDE	D4929	ug/g	N/A
FLASH POINT	D93	° F	N/A
HEATING VALUE	D4809	BTU/ LB	N/A
VISUAL APPEARANCE			BLACK
BS&W	D96		
Crude Oil		VOL %	N/A
Water		VOL %	N/A
Emulsion		VOL %	N/A
Sediment		VOL %	N/A
DISTILLATION:	D86		
INITIAL POINT		DEG F	N/A
50%		DEG F	N/A
90%		DEG F	N/A
END POINT		DEG F	N/A
DISTILLATION: @TEMP	D445		
Average Centipoise 20°C			N/A
Average Centipoise 30°C			N/A
Average Centipoise 80°C			N/A
Kinetic Viscosity 20°C		cSt (mm2/s)	N/A
Kinetic Viscosity 30°C		cSt (mm2/s)	N/A
Kinetic Viscosity 80°C		cSt (mm2/s)	N/A

ND: NOT DETECTED
N/A: NO TEST PREFORMED FOR THIS PARAMETER

EMPACT ANALYTICAL SYSTEMS INC.
365 S. MAIN ST.
BRIGHTON, CO
80601

303-637-0150

EXTENDED NATURAL GAS LIQUID ANALYSIS (*DHA)

MAIN PAGE

PROJECT NO. :	201310129	ANALYSIS NO. :	14
COMPANY NAME :	CARRIZO OIL & GAS, INC.	ANALYSIS DATE:	OCTOBER 23, 2013
ACCOUNT NO. :		SAMPLE DATE :	OCTOBER 18, 201
PRODUCER :		CYLINDER NO. :	2778
LEASE NO. :		SAMPLED BY :	GALE MCENDREE
NAME/DESCRIP :	SEPARATOR @ 17:00 CASTOR 3-36-11-9-59		EMPACT
FIELD DATA		SAMPLE TEMP. :	152
SAMPLE PRES. :	15	AMBIENT TEMP.:	
VAPOR PRES. :		GRAVITY :	
COMMENTS :	SPOT, NO PROBE		

COMPONENT	MOLE %	MASS %	VOL %
ALCOHOLS	0.0221	0.0125	0.0116
NITROGEN (AIR)	0.0145	0.0038	0.0035
CARBON DIOXIDE	0.0225	0.0093	0.0084
METHANE	0.0475	0.0071	0.0175
ETHANE	0.2377	0.0670	0.1388
PROPANE	1.2609	0.5215	0.7592
I-BUTANE	0.3668	0.1999	0.2621
N-BUTANE	1.9278	1.0509	1.3282
I-PENTANE	0.8513	0.5761	0.6811
N-PENTANE	1.4791	1.0009	1.1706
HEXANES PLUS	93.7698	96.5510	95.6190
TOTALS	100.0000	100.0000	100.0000

BTEX COMPONENTS	**MOLE%**	**MASS%**
BENZENE	1.8626	1.3645
TOLUENE	3.3492	2.8943
ETHYLBENZENE	0.7241	0.7210
XYLENE	1.7878	1.7802
TOTAL BTEX	7.7237	6.7600

(CALC: GPA STD 2145-94 & TP-17 @14.696 & 60 F)

	TOTAL SAMPLE	**C6+ FRACTION**	
Specific Gravity (H2O=1) =	0.7381	0.7454	60/60
API Gravity =	60.21	58.33	60/60
Molecular Weight =	106.62	110.558	
Absolute Density =	6.15	6.21	LBS/GAL
Heating Value Liq. Idl Gas=	125014	126682	BTU/GAL
Vapor/Liquid =	21.86	21.39	CUFT/GAL
Vapor Pressure =	10.27	1.99	PSIA @100 F

**(DETAILED HYDROCARBON ANALYSIS/NJ 1993) ; ASTM D6730*

EMPACT ANALYTICAL SYSTEMS INC.
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303-637-0150

EXTENDED NATURAL GAS LIQUID ANALYSIS (*DHA)

E & P TANK / GLYCALC INFORMATION

PROJECT NO. :	201310129	ANALYSIS NO. :	14
COMPANY NAME :	CARRIZO OIL & GAS, INC.	ANALYSIS DATE:	OCTOBER 23, 2013
ACCOUNT NO. :		SAMPLE DATE :	OCTOBER 18, 201
PRODUCER :		CYLINDER NO. :	2778
LEASE NO. :		SAMPLED BY :	GALE MCENDREE
NAME/DESCRIP :	SEPARATOR @ 17:00 CASTOR 3-36-11-9-59		EMPACT
FIELD DATA		SAMPLE TEMP. :	152
SAMPLE PRES. :	15	AMBIENT TEMP.:	
VAPOR PRES. :		GRAVITY :	
COMMENTS :	SPOT, NO PROBE		

COMPONENT	Mole %		Wt %		LV %	
CARBON DIOXIDE	0.0225		0.0093		0.0084	
NITROGEN (AIR)	0.0145		0.0038		0.0035	
METHANE	0.0475		0.0071		0.0175	
ETHANE	0.2377		0.0670		0.1388	
PROPANE	1.2609		0.5215		0.7592	
I-BUTANE	0.3668		0.1999		0.2621	
N-BUTANE	1.9278		1.0509		1.3282	
I-PENTANE	0.8513		0.5761		0.6811	
N-PENTANE	1.4791		1.0009		1.1706	
CYCLOPENTANE (N-C5)	1.8082		1.1894		1.1549	
N-HEXANE	8.2420		6.6630		7.4094	
CYCLOHEXANE (OTHER C6)	3.2641		2.5765		2.4274	
OTHER HEXANES	12.5167		10.0160		10.5944	
OTHER HEPTANES	15.1387		14.1279		14.6583	
METHYLCYCLOHEXANE (OTHER C7)	4.2424		3.9070		3.7224	
2,2,4 TRIMETHYLPENTANE	0.8689		0.8002		0.7839	
BENZENE	1.8626		1.3645		1.1407	
TOLUENE	3.3492		2.8943		2.4436	
ETHYLBENZENE	0.7241		0.7210		0.6086	
XYLENES	1.7878		1.7802		1.5062	
OTHER OCTANES	10.9149		11.7198		11.7013	
OCTANES PLUS	----	43.3459	----	53.8124	----	52.0679
NONANES	11.0743		13.1820		12.9079	
DECANES PLUS	17.9759		25.6092		24.5600	
SUB TOTAL	99.9779		99.9875		99.9884	
ALCOHOLS	0.0221		0.0125		0.0116	
TOTAL	100.0000		100.0000		100.0000	

API Gravity =	**60.21**	60/60
Vapor Pressure =	**10.27**	PSIA & 100 F
Average Molecular Weight of Decanes plus =	**151.90**	
Average Specific Gravity of Decanes plus =	**0.7740**	

EMPACT ANALYTICAL SYSTEMS INC.
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303-637-0150

EXTENDED NATURAL GAS LIQUID ANALYSIS (*DHA)

BY CARBON NUMBER

PROJECT NO. :	201310129	ANALYSIS NO. :	14
COMPANY NAME :	CARRIZO OIL & GAS, INC.	ANALYSIS DATE:	OCTOBER 23, 2013
ACCOUNT NO. :		SAMPLE DATE :	OCTOBER 18, 201
PRODUCER :		CYLINDER NO. :	2778
LEASE NO. :		SAMPLED BY :	GALE MCENDREE
NAME/DESCRIP :	SEPARATOR @ 17:00		EMPACT
	CASTOR 3-36-11-9-59		
FIELD DATA		SAMPLE TEMP. :	152
SAMPLE PRES. :	15	AMBIENT TEMP.:	
VAPOR PRES. :		GRAVITY :	
COMMENTS :	SPOT, NO PROBE		

COMPONENT / CARBON NUMBER		MOLE%	MASS %	VOLUME %
ALCOHOLS		0.0221	0.0125	0.0116
NITROGEN		0.0145	0.0038	0.0035
CARBON DIOXIDE		0.0225	0.0093	0.0084
	C1	0.0475	0.0071	0.0175
	C2	0.2377	0.0670	0.1388
	C3	1.2609	0.5215	0.7592
	C4	2.2946	1.2508	1.5903
	C5	4.1386	2.7664	3.0066
	C6	25.8854	20.6200	21.5719
	C7	22.7303	20.9292	20.8243
	C8	14.2957	15.0212	14.6000
	C9	11.0743	13.1820	12.9079
	C10	9.2698	11.9981	11.5940
	C11	4.1844	5.8993	5.5852
	C12	2.1912	3.2842	3.1307
	C13	0.6583	1.1230	1.0828
	C14	0.7082	1.3178	1.2743
	C15	0.5522	1.1002	1.0516
	C16	0.3545	0.7529	0.7150
	C17	0.0308	0.0695	0.0658
	C18	0.0192	0.0458	0.0433
	C19	0.0073	0.0184	0.0173
	C20	0.0000	0.0000	0.0000
	C21	0.0000	0.0000	0.0000
	C22	0.0000	0.0000	0.0000
	C23	0.0000	0.0000	0.0000
	C24	0.0000	0.0000	0.0000
	C25	0.0000	0.0000	0.0000
	C26	0.0000	0.0000	0.0000
	C27	0.0000	0.0000	0.0000
	C28	0.0000	0.0000	0.0000
	C29	0.0000	0.0000	0.0000
	C30+	0.0000	0.0000	0.0000
	Total	100.0000	100.0000	100.0000

EMPACT ANALYTICAL SYSTEMS INC.
365 S. MAIN ST.
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303-637-0150

EXTENDED NATURAL GAS LIQUID ANALYSIS (*DHA)

DHA COMPONENT LIST

PROJECT NO. :	201310129	ANALYSIS NO. :	14
COMPANY NAME :	CARRIZO OIL & GAS, INC.	ANALYSIS DATE:	OCTOBER 23, 2013
ACCOUNT NO. :		SAMPLE DATE :	OCTOBER 18, 201
PRODUCER :		CYLINDER NO. :	2778
LEASE NO. :		SAMPLED BY :	GALE MCENDREE
NAME/DESCRIP :	SEPARATOR @ 17:00		EMPACT
	CASTOR 3-36-11-9-59		
FIELD DATA		SAMPLE TEMP. :	152
SAMPLE PRES. :	15	AMBIENT TEMP.:	
VAPOR PRES. :		GRAVITY :	
COMMENTS :	SPOT, NO PROBE		

COMPONENT	PIANO #	MOLE %	MASS %	VOL %
Nitrogen	NHC	0.0145	0.0038	0.0035
Carbon Dioxide	NHC	0.0225	0.0093	0.0084
Methane	P1	0.0475	0.0071	0.0175
Ethane	P2	0.2377	0.0670	0.1388
Propane	P3	1.2609	0.5215	0.7592
i-Butane	I4	0.3668	0.1999	0.2621
n-Butane	P4	1.9278	1.0509	1.3282
2,2-Dimethylpropane	I5	0.0099	0.0067	0.0083
i-Pentane	I5	0.8414	0.5694	0.6728
i-Propanol	X3	0.0221	0.0125	0.0116
n-Pentane	P5	1.4791	1.0009	1.1706
2,2-Dimethylbutane	I6	0.0335	0.0271	0.0306
Cyclopentane	N5	1.8082	1.1894	1.1549
2,3-Dimethylbutane	I6	0.4077	0.3295	0.3646
2-Methylpentane	I6	4.2801	3.4596	3.8822
3-Methylpentane	I6	2.4598	1.9882	2.1939
n-Hexane	P6	8.2420	6.6630	7.4094
2,2-Dimethylpentane	I7	0.0099	0.0093	0.0101
Methylcyclopentane	N6	5.3356	4.2116	4.1231
2,4-Dimethylpentane	I7	0.2925	0.2749	0.3000
2,2,3-Trimethylbutane	I7	0.0135	0.0127	0.0135
Benzene	A6	1.8626	1.3645	1.1407
3,3-Dimethylpentane	I7	0.0229	0.0215	0.0228
Cyclohexane	N6	3.2641	2.5765	2.4274
2-Methylhexane	I7	1.2470	1.1719	1.2677
2,3-Dimethylpentane	I7	0.8688	0.8165	0.8580
1,1-Dimethylcyclopentane	N7	0.3786	0.3487	0.3390
3-Methylhexane	I7	1.9689	1.8503	1.9714
1c,3-Dimethylcyclopentane	N7	0.9812	0.9036	0.8898
1t,3-Dimethylcyclopentane	N7	0.8689	0.8002	0.7839
3-Ethylpentane	I7	0.1064	0.1000	0.1048
1t,2-Dimethylcyclopentane	N7	2.0560	1.8934	1.8483
2,2,4-Trimethylpentane	I8	0.0960	0.1029	0.1086
n-Heptane	P7	5.3411	5.0195	5.3833
1c,2-Dimethylcyclopentane	N7	0.1625	0.1497	0.1422

Methylcyclohexane	N7	4.2424	3.9070	3.7224
2,2-Dimethylhexane	I8	0.4290	0.4596	0.4846
Ethylcyclopentane	N7	0.8186	0.7539	0.7216
2,5-Dimethylhexane	I8	0.1059	0.1135	0.1200
2,2,3-Trimethylpentane	I8	0.0525	0.0562	0.0576
2,4-Dimethylhexane	I8	0.2561	0.2744	0.2887
1c,2t,4-Trimethylcyclopentane	N8	0.4046	0.4258	0.4092
3,3-Dimethylhexane	I8	0.0536	0.0574	0.0593
2,3,4-Trimethylpentane	I8	0.1080	0.1157	0.1180
2,3,3-Trimethylpentane	I8	0.0166	0.0178	0.0180
Toluene	A7	3.3492	2.8943	2.4436
2,3-Dimethylhexane	I8	0.1975	0.2116	0.2181
2-Methyl-3-ethylpentane	I8	0.1766	0.1892	0.1929
1,1,2-Trimethylcyclopentane	N8	0.0084	0.0088	0.0084
2-Methylheptane	I8	1.2880	1.3799	1.4476
4-Methylheptane	I8	0.4806	0.5149	0.5271
3-Methyl-3-ethylpentane	I8	0.0789	0.0845	0.0853
3,4-Dimethylhexane	I8	0.1218	0.1305	0.1330
1c,2c,4-Trimethylcyclopentane	N8	0.0468	0.0492	0.0468
1c,3-Dimethylcyclohexane	N8	0.0283	0.0298	0.0286
3-Methylheptane	I8	0.4153	0.4449	0.4627
1c,2t,3-Trimethylcyclopentane	N8	0.9253	0.9738	0.9275
3-Ethylhexane	I8	0.2474	0.2651	0.2728
1t,4-Dimethylcyclohexane	N8	0.5484	0.5772	0.5554
1,1-Dimethylcyclohexane	N8	0.1138	0.1198	0.1126
3t-Ethylmethylcyclopentane	N8	0.2407	0.2533	0.2424
2t-Ethylmethylcyclopentane	N8	0.1818	0.1913	0.1826
1,1-Methylethylcyclopentane	N8	0.7513	0.7907	0.7431
2,2,4-Trimethylhexane	I9	0.0654	0.0787	0.0807
1t,2-Dimethylcyclohexane	N8	0.5629	0.5924	0.5604
1t,3-Dimethylcyclohexane	N8	0.0043	0.0045	0.0042
UnknownC7s	U7	0.0019	0.0018	0.0019
n-Octane	P8	2.0943	2.2438	2.3427
1c,4-Dimethylcyclohexane	N8	0.8251	0.8684	0.8141
i-Propylcyclopentane	I8	0.0443	0.0466	0.0440
2,4,4-Trimethylhexane	I9	0.0191	0.0230	0.0234
2,2,3,4-Tetramethylpentane	I9	0.0154	0.0185	0.0189
2,3,4-Trimethylhexane	I9	0.0150	0.0180	0.0183
1c,2-Dimethylcyclohexane	N8	0.1635	0.1721	0.1587
2,3,5-Trimethylhexane	I9	0.0677	0.0814	0.0827
2,2-Dimethylheptane	I9	0.0080	0.0096	0.0099
1,1,4-Trimethylcyclohexane	N9	0.9567	1.1328	1.0772
2,2,3-Trimethylhexane	I9	0.4495	0.5407	0.5440
2,4-Dimethylheptane	I9	0.0236	0.0284	0.0291
4,4-Dimethylheptane	I9	0.0881	0.1060	0.1087
Ethylcyclohexane	N8	0.4892	0.5148	0.4797
n-Propylcyclopentane	N8	0.1886	0.1985	0.1876
1c,3c,5-Trimethylcyclohexane	N9	0.0519	0.0615	0.0585
2,5-Dimethylheptane	I9	0.0937	0.1127	0.1154
3,3-Dimethylheptane	I9	0.0960	0.1155	0.1182
3,5-Dimethylheptane	I9	0.0659	0.0793	0.0812
2,6-Dimethylheptane	I9	0.0628	0.0755	0.0781
1,1,3-Trimethylcyclohexane	N9	0.0672	0.0796	0.0757
Ethylbenzene	A8	0.7241	0.7210	0.6086
1c,2t,4t-Trimethylcyclohexane	N9	0.4338	0.5136	0.4791
2,3-Dimethylheptane	I9	0.0032	0.0038	0.0038
1,3-Dimethylbenzene (m-Xylene)	A8	0.5427	0.5404	0.4588
1,4-Dimethylbenzene (p-Xylene)	A8	0.7540	0.7508	0.6395
3,4-Dimethylheptane	I9	0.3482	0.4189	0.4203
3,4-Dimethylheptane (2)	I9	0.1793	0.2157	0.2164
4-Ethylheptane	I9	0.0758	0.0912	0.0935
4-Methyloctane	I9	0.2404	0.2892	0.2945
2-Methyloctane	I9	0.2997	0.3605	0.3707
1c,2t,4c-Trimethylcyclohexane	I9	0.0964	0.1160	0.1173
3-Ethylheptane	I9	0.0646	0.0777	0.0785
3-Methyloctane	I9	0.3636	0.4374	0.4454
3,3-Diethylpentane	I9	0.0429	0.0516	0.0502

1c,2t,3-Trimethylcyclohexane	N9	0.1103	0.1306	0.1218
1,1,2-Trimethylcyclohexane	N9	0.0307	0.0364	0.0340
1,2-Dimethylbenzene (o-Xylene)	A8	0.4911	0.4890	0.4079
i-Butylcyclopentane	N9	0.2149	0.2544	0.2391
UnknownC8s	U8	0.0384	0.0411	0.0429
n-Nonane	P9	1.4032	1.6880	1.7261
1,1-Methylethylcyclohexane	N9	0.6418	0.7720	0.7918
i-Propylbenzene	A9	0.3196	0.3603	0.3062
i-Propylcyclohexane	N9	0.1018	0.1205	0.1103
2,2-Dimethyloctane	I10	0.0204	0.0272	0.0270
2,4-Dimethyloctane	I10	0.0703	0.0938	0.0931
2,6-Dimethyloctane	I10	0.0088	0.0117	0.0120
2,5-Dimethyloctane	I10	0.0319	0.0426	0.0423
n-Butylcyclopentane	N9	0.2015	0.2651	0.2436
3,3-Dimethyloctane	I10	0.1469	0.1960	0.1947
n-Propylbenzene	A9	0.3349	0.3775	0.3209
3,6-Dimethyloctane	I10	0.2449	0.3268	0.3244
3-Methyl-5-ethylheptane	I10	0.2431	0.2924	0.2957
1,3-Methylethylbenzene	A9	0.2870	0.3235	0.2727
1,4-Methylethylbenzene	A9	0.0885	0.0998	0.0841
1,3,5-Trimethylbenzene	A9	0.1385	0.1561	0.1325
2,3-Dimethyloctane	I10	0.0750	0.1001	0.0994
5-Methylnonane	I10	0.1739	0.2321	0.2325
1,2-Methylethylbenzene	A9	0.2914	0.3285	0.2755
2-Methylnonane	I10	0.0466	0.0622	0.0628
3-Ethyloctane	I10	0.0926	0.1236	0.1227
3-Methylnonane	I10	0.1856	0.2477	0.2479
1,2,4-Trimethylbenzene	A9	0.0300	0.0338	0.0283
t-Butylbenzene	A10	0.1204	0.1516	0.1285
i-Butylcyclohexane	N10	0.2329	0.3064	0.2771
1t-Methyl-2-n-propylcyclohexane	I10	0.1026	0.1234	0.1248
i-Butylbenzene	A10	0.0210	0.0264	0.0227
sec-Butylbenzene	A10	0.0446	0.0561	0.0478
UnknownC9s	U9	2.4212	2.9126	2.9784
n-Decane	P10	1.0104	1.3483	1.3555
1,2,3-Trimethylbenzene	A9	0.1651	0.1861	0.1529
1,3-Methyl-i-propylbenzene	A10	0.0982	0.1107	0.0928
1,4-Methyl-i-propylbenzene	A10	0.0822	0.0927	0.0777
Sec-Butylcyclohexane	N10	0.2332	0.3068	0.2771
1,2-Methyl-i-propylbenzene	A10	0.1375	0.1731	0.1450
3-Ethylnonane	I10	0.0515	0.0687	0.0694
1,3-Diethylbenzene	A10	0.1079	0.1358	0.1154
1,3-Methyl-n-propylbenzene	A10	0.0485	0.0611	0.0521
1,4-Diethylbenzene	A10	0.0999	0.1258	0.1072
1,4-Methyl-n-propylbenzene	A10	0.0483	0.0608	0.0520
n-Butylbenzene	A10	0.1008	0.1269	0.1082
1,3-Dimethyl-5-ethylbenzene	A10	0.0591	0.0744	0.0632
1,2-Diethylbenzene	A10	0.0981	0.1235	0.1031
1,2-Methyl-n-propylbenzene	A10	0.0731	0.0920	0.0773
1,4-Dimethyl-2-ethylbenzene	A10	0.0965	0.1215	0.1017
1,3-Dimethyl-4-ethylbenzene	A10	0.0280	0.0352	0.0295
1,2-Dimethyl-4-ethylbenzene	A10	0.1209	0.1522	0.1278
1,3-Dimethyl-2-ethylbenzene	A10	0.1126	0.1417	0.1169
1t,2c,4-Trimethylcyclopentane	A10	0.5223	0.5497	0.5397
1,2-Dimethyl-3-ethylbenzene	A10	0.0749	0.0943	0.0776
1,2-Ethyl-i-propylbenzene	A10	0.0907	0.1142	0.0957
1,4-Methyl-t-butylbenzene	A11	0.1490	0.1876	0.1572
UnknownC10s	U10	3.8998	5.2041	5.2321
n-Undecane	P11	0.6267	0.9188	0.9109
1,4-Ethyl-i-propylbenzene	A11	0.0997	0.1255	0.1051
1,2,4,5-Tetramethylbenzene	A11	0.1014	0.1276	0.1058
1,2-Methyl-n-butylbenzene	A11	0.0567	0.0714	0.0598
1,2,3,5-Tetramethylbenzene	A11	0.0857	0.1079	0.0890
1,2-Methyl-t-butylbenzene	A11	0.0623	0.0784	0.0657
5-Methylindan	A11	0.0248	0.0396	0.0388
4-Methylindan	A11	0.0089	0.0142	0.0139
1,2-Ethyl-n-propylbenzene	A11	0.0563	0.0709	0.0594

2-Methylindan	A11	0.0605	0.0967	0.0948
1,3-Methyl-n-butylbenzene	A11	0.0691	0.0870	0.0729
1,3-Di-i-propylbenzene	A11	0.0731	0.0920	0.0771
sec-Pentylbenzene	A11	0.1431	0.1801	0.1509
n-Pentylbenzene	A11	0.0191	0.0266	0.0228
1t-M-2-(4MP)cyclopentane	P12	0.0240	0.0383	0.0376
1,2-Di-n-propylbenzene	A11	0.0564	0.0710	0.0595
1,4-Di-i-propylbenzene	A11	0.0941	0.1185	0.0993
Tetrahydronaphthalene	A10	0.0236	0.0297	0.0249
t-Decahydronaphthalene	A10	0.1071	0.1348	0.1129
Naphthalene	A10	0.0832	0.1000	0.0838
1-t-Butyl-3,5-dimethylbenzene	A12	0.0681	0.0857	0.0718
1,4-Ethyl-t-butylbenzene	A11	0.0476	0.0599	0.0502
UnknownC11s	U11	2.2031	3.2298	3.2022
n-Dodecane	P12	0.4680	0.7477	0.7332
1,3-Di-n-propylbenzene	A12	0.0571	0.0719	0.0602
1,3,5-Triethylbenzene	A12	0.0959	0.1081	0.0917
1,2,4-Triethylbenzene	A12	0.2312	0.2606	0.2184
1,4-Methyl-n-pentylbenzene	A12	0.0522	0.0657	0.0550
n-Hexylbenzene	A12	0.0332	0.0505	0.0432
1,2,3,4,5-Pentamethylbenzene	A13	0.0324	0.0408	0.0342
2-Methylnaphthalene	A11	0.0569	0.0759	0.0636
1-Methylnaphthalene	A11	0.0899	0.1199	0.0863
UnknownC12s	U12	1.1615	1.8557	1.8196
n-Tridecane	P13	0.1284	0.2220	0.2151
UnknownC13s	U13	0.4975	0.8602	0.8335
n-Tetradecane	P14	0.1559	0.2901	0.2805
UnknownC14s	U14	0.5523	1.0277	0.9938
n-Pentadecane	P15	0.1080	0.2152	0.2057
UnknownC15s	U15	0.4442	0.8850	0.8459
n-Hexadecane	P16	0.0334	0.0709	0.0673
UnknownC16s	U16	0.3211	0.6820	0.6477
n-Heptadecane	P17	0.0308	0.0695	0.0658
n-Octadecane	P18	0.0166	0.0396	0.0374
UnknownC18s	U18	0.0026	0.0062	0.0059
n-Nonadecane	P19	0.0039	0.0098	0.0092
UnknownC19s	U19	0.0034	0.0086	0.0081
TOTAL		100.0000	100.0000	100.0000

EMPACT ANALYTICAL SYSTEMS INC.
365 S. MAIN ST.
BRIGHTON, CO
80601

303-637-0150

EXTENDED NATURAL GAS ANALYSIS (*DHA)

MAIN PAGE

PROJECT NO. :	201310129	ANALYSIS NO. :	15
COMPANY NAME :	CARRIZO OIL & GAS, INC.	ANALYSIS DATE:	OCTOBER 26, 2013
ACCOUNT NO. :		SAMPLE DATE :	OCTOBER 18, 2013
PRODUCER :		CYLINDER NO. :	0926
LEASE NO. :		SAMPLED BY :	GALE MCENDREE-EMPACT
NAME/DESCRIP :	FLARE GAS @ 17:10 CASTOR 3-36-11-9-59		
FIELD DATA		SAMPLE TEMP. :	60
SAMPLE PRES. :	15	AMBIENT TEMP.:	
VAPOR PRES. :		GRAVITY :	
COMMENTS :	SPOT; PROBE; LENGTH OF H2S STAIN (1-7) @ 5PPM @ 17:15		

COMPONENT	MOLE %	MASS %	GPM @ 14.650	GPM @ 14.730
ALCOHOLS	0.0013	0.0032		
HELIUM	0.02	0.00	---	---
OXYGEN/ARGON	0.01	0.01	---	---
NITROGEN	1.00	1.17	---	---
CARBON DIOXIDE	2.52	4.64	---	---
METHANE	69.67510	46.72500	---	---
ETHANE	11.8465	14.8907	3.1639	3.1811
PROPANE	9.1847	16.9304	2.5271	2.5409
I-BUTANE	0.8786	2.1347	0.2874	0.2889
N-BUTANE	2.9355	7.1323	0.9241	0.9292
I-PENTANE	0.5713	1.7181	0.2042	0.2053
N-PENTANE	0.6790	2.0479	0.2453	0.2466
HEXANES PLUS	0.6780	2.5977	0.2682	0.2694
TOTALS	100.00000	100.00000	7.6202	7.6614

BTEX COMPONENTS	**MOLE%**	**WT%**
BENZENE	0.0257	0.0839
TOLUENE	0.0158	0.0609
ETHYLBENZENE	0.0018	0.0080
XYLENES	0.0044	0.0196
TOTAL BTEX	0.0477	0.1724

	BTU @	14.650	14.730
LOW	NET DRY REAL :	1230.8 **/scf**	1237.5 **/scf**
	NET WET REAL :	1209.3 **/scf**	1216.0 **/scf**
HIGH	GROSS DRY REAL :	1353.1 **/scf**	1360.4 **/scf**
	GROSS WET REAL :	1329.4 **/scf**	1336.8 **/scf**
	NET DRY REAL :	19546.1 **/lb**	19652.9 **/lb**
	GROSS DRY REAL :	21486.4 **/lb**	21603.7 **/lb**
	RELATIVE DENSITY (AIR=1):		0.8250
	COMPRESSIBILITY FACTOR :		0.99565

(CALC: GPA STD 2145 & TP-17 @14.696 & 60 F)

**(DETAILED HYDROCARBON ANALYSIS/NJ 1993) ; ASTM D6730*

EMPACT ANALYTICAL SYSTEMS INC.
365 S. MAIN ST.
BRIGHTON, CO
80601

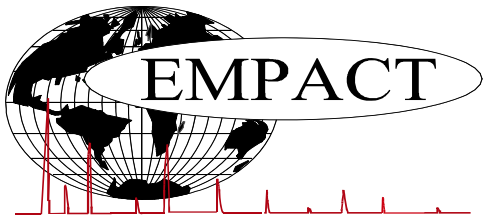
303-637-0150

EXTENDED NATURAL GAS ANALYSIS (*DHA)

GLYCALC INFORMATION

PROJECT NO. :	201310129	ANALYSIS NO. :	15
COMPANY NAME :	CARRIZO OIL & GAS, INC.	ANALYSIS DATE:	OCTOBER 26, 2013
ACCOUNT NO. :		SAMPLE DATE :	OCTOBER 18, 2013
PRODUCER :		CYLINDER NO. :	0926
LEASE NO. :		SAMPLED BY :	GALE MCENDREE-EMPACT
NAME/DESCRIP :	FLARE GAS @ 17:10 CASTOR 3-36-11-9-59		
FIELD DATA		SAMPLE TEMP. :	60
SAMPLE PRES. :	15	AMBIENT TEMP.:	
VAPOR PRES. :		GRAVITY :	
COMMENTS :	SPOT; PROBE; LENGTH OF H2S STAIN (1-7) @ 5PPM @ 17:15		

Componet	Mole %	Wt %
Helium	0.02	0.00
Carbon Dioxide	2.52	4.64
Nitrogen	1.00	1.17
Methane	69.67510	46.72500
Ethane	11.8465	14.8907
Propane	9.1847	16.9304
Isobutane	0.8786	2.1347
n-Butane	2.9355	7.1323
Isopentane	0.5129	1.5469
n-Pentane	0.6790	2.0479
Cyclopentane	0.0584	0.1712
n-Hexane	0.1410	0.5079
Cyclohexane	0.0365	0.1284
Other Hexanes	0.2440	0.8724
Heptanes	0.1192	0.4959
Methycyclohexane	0.0267	0.1096
2,2,4 Trimethylpentane	0.0000	0.0000
Benzene	0.0257	0.0839
Toluene	0.0158	0.0609
Ethylbenzene	0.0018	0.0080
Xylenes	0.0044	0.0196
C8+ Heavies	0.0629	0.3111
Subtotal	99.98870	99.98680
Oxygen/Argon	0.01	0.01
Alcohols	0.0013	0.0032
Total	100.00000	100.00000



EXTENDED NATURAL GAS ANALYSIS (*DHA)

DHA COMPONENT LIST

PROJECT NO. :	201310129	ANALYSIS NO. :	15
COMPANY NAME :	CARRIZO OIL & GAS, INC	ANALYSIS DATE:	OCTOBER 26, 2013
ACCOUNT NO. :		SAMPLE DATE :	OCTOBER 18, 2013
PRODUCER :		CYLINDER NO. :	0926
LEASE NO. :		SAMPLED BY :	GALE MCENDREE-EMPACT
NAME/DESCRIP :	FLARE GAS @ 17:10 CASTOR 3-36-11-9-59		
FIELD DATA		SAMPLE TEMP. :	60
SAMPLE PRES. :	15	AMBIENT TEMP.:	
VAPOR PRES. :		GRAVITY :	
COMMENTS :	SPOT; PROBE; LENGTH OF H2S STAIN (1-7) @ 5PPM @ 17:15		

COMPONENT	PIANO #	MOLE %	MASS %	GPM @ 14.650	GPM @ 14.730
Helium	---	0.02	0.00	---	---
Oxygen/Argon	---	0.01	0.01	---	---
Nitrogen	---	1.00	1.17	---	---
Carbon Dioxide	---	2.52	4.64	---	---
Methane	P1	69.67510	46.72500	---	---
Ethane	P2	11.8465	14.8907	3.164	3.181
Propane	P3	9.1847	16.9304	2.527	2.541
i-Butane	I4	0.8786	2.1347	0.287	0.289
n-Butane	P4	2.9355	7.1323	0.924	0.929
2,2-Dimethylpropane	I5	0.0024	0.0072	0.001	0.001
Ethanol	X2	0.0001	0.0002	0.000	0.000
i-Pentane	I5	0.5105	1.5397	0.186	0.187
Acetone	X3	0.0008	0.0019	0.000	0.000
i-Propanol	X3	0.0002	0.0005	0.000	0.000
n-Pentane	P5	0.6790	2.0479	0.245	0.247
t-Butanol	X4	0.0002	0.0006	0.000	0.000
2,2-Dimethylbutane	I6	0.0014	0.0051	0.001	0.001
Cyclopentane	N5	0.0584	0.1712	0.017	0.017
2,3-Dimethylbutane	I6	0.0076	0.0274	0.003	0.003
2-Methylpentane	I6	0.1023	0.3685	0.042	0.042
3-Methylpentane	I6	0.0527	0.1899	0.021	0.021
n-Hexane	P6	0.1410	0.5079	0.058	0.058
2,2-Dimethylpentane	I7	0.0005	0.0021	0.000	0.000
Methylcyclopentane	N6	0.0800	0.2815	0.028	0.028
2,4-Dimethylpentane	I7	0.0032	0.0134	0.001	0.001
2,2,3-Trimethylbutane	I7	0.0001	0.0004	0.000	0.000
Benzene	A6	0.0257	0.0839	0.007	0.007
3,3-Dimethylpentane	I7	0.0003	0.0013	0.000	0.000
Cyclohexane	N6	0.0365	0.1284	0.012	0.012
2-Methylhexane	I7	0.0144	0.0603	0.007	0.007
2,3-Dimethylpentane	I7	0.0067	0.0281	0.003	0.003
1,1-Dimethylcyclopentane	N7	0.0028	0.0115	0.001	0.001
3-Methylhexane	I7	0.0167	0.0699	0.008	0.008
1c,3-Dimethylcyclopentane	N7	0.0085	0.0349	0.004	0.004
1t,3-Dimethylcyclopentane	N7	0.0077	0.0316	0.004	0.004
3-Ethylpentane	I7	0.0014	0.0059	0.001	0.001
1t,2-Dimethylcyclopentane	N7	0.0160	0.0657	0.007	0.007
n-Heptane	P7	0.0347	0.1453	0.016	0.016
1c,2-Dimethylcyclopentane	N7	0.0013	0.0054	0.001	0.001
Methylcyclohexane	N7	0.0267	0.1096	0.011	0.011
2,2-Dimethylhexane	I8	0.0016	0.0077	0.001	0.001
Ethylcyclopentane	N7	0.0049	0.0201	0.002	0.002
2,5-Dimethylhexane	I8	0.0007	0.0033	0.000	0.000
2,4-Dimethylhexane	I8	0.0013	0.0062	0.001	0.001
1c,2t,4-Trimethylcyclopentane	N8	0.0023	0.0108	0.001	0.001
3,3-Dimethylhexane	I8	0.0001	0.0005	0.000	0.000
1t,2c,4-Trimethylcyclopentane	N8	0.0026	0.0122	0.001	0.001
2,3,4-Trimethylpentane	I8	0.0005	0.0024	0.000	0.000

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

Toluene	A7	0.0158	0.0609	0.005	0.005
2,3-Dimethylhexane	I8	0.0006	0.0029	0.000	0.000
2-Methyl-3-ethylpentane	I8	0.0009	0.0043	0.000	0.000
2-Methylheptane	I8	0.0056	0.0268	0.003	0.003
4-Methylheptane	I8	0.0016	0.0077	0.001	0.001
3-Methyl-3-ethylpentane	I8	0.0002	0.0010	0.000	0.000
3,4-Dimethylhexane	I8	0.0002	0.0010	0.000	0.000
1c,2c,4-Trimethylcyclopentane	N8	0.0001	0.0005	0.000	0.000
1c,3-Dimethylcyclohexane	N8	0.0001	0.0005	0.000	0.000
3-Methylheptane	I8	0.0027	0.0129	0.001	0.001
1c,2t,3-Trimethylcyclopentane	N8	0.0035	0.0164	0.002	0.002
3-Ethylhexane	I8	0.0004	0.0019	0.000	0.000
1t,4-Dimethylcyclohexane	N8	0.0012	0.0056	0.001	0.001
1,1-Dimethylcyclohexane	N8	0.0005	0.0023	0.000	0.000
3t-Ethylmethylcyclopentane	N8	0.0009	0.0042	0.000	0.000
2t-Ethylmethylcyclopentane	N8	0.0008	0.0038	0.000	0.000
1,1-Methylethylcyclopentane	N8	0.0025	0.0118	0.001	0.001
2,2,4-Trimethylhexane	I9	0.0001	0.0005	0.000	0.000
1t,2-Dimethylcyclohexane	N8	0.0018	0.0084	0.001	0.001
1t,3-Dimethylcyclohexane	N8	0.0001	0.0005	0.000	0.000
n-Octane	P8	0.0081	0.0387	0.004	0.004
1c,4-Dimethylcyclohexane	N8	0.0007	0.0033	0.000	0.000
i-Propylcyclopentane	I8	0.0002	0.0009	0.000	0.000
2,4,4-Trimethylhexane	I9	0.0001	0.0005	0.000	0.000
2,3,5-Trimethylhexane	I9	0.0003	0.0016	0.000	0.000
2,2,3,4-Tetramethylpentane	I9	0.0001	0.0005	0.000	0.000
1c,2-Dimethylcyclohexane	N8	0.0004	0.0019	0.000	0.000
1,1,4-Trimethylcyclohexane	N9	0.0022	0.0116	0.001	0.001
2,2,3-Trimethylhexane	I9	0.0009	0.0048	0.000	0.000
2,4-Dimethylheptane	I9	0.0004	0.0021	0.000	0.000
4,4-Dimethylheptane	I9	0.0001	0.0005	0.000	0.000
Ethylcyclohexane	N8	0.0013	0.0061	0.001	0.001
n-Propylcyclopentane	N8	0.0005	0.0023	0.000	0.000
1c,3c,5-Trimethylcyclohexane	N9	0.0001	0.0005	0.000	0.000
2,5-Dimethylheptane	I9	0.0002	0.0011	0.000	0.000
3,3-Dimethylheptane	I9	0.0002	0.0011	0.000	0.000
3,5-Dimethylheptane	I9	0.0001	0.0005	0.000	0.000
2,6-Dimethylheptane	I9	0.0001	0.0005	0.000	0.000
1,1,3-Trimethylcyclohexane	N9	0.0005	0.0026	0.000	0.000
Ethylbenzene	I8	0.0018	0.0080	0.001	0.001
1c,2t,4t-Trimethylcyclohexane	N9	0.0001	0.0005	0.000	0.000
2,3-Dimethylheptane	I9	0.0001	0.0005	0.000	0.000
1,3-Dimethylbenzene (m-Xylene)	A8	0.0029	0.0129	0.001	0.001
1,4-Dimethylbenzene (p-Xylene)	A8	0.0004	0.0018	0.000	0.000
3,4-Dimethylheptane	I9	0.0001	0.0005	0.000	0.000
3,4-Dimethylheptane (2)	I9	0.0003	0.0016	0.000	0.000
4-Ethylheptane	I9	0.0001	0.0005	0.000	0.000
4-Methyloctane	I9	0.0005	0.0027	0.000	0.000
2-Methyloctane	I9	0.0006	0.0032	0.000	0.000
3-Ethylheptane	I9	0.0002	0.0011	0.000	0.000
3-Methyloctane	I9	0.0007	0.0038	0.000	0.000
3,3-Diethylpentane	I9	0.0001	0.0005	0.000	0.000
1,2-Dimethylbenzene (o-Xylene)	A8	0.0011	0.0049	0.000	0.000
i-Butylcyclopentane	N9	0.0005	0.0026	0.000	0.000
UnknownC8s	U8	0.0001	0.0005	0.000	0.000
n-Nonane	P9	0.0020	0.0107	0.001	0.001
1,1-Methylethylcyclohexane	N9	0.0003	0.0016	0.000	0.000
i-Propylbenzene	A9	0.0003	0.0015	0.000	0.000
i-Propylcyclohexane	N9	0.0001	0.0005	0.000	0.000
2,4-Dimethyloctane	I10	0.0001	0.0006	0.000	0.000
n-Butylcyclopentane	N9	0.0004	0.0021	0.000	0.000
3,3-Dimethyloctane	I10	0.0002	0.0012	0.000	0.000
n-Propylbenzene	A9	0.0004	0.0020	0.000	0.000
3,6-Dimethyloctane	I10	0.0002	0.0012	0.000	0.000
3-Methyl-5-ethylheptane	I10	0.0004	0.0024	0.000	0.000
1,3-Methylethylbenzene	A9	0.0003	0.0015	0.000	0.000
1,4-Methylethylbenzene	A9	0.0001	0.0005	0.000	0.000
1,3,5-Trimethylbenzene	A9	0.0002	0.0010	0.000	0.000
5-Methylnonane	I10	0.0002	0.0012	0.000	0.000
1,2-Methylethylbenzene	A9	0.0001	0.0005	0.000	0.000
2-Methylnonane	I10	0.0002	0.0012	0.000	0.000
3-Methylnonane	I10	0.0001	0.0006	0.000	0.000
t-Butylbenzene	A10	0.0003	0.0017	0.000	0.000

i-Butylcyclohexane	N10	0.0001	0.0006	0.000	0.000
UnknownC9s	U9	0.0019	0.0102	0.001	0.001
n-Decane	P10	0.0004	0.0024	0.000	0.000
1,2,3-Trimethylbenzene	A9	0.0001	0.0005	0.000	0.000
Sec-Butylcyclohexane	A10	0.0001	0.0006	0.000	0.000
1,2-Methyl-i-propylbenzene	A10	0.0001	0.0005	0.000	0.000
1,4-Diethylbenzene	A10	0.0001	0.0005	0.000	0.000
UnknownC10s	U10	0.0012	0.0072	0.001	0.001
n-Undecane	P11	0.0001	0.0007	0.000	0.000
UnknownC11s	U11	0.0001	0.0007	0.000	0.000
TOTAL		100.00000	100.00000	7.6202	7.6614

BTEX COMPONENTS	**MOLE%**	**WT%**
BENZENE	0.0257	0.0839
TOLUENE	0.0158	0.0609
ETHYLBENZENE	0.0018	0.0080
XYLENES	0.0044	0.0196
TOTAL BTEX	0.0477	0.1724

	BTU @	14.650		14.730	
LOW	NET DRY REAL :	1230.8	**/scf**	1237.5	**/scf**
	NET WET REAL :	1209.3	**/scf**	1216.0	**/scf**
HIGH	GROSS DRY REAL :	1353.1	**/scf**	1360.4	**/scf**
	GROSS WET REAL :	1329.4	**/scf**	1336.8	**/scf**
	NET DRY REAL :	19546.1	**/lb**	19652.9	**/lb**
	GROSS DRY REAL :	21486.4	**/lb**	21603.7	**/lb**
	RELATIVE DENSITY (AIR=1):			0.8250	
	COMPRESSIBILITY FACTOR :			0.99565	

(CALC: GPA STD 2145 & TP-17 @14.696 & 60 F)

**(DETAILED HYDROCARBON ANALYSIS/NJ 1993) ; ASTM D6730*

THIS DATA HAS BEEN ACQUIRED THROUGH APPLICATION OF CURRENT STATE-OF-THE-ART ANALYTICAL TECHNIQUES. THE USE OF THIS INFORMATION IS THE RESPONSIBLITY OF THE USER. EMPACT ANALYTICAL SYSTEMS, ASSUMES NO RESPONSIBLITY FOR ACCURACY OF THE REPORTED INFORMATION NOR ANY CONSEQUENCES OF IT'S APPLICATION.

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