CRUDE OIL ASSAY

PROJECT NO. :	201403015	ANALYSIS NO. :	13
COMPANY NAME :	CARRIZO OIL & GAS	ANALYSIS DATE:	MARCH 7, 2014
ACCOUNT NO. :		SAMPLE DATE :	MARCH 4, 2014
PRODUCER :		CYLINDER NO. :	1L GLASS JAR
LEASE NO. :		SAMPLED BY :	GALE MCENDREE
NAME/DESCRIP :	TANK BATTERY @ 17:00 SPEAKER 1-27-8-61		EMPACT
FIELD DATA		SAMPLE TEMP. :	55
SAMPLE PRES. :		AMBIENT TEMP.:	
VAPOR PRES. :		GRAVITY :	
COMMENTS :	SPOT; TK# 271103		

SPECIFICATION		TEST METHOD	UNITS	RESULTS
API GRAVITY			API 60/60	37.3
RVP @100 DEG F		D323	PSIG	7.2
TOTAL SULFUR		D2622	WT %	N/A
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				RED/BROWN
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.
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80601

303-637-0150

EXTENDED NATURAL GAS LIQUID ANALYSIS (*DHA)

MAIN PAGE

PROJECT NO. :	201403015	ANALYSIS NO. :	14
COMPANY NAME :	CARRIZO OIL & GAS	ANALYSIS DATE:	MARCH 6, 2014
ACCOUNT NO. :		SAMPLE DATE :	MARCH 4, 2014
PRODUCER :		CYLINDER NO. :	11116
LEASE NO. :		SAMPLED BY :	GALE MCENDREE
NAME/DESCRIP :	SEPARATOR @ 16:35 SPEAKER 1-27-8-61		EMPACT
FIELD DATA		SAMPLE TEMP. :	116
SAMPLE PRES. :	19	AMBIENT TEMP.:	
VAPOR PRES. :		GRAVITY :	
COMMENTS :	SPOT; NO PROBE		

COMPONENT	MOLE %	MASS %	VOL %
NITROGEN (AIR)	0.0086	0.0023	0.0021
CARBON DIOXIDE	0.0295	0.0121	0.0110
METHANE	0.1249	0.0187	0.0463
ETHANE	0.3905	0.1098	0.2289
PROPANE	1.5813	0.6524	0.9555
I-BUTANE	0.6444	0.3504	0.4622
N-BUTANE	2.7486	1.4945	1.9003
I-PENTANE	1.0673	0.7204	0.8564
N-PENTANE	1.7191	1.1603	1.3651
HEXANES PLUS	91.6858	95.4791	94.1722
TOTALS	100.0000	100.0000	100.0000

BTEX COMPONENTS	**MOLE%**	**MASS%**
BENZENE	1.4262	1.0422
TOLUENE	3.0690	2.6454
ETHYLBENZENE	0.5670	0.5632
XYLENE	2.0743	2.0602
TOTAL BTEX	7.1365	6.3110

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

	TOTAL SAMPLE	**C6+ FRACTION**	
Specific Gravity (H2O=1) =	0.7428	0.7527	60/60
API Gravity =	59	56.49	60/60
Molecular Weight =	106.89	111.879	
Absolute Density =	6.19	6.28	LBS/GAL
Heating Value Liq. Idl Gas=	125866	127594	BTU/GAL
Vapor/Liquid =	22.06	21.42	CUFT/GAL
Vapor Pressure =	16.35	1.75	PSIA @100 F

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

EMPACT ANALYTICAL SYSTEMS INC.
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EXTENDED NATURAL GAS LIQUID ANALYSIS (*DHA)

E & P TANK / GLYCALC INFORMATION

PROJECT NO. :	201403015	ANALYSIS NO. :	14
COMPANY NAME :	CARRIZO OIL & GAS	ANALYSIS DATE:	MARCH 6, 2014
ACCOUNT NO. :		SAMPLE DATE :	MARCH 4, 2014
PRODUCER :		CYLINDER NO. :	11116
LEASE NO. :		SAMPLED BY :	GALE MCENDREE
NAME/DESCRIP :	SEPARATOR @ 16:35		EMPACT
	SPEAKER 1-27-8-61		
FIELD DATA		SAMPLE TEMP. :	116
SAMPLE PRES. :	19	AMBIENT TEMP.:	
VAPOR PRES. :		GRAVITY :	
COMMENTS :	SPOT; NO PROBE		

COMPONENT	Mole %		Wt %		LV %	
CARBON DIOXIDE	0.0295		0.0121		0.0110	
NITROGEN (AIR)	0.0086		0.0023		0.0021	
METHANE	0.1249		0.0187		0.0463	
ETHANE	0.3905		0.1098		0.2289	
PROPANE	1.5813		0.6524		0.9555	
I-BUTANE	0.6444		0.3504		0.4622	
N-BUTANE	2.7486		1.4945		1.9003	
I-PENTANE	1.0673		0.7204		0.8564	
N-PENTANE	1.7191		1.1603		1.3651	
CYCLOPENTANE (N-C5)	1.2392		0.8130		0.7941	
N-HEXANE	6.5979		5.3199		5.9511	
CYCLOHEXANE (OTHER C6)	2.9197		2.2988		2.1788	
OTHER HEXANES	10.1324		8.0854		8.5918	
OTHER HEPTANES	14.0768		13.1049		13.6873	
METHYLCYCLOHEXANE (OTHER C7)	4.3761		4.0198		3.8530	
2,2,4 TRIMETHYLPENTANE	0.7899		0.7256		0.7151	
BENZENE	1.4262		1.0422		0.8765	
TOLUENE	3.0690		2.6454		2.2469	
ETHYLBENZENE	0.5670		0.5632		0.4783	
XYLENES	2.0743		2.0602		1.7512	
OTHER OCTANES	12.3098		13.1616		13.2354	
OCTANES PLUS	----	47.8485	----	58.1497	----	55.9927
NONANES	12.4189		14.7323		14.4684	
DECANES PLUS	19.6886		26.9068		25.3443	
SUB TOTAL	100.0000		100.0000		100.0000	
TOTAL	100.0000		100.0000		100.0000	

API Gravity	=	**59.00**	60/60
Vapor Pressure	=	**16.35**	PSIA & 100 F
Average Molecular Weight of Decanes plus	=	**146.08**	
Average Specific Gravity of Decanes plus	=	**0.7880**	

EMPACT ANALYTICAL SYSTEMS INC.
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303-637-0150

EXTENDED NATURAL GAS LIQUID ANALYSIS (*DHA)

BY CARBON NUMBER

PROJECT NO. :	201403015	ANALYSIS NO. :	14
COMPANY NAME :	CARRIZO OIL & GAS	ANALYSIS DATE:	MARCH 6, 2014
ACCOUNT NO. :		SAMPLE DATE :	MARCH 4, 2014
PRODUCER :		CYLINDER NO. :	11116
LEASE NO. :		SAMPLED BY :	GALE MCENDREE
NAME/DESCRIP :	SEPARATOR @ 16:35		EMPACT
	SPEAKER 1-27-8-61		
FIELD DATA		SAMPLE TEMP. :	116
SAMPLE PRES. :	19	AMBIENT TEMP.:	
VAPOR PRES. :		GRAVITY :	
COMMENTS :	SPOT; NO PROBE		

COMPONENT / CARBON NUMBER		MOLE%	MASS %	VOLUME %
NITROGEN		0.0086	0.0023	0.0021
CARBON DIOXIDE		0.0295	0.0121	0.0110
	C1	0.1249	0.0187	0.0463
	C2	0.3905	0.1098	0.2289
	C3	1.5813	0.6524	0.9555
	C4	3.3930	1.8449	2.3625
	C5	4.0256	2.6937	3.0156
	C6	21.0762	16.7463	17.5982
	C7	21.5219	19.7701	19.7872
	C8	15.7410	16.5106	16.1800
	C9	12.4189	14.7323	14.4684
	C10	10.8273	13.8947	13.1954
	C11	5.2184	7.0986	6.5065
	C12	1.6693	2.3850	2.2320
	C13	1.0537	1.7688	1.7071
	C14	0.5668	1.0519	1.0233
	C15	0.3072	0.6105	0.5870
	C16	0.0459	0.0973	0.0930
	C17	0.0000	0.0000	0.0000
	C18	0.0000	0.0000	0.0000
	C19	0.0000	0.0000	0.0000
	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.
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303-637-0150

EXTENDED NATURAL GAS LIQUID ANALYSIS (*DHA)

DHA COMPONENT LIST

PROJECT NO. :	201403015	ANALYSIS NO. :	14
COMPANY NAME :	CARRIZO OIL & GAS	ANALYSIS DATE:	MARCH 6, 2014
ACCOUNT NO. :		SAMPLE DATE :	MARCH 4, 2014
PRODUCER :		CYLINDER NO. :	11116
LEASE NO. :		SAMPLED BY :	GALE MCENDREE
NAME/DESCRIP :	SEPARATOR @ 16:35 SPEAKER 1-27-8-61		EMPACT
FIELD DATA		SAMPLE TEMP. :	116
SAMPLE PRES. :	19	AMBIENT TEMP.:	
VAPOR PRES. :		GRAVITY :	
COMMENTS :	SPOT; NO PROBE		

COMPONENT	PIANO #	MOLE %	MASS %	VOL %
Nitrogen	NHC	0.0086	0.0023	0.0021
Carbon Dioxide	NHC	0.0295	0.0121	0.0110
Methane	P1	0.1249	0.0187	0.0463
Ethane	P2	0.3905	0.1098	0.2289
Propane	P3	1.5813	0.6524	0.9555
i-Butane	I4	0.6444	0.3504	0.4622
n-Butane	P4	2.7486	1.4945	1.9003
i-Pentane	I5	1.0673	0.7204	0.8564
n-Pentane	P5	1.7191	1.1603	1.3651
2,2-Dimethylbutane	I6	0.0376	0.0303	0.0344
Cyclopentane	N5	1.2392	0.8130	0.7941
2,3-Dimethylbutane	I6	0.3585	0.2890	0.3217
2-Methylpentane	I6	3.3556	2.7054	3.0541
3-Methylpentane	I6	1.9560	1.5770	1.7506
n-Hexane	P6	6.5979	5.3199	5.9511
2,2-Dimethylpentane	I7	0.0180	0.0169	0.0184
Methylcyclopentane	N6	4.4247	3.4837	3.4310
2,4-Dimethylpentane	I7	0.3246	0.3043	0.3341
2,2,3-Trimethylbutane	I7	0.0368	0.0345	0.0368
Benzene	A6	1.4262	1.0422	0.8765
3,3-Dimethylpentane	I7	0.0300	0.0281	0.0300
Cyclohexane	N6	2.9197	2.2988	2.1788
2-Methylhexane	I7	1.0858	1.0178	1.1076
2,3-Dimethylpentane	I7	0.8293	0.7774	0.8219
1,1-Dimethylcyclopentane	N7	0.4793	0.4403	0.4306
3-Methylhexane	I7	1.7702	1.6594	1.7786
1c,3-Dimethylcyclopentane	N7	0.9023	0.8288	0.8211
1t,3-Dimethylcyclopentane	N7	0.7899	0.7256	0.7151
3-Ethylpentane	I7	0.1638	0.1535	0.1619
1t,2-Dimethylcyclopentane	N7	1.9085	1.7531	1.7217
2,2,4-Trimethylpentane	I8	0.0906	0.0968	0.1028
n-Heptane	P7	5.0033	4.6900	5.0602
1c,2-Dimethylcyclopentane	N7	0.1387	0.1274	0.1218
Methylcyclohexane	N7	4.3761	4.0198	3.8530
2,2-Dimethylhexane	I8	0.6389	0.6828	0.7242

Ethylcyclopentane	N7	0.5963	0.5478	0.5275
2,5-Dimethylhexane	I8	0.1536	0.1641	0.1745
2,2,3-Trimethylpentane	I8	0.0392	0.0419	0.0432
2,4-Dimethylhexane	I8	0.2876	0.3073	0.3252
1c,2t,4-Trimethylcyclopentane	N8	0.3870	0.4062	0.3927
3,3-Dimethylhexane	I8	0.0943	0.1008	0.1048
2,3,4-Trimethylpentane	I8	0.1252	0.1338	0.1372
2,3,3-Trimethylpentane	I8	0.0033	0.0035	0.0036
Toluene	A7	3.0690	2.6454	2.2469
2,3-Dimethylhexane	I8	0.1929	0.2061	0.2137
2-Methyl-3-ethylpentane	I8	0.1956	0.2090	0.2144
1,1,2-Trimethylcyclopentane	N8	0.0089	0.0093	0.0089
2-Methylheptane	I8	1.2341	1.3188	1.3919
4-Methylheptane	I8	0.5019	0.5363	0.5524
3-Methyl-3-ethylpentane	I8	0.1489	0.1591	0.1615
3,4-Dimethylhexane	I8	0.1426	0.1524	0.1563
1c,2c,4-Trimethylcyclopentane	N8	0.0433	0.0455	0.0435
1c,3-Dimethylcyclohexane	N8	0.0382	0.0401	0.0387
3-Methylheptane	I8	0.5038	0.5384	0.5633
1c,2t,3-Trimethylcyclopentane	N8	0.9609	1.0087	0.9665
3-Ethylhexane	I8	0.2515	0.2688	0.2783
1t,4-Dimethylcyclohexane	N8	0.6344	0.6660	0.6447
1,1-Dimethylcyclohexane	N8	0.1370	0.1438	0.1360
3c-Ethylmethylcyclopentane	N8	0.0059	0.0062	0.0060
2t-Ethylmethylcyclopentane	N8	0.1602	0.1682	0.1615
1,1-Methylethylcyclopentane	N8	0.6763	0.7099	0.6712
2,2,4-Trimethylhexane	I9	0.0823	0.0988	0.1019
1t,2-Dimethylcyclohexane	N8	0.6500	0.6823	0.6494
1t,3-Dimethylcyclohexane	N8	0.0053	0.0056	0.0053
n-Octane	P8	2.3143	2.4731	2.5977
1c,4-Dimethylcyclohexane	N8	1.0313	1.0826	1.0211
i-Propylcyclopentane	I8	0.0890	0.0934	0.0888
2,4,4-Trimethylhexane	I9	0.0170	0.0204	0.0209
2,2,3,4-Tetramethylpentane	I9	0.0182	0.0218	0.0224
2,3,4-Trimethylhexane	I9	0.0216	0.0259	0.0265
1c,2-Dimethylcyclohexane	N8	0.2349	0.2466	0.2287
2,3,5-Trimethylhexane	I9	0.0714	0.0857	0.0876
2,2-Dimethylheptane	I9	0.0217	0.0260	0.0270
1,1,4-Trimethylcyclohexane	N9	0.9774	1.1543	1.1042
2,2,3-Trimethylhexane	I9	0.5280	0.6335	0.6413
2,4-Dimethylheptane	I9	0.0483	0.0580	0.0598
4,4-Dimethylheptane	I9	0.0939	0.1127	0.1163
Ethylcyclohexane	N8	0.6210	0.6519	0.6111
n-Propylcyclopentane	N8	0.2202	0.2312	0.2198
1c,3c,5-Trimethylcyclohexane	N9	0.0647	0.0764	0.0731
2,5-Dimethylheptane	I9	0.0925	0.1110	0.1143
3,3-Dimethylheptane	I9	0.0996	0.1195	0.1231
3,5-Dimethylheptane	I9	0.0681	0.0817	0.0841
2,6-Dimethylheptane	I9	0.0604	0.0725	0.0755
1,1,3-Trimethylcyclohexane	N9	0.0935	0.1104	0.1056
Ethylbenzene	A8	0.5670	0.5632	0.4783
1c,2t,4t-Trimethylcyclohexane	N9	0.3979	0.4699	0.4409
2,3-Dimethylheptane	I9	0.0091	0.0109	0.0111
1,3-Dimethylbenzene (m-Xylene)	A8	0.4539	0.4508	0.3851
1,4-Dimethylbenzene (p-Xylene)	A8	0.8802	0.8742	0.7491
3,4-Dimethylheptane	I9	0.1931	0.2317	0.2339
3,4-Dimethylheptane (2)	I9	0.1809	0.2171	0.2192
4-Ethylheptane	I9	0.0329	0.0395	0.0408
4-Methyloctane	I9	0.2615	0.3138	0.3215
2-Methyloctane	I9	0.3798	0.4557	0.4715
1c,2t,4c-Trimethylcyclohexane	I9	0.0824	0.0989	0.1006
3-Ethylheptane	I9	0.1044	0.1253	0.1273
3-Methyloctane	I9	0.4440	0.5327	0.5457
3,3-Diethylpentane	I9	0.0706	0.0847	0.0829
1c,2t,3-Trimethylcyclohexane	N9	0.1030	0.1216	0.1141
1,1,2-Trimethylcyclohexane	N9	0.0397	0.0469	0.0440
1,2-Dimethylbenzene (o-Xylene)	A8	0.7402	0.7352	0.6170

i-Butylcyclopentane	N9	0.2796	0.3302	0.3122
UnknownC8s	U8	0.2776	0.2967	0.3116
n-Nonane	P9	1.7642	2.1168	2.1776
1,1-Methylethylcyclohexane	N9	0.5638	0.6765	0.6980
i-Propylbenzene	A9	0.3741	0.4206	0.3597
i-Propylcyclohexane	N9	0.1244	0.1469	0.1353
2,2-Dimethyloctane	I10	0.0761	0.1013	0.1012
2,4-Dimethyloctane	I10	0.0870	0.1158	0.1156
2,6-Dimethyloctane	I10	0.0117	0.0156	0.0161
2,5-Dimethyloctane	I10	0.0373	0.0496	0.0495
n-Butylcyclopentane	N9	0.2638	0.3462	0.3200
3,3-Dimethyloctane	I10	0.1433	0.1908	0.1906
n-Propylbenzene	A9	0.3442	0.3870	0.3310
3,6-Dimethyloctane	I10	0.2214	0.2947	0.2943
3-Methyl-5-ethylheptane	I10	0.3465	0.4158	0.4230
1,3-Methylethylbenzene	A9	0.2707	0.3044	0.2582
1,4-Methylethylbenzene	A9	0.1244	0.1399	0.1186
1,3,5-Trimethylbenzene	A9	0.1228	0.1381	0.1179
2,3-Dimethyloctane	I10	0.0646	0.0860	0.0859
5-Methylnonane	I10	0.2962	0.3943	0.3974
1,2-Methylethylbenzene	A9	0.6999	0.7870	0.6639
3-Ethyloctane	I10	0.1047	0.1394	0.1392
3-Methylnonane	I10	0.3082	0.4102	0.4130
1,2,4-Trimethylbenzene	A9	0.0125	0.0141	0.0119
t-Butylbenzene	A10	0.5534	0.6949	0.5927
i-Butylcyclohexane	N10	0.4253	0.5581	0.5078
1t-Methyl-2-n-propylcyclohexane	I10	0.1272	0.1526	0.1553
i-Butylbenzene	A10	0.0804	0.1010	0.0875
sec-Butylbenzene	A10	0.1172	0.1472	0.1262
UnknownC9s	U9	2.6535	3.1839	3.2754
n-Decane	P10	1.4897	1.9829	2.0056
1,2,3-Trimethylbenzene	A9	0.1631	0.1834	0.1516
1,3-Methyl-i-propylbenzene	A10	0.0916	0.1030	0.0869
1,4-Methyl-i-propylbenzene	A10	0.1062	0.1194	0.1007
Sec-Butylcyclohexane	N10	0.4177	0.5481	0.4981
1,2-Methyl-i-propylbenzene	A10	0.2731	0.3429	0.2890
1,3-Diethylbenzene	A10	0.1699	0.2133	0.1824
1,3-Methyl-n-propylbenzene	A10	0.0797	0.1001	0.0859
1,4-Diethylbenzene	A10	0.3298	0.4141	0.3550
n-Butylbenzene	A10	0.1815	0.2279	0.1954
1,3-Dimethyl-5-ethylbenzene	A10	0.0799	0.1003	0.0857
1,2-Diethylbenzene	A10	0.1427	0.1792	0.1506
1,2-Methyl-n-propylbenzene	A10	0.1056	0.1326	0.1121
1,4-Dimethyl-2-ethylbenzene	A10	0.1799	0.2259	0.1903
1,2-Dimethyl-4-ethylbenzene	A10	0.4394	0.5517	0.4662
1t,2c,4-Trimethylcyclopentane	A10	0.4909	0.5153	0.5090
1,2-Ethyl-i-propylbenzene	A10	0.3325	0.4175	0.3519
1,4-Methyl-t-butylbenzene	A11	0.3655	0.4589	0.3868
UnknownC10s	U10	2.6189	3.4859	3.5257
n-Undecane	P11	1.3681	2.0006	1.9954
1,2,4,5-Tetramethylbenzene	A11	0.3481	0.4371	0.3646
1,2-Methyl-n-butylbenzene	A11	0.1465	0.1839	0.1550
1,2,3,5-Tetramethylbenzene	A11	0.3879	0.4871	0.4043
1,2-Ethyl-n-propylbenzene	A11	0.2632	0.3305	0.2786
2-Methylindan	A11	0.1149	0.1831	0.1806
1,3-Methyl-n-butylbenzene	A11	0.1769	0.2221	0.1872
1,3-Di-i-propylbenzene	A11	0.1247	0.1566	0.1320
1t-M-2-(4MP)cyclopentane	P12	0.2077	0.3310	0.3266
1,2-Di-n-propylbenzene	A11	0.1186	0.1489	0.1255
1,4-Di-i-propylbenzene	A11	0.2698	0.3388	0.2856
t-Decahydronaphthalene	A10	0.1804	0.2265	0.1909
Naphthalene	A10	0.1174	0.1408	0.1187
1-t-Butyl-3,5-dimethylbenzene	A12	0.2744	0.3445	0.2904
1,4-Ethyl-t-butylbenzene	A11	0.2724	0.3420	0.2882
UnknownC11s	U11	0.9883	1.4452	1.4415
n-Dodecane	P12	0.6078	0.9686	0.9555
1,3,5-Triethylbenzene	A12	0.0816	0.0918	0.0784

1,2,4-Triethylbenzene	A12	0.2667	0.2999	0.2529
1,4-Methyl-n-pentylbenzene	A12	0.0470	0.0590	0.0497
n-Hexylbenzene	A12	0.0410	0.0622	0.0536
1,2,3,4,5-Pentamethylbenzene	A13	0.1034	0.1298	0.1094
2-Methylnaphthalene	A11	0.1123	0.1494	0.1259
1-Methylnaphthalene	A11	0.1612	0.2144	0.1553
UnknownC12s	U12	0.1431	0.2280	0.2249
n-Tridecane	P13	0.2444	0.4215	0.4109
UnknownC13s	U13	0.7059	1.2175	1.1868
n-Tetradecane	P14	0.1178	0.2186	0.2127
UnknownC14s	U14	0.4490	0.8333	0.8106
n-Pentadecane	P15	0.0638	0.1268	0.1219
UnknownC15s	U15	0.2434	0.4837	0.4651
n-Hexadecane	P16	0.0015	0.0032	0.0031
UnknownC16s	U16	0.0444	0.0941	0.0899
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. :	201403015	ANALYSIS NO. :	15
COMPANY NAME :	CARRIZO OIL & GAS	ANALYSIS DATE:	MARCH 7, 2014
ACCOUNT NO. :		SAMPLE DATE :	MARCH 4, 2014
PRODUCER :		CYLINDER NO. :	1440
LEASE NO. :		SAMPLED BY :	BRIAN MORROW-EMPACT
NAME/DESCRIP :	SALES GAS @ 16:40 SPEAKER 1-27-8-61		
FIELD DATA		SAMPLE TEMP. :	75
SAMPLE PRES. :	60	AMBIENT TEMP.:	
VAPOR PRES. :		GRAVITY :	
COMMENTS :	SPOT; NO PROBE; LENGTH OF H2S STAIN @ 5PPM (1-7PPM) @ 16:45 WITNESSED BY GALE MCENDREE-EMPACT		

COMPONENT	MOLE %	MASS %	GPM @ 14.650	GPM @ 14.730
ALCOHOLS	0.0027	0.0041		
HELIUM	0.01	0.00	---	---
HYDROGEN	0.01	0.00	---	---
OXYGEN/ARGON	0.01	0.01	---	---
NITROGEN	0.79	0.86	---	---
CARBON DIOXIDE	2.72	4.66	---	---
METHANE	64.90040	40.57030	---	---
ETHANE	13.1538	15.4123	3.5156	3.5348
PROPANE	10.4204	17.9051	2.8684	2.8840
I-BUTANE	1.1371	2.5754	0.3717	0.3737
N-BUTANE	3.8113	8.6320	1.2002	1.2068
I-PENTANE	0.8743	2.4502	0.3126	0.3143
N-PENTANE	1.0267	2.8865	0.3717	0.3737
HEXANES PLUS	1.1333	4.0341	0.4596	0.4620
TOTALS	100.00000	100.00000	9.0998	9.1493

BTEX COMPONENTS	MOLE%	WT%
BENZENE	0.0414	0.1260
TOLUENE	0.0253	0.0908
ETHYLBENZENE	0.0021	0.0087
XYLENES	0.0049	0.0203
TOTAL BTEX	0.0737	0.2458

	BTU @	14.650	14.730
LOW	NET DRY REAL :	1317.1 /scf	1324.3 /scf
	NET WET REAL :	1294.1 /scf	1301.2 /scf
HIGH	GROSS DRY REAL :	1445.3 /scf	1453.2 /scf
	GROSS WET REAL :	1420.0 /scf	1427.9 /scf
	NET DRY REAL :	19499.9 /lb	19606.4 /lb
	GROSS DRY REAL :	21399.7 /lb	21516.6 /lb
	RELATIVE DENSITY (AIR=1):		0.8852
	COMPRESSIBILITY FACTOR :		0.99501

(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

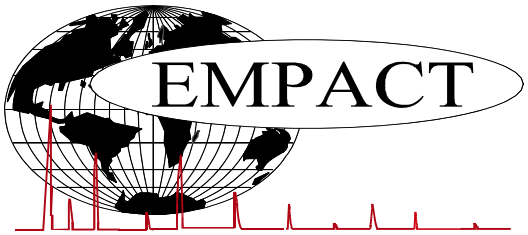
303-637-0150

EXTENDED NATURAL GAS ANALYSIS (*DHA)

GLYCALC INFORMATION

PROJECT NO. :	201403015	ANALYSIS NO. :	15
COMPANY NAME :	CARRIZO OIL & GAS	ANALYSIS DATE:	MARCH 7, 2014
ACCOUNT NO. :		SAMPLE DATE :	MARCH 4, 2014
PRODUCER :		CYLINDER NO. :	1440
LEASE NO. :		SAMPLED BY :	BRIAN MORROW-EMPACT
NAME/DESCRIP :	SALES GAS @ 16:40 SPEAKER 1-27-8-61		
FIELD DATA		SAMPLE TEMP. :	75
SAMPLE PRES. :	60	AMBIENT TEMP.:	
VAPOR PRES. :		GRAVITY :	
COMMENTS :	SPOT; NO PROBE; LENGTH OF H2S STAIN @ 5PPM (1-7PPM) @ 16:45 WITNESSED BY GALE MCENDREE-EMPACT		

Componet	Mole %	Wt %
Helium	0.01	0.00
Hydrogen	0.01	0.00
Carbon Dioxide	2.72	4.66
Nitrogen	0.79	0.86
Methane	64.90040	40.57030
Ethane	13.1538	15.4123
Propane	10.4204	17.9051
Isobutane	1.1371	2.5754
n-Butane	3.8113	8.6320
Isopentane	0.7742	2.1766
n-Pentane	1.0267	2.8865
Cyclopentane	0.1001	0.2736
n-Hexane	0.2366	0.7945
Cyclohexane	0.0642	0.2105
Other Hexanes	0.4107	1.3683
Heptanes	0.2044	0.7924
Methycyclohexane	0.0487	0.1863
2,2,4 Trimethylpentane	0.0001	0.0004
Benzene	0.0414	0.1260
Toluene	0.0253	0.0908
Ethylbenzene	0.0021	0.0087
Xylenes	0.0049	0.0203
C8+ Heavies	0.0949	0.4359
Subtotal	99.98730	99.98590
Oxygen/Argon	0.01	0.01
Alcohols	0.0027	0.0041
Total	100.00000	100.00000



EXTENDED NATURAL GAS ANALYSIS (*DHA)

DHA COMPONENT LIST

PROJECT NO. :	201403015	ANALYSIS NO. :	15
COMPANY NAME :	CARRIZO OIL & GAS	ANALYSIS DATE:	MARCH 7, 2014
ACCOUNT NO. :		SAMPLE DATE :	MARCH 4, 2014
PRODUCER :		CYLINDER NO. :	1440
LEASE NO. :		SAMPLED BY :	BRIAN MORROW-EMPACT
NAME/DESCRIP :	SALES GAS @ 16:40 SPEAKER 1-27-8-61		
FIELD DATA		SAMPLE TEMP. :	75
SAMPLE PRES. :	60	AMBIENT TEMP.:	
VAPOR PRES. :		GRAVITY :	
COMMENTS :	SPOT; NO PROBE; LENGTH OF H2S STAIN @ 5PPM (1-7PPM) @ 16:45 WITNESSED BY GALE MCENDREE-EMPACT		

COMPONENT	PIANO #	MOLE %	MASS %	GPM @ 14.650	GPM @ 14.730
Helium	---	0.01	0.00	---	---
Hydrogen	---	0.01	0.00	---	---
Oxygen/Argon	---	0.01	0.01	---	---
Nitrogen	---	0.79	0.86	---	---
Carbon Dioxide	---	2.72	4.66	---	---
Methane	P1	64.90040	40.57030	---	---
Ethane	P2	13.1538	15.4123	3.516	3.535
Propane	P3	10.4204	17.9051	2.868	2.884
i-Butane	I4	1.1371	2.5754	0.372	0.374
Methanol	X1	0.0021	0.0026	0.000	0.000
n-Butane	P4	3.8113	8.6320	1.200	1.207
2,2-Dimethylpropane	I5	0.0032	0.0090	0.001	0.001
i-Pentane	I5	0.7710	2.1676	0.282	0.283
i-Propanol	X3	0.0004	0.0009	0.000	0.000
n-Pentane	P5	1.0267	2.8865	0.372	0.374
t-Butanol	X4	0.0002	0.0006	0.000	0.000
2,2-Dimethylbutane	I6	0.0025	0.0084	0.001	0.001
Cyclopentane	N5	0.1001	0.2736	0.030	0.030
2,3-Dimethylbutane	I6	0.0109	0.0366	0.004	0.004
2-Methylpentane	I6	0.1712	0.5749	0.071	0.072
3-Methylpentane	I6	0.0876	0.2942	0.036	0.036
n-Hexane	P6	0.2366	0.7945	0.097	0.098
2,2-Dimethylpentane	I7	0.0009	0.0035	0.000	0.000
Methylcyclopentane	N6	0.1385	0.4542	0.049	0.049
2,4-Dimethylpentane	I7	0.0059	0.0230	0.003	0.003
2,2,3-Trimethylbutane	I7	0.0002	0.0008	0.000	0.000
Benzene	A6	0.0414	0.1260	0.012	0.012
3,3-Dimethylpentane	I7	0.0006	0.0023	0.000	0.000
Cyclohexane	N6	0.0642	0.2105	0.022	0.022
2-Methylhexane	I7	0.0246	0.0961	0.011	0.011
2,3-Dimethylpentane	I7	0.0117	0.0457	0.005	0.005
1,1-Dimethylcyclopentane	N7	0.0064	0.0245	0.003	0.003
3-Methylhexane	I7	0.0282	0.1101	0.013	0.013
1c,3-Dimethylcyclopentane	N7	0.0152	0.0581	0.007	0.007
1t,3-Dimethylcyclopentane	N7	0.0137	0.0524	0.006	0.006
3-Ethylpentane	I7	0.0013	0.0051	0.001	0.001
1t,2-Dimethylcyclopentane	N7	0.0285	0.1090	0.013	0.013
2,2,4-Trimethylpentane	I8	0.0001	0.0004	0.000	0.000
n-Heptane	P7	0.0588	0.2296	0.027	0.027
1c,2-Dimethylcyclopentane	N7	0.0018	0.0069	0.001	0.001
Methylcyclohexane	N7	0.0487	0.1863	0.020	0.020
2,2-Dimethylhexane	I8	0.0034	0.0151	0.002	0.002

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Ethylcyclopentane	N7	0.0066	0.0253	0.003	0.003
2,5-Dimethylhexane	I8	0.0012	0.0053	0.001	0.001
2,2,3-Trimethylpentane	I8	0.0001	0.0004	0.000	0.000
2,4-Dimethylhexane	I8	0.0021	0.0094	0.001	0.001
1c,2t,4-Trimethylcyclopentane	N8	0.0038	0.0166	0.002	0.002
3,3-Dimethylhexane	I8	0.0002	0.0009	0.000	0.000
1t,2c,4-Trimethylcyclopentane	N8	0.0043	0.0188	0.002	0.002
2,3,4-Trimethylpentane	I8	0.0008	0.0036	0.000	0.000
2,3,3-Trimethylpentane	I8	0.0001	0.0004	0.000	0.000
Toluene	A7	0.0253	0.0908	0.008	0.008
2,3-Dimethylhexane	I8	0.0010	0.0044	0.001	0.001
2-Methyl-3-ethylpentane	I8	0.0011	0.0049	0.001	0.001
2-Methylheptane	I8	0.0089	0.0396	0.005	0.005
4-Methylheptane	I8	0.0025	0.0111	0.001	0.001
3-Methyl-3-ethylpentane	I8	0.0002	0.0009	0.000	0.000
3,4-Dimethylhexane	I8	0.0004	0.0018	0.000	0.000
1c,2c,4-Trimethylcyclopentane	N8	0.0002	0.0009	0.000	0.000
1c,3-Dimethylcyclohexane	N8	0.0002	0.0009	0.000	0.000
3-Methylheptane	I8	0.0042	0.0187	0.002	0.002
1c,2t,3-Trimethylcyclopentane	N8	0.0057	0.0249	0.003	0.003
3-Ethylhexane	I8	0.0006	0.0027	0.000	0.000
1t,4-Dimethylcyclohexane	N8	0.0020	0.0087	0.001	0.001
1,1-Dimethylcyclohexane	N8	0.0007	0.0031	0.000	0.000
3t-Ethylmethylcyclopentane	N8	0.0012	0.0053	0.001	0.001
2t-Ethylmethylcyclopentane	N8	0.0011	0.0048	0.001	0.001
1,1-Methylethylcyclopentane	N8	0.0035	0.0153	0.002	0.002
2,2,4-Trimethylhexane	I9	0.0002	0.0010	0.000	0.000
1t,2-Dimethylcyclohexane	N8	0.0030	0.0131	0.002	0.002
n-Octane	P8	0.0125	0.0556	0.006	0.006
1c,4-Dimethylcyclohexane	N8	0.0010	0.0044	0.001	0.001
i-Propylcyclopentane	I8	0.0003	0.0013	0.000	0.000
2,4,4-Trimethylhexane	I9	0.0001	0.0005	0.000	0.000
2,3,5-Trimethylhexane	I9	0.0005	0.0025	0.000	0.000
2,2,3,4-Tetramethylpentane	I9	0.0001	0.0005	0.000	0.000
2,3,4-Trimethylhexane	I9	0.0001	0.0005	0.000	0.000
1c,2-Dimethylcyclohexane	N8	0.0005	0.0022	0.000	0.000
1,1,4-Trimethylcyclohexane	N9	0.0034	0.0167	0.002	0.002
2,2,3-Trimethylhexane	I9	0.0012	0.0060	0.001	0.001
2,4-Dimethylheptane	I9	0.0004	0.0020	0.000	0.000
4,4-Dimethylheptane	I9	0.0001	0.0005	0.000	0.000
Ethylcyclohexane	N8	0.0018	0.0079	0.001	0.001
n-Propylcyclopentane	N8	0.0007	0.0031	0.000	0.000
1c,3c,5-Trimethylcyclohexane	N9	0.0001	0.0005	0.000	0.000
2,5-Dimethylheptane	I9	0.0002	0.0010	0.000	0.000
3,3-Dimethylheptane	I9	0.0003	0.0015	0.000	0.000
3,5-Dimethylheptane	I9	0.0002	0.0010	0.000	0.000
2,6-Dimethylheptane	I9	0.0002	0.0010	0.000	0.000
1,1,3-Trimethylcyclohexane	N9	0.0007	0.0034	0.000	0.000
Ethylbenzene	I8	0.0021	0.0087	0.001	0.001
1c,2t,4t-Trimethylcyclohexane	N9	0.0005	0.0025	0.000	0.000
2,3-Dimethylheptane	I9	0.0015	0.0075	0.001	0.001
1,3-Dimethylbenzene (m-Xylene)	A8	0.0026	0.0108	0.001	0.001
1,4-Dimethylbenzene (p-Xylene)	A8	0.0008	0.0033	0.000	0.000
3,4-Dimethylheptane (2)	I9	0.0004	0.0020	0.000	0.000
4-Ethylheptane	I9	0.0001	0.0005	0.000	0.000
4-Methyloctane	I9	0.0006	0.0030	0.000	0.000
2-Methyloctane	I9	0.0007	0.0035	0.000	0.000
1c,2t,3-Trimethylcyclohexane	N9	0.0001	0.0005	0.000	0.000
3-Ethylheptane	I9	0.0003	0.0015	0.000	0.000
3-Methyloctane	I9	0.0008	0.0040	0.000	0.000
1c,2t,4c-Trimethylcyclohexane	I9	0.0001	0.0005	0.000	0.000
1,1,2-Trimethylcyclohexane	N9	0.0001	0.0005	0.000	0.000
1,2-Dimethylbenzene (o-Xylene)	A8	0.0015	0.0062	0.001	0.001
i-Butylcyclopentane	N9	0.0006	0.0030	0.000	0.000
UnknownC8s	U8	0.0007	0.0031	0.000	0.000
n-Nonane	P9	0.0023	0.0115	0.001	0.001
1,1-Methylethylcyclohexane	N9	0.0003	0.0015	0.000	0.000
i-Propylbenzene	A9	0.0004	0.0019	0.000	0.000

i-Propylcyclohexane	N9	0.0001	0.0005	0.000	0.000
2,2-Dimethyloctane	I10	0.0001	0.0006	0.000	0.000
2,4-Dimethyloctane	I10	0.0001	0.0006	0.000	0.000
n-Butylcyclopentane	N9	0.0004	0.0020	0.000	0.000
3,3-Dimethyloctane	I10	0.0002	0.0011	0.000	0.000
n-Propylbenzene	A9	0.0003	0.0014	0.000	0.000
3,6-Dimethyloctane	I10	0.0001	0.0006	0.000	0.000
3-Methyl-5-ethylheptane	I10	0.0006	0.0033	0.000	0.000
1,3-Methylethylbenzene	A9	0.0003	0.0014	0.000	0.000
1,4-Methylethylbenzene	A9	0.0001	0.0005	0.000	0.000
1,3,5-Trimethylbenzene	A9	0.0001	0.0005	0.000	0.000
2,3-Dimethyloctane	I10	0.0001	0.0006	0.000	0.000
5-Methylnonane	I10	0.0002	0.0011	0.000	0.000
1,2-Methylethylbenzene	A9	0.0002	0.0009	0.000	0.000
2-Methylnonane	I10	0.0002	0.0011	0.000	0.000
3-Methylnonane	I10	0.0001	0.0006	0.000	0.000
1,2,4-Trimethylbenzene	A9	0.0001	0.0005	0.000	0.000
t-Butylbenzene	A10	0.0003	0.0016	0.000	0.000
i-Butylcyclohexane	N10	0.0001	0.0006	0.000	0.000
UnknownC9s	U9	0.0021	0.0105	0.001	0.001
n-Decane	P10	0.0005	0.0028	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
UnknownC10s	U10	0.0012	0.0067	0.001	0.001
n-Undecane	P11	0.0002	0.0012	0.000	0.000
UnknownC11s	U11	0.0002	0.0012	0.000	0.000
n-Dodecane	P12	0.0001	0.0007	0.000	0.000
TOTAL		100.00000	100.00000	9.0998	9.1493

BTEX COMPONENTS	**MOLE%**	**WT%**
BENZENE	0.0414	0.1260
TOLUENE	0.0253	0.0908
ETHYLBENZENE	0.0021	0.0087
XYLENES	0.0049	0.0203
TOTAL BTEX	0.0737	0.2458

	BTU @	14.650		14.730
LOW	NET DRY REAL :	1317.1	**/scf**	1324.3 **/scf**
	NET WET REAL :	1294.1	**/scf**	1301.2 **/scf**
HIGH	GROSS DRY REAL :	1445.3	**/scf**	1453.2 **/scf**
	GROSS WET REAL :	1420.0	**/scf**	1427.9 **/scf**
	NET DRY REAL :	19499.9	**/lb**	19606.4 **/lb**
	GROSS DRY REAL :	21399.7	**/lb**	21516.6 **/lb**

RELATIVE DENSITY (AIR=1): 0.8852

COMPRESSIBILITY FACTOR : 0.99501

(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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