CRUDE OIL ASSAY

PROJECT NO. :	201403106	ANALYSIS NO. :	01
COMPANY NAME :	CARRIZO OIL & GAS	ANALYSIS DATE:	MARCH 25, 2014
ACCOUNT NO. :		SAMPLE DATE :	MARCH 19, 2014
PRODUCER :		CYLINDER NO. :	1L GLASS JAR
LEASE NO. :		SAMPLED BY :	GALE MCENDREE
NAME/DESCRIP :	TANK BATTERY @ 12:45 CASTOR 4-36-9-59		EMPACT
FIELD DATA		SAMPLE TEMP. :	82
SAMPLE PRES. :		AMBIENT TEMP.:	
VAPOR PRES. :		GRAVITY :	
COMMENTS :	SPOT; TK# 43608		

SPECIFICATION		TEST METHOD	UNITS	RESULTS
API GRAVITY			API 60/60	31.6
RVP @100 DEG F		D323	PSIG	5
TOTAL SULFUR		D2622	WT %	0.433
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				DARK BROWN, THICK
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. :	201403106	ANALYSIS NO. :	02
COMPANY NAME :	CARRIZO OIL & GAS	ANALYSIS DATE:	MARCH 22, 2014
ACCOUNT NO. :		SAMPLE DATE :	MARCH 19, 2014
PRODUCER :		CYLINDER NO. :	11917
LEASE NO. :		SAMPLED BY :	GALE MCENDREE
NAME/DESCRIP :	SEPARATOR @ 11:50 CASTOR 4-36-9-59		EMPACT
FIELD DATA		SAMPLE TEMP. :	132
SAMPLE PRES. :	35	AMBIENT TEMP.:	
VAPOR PRES. :		GRAVITY :	
COMMENTS :	SPOT; NO PROBE		

COMPONENT	MOLE %	MASS %	VOL %
NITROGEN (AIR)	0.0247	0.0063	0.0058
CARBON DIOXIDE	0.0381	0.0152	0.0139
METHANE	0.1930	0.0281	0.0699
ETHANE	0.2944	0.0802	0.1678
PROPANE	0.9365	0.3743	0.5504
I-BUTANE	0.2445	0.1288	0.1706
N-BUTANE	1.2923	0.6806	0.8689
I-PENTANE	0.6412	0.4192	0.5003
N-PENTANE	1.1487	0.7511	0.8873
HEXANES PLUS	95.1866	97.5162	96.7651
TOTALS	100.0000	100.0000	100.0000

BTEX COMPONENTS	MOLE%	MASS%
BENZENE	1.5310	1.0837
TOLUENE	3.4279	2.8623
ETHYLBENZENE	0.8865	0.8529
XYLENE	2.3673	2.2777
TOTAL BTEX	8.2127	7.0766

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

	TOTAL SAMPLE	C6+ FRACTION	
Specific Gravity (H2O=1) =	0.7454	0.752	60/60
API Gravity =	58.33	56.66	60/60
Molecular Weight =	110.35	113.648	
Absolute Density =	6.21	6.26	LBS/GAL
Heating Value Liq. Idl Gas=	126525	127573	BTU/GAL
Vapor/Liquid =	21.43	21.00	CUFT/GAL
Vapor Pressure =	16.56	1.67	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. :	201403106	ANALYSIS NO. :	02
COMPANY NAME :	CARRIZO OIL & GAS	ANALYSIS DATE:	MARCH 22, 2014
ACCOUNT NO. :		SAMPLE DATE :	MARCH 19, 2014
PRODUCER :		CYLINDER NO. :	11917
LEASE NO. :		SAMPLED BY :	GALE MCENDREE
NAME/DESCRIP :	SEPARATOR @ 11:50		EMPACT
	CASTOR 4-36-9-59		
FIELD DATA		SAMPLE TEMP. :	132
SAMPLE PRES. :	35	AMBIENT TEMP.:	
VAPOR PRES. :		GRAVITY :	
COMMENTS :	SPOT; NO PROBE		

COMPONENT	Mole %		Wt %		LV %	
CARBON DIOXIDE	0.0381		0.0152		0.0139	
NITROGEN (AIR)	0.0247		0.0063		0.0058	
METHANE	0.1930		0.0281		0.0699	
ETHANE	0.2944		0.0802		0.1678	
PROPANE	0.9365		0.3743		0.5504	
I-BUTANE	0.2445		0.1288		0.1706	
N-BUTANE	1.2923		0.6806		0.8689	
I-PENTANE	0.6412		0.4192		0.5003	
N-PENTANE	1.1487		0.7511		0.8873	
CYCLOPENTANE (N-C5)	1.3190		0.8383		0.8222	
N-HEXANE	6.5175		5.0906		5.7180	
CYCLOHEXANE (OTHER C6)	2.8542		2.1768		2.0715	
OTHER HEXANES	10.0037		7.7307		8.2363	
OTHER HEPTANES	13.7695		12.4170		13.0177	
METHYLCYCLOHEXANE (OTHER C7)	4.2080		3.7444		3.6035	
2,2,4 TRIMETHYLPENTANE	0.8070		0.7181		0.7106	
BENZENE	1.5310		1.0837		0.9151	
TOLUENE	3.4279		2.8623		2.4409	
ETHYLBENZENE	0.8865		0.8529		0.7272	
XYLENES	2.3673		2.2777		1.9424	
OTHER OCTANES	12.3327		12.7652		12.8400	
OCTANES PLUS	----	51.5558	----	61.5724	----	59.9399
NONANES	13.2265		15.1961		14.9996	
DECANES PLUS	21.9358		29.7624		28.7201	
SUB TOTAL	100.0000		100.0000		100.0000	
TOTAL	100.0000		100.0000		100.0000	

API Gravity =	**58.33**	60/60
Vapor Pressure =	**16.56**	PSIA & 100 F
Average Molecular Weight of Decanes plus =	**149.72**	
Average Specific Gravity of Decanes plus =	**0.7730**	

EMPACT ANALYTICAL SYSTEMS INC.
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303-637-0150

EXTENDED NATURAL GAS LIQUID ANALYSIS (*DHA)

BY CARBON NUMBER

PROJECT NO. :	201403106	ANALYSIS NO. :	02
COMPANY NAME :	CARRIZO OIL & GAS	ANALYSIS DATE:	MARCH 22, 2014
ACCOUNT NO. :		SAMPLE DATE :	MARCH 19, 2014
PRODUCER :		CYLINDER NO. :	11917
LEASE NO. :		SAMPLED BY :	GALE MCENDREE
NAME/DESCRIP :	SEPARATOR @ 11:50		EMPACT
	CASTOR 4-36-9-59		
FIELD DATA		SAMPLE TEMP. :	132
SAMPLE PRES. :	35	AMBIENT TEMP.:	
VAPOR PRES. :		GRAVITY :	
COMMENTS :	SPOT; NO PROBE		

COMPONENT / CARBON NUMBER	MOLE%	MASS %	VOLUME %
NITROGEN	0.0247	0.0063	0.0058
CARBON DIOXIDE	0.0381	0.0152	0.0139
C1	0.1930	0.0281	0.0699
C2	0.2944	0.0802	0.1678
C3	0.9365	0.3743	0.5504
C4	1.5368	0.8094	1.0395
C5	3.1089	2.0086	2.2098
C6	20.9064	16.0818	16.9409
C7	21.4054	19.0237	19.0621
C8	16.3935	16.6139	16.2202
C9	13.2265	15.1961	14.9996
C10	11.2099	13.9988	13.5840
C11	5.1238	6.9504	6.6051
C12	3.0432	4.4474	4.2901
C13	1.5790	2.5727	2.4948
C14	0.7372	1.3254	1.2946
C15	0.2380	0.4581	0.4423
C16	0.0047	0.0096	0.0092
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. :	201403106	ANALYSIS NO. :	02
COMPANY NAME :	CARRIZO OIL & GAS	ANALYSIS DATE:	MARCH 22, 2014
ACCOUNT NO. :		SAMPLE DATE :	MARCH 19, 2014
PRODUCER :		CYLINDER NO. :	11917
LEASE NO. :		SAMPLED BY :	GALE MCENDREE
NAME/DESCRIP :	SEPARATOR @ 11:50 CASTOR 4-36-9-59		EMPACT
FIELD DATA		SAMPLE TEMP. :	132
SAMPLE PRES. :	35	AMBIENT TEMP.:	
VAPOR PRES. :		GRAVITY :	
COMMENTS :	SPOT; NO PROBE		

COMPONENT	PIANO #	MOLE %	MASS %	VOL %
Nitrogen	NHC	0.0247	0.0063	0.0058
Carbon Dioxide	NHC	0.0381	0.0152	0.0139
Methane	P1	0.1930	0.0281	0.0699
Ethane	P2	0.2944	0.0802	0.1678
Propane	P3	0.9365	0.3743	0.5504
i-Butane	I4	0.2445	0.1288	0.1706
n-Butane	P4	1.2923	0.6806	0.8689
i-Pentane	I5	0.6412	0.4192	0.5003
n-Pentane	P5	1.1487	0.7511	0.8873
2,2-Dimethylbutane	I6	0.0372	0.0291	0.0332
Cyclopentane	N5	1.3190	0.8383	0.8222
2,3-Dimethylbutane	I6	0.3397	0.2653	0.2965
2-Methylpentane	I6	3.2452	2.5344	2.8727
3-Methylpentane	I6	1.9005	1.4843	1.6544
n-Hexane	P6	6.5175	5.0906	5.7180
2,2-Dimethylpentane	I7	0.0153	0.0139	0.0152
Methylcyclopentane	N6	4.4811	3.4176	3.3795
2,4-Dimethylpentane	I7	0.3365	0.3056	0.3369
Benzene	A6	1.5310	1.0837	0.9151
3,3-Dimethylpentane	I7	0.0200	0.0182	0.0195
Cyclohexane	N6	2.8542	2.1768	2.0715
2-Methylhexane	I7	1.0636	0.9658	1.0553
2,3-Dimethylpentane	I7	0.8016	0.7279	0.7726
1,1-Dimethylcyclopentane	N7	0.3589	0.3194	0.3136
3-Methylhexane	I7	1.7339	1.5744	1.6943
1c,3-Dimethylcyclopentane	N7	0.8853	0.7878	0.7836
1t,3-Dimethylcyclopentane	N7	0.8070	0.7181	0.7106
3-Ethylpentane	I7	0.0861	0.0782	0.0828
1t,2-Dimethylcyclopentane	N7	1.7314	1.5406	1.5191
2,2,4-Trimethylpentane	I8	0.2643	0.2736	0.2918
n-Heptane	P7	4.9752	4.5176	4.8939
1c,2-Dimethylcyclopentane	N7	0.1542	0.1372	0.1316
Methylcyclohexane	N7	4.2080	3.7444	3.6035
2,2-Dimethylhexane	I8	0.4550	0.4710	0.5016
Ethylcyclopentane	N7	0.8005	0.7123	0.6887

2,5-Dimethylhexane	I8	0.1083	0.1121	0.1197
2,2,3-Trimethylpentane	I8	0.0499	0.0517	0.0535
2,4-Dimethylhexane	I8	0.2587	0.2678	0.2846
1c,2t,4-Trimethylcyclopentane	N8	0.4059	0.4127	0.4006
3,3-Dimethylhexane	I8	0.0631	0.0653	0.0682
2,3,4-Trimethylpentane	I8	0.1169	0.1210	0.1246
2,3,3-Trimethylpentane	I8	0.0189	0.0196	0.0200
Toluene	A7	3.4279	2.8623	2.4409
2,3-Dimethylhexane	I8	0.1936	0.2004	0.2086
2-Methyl-3-ethylpentane	I8	0.2074	0.2147	0.2211
1,1,2-Trimethylcyclopentane	N8	0.0584	0.0594	0.0570
2-Methylheptane	I8	1.2848	1.3300	1.4093
4-Methylheptane	I8	0.4856	0.5027	0.5198
3-Methyl-3-ethylpentane	I8	0.1245	0.1289	0.1314
3,4-Dimethylhexane	I8	0.1368	0.1416	0.1458
1c,2c,4-Trimethylcyclopentane	N8	0.0606	0.0616	0.0592
1c,3-Dimethylcyclohexane	N8	0.0336	0.0342	0.0331
3-Methylheptane	I8	0.4388	0.4542	0.4771
1c,2t,3-Trimethylcyclopentane	N8	1.1137	1.1325	1.0895
3-Ethylhexane	I8	0.1713	0.1773	0.1843
1t,4-Dimethylcyclohexane	N8	0.6534	0.6644	0.6458
1,1-Dimethylcyclohexane	N8	0.1468	0.1493	0.1417
3t-Ethylmethylcyclopentane	N8	0.2671	0.2716	0.2626
2t-Ethylmethylcyclopentane	N8	0.2053	0.2088	0.2013
1,1-Methylethylcyclopentane	N8	0.7909	0.8042	0.7634
2,2,4-Trimethylhexane	I9	0.0837	0.0973	0.1008
1t,2-Dimethylcyclohexane	N8	0.6568	0.6679	0.6382
1t,3-Dimethylcyclohexane	N8	0.0130	0.0132	0.0125
n-Octane	P8	2.2628	2.3424	2.4704
1c,4-Dimethylcyclohexane	N8	0.8950	0.9101	0.8618
i-Propylcyclopentane	I8	0.0892	0.0907	0.0866
2,4,4-Trimethylhexane	I9	0.0223	0.0259	0.0266
2,2,3,4-Tetramethylpentane	I9	0.0191	0.0222	0.0229
2,3,4-Trimethylhexane	I9	0.0253	0.0294	0.0302
1c,2-Dimethylcyclohexane	N8	0.1983	0.2016	0.1877
2,3,5-Trimethylhexane	I9	0.0615	0.0715	0.0734
2,2-Dimethylheptane	I9	0.0212	0.0246	0.0257
1,1,4-Trimethylcyclohexane	N9	1.1415	1.3059	1.2543
2,2,3-Trimethylhexane	I9	0.4648	0.5402	0.5490
2,4-Dimethylheptane	I9	0.0313	0.0364	0.0377
4,4-Dimethylheptane	I9	0.1275	0.1482	0.1535
Ethylcyclohexane	N8	0.6752	0.6866	0.6463
n-Propylcyclopentane	N8	0.2141	0.2177	0.2078
1c,3c,5-Trimethylcyclohexane	N9	0.0569	0.0651	0.0625
2,5-Dimethylheptane	I9	0.1080	0.1255	0.1298
3,3-Dimethylheptane	I9	0.1086	0.1262	0.1305
3,5-Dimethylheptane	I9	0.0908	0.1055	0.1091
2,6-Dimethylheptane	I9	0.0710	0.0825	0.0862
1,1,3-Trimethylcyclohexane	N9	0.0680	0.0778	0.0747
Ethylbenzene	A8	0.8865	0.8529	0.7272
1c,2t,4t-Trimethylcyclohexane	N9	0.4673	0.5346	0.5037
2,3-Dimethylheptane	I9	0.3970	0.4614	0.4711
1,3-Dimethylbenzene (m-Xylene)	A8	0.7561	0.7275	0.6239
1,4-Dimethylbenzene (p-Xylene)	A8	0.7182	0.6910	0.5945
3,4-Dimethylheptane	I9	0.2289	0.2660	0.2696
3,4-Dimethylheptane (2)	I9	0.2164	0.2515	0.2549
4-Ethylheptane	I9	0.0912	0.1060	0.1098
4-Methyloctane	I9	0.2939	0.3416	0.3514
2-Methyloctane	I9	0.3646	0.4238	0.4402
1c,2t,4c-Trimethylcyclohexane	I9	0.1607	0.1868	0.1908
3-Ethylheptane	I9	0.1019	0.1184	0.1208
3-Methyloctane	I9	0.4105	0.4771	0.4907
3,3-Diethylpentane	I9	0.0756	0.0879	0.0864
1c,2t,3-Trimethylcyclohexane	N9	0.1364	0.1560	0.1470
1,1,2-Trimethylcyclohexane	N9	0.0764	0.0874	0.0823
1,2-Dimethylbenzene (o-Xylene)	A8	0.8930	0.8592	0.7240
i-Butylcyclopentane	N9	0.3090	0.3535	0.3356

UnknownC8s	U8	0.0217	0.0225	0.0237
n-Nonane	P9	1.6594	1.9288	1.9922
1,1-Methylethylcyclohexane	N9	0.8610	1.0007	1.0367
i-Propylbenzene	A9	0.3587	0.3907	0.3354
i-Propylcyclohexane	N9	0.1551	0.1774	0.1640
2,2-Dimethyloctane	I10	0.0429	0.0553	0.0554
2,4-Dimethyloctane	I10	0.0822	0.1060	0.1063
2,6-Dimethyloctane	I10	0.0099	0.0128	0.0133
2,5-Dimethyloctane	I10	0.0448	0.0578	0.0580
n-Butylcyclopentane	N9	0.1961	0.2493	0.2314
3,3-Dimethyloctane	I10	0.1741	0.2245	0.2252
n-Propylbenzene	A9	0.3654	0.3980	0.3418
3,6-Dimethyloctane	I10	0.2256	0.2909	0.2916
3-Methyl-5-ethylheptane	I10	0.4114	0.4782	0.4885
1,3-Methylethylbenzene	A9	0.4624	0.5037	0.4289
1,4-Methylethylbenzene	A9	0.1405	0.1530	0.1303
1,3,5-Trimethylbenzene	A9	0.1767	0.1925	0.1650
2,3-Dimethyloctane	I10	0.0971	0.1252	0.1255
5-Methylnonane	I10	0.2379	0.3067	0.3104
1,2-Methylethylbenzene	A9	0.3218	0.3505	0.2969
2-Methylnonane	I10	0.1295	0.1670	0.1704
3-Ethyloctane	I10	0.0772	0.0995	0.0998
3-Methylnonane	I10	0.2297	0.2962	0.2994
1,2,4-Trimethylbenzene	A9	0.0424	0.0462	0.0391
t-Butylbenzene	A10	0.2319	0.2821	0.2416
i-Butylcyclohexane	N10	0.2514	0.3196	0.2920
1t-Methyl-2-n-propylcyclohexane	I10	0.1123	0.1305	0.1333
i-Butylbenzene	A10	0.0877	0.1067	0.0928
sec-Butylbenzene	A10	0.1551	0.1887	0.1624
UnknownC9s	U9	2.4147	2.8066	2.8989
n-Decane	P10	1.4844	1.9139	1.9436
1,2,3-Trimethylbenzene	A9	0.2410	0.2625	0.2178
1,3-Methyl-i-propylbenzene	A10	0.1201	0.1308	0.1108
1,4-Methyl-i-propylbenzene	A10	0.1201	0.1308	0.1108
Sec-Butylcyclohexane	N10	0.3248	0.4129	0.3767
1,2-Methyl-i-propylbenzene	A10	0.1798	0.2187	0.1851
3-Ethylnonane	I10	0.0617	0.0796	0.0812
1,3-Diethylbenzene	A10	0.1368	0.1664	0.1429
1,3-Methyl-n-propylbenzene	A10	0.0788	0.0959	0.0826
1,4-Diethylbenzene	A10	0.1411	0.1716	0.1477
1,4-Methyl-n-propylbenzene	A10	0.1195	0.1453	0.1255
n-Butylbenzene	A10	0.1429	0.1738	0.1496
1,3-Dimethyl-5-ethylbenzene	A10	0.0715	0.0870	0.0746
1,2-Diethylbenzene	A10	0.1311	0.1595	0.1345
1,2-Methyl-n-propylbenzene	A10	0.0926	0.1126	0.0956
1,4-Dimethyl-2-ethylbenzene	A10	0.1167	0.1419	0.1200
1,3-Dimethyl-4-ethylbenzene	A10	0.0763	0.0928	0.0786
1,2-Dimethyl-4-ethylbenzene	A10	0.2232	0.2715	0.2303
1,3-Dimethyl-2-ethylbenzene	A10	0.0633	0.0770	0.0642
1t,2c,4-Trimethylcyclopentane	A10	0.5295	0.5384	0.5339
1,2-Dimethyl-3-ethylbenzene	A10	0.0714	0.0868	0.0722
1,2-Ethyl-i-propylbenzene	A10	0.0686	0.0834	0.0706
1,4-Methyl-t-butylbenzene	A11	0.2158	0.2625	0.2221
UnknownC10s	U10	3.9688	5.1173	5.1967
n-Undecane	P11	0.8694	1.2315	1.2333
1,4-Ethyl-i-propylbenzene	A11	0.1348	0.1640	0.1388
1,2,4,5-Tetramethylbenzene	A11	0.0690	0.0839	0.0703
1,2-Methyl-n-butylbenzene	A11	0.0673	0.0819	0.0693
1,2,3,5-Tetramethylbenzene	A11	0.0940	0.1143	0.0953
1,2-Methyl-t-butylbenzene	A11	0.0732	0.0890	0.0753
5-Methylindan	A11	0.0233	0.0360	0.0357
4-Methylindan	A11	0.0139	0.0215	0.0213
1,2-Ethyl-n-propylbenzene	A11	0.0929	0.1130	0.0956
2-Methylindan	A11	0.0714	0.1102	0.1092
1,3-Methyl-n-butylbenzene	A11	0.0628	0.0764	0.0647
1,3-Di-i-propylbenzene	A11	0.0846	0.1029	0.0871
sec-Pentylbenzene	A11	0.1091	0.1327	0.1123

n-Pentylbenzene	A11	0.1125	0.1511	0.1306
1t-M-2-(4MP)cyclopentane	P12	0.0191	0.0295	0.0292
1,2-Di-n-propylbenzene	A11	0.0875	0.1064	0.0900
1,4-Di-i-propylbenzene	A11	0.2121	0.2580	0.2183
Tetrahydronaphthalene	A10	0.0104	0.0127	0.0107
t-Decahydronaphthalene	A10	0.1843	0.2242	0.1897
Naphthalene	A10	0.0915	0.1063	0.0900
1-t-Butyl-3,5-dimethylbenzene	A12	0.0998	0.1214	0.1027
1,4-Ethyl-t-butylbenzene	A11	0.1055	0.1283	0.1086
UnknownC11s	U11	2.3814	3.3733	3.3782
n-Dodecane	P12	0.7252	1.1195	1.1088
1,3-Di-n-propylbenzene	A12	0.0780	0.0949	0.0803
1,3,5-Triethylbenzene	A12	0.0536	0.0584	0.0501
1,2,4-Triethylbenzene	A12	0.3032	0.3302	0.2796
1,4-Methyl-n-pentylbenzene	A12	0.0724	0.0881	0.0746
n-Hexylbenzene	A12	0.0853	0.1254	0.1085
1,2,3,4,5-Pentamethylbenzene	A13	0.1437	0.1748	0.1479
2-Methylnaphthalene	A11	0.1376	0.1773	0.1500
1-Methylnaphthalene	A11	0.1057	0.1362	0.0991
UnknownC12s	U12	1.6066	2.4800	2.4563
n-Tridecane	P13	0.3388	0.5660	0.5540
UnknownC13s	U13	1.0965	1.8319	1.7929
n-Tetradecane	P14	0.0608	0.1093	0.1068
UnknownC14s	U14	0.6764	1.2161	1.1878
n-Pentadecane	P15	0.0118	0.0227	0.0219
UnknownC15s	U15	0.2262	0.4354	0.4204
n-Hexadecane	P16	0.0047	0.0096	0.0092
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. :	201403106	ANALYSIS NO. :	03
COMPANY NAME :	CARRIZO OIL & GAS	ANALYSIS DATE:	MARCH 28, 2014
ACCOUNT NO. :		SAMPLE DATE :	MARCH 19, 2014
PRODUCER :		CYLINDER NO. :	0587
LEASE NO. :		SAMPLED BY :	GALE MCENDREE-EMPACT
NAME/DESCRIP :	SALES GAS @ 12:25 CASTOR 4-36-9-59		
FIELD DATA		SAMPLE TEMP. :	115
SAMPLE PRES. :	52	AMBIENT TEMP.:	
VAPOR PRES. :		GRAVITY :	
COMMENTS :	SPOT; NO PROBE; LENGTH OF H2S STAIN @ 6PPM (1-7PPM) @ 12:35 POSSIBLE MOISTURE IN SAMPLE-EMPACT		

COMPONENT	MOLE %	MASS %	GPM @ 14.650	GPM @ 14.730
ALCOHOLS	0.0003	0.0009		
HELIUM	0.01	0.00	---	---
HYDROGEN	0.00	0.00	---	---
OXYGEN/ARGON	0.01	0.01	---	---
NITROGEN	1.07	1.20	---	---
CARBON DIOXIDE	2.37	4.16	---	---
METHANE	68.07730	43.56000	---	---
ETHANE	11.1022	13.3146	2.9668	2.9830
PROPANE	9.3846	16.5049	2.5831	2.5973
I-BUTANE	1.0280	2.3831	0.3365	0.3384
N-BUTANE	3.7568	8.7088	1.1829	1.1894
I-PENTANE	0.9092	2.6077	0.3246	0.3263
N-PENTANE	1.1201	3.2232	0.4057	0.4079
HEXANES PLUS	1.1615	4.3268	0.4725	0.4747
TOTALS	100.00000	100.00000	8.2721	8.3170

BTEX COMPONENTS	MOLE%	WT%
BENZENE	0.0493	0.1536
TOLUENE	0.0195	0.0717
ETHYLBENZENE	0.0013	0.0055
XYLENES	0.0025	0.0105
TOTAL BTEX	0.0726	0.2413

BTU @		14.650	14.730
LOW	NET DRY REAL :	1290.0 **/scf**	1297.0 **/scf**
	NET WET REAL :	1267.4 **/scf**	1274.5 **/scf**
HIGH	GROSS DRY REAL :	1416.5 **/scf**	1424.2 **/scf**
	GROSS WET REAL :	1391.7 **/scf**	1399.5 **/scf**
	NET DRY REAL :	19557.6 **/lb**	19664.4 **/lb**
	GROSS DRY REAL :	21473.8 **/lb**	21591.0 **/lb**
	RELATIVE DENSITY (AIR=1):		0.8645
	COMPRESSIBILITY FACTOR :		0.99527

(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

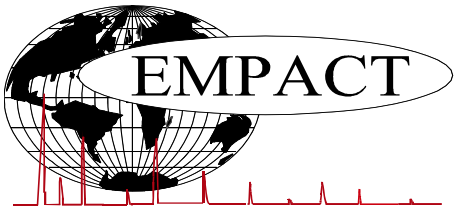
303-637-0150

EXTENDED NATURAL GAS ANALYSIS (*DHA)

GLYCALC INFORMATION

PROJECT NO. :	201403106	ANALYSIS NO. :	03
COMPANY NAME :	CARRIZO OIL & GAS	ANALYSIS DATE:	MARCH 28, 2014
ACCOUNT NO. :		SAMPLE DATE :	MARCH 19, 2014
PRODUCER :		CYLINDER NO. :	0587
LEASE NO. :		SAMPLED BY :	GALE MCENDREE-EMPACT
NAME/DESCRIP :	SALES GAS @ 12:25 CASTOR 4-36-9-59		
FIELD DATA		SAMPLE TEMP. :	115
SAMPLE PRES. :	52	AMBIENT TEMP.:	
VAPOR PRES. :		GRAVITY :	
COMMENTS :	SPOT; NO PROBE; LENGTH OF H2S STAIN @ 6PPM (1-7PPM) @ 12:35 POSSIBLE MOISTURE IN SAMPLE-EMPACT		

Componet	Mole %	Wt %
Helium	0.01	0.00
Hydrogen	0.00	0.00
Carbon Dioxide	2.37	4.16
Nitrogen	1.07	1.20
Methane	68.07730	43.56000
Ethane	11.1022	13.3146
Propane	9.3846	16.5049
Isobutane	1.0280	2.3831
n-Butane	3.7568	8.7088
Isopentane	0.8016	2.3067
n-Pentane	1.1201	3.2232
Cyclopentane	0.1076	0.3010
n-Hexane	0.2542	0.8737
Cyclohexane	0.0633	0.2125
Other Hexanes	0.4479	1.5274
Heptanes	0.1816	0.7207
Methycyclohexane	0.0360	0.1410
2,2,4 Trimethylpentane	0.0001	0.0004
Benzene	0.0493	0.1536
Toluene	0.0195	0.0717
Ethylbenzene	0.0013	0.0055
Xylenes	0.0025	0.0105
C8+ Heavies	0.1058	0.6098
Subtotal	99.98970	99.98910
Oxygen/Argon	0.01	0.01
Alcohols	0.0003	0.0009
Total	100.00000	100.00000



EXTENDED NATURAL GAS ANALYSIS (*DHA)

DHA COMPONENT LIST

PROJECT NO. :	201403106	ANALYSIS NO. :	03
COMPANY NAME :	CARRIZO OIL & GAS	ANALYSIS DATE:	MARCH 28, 2014
ACCOUNT NO. :		SAMPLE DATE :	MARCH 19, 2014
PRODUCER :		CYLINDER NO. :	0587
LEASE NO. :		SAMPLED BY :	GALE MCENDREE-EMPACT
NAME/DESCRIP :	SALES GAS @ 12:25 CASTOR 4-36-9-59		
FIELD DATA		SAMPLE TEMP. :	115
SAMPLE PRES. :	52	AMBIENT TEMP.:	
VAPOR PRES. :		GRAVITY :	
COMMENTS :	SPOT; NO PROBE; LENGTH OF H2S STAIN @ 6PPM (1-7PPM) @ 12:35 POSSIBLE MOISTURE IN SAMPLE-EMPACT		

COMPONENT	PIANO #	MOLE %	MASS %	GPM @ 14.650	GPM @ 14.730
Helium	---	0.01	0.00	---	---
Hydrogen	---	0.00	0.00	---	---
Oxygen/Argon	---	0.01	0.01	---	---
Nitrogen	---	1.07	1.20	---	---
Carbon Dioxide	---	2.37	4.16	---	---
Methane	P1	68.07730	43.56000	---	---
Ethane	P2	11.1022	13.3146	2.967	2.983
Propane	P3	9.3846	16.5049	2.583	2.597
i-Butane	I4	1.0280	2.3831	0.337	0.338
n-Butane	P4	3.7568	8.7088	1.183	1.189
2,2-Dimethylpropane	I5	0.0031	0.0089	0.001	0.001
i-Pentane	I5	0.7985	2.2978	0.292	0.293
n-Pentane	P5	1.1200	3.2229	0.406	0.408
t-Butanol	X4	0.0003	0.0009	0.000	0.000
2,2-Dimethylbutane	I6	0.0026	0.0089	0.001	0.001
Cyclopentane	N5	0.1076	0.3010	0.032	0.032
2,3-Dimethylbutane	I6	0.0167	0.0574	0.007	0.007
2-Methylpentane	I6	0.1852	0.6365	0.077	0.078
3-Methylpentane	I6	0.0945	0.3248	0.038	0.038
UnknownC5s	U5	0.0001	0.0003	0.000	0.000
n-Hexane	P6	0.2542	0.8737	0.104	0.105
2,2-Dimethylpentane	I7	0.0001	0.0004	0.000	0.000
Methylcyclopentane	N6	0.1489	0.4998	0.053	0.053
2,4-Dimethylpentane	I7	0.0058	0.0232	0.003	0.003
2,2,3-Trimethylbutane	I7	0.0002	0.0008	0.000	0.000
Benzene	A6	0.0493	0.1536	0.014	0.014
3,3-Dimethylpentane	I7	0.0003	0.0012	0.000	0.000
Cyclohexane	N6	0.0633	0.2125	0.021	0.021
2-Methylhexane	I7	0.0231	0.0923	0.011	0.011
2,3-Dimethylpentane	I7	0.0107	0.0428	0.005	0.005
1,1-Dimethylcyclopentane	N7	0.0049	0.0192	0.002	0.002
3-Methylhexane	I7	0.0261	0.1043	0.012	0.012
1c,3-Dimethylcyclopentane	N7	0.0136	0.0532	0.006	0.006
1t,3-Dimethylcyclopentane	N7	0.0119	0.0466	0.005	0.005
3-Ethylpentane	I7	0.0019	0.0076	0.001	0.001
1t,2-Dimethylcyclopentane	N7	0.0251	0.0983	0.012	0.012
2,2,4-Trimethylpentane	I8	0.0001	0.0004	0.000	0.000
n-Heptane	P7	0.0499	0.1994	0.023	0.023
1c,2-Dimethylcyclopentane	N7	0.0019	0.0075	0.001	0.001
Methylcyclohexane	N7	0.0360	0.1410	0.014	0.014
2,2-Dimethylhexane	I8	0.0023	0.0105	0.001	0.001
Ethylcyclopentane	N7	0.0061	0.0239	0.002	0.002
2,5-Dimethylhexane	I8	0.0008	0.0036	0.000	0.000
2,2,3-Trimethylpentane	I8	0.0002	0.0009	0.000	0.000
2,4-Dimethylhexane	I8	0.0016	0.0073	0.001	0.001
1c,2t,4-Trimethylcyclopentane	N8	0.0027	0.0121	0.001	0.001
3,3-Dimethylhexane	I8	0.0002	0.0009	0.000	0.000
1t,2c,4-Trimethylcyclopentane	N8	0.0031	0.0139	0.001	0.001
2,3,4-Trimethylpentane	I8	0.0006	0.0027	0.000	0.000
Toluene	A7	0.0195	0.0717	0.007	0.007

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2,3-Dimethylhexane	I8	0.0011	0.0050	0.001	0.001
2-Methyl-3-ethylpentane	I8	0.0007	0.0032	0.000	0.000
2-Methylheptane	I8	0.0057	0.0260	0.003	0.003
4-Methylheptane	I8	0.0016	0.0073	0.001	0.001
3-Methyl-3-ethylpentane	I8	0.0001	0.0004	0.000	0.000
3,4-Dimethylhexane	I8	0.0002	0.0009	0.000	0.000
1c,2c,4-Trimethylcyclopentane	N8	0.0002	0.0009	0.000	0.000
1c,3-Dimethylcyclohexane	N8	0.0001	0.0004	0.000	0.000
3-Methylheptane	I8	0.0025	0.0114	0.001	0.001
1c,2t,3-Trimethylcyclopentane	N8	0.0032	0.0143	0.002	0.002
3-Ethylhexane	I8	0.0005	0.0023	0.000	0.000
1t,4-Dimethylcyclohexane	N8	0.0011	0.0049	0.001	0.001
1,1-Dimethylcyclohexane	N8	0.0004	0.0018	0.000	0.000
3t-Ethylmethylcyclopentane	N8	0.0008	0.0036	0.000	0.000
2t-Ethylmethylcyclopentane	N8	0.0007	0.0031	0.000	0.000
1,1-Methylethylcyclopentane	N8	0.0021	0.0094	0.001	0.001
2,2,4-Trimethylhexane	I9	0.0001	0.0005	0.000	0.000
1t,2-Dimethylcyclohexane	N8	0.0015	0.0067	0.001	0.001
n-Octane	P8	0.0067	0.0305	0.003	0.003
1c,4-Dimethylcyclohexane	N8	0.0007	0.0031	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	0.0001	0.0005	0.000	0.000
2,2,3,4-Tetramethylpentane	I9	0.0001	0.0005	0.000	0.000
1c,2-Dimethylcyclohexane	N8	0.0004	0.0018	0.000	0.000
1,1,4-Trimethylcyclohexane	N9	0.0015	0.0075	0.001	0.001
2,2,3-Trimethylhexane	I9	0.0006	0.0031	0.000	0.000
2,4-Dimethylheptane	I9	0.0003	0.0015	0.000	0.000
Ethylcyclohexane	N8	0.0007	0.0031	0.000	0.000
n-Propylcyclopentane	N8	0.0003	0.0014	0.000	0.000
2,5-Dimethylheptane	I9	0.0001	0.0005	0.000	0.000
3,3-Dimethylheptane	I9	0.0001	0.0005	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	0.0002	0.0010	0.000	0.000
Ethylbenzene	I8	0.0013	0.0055	0.001	0.001
1c,2t,4t-Trimethylcyclohexane	N9	0.0002	0.0010	0.000	0.000
1,3-Dimethylbenzene (m-Xylene)	A8	0.0010	0.0042	0.000	0.000
1,4-Dimethylbenzene (p-Xylene)	A8	0.0008	0.0034	0.000	0.000
3,4-Dimethylheptane	I9	0.0002	0.0010	0.000	0.000
3,4-Dimethylheptane (2)	I9	0.0002	0.0010	0.000	0.000
4-Methyloctane	I9	0.0003	0.0015	0.000	0.000
2-Methyloctane	I9	0.0003	0.0015	0.000	0.000
1c,2t,3-Trimethylcyclohexane	N9	0.0001	0.0005	0.000	0.000
3-Ethylheptane	I9	0.0001	0.0005	0.000	0.000
3-Methyloctane	I9	0.0004	0.0020	0.000	0.000
1,2-Dimethylbenzene (o-Xylene)	A8	0.0007	0.0029	0.000	0.000
i-Butylcyclopentane	N9	0.0003	0.0015	0.000	0.000
n-Nonane	P9	0.0011	0.0056	0.001	0.001
1,1-Methylethylcyclohexane	N9	0.0002	0.0010	0.000	0.000
i-Propylbenzene	A9	0.0002	0.0010	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	0.0002	0.0010	0.000	0.000
3,3-Dimethyloctane	I10	0.0001	0.0006	0.000	0.000
n-Propylbenzene	A9	0.0002	0.0010	0.000	0.000
3,6-Dimethyloctane	I10	0.0002	0.0011	0.000	0.000
3-Methyl-5-ethylheptane	I10	0.0002	0.0011	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	0.0002	0.0010	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	0.0001	0.0005	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
t-Butylbenzene	A10	0.0006	0.0032	0.000	0.000
i-Butylcyclohexane	N10	0.0002	0.0011	0.000	0.000
i-Butylbenzene	A10	0.0001	0.0005	0.000	0.000
UnknownC9s	U9	0.0009	0.0046	0.001	0.001
n-Decane	P10	0.0011	0.0063	0.001	0.001
1,2,3-Trimethylbenzene	A9	0.0003	0.0014	0.000	0.000
1,3-Methyl-i-propylbenzene	A10	0.0001	0.0005	0.000	0.000
1,4-Methyl-i-propylbenzene	A10	0.0001	0.0005	0.000	0.000
Sec-Butylcyclohexane	A10	0.0004	0.0022	0.000	0.000

1,2-Methyl-i-propylbenzene	A10	0.0003	0.0016	0.000	0.000
1,3-Diethylbenzene	A10	0.0001	0.0005	0.000	0.000
1,4-Diethylbenzene	A10	0.0003	0.0016	0.000	0.000
n-Butylbenzene	A10	0.0001	0.0005	0.000	0.000
1,3-Dimethyl-5-ethylbenzene	A10	0.0001	0.0005	0.000	0.000
1,2-Diethylbenzene	A10	0.0002	0.0011	0.000	0.000
t-Decahydronaphthalene	A9	0.0001	0.0006	0.000	0.000
1,2-Methyl-n-propylbenzene	A10	0.0002	0.0011	0.000	0.000
1,4-Dimethyl-2-ethylbenzene	A10	0.0002	0.0011	0.000	0.000
1,3-Dimethyl-4-ethylbenzene	A10	0.0003	0.0016	0.000	0.000
1,2-Dimethyl-4-ethylbenzene	A10	0.0001	0.0005	0.000	0.000
1,3-Dimethyl-2-ethylbenzene	A10	0.0002	0.0011	0.000	0.000
1,2-Dimethyl-3-ethylbenzene	A10	0.0003	0.0016	0.000	0.000
1,2-Ethyl-i-propylbenzene	A10	0.0001	0.0006	0.000	0.000
1,4-Methyl-t-butylbenzene	A11	0.0002	0.0012	0.000	0.000
UnknownC10s	U10	0.0010	0.0057	0.001	0.001
n-Undecane	P11	0.0026	0.0162	0.002	0.002
1,4-Ethyl-i-propylbenzene	A11	0.0001	0.0006	0.000	0.000
1,2,4,5-Tetramethylbenzene	A11	0.0005	0.0027	0.000	0.000
1,2-Methyl-n-butylbenzene	A11	0.0002	0.0012	0.000	0.000
1,2-Methyl-t-butylbenzene	A11	0.0004	0.0023	0.000	0.000
5-Methylindan	A11	0.0001	0.0005	0.000	0.000
1,2-Ethyl-n-propylbenzene	A11	0.0005	0.0029	0.000	0.000
2-Methylindan	A11	0.0002	0.0010	0.000	0.000
1,3-Methyl-n-butylbenzene	A11	0.0002	0.0012	0.000	0.000
1,3-Di-i-propylbenzene	A11	0.0003	0.0019	0.000	0.000
sec-Pentylbenzene	A11	0.0003	0.0017	0.000	0.000
n-Pentylbenzene	A11	0.0002	0.0012	0.000	0.000
1t-M-2-(4MP)cyclopentane	P12	0.0001	0.0007	0.000	0.000
1,2-Di-n-propylbenzene	A11	0.0005	0.0032	0.000	0.000
1,4-Di-i-propylbenzene	A11	0.0006	0.0039	0.000	0.000
Tetrahydronaphthalene	A10	0.0002	0.0010	0.000	0.000
Naphthalene	A10	0.0004	0.0020	0.000	0.000
1,4-Ethyl-t-butylbenzene	A11	0.0005	0.0032	0.000	0.000
1,3-Di-n-propylbenzene	A12	0.0003	0.0019	0.000	0.000
UnknownC11s	U11	0.0014	0.0087	0.001	0.001
n-Dodecane	P12	0.0039	0.0265	0.003	0.003
1,2,4-Triethylbenzene	A12	0.0009	0.0058	0.001	0.001
1,4-Methyl-n-pentylbenzene	A12	0.0002	0.0013	0.000	0.000
n-Hexylbenzene	A12	0.0003	0.0019	0.000	0.000
1,2,3,4,5-Pentamethylbenzene	A13	0.0011	0.0065	0.001	0.001
2-Methylnaphthalene	A11	0.0012	0.0068	0.001	0.001
1-Methylnaphthalene	A11	0.0015	0.0085	0.001	0.001
UnknownC12s	U12	0.0033	0.0206	0.002	0.002
n-Tridecane	P13	0.0041	0.0301	0.003	0.003
UnknownC13s	U13	0.0044	0.0323	0.003	0.003
n-Tetradecane	P14	0.0027	0.0214	0.002	0.002
UnknownC14s	U14	0.0041	0.0324	0.003	0.003
n-Pentadecane	P15	0.0013	0.0110	0.001	0.001
UnknownC15s	U15	0.0044	0.0373	0.004	0.004
n-Hexadecane	P16	0.0005	0.0045	0.000	0.000
UnknownC16s	U16	0.0012	0.0108	0.001	0.001
n-Heptadecane	P17	0.0002	0.0019	0.000	0.000
UnknownC17s	U17	0.0003	0.0029	0.000	0.000
n-Octadecane	P18	0.0001	0.0010	0.000	0.000
UnknownC18s	U18	0.0001	0.0010	0.000	0.000
n-Nonadecane	P19	0.0001	0.0011	0.000	0.000
UnknownC19s	U19	0.0001	0.0011	0.000	0.000
n-Eicosane	P20	0.0001	0.0011	0.000	0.000
TOTAL		100.00000	100.00000	8.2721	8.3170

BTEX COMPONENTS	**MOLE%**	**WT%**
BENZENE	0.0493	0.1536
TOLUENE	0.0195	0.0717
ETHYLBENZENE	0.0013	0.0055
XYLENES	0.0025	0.0105
TOTAL BTEX	0.0726	0.2413

	BTU @	14.650	14.730
LOW	NET DRY REAL :	1290.0 **/scf**	1297.0 **/scf**
	NET WET REAL :	1267.4 **/scf**	1274.5 **/scf**
HIGH	GROSS DRY REAL :	1416.5 **/scf**	1424.2 **/scf**
	GROSS WET REAL :	1391.7 **/scf**	1399.5 **/scf**
	NET DRY REAL :	19557.6 **/lb**	19664.4 **/lb**
	GROSS DRY REAL :	21473.8 **/lb**	21591.0 **/lb**

RELATIVE DENSITY (AIR=1): 0.8645

COMPRESSIBILITY FACTOR : 0.99527

(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.

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