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

303-637-0150

EXTENDED NATURAL GAS LIQUID ANALYSIS (*DHA)

MAIN PAGE

PROJECT NO. :	201404096	ANALYSIS NO. :	01
COMPANY NAME :	CARRIZO OIL & GAS	ANALYSIS DATE:	APRIL 28, 2014
ACCOUNT NO. :		SAMPLE DATE :	APRIL 17, 2014
PRODUCER :		CYLINDER NO. :	2821
LEASE NO. :		SAMPLED BY :	JOHN MOSER
NAME/DESCRIP :	OIL TREATER @ 13:35 STATE 4-16-9-60		EMPACT
FIELD DATA		SAMPLE TEMP. :	126
SAMPLE PRES. :	23	AMBIENT TEMP.:	
VAPOR PRES. :		GRAVITY :	
COMMENTS :	SPOT; NO PROBE		

COMPONENT	MOLE %	MASS %	VOL %
ALCOHOLS	0.0087	0.0051	0.0048
NITROGEN (AIR)	0.0302	0.0075	0.0069
CARBON DIOXIDE	0.0337	0.0132	0.0120
METHANE	0.0694	0.0099	0.0246
ETHANE	0.3626	0.0972	0.2030
PROPANE	1.6425	0.6460	0.9479
I-BUTANE	0.4261	0.2209	0.2919
N-BUTANE	2.1494	1.1140	1.4191
I-PENTANE	0.9194	0.5916	0.7049
N-PENTANE	1.5085	0.9706	1.1441
HEXANES PLUS	92.8495	96.3240	95.2408
TOTALS	100.0000	100.0000	100.0000

BTEX COMPONENTS	**MOLE%**	**MASS%**
BENZENE	1.3173	0.9176
TOLUENE	2.5453	2.0915
ETHYLBENZENE	0.8263	0.7823
XYLENE	2.0641	1.9544
TOTAL BTEX	6.7530	5.7458

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

	TOTAL SAMPLE	**C6+ FRACTION**	
Specific Gravity (H2O=1) =	0.7444	0.7531	60/60
API Gravity =	58.59	56.39	60/60
Molecular Weight =	112.13	117.169	
Absolute Density =	6.21	6.27	LBS/GAL
Heating Value Liq. Idl Gas=	126094	127391	BTU/GAL
Vapor/Liquid =	21.14	20.48	CUFT/GAL
Vapor Pressure =	13.00	1.75	PSIA @100 F

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

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EXTENDED NATURAL GAS LIQUID ANALYSIS (*DHA)

E & P TANK / GLYCALC INFORMATION

PROJECT NO. :	201404096	ANALYSIS NO. :	01
COMPANY NAME :	CARRIZO OIL & GAS	ANALYSIS DATE:	APRIL 28, 2014
ACCOUNT NO. :		SAMPLE DATE :	APRIL 17, 2014
PRODUCER :		CYLINDER NO. :	2821
LEASE NO. :		SAMPLED BY :	JOHN MOSER
NAME/DESCRIP :	OIL TREATER @ 13:35 STATE 4-16-9-60		EMPACT
FIELD DATA		SAMPLE TEMP. :	126
SAMPLE PRES. :	23	AMBIENT TEMP.:	
VAPOR PRES. :		GRAVITY :	
COMMENTS :	SPOT; NO PROBE		

COMPONENT	Mole %		Wt %		LV %	
CARBON DIOXIDE	0.0337		0.0132		0.0120	
NITROGEN (AIR)	0.0302		0.0075		0.0069	
METHANE	0.0694		0.0099		0.0246	
ETHANE	0.3626		0.0972		0.2030	
PROPANE	1.6425		0.6460		0.9479	
I-BUTANE	0.4261		0.2209		0.2919	
N-BUTANE	2.1494		1.1140		1.4191	
I-PENTANE	0.9194		0.5916		0.7049	
N-PENTANE	1.5085		0.9706		1.1441	
CYCLOPENTANE (N-C5)	1.6664		1.0422		1.0199	
N-HEXANE	6.9759		5.3619		6.0098	
CYCLOHEXANE (OTHER C6)	2.6619		1.9978		1.8970	
OTHER HEXANES	11.1037		8.4464		8.9926	
OTHER HEPTANES	13.7489		12.1963		12.7399	
METHYLCYCLOHEXANE (OTHER C7)	3.9123		3.4258		3.2897	
2,2,4 TRIMETHYLPENTANE	0.8995		0.7876		0.7776	
BENZENE	1.3173		0.9176		0.7732	
TOLUENE	2.5453		2.0915		1.7797	
ETHYLBENZENE	0.8263		0.7823		0.6656	
XYLENES	2.0641		1.9544		1.6643	
OTHER OCTANES	10.7364		10.9746		11.0923	
OCTANES PLUS	----	48.9178	----	60.8445	----	58.7390
NONANES	10.5882		11.9563		11.7031	
DECANES PLUS	23.8033		34.3893		32.8361	
SUB TOTAL	99.9913		99.9949		99.9952	
ALCOHOLS	0.0087		0.0051		0.0048	
TOTAL	100.0000		100.0000		100.0000	

API Gravity =	**58.59**	60/60
Vapor Pressure =	**13.00**	PSIA & 100 F
Average Molecular Weight of Decanes plus =	**162.00**	
Average Specific Gravity of Decanes plus =	**0.7800**	

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BY CARBON NUMBER

PROJECT NO. :	201404096	ANALYSIS NO. :	01
COMPANY NAME :	CARRIZO OIL & GAS	ANALYSIS DATE:	APRIL 28, 2014
ACCOUNT NO. :		SAMPLE DATE :	APRIL 17, 2014
PRODUCER :		CYLINDER NO. :	2821
LEASE NO. :		SAMPLED BY :	JOHN MOSER
NAME/DESCRIP :	OIL TREATER @ 13:35		EMPACT
	STATE 4-16-9-60		
FIELD DATA		SAMPLE TEMP. :	126
SAMPLE PRES. :	23	AMBIENT TEMP.:	
VAPOR PRES. :		GRAVITY :	
COMMENTS :	SPOT; NO PROBE		

COMPONENT / CARBON NUMBER	MOLE%	MASS %	VOLUME %
ALCOHOLS	0.0087	0.0051	0.0048
NITROGEN	0.0302	0.0075	0.0069
CARBON DIOXIDE	0.0337	0.0132	0.0120
C1	0.0694	0.0099	0.0246
C2	0.3626	0.0972	0.2030
C3	1.6425	0.6460	0.9479
C4	2.5755	1.3349	1.7110
C5	4.0943	2.6044	2.8689
C6	22.0588	16.7237	17.6726
C7	20.2065	17.7136	17.8093
C8	14.5263	14.4989	14.1998
C9	10.5882	11.9563	11.7031
C10	8.9594	10.9030	10.3996
C11	4.8758	6.4489	6.0116
C12	2.7987	4.0296	3.8733
C13	2.2914	3.6631	3.5405
C14	1.8661	3.3015	3.2177
C15	1.6626	3.1495	3.0342
C16	0.6180	1.2480	1.1945
C17	0.3049	0.6539	0.6240
C18	0.2784	0.6318	0.6011
C19	0.1043	0.2497	0.2360
C20	0.0419	0.1055	0.0991
C21	0.0010	0.0026	0.0024
C22	0.0008	0.0022	0.0021
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

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EXTENDED NATURAL GAS LIQUID ANALYSIS (*DHA)

DHA COMPONENT LIST

PROJECT NO. :	201404096	ANALYSIS NO. :	01
COMPANY NAME :	CARRIZO OIL & GAS	ANALYSIS DATE:	APRIL 28, 2014
ACCOUNT NO. :		SAMPLE DATE :	APRIL 17, 2014
PRODUCER :		CYLINDER NO. :	2821
LEASE NO. :		SAMPLED BY :	JOHN MOSER
NAME/DESCRIP :	OIL TREATER @ 13:35 STATE 4-16-9-60		EMPACT
FIELD DATA		SAMPLE TEMP. :	126
SAMPLE PRES. :	23	AMBIENT TEMP.:	
VAPOR PRES. :		GRAVITY :	
COMMENTS :	SPOT; NO PROBE		

COMPONENT	PIANO #	MOLE %	MASS %	VOL %
Nitrogen	NHC	0.0302	0.0075	0.0069
Carbon Dioxide	NHC	0.0337	0.0132	0.0120
Methane	P1	0.0694	0.0099	0.0246
Ethane	P2	0.3626	0.0972	0.2030
Propane	P3	1.6425	0.6460	0.9479
i-Butane	I4	0.4261	0.2209	0.2919
n-Butane	P4	2.1494	1.1140	1.4191
2,2-Dimethylpropane	I5	0.0098	0.0063	0.0078
i-Pentane	I5	0.9096	0.5853	0.6971
i-Propanol	X3	0.0054	0.0029	0.0027
n-Pentane	P5	1.5085	0.9706	1.1441
t-Butanol	X4	0.0033	0.0022	0.0021
2,2-Dimethylbutane	I6	0.0317	0.0244	0.0278
Cyclopentane	N5	1.6664	1.0422	1.0199
2,3-Dimethylbutane	I6	0.3404	0.2616	0.2918
2-Methylpentane	I6	3.6749	2.8243	3.1943
3-Methylpentane	I6	2.2146	1.7020	1.8929
n-Hexane	P6	6.9759	5.3619	6.0098
2,2-Dimethylpentane	I7	0.0125	0.0112	0.0122
Methylcyclopentane	N6	4.8421	3.6341	3.5858
2,4-Dimethylpentane	I7	0.2139	0.1911	0.2102
2,2,3-Trimethylbutane	I7	0.0092	0.0082	0.0088
Benzene	A6	1.3173	0.9176	0.7732
3,3-Dimethylpentane	I7	0.0213	0.0190	0.0203
Cyclohexane	N6	2.6619	1.9978	1.8970
2-Methylhexane	I7	1.3012	1.1627	1.2676
2,3-Dimethylpentane	I7	0.6500	0.5808	0.6152
1,1-Dimethylcyclopentane	N7	0.3106	0.2720	0.2665
3-Methylhexane	I7	1.7629	1.5753	1.6916
1c,3-Dimethylcyclopentane	N7	0.9774	0.8559	0.8495
1t,3-Dimethylcyclopentane	N7	0.8995	0.7876	0.7776
3-Ethylpentane	I7	0.1605	0.1434	0.1515
1t,2-Dimethylcyclopentane	N7	1.8717	1.6389	1.6125
2,2,4-Trimethylpentane	I8	0.0415	0.0423	0.0450
n-Heptane	P7	4.5994	4.1099	4.4426

1c,2-Dimethylcyclopentane	N7	0.1913	0.1675	0.1604
Methylcyclohexane	N7	3.9123	3.4258	3.2897
2,2-Dimethylhexane	I8	0.3772	0.3843	0.4084
Ethylcyclopentane	N7	0.7261	0.6358	0.6134
2,5-Dimethylhexane	I8	0.1429	0.1456	0.1551
2,2,3-Trimethylpentane	I8	0.0152	0.0155	0.0160
2,4-Dimethylhexane	I8	0.2190	0.2231	0.2365
1c,2t,4-Trimethylcyclopentane	N8	0.4412	0.4415	0.4277
3,3-Dimethylhexane	I8	0.0330	0.0336	0.0350
2,3,4-Trimethylpentane	I8	0.1065	0.1085	0.1115
2,3,3-Trimethylpentane	I8	0.0069	0.0070	0.0071
Toluene	A7	2.5453	2.0915	1.7797
2,3-Dimethylhexane	I8	0.1889	0.1924	0.1999
2-Methyl-3-ethylpentane	I8	0.1526	0.1554	0.1597
1,1,2-Trimethylcyclopentane	N8	0.0036	0.0036	0.0034
2-Methylheptane	I8	1.3226	1.3473	1.4246
4-Methylheptane	I8	0.3749	0.3819	0.3941
3-Methyl-3-ethylpentane	I8	0.0707	0.0720	0.0732
3,4-Dimethylhexane	I8	0.0597	0.0608	0.0625
1c,2c,4-Trimethylcyclopentane	N8	0.0297	0.0297	0.0285
1c,3-Dimethylcyclohexane	N8	0.0296	0.0296	0.0286
3-Methylheptane	I8	0.6436	0.6556	0.6872
1c,2t,3-Trimethylcyclopentane	N8	0.9761	0.9768	0.9377
3-Ethylhexane	I8	0.1192	0.1214	0.1259
1t,4-Dimethylcyclohexane	N8	0.3717	0.3719	0.3607
1,1-Dimethylcyclohexane	N8	0.1094	0.1095	0.1037
3c-Ethylmethylcyclopentane	N8	0.0026	0.0026	0.0025
3t-Ethylmethylcyclopentane	N8	0.2293	0.2295	0.2214
2t-Ethylmethylcyclopentane	N8	0.2000	0.2001	0.1925
1,1-Methylethylcyclopentane	N8	0.6607	0.6611	0.6262
2,2,4-Trimethylhexane	I9	0.0402	0.0460	0.0476
1t,2-Dimethylcyclohexane	N8	0.5728	0.5732	0.5465
1t,3-Dimethylcyclohexane	N8	0.0229	0.0229	0.0216
UnknownC7s	U7	0.0414	0.0370	0.0400
n-Octane	P8	2.6652	2.7150	2.8571
1c,4-Dimethylcyclohexane	N8	0.3513	0.3515	0.3321
i-Propylcyclopentane	I8	0.0884	0.0885	0.0843
2,4,4-Trimethylhexane	I9	0.0232	0.0265	0.0271
2,2,3,4-Tetramethylpentane	I9	0.0197	0.0225	0.0231
2,3,4-Trimethylhexane	I9	0.0218	0.0249	0.0255
1c,2-Dimethylcyclohexane	N8	0.1877	0.1878	0.1745
2,3,5-Trimethylhexane	I9	0.0652	0.0746	0.0764
2,2-Dimethylheptane	I9	0.0170	0.0194	0.0202
1,1,4-Trimethylcyclohexane	N9	0.0641	0.0722	0.0692
2,2,3-Trimethylhexane	I9	0.4026	0.4605	0.4670
4,4-Dimethylheptane	I9	0.0428	0.0490	0.0507
Ethylcyclohexane	N8	0.5607	0.5611	0.5270
n-Propylcyclopentane	N8	0.2106	0.2107	0.2007
1c,3c,5-Trimethylcyclohexane	N9	0.0366	0.0412	0.0395
2,5-Dimethylheptane	I9	0.0759	0.0868	0.0896
3,3-Dimethylheptane	I9	0.0961	0.1099	0.1134
3,5-Dimethylheptane	I9	0.0668	0.0764	0.0788
2,6-Dimethylheptane	I9	0.0629	0.0719	0.0750
1,1,3-Trimethylcyclohexane	N9	0.1976	0.2225	0.2132
Ethylbenzene	A8	0.8263	0.7823	0.6656
1c,2t,4t-Trimethylcyclohexane	N9	0.0992	0.1117	0.1050
2,3-Dimethylheptane	I9	0.1925	0.2202	0.2243
1,3-Dimethylbenzene (m-Xylene)	A8	1.1590	1.0974	0.9391
1,4-Dimethylbenzene (p-Xylene)	A8	0.2825	0.2675	0.2296
3,4-Dimethylheptane	I9	0.0412	0.0471	0.0476
3,4-Dimethylheptane (2)	I9	0.1534	0.1755	0.1775
4-Ethylheptane	I9	0.0305	0.0349	0.0361
4-Methyloctane	I9	0.2832	0.3239	0.3324
2-Methyloctane	I9	0.3513	0.4018	0.4165
1c,2t,4c-Trimethylcyclohexane	I9	0.0422	0.0483	0.0492
3-Ethylheptane	I9	0.0874	0.1000	0.1018
3-Methyloctane	I9	0.4565	0.5221	0.5358

3,3-Diethylpentane	I9	0.0766	0.0876	0.0859
1c,2t,3-Trimethylcyclohexane	N9	0.0875	0.0985	0.0926
1,1,2-Trimethylcyclohexane	N9	0.0240	0.0270	0.0254
1,2-Dimethylbenzene (o-Xylene)	A8	0.6226	0.5895	0.4956
i-Butylcyclopentane	N9	0.2933	0.3302	0.3128
UnknownC8s	U8	0.0480	0.0489	0.0515
n-Nonane	P9	1.7827	2.0391	2.1016
1,1-Methylethylcyclohexane	N9	0.3173	0.3629	0.3751
i-Propylbenzene	A9	0.4252	0.4557	0.3904
i-Propylcyclohexane	N9	0.1036	0.1166	0.1076
2,2-Dimethyloctane	I10	0.0850	0.1079	0.1079
2,4-Dimethyloctane	I10	0.0887	0.1126	0.1126
2,6-Dimethyloctane	I10	0.0144	0.0183	0.0189
2,5-Dimethyloctane	I10	0.0398	0.0505	0.0505
n-Butylcyclopentane	N9	0.3342	0.4181	0.3872
3,3-Dimethyloctane	I10	0.1107	0.1405	0.1406
n-Propylbenzene	A9	0.4194	0.4495	0.3851
3,6-Dimethyloctane	I10	0.2476	0.3142	0.3143
3-Methyl-5-ethylheptane	I10	0.5037	0.5761	0.5872
1,3-Methylethylbenzene	A9	0.3500	0.3752	0.3188
1,4-Methylethylbenzene	A9	0.2654	0.2845	0.2417
1,3,5-Trimethylbenzene	A9	0.1580	0.1694	0.1449
2,3-Dimethyloctane	I10	0.0681	0.0864	0.0864
5-Methylnonane	I10	0.2507	0.3181	0.3212
1,2-Methylethylbenzene	A9	0.5139	0.5508	0.4655
2-Methylnonane	I10	0.0422	0.0535	0.0545
3-Ethyloctane	I10	0.0880	0.1117	0.1117
3-Methylnonane	I10	0.2360	0.2994	0.3020
1,2,4-Trimethylbenzene	A9	0.0424	0.0454	0.0384
t-Butylbenzene	A10	0.4248	0.5085	0.4345
i-Butylcyclohexane	N10	0.2061	0.2578	0.2350
1t-Methyl-2-n-propylcyclohexane	I10	0.0350	0.0400	0.0408
i-Butylbenzene	A10	0.0725	0.0868	0.0753
sec-Butylbenzene	A10	0.0695	0.0832	0.0715
UnknownC9s	U9	2.1815	2.4952	2.5717
n-Decane	P10	1.3392	1.6992	1.7218
1,2,3-Trimethylbenzene	A9	0.2433	0.2608	0.2159
1,3-Methyl-i-propylbenzene	A10	0.1091	0.1169	0.0988
1,4-Methyl-i-propylbenzene	A10	0.1041	0.1116	0.0943
Sec-Butylcyclohexane	N10	0.3407	0.4262	0.3880
1,2-Methyl-i-propylbenzene	A10	0.1850	0.2214	0.1870
3-Ethylnonane	I10	0.0463	0.0588	0.0599
1,3-Diethylbenzene	A10	0.1562	0.1870	0.1602
1,3-Methyl-n-propylbenzene	A10	0.0522	0.0625	0.0537
1,4-Diethylbenzene	A10	0.2751	0.3293	0.2828
1,4-Methyl-n-propylbenzene	A10	0.0415	0.0497	0.0429
n-Butylbenzene	A10	0.0650	0.0778	0.0668
1,3-Dimethyl-5-ethylbenzene	A10	0.0724	0.0867	0.0742
1,2-Diethylbenzene	A10	0.1001	0.1198	0.1008
1,2-Methyl-n-propylbenzene	A10	0.1056	0.1264	0.1071
1,4-Dimethyl-2-ethylbenzene	A10	0.1508	0.1805	0.1523
1,3-Dimethyl-4-ethylbenzene	A10	0.0099	0.0119	0.0101
1,2-Dimethyl-4-ethylbenzene	A10	0.2065	0.2472	0.2093
1,3-Dimethyl-2-ethylbenzene	A10	0.1502	0.1798	0.1495
1t,2c,4-Trimethylcyclopentane	A10	0.5616	0.5620	0.5561
1,2-Dimethyl-3-ethylbenzene	A10	0.0830	0.0993	0.0824
1,2-Ethyl-i-propylbenzene	A10	0.1104	0.1321	0.1115
1,4-Methyl-t-butylbenzene	A11	0.1479	0.1770	0.1495
UnknownC10s	U10	1.8025	2.2871	2.3175
n-Undecane	P11	1.1154	1.5548	1.5537
1,4-Ethyl-i-propylbenzene	A11	0.0627	0.0751	0.0634
1,2,4,5-Tetramethylbenzene	A11	0.1498	0.1793	0.1498
1,2-Methyl-n-butylbenzene	A11	0.0837	0.1002	0.0846
1,2,3,5-Tetramethylbenzene	A11	0.1274	0.1525	0.1268
1,2-Methyl-t-butylbenzene	A11	0.1022	0.1223	0.1033
5-Methylindan	A11	0.0227	0.0345	0.0341
4-Methylindan	A11	0.0068	0.0103	0.0102

1,2-Ethyl-n-propylbenzene	A11	0.1614	0.1932	0.1631
2-Methylindan	A11	0.1237	0.1879	0.1857
1,3-Methyl-n-butylbenzene	A11	0.0866	0.1037	0.0876
1,3-Di-i-propylbenzene	A11	0.1459	0.1746	0.1474
sec-Pentylbenzene	A11	0.0696	0.0833	0.0703
n-Pentylbenzene	A11	0.0932	0.1232	0.1062
1t-M-2-(4MP)cyclopentane	P12	0.0945	0.1436	0.1419
1,2-Di-n-propylbenzene	A11	0.1148	0.1374	0.1160
1,4-Di-i-propylbenzene	A11	0.1725	0.2065	0.1744
Tetrahydronaphthalene	A10	0.0313	0.0375	0.0317
t-Decahydronaphthalene	A10	0.1688	0.2021	0.1707
Naphthalene	A10	0.1091	0.1247	0.1053
1-t-Butyl-3,5-dimethylbenzene	A12	0.0506	0.0606	0.0512
1,4-Ethyl-t-butylbenzene	A11	0.1017	0.1217	0.1028
UnknownC11s	U11	1.5150	2.1118	2.1102
n-Dodecane	P12	0.9167	1.3925	1.3762
1,3-Di-n-propylbenzene	A12	0.1000	0.1197	0.1011
1,3,5-Triethylbenzene	A12	0.0320	0.0343	0.0293
1,2,4-Triethylbenzene	A12	0.3088	0.3310	0.2796
1,4-Methyl-n-pentylbenzene	A12	0.0339	0.0406	0.0343
n-Hexylbenzene	A12	0.1392	0.2014	0.1738
1,2,3,4,5-Pentamethylbenzene	A13	0.2330	0.2789	0.2355
2-Methylnaphthalene	A11	0.2480	0.3145	0.2656
1-Methylnaphthalene	A11	0.2248	0.2851	0.2069
UnknownC12s	U12	1.1230	1.7059	1.6859
n-Tridecane	P13	0.7633	1.2549	1.2255
UnknownC13s	U13	1.2951	2.1293	2.0795
n-Tetradecane	P14	0.5991	1.0599	1.0330
UnknownC14s	U14	1.2670	2.2416	2.1847
n-Pentadecane	P15	0.3717	0.7041	0.6783
UnknownC15s	U15	1.2909	2.4454	2.3559
n-Hexadecane	P16	0.1803	0.3641	0.3485
UnknownC16s	U16	0.4377	0.8839	0.8460
n-Heptadecane	P17	0.1176	0.2522	0.2407
UnknownC17s	U17	0.1873	0.4017	0.3833
n-Octadecane	P18	0.0943	0.2140	0.2036
UnknownC18s	U18	0.1841	0.4178	0.3975
n-Nonadecane	P19	0.0318	0.0761	0.0719
UnknownC19s	U19	0.0725	0.1736	0.1641
n-Eicosane	P20	0.0097	0.0244	0.0229
UnknownC20s	U20	0.0322	0.0811	0.0762
n-Heneicosane	P21	0.0010	0.0026	0.0024
n-Docosane	P22	0.0008	0.0022	0.0021
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. :	201404096	ANALYSIS NO. :	02
COMPANY NAME :	CARRIZO OIL & GAS	ANALYSIS DATE:	APRIL 30, 2014
ACCOUNT NO. :		SAMPLE DATE :	APRIL 17, 2014
PRODUCER :		CYLINDER NO. :	1302
LEASE NO. :		SAMPLED BY :	JOHN MOSER-EMPACT
NAME/DESCRIP :	SALES GAS @ 13:45 STATE 4-16-9-60		
FIELD DATA		SAMPLE TEMP. :	80
SAMPLE PRES. :	116	AMBIENT TEMP.:	
VAPOR PRES. :		GRAVITY :	
COMMENTS :	SPOT; PROBE; LENGTH OF H2S STAIN @ 5.0 PPM (1-7 PPM) @ 13:50		

COMPONENT	MOLE %	MASS %	GPM @ 14.650	GPM @ 14.730
ALCOHOLS	0.0002	0.0006		
HELIUM	0.01	0.00	---	---
HYDROGEN	0.00	0.00	---	---
OXYGEN/ARGON	0.01	0.01	---	---
NITROGEN	0.68	0.79	---	---
CARBON DIOXIDE	2.85	5.21	---	---
METHANE	68.49960	45.65200	---	---
ETHANE	12.7411	15.9159	3.4035	3.4221
PROPANE	9.8117	17.9740	2.6995	2.7143
I-BUTANE	0.8673	2.0942	0.2834	0.2849
N-BUTANE	2.8633	6.9137	0.9012	0.9061
I-PENTANE	0.5235	1.5648	0.1882	0.1893
N-PENTANE	0.5919	1.7741	0.2143	0.2155
HEXANES PLUS	0.5514	2.1007	0.2171	0.2181
TOTALS	100.00000	100.00000	7.9072	7.9503

BTEX COMPONENTS	**MOLE%**	**WT%**
BENZENE	0.0202	0.0656
TOLUENE	0.0119	0.0455
ETHYLBENZENE	0.0017	0.0075
XYLENES	0.0034	0.0150
TOTAL BTEX	0.0372	0.1336

	BTU @	14.650	14.730
LOW	NET DRY REAL :	1235.7 **/scf**	1242.5 **/scf**
	NET WET REAL :	1214.1 **/scf**	1220.9 **/scf**
HIGH	GROSS DRY REAL :	1358.8 **/scf**	1366.2 **/scf**
	GROSS WET REAL :	1335.0 **/scf**	1342.5 **/scf**
	NET DRY REAL :	19504.0 **/lb**	19610.5 **/lb**
	GROSS DRY REAL :	21438.9 **/lb**	21555.9 **/lb**
	RELATIVE DENSITY (AIR=1):		0.8303
	COMPRESSIBILITY FACTOR :		0.99556

(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.

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

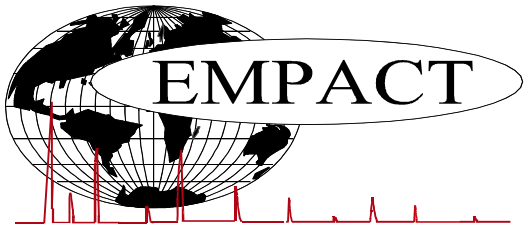
303-637-0150

EXTENDED NATURAL GAS ANALYSIS (*DHA)

GLYCALC INFORMATION

PROJECT NO. :	201404096	ANALYSIS NO. :	02
COMPANY NAME :	CARRIZO OIL & GAS	ANALYSIS DATE:	APRIL 30, 2014
ACCOUNT NO. :		SAMPLE DATE :	APRIL 17, 2014
PRODUCER :		CYLINDER NO. :	1302
LEASE NO. :		SAMPLED BY :	JOHN MOSER-EMPACT
NAME/DESCRIP :	SALES GAS @ 13:45 STATE 4-16-9-60		
FIELD DATA		SAMPLE TEMP. :	80
SAMPLE PRES. :	116	AMBIENT TEMP.:	
VAPOR PRES. :		GRAVITY :	
COMMENTS :	SPOT; PROBE; LENGTH OF H2S STAIN @ 5.0 PPM (1-7 PPM) @ 13:50		

Componet	Mole %	Wt %
Helium	0.01	0.00
Hydrogen	0.00	0.00
Carbon Dioxide	2.85	5.21
Nitrogen	0.68	0.79
Methane	68.49960	45.65200
Ethane	12.7411	15.9159
Propane	9.8117	17.9740
Isobutane	0.8673	2.0942
n-Butane	2.8633	6.9137
Isopentane	0.4726	1.4165
n-Pentane	0.5919	1.7741
Cyclopentane	0.0509	0.1483
n-Hexane	0.1116	0.3995
Cyclohexane	0.0281	0.0982
Other Hexanes	0.2080	0.7389
Heptanes	0.0926	0.3825
Methycyclohexane	0.0210	0.0857
2,2,4 Trimethylpentane	0.0002	0.0010
Benzene	0.0202	0.0656
Toluene	0.0119	0.0455
Ethylbenzene	0.0017	0.0075
Xylenes	0.0034	0.0150
C8+ Heavies	0.0527	0.2613
Subtotal	99.98980	99.98940
Oxygen/Argon	0.01	0.01
Alcohols	0.0002	0.0006
Total	100.00000	100.00000



EXTENDED NATURAL GAS ANALYSIS (*DHA)

DHA COMPONENT LIST

PROJECT NO. :	201404096	ANALYSIS NO. :	02
COMPANY NAME :	CARRIZO OIL & GAS	ANALYSIS DATE:	APRIL 30, 2014
ACCOUNT NO. :		SAMPLE DATE :	APRIL 17, 2014
PRODUCER :		CYLINDER NO. :	1302
LEASE NO. :		SAMPLED BY :	JOHN MOSER-EMPACT
NAME/DESCRIP :	SALES GAS @ 13:45 STATE 4-16-9-60		
FIELD DATA		SAMPLE TEMP. :	80
SAMPLE PRES. :	116	AMBIENT TEMP.:	
VAPOR PRES. :		GRAVITY :	
COMMENTS :	SPOT; PROBE; LENGTH OF H2S STAIN @ 5.0 PPM (1-7 PPM) @ 13:50		

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	---	0.68	0.79	---	---
Carbon Dioxide	---	2.85	5.21	---	---
Methane	P1	68.49960	45.65200	---	---
Ethane	P2	12.7411	15.9159	3.404	3.422
Propane	P3	9.8117	17.9740	2.700	2.714
i-Butane	I4	0.8673	2.0942	0.283	0.285
n-Butane	P4	2.8633	6.9137	0.901	0.906
2,2-Dimethylpropane	I5	0.0019	0.0057	0.001	0.001
i-Pentane	I5	0.4707	1.4108	0.172	0.173
n-Pentane	P5	0.5919	1.7741	0.214	0.216
t-Butanol	X4	0.0002	0.0006	0.000	0.000
2,2-Dimethylbutane	I6	0.0012	0.0043	0.000	0.000
Cyclopentane	N5	0.0509	0.1483	0.015	0.015
2,3-Dimethylbutane	I6	0.0078	0.0279	0.003	0.003
2-Methylpentane	I6	0.0854	0.3058	0.035	0.035
3-Methylpentane	I6	0.0444	0.1590	0.018	0.018
n-Hexane	P6	0.1116	0.3995	0.046	0.046
Methylcyclopentane	N6	0.0692	0.2419	0.024	0.024
2,4-Dimethylpentane	I7	0.0025	0.0104	0.001	0.001
2,2,3-Trimethylbutane	I7	0.0001	0.0004	0.000	0.000
Benzene	A6	0.0202	0.0656	0.006	0.006
3,3-Dimethylpentane	I7	0.0001	0.0004	0.000	0.000
Cyclohexane	N6	0.0281	0.0982	0.010	0.010
2-Methylhexane	I7	0.0104	0.0433	0.005	0.005
2,3-Dimethylpentane	I7	0.0051	0.0212	0.002	0.002
1,1-Dimethylcyclopentane	N7	0.0030	0.0123	0.001	0.001
3-Methylhexane	I7	0.0127	0.0529	0.006	0.006
1c,3-Dimethylcyclopentane	N7	0.0075	0.0306	0.003	0.003
1t,3-Dimethylcyclopentane	N7	0.0067	0.0273	0.003	0.003
3-Ethylpentane	I7	0.0005	0.0021	0.000	0.000
1t,2-Dimethylcyclopentane	N7	0.0140	0.0571	0.006	0.006
2,2,4-Trimethylpentane	I8	0.0002	0.0010	0.000	0.000
n-Heptane	P7	0.0253	0.1053	0.012	0.012

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1c,2-Dimethylcyclopentane	N7	0.0011	0.0045	0.001	0.001
Methylcyclohexane	N7	0.0210	0.0857	0.008	0.008
2,2-Dimethylhexane	I8	0.0018	0.0086	0.001	0.001
Ethylcyclopentane	N7	0.0036	0.0147	0.001	0.001
2,5-Dimethylhexane	I8	0.0005	0.0024	0.000	0.000
2,4-Dimethylhexane	I8	0.0009	0.0043	0.000	0.000
1c,2t,4-Trimethylcyclopentane	N8	0.0019	0.0089	0.001	0.001
3,3-Dimethylhexane	I8	0.0001	0.0005	0.000	0.000
1t,2c,4-Trimethylcyclopentane	N8	0.0022	0.0103	0.001	0.001
2,3,4-Trimethylpentane	I8	0.0004	0.0019	0.000	0.000
Toluene	A7	0.0119	0.0455	0.004	0.004
2,3-Dimethylhexane	I8	0.0008	0.0038	0.000	0.000
2-Methyl-3-ethylpentane	I8	0.0004	0.0019	0.000	0.000
1,1,2-Trimethylcyclopentane	N8	0.0001	0.0005	0.000	0.000
2-Methylheptane	I8	0.0042	0.0199	0.002	0.002
4-Methylheptane	I8	0.0012	0.0057	0.001	0.001
3-Methyl-3-ethylpentane	I8	0.0001	0.0005	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	0.0017	0.0081	0.001	0.001
1c,2t,3-Trimethylcyclopentane	N8	0.0030	0.0140	0.002	0.002
3-Ethylhexane	I8	0.0004	0.0019	0.000	0.000
1t,4-Dimethylcyclohexane	N8	0.0011	0.0051	0.001	0.001
1,1-Dimethylcyclohexane	N8	0.0004	0.0019	0.000	0.000
3t-Ethylmethylcyclopentane	N8	0.0007	0.0033	0.000	0.000
2t-Ethylmethylcyclopentane	N8	0.0006	0.0028	0.000	0.000
1,1-Methylethylcyclopentane	N8	0.0018	0.0084	0.001	0.001
2,2,4-Trimethylhexane	I9	0.0001	0.0005	0.000	0.000
1t,2-Dimethylcyclohexane	N8	0.0015	0.0070	0.001	0.001
n-Octane	P8	0.0053	0.0251	0.003	0.003
1c,4-Dimethylcyclohexane	N8	0.0016	0.0075	0.001	0.001
i-Propylcyclopentane	I8	0.0001	0.0005	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
1c,2-Dimethylcyclohexane	N8	0.0003	0.0014	0.000	0.000
1,1,4-Trimethylcyclohexane	N9	0.0018	0.0094	0.001	0.001
2,2,3-Trimethylhexane	I9	0.0007	0.0037	0.000	0.000
2,4-Dimethylheptane	I9	0.0003	0.0016	0.000	0.000
4,4-Dimethylheptane	I9	0.0001	0.0005	0.000	0.000
Ethylcyclohexane	N8	0.0010	0.0047	0.000	0.000
n-Propylcyclopentane	N8	0.0003	0.0014	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	0.0001	0.0005	0.000	0.000
Ethylbenzene	I8	0.0017	0.0075	0.001	0.001
1c,2t,4t-Trimethylcyclohexane	N9	0.0004	0.0021	0.000	0.000
2,3-Dimethylheptane	I9	0.0002	0.0011	0.000	0.000
1,3-Dimethylbenzene (m-Xylene)	A8	0.0014	0.0062	0.001	0.001
1,4-Dimethylbenzene (p-Xylene)	A8	0.0010	0.0044	0.000	0.000
3,4-Dimethylheptane	I9	0.0001	0.0005	0.000	0.000
3,4-Dimethylheptane (2)	I9	0.0002	0.0011	0.000	0.000
4-Ethylheptane	I9	0.0001	0.0005	0.000	0.000
4-Methyloctane	I9	0.0004	0.0021	0.000	0.000
2-Methyloctane	I9	0.0005	0.0027	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	0.0006	0.0032	0.000	0.000

1,2-Dimethylbenzene (o-Xylene)	A8	0.0010	0.0044	0.000	0.000
i-Butylcyclopentane	N9	0.0004	0.0021	0.000	0.000
n-Nonane	P9	0.0019	0.0101	0.001	0.001
1,1-Methylethylcyclohexane	N9	0.0002	0.0010	0.000	0.000
i-Propylbenzene	A9	0.0004	0.0020	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	0.0021	0.000	0.000
3,3-Dimethyloctane	I10	0.0001	0.0006	0.000	0.000
n-Propylbenzene	A9	0.0003	0.0015	0.000	0.000
3,6-Dimethyloctane	I10	0.0003	0.0018	0.000	0.000
3-Methyl-5-ethylheptane	I10	0.0003	0.0018	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	0.0004	0.0020	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	0.0016	0.0085	0.001	0.001
n-Decane	P10	0.0005	0.0030	0.000	0.000
1,2,3-Trimethylbenzene	A9	0.0002	0.0010	0.000	0.000
1,3-Methyl-i-propylbenzene	A10	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
1,3-Diethylbenzene	A10	0.0001	0.0005	0.000	0.000
1,4-Diethylbenzene	A10	0.0001	0.0005	0.000	0.000
1,2-Dimethyl-4-ethylbenzene	A10	0.0001	0.0005	0.000	0.000
1,4-Methyl-t-butylbenzene	A11	0.0001	0.0006	0.000	0.000
UnknownC10s	U10	0.0014	0.0083	0.001	0.001
n-Undecane	P11	0.0002	0.0013	0.000	0.000
1,4-Di-i-propylbenzene	A11	0.0001	0.0007	0.000	0.000
UnknownC11s	U11	0.0002	0.0013	0.000	0.000
n-Dodecane	P12	0.0001	0.0007	0.000	0.000
TOTAL		100.00000	100.00000	7.9072	7.9503

BTEX COMPONENTS	**MOLE%**	**WT%**
BENZENE	0.0202	0.0656
TOLUENE	0.0119	0.0455
ETHYLBENZENE	0.0017	0.0075
XYLENES	0.0034	0.0150
TOTAL BTEX	0.0372	0.1336

		BTU @	14.650	14.730
LOW	NET DRY REAL :		1235.7 **/scf**	1242.5 **/scf**
	NET WET REAL :		1214.1 **/scf**	1220.9 **/scf**
HIGH	GROSS DRY REAL :		1358.8 **/scf**	1366.2 **/scf**
	GROSS WET REAL :		1335.0 **/scf**	1342.5 **/scf**
	NET DRY REAL :		19504.0 **/lb**	19610.5 **/lb**
	GROSS DRY REAL :		21438.9 **/lb**	21555.9 **/lb**

RELATIVE DENSITY (AIR=1): 0.8303

COMPRESSIBILITY FACTOR : 0.99556

(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.

CRUDE OIL ASSAY

PROJECT NO. :	201404096	ANALYSIS NO. :	03
COMPANY NAME :	CARRIZO OIL & GAS	ANALYSIS DATE:	APRIL 30, 2014
ACCOUNT NO. :		SAMPLE DATE :	APRIL 17, 2014
PRODUCER :		CYLINDER NO. :	1L GLASS JAR
LEASE NO. :		SAMPLED BY :	JOHN MOSER
NAME/DESCRIP :	PRODUCTION TANK @ 14:10 STATE 4-16-9-60		EMPACT
FIELD DATA		SAMPLE TEMP. :	79
SAMPLE PRES. :		AMBIENT TEMP.:	
VAPOR PRES. :		GRAVITY :	
COMMENTS :	SPOT		

SPECIFICATION		TEST METHOD	UNITS	RESULTS
API GRAVITY			API 60/60	34.7
RVP @100 DEG F		D323	PSIG	7.6
TOTAL SULFUR		D2622	WT %	0.458
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 RED/BROWN, CLOUDY
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