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

303-637-0150

EXTENDED NATURAL GAS LIQUID ANALYSIS (*DHA)

MAIN PAGE

PROJECT NO. :	201308014	ANALYSIS NO. :	10
COMPANY NAME :	CARRIZO OIL & GAS	ANALYSIS DATE:	AUGUST 6, 2013
ACCOUNT NO. :		SAMPLE DATE :	AUGUST 4, 2013
PRODUCER :		CYLINDER NO. :	6016
LEASE NO. :		SAMPLED BY :	BURL MCENDREE
NAME/DESCRIP :	SEPARATOR		EMPACT
	NELSON 4-17-9-60		
FIELD DATA		SAMPLE TEMP. :	168
SAMPLE PRES. :	9	AMBIENT TEMP.:	
VAPOR PRES. :		GRAVITY :	
COMMENTS :	SPOT; NO PROBE		

COMPONENT	MOLE %	MASS %	VOL %
ALCOHOLS	0.0054	0.0037	0.0035
NITROGEN (AIR)	0.0669	0.0174	0.0159
CARBON DIOXIDE	0.0296	0.0121	0.0110
METHANE	0.0424	0.0063	0.0156
ETHANE	0.1715	0.0480	0.0998
PROPANE	1.1216	0.4604	0.6726
I-BUTANE	0.3674	0.1988	0.2616
N-BUTANE	1.8791	1.0166	1.2893
I-PENTANE	0.8966	0.6022	0.7156
N-PENTANE	1.5012	1.0082	1.1832
HEXANES PLUS	93.9183	96.6263	95.7319
TOTALS	100.0000	100.0000	100.0000

BTEX COMPONENTS	**MOLE%**	**MASS%**
BENZENE	1.6785	1.2204
TOLUENE	3.0999	2.6588
ETHYLBENZENE	0.8409	0.8310
XYLENE	2.3034	2.2765
TOTAL BTEX	7.9227	6.9867

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

	TOTAL SAMPLE	**C6+ FRACTION**	
Specific Gravity (H2O=1) =	0.7406	0.7475	60/60
API Gravity =	59.56	57.8	60/60
Molecular Weight =	107.43	111.311	
Absolute Density =	6.17	6.23	LBS/GAL
Heating Value Liq. Idl Gas=	125353	126874	BTU/GAL
Vapor/Liquid =	21.81	21.33	CUFT/GAL
Vapor Pressure =	9.19	1.99	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. :	201308014	ANALYSIS NO. :	10
COMPANY NAME :	CARRIZO OIL & GAS	ANALYSIS DATE:	AUGUST 6, 2013
ACCOUNT NO. :		SAMPLE DATE :	AUGUST 4, 2013
PRODUCER :		CYLINDER NO. :	6016
LEASE NO. :		SAMPLED BY :	BURL MCENDREE
NAME/DESCRIP :	SEPARATOR		EMPACT
	NELSON 4-17-9-60		
FIELD DATA		SAMPLE TEMP. :	168
SAMPLE PRES. :	9	AMBIENT TEMP.:	
VAPOR PRES. :		GRAVITY :	
COMMENTS :	SPOT; NO PROBE		

COMPONENT	Mole %		Wt %		LV %	
CARBON DIOXIDE	0.0296		0.0121		0.0110	
NITROGEN (AIR)	0.0669		0.0174		0.0159	
METHANE	0.0424		0.0063		0.0156	
ETHANE	0.1715		0.0480		0.0998	
PROPANE	1.1216		0.4604		0.6726	
I-BUTANE	0.3674		0.1988		0.2616	
N-BUTANE	1.8791		1.0166		1.2893	
I-PENTANE	0.8966		0.6022		0.7156	
N-PENTANE	1.5012		1.0082		1.1832	
CYCLOPENTANE (N-C5)	1.7900		1.1685		1.1385	
N-HEXANE	8.1214		6.5149		7.2683	
CYCLOHEXANE (OTHER C6)	3.2217		2.5239		2.3860	
OTHER HEXANES	13.0988		10.4068		11.0677	
OTHER HEPTANES	14.5231		13.4504		14.0027	
METHYLCYCLOHEXANE (OTHER C7)	4.3800		4.0033		3.8274	
2,2,4 TRIMETHYLPENTANE	0.8891		0.8126		0.7988	
BENZENE	1.6785		1.2204		1.0238	
TOLUENE	3.0999		2.6588		2.2525	
ETHYLBENZENE	0.8409		0.8310		0.7039	
XYLENES	2.3034		2.2765		1.9321	
OTHER OCTANES	10.6368		11.3475		11.4087	
OCTANES PLUS	----	44.0049	----	54.6793	----	52.7650
NONANES	10.0825		11.8816		11.5882	
DECANES PLUS	19.2522		27.5301		26.3333	
SUB TOTAL	99.9946		99.9963		99.9965	
ALCOHOLS	0.0054		0.0037		0.0035	
TOTAL	100.0000		100.0000		100.0000	

API Gravity =	**59.56**	60/60
Vapor Pressure =	**9.19**	PSIA & 100 F
Average Molecular Weight of Decanes plus =	**153.62**	
Average Specific Gravity of Decanes plus =	**0.7710**	

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EXTENDED NATURAL GAS LIQUID ANALYSIS (*DHA)

BY CARBON NUMBER

PROJECT NO. :	201308014	ANALYSIS NO. :	10
COMPANY NAME :	CARRIZO OIL & GAS	ANALYSIS DATE:	AUGUST 6, 2013
ACCOUNT NO. :		SAMPLE DATE :	AUGUST 4, 2013
PRODUCER :		CYLINDER NO. :	6016
LEASE NO. :		SAMPLED BY :	BURL MCENDREE
NAME/DESCRIP :	SEPARATOR		EMPACT
	NELSON 4-17-9-60		
FIELD DATA		SAMPLE TEMP. :	168
SAMPLE PRES. :	9	AMBIENT TEMP.:	
VAPOR PRES. :		GRAVITY :	
COMMENTS :	SPOT; NO PROBE		

COMPONENT / CARBON NUMBER		MOLE%	MASS %	VOLUME %
ALCOHOLS		0.0054	0.0037	0.0035
GLYCOLS		0.0000	0.0000	0.0000
NITROGEN		0.0669	0.0174	0.0159
CARBON DIOXIDE		0.0296	0.0121	0.0110
	C1	0.0424	0.0063	0.0156
	C2	0.1715	0.0480	0.0998
	C3	1.1216	0.4604	0.6726
	C4	2.2465	1.2154	1.5509
	C5	4.1878	2.7789	3.0373
	C6	26.1204	20.6660	21.7458
	C7	22.0030	20.1125	20.0826
	C8	14.6702	15.2676	14.8435
	C9	10.0825	11.8816	11.5882
	C10	9.0863	11.6070	11.1286
	C11	4.3509	6.0603	5.7137
	C12	2.3684	3.5530	3.4079
	C13	1.6657	2.8121	2.7179
	C14	0.8391	1.5496	1.5036
	C15	0.5571	1.1016	1.0567
	C16	0.1857	0.3914	0.3730
	C17	0.1318	0.2950	0.2803
	C18	0.0626	0.1483	0.1405
	C19	0.0030	0.0075	0.0071
	C20	0.0010	0.0026	0.0024
	C21	0.0006	0.0017	0.0016
	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

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EXTENDED NATURAL GAS LIQUID ANALYSIS (*DHA)

DHA COMPONENT LIST

PROJECT NO. :	201308014	ANALYSIS NO. :	10
COMPANY NAME :	CARRIZO OIL & GAS	ANALYSIS DATE:	AUGUST 6, 2013
ACCOUNT NO. :		SAMPLE DATE :	AUGUST 4, 2013
PRODUCER :		CYLINDER NO. :	6016
LEASE NO. :		SAMPLED BY :	BURL MCENDREE
NAME/DESCRIP :	SEPARATOR		EMPACT
	NELSON 4-17-9-60		
FIELD DATA		SAMPLE TEMP. :	168
SAMPLE PRES. :	9	AMBIENT TEMP.:	
VAPOR PRES. :		GRAVITY :	
COMMENTS :	SPOT; NO PROBE		

COMPONENT	PIANO #	MOLE %	MASS %	VOL %
Nitrogen	NHC	0.0669	0.0174	0.0159
Carbon Dioxide	NHC	0.0296	0.0121	0.0110
Methane	P1	0.0424	0.0063	0.0156
Ethane	P2	0.1715	0.0480	0.0998
Propane	P3	1.1216	0.4604	0.6726
i-Butane	I4	0.3674	0.1988	0.2616
n-Butane	P4	1.8791	1.0166	1.2893
2,2-Dimethylpropane	I5	0.0435	0.0292	0.0362
i-Pentane	I5	0.8531	0.5730	0.6794
n-Pentane	P5	1.5012	1.0082	1.1832
t-Butanol	X4	0.0054	0.0037	0.0035
2,2-Dimethylbutane	I6	0.1034	0.0829	0.0939
Cyclopentane	N5	1.7900	1.1685	1.1385
2,3-Dimethylbutane	I6	0.4724	0.3790	0.4209
2-Methylpentane	I6	4.4880	3.6003	4.0540
3-Methylpentane	I6	2.6573	2.1317	2.3603
n-Hexane	P6	8.1214	6.5149	7.2683
2,2-Dimethylpentane	I7	0.0048	0.0045	0.0049
Methylcyclopentane	N6	5.3777	4.2129	4.1386
2,4-Dimethylpentane	I7	0.2844	0.2653	0.2905
2,2,3-Trimethylbutane	I7	0.0197	0.0184	0.0196
Benzene	A6	1.6785	1.2204	1.0238
3,3-Dimethylpentane	I7	0.0285	0.0266	0.0283
Cyclohexane	N6	3.2217	2.5239	2.3860
2-Methylhexane	I7	1.3438	1.2534	1.3605
2,3-Dimethylpentane	I7	0.7976	0.7439	0.7844
1,1-Dimethylcyclopentane	N7	0.3397	0.3105	0.3029
3-Methylhexane	I7	1.9120	1.7834	1.9066
1c,3-Dimethylcyclopentane	N7	0.9603	0.8777	0.8673
1t,3-Dimethylcyclopentane	N7	0.8891	0.8126	0.7988
3-Ethylpentane	I7	0.0434	0.0405	0.0426
1t,2-Dimethylcyclopentane	N7	2.0027	1.8305	1.7931
2,2,4-Trimethylpentane	I8	0.0657	0.0699	0.0741
n-Heptane	P7	4.9771	4.6422	4.9959
1c,2-Dimethylcyclopentane	N7	0.0661	0.0604	0.0576
Methylcyclohexane	N7	4.3800	4.0033	3.8274
2,2-Dimethylhexane	I8	0.3320	0.3530	0.3734
Ethylcyclopentane	N7	0.8539	0.7805	0.7497
2,5-Dimethylhexane	I8	0.1359	0.1445	0.1533
2,2,3-Trimethylpentane	I8	0.0187	0.0199	0.0205
2,4-Dimethylhexane	I8	0.2329	0.2476	0.2614

1c,2t,4-Trimethylcyclopentane	N8	0.4085	0.4267	0.4115
3,3-Dimethylhexane	I8	0.0378	0.0402	0.0417
2,3,4-Trimethylpentane	I8	0.1091	0.1160	0.1187
2,3,3-Trimethylpentane	I8	0.0011	0.0012	0.0012
Toluene	A7	3.0999	2.6588	2.2525
2,3-Dimethylhexane	I8	0.2309	0.2455	0.2539
2-Methyl-3-ethylpentane	I8	0.1588	0.1689	0.1728
1,1,2-Trimethylcyclopentane	N8	0.0059	0.0062	0.0059
2-Methylheptane	I8	1.2806	1.3617	1.4335
4-Methylheptane	I8	0.4476	0.4759	0.4889
3-Methyl-3-ethylpentane	I8	0.0421	0.0448	0.0454
3,4-Dimethylhexane	I8	0.0720	0.0766	0.0783
1c,2c,4-Trimethylcyclopentane	N8	0.0341	0.0356	0.0340
1c,3-Dimethylcyclohexane	N8	0.0367	0.0383	0.0368
3-Methylheptane	I8	0.2974	0.3162	0.3300
1c,2t,3-Trimethylcyclopentane	N8	1.0440	1.0905	1.0423
3-Ethylhexane	I8	0.2680	0.2850	0.2943
1t,4-Dimethylcyclohexane	N8	0.4112	0.4295	0.4147
1,1-Dimethylcyclohexane	N8	0.1196	0.1249	0.1178
3c-Ethylmethylcyclopentane	N8	0.0013	0.0014	0.0013
3t-Ethylmethylcyclopentane	N8	0.2503	0.2614	0.2510
2t-Ethylmethylcyclopentane	N8	0.2094	0.2187	0.2094
1,1-Methylethylcyclopentane	N8	0.7494	0.7828	0.7382
2,2,4-Trimethylhexane	I9	0.0506	0.0604	0.0622
1t,2-Dimethylcyclohexane	N8	0.5524	0.5770	0.5477
1t,3-Dimethylcyclohexane	N8	0.0067	0.0070	0.0066
n-Octane	P8	2.7014	2.8724	3.0094
1c,4-Dimethylcyclohexane	N8	0.2699	0.2819	0.2652
i-Propylcyclopentane	I8	0.0618	0.0646	0.0613
2,4,4-Trimethylhexane	I9	0.0218	0.0260	0.0265
2,2,3,4-Tetramethylpentane	I9	0.0152	0.0182	0.0186
2,3,4-Trimethylhexane	I9	0.0155	0.0185	0.0189
1c,2-Dimethylcyclohexane	N8	0.1642	0.1715	0.1587
2,3,5-Trimethylhexane	I9	0.0287	0.0343	0.0350
2,2-Dimethylheptane	I9	0.0213	0.0254	0.0263
1,1,4-Trimethylcyclohexane	N9	1.0158	1.1937	1.1390
2,2,3-Trimethylhexane	I9	0.3682	0.4396	0.4439
2,4-Dimethylheptane	I9	0.0407	0.0486	0.0500
4,4-Dimethylheptane	I9	0.0548	0.0654	0.0673
Ethylcyclohexane	N8	0.5668	0.5920	0.5536
n-Propylcyclopentane	N8	0.1947	0.2034	0.1929
1c,3c,5-Trimethylcyclohexane	N9	0.0286	0.0336	0.0321
2,5-Dimethylheptane	I9	0.0939	0.1121	0.1152
3,3-Dimethylheptane	I9	0.0871	0.1040	0.1068
3,5-Dimethylheptane	I9	0.0712	0.0850	0.0873
2,6-Dimethylheptane	I9	0.0644	0.0769	0.0799
1,1,3-Trimethylcyclohexane	N9	0.0465	0.0546	0.0521
Ethylbenzene	A8	0.8409	0.8310	0.7039
1c,2t,4t-Trimethylcyclohexane	N9	0.2917	0.3428	0.3209
2,3-Dimethylheptane	I9	0.0040	0.0048	0.0049
1,3-Dimethylbenzene (m-Xylene)	A8	0.7467	0.7380	0.6288
1,4-Dimethylbenzene (p-Xylene)	A8	0.8872	0.8768	0.7494
3,4-Dimethylheptane	I9	0.0970	0.1158	0.1166
3,4-Dimethylheptane (2)	I9	0.1767	0.2110	0.2125
4-Ethylheptane	I9	0.0798	0.0953	0.0981
4-Methyloctane	I9	0.2487	0.2969	0.3034
2-Methyloctane	I9	0.3349	0.3998	0.4126
1c,2t,4c-Trimethylcyclohexane	I9	0.0377	0.0450	0.0457
3-Ethylheptane	I9	0.0511	0.0610	0.0618
3-Methyloctane	I9	0.4226	0.5046	0.5155
3,3-Diethylpentane	I9	0.0424	0.0506	0.0494
1c,2t,3-Trimethylcyclohexane	N9	0.1031	0.1212	0.1134
1,1,2-Trimethylcyclohexane	N9	0.0297	0.0349	0.0327
1,2-Dimethylbenzene (o-Xylene)	A8	0.6695	0.6617	0.5539
i-Butylcyclopentane	N9	0.2321	0.2727	0.2572
UnknownC8s	U8	0.0070	0.0074	0.0078
n-Nonane	P9	1.7677	2.1105	2.1656
1,1-Methylethylcyclohexane	N9	0.2754	0.3288	0.3384
i-Propylbenzene	A9	0.3948	0.4417	0.3767
i-Propylcyclohexane	N9	0.1171	0.1376	0.1264
2,2-Dimethyloctane	I10	0.0693	0.0918	0.0914
2,4-Dimethyloctane	I10	0.0645	0.0854	0.0851
2,6-Dimethyloctane	I10	0.0047	0.0062	0.0064

2,5-Dimethyloctane	I10	0.0406	0.0538	0.0536
n-Butylcyclopentane	N9	0.2042	0.2666	0.2458
3,3-Dimethyloctane	I10	0.0625	0.0828	0.0825
n-Propylbenzene	A9	0.3750	0.4195	0.3578
3,6-Dimethyloctane	I10	0.2485	0.3291	0.3278
3-Methyl-5-ethylheptane	I10	0.4505	0.5378	0.5458
1,3-Methylethylbenzene	A9	0.3678	0.4115	0.3481
1,4-Methylethylbenzene	A9	0.0880	0.0985	0.0833
1,3,5-Trimethylbenzene	A9	0.1164	0.1302	0.1109
2,3-Dimethyloctane	I10	0.0650	0.0861	0.0858
5-Methylnonane	I10	0.1518	0.2010	0.2021
1,2-Methylethylbenzene	A9	0.2999	0.3355	0.2823
2-Methylnonane	I10	0.0471	0.0624	0.0633
3-Ethyloctane	I10	0.0799	0.1058	0.1054
3-Methylnonane	I10	0.1700	0.2252	0.2262
1,2,4-Trimethylbenzene	A9	0.0601	0.0672	0.0565
t-Butylbenzene	A10	0.2160	0.2699	0.2296
i-Butylcyclohexane	N10	0.2267	0.2960	0.2686
1t-Methyl-2-n-propylcyclohexane	I10	0.0485	0.0579	0.0588
i-Butylbenzene	A10	0.0708	0.0885	0.0764
sec-Butylbenzene	A10	0.1216	0.1519	0.1299
UnknownC9s	U9	1.6290	1.9449	1.9957
n-Decane	P10	1.1937	1.5810	1.5950
1,2,3-Trimethylbenzene	A9	0.2113	0.2364	0.1949
1,3-Methyl-i-propylbenzene	A10	0.0916	0.1025	0.0862
1,4-Methyl-i-propylbenzene	A10	0.0390	0.0436	0.0367
Sec-Butylcyclohexane	N10	0.2966	0.3873	0.3510
1,2-Methyl-i-propylbenzene	A10	0.1624	0.2029	0.1706
3-Ethylnonane	I10	0.0360	0.0477	0.0484
1,3-Diethylbenzene	A10	0.1413	0.1765	0.1506
1,3-Methyl-n-propylbenzene	A10	0.0615	0.0768	0.0657
1,4-Diethylbenzene	A10	0.1502	0.1877	0.1605
1,4-Methyl-n-propylbenzene	A10	0.0667	0.0833	0.0715
n-Butylbenzene	A10	0.0639	0.0798	0.0683
1,3-Dimethyl-5-ethylbenzene	A10	0.1528	0.1909	0.1627
1,2-Diethylbenzene	A10	0.0772	0.0965	0.0809
1,2-Methyl-n-propylbenzene	A10	0.0933	0.1166	0.0984
1,4-Dimethyl-2-ethylbenzene	A10	0.1204	0.1504	0.1264
1,3-Dimethyl-4-ethylbenzene	A10	0.0617	0.0771	0.0648
1,2-Dimethyl-4-ethylbenzene	A10	0.1651	0.2063	0.1739
1,3-Dimethyl-2-ethylbenzene	A10	0.0840	0.1049	0.0868
1t,2c,4-Trimethylcyclopentane	A10	0.5283	0.5518	0.5436
1,2-Dimethyl-3-ethylbenzene	A10	0.1673	0.2090	0.1727
1,2-Ethyl-i-propylbenzene	A10	0.0622	0.0777	0.0653
1,4-Methyl-t-butylbenzene	A11	0.0517	0.0646	0.0543
UnknownC10s	U10	2.8826	3.8178	3.8516
n-Undecane	P11	0.8588	1.2496	1.2432
1,4-Ethyl-i-propylbenzene	A11	0.1488	0.1859	0.1563
1,2,4,5-Tetramethylbenzene	A11	0.0591	0.0738	0.0614
1,2-Methyl-n-butylbenzene	A11	0.1536	0.1919	0.1613
1,2,3,5-Tetramethylbenzene	A11	0.0396	0.0495	0.0410
1,2-Methyl-t-butylbenzene	A11	0.0572	0.0715	0.0601
5-Methylindan	A11	0.0228	0.0362	0.0356
4-Methylindan	A11	0.0106	0.0168	0.0165
1,2-Ethyl-n-propylbenzene	A11	0.0778	0.0972	0.0817
2-Methylindan	A11	0.0224	0.0355	0.0349
1,3-Methyl-n-butylbenzene	A11	0.0656	0.0820	0.0689
1,3-Di-i-propylbenzene	A11	0.0826	0.1032	0.0868
sec-Pentylbenzene	A11	0.0954	0.1192	0.1002
n-Pentylbenzene	A11	0.0399	0.0551	0.0473
1t-M-2-(4MP)cyclopentane	P12	0.0648	0.1027	0.1011
1,2-Di-n-propylbenzene	A11	0.1178	0.1472	0.1237
1,4-Di-i-propylbenzene	A11	0.1356	0.1694	0.1424
Tetrahydronaphthalene	A10	0.0130	0.0162	0.0136
t-Decahydronaphthalene	A10	0.1380	0.1724	0.1449
Naphthalene	A10	0.0995	0.1187	0.0998
1-t-Butyl-3,5-dimethylbenzene	A12	0.0631	0.0788	0.0662
1,4-Ethyl-t-butylbenzene	A11	0.0705	0.0881	0.0741
UnknownC11s	U11	1.9578	2.8486	2.8340
n-Dodecane	P12	0.5527	0.8764	0.8623
1,3-Di-n-propylbenzene	A12	0.0433	0.0541	0.0455
1,3,5-Triethylbenzene	A12	0.0382	0.0427	0.0364
1,2,4-Triethylbenzene	A12	0.2777	0.3107	0.2613

1,4-Methyl-n-pentylbenzene	A12	0.0436	0.0545	0.0458
n-Hexylbenzene	A12	0.0592	0.0894	0.0768
1,2,3,4,5-Pentamethylbenzene	A13	0.0995	0.1243	0.1045
2-Methylnaphthalene	A11	0.1217	0.1611	0.1354
1-Methylnaphthalene	A11	0.1616	0.2139	0.1546
UnknownC12s	U12	1.2258	1.9437	1.9125
n-Tridecane	P13	0.4799	0.8236	0.8008
UnknownC13s	U13	1.0863	1.8642	1.8126
n-Tetradecane	P14	0.1258	0.2323	0.2254
UnknownC14s	U14	0.7133	1.3173	1.2782
n-Pentadecane	P15	0.0390	0.0771	0.0740
UnknownC15s	U15	0.5181	1.0245	0.9827
n-Hexadecane	P16	0.0657	0.1385	0.1320
UnknownC16s	U16	0.1200	0.2529	0.2410
n-Heptadecane	P17	0.0324	0.0725	0.0689
UnknownC17s	U17	0.0994	0.2225	0.2114
n-Octadecane	P18	0.0050	0.0118	0.0112
UnknownC18s	U18	0.0576	0.1365	0.1293
n-Nonadecane	P19	0.0016	0.0040	0.0038
UnknownC19s	U19	0.0014	0.0035	0.0033
n-Eicosane	P20	0.0010	0.0026	0.0024
n-Heneicosane	P21	0.0006	0.0017	0.0016
TOTAL		100.0000	100.0000	100.0000

EMPACT ANALYTICAL SYSTEMS INC.
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303-637-0150

EXTENDED NATURAL GAS ANALYSIS (*DHA)

MAIN PAGE

PROJECT NO. :	201308014	ANALYSIS NO. :	11
COMPANY NAME :	CARRIZO OIL & GAS	ANALYSIS DATE:	AUGUST 9, 2013
ACCOUNT NO. :		SAMPLE DATE :	AUGUST 4, 2013
PRODUCER :		CYLINDER NO. :	0915
LEASE NO. :		SAMPLED BY :	BURL MCENDREE - EMPACT
NAME/DESCRIP :	SALES GAS NELSON 4-17-9-60		
FIELD DATA		SAMPLE TEMP. :	101
SAMPLE PRES. :	132	AMBIENT TEMP.:	
VAPOR PRES. :		GRAVITY :	
COMMENTS :	SPOT; PROBE; LENGTH OF H2S STAIN @ 10 PPM		

COMPONENT	MOLE %	MASS %	GPM @ 14.650	GPM @ 14.730
ALCOHOLS	0.0010	0.0022		
HELIUM	0.02	0.00	---	---
OXYGEN/ARGON	0.01	0.01	---	---
NITROGEN	1.23	1.44	---	---
CARBON DIOXIDE	2.73	5.01	---	---
METHANE	69.63770	46.60270	---	---
ETHANE	11.3550	14.2427	3.0326	3.0492
PROPANE	9.3107	17.1264	2.5621	2.5760
I-BUTANE	0.8712	2.1123	0.2843	0.2859
N-BUTANE	2.9045	7.0421	0.9141	0.9191
I-PENTANE	0.5595	1.6791	0.2012	0.2023
N-PENTANE	0.6539	1.9680	0.2363	0.2376
HEXANES PLUS	0.7165	2.7645	0.2872	0.2885
TOTALS	100.00000	100.00000	7.5178	7.5586

BTEX COMPONENTS	**MOLE%**	**WT%**
BENZENE	0.0252	0.0821
TOLUENE	0.0177	0.0680
ETHYLBENZENE	0.0024	0.0106
XYLENES	0.0043	0.0191
TOTAL BTEX	0.0496	0.1798

	BTU @	14.650	14.730
LOW	NET DRY REAL :	1225.3 **/scf**	1232.0 **/scf**
	NET WET REAL :	1203.9 **/scf**	1210.5 **/scf**
HIGH	GROSS DRY REAL :	1346.6 **/scf**	1354.0 **/scf**
	GROSS WET REAL :	1323.1 **/scf**	1330.4 **/scf**
	NET DRY REAL :	19412.3 **/lb**	19518.3 **/lb**
	GROSS DRY REAL :	21339.9 **/lb**	21456.4 **/lb**
	RELATIVE DENSITY (AIR=1):		0.8270
	COMPRESSIBILITY FACTOR :		0.99568

(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

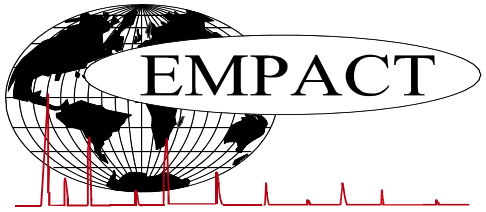
303-637-0150

EXTENDED NATURAL GAS ANALYSIS (*DHA)

GLYCALC INFORMATION

PROJECT NO. :	201308014	ANALYSIS NO. :	11
COMPANY NAME :	CARRIZO OIL & GAS	ANALYSIS DATE:	AUGUST 9, 2013
ACCOUNT NO. :		SAMPLE DATE :	AUGUST 4, 2013
PRODUCER :		CYLINDER NO. :	0915
LEASE NO. :		SAMPLED BY :	BURL MCENDREE - EMPACT
NAME/DESCRIP :	SALES GAS NELSON 4-17-9-60		
FIELD DATA		SAMPLE TEMP. :	101
SAMPLE PRES. :	132	AMBIENT TEMP.:	
VAPOR PRES. :		GRAVITY :	
COMMENTS :	SPOT; PROBE; LENGTH OF H2S STAIN @ 10 PPM		

Componet	Mole %	Wt %
Helium	0.02	0.00
Carbon Dioxide	2.73	5.01
Nitrogen	1.23	1.44
Methane	69.63770	46.60270
Ethane	11.3550	14.2427
Propane	9.3107	17.1264
Isobutane	0.8712	2.1123
n-Butane	2.9045	7.0421
Isopentane	0.5023	1.5117
n-Pentane	0.6539	1.9680
Cyclopentane	0.0572	0.1674
n-Hexane	0.1430	0.5140
Cyclohexane	0.0367	0.1289
Other Hexanes	0.2496	0.8902
Heptanes	0.1297	0.5383
Methycyclohexane	0.0279	0.1143
2,2,4 Trimethylpentane	0.0001	0.0005
Benzene	0.0252	0.0821
Toluene	0.0177	0.0680
Ethylbenzene	0.0024	0.0106
Xylenes	0.0043	0.0191
C8+ Heavies	0.0799	0.3985
Subtotal	99.98900	99.98780
Oxygen/Argon	0.01	0.01
Alcohols	0.0010	0.0022
Total	100.00000	100.00000



EXTENDED NATURAL GAS ANALYSIS (*DHA)

DHA COMPONENT LIST

PROJECT NO. :	201308014	ANALYSIS NO. :	11
COMPANY NAME :	CARRIZO OIL & GAS	ANALYSIS DATE:	AUGUST 9, 2013
ACCOUNT NO. :		SAMPLE DATE :	AUGUST 4, 2013
PRODUCER :		CYLINDER NO. :	0915
LEASE NO. :		SAMPLED BY :	BURL MCENDREE - EMPACT
NAME/DESCRIP :	SALES GAS NELSON 4-17-9-60		
FIELD DATA		SAMPLE TEMP. :	101
SAMPLE PRES. :	132	AMBIENT TEMP.:	
VAPOR PRES. :		GRAVITY :	
COMMENTS :	SPOT; PROBE; LENGTH OF H2S STAIN @ 10 PPM		

COMPONENT	PIANO #	MOLE %	MASS %	GPM @ 14.650	GPM @ 14.730
Helium	---	0.02	0.00	---	---
Oxygen/Argon	---	0.01	0.01	---	---
Nitrogen	---	1.23	1.44	---	---
Carbon Dioxide	---	2.73	5.01	---	---
Methane	P1	69.63770	46.60270	---	---
Ethane	P2	11.3550	14.2427	3.033	3.049
Propane	P3	9.3107	17.1264	2.562	2.576
i-Butane	I4	0.8712	2.1123	0.284	0.286
n-Butane	P4	2.9045	7.0421	0.914	0.919
2,2-Dimethylpropane	I5	0.0019	0.0057	0.001	0.001
Ethanol	X2	0.0007	0.0013	0.000	0.000
i-Pentane	I5	0.5004	1.5060	0.183	0.184
i-Propanol	X3	0.0001	0.0003	0.000	0.000
n-Pentane	P5	0.6539	1.9680	0.236	0.238
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	0.0572	0.1674	0.017	0.017
2,3-Dimethylbutane	I6	0.0086	0.0309	0.004	0.004
2-Methylpentane	I6	0.1022	0.3674	0.042	0.042
3-Methylpentane	I6	0.0535	0.1923	0.022	0.022
n-Hexane	P6	0.1430	0.5140	0.059	0.059
2,2-Dimethylpentane	I7	0.0004	0.0017	0.000	0.000
Methylcyclopentane	N6	0.0841	0.2953	0.030	0.030
2,4-Dimethylpentane	I7	0.0031	0.0130	0.001	0.001
2,2,3-Trimethylbutane	I7	0.0001	0.0004	0.000	0.000
Benzene	A6	0.0252	0.0821	0.007	0.007
3,3-Dimethylpentane	I7	0.0002	0.0008	0.000	0.000
Cyclohexane	N6	0.0367	0.1289	0.012	0.012
2-Methylhexane	I7	0.0151	0.0631	0.007	0.007
2,3-Dimethylpentane	I7	0.0073	0.0305	0.003	0.003
1,1-Dimethylcyclopentane	N7	0.0028	0.0115	0.001	0.001
3-Methylhexane	I7	0.0181	0.0757	0.008	0.008
1c,3-Dimethylcyclopentane	N7	0.0094	0.0385	0.004	0.004
1t,3-Dimethylcyclopentane	N7	0.0084	0.0344	0.004	0.004
3-Ethylpentane	I7	0.0011	0.0046	0.000	0.000
1t,2-Dimethylcyclopentane	N7	0.0183	0.0750	0.008	0.008
2,2,4-Trimethylpentane	I8	0.0001	0.0005	0.000	0.000
n-Heptane	P7	0.0381	0.1593	0.018	0.018
1c,2-Dimethylcyclopentane	N7	0.0015	0.0061	0.001	0.001
Methylcyclohexane	N7	0.0279	0.1143	0.011	0.011
2,2-Dimethylhexane	I8	0.0016	0.0076	0.001	0.001

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Ethylcyclopentane	N7	0.0058	0.0237	0.002	0.002
2,5-Dimethylhexane	I8	0.0008	0.0038	0.000	0.000
2,2,3-Trimethylpentane	I8	0.0001	0.0005	0.000	0.000
2,4-Dimethylhexane	I8	0.0014	0.0067	0.001	0.001
1c,2t,4-Trimethylcyclopentane	N8	0.0025	0.0117	0.001	0.001
3,3-Dimethylhexane	I8	0.0002	0.0010	0.000	0.000
1t,2c,4-Trimethylcyclopentane	N8	0.0031	0.0145	0.001	0.001
2,3,4-Trimethylpentane	I8	0.0006	0.0029	0.000	0.000
Toluene	A7	0.0177	0.0680	0.006	0.006
2,3-Dimethylhexane	I8	0.0012	0.0057	0.001	0.001
2-Methyl-3-ethylpentane	I8	0.0007	0.0033	0.000	0.000
2-Methylheptane	I8	0.0064	0.0305	0.003	0.003
4-Methylheptane	I8	0.0019	0.0091	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	0.0028	0.0134	0.001	0.001
1c,2t,3-Trimethylcyclopentane	N8	0.0039	0.0183	0.002	0.002
3-Ethylhexane	I8	0.0006	0.0029	0.000	0.000
1t,4-Dimethylcyclohexane	N8	0.0013	0.0061	0.001	0.001
1,1-Dimethylcyclohexane	N8	0.0005	0.0023	0.000	0.000
3t-Ethylmethylcyclopentane	N8	0.0011	0.0051	0.001	0.001
2t-Ethylmethylcyclopentane	N8	0.0009	0.0042	0.000	0.000
1,1-Methylethylcyclopentane	N8	0.0031	0.0145	0.002	0.002
2,2,4-Trimethylhexane	I9	0.0001	0.0005	0.000	0.000
1t,2-Dimethylcyclohexane	N8	0.0020	0.0093	0.001	0.001
n-Octane	P8	0.0093	0.0443	0.005	0.005
1c,4-Dimethylcyclohexane	N8	0.0017	0.0080	0.001	0.001
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
2,3,4-Trimethylhexane	I9	0.0001	0.0005	0.000	0.000
1c,2-Dimethylcyclohexane	N8	0.0005	0.0023	0.000	0.000
1,1,4-Trimethylcyclohexane	N9	0.0031	0.0163	0.002	0.002
2,2,3-Trimethylhexane	I9	0.0011	0.0059	0.001	0.001
2,4-Dimethylheptane	I9	0.0001	0.0005	0.000	0.000
4,4-Dimethylheptane	I9	0.0001	0.0005	0.000	0.000
Ethylcyclohexane	N8	0.0015	0.0070	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	0.0002	0.0011	0.000	0.000
2,6-Dimethylheptane	I9	0.0002	0.0011	0.000	0.000
1,1,3-Trimethylcyclohexane	N9	0.0004	0.0021	0.000	0.000
Ethylbenzene	I8	0.0024	0.0106	0.001	0.001
1c,2t,4t-Trimethylcyclohexane	N9	0.0005	0.0026	0.000	0.000
1,3-Dimethylbenzene (m-Xylene)	A8	0.0022	0.0098	0.001	0.001
1,4-Dimethylbenzene (p-Xylene)	A8	0.0005	0.0022	0.000	0.000
3,4-Dimethylheptane	I9	0.0015	0.0080	0.001	0.001
3,4-Dimethylheptane (2)	I9	0.0004	0.0021	0.000	0.000
4-Ethylheptane	I9	0.0002	0.0011	0.000	0.000
4-Methyloctane	I9	0.0007	0.0038	0.000	0.000
2-Methyloctane	I9	0.0008	0.0043	0.000	0.000
1c,2t,3-Trimethylcyclohexane	N9	0.0002	0.0010	0.000	0.000
3-Ethylheptane	I9	0.0001	0.0005	0.000	0.000
3-Methyloctane	I9	0.0009	0.0048	0.001	0.001
1c,2t,4c-Trimethylcyclohexane	I9	0.0001	0.0005	0.000	0.000
3,3-Diethylpentane	I9	0.0001	0.0005	0.000	0.000
1,2-Dimethylbenzene (o-Xylene)	A8	0.0016	0.0071	0.001	0.001
i-Butylcyclopentane	N9	0.0005	0.0026	0.000	0.000
n-Nonane	P9	0.0026	0.0139	0.001	0.001

1,1-Methylethylcyclohexane	N9	0.0006	0.0032	0.000	0.000
i-Propylbenzene	A9	0.0005	0.0025	0.000	0.000
i-Propylcyclohexane	N9	0.0002	0.0010	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
2,5-Dimethyloctane	I10	0.0001	0.0006	0.000	0.000
n-Butylcyclopentane	N9	0.0005	0.0026	0.000	0.000
3,3-Dimethyloctane	I10	0.0001	0.0006	0.000	0.000
n-Propylbenzene	A9	0.0005	0.0025	0.000	0.000
3,6-Dimethyloctane	I10	0.0004	0.0024	0.000	0.000
3-Methyl-5-ethylheptane	I10	0.0005	0.0030	0.000	0.000
1,3-Methylethylbenzene	A9	0.0004	0.0020	0.000	0.000
1,4-Methylethylbenzene	A9	0.0002	0.0010	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	0.0004	0.0024	0.000	0.000
1,2-Methylethylbenzene	A9	0.0002	0.0010	0.000	0.000
3-Methylnonane	I10	0.0002	0.0012	0.000	0.000
1,2,4-Trimethylbenzene	A9	0.0001	0.0005	0.000	0.000
t-Butylbenzene	A10	0.0003	0.0017	0.000	0.000
i-Butylcyclohexane	N10	0.0002	0.0012	0.000	0.000
1t-Methyl-2-n-propylcyclohexane	I10	0.0001	0.0006	0.000	0.000
i-Butylbenzene	A10	0.0001	0.0005	0.000	0.000
sec-Butylbenzene	A10	0.0001	0.0005	0.000	0.000
UnknownC9s	U9	0.0028	0.0150	0.002	0.002
n-Decane	P10	0.0008	0.0048	0.000	0.000
1,2,3-Trimethylbenzene	A9	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	0.0002	0.0012	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-Diethylbenzene	A10	0.0001	0.0005	0.000	0.000
t-Decahydronaphthalene	A9	0.0001	0.0006	0.000	0.000
1,3-Dimethyl-2-ethylbenzene	A10	0.0001	0.0005	0.000	0.000
UnknownC10s	U10	0.0026	0.0154	0.002	0.002
n-Undecane	P11	0.0002	0.0013	0.000	0.000
UnknownC11s	U11	0.0004	0.0026	0.000	0.000
n-Dodecane	P12	0.0001	0.0007	0.000	0.000
TOTAL		100.00000	100.00000	7.5178	7.5586

BTEX COMPONENTS	**MOLE%**	**WT%**
BENZENE	0.0252	0.0821
TOLUENE	0.0177	0.0680
ETHYLBENZENE	0.0024	0.0106
XYLENES	0.0043	0.0191
TOTAL BTEX	0.0496	0.1798

	BTU @	14.650	14.730
LOW	NET DRY REAL :	1225.3 **/scf**	1232.0 **/scf**
	NET WET REAL :	1203.9 **/scf**	1210.5 **/scf**
HIGH	GROSS DRY REAL :	1346.6 **/scf**	1354.0 **/scf**
	GROSS WET REAL :	1323.1 **/scf**	1330.4 **/scf**
	NET DRY REAL :	19412.3 **/lb**	19518.3 **/lb**
	GROSS DRY REAL :	21339.9 **/lb**	21456.4 **/lb**

RELATIVE DENSITY (AIR=1): 0.8270

COMPRESSIBILITY FACTOR : 0.99568

(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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EXTENDED NATURAL GAS LIQUID ANALYSIS (*DHA)

MAIN PAGE

PROJECT NO. :	201308014	ANALYSIS NO. :	12
COMPANY NAME :	CARRIZO OIL & GAS	ANALYSIS DATE:	AUGUST 8, 2013
ACCOUNT NO. :		SAMPLE DATE :	AUGUST 4, 2013
PRODUCER :		CYLINDER NO. :	1L GLASS JAR
LEASE NO. :		SAMPLED BY :	BURL MCENDREE
NAME/DESCRIP :	SALES OIL		EMPACT
	NELSON 4-17-9-60		
FIELD DATA		SAMPLE TEMP. :	
SAMPLE PRES. :		AMBIENT TEMP.:	
VAPOR PRES. :		GRAVITY :	
COMMENTS :	SPOT		

COMPONENT	MOLE %	MASS %	VOL %
ALCOHOLS	0.0010	0.0007	0.0007
NITROGEN (AIR)	0.0000	0.0000	0.0000
CARBON DIOXIDE	0.0000	0.0000	0.0000
METHANE	0.1045	0.0155	0.0381
ETHANE	0.8731	0.2421	0.5012
PROPANE	3.6021	1.4651	2.1312
I-BUTANE	0.6369	0.3414	0.4473
N-BUTANE	2.3505	1.2600	1.5912
I-PENTANE	2.0132	1.3397	1.5832
N-PENTANE	4.3875	2.9197	3.4117
HEXANES PLUS	86.0312	92.4158	90.2954
TOTALS	100.0000	100.0000	100.0000

BTEX COMPONENTS	**MOLE%**	**MASS%**
BENZENE	1.6015	1.1538
TOLUENE	3.1351	2.6644
ETHYLBENZENE	0.6809	0.6668
XYLENE	2.2144	2.1683
TOTAL BTEX	7.6319	6.6533

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

	TOTAL SAMPLE	**C6+ FRACTION**	
Specific Gravity (H2O=1) =	0.7378	0.7549	60/60
API Gravity =	60.29	55.94	60/60
Molecular Weight =	100.00	117.08	
Absolute Density =	6.15	6.29	LBS/GAL
Heating Value Liq. Idl Gas=	124980	127696	BTU/GAL
Vapor/Liquid =	21.63	20.55	CUFT/GAL
Vapor Pressure =	23.14	1.57	PSIA @100 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 LIQUID ANALYSIS (*DHA)

E & P TANK / GLYCALC INFORMATION

PROJECT NO. :	201308014	ANALYSIS NO. :	12
COMPANY NAME :	CARRIZO OIL & GAS	ANALYSIS DATE:	AUGUST 8, 2013
ACCOUNT NO. :		SAMPLE DATE :	AUGUST 4, 2013
PRODUCER :		CYLINDER NO. :	1L GLASS JAR
LEASE NO. :		SAMPLED BY :	BURL MCENDREE
NAME/DESCRIP :	SALES OIL NELSON 4-17-9-60		EMPACT
FIELD DATA		SAMPLE TEMP. :	
SAMPLE PRES. :		AMBIENT TEMP.:	
VAPOR PRES. :		GRAVITY :	
COMMENTS :	SPOT		

COMPONENT	Mole %		Wt %		LV %	
CARBON DIOXIDE	0.0000		0.0000		0.0000	
NITROGEN (AIR)	0.0000		0.0000		0.0000	
METHANE	0.1045		0.0155		0.0381	
ETHANE	0.8731		0.2421		0.5012	
PROPANE	3.6021		1.4651		2.1312	
I-BUTANE	0.6369		0.3414		0.4473	
N-BUTANE	2.3505		1.2600		1.5912	
I-PENTANE	2.0132		1.3397		1.5832	
N-PENTANE	4.3875		2.9197		3.4117	
CYCLOPENTANE (N-C5)	1.1327		0.7326		0.7107	
N-HEXANE	5.2771		4.1959		4.6622	
CYCLOHEXANE (OTHER C6)	2.5791		2.0020		1.8845	
OTHER HEXANES	8.4602		6.6469		6.9623	
OTHER HEPTANES	12.6676		11.6197		12.0177	
METHYLCYCLOHEXANE (OTHER C7)	3.7326		3.3804		3.2180	
2,2,4 TRIMETHYLPENTANE	0.7909		0.7163		0.7011	
BENZENE	1.6015		1.1538		0.9638	
TOLUENE	3.1351		2.6644		2.2476	
ETHYLBENZENE	0.6809		0.6668		0.5624	
XYLENES	2.2144		2.1683		1.8295	
OTHER OCTANES	10.6673		11.2585		11.2540	
OCTANES PLUS	----	47.4453	----	60.0201	----	57.6286
NONANES	11.1351		13.0224		12.6458	
DECANES PLUS	21.9567		32.1878		30.6358	
SUB TOTAL	99.9990		99.9993		99.9993	
ALCOHOLS	0.0010		0.0007		0.0007	
TOTAL	100.0000		100.0000		100.0000	

API Gravity =	**60.29**	60/60
Vapor Pressure =	**23.14**	PSIA & 100 F
Average Molecular Weight of Decanes plus =	**158.94**	
Average Specific Gravity of Decanes plus =	**0.7700**	

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

303-637-0150

EXTENDED NATURAL GAS LIQUID ANALYSIS (*DHA)

BY CARBON NUMBER

PROJECT NO. :	201308014	ANALYSIS NO. :	12
COMPANY NAME :	CARRIZO OIL & GAS	ANALYSIS DATE:	AUGUST 8, 2013
ACCOUNT NO. :		SAMPLE DATE :	AUGUST 4, 2013
PRODUCER :		CYLINDER NO. :	1L GLASS JAR
LEASE NO. :		SAMPLED BY :	BURL MCENDREE
NAME/DESCRIP :	SALES OIL		EMPACT
	NELSON 4-17-9-60		
FIELD DATA		SAMPLE TEMP. :	
SAMPLE PRES. :		AMBIENT TEMP.:	
VAPOR PRES. :		GRAVITY :	
COMMENTS :	SPOT		

COMPONENT / CARBON NUMBER		MOLE%	MASS %	VOLUME %
ALCOHOLS		0.0010	0.0007	0.0007
NITROGEN		0.0000	0.0000	0.0000
CARBON DIOXIDE		0.0000	0.0000	0.0000
	C1	0.1045	0.0155	0.0381
	C2	0.8731	0.2421	0.5012
	C3	3.6021	1.4651	2.1312
	C4	2.9874	1.6014	2.0385
	C5	7.5334	4.9920	5.7056
	C6	17.9179	13.9986	14.4728
	C7	19.5353	17.6645	17.4833
	C8	14.3535	14.8099	14.3470
	C9	11.1351	13.0224	12.6458
	C10	9.9099	12.5564	11.9751
	C11	4.5237	6.2403	5.8556
	C12	2.6407	3.9652	3.8049
	C13	1.7137	2.8640	2.7553
	C14	1.1180	2.0457	1.9765
	C15	0.8033	1.5737	1.5029
	C16	0.4269	0.8915	0.8459
	C17	0.2671	0.5923	0.5603
	C18	0.1889	0.4433	0.4181
	C19	0.1115	0.2761	0.2587
	C20	0.0735	0.1917	0.1787
	C21	0.0386	0.1054	0.0978
	C22	0.0342	0.0979	0.0905
	C23	0.0264	0.0791	0.0729
	C24	0.0255	0.0795	0.0730
	C25	0.0134	0.0435	0.0399
	C26	0.0336	0.1139	0.1040
	C27	0.0048	0.0171	0.0156
	C28	0.0017	0.0062	0.0056
	C29	0.0000	0.0000	0.0000
	C30+	0.0013	0.0050	0.0045
	Total	100.0000	100.0000	100.0000

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

303-637-0150

EXTENDED NATURAL GAS LIQUID ANALYSIS (*DHA)

DHA COMPONENT LIST

PROJECT NO. :	201308014	ANALYSIS NO. :	12
COMPANY NAME :	CARRIZO OIL & GAS	ANALYSIS DATE:	AUGUST 8, 2013
ACCOUNT NO. :		SAMPLE DATE :	AUGUST 4, 2013
PRODUCER :		CYLINDER NO. :	1L GLASS JAR
LEASE NO. :		SAMPLED BY :	BURL MCENDREE
NAME/DESCRIP :	SALES OIL		EMPACT
	NELSON 4-17-9-60		
FIELD DATA		SAMPLE TEMP. :	
SAMPLE PRES. :		AMBIENT TEMP.:	
VAPOR PRES. :		GRAVITY :	
COMMENTS :	SPOT		

COMPONENT	PIANO #	MOLE %	MASS %	VOL %
Nitrogen	NHC	0.0000	0.0000	0.0000
Carbon Dioxide	NHC	0.0000	0.0000	0.0000
Methane	P1	0.1045	0.0155	0.0381
Ethane	P2	0.8731	0.2421	0.5012
Propane	P3	3.6021	1.4651	2.1312
i-Butane	I4	0.6369	0.3414	0.4473
n-Butane	P4	2.3505	1.2600	1.5912
2,2-Dimethylpropane	I5	0.0403	0.0268	0.0331
i-Pentane	I5	1.9729	1.3129	1.5501
n-Pentane	P5	4.3875	2.9197	3.4117
t-Butanol	X4	0.0010	0.0007	0.0007
2,2-Dimethylbutane	I6	0.0164	0.0130	0.0147
Cyclopentane	N5	1.1327	0.7326	0.7107
2,3-Dimethylbutane	I6	0.2550	0.2027	0.2241
2-Methylpentane	I6	2.4625	1.9574	2.1947
3-Methylpentane	I6	1.5449	1.2280	1.3539
n-Hexane	P6	5.2771	4.1959	4.6622
2,2-Dimethylpentane	I7	0.0085	0.0078	0.0084
Methylcyclopentane	N6	4.1814	3.2458	3.1749
2,4-Dimethylpentane	I7	0.1754	0.1621	0.1768
2,2,3-Trimethylbutane	I7	0.0045	0.0042	0.0045
Benzene	A6	1.6015	1.1538	0.9638
3,3-Dimethylpentane	I7	0.0152	0.0141	0.0149
Cyclohexane	N6	2.5791	2.0020	1.8845
2-Methylhexane	I7	1.0539	0.9739	1.0526
2,3-Dimethylpentane	I7	0.7363	0.6805	0.7145
1,1-Dimethylcyclopentane	N7	0.2412	0.2185	0.2122
3-Methylhexane	I7	1.5893	1.4688	1.5636
1c,3-Dimethylcyclopentane	N7	0.8442	0.7645	0.7522
1t,3-Dimethylcyclopentane	N7	0.7909	0.7163	0.7011
3-Ethylpentane	I7	0.0135	0.0124	0.0130
1t,2-Dimethylcyclopentane	N7	1.8531	1.6782	1.6369
2,2,4-Trimethylpentane	I8	0.0104	0.0110	0.0116
n-Heptane	P7	4.3570	4.0267	4.3150
1c,2-Dimethylcyclopentane	N7	0.1323	0.1198	0.1137
Methylcyclohexane	N7	3.7326	3.3804	3.2180
2,2-Dimethylhexane	I8	0.2276	0.2397	0.2525
Ethylcyclopentane	N7	0.8523	0.7719	0.7383
2,5-Dimethylhexane	I8	0.1182	0.1245	0.1315
2,2,3-Trimethylpentane	I8	0.0194	0.0204	0.0209
2,4-Dimethylhexane	I8	0.2092	0.2204	0.2317

1c,2t,4-Trimethylcyclopentane	N8	0.4079	0.4222	0.4054
3,3-Dimethylhexane	I8	0.0246	0.0259	0.0267
2,3,4-Trimethylpentane	I8	0.1036	0.1091	0.1111
2,3,3-Trimethylpentane	I8	0.0059	0.0062	0.0063
Toluene	A7	3.1351	2.6644	2.2476
2,3-Dimethylhexane	I8	0.1844	0.1943	0.2001
2-Methyl-3-ethylpentane	I8	0.1341	0.1412	0.1438
1,1,2-Trimethylcyclopentane	N8	0.0018	0.0019	0.0018
2-Methylheptane	I8	1.3640	1.4371	1.5064
4-Methylheptane	I8	0.4142	0.4364	0.4464
3-Methyl-3-ethylpentane	I8	0.0400	0.0422	0.0425
3,4-Dimethylhexane	I8	0.0364	0.0383	0.0390
1c,2c,4-Trimethylcyclopentane	N8	0.0320	0.0331	0.0315
1c,3-Dimethylcyclohexane	N8	0.0192	0.0199	0.0190
1c,2t,3-Trimethylcyclopentane	N8	1.0607	1.0977	1.0446
3-Ethylhexane	I8	0.2135	0.2249	0.2312
1t,4-Dimethylcyclohexane	N8	0.3057	0.3163	0.3041
1,1-Dimethylcyclohexane	N8	0.1117	0.1156	0.1086
3c-Ethylmethylcyclopentane	N8	0.0014	0.0015	0.0014
3t-Ethylmethylcyclopentane	N8	0.2682	0.2775	0.2654
2t-Ethylmethylcyclopentane	N8	0.2309	0.2390	0.2279
1,1-Methylethylcyclopentane	N8	0.7828	0.8102	0.7608
2,2,4-Trimethylhexane	I9	0.0347	0.0411	0.0421
1t,2-Dimethylcyclohexane	N8	0.5350	0.5537	0.5234
1c,2c,3-Trimethylcyclopentane	N8	0.0077	0.0080	0.0075
n-Octane	P8	2.7544	2.9020	3.0274
1c,4-Dimethylcyclohexane	N8	0.4302	0.4452	0.4170
i-Propylcyclopentane	I8	0.0775	0.0802	0.0758
2,4,4-Trimethylhexane	I9	0.0200	0.0237	0.0241
2,2,3,4-Tetramethylpentane	I9	0.0776	0.0918	0.0936
2,3,4-Trimethylhexane	I9	0.0150	0.0178	0.0181
1c,2-Dimethylcyclohexane	N8	0.1552	0.1606	0.1479
2,3,5-Trimethylhexane	I9	0.0580	0.0686	0.0697
2,2-Dimethylheptane	I9	0.0133	0.0157	0.0162
1,1,4-Trimethylcyclohexane	N9	1.0941	1.2740	1.2104
2,2,3-Trimethylhexane	I9	0.3837	0.4539	0.4563
2,4-Dimethylheptane	I9	0.0164	0.0194	0.0199
4,4-Dimethylheptane	I9	0.0328	0.0387	0.0397
Ethylcyclohexane	N8	0.5806	0.6009	0.5595
n-Propylcyclopentane	N8	0.1955	0.2023	0.1910
1c,3c,5-Trimethylcyclohexane	N9	0.0346	0.0403	0.0383
2,5-Dimethylheptane	I9	0.0878	0.1039	0.1063
3,3-Dimethylheptane	I9	0.1005	0.1188	0.1215
3,5-Dimethylheptane	I9	0.0732	0.0865	0.0885
2,6-Dimethylheptane	I9	0.0754	0.0892	0.0922
1,1,3-Trimethylcyclohexane	N9	0.1906	0.2219	0.2108
Ethylbenzene	A8	0.6809	0.6668	0.5624
1c,2t,4t-Trimethylcyclohexane	N9	0.3809	0.4435	0.4133
2,3-Dimethylheptane	I9	0.0132	0.0156	0.0158
1,3-Dimethylbenzene (m-Xylene)	A8	0.8486	0.8309	0.7049
1,4-Dimethylbenzene (p-Xylene)	A8	0.5757	0.5637	0.4797
3,4-Dimethylheptane	I9	0.4005	0.4738	0.4750
3,4-Dimethylheptane (2)	I9	0.1375	0.1626	0.1630
4-Ethylheptane	I9	0.0692	0.0818	0.0838
4-Methyloctane	I9	0.3350	0.3963	0.4032
2-Methyloctane	I9	0.2926	0.3461	0.3556
1c,2t,4c-Trimethylcyclohexane	I9	0.0949	0.1123	0.1135
3-Ethylheptane	I9	0.0587	0.0694	0.0700
3-Methyloctane	I9	0.4240	0.5016	0.5103
3,3-Diethylpentane	I9	0.0567	0.0671	0.0652
1c,2t,3-Trimethylcyclohexane	N9	0.0871	0.1014	0.0945
1,1,2-Trimethylcyclohexane	N9	0.0203	0.0237	0.0221
1,2-Dimethylbenzene (o-Xylene)	A8	0.7901	0.7737	0.6449
i-Butylcyclopentane	N9	0.2306	0.2685	0.2522
UnknownC8s	U8	0.3943	0.4154	0.4334
n-Nonane	P9	1.8785	2.2223	2.2706
1,1-Methylethylcyclohexane	N9	0.3936	0.4656	0.4771
i-Propylbenzene	A9	0.4294	0.4761	0.4043
i-Propylcyclohexane	N9	0.0850	0.0990	0.0905
2,2-Dimethyloctane	I10	0.0610	0.0800	0.0793
2,4-Dimethyloctane	I10	0.0563	0.0739	0.0733
2,6-Dimethyloctane	I10	0.0053	0.0069	0.0071
2,5-Dimethyloctane	I10	0.0390	0.0512	0.0508

n-Butylcyclopentane	N9	0.3394	0.4391	0.4031
3,3-Dimethyloctane	I10	0.0665	0.0873	0.0866
n-Propylbenzene	A9	0.3691	0.4092	0.3476
3,6-Dimethyloctane	I10	0.3233	0.4242	0.4207
3-Methyl-5-ethylheptane	I10	0.4247	0.5024	0.5077
1,3-Methylethylbenzene	A9	0.4218	0.4676	0.3939
1,4-Methylethylbenzene	A9	0.0423	0.0469	0.0395
1,3,5-Trimethylbenzene	A9	0.1632	0.1809	0.1534
2,3-Dimethyloctane	I10	0.0718	0.0942	0.0934
5-Methylnonane	I10	0.2362	0.3100	0.3103
1,2-Methylethylbenzene	A9	0.3127	0.3467	0.2905
2-Methylnonane	I10	0.0319	0.0419	0.0423
3-Ethyloctane	I10	0.0694	0.0911	0.0903
3-Methylnonane	I10	0.1968	0.2583	0.2583
1,2,4-Trimethylbenzene	A9	0.0549	0.0608	0.0509
t-Butylbenzene	A10	0.2919	0.3613	0.3060
i-Butylcyclohexane	N10	0.1565	0.2025	0.1830
1t-Methyl-2-n-propylcyclohexane	I10	0.0753	0.0891	0.0900
i-Butylbenzene	A10	0.0758	0.0938	0.0807
sec-Butylbenzene	A10	0.1389	0.1720	0.1465
UnknownC9s	U9	1.5373	1.8186	1.8581
n-Decane	P10	1.4234	1.8680	1.8765
1,2,3-Trimethylbenzene	A9	0.1990	0.2206	0.1811
1,3-Methyl-i-propylbenzene	A10	0.0947	0.1050	0.0880
1,4-Methyl-i-propylbenzene	A10	0.0476	0.0527	0.0442
Sec-Butylcyclohexane	N10	0.3683	0.4765	0.4300
1,2-Methyl-i-propylbenzene	A10	0.1591	0.1970	0.1649
3-Ethylnonane	I10	0.0372	0.0489	0.0494
1,3-Diethylbenzene	A10	0.1434	0.1775	0.1508
1,3-Methyl-n-propylbenzene	A10	0.0472	0.0585	0.0499
1,4-Diethylbenzene	A10	0.2368	0.2931	0.2495
1,4-Methyl-n-propylbenzene	A10	0.0695	0.0860	0.0735
n-Butylbenzene	A10	0.1443	0.1787	0.1522
1,3-Dimethyl-5-ethylbenzene	A10	0.0165	0.0205	0.0174
1,2-Diethylbenzene	A10	0.1622	0.2008	0.1675
1,2-Methyl-n-propylbenzene	A10	0.1215	0.1504	0.1263
1,4-Dimethyl-2-ethylbenzene	A10	0.1355	0.1677	0.1403
1,3-Dimethyl-4-ethylbenzene	A10	0.0713	0.0882	0.0739
1,2-Dimethyl-4-ethylbenzene	A10	0.1602	0.1984	0.1665
1,3-Dimethyl-2-ethylbenzene	A10	0.0893	0.1106	0.0912
1t,2c,4-Trimethylcyclopentane	A10	0.5320	0.5506	0.5401
1,2-Dimethyl-3-ethylbenzene	A10	0.1557	0.1928	0.1586
1,2-Ethyl-i-propylbenzene	A10	0.0628	0.0777	0.0650
1,4-Methyl-t-butylbenzene	A11	0.0669	0.0828	0.0693
UnknownC10s	U10	3.0019	3.9394	3.9573
n-Undecane	P11	1.0725	1.5463	1.5318
1,4-Ethyl-i-propylbenzene	A11	0.1140	0.1411	0.1181
1,2,4,5-Tetramethylbenzene	A11	0.0461	0.0571	0.0473
1,2-Methyl-n-butylbenzene	A11	0.0539	0.0667	0.0558
1,2,3,5-Tetramethylbenzene	A11	0.1679	0.2078	0.1713
1,2-Methyl-t-butylbenzene	A11	0.0869	0.1076	0.0901
5-Methylindan	A11	0.0170	0.0267	0.0262
4-Methylindan	A11	0.0217	0.0341	0.0334
1,2-Ethyl-n-propylbenzene	A11	0.1091	0.1351	0.1131
2-Methylindan	A11	0.0169	0.0266	0.0261
1,3-Methyl-n-butylbenzene	A11	0.0680	0.0842	0.0705
1,3-Di-i-propylbenzene	A11	0.1199	0.1484	0.1242
sec-Pentylbenzene	A11	0.0804	0.0996	0.0834
n-Pentylbenzene	A11	0.0844	0.1153	0.0985
1t-M-2-(4MP)cyclopentane	P12	0.0526	0.0826	0.0809
1,2-Di-n-propylbenzene	A11	0.1114	0.1380	0.1155
1,4-Di-i-propylbenzene	A11	0.1377	0.1705	0.1427
Tetrahydronaphthalene	A10	0.0323	0.0399	0.0334
t-Decahydronaphthalene	A10	0.1852	0.2293	0.1919
Naphthalene	A10	0.0914	0.1081	0.0905
1-t-Butyl-3,5-dimethylbenzene	A12	0.0236	0.0292	0.0244
1,4-Ethyl-t-butylbenzene	A11	0.0537	0.0664	0.0556
UnknownC11s	U11	1.8279	2.6352	2.6105
n-Dodecane	P12	0.7529	1.1829	1.1589
1,3-Di-n-propylbenzene	A12	0.0392	0.0486	0.0407
1,3,5-Triethylbenzene	A12	0.0449	0.0498	0.0422
1,2,4-Triethylbenzene	A12	0.2475	0.2744	0.2298
1,4-Methyl-n-pentylbenzene	A12	0.0697	0.0863	0.0722

n-Hexylbenzene	A12	0.0577	0.0863	0.0738
1,2,3,4,5-Pentamethylbenzene	A13	0.1080	0.1337	0.1119
2-Methylnaphthalene	A11	0.1282	0.1682	0.1408
1-Methylnaphthalene	A11	0.1392	0.1826	0.1314
UnknownC12s	U12	1.3526	2.1251	2.0820
n-Tridecane	P13	0.5466	0.9294	0.8998
UnknownC13s	U13	1.0591	1.8009	1.7436
n-Tetradecane	P14	0.3967	0.7259	0.7013
UnknownC14s	U14	0.7213	1.3198	1.2752
n-Pentadecane	P15	0.2665	0.5220	0.4985
UnknownC15s	U15	0.5368	1.0517	1.0044
n-Hexadecane	P16	0.1685	0.3519	0.3339
UnknownC16s	U16	0.2584	0.5396	0.5120
n-Heptadecane	P17	0.0951	0.2108	0.1994
UnknownC17s	U17	0.1720	0.3815	0.3609
n-Octadecane	P18	0.0609	0.1429	0.1348
UnknownC18s	U18	0.1280	0.3004	0.2833
n-Nonadecane	P19	0.0454	0.1124	0.1053
UnknownC19s	U19	0.0661	0.1637	0.1534
n-Eicosane	P20	0.0284	0.0741	0.0691
UnknownC20s	U20	0.0451	0.1176	0.1096
n-Heneicosane	P21	0.0173	0.0472	0.0438
UnknownC21s	U21	0.0213	0.0582	0.0540
n-Docosane	P22	0.0134	0.0383	0.0354
UnknownC22s	U22	0.0208	0.0596	0.0551
n-Tricosane	P23	0.0082	0.0246	0.0227
UnknownC23s	U23	0.0182	0.0545	0.0502
n-Tetracosane	P24	0.0082	0.0255	0.0234
UnknownC24s	U24	0.0173	0.0540	0.0496
n-Pentacosane	P25	0.0036	0.0118	0.0108
UnknownC25s	U25	0.0098	0.0317	0.0291
n-Hexacosane	P26	0.0052	0.0177	0.0162
UnknownC26s	U26	0.0284	0.0962	0.0878
n-Heptacosane	P27	0.0022	0.0079	0.0072
UnknownC27s	U27	0.0026	0.0092	0.0084
n-Octacosane	P28	0.0017	0.0062	0.0056
n-Triacontane Plus	P30	0.0013	0.0050	0.0045
TOTAL		100.0000	100.0000	100.0000

CRUDE OIL ASSAY

PROJECT NO. :	201308014	ANALYSIS NO. :	12
COMPANY NAME :	CARRIZO OIL & GAS	ANALYSIS DATE:	AUGUST 8, 2013
ACCOUNT NO. :		SAMPLE DATE :	AUGUST 4, 2013
PRODUCER :		CYLINDER NO. :	1L GLASS JAR
LEASE NO. :		SAMPLED BY :	BURL MCENDREE
NAME/DESCRIP :	NELSON 4-17-9-60		EMPACT
FIELD DATA		SAMPLE TEMP. :	
SAMPLE PRES. :		AMBIENT TEMP.:	
VAPOR PRES. :		GRAVITY :	
COMMENTS :	SPOT		

SPECIFICATION	TEST METHOD	UNITS	RESULTS
API GRAVITY		API 60/60	33.6
RVP @100 DEG F	D323	PSIG	5.9
TOTAL SULFUR	D2622	WT %	0.479
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			VISCOUS, DARK 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