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. :	13
COMPANY NAME :	CARRIZO OIL & GAS	ANALYSIS DATE:	AUGUST 6, 2013
ACCOUNT NO. :		SAMPLE DATE :	AUGUST 4, 2013
PRODUCER :		CYLINDER NO. :	6842
LEASE NO. :		SAMPLED BY :	BURL MCENDREE
NAME/DESCRIP :	SEPARATOR		EMPACT
	NELSON 5-17-9-60		
FIELD DATA		SAMPLE TEMP. :	168
SAMPLE PRES. :	20	AMBIENT TEMP.:	
VAPOR PRES. :		GRAVITY :	
COMMENTS :	SPOT; NO PROBE		

COMPONENT	MOLE %	MASS %	VOL %
ALCOHOLS	0.6390	0.3634	0.3384
GLYCOLS	7.4419	2.3347	2.1766
NITROGEN (AIR)	0.0236	0.0065	0.0060
CARBON DIOXIDE	0.0197	0.0085	0.0077
METHANE	0.0220	0.0035	0.0087
ETHANE	0.1618	0.0476	0.0992
PROPANE	0.9776	0.4221	0.6181
I-BUTANE	0.3035	0.1727	0.2278
N-BUTANE	1.7522	0.9971	1.2675
I-PENTANE	0.8509	0.6010	0.7153
N-PENTANE	1.4684	1.0373	1.2201
HEXANES PLUS	86.3394	94.0056	93.3146
TOTALS	100.0000	100.0000	100.0000

BTEX COMPONENTS	**MOLE%**	**MASS%**
BENZENE	1.5091	1.1541
TOLUENE	3.0148	2.7197
ETHYLBENZENE	0.7637	0.7939
XYLENE	2.2627	2.3520
TOTAL BTEX	7.5503	7.0197

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

	TOTAL SAMPLE	**C6+ FRACTION**	
Specific Gravity (H2O=1) =	0.7423	0.7488	60/60
API Gravity =	59.12	57.47	60/60
Molecular Weight =	102.14	105.501	
Absolute Density =	6.19	6.24	LBS/GAL
Heating Value Liq. Idl Gas=	125139	125632	BTU/GAL
Vapor/Liquid =	23.21	22.54	CUFT/GAL
Vapor Pressure =	7.88	2.13	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. :	13
COMPANY NAME :	CARRIZO OIL & GAS	ANALYSIS DATE:	AUGUST 6, 2013
ACCOUNT NO. :		SAMPLE DATE :	AUGUST 4, 2013
PRODUCER :		CYLINDER NO. :	6842
LEASE NO. :		SAMPLED BY :	BURL MCENDREE
NAME/DESCRIP :	SEPARATOR		EMPACT
	NELSON 5-17-9-60		
FIELD DATA		SAMPLE TEMP. :	168
SAMPLE PRES. :	20	AMBIENT TEMP.:	
VAPOR PRES. :		GRAVITY :	
COMMENTS :	SPOT; NO PROBE		

COMPONENT	Mole %		Wt %		LV %	
CARBON DIOXIDE	0.0197		0.0085		0.0077	
NITROGEN (AIR)	0.0236		0.0065		0.0060	
METHANE	0.0220		0.0035		0.0087	
ETHANE	0.1618		0.0476		0.0992	
PROPANE	0.9776		0.4221		0.6181	
I-BUTANE	0.3035		0.1727		0.2278	
N-BUTANE	1.7522		0.9971		1.2675	
I-PENTANE	0.8509		0.6010		0.7153	
N-PENTANE	1.4684		1.0373		1.2201	
CYCLOPENTANE (N-C5)	1.5242		1.0466		1.0220	
N-HEXANE	7.0178		5.9209		6.6213	
CYCLOHEXANE (OTHER C6)	2.9024		2.3916		2.2661	
OTHER HEXANES	11.4003		9.5240		10.1371	
OTHER HEPTANES	12.6918		12.3756		12.9616	
METHYLCYCLOHEXANE (OTHER C7)	4.1456		3.9854		3.8190	
2,2,4 TRIMETHYLPENTANE	0.8183		0.7867		0.7751	
BENZENE	1.5091		1.1541		0.9704	
TOLUENE	3.0148		2.7197		2.3094	
ETHYLBENZENE	0.7637		0.7939		0.6740	
XYLENES	2.2627		2.3520		2.0016	
OTHER OCTANES	10.4572		11.7199		11.7716	
OCTANES PLUS	----	42.1334	----	54.8877	----	53.2077
NONANES	9.9836		12.3951		12.1434	
DECANES PLUS	17.8479		26.8401		25.8420	
SUB TOTAL	91.9191		97.3019		97.4850	
ALCOHOLS	0.6390		0.3634		0.3384	
GLYCOLS	7.4419		2.3347		2.1766	
TOTAL	100.0000		100.0000		100.0000	

API Gravity	=	**59.12**	60/60
Vapor Pressure	=	**7.88**	PSIA & 100 F
Average Molecular Weight of Decanes plus	=	**153.60**	
Average Specific Gravity of Decanes plus	=	**0.7690**	

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EXTENDED NATURAL GAS LIQUID ANALYSIS (*DHA)

BY CARBON NUMBER

PROJECT NO. :	201308014	ANALYSIS NO. :	13
COMPANY NAME :	CARRIZO OIL & GAS	ANALYSIS DATE:	AUGUST 6, 2013
ACCOUNT NO. :		SAMPLE DATE :	AUGUST 4, 2013
PRODUCER :		CYLINDER NO. :	6842
LEASE NO. :		SAMPLED BY :	BURL MCENDREE
NAME/DESCRIP :	SEPARATOR		EMPACT
	NELSON 5-17-9-60		
FIELD DATA		SAMPLE TEMP. :	168
SAMPLE PRES. :	20	AMBIENT TEMP.:	
VAPOR PRES. :		GRAVITY :	
COMMENTS :	SPOT; NO PROBE		

COMPONENT / CARBON NUMBER		MOLE%	MASS %	VOLUME %
ALCOHOLS		0.6390	0.3634	0.3384
GLYCOLS		7.4419	2.3347	2.1766
NITROGEN		0.0236	0.0065	0.0060
CARBON DIOXIDE		0.0197	0.0085	0.0077
	C1	0.0220	0.0035	0.0087
	C2	0.1618	0.0476	0.0992
	C3	0.9776	0.4221	0.6181
	C4	2.0557	1.1698	1.4953
	C5	3.8435	2.6849	2.9574
	C6	22.8296	18.9906	19.9949
	C7	19.8522	19.0807	19.0900
	C8	14.3019	15.6525	15.2223
	C9	9.9836	12.3951	12.1434
	C10	8.4475	11.3565	10.9504
	C11	3.9791	5.8861	5.6191
	C12	2.5777	4.1064	3.9685
	C13	1.2866	2.2814	2.2089
	C14	0.7107	1.3805	1.3426
	C15	0.5081	1.0567	1.0159
	C16	0.2103	0.4662	0.4453
	C17	0.0939	0.2211	0.2105
	C18	0.0318	0.0792	0.0752
	C19	0.0013	0.0034	0.0032
	C20	0.0006	0.0017	0.0016
	C21	0.0003	0.0009	0.0008
	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. :	13
COMPANY NAME :	CARRIZO OIL & GAS	ANALYSIS DATE:	AUGUST 6, 2013
ACCOUNT NO. :		SAMPLE DATE :	AUGUST 4, 2013
PRODUCER :		CYLINDER NO. :	6842
LEASE NO. :		SAMPLED BY :	BURL MCENDREE
NAME/DESCRIP :	SEPARATOR NELSON 5-17-9-60		EMPACT
FIELD DATA		SAMPLE TEMP. :	168
SAMPLE PRES. :	20	AMBIENT TEMP.:	
VAPOR PRES. :		GRAVITY :	
COMMENTS :	SPOT; NO PROBE		

COMPONENT	PIANO #	MOLE %	MASS %	VOL %
Nitrogen	NHC	0.0236	0.0065	0.0060
Carbon Dioxide	NHC	0.0197	0.0085	0.0077
Methane	P1	0.0220	0.0035	0.0087
Ethane	P2	0.1618	0.0476	0.0992
Propane	P3	0.9776	0.4221	0.6181
i-Butane	I4	0.3035	0.1727	0.2278
n-Butane	P4	1.7522	0.9971	1.2675
2,2-Dimethylpropane	I5	0.0278	0.0196	0.0244
i-Pentane	I5	0.8231	0.5814	0.6909
Acetone	X2	0.6390	0.3634	0.3384
n-Pentane	P5	1.4684	1.0373	1.2201
2,2-Dimethylbutane	I6	0.0829	0.0699	0.0794
Cyclopentane	N5	1.5242	1.0466	1.0220
2,3-Dimethylbutane	I6	0.4101	0.3460	0.3851
2-Methylpentane	I6	3.8351	3.2360	3.6522
3-Methylpentane	I6	2.2589	1.9060	2.1153
n-Hexane	P6	7.0178	5.9209	6.6213
2,2-Dimethylpentane	I7	0.0040	0.0039	0.0042
Methylcyclopentane	N6	4.8133	3.9661	3.9051
2,4-Dimethylpentane	I7	0.2576	0.2527	0.2774
2,2,3-Trimethylbutane	I7	0.0236	0.0232	0.0248
Benzene	A6	1.5091	1.1541	0.9704
3,3-Dimethylpentane	I7	0.0258	0.0253	0.0270
Cyclohexane	N6	2.9024	2.3916	2.2661
2-Methylhexane	I7	1.1963	1.1736	1.2768
2,3-Dimethylpentane	I7	0.7781	0.7634	0.8068
1,1-Dimethylcyclopentane	N7	0.2987	0.2872	0.2808
3-Methylhexane	I7	1.7490	1.7158	1.8386
1t,3-Dimethylcyclopentane	N7	0.8183	0.7867	0.7751
3-Ethylpentane	I7	0.0478	0.0469	0.0494
1t,2-Dimethylcyclopentane	N7	1.8468	1.7754	1.7431
2,2,4-Trimethylpentane	I8	0.0630	0.0705	0.0749
n-Heptane	P7	4.7685	4.6781	5.0460
1c,2-Dimethylcyclopentane	N7	0.0532	0.0511	0.0488
Methylcyclohexane	N7	4.1456	3.9854	3.8190
2,2-Dimethylhexane	I8	0.3236	0.3619	0.3837
Ethylcyclopentane	N7	0.8241	0.7923	0.7628
2,5-Dimethylhexane	I8	0.1242	0.1389	0.1477
2,2,3-Trimethylpentane	I8	0.0267	0.0299	0.0308
2,4-Dimethylhexane	I8	0.2242	0.2507	0.2652
1c,2t,4-Trimethylcyclopentane	N8	0.3938	0.4326	0.4182

3,3-Dimethylhexane	I8	0.0391	0.0437	0.0454
2,3,4-Trimethylpentane	I8	0.1148	0.1284	0.1317
2,3,3-Trimethylpentane	I8	0.0004	0.0005	0.0005
Ethylene Glycol	GL6	7.4419	2.3347	2.1766
Toluene	A7	3.0148	2.7197	2.3094
2,3-Dimethylhexane	I8	0.2264	0.2532	0.2625
2-Methyl-3-ethylpentane	I8	0.1415	0.1583	0.1623
1,1,2-Trimethylcyclopentane	N8	0.0117	0.0129	0.0123
2-Methylheptane	I8	1.2504	1.3985	1.4756
4-Methylheptane	I8	0.4484	0.5015	0.5164
3-Methyl-3-ethylpentane	I8	0.0507	0.0567	0.0575
3,4-Dimethylhexane	I8	0.0665	0.0744	0.0763
1c,2c,4-Trimethylcyclopentane	N8	0.0397	0.0436	0.0417
1c,3-Dimethylcyclohexane	N8	0.0187	0.0205	0.0198
3-Methylheptane	I8	0.2823	0.3157	0.3302
1c,2t,3-Trimethylcyclopentane	N8	1.0049	1.1040	1.0576
3-Ethylhexane	I8	0.2738	0.3062	0.3169
1t,4-Dimethylcyclohexane	N8	0.3890	0.4274	0.4136
1,1-Dimethylcyclohexane	N8	0.1073	0.1179	0.1114
3c-Ethylmethylcyclopentane	N8	0.0048	0.0053	0.0051
3t-Ethylmethylcyclopentane	N8	0.2420	0.2659	0.2559
2t-Ethylmethylcyclopentane	N8	0.2010	0.2208	0.2119
1,1-Methylethylcyclopentane	N8	0.7512	0.8253	0.7801
2,2,4-Trimethylhexane	I9	0.0520	0.0653	0.0674
1t,2-Dimethylcyclohexane	N8	0.5410	0.5944	0.5656
1t,3-Dimethylcyclohexane	N8	0.0070	0.0077	0.0072
n-Octane	P8	2.3281	2.6038	2.7343
1c,4-Dimethylcyclohexane	N8	0.6497	0.7138	0.6731
i-Propylcyclopentane	I8	0.0287	0.0315	0.0300
2,4,4-Trimethylhexane	I9	0.0179	0.0225	0.0230
2,2,3,4-Tetramethylpentane	I9	0.0140	0.0176	0.0181
2,3,4-Trimethylhexane	I9	0.0132	0.0166	0.0170
1c,2-Dimethylcyclohexane	N8	0.1560	0.1714	0.1589
2,3,5-Trimethylhexane	I9	0.0311	0.0391	0.0400
2,2-Dimethylheptane	I9	0.0131	0.0164	0.0170
1,1,4-Trimethylcyclohexane	N9	1.0004	1.2365	1.1825
2,2,3-Trimethylhexane	I9	0.3571	0.4484	0.4538
2,4-Dimethylheptane	I9	0.0525	0.0659	0.0680
4,4-Dimethylheptane	I9	0.0679	0.0853	0.0880
Ethylcyclohexane	N8	0.5381	0.5912	0.5541
n-Propylcyclopentane	N8	0.1891	0.2078	0.1975
1c,3c,5-Trimethylcyclohexane	N9	0.0297	0.0367	0.0351
2,5-Dimethylheptane	I9	0.0917	0.1151	0.1185
3,3-Dimethylheptane	I9	0.0933	0.1172	0.1207
3,5-Dimethylheptane	I9	0.0746	0.0937	0.0965
2,6-Dimethylheptane	I9	0.0645	0.0810	0.0843
1,1,3-Trimethylcyclohexane	N9	0.0712	0.0880	0.0842
Ethylbenzene	A8	0.7637	0.7939	0.6740
1c,2t,4t-Trimethylcyclohexane	N9	0.2803	0.3465	0.3251
2,3-Dimethylheptane	I9	0.0067	0.0084	0.0085
1,3-Dimethylbenzene (m-Xylene)	A8	0.7267	0.7554	0.6451
1,4-Dimethylbenzene (p-Xylene)	A8	0.9227	0.9591	0.8216
3,4-Dimethylheptane	I9	0.0892	0.1120	0.1130
3,4-Dimethylheptane (2)	I9	0.1738	0.2182	0.2202
4-Ethylheptane	I9	0.0639	0.0802	0.0827
4-Methyloctane	I9	0.2517	0.3161	0.3237
2-Methyloctane	I9	0.3137	0.3939	0.4074
1c,2t,4c-Trimethylcyclohexane	I9	0.0634	0.0796	0.0810
3-Ethylheptane	I9	0.0494	0.0620	0.0630
3-Methyloctane	I9	0.3807	0.4781	0.4896
3,3-Diethylpentane	I9	0.0440	0.0552	0.0540
1c,2t,3-Trimethylcyclohexane	N9	0.0869	0.1074	0.1008
1,1,2-Trimethylcyclohexane	N9	0.0303	0.0374	0.0351
1,2-Dimethylbenzene (o-Xylene)	A8	0.6133	0.6375	0.5349
i-Butylcyclopentane	N9	0.2327	0.2876	0.2719
UnknownC8s	U8	0.0177	0.0198	0.0208
n-Nonane	P9	1.5929	2.0003	2.0572
1,1-Methylethylcyclohexane	N9	0.4195	0.5268	0.5434
i-Propylbenzene	A9	0.3969	0.4671	0.3993
i-Propylcyclohexane	N9	0.0927	0.1146	0.1055
2,2-Dimethyloctane	I10	0.0597	0.0832	0.0831
2,4-Dimethyloctane	I10	0.0383	0.0534	0.0533
2,6-Dimethyloctane	I10	0.0037	0.0051	0.0053

2,5-Dimethyloctane	I10	0.0265	0.0369	0.0368
n-Butylcyclopentane	N9	0.2710	0.3722	0.3439
3,3-Dimethyloctane	I10	0.0684	0.0953	0.0952
n-Propylbenzene	A9	0.3342	0.3933	0.3363
3,6-Dimethyloctane	I10	0.1725	0.2403	0.2399
3-Methyl-5-ethylheptane	I10	0.4009	0.5034	0.5120
1,3-Methylethylbenzene	A9	0.3348	0.3940	0.3341
1,4-Methylethylbenzene	A9	0.0872	0.1026	0.0870
1,3,5-Trimethylbenzene	A9	0.0818	0.0963	0.0822
2,3-Dimethyloctane	I10	0.0600	0.0836	0.0835
5-Methylnonane	I10	0.1491	0.2077	0.2093
1,2-Methylethylbenzene	A9	0.2501	0.2943	0.2482
2-Methylnonane	I10	0.0470	0.0655	0.0666
3-Ethyloctane	I10	0.0574	0.0800	0.0799
3-Methylnonane	I10	0.1638	0.2282	0.2297
1,2,4-Trimethylbenzene	A9	0.0502	0.0591	0.0498
t-Butylbenzene	A10	0.1837	0.2414	0.2058
i-Butylcyclohexane	N10	0.1883	0.2586	0.2352
1t-Methyl-2-n-propylcyclohexane	I10	0.0624	0.0784	0.0797
i-Butylbenzene	A10	0.0649	0.0853	0.0739
sec-Butylbenzene	A10	0.1188	0.1561	0.1338
UnknownC9s	U9	1.7522	2.2004	2.2630
n-Decane	P10	1.0699	1.4904	1.5070
1,2,3-Trimethylbenzene	A9	0.2092	0.2462	0.2034
1,3-Methyl-i-propylbenzene	A10	0.0865	0.1018	0.0859
1,4-Methyl-i-propylbenzene	A10	0.0264	0.0311	0.0262
Sec-Butylcyclohexane	N10	0.2618	0.3595	0.3266
1,2-Methyl-i-propylbenzene	A10	0.1327	0.1744	0.1470
3-Ethylnonane	I10	0.0321	0.0447	0.0454
1,3-Diethylbenzene	A10	0.1194	0.1569	0.1341
1,3-Methyl-n-propylbenzene	A10	0.0265	0.0348	0.0299
1,4-Diethylbenzene	A10	0.1394	0.1832	0.1570
1,4-Methyl-n-propylbenzene	A10	0.0575	0.0756	0.0650
n-Butylbenzene	A10	0.1355	0.1781	0.1527
1,3-Dimethyl-5-ethylbenzene	A10	0.0141	0.0185	0.0158
1,2-Diethylbenzene	A10	0.1194	0.1569	0.1318
1,2-Methyl-n-propylbenzene	A10	0.0839	0.1103	0.0933
1,4-Dimethyl-2-ethylbenzene	A10	0.1063	0.1397	0.1176
1,3-Dimethyl-4-ethylbenzene	A10	0.0534	0.0702	0.0592
1,2-Dimethyl-4-ethylbenzene	A10	0.1568	0.2061	0.1741
1,3-Dimethyl-2-ethylbenzene	A10	0.0310	0.0407	0.0338
1t,2c,4-Trimethylcyclopentane	A10	0.5175	0.5685	0.5614
1,2-Dimethyl-3-ethylbenzene	A10	0.1481	0.1946	0.1611
1,2-Ethyl-i-propylbenzene	A10	0.0828	0.1088	0.0917
1,4-Methyl-t-butylbenzene	A11	0.0456	0.0599	0.0505
UnknownC10s	U10	2.9624	4.1267	4.1727
n-Undecane	P11	0.7216	1.1043	1.1012
1,4-Ethyl-i-propylbenzene	A11	0.1254	0.1648	0.1389
1,2,4,5-Tetramethylbenzene	A11	0.0320	0.0421	0.0351
1,2-Methyl-n-butylbenzene	A11	0.0257	0.0338	0.0285
1,2,3,5-Tetramethylbenzene	A11	0.0581	0.0763	0.0633
1,2-Methyl-t-butylbenzene	A11	0.0539	0.0708	0.0597
5-Methylindan	A11	0.0199	0.0332	0.0327
4-Methylindan	A11	0.0152	0.0253	0.0250
1,2-Ethyl-n-propylbenzene	A11	0.0663	0.0871	0.0734
2-Methylindan	A11	0.0253	0.0422	0.0416
1,3-Methyl-n-butylbenzene	A11	0.0511	0.0672	0.0566
1,3-Di-i-propylbenzene	A11	0.0724	0.0951	0.0801
sec-Pentylbenzene	A11	0.0579	0.0761	0.0641
n-Pentylbenzene	A11	0.0877	0.1273	0.1095
1t-M-2-(4MP)cyclopentane	P12	0.0063	0.0105	0.0104
1,2-Di-n-propylbenzene	A11	0.0489	0.0643	0.0542
1,4-Di-i-propylbenzene	A11	0.1159	0.1523	0.1283
Tetrahydronaphthalene	A10	0.0219	0.0288	0.0243
t-Decahydronaphthalene	A10	0.1158	0.1522	0.1282
Naphthalene	A10	0.0810	0.1016	0.0856
1-t-Butyl-3,5-dimethylbenzene	A12	0.0480	0.0631	0.0532
1,4-Ethyl-t-butylbenzene	A11	0.0592	0.0778	0.0656
UnknownC11s	U11	2.0865	3.1932	3.1841
n-Dodecane	P12	0.6744	1.1247	1.1092
1,3-Di-n-propylbenzene	A12	0.0380	0.0499	0.0420
1,3,5-Triethylbenzene	A12	0.0505	0.0594	0.0507
1,2,4-Triethylbenzene	A12	0.2592	0.3050	0.2571

1,4-Methyl-n-pentylbenzene	A12	0.0164	0.0215	0.0181
n-Hexylbenzene	A12	0.0522	0.0829	0.0714
1,2,3,4,5-Pentamethylbenzene	A13	0.0832	0.1093	0.0921
2-Methylnaphthalene	A11	0.0878	0.1222	0.1030
1-Methylnaphthalene	A11	0.1227	0.1708	0.1237
UnknownC12s	U12	1.4327	2.3894	2.3564
n-Tridecane	P13	0.4106	0.7411	0.7222
UnknownC13s	U13	0.7928	1.4310	1.3946
n-Tetradecane	P14	0.1476	0.2867	0.2788
UnknownC14s	U14	0.5631	1.0938	1.0638
n-Pentadecane	P15	0.0706	0.1468	0.1411
UnknownC15s	U15	0.4375	0.9099	0.8748
n-Hexadecane	P16	0.0632	0.1401	0.1338
UnknownC16s	U16	0.1471	0.3261	0.3115
n-Heptadecane	P17	0.0345	0.0812	0.0773
UnknownC17s	U17	0.0594	0.1399	0.1332
n-Octadecane	P18	0.0027	0.0067	0.0064
UnknownC18s	U18	0.0291	0.0725	0.0688
n-Nonadecane	P19	0.0013	0.0034	0.0032
n-Eicosane	P20	0.0006	0.0017	0.0016
n-Heneicosane	P21	0.0003	0.0009	0.0008
TOTAL		100.0000	100.0000	100.0000

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

EXTENDED NATURAL GAS ANALYSIS (*DHA)

MAIN PAGE

PROJECT NO. :	201308014	ANALYSIS NO. :	14
COMPANY NAME :	CARRIZO OIL & GAS	ANALYSIS DATE:	AUGUST 9, 2013
ACCOUNT NO. :		SAMPLE DATE :	AUGUST 4, 2013
PRODUCER :		CYLINDER NO. :	1315
LEASE NO. :		SAMPLED BY :	BURL MCENDREE - EMPACT
NAME/DESCRIP :	SALES GAS NELSON 5-17-9-60		
FIELD DATA		SAMPLE TEMP. :	102
SAMPLE PRES. :	132	AMBIENT TEMP.:	
VAPOR PRES. :		GRAVITY :	
COMMENTS :	SPOT; PROBE; LENGTH OF H2S STAIN @ 9 PPM		

COMPONENT	MOLE %	MASS %	GPM @ 14.650	GPM @ 14.730
ALCOHOLS	0.0012	0.0026		
HELIUM	0.02	0.00	---	---
OXYGEN/ARGON	0.01	0.01	---	---
NITROGEN	1.26	1.49	---	---
CARBON DIOXIDE	2.81	5.21	---	---
METHANE	70.98790	48.02160	---	---
ETHANE	10.6271	13.4748	2.8380	2.8535
PROPANE	8.5655	15.9272	2.3565	2.3694
I-BUTANE	0.8298	2.0338	0.2713	0.2728
N-BUTANE	2.8535	6.9938	0.8980	0.9029
I-PENTANE	0.5876	1.7822	0.2102	0.2113
N-PENTANE	0.6883	2.0941	0.2493	0.2506
HEXANES PLUS	0.7591	2.9599	0.3071	0.3086
TOTALS	100.00000	100.00000	7.1304	7.1691

BTEX COMPONENTS	**MOLE%**	**WT%**
BENZENE	0.0263	0.0866
TOLUENE	0.0180	0.0700
ETHYLBENZENE	0.0028	0.0125
XYLENES	0.0039	0.0175
TOTAL BTEX	0.0510	0.1866

	BTU @	14.650	14.730
LOW	NET DRY REAL :	1210.0 **/scf**	1216.6 **/scf**
	NET WET REAL :	1188.8 **/scf**	1195.4 **/scf**
HIGH	GROSS DRY REAL :	1330.3 **/scf**	1337.6 **/scf**
	GROSS WET REAL :	1307.0 **/scf**	1314.3 **/scf**
	NET DRY REAL :	19376.7 **/lb**	19482.5 **/lb**
	GROSS DRY REAL :	21307.1 **/lb**	21423.4 **/lb**
	RELATIVE DENSITY (AIR=1):		0.8179
	COMPRESSIBILITY FACTOR :		0.99581

(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

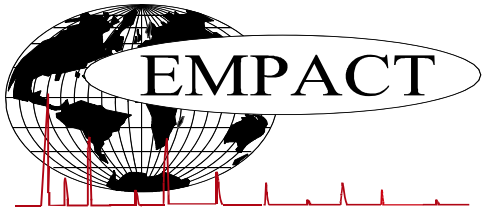
303-637-0150

EXTENDED NATURAL GAS ANALYSIS (*DHA)

GLYCALC INFORMATION

PROJECT NO. :	201308014	ANALYSIS NO. :	14
COMPANY NAME :	CARRIZO OIL & GAS	ANALYSIS DATE:	AUGUST 9, 2013
ACCOUNT NO. :		SAMPLE DATE :	AUGUST 4, 2013
PRODUCER :		CYLINDER NO. :	1315
LEASE NO. :		SAMPLED BY :	BURL MCENDREE - EMPACT
NAME/DESCRIP :	SALES GAS NELSON 5-17-9-60		
FIELD DATA		SAMPLE TEMP. :	102
SAMPLE PRES. :	132	AMBIENT TEMP.:	
VAPOR PRES. :		GRAVITY :	
COMMENTS :	SPOT; PROBE; LENGTH OF H2S STAIN @ 9 PPM		

Componet	Mole %	Wt %
Helium	0.02	0.00
Carbon Dioxide	2.81	5.21
Nitrogen	1.26	1.49
Methane	70.98790	48.02160
Ethane	10.6271	13.4748
Propane	8.5655	15.9272
Isobutane	0.8298	2.0338
n-Butane	2.8535	6.9938
Isopentane	0.5227	1.5903
n-Pentane	0.6883	2.0941
Cyclopentane	0.0649	0.1919
n-Hexane	0.1528	0.5553
Cyclohexane	0.0389	0.1381
Other Hexanes	0.2648	0.9546
Heptanes	0.1383	0.5803
Methycyclohexane	0.0303	0.1255
2,2,4 Trimethylpentane	0.0001	0.0005
Benzene	0.0263	0.0866
Toluene	0.0180	0.0700
Ethylbenzene	0.0028	0.0125
Xylenes	0.0039	0.0175
C8+ Heavies	0.0829	0.4190
Subtotal	99.98880	99.98740
Oxygen/Argon	0.01	0.01
Alcohols	0.0012	0.0026
Total	100.00000	100.00000



EXTENDED NATURAL GAS ANALYSIS (*DHA)

DHA COMPONENT LIST

PROJECT NO. :	201308014	ANALYSIS NO. :	14
COMPANY NAME :	CARRIZO OIL & GAS	ANALYSIS DATE:	AUGUST 9, 2013
ACCOUNT NO. :		SAMPLE DATE :	AUGUST 4, 2013
PRODUCER :		CYLINDER NO. :	1315
LEASE NO. :		SAMPLED BY :	BURL MCENDREE - EMPACT
NAME/DESCRIP :	SALES GAS NELSON 5-17-9-60		
FIELD DATA		SAMPLE TEMP. :	102
SAMPLE PRES. :	132	AMBIENT TEMP.:	
VAPOR PRES. :		GRAVITY :	
COMMENTS :	SPOT; PROBE; LENGTH OF H2S STAIN @ 9 PPM		

COMPONENT	PIANO #	MOLE %	MASS %	GPM @ 14.650	GPM @ 14.730
Helium	---	0.02	0.00	---	---
Oxygen/Argon	---	0.01	0.01	---	---
Nitrogen	---	1.26	1.49	---	---
Carbon Dioxide	---	2.81	5.21	---	---
Methane	P1	70.98790	48.02160	---	---
Ethane	P2	10.6271	13.4748	2.838	2.854
Propane	P3	8.5655	15.9272	2.357	2.369
i-Butane	I4	0.8298	2.0338	0.271	0.273
n-Butane	P4	2.8535	6.9938	0.898	0.903
2,2-Dimethylpropane	I5	0.0021	0.0064	0.001	0.001
Ethanol	X2	0.0009	0.0017	0.000	0.000
i-Pentane	I5	0.5206	1.5839	0.190	0.191
i-Propanol	X3	0.0001	0.0003	0.000	0.000
n-Pentane	P5	0.6882	2.0938	0.249	0.251
t-Butanol	X4	0.0002	0.0006	0.000	0.000
2,2-Dimethylbutane	I6	0.0013	0.0047	0.001	0.001
Cyclopentane	N5	0.0649	0.1919	0.019	0.019
2,3-Dimethylbutane	I6	0.0055	0.0200	0.002	0.002
2-Methylpentane	I6	0.1097	0.3987	0.045	0.045
3-Methylpentane	I6	0.0578	0.2100	0.024	0.024
UnknownC5s	U5	0.0001	0.0003	0.000	0.000
n-Hexane	P6	0.1528	0.5553	0.063	0.063
2,2-Dimethylpentane	I7	0.0004	0.0017	0.000	0.000
Methylcyclopentane	N6	0.0905	0.3212	0.032	0.032
2,4-Dimethylpentane	I7	0.0034	0.0144	0.002	0.002
2,2,3-Trimethylbutane	I7	0.0001	0.0004	0.000	0.000
Benzene	A6	0.0263	0.0866	0.007	0.007
3,3-Dimethylpentane	I7	0.0003	0.0013	0.000	0.000
Cyclohexane	N6	0.0389	0.1381	0.013	0.013
2-Methylhexane	I7	0.0160	0.0676	0.007	0.007
2,3-Dimethylpentane	I7	0.0079	0.0334	0.004	0.004
1,1-Dimethylcyclopentane	N7	0.0032	0.0132	0.001	0.001
3-Methylhexane	I7	0.0193	0.0816	0.009	0.009
1c,3-Dimethylcyclopentane	N7	0.0102	0.0423	0.005	0.005
1t,3-Dimethylcyclopentane	N7	0.0092	0.0381	0.004	0.004
3-Ethylpentane	I7	0.0011	0.0046	0.000	0.000
1t,2-Dimethylcyclopentane	N7	0.0196	0.0812	0.009	0.009
2,2,4-Trimethylpentane	I8	0.0001	0.0005	0.000	0.000
n-Heptane	P7	0.0403	0.1703	0.019	0.019
1c,2-Dimethylcyclopentane	N7	0.0013	0.0054	0.001	0.001
Methylcyclohexane	N7	0.0303	0.1255	0.012	0.012

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2,2-Dimethylhexane	I8	0.0019	0.0092	0.001	0.001
Ethylcyclopentane	N7	0.0060	0.0248	0.002	0.002
2,5-Dimethylhexane	I8	0.0008	0.0038	0.000	0.000
2,2,3-Trimethylpentane	I8	0.0002	0.0010	0.000	0.000
2,4-Dimethylhexane	I8	0.0014	0.0068	0.001	0.001
1c,2t,4-Trimethylcyclopentane	N8	0.0028	0.0132	0.001	0.001
3,3-Dimethylhexane	I8	0.0002	0.0010	0.000	0.000
1t,2c,4-Trimethylcyclopentane	N8	0.0034	0.0161	0.002	0.002
2,3,4-Trimethylpentane	I8	0.0006	0.0029	0.000	0.000
Toluene	A7	0.0180	0.0700	0.006	0.006
2,3-Dimethylhexane	I8	0.0013	0.0063	0.001	0.001
2-Methyl-3-ethylpentane	I8	0.0008	0.0038	0.000	0.000
2-Methylheptane	I8	0.0068	0.0328	0.003	0.003
4-Methylheptane	I8	0.0019	0.0092	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	0.0002	0.0009	0.000	0.000
1c,3-Dimethylcyclohexane	N8	0.0001	0.0005	0.000	0.000
3-Methylheptane	I8	0.0028	0.0135	0.001	0.001
1c,2t,3-Trimethylcyclopentane	N8	0.0045	0.0213	0.002	0.002
3-Ethylhexane	I8	0.0006	0.0029	0.000	0.000
1t,4-Dimethylcyclohexane	N8	0.0014	0.0066	0.001	0.001
1,1-Dimethylcyclohexane	N8	0.0005	0.0024	0.000	0.000
3t-Ethylmethylcyclopentane	N8	0.0011	0.0052	0.001	0.001
2t-Ethylmethylcyclopentane	N8	0.0010	0.0047	0.001	0.001
1,1-Methylethylcyclopentane	N8	0.0032	0.0151	0.002	0.002
2,2,4-Trimethylhexane	I9	0.0001	0.0006	0.000	0.000
1t,2-Dimethylcyclohexane	N8	0.0022	0.0104	0.001	0.001
n-Octane	P8	0.0104	0.0501	0.005	0.005
1c,4-Dimethylcyclohexane	N8	0.0010	0.0047	0.001	0.001
i-Propylcyclopentane	I8	0.0003	0.0014	0.000	0.000
2,4,4-Trimethylhexane	I9	0.0001	0.0006	0.000	0.000
2,3,5-Trimethylhexane	I9	0.0001	0.0006	0.000	0.000
2,2,3,4-Tetramethylpentane	I9	0.0001	0.0006	0.000	0.000
2,3,4-Trimethylhexane	I9	0.0001	0.0006	0.000	0.000
1c,2-Dimethylcyclohexane	N8	0.0005	0.0024	0.000	0.000
1,1,4-Trimethylcyclohexane	N9	0.0032	0.0170	0.002	0.002
2,2,3-Trimethylhexane	I9	0.0011	0.0060	0.001	0.001
2,4-Dimethylheptane	I9	0.0001	0.0006	0.000	0.000
4,4-Dimethylheptane	I9	0.0001	0.0006	0.000	0.000
Ethylcyclohexane	N8	0.0016	0.0076	0.001	0.001
n-Propylcyclopentane	N8	0.0005	0.0024	0.000	0.000
1c,3c,5-Trimethylcyclohexane	N9	0.0001	0.0006	0.000	0.000
2,5-Dimethylheptane	I9	0.0002	0.0011	0.000	0.000
3,3-Dimethylheptane	I9	0.0003	0.0016	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	0.0001	0.0006	0.000	0.000
Ethylbenzene	I8	0.0028	0.0125	0.001	0.001
1c,2t,4t-Trimethylcyclohexane	N9	0.0005	0.0027	0.000	0.000
1,3-Dimethylbenzene (m-Xylene)	A8	0.0021	0.0094	0.001	0.001
1,4-Dimethylbenzene (p-Xylene)	A8	0.0003	0.0014	0.000	0.000
3,4-Dimethylheptane	I9	0.0016	0.0086	0.001	0.001
3,4-Dimethylheptane (2)	I9	0.0003	0.0016	0.000	0.000
4-Ethylheptane	I9	0.0001	0.0006	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	0.0011	0.000	0.000
3-Ethylheptane	I9	0.0002	0.0011	0.000	0.000
3-Methyloctane	I9	0.0009	0.0049	0.001	0.001
1c,2t,4c-Trimethylcyclohexane	I9	0.0001	0.0006	0.000	0.000
1,1,2-Trimethylcyclohexane	N9	0.0001	0.0006	0.000	0.000
3,3-Diethylpentane	I9	0.0001	0.0006	0.000	0.000
1,2-Dimethylbenzene (o-Xylene)	A8	0.0015	0.0067	0.001	0.001

i-Butylcyclopentane	N9	0.0005	0.0027	0.000	0.000
n-Nonane	P9	0.0028	0.0151	0.002	0.002
1,1-Methylethylcyclohexane	N9	0.0003	0.0016	0.000	0.000
i-Propylbenzene	A9	0.0005	0.0025	0.000	0.000
i-Propylcyclohexane	N9	0.0002	0.0011	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	0.0006	0.0032	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	0.0004	0.0024	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	0.0001	0.0005	0.000	0.000
2,3-Dimethyloctane	I10	0.0001	0.0006	0.000	0.000
5-Methylnonane	I10	0.0003	0.0018	0.000	0.000
1,2-Methylethylbenzene	A9	0.0002	0.0010	0.000	0.000
3-Ethyloctane	I10	0.0001	0.0006	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	0.0002	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	0.0006	0.000	0.000
sec-Butylbenzene	A10	0.0001	0.0006	0.000	0.000
UnknownC9s	U9	0.0029	0.0157	0.002	0.002
n-Decane	P10	0.0007	0.0042	0.000	0.000
1,2,3-Trimethylbenzene	A9	0.0001	0.0005	0.000	0.000
1,3-Methyl-i-propylbenzene	A10	0.0001	0.0006	0.000	0.000
Sec-Butylcyclohexane	A10	0.0002	0.0012	0.000	0.000
1,2-Methyl-i-propylbenzene	A10	0.0001	0.0006	0.000	0.000
1,3-Diethylbenzene	A10	0.0001	0.0006	0.000	0.000
1,4-Diethylbenzene	A10	0.0001	0.0006	0.000	0.000
n-Butylbenzene	A10	0.0001	0.0006	0.000	0.000
1,2-Diethylbenzene	A10	0.0001	0.0006	0.000	0.000
t-Decahydronaphthalene	A9	0.0001	0.0006	0.000	0.000
UnknownC10s	U10	0.0023	0.0138	0.001	0.001
n-Undecane	P11	0.0002	0.0013	0.000	0.000
UnknownC11s	U11	0.0006	0.0040	0.000	0.000
n-Dodecane	P12	0.0001	0.0007	0.000	0.000
UnknownC12s	U12	0.0001	0.0007	0.000	0.000
TOTAL		100.00000	100.00000	7.1304	7.1691

BTEX COMPONENTS	**MOLE%**	**WT%**
BENZENE	0.0263	0.0866
TOLUENE	0.0180	0.0700
ETHYLBENZENE	0.0028	0.0125
XYLENES	0.0039	0.0175
TOTAL BTEX	0.0510	0.1866

	BTU @	14.650	14.730
LOW	NET DRY REAL :	1210.0 **/scf**	1216.6 **/scf**
	NET WET REAL :	1188.8 **/scf**	1195.4 **/scf**
HIGH	GROSS DRY REAL :	1330.3 **/scf**	1337.6 **/scf**
	GROSS WET REAL :	1307.0 **/scf**	1314.3 **/scf**
	NET DRY REAL :	19376.7 **/lb**	19482.5 **/lb**
	GROSS DRY REAL :	21307.1 **/lb**	21423.4 **/lb**

RELATIVE DENSITY (AIR=1): 0.8179

COMPRESSIBILITY FACTOR : 0.99581

(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.
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BRIGHTON, CO
80601

303-637-0150

EXTENDED NATURAL GAS LIQUID ANALYSIS (*DHA)

MAIN PAGE

PROJECT NO. :	201308014	ANALYSIS NO. :	15
COMPANY NAME :	CARRIZO OIL & GAS	ANALYSIS DATE:	AUGUST 9, 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 5-17-9-60		
FIELD DATA		SAMPLE TEMP. :	
SAMPLE PRES. :		AMBIENT TEMP.:	
VAPOR PRES. :		GRAVITY :	
COMMENTS :	SPOT		

COMPONENT	MOLE %	MASS %	VOL %
ALCOHOLS	0.0045	0.0020	0.0020
NITROGEN (AIR)	0.0000	0.0000	0.0000
CARBON DIOXIDE	0.0000	0.0000	0.0000
METHANE	0.0174	0.0021	0.0053
ETHANE	0.1297	0.0294	0.0624
PROPANE	1.2205	0.4056	0.6047
I-BUTANE	0.5182	0.2269	0.3047
N-BUTANE	3.3675	1.4748	1.9088
I-PENTANE	2.4094	1.3099	1.5852
N-PENTANE	4.5387	2.4658	2.9539
UNKNOWN C1-C5	0.0010	0.0004	0.0005
HEXANES PLUS	87.7931	94.0831	92.5725
TOTALS	100.0000	100.0000	100.0000

BTEX COMPONENTS	**MOLE%**	**MASS%**
BENZENE	1.1143	0.6559
TOLUENE	2.3459	1.6288
ETHYLBENZENE	0.5724	0.4579
XYLENE	2.2648	1.8119
TOTAL BTEX	6.2974	4.5545

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

	TOTAL SAMPLE	**C6+ FRACTION**	
Specific Gravity (H2O=1) =	0.7568	0.7684	60/60
API Gravity =	55.47	52.65	60/60
Molecular Weight =	100.00	142.85	
Absolute Density =	6.31	6.41	LBS/GAL
Heating Value Liq. Idl Gas=	124916	127032	BTU/GAL
Vapor/Liquid =	18.64	17.73	CUFT/GAL
Vapor Pressure =	8.49	1.11	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. :	15
COMPANY NAME :	CARRIZO OIL & GAS	ANALYSIS DATE:	AUGUST 9, 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 5-17-9-60		
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	0.0174		0.0021		0.0053	
ETHANE	0.1297		0.0294		0.0624	
PROPANE	1.2205		0.4056		0.6047	
I-BUTANE	0.5182		0.2269		0.3047	
N-BUTANE	3.3675		1.4748		1.9088	
I-PENTANE	2.4094		1.3099		1.5852	
N-PENTANE	4.5387		2.4658		2.9539	
CYCLOPENTANE (N-C5)	0.7719		0.4079		0.4056	
UNKNOWN C1-C5	0.0010		0.0004		0.0005	
N-HEXANE	3.6106		2.3447		2.6701	
CYCLOHEXANE (OTHER C6)	1.7933		1.1373		1.0972	
OTHER HEXANES	6.1148		3.9268		4.2258	
OTHER HEPTANES	8.7395		6.5492		6.9393	
METHYLCYCLOHEXANE (OTHER C7)	2.8072		2.0770		2.0265	
2,2,4 TRIMETHYLPENTANE	0.5676		0.4200		0.4213	
BENZENE	1.1143		0.6559		0.5615	
TOLUENE	2.3459		1.6288		1.4082	
ETHYLBENZENE	0.5724		0.4579		0.3958	
XYLENES	2.2648		1.8119		1.5683	
OTHER OCTANES	8.3677		7.2092		7.3826	
OCTANES PLUS	----	60.4956	----	75.3555	----	73.2383
NONANES	9.9988		9.5385		9.4434	
DECANES PLUS	38.7243		55.9180		54.0269	
SUB TOTAL	99.9955		99.9980		99.9980	
ALCOHOLS	0.0045		0.0020		0.0020	
TOTAL	100.0000		100.0000		100.0000	

API Gravity	=	**55.47**	60/60
Vapor Pressure	=	**8.49**	PSIA & 100 F
Average Molecular Weight of Decanes plus	=	**191.63**	
Average Specific Gravity of Decanes plus	=	**0.7820**	

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. :	15
COMPANY NAME :	CARRIZO OIL & GAS	ANALYSIS DATE:	AUGUST 9, 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 5-17-9-60		
FIELD DATA		SAMPLE TEMP. :	
SAMPLE PRES. :		AMBIENT TEMP.:	
VAPOR PRES. :		GRAVITY :	
COMMENTS :	SPOT		

COMPONENT / CARBON NUMBER		MOLE%	MASS %	VOLUME %
ALCOHOLS		0.0045	0.0020	0.0020
NITROGEN		0.0000	0.0000	0.0000
CARBON DIOXIDE		0.0000	0.0000	0.0000
	C1	0.0174	0.0021	0.0053
	C2	0.1297	0.0294	0.0624
	C3	1.2205	0.4056	0.6047
	C4	3.8867	1.7021	2.2140
	C5	7.7200	4.1836	4.9447
	C6	12.6330	8.0647	8.5546
	C7	13.8926	10.2550	10.3740
	C8	11.7725	9.8990	9.7680
	C9	9.9988	9.5385	9.4434
	C10	10.5721	10.9584	10.6489
	C11	6.1810	6.9114	6.5660
	C12	4.2630	5.2270	5.1299
	C13	3.0984	4.2373	4.1805
	C14	2.6223	3.9203	3.8821
	C15	2.3587	3.7753	3.6956
	C16	1.7207	2.9362	2.8555
	C17	1.3866	2.5125	2.4360
	C18	1.2456	2.3887	2.3092
	C19	0.8860	1.7930	1.7222
	C20	0.6857	1.4601	1.3948
	C21	0.5395	1.2058	1.1460
	C22	0.5867	1.3733	1.3007
	C23	0.4584	1.1214	1.0590
	C24	0.3696	0.9431	0.8884
	C25	0.3002	0.7978	0.7513
	C26	0.3069	0.8481	0.7935
	C27	0.2234	0.6409	0.5991
	C28	0.2005	0.5966	0.5567
	C29	0.1909	0.5881	0.5474
	C30+	0.5281	1.6827	1.5641
	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. :	15
COMPANY NAME :	CARRIZO OIL & GAS	ANALYSIS DATE:	AUGUST 9, 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 5-17-9-60		
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	0.0174	0.0021	0.0053
Ethane	P2	0.1297	0.0294	0.0624
Propane	P3	1.2205	0.4056	0.6047
i-Butane	I4	0.5182	0.2269	0.3047
n-Butane	P4	3.3675	1.4748	1.9088
2,2-Dimethylpropane	I5	0.0026	0.0014	0.0018
Ethanol	X2	0.0020	0.0007	0.0007
i-Pentane	I5	2.4068	1.3085	1.5834
i-Propanol	X3	0.0011	0.0005	0.0005
UnknownC4s	U4	0.0010	0.0004	0.0005
n-Pentane	P5	4.5387	2.4658	2.9539
t-Butanol	X4	0.0014	0.0008	0.0008
2,2-Dimethylbutane	I6	0.0148	0.0096	0.0111
Cyclopentane	N5	0.7719	0.4079	0.4056
2,3-Dimethylbutane	I6	0.2684	0.1743	0.1975
2-Methylpentane	I6	1.8122	1.1769	1.3524
3-Methylpentane	I6	1.1147	0.7239	0.8180
n-Hexane	P6	3.6106	2.3447	2.6701
2,2-Dimethylpentane	I7	0.0024	0.0018	0.0020
Methylcyclopentane	N6	2.9047	1.8421	1.8468
2,4-Dimethylpentane	I7	0.1181	0.0892	0.0997
2,2,3-Trimethylbutane	I7	0.0034	0.0026	0.0028
Benzene	A6	1.1143	0.6559	0.5615
3,3-Dimethylpentane	I7	0.0111	0.0084	0.0091
Cyclohexane	N6	1.7933	1.1373	1.0972
2-Methylhexane	I7	0.7258	0.5480	0.6070
2,3-Dimethylpentane	I7	0.4930	0.3723	0.4007
1,1-Dimethylcyclopentane	N7	0.1832	0.1356	0.1350
3-Methylhexane	I7	1.0855	0.8196	0.8942
1c,3-Dimethylcyclopentane	N7	0.6053	0.4479	0.4517
1t,3-Dimethylcyclopentane	N7	0.5676	0.4200	0.4213
3-Ethylpentane	I7	0.0366	0.0277	0.0297
1t,2-Dimethylcyclopentane	N7	1.2672	0.9376	0.9373
2,2,4-Trimethylpentane	I8	0.0045	0.0038	0.0041
n-Heptane	P7	2.9679	2.2409	2.4612
1c,2-Dimethylcyclopentane	N7	0.0670	0.0496	0.0483
Methylcyclohexane	N7	2.8072	2.0770	2.0265
2,2-Dimethylhexane	I8	0.1880	0.1618	0.1747
Ethylcyclopentane	N7	0.6034	0.4465	0.4377
2,5-Dimethylhexane	I8	0.0877	0.0755	0.0817
2,2,3-Trimethylpentane	I8	0.0120	0.0103	0.0108
2,4-Dimethylhexane	I8	0.1513	0.1303	0.1404
1c,2t,4-Trimethylcyclopentane	N8	0.3109	0.2629	0.2588
3,3-Dimethylhexane	I8	0.0173	0.0149	0.0158

2,3,4-Trimethylpentane	I8	0.0783	0.0674	0.0704
2,3,3-Trimethylpentane	I8	0.0009	0.0008	0.0008
Toluene	A7	2.3459	1.6288	1.4082
2,3-Dimethylhexane	I8	0.1462	0.1259	0.1329
2-Methyl-3-ethylpentane	I8	0.1009	0.0869	0.0907
1,1,2-Trimethylcyclopentane	N8	0.0012	0.0010	0.0010
2-Methylheptane	I8	1.0101	0.8695	0.9341
4-Methylheptane	I8	0.3127	0.2692	0.2822
3-Methyl-3-ethylpentane	I8	0.0210	0.0181	0.0187
3,4-Dimethylhexane	I8	0.0288	0.0248	0.0259
1c,2c,4-Trimethylcyclopentane	N8	0.0236	0.0200	0.0195
1c,3-Dimethylcyclohexane	N8	0.0192	0.0163	0.0160
3-Methylheptane	I8	0.1917	0.1650	0.1757
1c,2t,3-Trimethylcyclopentane	N8	0.9243	0.7815	0.7623
3-Ethylhexane	I8	0.1633	0.1405	0.1481
1t,4-Dimethylcyclohexane	N8	0.2607	0.2205	0.2173
1,1-Dimethylcyclohexane	N8	0.0933	0.0789	0.0759
3c-Ethylmethylcyclopentane	N8	0.0012	0.0010	0.0010
3t-Ethylmethylcyclopentane	N8	0.2058	0.1740	0.1705
2t-Ethylmethylcyclopentane	N8	0.1758	0.1486	0.1452
1,1-Methylethylcyclopentane	N8	0.5997	0.5071	0.4880
2,2,4-Trimethylhexane	I9	0.0274	0.0265	0.0278
1t,2-Dimethylcyclohexane	N8	0.4541	0.3840	0.3720
1c,2c,3-Trimethylcyclopentane	N8	0.0052	0.0044	0.0042
UnknownC7s	U7	0.0020	0.0015	0.0016
n-Octane	P8	2.2873	1.9688	2.1051
1c,4-Dimethylcyclohexane	N8	0.1702	0.1439	0.1382
i-Propylcyclopentane	I8	0.0526	0.0445	0.0431
2,4,4-Trimethylhexane	I9	0.0190	0.0184	0.0192
2,2,3,4-Tetramethylpentane	I9	0.0642	0.0621	0.0649
2,3,4-Trimethylhexane	I9	0.0134	0.0129	0.0134
1c,2-Dimethylcyclohexane	N8	0.1115	0.0943	0.0890
2,3,5-Trimethylhexane	I9	0.0598	0.0578	0.0602
2,2-Dimethylheptane	I9	0.0124	0.0120	0.0127
1,1,4-Trimethylcyclohexane	N9	0.9248	0.8797	0.8566
2,2,3-Trimethylhexane	I9	0.3176	0.3070	0.3163
2,4-Dimethylheptane	I9	0.0059	0.0057	0.0060
4,4-Dimethylheptane	I9	0.0305	0.0295	0.0310
Ethylcyclohexane	N8	0.5234	0.4426	0.4224
n-Propylcyclopentane	N8	0.1698	0.1436	0.1390
1c,3c,5-Trimethylcyclohexane	N9	0.0238	0.0227	0.0221
2,5-Dimethylheptane	I9	0.0794	0.0767	0.0804
3,3-Dimethylheptane	I9	0.0845	0.0817	0.0857
3,5-Dimethylheptane	I9	0.0624	0.0604	0.0633
2,6-Dimethylheptane	I9	0.0646	0.0624	0.0661
1,1,3-Trimethylcyclohexane	N9	0.1502	0.1429	0.1391
Ethylbenzene	A8	0.5724	0.4579	0.3958
1c,2t,4t-Trimethylcyclohexane	N9	0.3412	0.3246	0.3101
2,3-Dimethylheptane	I9	0.0034	0.0032	0.0033
1,3-Dimethylbenzene (m-Xylene)	A8	0.7241	0.5793	0.5037
1,4-Dimethylbenzene (p-Xylene)	A8	0.8063	0.6451	0.5627
3,4-Dimethylheptane	I9	0.1263	0.1220	0.1254
3,4-Dimethylheptane (2)	I9	0.1199	0.1159	0.1191
4-Ethylheptane	I9	0.0536	0.0518	0.0544
4-Methyloctane	I9	0.2692	0.2602	0.2714
2-Methyloctane	I9	0.3197	0.3090	0.3254
1c,2t,4c-Trimethylcyclohexane	I9	0.0365	0.0353	0.0366
3-Ethylheptane	I9	0.0484	0.0468	0.0484
3-Methyloctane	I9	0.4293	0.4149	0.4326
3,3-Diethylpentane	I9	0.0559	0.0540	0.0538
1c,2t,3-Trimethylcyclohexane	N9	0.0805	0.0766	0.0732
1,1,2-Trimethylcyclohexane	N9	0.0208	0.0198	0.0189
1,2-Dimethylbenzene (o-Xylene)	A8	0.7344	0.5875	0.5019
i-Butylcyclopentane	N9	0.2919	0.2777	0.2673
UnknownC8s	U8	0.0308	0.0266	0.0284
n-Nonane	P9	1.8922	1.8288	1.9151
1,1-Methylethylcyclohexane	N9	0.1477	0.1428	0.1500
i-Propylbenzene	A9	0.4730	0.4284	0.3729
i-Propylcyclohexane	N9	0.0904	0.0860	0.0806
2,2-Dimethyloctane	I10	0.0436	0.0468	0.0476
2,4-Dimethyloctane	I10	0.0583	0.0625	0.0635
2,6-Dimethyloctane	I10	0.0050	0.0054	0.0057
2,5-Dimethyloctane	I10	0.0386	0.0414	0.0421
n-Butylcyclopentane	N9	0.3310	0.3499	0.3292
3,3-Dimethyloctane	I10	0.0598	0.0641	0.0652

n-Propylbenzene	A9	0.3220	0.2916	0.2539
3,6-Dimethyloctane	I10	0.3407	0.3653	0.3713
3-Methyl-5-ethylheptane	I10	0.4133	0.3995	0.4137
1,3-Methylethylbenzene	A9	0.4311	0.3904	0.3370
1,4-Methylethylbenzene	A9	0.0425	0.0385	0.0332
1,3,5-Trimethylbenzene	A9	0.1866	0.1690	0.1469
2,3-Dimethyloctane	I10	0.0709	0.0760	0.0772
5-Methylnonane	I10	0.2151	0.2307	0.2367
1,2-Methylethylbenzene	A9	0.3100	0.2808	0.2411
2-Methylnonane	I10	0.0372	0.0399	0.0413
3-Ethyloctane	I10	0.0906	0.0971	0.0987
3-Methylnonane	I10	0.1991	0.2135	0.2188
1,2,4-Trimethylbenzene	A9	0.0582	0.0527	0.0453
t-Butylbenzene	A10	0.2682	0.2713	0.2355
i-Butylcyclohexane	N10	0.1777	0.1878	0.1739
1t-Methyl-2-n-propylcyclohexane	I10	0.0924	0.0893	0.0925
i-Butylbenzene	A10	0.0785	0.0794	0.0700
sec-Butylbenzene	A10	0.1566	0.1584	0.1382
UnknownC9s	U9	1.3253	1.2809	1.3413
n-Decane	P10	1.4404	1.5443	1.5900
1,2,3-Trimethylbenzene	A9	0.2523	0.2285	0.1922
1,3-Methyl-i-propylbenzene	A10	0.0979	0.0887	0.0762
1,4-Methyl-i-propylbenzene	A10	0.0581	0.0526	0.0452
Sec-Butylcyclohexane	N10	0.3974	0.4201	0.3886
1,2-Methyl-i-propylbenzene	A10	0.1988	0.2011	0.1725
3-Ethylnonane	I10	0.0484	0.0519	0.0537
1,3-Diethylbenzene	A10	0.1814	0.1834	0.1597
1,3-Methyl-n-propylbenzene	A10	0.0631	0.0638	0.0557
1,4-Diethylbenzene	A10	0.2956	0.2990	0.2609
1,4-Methyl-n-propylbenzene	A10	0.0837	0.0847	0.0742
n-Butylbenzene	A10	0.1760	0.1780	0.1554
1,3-Dimethyl-5-ethylbenzene	A10	0.0613	0.0621	0.0540
1,2-Diethylbenzene	A10	0.1729	0.1749	0.1496
1,2-Methyl-n-propylbenzene	A10	0.1416	0.1432	0.1233
1,4-Dimethyl-2-ethylbenzene	A10	0.1693	0.1712	0.1468
1,3-Dimethyl-4-ethylbenzene	A10	0.0985	0.0996	0.0855
1,2-Dimethyl-4-ethylbenzene	A10	0.1916	0.1938	0.1667
1,3-Dimethyl-2-ethylbenzene	A10	0.1380	0.1396	0.1179
1t,2c,4-Trimethylcyclopentane	A10	0.4042	0.3418	0.3437
1,2-Dimethyl-3-ethylbenzene	A10	0.1928	0.1950	0.1644
1,2-Ethyl-i-propylbenzene	A10	0.0955	0.0966	0.0829
1,4-Methyl-t-butylbenzene	A11	0.1007	0.1018	0.0873
UnknownC10s	U10	3.1377	3.3640	3.4635
n-Undecane	P11	1.2638	1.4886	1.5114
1,4-Ethyl-i-propylbenzene	A11	0.1683	0.1702	0.1460
1,2,4,5-Tetramethylbenzene	A11	0.0692	0.0700	0.0594
1,2-Methyl-n-butylbenzene	A11	0.0230	0.0233	0.0200
1,2,3,5-Tetramethylbenzene	A11	0.2421	0.2449	0.2069
1,2-Methyl-t-butylbenzene	A11	0.1221	0.1235	0.1060
5-Methylindan	A11	0.0127	0.0163	0.0164
4-Methylindan	A11	0.0203	0.0261	0.0262
1,2-Ethyl-n-propylbenzene	A11	0.1560	0.1578	0.1354
2-Methylindan	A11	0.0175	0.0224	0.0225
1,3-Methyl-n-butylbenzene	A11	0.1399	0.1416	0.1215
1,3-Di-i-propylbenzene	A11	0.1767	0.1787	0.1533
sec-Pentylbenzene	A11	0.0880	0.0890	0.0764
n-Pentylbenzene	A11	0.1003	0.1120	0.0981
1t-M-2-(4MP)cyclopentane	P12	0.0177	0.0227	0.0228
1,2-Di-n-propylbenzene	A11	0.2876	0.2909	0.2496
1,4-Di-i-propylbenzene	A11	0.1966	0.1988	0.1706
Tetrahydronaphthalene	A10	0.0330	0.0334	0.0287
t-Decahydronaphthalene	A10	0.2142	0.2167	0.1859
Naphthalene	A10	0.1351	0.1305	0.1120
1-t-Butyl-3,5-dimethylbenzene	A12	0.0631	0.0638	0.0547
1,4-Ethyl-t-butylbenzene	A11	0.0904	0.0914	0.0784
UnknownC11s	U11	2.3560	2.7750	2.8175
n-Dodecane	P12	1.0756	1.3806	1.3863
1,3-Di-n-propylbenzene	A12	0.0663	0.0671	0.0576
1,3,5-Triethylbenzene	A12	0.0812	0.0735	0.0639
1,2,4-Triethylbenzene	A12	0.3628	0.3286	0.2821
1,4-Methyl-n-pentylbenzene	A12	0.1193	0.1207	0.1036
n-Hexylbenzene	A12	0.1555	0.1902	0.1668

1,2,3,4,5-Pentamethylbenzene	A13	0.1777	0.1798	0.1543
2-Methylnaphthalene	A11	0.2226	0.2385	0.2046
1-Methylnaphthalene	A11	0.3272	0.3506	0.2585
UnknownC12s	U12	2.3215	2.9798	2.9921
n-Tridecane	P13	0.9450	1.3128	1.3027
UnknownC13s	U13	1.9757	2.7447	2.7235
n-Tetradecane	P14	0.9418	1.4080	1.3943
UnknownC14s	U14	1.6805	2.5123	2.4878
n-Pentadecane	P15	0.7758	1.2417	1.2155
UnknownC15s	U15	1.5829	2.5336	2.4801
n-Hexadecane	P16	0.6483	1.1063	1.0759
UnknownC16s	U16	1.0724	1.8299	1.7796
n-Heptadecane	P17	0.5182	0.9389	0.9103
UnknownC17s	U17	0.8684	1.5736	1.5257
n-Octadecane	P18	0.4358	0.8358	0.8080
UnknownC18s	U18	0.8098	1.5529	1.5012
n-Nonadecane	P19	0.4082	0.8261	0.7935
UnknownC19s	U19	0.4778	0.9669	0.9287
n-Eicosane	P20	0.3128	0.6661	0.6363
UnknownC20s	U20	0.3729	0.7940	0.7585
n-Heneicosane	P21	0.2642	0.5905	0.5612
UnknownC21s	U21	0.2753	0.6153	0.5848
n-Docosane	P22	0.2707	0.6337	0.6002
UnknownC22s	U22	0.3160	0.7396	0.7005
n-Tricosane	P23	0.2129	0.5208	0.4918
UnknownC23s	U23	0.2455	0.6006	0.5672
n-Tetracosane	P24	0.1868	0.4766	0.4490
UnknownC24s	U24	0.1828	0.4665	0.4394
n-Pentacosane	P25	0.1426	0.3790	0.3569
UnknownC25s	U25	0.1576	0.4188	0.3944
n-Hexacosane	P26	0.1355	0.3745	0.3504
UnknownC26s	U26	0.1714	0.4736	0.4431
n-Heptacosane	P27	0.0968	0.2777	0.2596
UnknownC27s	U27	0.1266	0.3632	0.3395
n-Octacosane	P28	0.0770	0.2292	0.2139
UnknownC28s	U28	0.1235	0.3674	0.3428
n-Nonacosane	P29	0.0693	0.2136	0.1988
UnknownC29s	U29	0.1216	0.3745	0.3486
n-Triacontane Plus	P30	0.5281	1.6827	1.5641
TOTAL		100.0000	100.0000	100.0000

CRUDE OIL ASSAY

PROJECT NO. :	201308014	ANALYSIS NO. :	15
COMPANY NAME :	CARRIZO OIL & GAS	ANALYSIS DATE:	AUGUST 9, 2013
ACCOUNT NO. :		SAMPLE DATE :	AUGUST 4, 2013
PRODUCER :		CYLINDER NO. :	1L GLASS JAR
LEASE NO. :		SAMPLED BY :	BURL MCENDREE
NAME/DESCRIP :	NELSON 5-17-9-60		EMPACT
FIELD DATA		SAMPLE TEMP. :	
SAMPLE PRES. :		AMBIENT TEMP.:	
VAPOR PRES. :		GRAVITY :	
COMMENTS :	SPOT		

SPECIFICATION		TEST METHOD	UNITS	RESULTS
API GRAVITY			API 60/60	32.5
RVP @100 DEG F		D323	PSIG	4.5
TOTAL SULFUR		D2622	WT %	0.500
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, BLACK
BS&W		D96		
Crude Oil			VOL %	N/A
Water			VOL %	N/A
Emulsion			VOL %	N/A
Sediment			VOL %	N/A
DISTILLATION:		D86		
INITIAL POINT			DEG F	N/A
50%			DEG F	N/A
90%			DEG F	N/A
END POINT			DEG F	N/A
DISTILLATION:	@TEMP	D445		
Average Centipoise	20°C			N/A
Average Centipoise	30°C			N/A
Average Centipoise	80°C			N/A
Kinetic Viscosity	20°C		cSt (mm2/s)	N/A
Kinetic Viscosity	30°C		cSt (mm2/s)	N/A
Kinetic Viscosity	80°C		cSt (mm2/s)	N/A

ND: NOT DETECTED

N/A: NO TEST PREFORMED FOR THIS PARAMETER