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

303-637-0150

EXTENDED NATURAL GAS LIQUID ANALYSIS (*DHA)

MAIN PAGE

PROJECT NO. :	201411074	ANALYSIS NO. :	03
COMPANY NAME :	CARRIZO OIL & GAS	ANALYSIS DATE:	NOVEMBER 16, 2014
ACCOUNT NO. :		SAMPLE DATE :	NOVEMBER 14, 2014
PRODUCER :		CYLINDER NO. :	2778
LEASE NO. :		SAMPLED BY :	GALE MCENDREE
NAME/DESCRIP :	SEPARATOR 13:40		EMPACT
	SHULL 1-35-9-60		
FIELD DATA		SAMPLE TEMP. :	170
SAMPLE PRES. :	45	AMBIENT TEMP.:	
VAPOR PRES. :		GRAVITY :	
COMMENTS :	SPOT; NO PROBE		

COMPONENT	MOLE %	MASS %	VOL %
NITROGEN (AIR)	0.0070	0.0017	0.0016
CARBON DIOXIDE	0.0310	0.0120	0.0109
METHANE	0.1750	0.0248	0.0616
ETHANE	0.3940	0.1047	0.2188
PROPANE	1.4310	0.5574	0.8186
I-BUTANE	0.3590	0.1843	0.2438
N-BUTANE	1.8350	0.9420	1.2010
I-PENTANE	0.8033	0.5120	0.6106
N-PENTANE	1.3200	0.8412	0.9924
HEXANES PLUS	93.6447	96.8199	95.8407
TOTALS	100.0000	100.0000	100.0000

BTEX COMPONENTS	**MOLE%**	**MASS%**
BENZENE	1.3381	0.9232
TOLUENE	2.8031	2.2813
ETHYLBENZENE	0.2870	0.2691
XYLENE	1.2463	1.1688
TOTAL BTEX	5.6745	4.6424

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

	TOTAL SAMPLE	**C6+ FRACTION**	
Specific Gravity (H2O=1) =	0.7452	0.7531	60/60
API Gravity =	58.38	56.39	60/60
Molecular Weight =	113.21	117.75	
Absolute Density =	6.21	6.27	LBS/GAL
Heating Value Liq. Idl Gas=	125999	127651	BTU/GAL
Vapor/Liquid =	20.83	20.32	CUFT/GAL
Vapor Pressure =	17.75	1.64	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. :	201411074	ANALYSIS NO. :	03
COMPANY NAME :	CARRIZO OIL & GAS	ANALYSIS DATE:	NOVEMBER 16, 2014
ACCOUNT NO. :		SAMPLE DATE :	NOVEMBER 14, 2014
PRODUCER :		CYLINDER NO. :	2778
LEASE NO. :		SAMPLED BY :	GALE MCENDREE
NAME/DESCRIP :	SEPARATOR 13:40		EMPACT
	SHULL 1-35-9-60		
FIELD DATA		SAMPLE TEMP. :	170
SAMPLE PRES. :	45	AMBIENT TEMP.:	
VAPOR PRES. :		GRAVITY :	
COMMENTS :	SPOT; NO PROBE		

COMPONENT	Mole %		Wt %		LV %	
CARBON DIOXIDE	0.0310		0.0120		0.0109	
NITROGEN (AIR)	0.0070		0.0017		0.0016	
METHANE	0.1750		0.0248		0.0616	
ETHANE	0.3940		0.1047		0.2188	
PROPANE	1.4310		0.5574		0.8186	
I-BUTANE	0.3590		0.1843		0.2438	
N-BUTANE	1.8350		0.9420		1.2010	
I-PENTANE	0.8033		0.5120		0.6106	
N-PENTANE	1.3200		0.8412		0.9924	
CYCLOPENTANE (N-C5)	1.3759		0.8523		0.8348	
N-HEXANE	6.4810		4.9339		5.5344	
CYCLOHEXANE (OTHER C6)	2.5975		1.9309		1.8351	
OTHER HEXANES	10.0837		7.5981		8.1004	
OTHER HEPTANES	13.1248		11.5363		12.0817	
METHYLCYCLOHEXANE (OTHER C7)	3.8830		3.3677		3.2367	
2,2,4 TRIMETHYLPENTANE	0.7814		0.6777		0.6697	
BENZENE	1.3381		0.9232		0.7786	
TOLUENE	2.8031		2.2813		1.9429	
ETHYLBENZENE	0.2870		0.2691		0.2292	
XYLENES	1.2463		1.1688		0.9921	
OTHER OCTANES	11.2018		11.3178		11.4248	
OCTANES PLUS	----	51.9576	----	63.3962	----	61.4961
NONANES	12.6698		14.1654		13.8858	
DECANES PLUS	25.7713		35.7974		34.2945	
SUB TOTAL	100.0000		100.0000		100.0000	
TOTAL	100.0000		100.0000		100.0000	

API Gravity =	**58.38**	60/60
Vapor Pressure =	**17.75**	PSIA & 100 F
Average Molecular Weight of Decanes plus =	**157.26**	
Average Specific Gravity of Decanes plus =	**0.7780**	

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BY CARBON NUMBER

PROJECT NO. :	201411074	ANALYSIS NO. :	03
COMPANY NAME :	CARRIZO OIL & GAS	ANALYSIS DATE:	NOVEMBER 16, 2014
ACCOUNT NO. :		SAMPLE DATE :	NOVEMBER 14, 2014
PRODUCER :		CYLINDER NO. :	2778
LEASE NO. :		SAMPLED BY :	GALE MCENDREE
NAME/DESCRIP :	SEPARATOR 13:40		EMPACT
	SHULL 1-35-9-60		
FIELD DATA		SAMPLE TEMP. :	170
SAMPLE PRES. :	45	AMBIENT TEMP.:	
VAPOR PRES. :		GRAVITY :	
COMMENTS :	SPOT; NO PROBE		

COMPONENT / CARBON NUMBER		MOLE%	MASS %	VOLUME %
NITROGEN		0.0070	0.0017	0.0016
CARBON DIOXIDE		0.0310	0.0120	0.0109
	C1	0.1750	0.0248	0.0616
	C2	0.3940	0.1047	0.2188
	C3	1.4310	0.5574	0.8186
	C4	2.1940	1.1263	1.4448
	C5	3.4992	2.2055	2.4378
	C6	20.5003	15.3861	16.2485
	C7	19.8109	17.1853	17.2613
	C8	13.5165	13.4334	13.3158
	C9	12.6698	14.1654	13.8858
	C10	10.5035	12.7281	12.2194
	C11	5.6131	7.3789	6.9206
	C12	3.5231	5.0142	4.8255
	C13	2.4262	3.8376	3.7110
	C14	1.6417	2.8769	2.8063
	C15	1.4563	2.7324	2.6347
	C16	0.4983	0.9966	0.9548
	C17	0.1006	0.2136	0.2040
	C18	0.0085	0.0191	0.0182
	C19	0.0000	0.0000	0.0000
	C20	0.0000	0.0000	0.0000
	C21	0.0000	0.0000	0.0000
	C22	0.0000	0.0000	0.0000
	C23	0.0000	0.0000	0.0000
	C24	0.0000	0.0000	0.0000
	C25	0.0000	0.0000	0.0000
	C26	0.0000	0.0000	0.0000
	C27	0.0000	0.0000	0.0000
	C28	0.0000	0.0000	0.0000
	C29	0.0000	0.0000	0.0000
	C30+	0.0000	0.0000	0.0000
	Total	100.0000	100.0000	100.0000

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EXTENDED NATURAL GAS LIQUID ANALYSIS (*DHA)

DHA COMPONENT LIST

PROJECT NO. :	201411074	ANALYSIS NO. :	03
COMPANY NAME :	CARRIZO OIL & GAS	ANALYSIS DATE:	NOVEMBER 16, 2014
ACCOUNT NO. :		SAMPLE DATE :	NOVEMBER 14, 2014
PRODUCER :		CYLINDER NO. :	2778
LEASE NO. :		SAMPLED BY :	GALE MCENDREE
NAME/DESCRIP :	SEPARATOR 13:40		EMPACT
	SHULL 1-35-9-60		
FIELD DATA		SAMPLE TEMP. :	170
SAMPLE PRES. :	45	AMBIENT TEMP.:	
VAPOR PRES. :		GRAVITY :	
COMMENTS :	SPOT; NO PROBE		

COMPONENT	PIANO #	MOLE %	MASS %	VOL %
Nitrogen	NHC	0.0070	0.0017	0.0016
Carbon Dioxide	NHC	0.0310	0.0120	0.0109
Methane	P1	0.1750	0.0248	0.0616
Ethane	P2	0.3940	0.1047	0.2188
Propane	P3	1.4310	0.5574	0.8186
i-Butane	I4	0.3590	0.1843	0.2438
n-Butane	P4	1.8350	0.9420	1.2010
2,2-Dimethylpropane	I5	0.0073	0.0047	0.0059
i-Pentane	I5	0.7960	0.5073	0.6047
n-Pentane	P5	1.3200	0.8412	0.9924
2,2-Dimethylbutane	I6	0.0297	0.0226	0.0257
Cyclopentane	N5	1.3759	0.8523	0.8348
2,3-Dimethylbutane	I6	0.3288	0.2503	0.2794
2-Methylpentane	I6	3.3550	2.5539	2.8910
3-Methylpentane	I6	2.0114	1.5311	1.7043
n-Hexane	P6	6.4810	4.9339	5.5344
2,2-Dimethylpentane	I7	0.0146	0.0129	0.0141
Methylcyclopentane	N6	4.3576	3.2393	3.1990
2,4-Dimethylpentane	I7	0.2261	0.2001	0.2203
2,2,3-Trimethylbutane	I7	0.0226	0.0200	0.0214
Benzene	A6	1.3381	0.9232	0.7786
3,3-Dimethylpentane	I7	0.0145	0.0128	0.0137
Cyclohexane	N6	2.5975	1.9309	1.8351
2-Methylhexane	I7	1.1163	0.9880	1.0781
2,3-Dimethylpentane	I7	0.6314	0.5588	0.5924
1,1-Dimethylcyclopentane	N7	0.3040	0.2637	0.2586
3-Methylhexane	I7	1.6590	1.4683	1.5781
1c,3-Dimethylcyclopentane	N7	0.7936	0.6883	0.6838
1t,3-Dimethylcyclopentane	N7	0.7814	0.6777	0.6697
3-Ethylpentane	I7	0.1436	0.1271	0.1344
1t,2-Dimethylcyclopentane	N7	1.7459	1.5142	1.4911
2,2,4-Trimethylpentane	I8	0.0879	0.0887	0.0945
UnknownC6s	U6	0.0012	0.0009	0.0010
n-Heptane	P7	4.5891	4.0616	4.3942
1c,2-Dimethylcyclopentane	N7	0.1693	0.1468	0.1407
Methylcyclohexane	N7	3.8830	3.3677	3.2367
2,2-Dimethylhexane	I8	0.3613	0.3645	0.3877
Ethylcyclopentane	N7	0.6953	0.6030	0.5823
2,5-Dimethylhexane	I8	0.1251	0.1262	0.1346
2,2,3-Trimethylpentane	I8	0.0394	0.0398	0.0411
2,4-Dimethylhexane	I8	0.1974	0.1992	0.2114
1c,2t,4-Trimethylcyclopentane	N8	0.3798	0.3764	0.3649

3,3-Dimethylhexane	I8	0.0487	0.0491	0.0512
2,3,4-Trimethylpentane	I8	0.1123	0.1133	0.1165
2,3,3-Trimethylpentane	I8	0.0010	0.0010	0.0010
Toluene	A7	2.8031	2.2813	1.9429
2,3-Dimethylhexane	I8	0.1791	0.1807	0.1879
2-Methyl-3-ethylpentane	I8	0.1576	0.1590	0.1635
1,1,2-Trimethylcyclopentane	N8	0.0208	0.0206	0.0197
2-Methylheptane	I8	1.2943	1.3059	1.3820
4-Methylheptane	I8	0.4168	0.4205	0.4343
3-Methyl-3-ethylpentane	I8	0.0876	0.0884	0.0900
3,4-Dimethylhexane	I8	0.0843	0.0851	0.0875
1c,2c,4-Trimethylcyclopentane	N8	0.0265	0.0263	0.0252
1c,3-Dimethylcyclohexane	N8	0.0324	0.0321	0.0310
3-Methylheptane	I8	0.5605	0.5655	0.5933
1c,2t,3-Trimethylcyclopentane	N8	0.8750	0.8672	0.8332
3-Ethylhexane	I8	0.2410	0.2432	0.2525
1t,4-Dimethylcyclohexane	N8	0.4278	0.4240	0.4116
1,1-Dimethylcyclohexane	N8	0.1029	0.1020	0.0967
2,2,5-Trimethylhexane	I9	0.0084	0.0095	0.0099
3c-Ethylmethylcyclopentane	N8	0.0040	0.0040	0.0039
3t-Ethylmethylcyclopentane	N8	0.2408	0.2387	0.2305
2t-Ethylmethylcyclopentane	N8	0.1969	0.1952	0.1879
1,1-Methylethylcyclopentane	N8	0.7280	0.7215	0.6840
2,2,4-Trimethylhexane	I9	0.0465	0.0527	0.0545
1t,2-Dimethylcyclohexane	N8	0.5774	0.5723	0.5462
1c,2c,3-Trimethylcyclopentane	N8	0.0018	0.0018	0.0017
1t,3-Dimethylcyclohexane	N8	0.0085	0.0084	0.0079
UnknownC7s	U7	0.2181	0.1930	0.2088
n-Octane	P8	2.5630	2.5860	2.7237
1c,4-Dimethylcyclohexane	N8	0.6911	0.6850	0.6478
i-Propylcyclopentane	I8	0.0729	0.0723	0.0689
2,4,4-Trimethylhexane	I9	0.0165	0.0187	0.0192
2,2,3,4-Tetramethylpentane	I9	0.0189	0.0214	0.0220
2,3,4-Trimethylhexane	I9	0.0167	0.0189	0.0194
1c,2-Dimethylcyclohexane	N8	0.1766	0.1750	0.1628
2,3,5-Trimethylhexane	I9	0.0932	0.1056	0.1083
2,2-Dimethylheptane	I9	0.0129	0.0146	0.0152
1,1,4-Trimethylcyclohexane	N9	1.0097	1.1259	1.0800
2,2,3-Trimethylhexane	I9	0.4459	0.5052	0.5128
2,4-Dimethylheptane	I9	0.0573	0.0649	0.0672
4,4-Dimethylheptane	I9	0.0628	0.0711	0.0736
Ethylcyclohexane	N8	0.5548	0.5499	0.5169
n-Propylcyclopentane	N8	0.2223	0.2203	0.2100
1c,3c,5-Trimethylcyclohexane	N9	0.0379	0.0423	0.0406
2,5-Dimethylheptane	I9	0.0868	0.0983	0.1015
3,3-Dimethylheptane	I9	0.0981	0.1111	0.1147
3,5-Dimethylheptane	I9	0.0667	0.0756	0.0781
2,6-Dimethylheptane	I9	0.0701	0.0794	0.0829
1,1,3-Trimethylcyclohexane	N9	0.1621	0.1808	0.1734
Ethylbenzene	A8	0.2870	0.2691	0.2292
1c,2t,4t-Trimethylcyclohexane	N9	0.5993	0.6683	0.6288
2,3-Dimethylheptane	I9	1.0913	1.2363	1.2607
1,3-Dimethylbenzene (m-Xylene)	A8	0.1985	0.1862	0.1595
1,4-Dimethylbenzene (p-Xylene)	A8	0.3458	0.3243	0.2786
3,4-Dimethylheptane	I9	0.0910	0.1031	0.1044
3,4-Dimethylheptane (2)	I9	0.1421	0.1610	0.1630
4-Ethylheptane	I9	0.0554	0.0628	0.0650
4-Methyloctane	I9	0.2949	0.3341	0.3432
2-Methyloctane	I9	0.3152	0.3571	0.3705
1c,2t,4c-Trimethylcyclohexane	I9	0.0712	0.0807	0.0823
3-Ethylheptane	I9	0.0681	0.0772	0.0787
3-Methyloctane	I9	0.4698	0.5322	0.5466
3,3-Diethylpentane	I9	0.0505	0.0572	0.0561
1c,2t,3-Trimethylcyclohexane	N9	0.0895	0.0998	0.0939
1,1,2-Trimethylcyclohexane	N9	0.0339	0.0378	0.0356
1,2-Dimethylbenzene (o-Xylene)	A8	0.7020	0.6583	0.5540
i-Butylcyclopentane	N9	0.2240	0.2498	0.2369
UnknownC8s	U8	0.0856	0.0864	0.0910
n-Nonane	P9	1.8649	2.1127	2.1793
1,1-Methylethylcyclohexane	N9	0.3577	0.4052	0.4192
i-Propylbenzene	A9	0.3374	0.3582	0.3071
i-Propylcyclohexane	N9	0.0976	0.1088	0.1005
2,2-Dimethyloctane	I10	0.0883	0.1110	0.1111
2,4-Dimethyloctane	I10	0.0685	0.0861	0.0862

2,6-Dimethyloctane	I10	0.0113	0.0142	0.0147
2,5-Dimethyloctane	I10	0.0432	0.0543	0.0544
n-Butylcyclopentane	N9	0.2152	0.2666	0.2471
3,3-Dimethyloctane	I10	0.1045	0.1313	0.1315
n-Propylbenzene	A9	0.4544	0.4824	0.4137
3,6-Dimethyloctane	I10	0.3154	0.3964	0.3969
3-Methyl-5-ethylheptane	I10	0.4616	0.5229	0.5334
1,3-Methylethylbenzene	A9	0.3367	0.3575	0.3040
1,4-Methylethylbenzene	A9	0.2145	0.2277	0.1936
1,3,5-Trimethylbenzene	A9	0.1206	0.1280	0.1096
2,3-Dimethyloctane	I10	0.0717	0.0901	0.0902
5-Methylnonane	I10	0.2247	0.2824	0.2854
1,2-Methylethylbenzene	A9	0.6090	0.6466	0.5470
2-Methylnonane	I10	0.0799	0.1004	0.1023
3-Ethyloctane	I10	0.0940	0.1181	0.1182
3-Methylnonane	I10	0.2437	0.3063	0.3092
1,2,4-Trimethylbenzene	A9	0.0553	0.0587	0.0497
t-Butylbenzene	A10	0.4767	0.5652	0.4834
i-Butylcyclohexane	N10	0.2186	0.2708	0.2471
1t-Methyl-2-n-propylcyclohexane	I10	0.0874	0.0990	0.1010
i-Butylbenzene	A10	0.0407	0.0483	0.0419
sec-Butylbenzene	A10	0.0401	0.0475	0.0408
UnknownC9s	U9	1.8301	2.0733	2.1387
n-Decane	P10	1.3639	1.7141	1.7384
1,2,3-Trimethylbenzene	A9	0.2697	0.2863	0.2373
1,3-Methyl-i-propylbenzene	A10	0.1180	0.1253	0.1060
1,4-Methyl-i-propylbenzene	A10	0.1193	0.1267	0.1072
Sec-Butylcyclohexane	N10	0.3651	0.4524	0.4122
1,2-Methyl-i-propylbenzene	A10	0.1811	0.2147	0.1815
3-Ethylnonane	I10	0.0513	0.0645	0.0657
1,3-Diethylbenzene	A10	0.1761	0.2088	0.1791
1,3-Methyl-n-propylbenzene	A10	0.0585	0.0694	0.0597
1,4-Diethylbenzene	A10	0.1445	0.1713	0.1472
1,4-Methyl-n-propylbenzene	A10	0.2131	0.2526	0.2180
n-Butylbenzene	A10	0.0704	0.0835	0.0718
1,3-Dimethyl-5-ethylbenzene	A10	0.0540	0.0640	0.0548
1,2-Diethylbenzene	A10	0.1283	0.1521	0.1281
1,2-Methyl-n-propylbenzene	A10	0.1248	0.1480	0.1255
1,4-Dimethyl-2-ethylbenzene	A10	0.1674	0.1985	0.1677
1,3-Dimethyl-4-ethylbenzene	A10	0.0145	0.0172	0.0145
1,2-Dimethyl-4-ethylbenzene	A10	0.2185	0.2590	0.2194
1,3-Dimethyl-2-ethylbenzene	A10	0.1559	0.1848	0.1538
1t,2c,4-Trimethylcyclopentane	A10	0.5249	0.5202	0.5152
1,2-Dimethyl-3-ethylbenzene	A10	0.0846	0.1003	0.0833
1,2-Ethyl-i-propylbenzene	A10	0.0623	0.0739	0.0625
1,4-Methyl-t-butylbenzene	A11	0.2187	0.2593	0.2191
UnknownC10s	U10	3.0162	3.7906	3.8444
n-Undecane	P11	1.1777	1.6260	1.6262
1,4-Ethyl-i-propylbenzene	A11	0.0660	0.0783	0.0662
1,2,4,5-Tetramethylbenzene	A11	0.0699	0.0829	0.0693
1,2-Methyl-n-butylbenzene	A11	0.0720	0.0854	0.0722
1,2,3,5-Tetramethylbenzene	A11	0.0708	0.0839	0.0698
1,2-Methyl-t-butylbenzene	A11	0.1111	0.1317	0.1113
5-Methylindan	A11	0.0266	0.0400	0.0396
4-Methylindan	A11	0.0146	0.0220	0.0218
1,2-Ethyl-n-propylbenzene	A11	0.1704	0.2020	0.1707
2-Methylindan	A11	0.0936	0.1408	0.1393
1,3-Methyl-n-butylbenzene	A11	0.0977	0.1158	0.0979
1,3-Di-i-propylbenzene	A11	0.1117	0.1324	0.1119
sec-Pentylbenzene	A11	0.1310	0.1553	0.1313
n-Pentylbenzene	A11	0.0552	0.0723	0.0624
1t-M-2-(4MP)cyclopentane	P12	0.1120	0.1685	0.1667
1,2-Di-n-propylbenzene	A11	0.1274	0.1510	0.1276
1,4-Di-i-propylbenzene	A11	0.2123	0.2517	0.2127
Tetrahydronaphthalene	A10	0.1114	0.1321	0.1116
t-Decahydronaphthalene	A10	0.1836	0.2177	0.1840
Naphthalene	A10	0.1255	0.1421	0.1201
1-t-Butyl-3,5-dimethylbenzene	A12	0.0675	0.0800	0.0676
1,4-Ethyl-t-butylbenzene	A11	0.1363	0.1616	0.1366
UnknownC11s	U11	2.0692	2.8569	2.8573
n-Dodecane	P12	1.0161	1.5288	1.5122
1,3-Di-n-propylbenzene	A12	0.0885	0.1049	0.0887
1,3,5-Triethylbenzene	A12	0.0481	0.0511	0.0437
1,2,4-Triethylbenzene	A12	0.4014	0.4261	0.3603

1,4-Methyl-n-pentylbenzene	A12	0.0877	0.1040	0.0879
n-Hexylbenzene	A12	0.1370	0.1964	0.1696
1,2,3,4,5-Pentamethylbenzene	A13	0.2558	0.3033	0.2563
2-Methylnaphthalene	A11	0.3179	0.3993	0.3375
1-Methylnaphthalene	A11	0.2630	0.3303	0.2399
UnknownC12s	U12	1.5648	2.3544	2.3288
n-Tridecane	P13	0.7665	1.2482	1.2201
UnknownC13s	U13	1.4039	2.2861	2.2346
n-Tetradecane	P14	0.3704	0.6491	0.6332
UnknownC14s	U14	1.2713	2.2278	2.1731
n-Pentadecane	P15	0.2324	0.4360	0.4204
UnknownC15s	U15	1.2239	2.2964	2.2143
n-Hexadecane	P16	0.0884	0.1768	0.1694
UnknownC16s	U16	0.4099	0.8198	0.7854
n-Heptadecane	P17	0.0059	0.0125	0.0119
UnknownC17s	U17	0.0947	0.2011	0.1921
n-Octadecane	P18	0.0003	0.0007	0.0007
UnknownC18s	U18	0.0082	0.0184	0.0175
TOTAL		100.0000	100.0000	100.0000

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303-637-0150

EXTENDED NATURAL GAS ANALYSIS (*DHA)

MAIN PAGE

PROJECT NO. :	201411074	ANALYSIS NO. :	04
COMPANY NAME :	CARRIZO OIL & GAS	ANALYSIS DATE:	NOVEMBER 20, 2014
ACCOUNT NO. :		SAMPLE DATE :	NOVEMBER 14, 2014
PRODUCER :		CYLINDER NO. :	1227
LEASE NO. :		SAMPLED BY :	GALE MCENDREE - EMPACT
NAME/DESCRIP :	SEPARATOR GAS 13:50 SHULL 1-35-9-60		
FIELD DATA		SAMPLE TEMP. :	105
SAMPLE PRES. :	55	AMBIENT TEMP.:	
VAPOR PRES. :		GRAVITY :	
COMMENTS :	SPOT; NO PROBE; LENGTH OF H2S STAIN @ 0.25 PPM (1-7PPM) 13:55		

COMPONENT	MOLE %	MASS %	GPM @ 14.650	GPM @ 14.730
ALCOHOLS	5.6363	7.2223		
HELIUM	0.02	0.00	---	---
HYDROGEN	0.01	0.00	---	---
OXYGEN/ARGON	0.01	0.01	---	---
NITROGEN	1.10	1.23	---	---
CARBON DIOXIDE	2.33	4.10	---	---
METHANE	64.84630	41.60300	---	---
ETHANE	10.5603	12.6988	2.8233	2.8388
PROPANE	8.8424	15.5930	2.4355	2.4488
I-BUTANE	0.9283	2.1577	0.3037	0.3053
N-BUTANE	3.2160	7.4752	1.0133	1.0188
I-PENTANE	0.7197	2.0704	0.2586	0.2600
N-PENTANE	0.8632	2.4906	0.3127	0.3144
HEXANES PLUS	0.9175	3.3490	0.3675	0.3694
TOTALS	100.00000	100.00000	7.5146	7.5555

BTEX COMPONENTS	MOLE%	WT%
BENZENE	0.0359	0.1121
TOLUENE	0.0193	0.0711
ETHYLBENZENE	0.0018	0.0076
XYLENES	0.0038	0.0161
TOTAL BTEX	0.0608	0.2069

	BTU @	14.650	14.730
LOW	NET DRY REAL :	1236.0 **/scf**	1242.7 **/scf**
	NET WET REAL :	1214.4 **/scf**	1221.1 **/scf**
HIGH	GROSS DRY REAL :	1359.1 **/scf**	1366.5 **/scf**
	GROSS WET REAL :	1335.3 **/scf**	1342.7 **/scf**
	NET DRY REAL :	18775.0 **/lb**	18877.5 **/lb**
	GROSS DRY REAL :	20646.7 **/lb**	20759.4 **/lb**
	RELATIVE DENSITY (AIR=1):		0.8627
	COMPRESSIBILITY FACTOR :		0.99463

(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

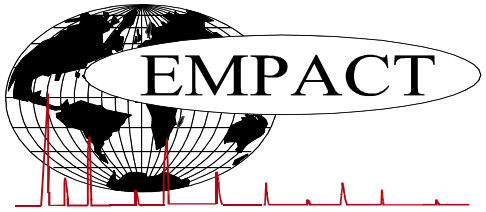
303-637-0150

EXTENDED NATURAL GAS ANALYSIS (*DHA)

GLYCALC INFORMATION

PROJECT NO. :	201411074	ANALYSIS NO. :	04
COMPANY NAME :	CARRIZO OIL & GAS	ANALYSIS DATE:	NOVEMBER 20, 2014
ACCOUNT NO. :		SAMPLE DATE :	NOVEMBER 14, 2014
PRODUCER :		CYLINDER NO. :	1227
LEASE NO. :		SAMPLED BY :	GALE MCENDREE - EMPACT
NAME/DESCRIP :	SEPARATOR GAS 13:50 SHULL 1-35-9-60		
FIELD DATA		SAMPLE TEMP. :	105
SAMPLE PRES. :	55	AMBIENT TEMP.:	
VAPOR PRES. :		GRAVITY :	
COMMENTS :	SPOT; NO PROBE; LENGTH OF H2S STAIN @ 0.25 PPM (1-7PPM) 13:55		

Componet	Mole %	Wt %
Helium	0.02	0.00
Hydrogen	0.01	0.00
Carbon Dioxide	2.33	4.10
Nitrogen	1.10	1.23
Methane	64.84630	41.60300
Ethane	10.5603	12.6988
Propane	8.8424	15.5930
Isobutane	0.9283	2.1577
n-Butane	3.2160	7.4752
Isopentane	0.6431	1.8556
n-Pentane	0.8632	2.4906
Cyclopentane	0.0766	0.2148
n-Hexane	0.1941	0.6689
Cyclohexane	0.0488	0.1642
Other Hexanes	0.3449	1.1795
Heptanes	0.1601	0.6369
Methycyclohexane	0.0345	0.1355
2,2,4 Trimethylpentane	0.0004	0.0018
Benzene	0.0359	0.1121
Toluene	0.0193	0.0711
Ethylbenzene	0.0018	0.0076
Xylenes	0.0038	0.0161
C8+ Heavies	0.0739	0.3553
Subtotal	94.35370	92.76770
Oxygen/Argon	0.01	0.01
Alcohols	5.6363	7.2223
Total	100.00000	100.00000



EXTENDED NATURAL GAS ANALYSIS (*DHA)

DHA COMPONENT LIST

PROJECT NO. :	201411074	ANALYSIS NO. :	04
COMPANY NAME :	CARRIZO OIL & GAS	ANALYSIS DATE:	NOVEMBER 20, 2014
ACCOUNT NO. :		SAMPLE DATE :	NOVEMBER 14, 2014
PRODUCER :		CYLINDER NO. :	1227
LEASE NO. :		SAMPLED BY :	GALE MCENDREE - EMPACT
NAME/DESCRIP :	SEPARATOR GAS 13:50 SHULL 1-35-9-60		
FIELD DATA		SAMPLE TEMP. :	105
SAMPLE PRES. :	55	AMBIENT TEMP.:	
VAPOR PRES. :		GRAVITY :	
COMMENTS :	SPOT; NO PROBE; LENGTH OF H2S STAIN @ 0.25 PPM (1-7PPM) 13:55		

COMPONENT	PIANO #	MOLE %	MASS %	GPM @ 14.650	GPM @ 14.730
Helium	---	0.02	0.00	---	---
Hydrogen	---	0.01	0.00	---	---
Oxygen/Argon	---	0.01	0.01	---	---
Nitrogen	---	1.10	1.23	---	---
Carbon Dioxide	---	2.33	4.10	---	---
Methane	P1	64.84630	41.60300	---	---
Ethane	P2	10.5603	12.6988	2.823	2.839
Propane	P3	8.8424	15.5930	2.436	2.449
i-Butane	I4	0.9283	2.1577	0.304	0.305
Methanol	X1	5.6363	7.2223	0.719	0.723
n-Butane	P4	3.2160	7.4752	1.013	1.019
2,2-Dimethylpropane	I5	0.0025	0.0072	0.001	0.001
i-Pentane	I5	0.6406	1.8484	0.235	0.236
n-Pentane	P5	0.8632	2.4906	0.313	0.314
2,2-Dimethylbutane	I6	0.0018	0.0062	0.001	0.001
Cyclopentane	N5	0.0766	0.2148	0.023	0.023
2,3-Dimethylbutane	I6	0.0126	0.0434	0.005	0.005
2-Methylpentane	I6	0.1422	0.4901	0.059	0.060
3-Methylpentane	I6	0.0749	0.2581	0.030	0.030
n-Hexane	P6	0.1941	0.6689	0.080	0.081
2,2-Dimethylpentane	I7	0.0002	0.0008	0.000	0.000
Methylcyclopentane	N6	0.1132	0.3810	0.040	0.040
2,4-Dimethylpentane	I7	0.0044	0.0176	0.002	0.002
2,2,3-Trimethylbutane	I7	0.0002	0.0008	0.000	0.000
Benzene	A6	0.0359	0.1121	0.010	0.010
Cyclohexane	N6	0.0488	0.1642	0.017	0.017
2-Methylhexane	I7	0.0180	0.0721	0.008	0.008
2,3-Dimethylpentane	I7	0.0091	0.0365	0.004	0.004
1,1-Dimethylcyclopentane	N7	0.0059	0.0232	0.002	0.002
3-Methylhexane	I7	0.0230	0.0922	0.011	0.011
1c,3-Dimethylcyclopentane	N7	0.0119	0.0467	0.005	0.005
1t,3-Dimethylcyclopentane	N7	0.0089	0.0350	0.004	0.004
3-Ethylpentane	I7	0.0016	0.0064	0.001	0.001
1t,2-Dimethylcyclopentane	N7	0.0246	0.0966	0.011	0.011
2,2,4-Trimethylpentane	I8	0.0004	0.0018	0.000	0.000
UnknownC6s	U6	0.0002	0.0007	0.000	0.000
n-Heptane	P7	0.0449	0.1799	0.021	0.021
1c,2-Dimethylcyclopentane	N7	0.0014	0.0055	0.001	0.001
Methylcyclohexane	N7	0.0345	0.1355	0.014	0.014
2,2-Dimethylhexane	I8	0.0023	0.0105	0.001	0.001
Ethylcyclopentane	N7	0.0058	0.0228	0.002	0.002

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2,5-Dimethylhexane	I8	0.0005	0.0023	0.000	0.000
2,2,3-Trimethylpentane	I8	0.0004	0.0018	0.000	0.000
2,4-Dimethylhexane	I8	0.0017	0.0078	0.001	0.001
1c,2t,4-Trimethylcyclopentane	N8	0.0028	0.0126	0.001	0.001
3,3-Dimethylhexane	I8	0.0002	0.0009	0.000	0.000
1t,2c,4-Trimethylcyclopentane	N8	0.0034	0.0153	0.002	0.002
2,3,4-Trimethylpentane	I8	0.0006	0.0028	0.000	0.000
Toluene	A7	0.0193	0.0711	0.006	0.006
2,3-Dimethylhexane	I8	0.0011	0.0050	0.001	0.001
2-Methyl-3-ethylpentane	I8	0.0006	0.0028	0.000	0.000
1,1,2-Trimethylcyclopentane	N8	0.0001	0.0004	0.000	0.000
2-Methylheptane	I8	0.0065	0.0297	0.003	0.003
4-Methylheptane	I8	0.0018	0.0082	0.001	0.001
3-Methyl-3-ethylpentane	I8	0.0004	0.0018	0.000	0.000
3,4-Dimethylhexane	I8	0.0003	0.0014	0.000	0.000
1c,2c,4-Trimethylcyclopentane	N8	0.0002	0.0009	0.000	0.000
1c,3-Dimethylcyclohexane	N8	0.0001	0.0004	0.000	0.000
3-Methylheptane	I8	0.0014	0.0064	0.001	0.001
1c,2t,3-Trimethylcyclopentane	N8	0.0050	0.0224	0.003	0.003
3-Ethylhexane	I8	0.0011	0.0050	0.001	0.001
1t,4-Dimethylcyclohexane	N8	0.0015	0.0067	0.001	0.001
1,1-Dimethylcyclohexane	N8	0.0005	0.0022	0.000	0.000
3t-Ethylmethylcyclopentane	N8	0.0010	0.0045	0.001	0.001
2t-Ethylmethylcyclopentane	N8	0.0010	0.0045	0.001	0.001
1,1-Methylethylcyclopentane	N8	0.0027	0.0121	0.001	0.001
2,2,4-Trimethylhexane	I9	0.0001	0.0005	0.000	0.000
1t,2-Dimethylcyclohexane	N8	0.0020	0.0090	0.001	0.001
UnknownC7s	U7	0.0002	0.0008	0.000	0.000
n-Octane	P8	0.0046	0.0210	0.002	0.002
1c,4-Dimethylcyclohexane	N8	0.0054	0.0242	0.003	0.003
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	0.0002	0.0010	0.000	0.000
1c,2-Dimethylcyclohexane	N8	0.0004	0.0018	0.000	0.000
2,2-Dimethylheptane	I9	0.0001	0.0005	0.000	0.000
1,1,4-Trimethylcyclohexane	N9	0.0026	0.0131	0.001	0.001
2,2,3-Trimethylhexane	I9	0.0008	0.0041	0.000	0.000
2,4-Dimethylheptane	I9	0.0002	0.0010	0.000	0.000
4,4-Dimethylheptane	I9	0.0002	0.0010	0.000	0.000
Ethylcyclohexane	N8	0.0011	0.0049	0.000	0.000
n-Propylcyclopentane	N8	0.0004	0.0018	0.000	0.000
1c,3c,5-Trimethylcyclohexane	N9	0.0001	0.0005	0.000	0.000
2,5-Dimethylheptane	I9	0.0002	0.0010	0.000	0.000
3,3-Dimethylheptane	I9	0.0002	0.0010	0.000	0.000
3,5-Dimethylheptane	I9	0.0002	0.0010	0.000	0.000
2,6-Dimethylheptane	I9	0.0001	0.0005	0.000	0.000
Ethylbenzene	I8	0.0018	0.0076	0.001	0.001
1c,2t,4t-Trimethylcyclohexane	N9	0.0004	0.0020	0.000	0.000
2,3-Dimethylheptane	I9	0.0005	0.0026	0.000	0.000
1,3-Dimethylbenzene (m-Xylene)	A8	0.0018	0.0076	0.001	0.001
1,4-Dimethylbenzene (p-Xylene)	A8	0.0009	0.0038	0.000	0.000
3,4-Dimethylheptane	I9	0.0004	0.0020	0.000	0.000
3,4-Dimethylheptane (2)	I9	0.0001	0.0005	0.000	0.000
4-Methyloctane	I9	0.0005	0.0026	0.000	0.000
2-Methyloctane	I9	0.0005	0.0026	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	0.0006	0.0031	0.000	0.000
1c,2t,4c-Trimethylcyclohexane	I9	0.0001	0.0005	0.000	0.000
1,2-Dimethylbenzene (o-Xylene)	A8	0.0011	0.0047	0.000	0.000
i-Butylcyclopentane	N9	0.0003	0.0015	0.000	0.000
UnknownC8s	U8	0.0002	0.0009	0.000	0.000
n-Nonane	P9	0.0014	0.0072	0.001	0.001
1,1-Methylethylcyclohexane	N9	0.0009	0.0046	0.001	0.001

i-Propylbenzene	A9	0.0005	0.0024	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
n-Butylcyclopentane	N9	0.0003	0.0015	0.000	0.000
3,3-Dimethyloctane	I10	0.0001	0.0006	0.000	0.000
n-Propylbenzene	A9	0.0004	0.0019	0.000	0.000
3,6-Dimethyloctane	I10	0.0003	0.0017	0.000	0.000
3-Methyl-5-ethylheptane	I10	0.0003	0.0017	0.000	0.000
1,3-Methylethylbenzene	A9	0.0003	0.0014	0.000	0.000
1,4-Methylethylbenzene	A9	0.0001	0.0005	0.000	0.000
1,3,5-Trimethylbenzene	A9	0.0001	0.0005	0.000	0.000
5-Methylnonane	I10	0.0001	0.0006	0.000	0.000
1,2-Methylethylbenzene	A9	0.0001	0.0005	0.000	0.000
3-Methylnonane	I10	0.0001	0.0006	0.000	0.000
t-Butylbenzene	A10	0.0002	0.0011	0.000	0.000
i-Butylcyclohexane	N10	0.0001	0.0006	0.000	0.000
UnknownC9s	U9	0.0034	0.0174	0.002	0.002
n-Decane	P10	0.0005	0.0028	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	0.0005	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
t-Decahydronaphthalene	A9	0.0001	0.0006	0.000	0.000
1,2-Dimethyl-4-ethylbenzene	A10	0.0001	0.0005	0.000	0.000
UnknownC10s	U10	0.0013	0.0074	0.001	0.001
n-Undecane	P11	0.0002	0.0012	0.000	0.000
UnknownC11s	U11	0.0001	0.0006	0.000	0.000
n-Dodecane	P12	0.0001	0.0007	0.000	0.000
n-Tridecane	P13	0.0001	0.0007	0.000	0.000
n-Tetradecane	P14	0.0002	0.0016	0.000	0.000
n-Pentadecane	P15	0.0003	0.0026	0.000	0.000
UnknownC15s	U15	0.0003	0.0026	0.000	0.000
n-Hexadecane	P16	0.0003	0.0027	0.000	0.000
UnknownC16s	U16	0.0002	0.0018	0.000	0.000
n-Heptadecane	P17	0.0001	0.0010	0.000	0.000
UnknownC17s	U17	0.0001	0.0010	0.000	0.000
UnknownC18s	U18	0.0001	0.0010	0.000	0.000
TOTAL		100.00000	100.00000	8.2332	8.2780

BTEX COMPONENTS	**MOLE%**	**WT%**
BENZENE	0.0359	0.1121
TOLUENE	0.0193	0.0711
ETHYLBENZENE	0.0018	0.0076
XYLENES	0.0038	0.0161
TOTAL BTEX	0.0608	0.2069

	BTU @	14.650	14.730
LOW	NET DRY REAL :	1236.0 **/scf**	1242.7 **/scf**
	NET WET REAL :	1214.4 **/scf**	1221.1 **/scf**
HIGH	GROSS DRY REAL :	1359.1 **/scf**	1366.5 **/scf**
	GROSS WET REAL :	1335.3 **/scf**	1342.7 **/scf**
	NET DRY REAL :	18775.0 **/lb**	18877.5 **/lb**
	GROSS DRY REAL :	20646.7 **/lb**	20759.4 **/lb**
	RELATIVE DENSITY (AIR=1):		0.8627
	COMPRESSIBILITY FACTOR :		0.99463

(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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