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

303-637-0150

EXTENDED NATURAL GAS LIQUID ANALYSIS (*DHA)

MAIN PAGE

PROJECT NO. :	201410118	ANALYSIS NO. :	04
COMPANY NAME :	CARRIZO OIL & GAS	ANALYSIS DATE:	OCTOBER 21, 2014
ACCOUNT NO. :		SAMPLE DATE :	OCTOBER 20, 2014
PRODUCER :		CYLINDER NO. :	4038
LEASE NO. :		SAMPLED BY :	JOHN MOSER
NAME/DESCRIP :	OIL TREATER 16:00		EMPACT
	HEMBERGER 5-25-8-60		
FIELD DATA		SAMPLE TEMP. :	163
SAMPLE PRES. :	26	AMBIENT TEMP.:	
VAPOR PRES. :		GRAVITY :	
COMMENTS :	SPOT; NO PROBE		

COMPONENT	MOLE %	MASS %	VOL %
ALCOHOLS	14.4776	4.7083	4.3957
NITROGEN (AIR)	0.0610	0.0173	0.0159
CARBON DIOXIDE	0.0080	0.0036	0.0033
METHANE	0.0170	0.0028	0.0069
ETHANE	0.3140	0.0958	0.2000
PROPANE	1.7160	0.7679	1.1264
I-BUTANE	0.4790	0.2825	0.3732
N-BUTANE	2.5040	1.4767	1.8805
I-PENTANE	1.0986	0.8042	0.9578
N-PENTANE	1.8430	1.3492	1.5898
UNKNOWN C1-C5	0.0003	0.0002	0.0002
HEXANES PLUS	77.4815	90.4915	89.4503
TOTALS	100.0000	100.0000	100.0000

BTEX COMPONENTS	MOLE%	MASS%
BENZENE	1.2298	0.9747
TOLUENE	2.4272	2.2693
ETHYLBENZENE	0.3539	0.3813
XYLENE	1.9006	2.0475
TOTAL BTEX	5.9115	5.6728

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

	TOTAL SAMPLE	C6+ FRACTION	
Specific Gravity (H2O=1) =	0.7435	0.7531	60/60
API Gravity =	58.82	56.39	60/60
Molecular Weight =	98.55	115.872	
Absolute Density =	6.2	6.27	LBS/GAL
Heating Value Liq. Idl Gas=	122670	127467	BTU/GAL
Vapor/Liquid =	23.89	20.68	CUFT/GAL
Vapor Pressure =	10.80	1.76	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. :	201410118	ANALYSIS NO. :	04
COMPANY NAME :	CARRIZO OIL & GAS	ANALYSIS DATE:	OCTOBER 21, 2014
ACCOUNT NO. :		SAMPLE DATE :	OCTOBER 20, 2014
PRODUCER :		CYLINDER NO. :	4038
LEASE NO. :		SAMPLED BY :	JOHN MOSER
NAME/DESCRIP :	OIL TREATER 16:00 HEMBERGER 5-25-8-60		EMPACT
FIELD DATA		SAMPLE TEMP. :	163
SAMPLE PRES. :	26	AMBIENT TEMP.:	
VAPOR PRES. :		GRAVITY :	
COMMENTS :	SPOT; NO PROBE		

COMPONENT	Mole %		Wt %		LV %	
CARBON DIOXIDE	0.0080		0.0036		0.0033	
NITROGEN (AIR)	0.0610		0.0173		0.0159	
METHANE	0.0170		0.0028		0.0069	
ETHANE	0.3140		0.0958		0.2000	
PROPANE	1.7160		0.7679		1.1264	
I-BUTANE	0.4790		0.2825		0.3732	
N-BUTANE	2.5040		1.4767		1.8805	
I-PENTANE	1.0986		0.8042		0.9578	
N-PENTANE	1.8430		1.3492		1.5898	
CYCLOPENTANE (N-C5)	1.3105		0.9325		0.9123	
UNKNOWN C1-C5	0.0003		0.0002		0.0002	
N-HEXANE	6.0026		5.2490		5.8811	
CYCLOHEXANE (OTHER C6)	2.3748		2.0280		1.9251	
OTHER HEXANES	9.0951		7.8755		8.4033	
OTHER HEPTANES	11.1314		11.2429		11.7762	
METHYLCYCLOHEXANE (OTHER C7)	3.3986		3.3861		3.2505	
2,2,4 TRIMETHYLPENTANE	0.6372		0.6349		0.6267	
BENZENE	1.2298		0.9747		0.8210	
TOLUENE	2.4272		2.2693		1.9304	
ETHYLBENZENE	0.3539		0.3813		0.3243	
XYLENES	1.9006		2.0475		1.7433	
OTHER OCTANES	8.9043		10.3389		10.4340	
OCTANES PLUS	----	40.5115	----	56.5335	----	54.5504
NONANES	9.2527		11.8727		11.5646	
DECANES PLUS	19.4628		31.2582		29.8575	
SUB TOTAL	85.5224		95.2917		95.6043	
ALCOHOLS	14.4776		4.7083		4.3957	
TOTAL	100.0000		100.0000		100.0000	

API Gravity	=	**58.82**	60/60
Vapor Pressure	=	**10.80**	PSIA & 100 F
Average Molecular Weight of Decanes plus	=	**158.27**	
Average Specific Gravity of Decanes plus	=	**0.7760**	

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BY CARBON NUMBER

PROJECT NO. :	201410118	ANALYSIS NO. :	04
COMPANY NAME :	CARRIZO OIL & GAS	ANALYSIS DATE:	OCTOBER 21, 2014
ACCOUNT NO. :		SAMPLE DATE :	OCTOBER 20, 2014
PRODUCER :		CYLINDER NO. :	4038
LEASE NO. :		SAMPLED BY :	JOHN MOSER
NAME/DESCRIP :	OIL TREATER 16:00		EMPACT
	HEMBERGER 5-25-8-60		
FIELD DATA		SAMPLE TEMP. :	163
SAMPLE PRES. :	26	AMBIENT TEMP.:	
VAPOR PRES. :		GRAVITY :	
COMMENTS :	SPOT; NO PROBE		

COMPONENT / CARBON NUMBER		MOLE%	MASS %	VOLUME %
ALCOHOLS		14.4776	4.7083	4.3957
NITROGEN		0.0610	0.0173	0.0159
CARBON DIOXIDE		0.0080	0.0036	0.0033
	C1	0.0170	0.0028	0.0069
	C2	0.3140	0.0958	0.2000
	C3	1.7160	0.7679	1.1264
	C4	2.9830	1.7592	2.2537
	C5	4.2524	3.0861	3.4601
	C6	18.7023	16.1272	17.0305
	C7	16.9572	16.8983	16.9571
	C8	11.7960	13.4026	13.1283
	C9	9.2527	11.8727	11.5646
	C10	7.8956	10.9813	10.4928
	C11	4.1228	6.2075	5.7949
	C12	2.4763	4.0452	3.8846
	C13	1.8660	3.3981	3.2848
	C14	1.3795	2.7770	2.7056
	C15	1.2120	2.6124	2.5159
	C16	0.3199	0.7350	0.7033
	C17	0.0604	0.1474	0.1406
	C18	0.0543	0.1402	0.1334
	C19	0.0452	0.1231	0.1163
	C20	0.0189	0.0542	0.0509
	C21	0.0071	0.0214	0.0200
	C22	0.0029	0.0091	0.0085
	C23	0.0019	0.0063	0.0059
	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. :	201410118	ANALYSIS NO. :	04
COMPANY NAME :	CARRIZO OIL & GAS	ANALYSIS DATE:	OCTOBER 21, 2014
ACCOUNT NO. :		SAMPLE DATE :	OCTOBER 20, 2014
PRODUCER :		CYLINDER NO. :	4038
LEASE NO. :		SAMPLED BY :	JOHN MOSER
NAME/DESCRIP :	OIL TREATER 16:00		EMPACT
	HEMBERGER 5-25-8-60		
FIELD DATA		SAMPLE TEMP. :	163
SAMPLE PRES. :	26	AMBIENT TEMP.:	
VAPOR PRES. :		GRAVITY :	
COMMENTS :	SPOT; NO PROBE		

COMPONENT	PIANO #	MOLE %	MASS %	VOL %
Nitrogen	NHC	0.0610	0.0173	0.0159
Carbon Dioxide	NHC	0.0080	0.0036	0.0033
Methane	P1	0.0170	0.0028	0.0069
Ethane	P2	0.3140	0.0958	0.2000
Propane	P3	1.7160	0.7679	1.1264
i-Butane	I4	0.4790	0.2825	0.3732
Methanol	X1	14.4693	4.7033	4.3910
n-Butane	P4	2.5040	1.4767	1.8805
2,2-Dimethylpropane	I5	0.0096	0.0070	0.0087
i-Pentane	I5	1.0890	0.7972	0.9491
Acetone	X2	0.0057	0.0034	0.0032
i-Propanol	X3	0.0026	0.0016	0.0015
n-Pentane	P5	1.8430	1.3492	1.5898
2,2-Dimethylbutane	I6	0.0293	0.0256	0.0291
Cyclopentane	N5	1.3105	0.9325	0.9123
2,3-Dimethylbutane	I6	0.3023	0.2643	0.2947
2-Methylpentane	I6	3.1599	2.7632	3.1242
3-Methylpentane	I6	1.8103	1.5830	1.7599
UnknownC5s	U5	0.0003	0.0002	0.0002
n-Hexane	P6	6.0026	5.2490	5.8811
2,2-Dimethylpentane	I7	0.0158	0.0161	0.0176
Methylcyclopentane	N6	3.7922	3.2384	3.1943
2,4-Dimethylpentane	I7	0.1923	0.1955	0.2150
2,2,3-Trimethylbutane	I7	0.0109	0.0111	0.0119
Benzene	A6	1.2298	0.9747	0.8210
3,3-Dimethylpentane	I7	0.0154	0.0157	0.0168
Cyclohexane	N6	2.3748	2.0280	1.9251
2-Methylhexane	I7	1.0411	1.0585	1.1537
2,3-Dimethylpentane	I7	0.5592	0.5685	0.6019
1,1-Dimethylcyclopentane	N7	0.2581	0.2572	0.2519
3-Methylhexane	I7	1.4304	1.4543	1.5612
1c,3-Dimethylcyclopentane	N7	0.6812	0.6787	0.6734
1t,3-Dimethylcyclopentane	N7	0.6372	0.6349	0.6267
3-Ethylpentane	I7	0.1177	0.1197	0.1264
1t,2-Dimethylcyclopentane	N7	1.4156	1.4104	1.3872
2,2,4-Trimethylpentane	I8	0.0354	0.0410	0.0436
UnknownC6s	U6	0.0011	0.0010	0.0011
n-Heptane	P7	3.9912	4.0579	4.3849
1c,2-Dimethylcyclopentane	N7	0.1366	0.1361	0.1303
Methylcyclohexane	N7	3.3986	3.3861	3.2505
2,2-Dimethylhexane	I8	0.2661	0.3084	0.3276
Ethylcyclopentane	N7	0.5325	0.5305	0.5116

2,5-Dimethylhexane	I8	0.0988	0.1145	0.1219
2,2,3-Trimethylpentane	I8	0.0322	0.0373	0.0385
2,4-Dimethylhexane	I8	0.1691	0.1960	0.2077
1c,2t,4-Trimethylcyclopentane	N8	0.3049	0.3472	0.3362
3,3-Dimethylhexane	I8	0.0378	0.0438	0.0456
2,3,4-Trimethylpentane	I8	0.0949	0.1100	0.1130
2,3,3-Trimethylpentane	I8	0.0008	0.0009	0.0009
Toluene	A7	2.4272	2.2693	1.9304
2,3-Dimethylhexane	I8	0.1785	0.2069	0.2149
2-Methyl-3-ethylpentane	I8	0.1234	0.1430	0.1469
1,1,2-Trimethylcyclopentane	N8	0.0130	0.0148	0.0142
2-Methylheptane	I8	1.0841	1.2566	1.3282
4-Methylheptane	I8	0.3069	0.3557	0.3669
3-Methyl-3-ethylpentane	I8	0.1076	0.1247	0.1268
3,4-Dimethylhexane	I8	0.0483	0.0560	0.0575
1c,2c,4-Trimethylcyclopentane	N8	0.0327	0.0372	0.0357
1c,3-Dimethylcyclohexane	N8	0.0112	0.0128	0.0124
3-Methylheptane	I8	0.4804	0.5568	0.5835
1c,2t,3-Trimethylcyclopentane	N8	0.7661	0.8723	0.8371
3-Ethylhexane	I8	0.1278	0.1481	0.1536
1t,4-Dimethylcyclohexane	N8	0.3173	0.3613	0.3503
1,1-Dimethylcyclohexane	N8	0.0966	0.1100	0.1042
3c-Ethylmethylcyclopentane	N8	0.0035	0.0040	0.0039
3t-Ethylmethylcyclopentane	N8	0.1846	0.2102	0.2027
2t-Ethylmethylcyclopentane	N8	0.1551	0.1766	0.1698
1,1-Methylethylcyclopentane	N8	0.5376	0.6121	0.5796
2,2,4-Trimethylhexane	I9	0.0372	0.0484	0.0500
1t,2-Dimethylcyclohexane	N8	0.4657	0.5302	0.5054
1c,2c,3-Trimethylcyclopentane	N8	0.0020	0.0023	0.0022
1t,3-Dimethylcyclohexane	N8	0.0225	0.0256	0.0241
UnknownC7s	U7	0.0962	0.0978	0.1057
n-Octane	P8	2.1385	2.4787	2.6076
1c,4-Dimethylcyclohexane	N8	0.4699	0.5350	0.5054
i-Propylcyclopentane	I8	0.0487	0.0555	0.0529
2,4,4-Trimethylhexane	I9	0.0146	0.0190	0.0195
2,2,3,4-Tetramethylpentane	I9	0.0162	0.0211	0.0217
2,3,4-Trimethylhexane	I9	0.0146	0.0190	0.0195
1c,2-Dimethylcyclohexane	N8	0.1493	0.1700	0.1579
2,3,5-Trimethylhexane	I9	0.0824	0.1072	0.1098
2,2-Dimethylheptane	I9	0.0096	0.0125	0.0130
1,1,4-Trimethylcyclohexane	N9	0.8305	1.0638	1.0192
2,2,3-Trimethylhexane	I9	0.3440	0.4477	0.4539
2,4-Dimethylheptane	I9	0.0273	0.0355	0.0367
4,4-Dimethylheptane	I9	0.0376	0.0489	0.0505
Ethylcyclohexane	N8	0.4180	0.4759	0.4468
n-Propylcyclopentane	N8	0.1743	0.1985	0.1890
1c,3c,5-Trimethylcyclohexane	N9	0.0323	0.0414	0.0397
2,5-Dimethylheptane	I9	0.0648	0.0843	0.0870
3,3-Dimethylheptane	I9	0.0734	0.0955	0.0985
3,5-Dimethylheptane	I9	0.0511	0.0665	0.0686
2,6-Dimethylheptane	I9	0.0431	0.0561	0.0585
1,1,3-Trimethylcyclohexane	N9	0.1369	0.1754	0.1680
Ethylbenzene	A8	0.3539	0.3813	0.3243
1c,2t,4t-Trimethylcyclohexane	N9	0.3599	0.4610	0.4333
2,3-Dimethylheptane	I9	0.2582	0.3360	0.3422
1,3-Dimethylbenzene (m-Xylene)	A8	0.9583	1.0324	0.8832
1,4-Dimethylbenzene (p-Xylene)	A8	0.3595	0.3873	0.3324
3,4-Dimethylheptane	I9	0.0348	0.0453	0.0458
3,4-Dimethylheptane (2)	I9	0.1105	0.1438	0.1454
4-Ethylheptane	I9	0.0249	0.0324	0.0335
4-Methyloctane	I9	0.2436	0.3170	0.3253
2-Methyloctane	I9	0.2623	0.3414	0.3537
1c,2t,4c-Trimethylcyclohexane	I9	0.0501	0.0652	0.0664
3-Ethylheptane	I9	0.0556	0.0724	0.0737
3-Methyloctane	I9	0.3675	0.4783	0.4907
3,3-Diethylpentane	I9	0.0318	0.0414	0.0406
1c,2t,3-Trimethylcyclohexane	N9	0.0627	0.0803	0.0755
1,1,2-Trimethylcyclohexane	N9	0.0221	0.0283	0.0266
1,2-Dimethylbenzene (o-Xylene)	A8	0.5828	0.6278	0.5277
i-Butylcyclopentane	N9	0.1701	0.2179	0.2064
UnknownC8s	U8	0.0379	0.0439	0.0462
n-Nonane	P9	1.5038	1.9571	2.0164
1,1-Methylethylcyclohexane	N9	0.2952	0.3842	0.3970
i-Propylbenzene	A9	0.2643	0.3223	0.2760

i-Propylcyclohexane	N9	0.0803	0.1029	0.0949
2,2-Dimethyloctane	I10	0.0665	0.0960	0.0960
2,4-Dimethyloctane	I10	0.0628	0.0907	0.0907
2,6-Dimethyloctane	I10	0.0084	0.0121	0.0125
2,5-Dimethyloctane	I10	0.0346	0.0500	0.0500
n-Butylcyclopentane	N9	0.2344	0.3336	0.3088
3,3-Dimethyloctane	I10	0.0817	0.1180	0.1181
n-Propylbenzene	A9	0.3545	0.4323	0.3703
3,6-Dimethyloctane	I10	0.2149	0.3103	0.3103
3-Methyl-5-ethylheptane	I10	0.3111	0.4049	0.4126
1,3-Methylethylbenzene	A9	0.3250	0.3964	0.3367
1,4-Methylethylbenzene	A9	0.2157	0.2631	0.2235
1,3,5-Trimethylbenzene	A9	0.1012	0.1234	0.1055
2,3-Dimethyloctane	I10	0.0583	0.0842	0.0842
5-Methylnonane	I10	0.1931	0.2788	0.2814
1,2-Methylethylbenzene	A9	0.4766	0.5813	0.4911
2-Methylnonane	I10	0.0549	0.0793	0.0807
3-Ethyloctane	I10	0.0451	0.0651	0.0651
3-Methylnonane	I10	0.1948	0.2812	0.2836
1,2,4-Trimethylbenzene	A9	0.0349	0.0426	0.0360
t-Butylbenzene	A10	0.3998	0.5445	0.4651
i-Butylcyclohexane	N10	0.1940	0.2761	0.2516
1t-Methyl-2-n-propylcyclohexane	I10	0.0771	0.1003	0.1022
i-Butylbenzene	A10	0.0312	0.0425	0.0369
sec-Butylbenzene	A10	0.0327	0.0445	0.0382
UnknownC9s	U9	1.2792	1.6648	1.7153
n-Decane	P10	1.1387	1.6439	1.6652
1,2,3-Trimethylbenzene	A9	0.2179	0.2657	0.2199
1,3-Methyl-i-propylbenzene	A10	0.1042	0.1271	0.1074
1,4-Methyl-i-propylbenzene	A10	0.1006	0.1227	0.1037
Sec-Butylcyclohexane	N10	0.2979	0.4240	0.3859
1,2-Methyl-i-propylbenzene	A10	0.1480	0.2016	0.1702
3-Ethylnonane	I10	0.0382	0.0551	0.0561
1,3-Diethylbenzene	A10	0.1353	0.1843	0.1579
1,3-Methyl-n-propylbenzene	A10	0.0415	0.0565	0.0486
1,4-Diethylbenzene	A10	0.1180	0.1607	0.1380
1,4-Methyl-n-propylbenzene	A10	0.1659	0.2259	0.1947
n-Butylbenzene	A10	0.0544	0.0741	0.0636
1,3-Dimethyl-5-ethylbenzene	A10	0.0437	0.0595	0.0509
1,2-Diethylbenzene	A10	0.1037	0.1412	0.1188
1,2-Methyl-n-propylbenzene	A10	0.0936	0.1275	0.1080
1,4-Dimethyl-2-ethylbenzene	A10	0.1256	0.1711	0.1443
1,3-Dimethyl-4-ethylbenzene	A10	0.0056	0.0076	0.0064
1,2-Dimethyl-4-ethylbenzene	A10	0.1811	0.2466	0.2087
1,3-Dimethyl-2-ethylbenzene	A10	0.1075	0.1464	0.1217
1t,2c,4-Trimethylcyclopentane	A10	0.3868	0.4404	0.4357
1,2-Dimethyl-3-ethylbenzene	A10	0.0864	0.1177	0.0976
1,2-Ethyl-i-propylbenzene	A10	0.0676	0.0921	0.0777
1,4-Methyl-t-butylbenzene	A11	0.1646	0.2242	0.1893
UnknownC10s	U10	1.9958	2.8813	2.9187
n-Undecane	P11	0.9118	1.4462	1.4447
1,4-Ethyl-i-propylbenzene	A11	0.0650	0.0885	0.0747
1,2,4,5-Tetramethylbenzene	A11	0.0932	0.1269	0.1060
1,2-Methyl-n-butylbenzene	A11	0.0597	0.0813	0.0686
1,2,3,5-Tetramethylbenzene	A11	0.0988	0.1346	0.1119
1,2-Methyl-t-butylbenzene	A11	0.0803	0.1094	0.0923
5-Methylindan	A11	0.0190	0.0328	0.0324
4-Methylindan	A11	0.0064	0.0111	0.0110
1,2-Ethyl-n-propylbenzene	A11	0.1310	0.1784	0.1506
2-Methylindan	A11	0.0748	0.1293	0.1278
1,3-Methyl-n-butylbenzene	A11	0.0772	0.1051	0.0887
1,3-Di-i-propylbenzene	A11	0.0722	0.0983	0.0830
sec-Pentylbenzene	A11	0.0643	0.0876	0.0739
n-Pentylbenzene	A11	0.0789	0.1187	0.1023
1t-M-2-(4MP)cyclopentane	P12	0.0771	0.1333	0.1317
1,2-Di-n-propylbenzene	A11	0.0962	0.1310	0.1106
1,4-Di-i-propylbenzene	A11	0.1576	0.2146	0.1812
Tetrahydronaphthalene	A10	0.0922	0.1256	0.1060
t-Decahydronaphthalene	A10	0.1112	0.1514	0.1278
Naphthalene	A10	0.0911	0.1185	0.1000
1-t-Butyl-3,5-dimethylbenzene	A12	0.0514	0.0700	0.0591
1,4-Ethyl-t-butylbenzene	A11	0.1082	0.1474	0.1244
UnknownC11s	U11	1.3791	2.1873	2.1850
n-Dodecane	P12	0.7554	1.3056	1.2899

1,3-Di-n-propylbenzene	A12	0.0712	0.0970	0.0819
1,3,5-Triethylbenzene	A12	0.0506	0.0617	0.0528
1,2,4-Triethylbenzene	A12	0.2602	0.3173	0.2680
1,4-Methyl-n-pentylbenzene	A12	0.0630	0.0858	0.0724
n-Hexylbenzene	A12	0.1060	0.1745	0.1505
1,2,3,4,5-Pentamethylbenzene	A13	0.1818	0.2476	0.2090
2-Methylnaphthalene	A11	0.1981	0.2858	0.2413
1-Methylnaphthalene	A11	0.1864	0.2690	0.1952
UnknownC12s	U12	1.0414	1.8000	1.7783
n-Tridecane	P13	0.6052	1.1321	1.1053
UnknownC13s	U13	1.0790	2.0184	1.9705
n-Tetradecane	P14	0.3818	0.7686	0.7488
UnknownC14s	U14	0.9977	2.0084	1.9568
n-Pentadecane	P15	0.1981	0.4270	0.4112
UnknownC15s	U15	1.0139	2.1854	2.1047
n-Hexadecane	P16	0.0330	0.0758	0.0725
UnknownC16s	U16	0.2869	0.6592	0.6308
n-Heptadecane	P17	0.0222	0.0542	0.0517
UnknownC17s	U17	0.0382	0.0932	0.0889
n-Octadecane	P18	0.0414	0.1069	0.1017
UnknownC18s	U18	0.0129	0.0333	0.0317
n-Nonadecane	P19	0.0344	0.0937	0.0885
UnknownC19s	U19	0.0108	0.0294	0.0278
n-Eicosane	P20	0.0189	0.0542	0.0509
n-Heneicosane	P21	0.0071	0.0214	0.0200
n-Docosane	P22	0.0029	0.0091	0.0085
n-Tricosane	P23	0.0019	0.0063	0.0059
TOTAL		100.0000	100.0000	100.0000

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

303-637-0150

EXTENDED NATURAL GAS ANALYSIS (*DHA)

MAIN PAGE

PROJECT NO. :	201410118	ANALYSIS NO. :	05
COMPANY NAME :	CARRIZO OIL & GAS	ANALYSIS DATE:	OCTOBER 27, 2014
ACCOUNT NO. :		SAMPLE DATE :	OCTOBER 20, 2014
PRODUCER :		CYLINDER NO. :	1869
LEASE NO. :		SAMPLED BY :	JOHN MOSER - EMPACT
NAME/DESCRIP :	SALES GAS 16:05 HEMBERGER 5-25-8-60		
FIELD DATA		SAMPLE TEMP. :	87
SAMPLE PRES. :	121	AMBIENT TEMP.:	
VAPOR PRES. :		GRAVITY :	
COMMENTS :	SPOT; PROBE; LENGTH OF H2S STAIN 1.0 PPM (1-7PPM) 16:10		

COMPONENT	MOLE %	MASS %	GPM @ 14.650	GPM @ 14.730
ALCOHOLS	0.0214	0.0672		
HELIUM	0.01	0.00	---	---
HYDROGEN	0.00	0.00	---	---
OXYGEN/ARGON	0.01	0.01	---	---
NITROGEN	0.86	1.02	---	---
CARBON DIOXIDE	2.58	4.81	---	---
METHANE	69.88630	47.51260	---	---
ETHANE	12.6295	16.0937	3.3729	3.3913
PROPANE	8.8736	16.5824	2.4408	2.4541
I-BUTANE	0.8623	2.1240	0.2813	0.2829
N-BUTANE	2.7897	6.8715	0.8780	0.8828
I-PENTANE	0.4855	1.4813	0.1752	0.1762
N-PENTANE	0.5479	1.6752	0.1982	0.1993
HEXANES PLUS	0.4438	1.7521	0.1760	0.1769
TOTALS	100.00000	100.00000	7.5224	7.5635

BTEX COMPONENTS	**MOLE%**	**WT%**
BENZENE	0.0000	0.0000
TOLUENE	0.0101	0.0395
ETHYLBENZENE	0.0016	0.0072
XYLENES	0.0029	0.0131
TOTAL BTEX	0.0146	0.0598

	BTU @	14.650	14.730
LOW	NET DRY REAL :	1215.6 **/scf**	1222.2 **/scf**
	NET WET REAL :	1194.3 **/scf**	1201.0 **/scf**
HIGH	GROSS DRY REAL :	1336.4 **/scf**	1343.7 **/scf**
	GROSS WET REAL :	1313.0 **/scf**	1320.4 **/scf**
	NET DRY REAL :	19568.7 **/lb**	19675.5 **/lb**
	GROSS DRY REAL :	21520.1 **/lb**	21637.6 **/lb**
	RELATIVE DENSITY (AIR=1):		0.8138
	COMPRESSIBILITY FACTOR :		0.99572

(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

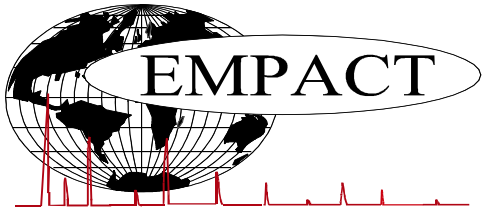
303-637-0150

EXTENDED NATURAL GAS ANALYSIS (*DHA)

GLYCALC INFORMATION

PROJECT NO. :	201410118	ANALYSIS NO. :	05
COMPANY NAME :	CARRIZO OIL & GAS	ANALYSIS DATE:	OCTOBER 27, 2014
ACCOUNT NO. :		SAMPLE DATE :	OCTOBER 20, 2014
PRODUCER :		CYLINDER NO. :	1869
LEASE NO. :		SAMPLED BY :	JOHN MOSER - EMPACT
NAME/DESCRIP :	SALES GAS 16:05 HEMBERGER 5-25-8-60		
FIELD DATA		SAMPLE TEMP. :	87
SAMPLE PRES. :	121	AMBIENT TEMP.:	
VAPOR PRES. :		GRAVITY :	
COMMENTS :	SPOT; PROBE; LENGTH OF H2S STAIN 1.0 PPM (1-7PPM) 16:10		

Componet	Mole %	Wt %
Helium	0.01	0.00
Hydrogen	0.00	0.00
Carbon Dioxide	2.58	4.81
Nitrogen	0.86	1.02
Methane	69.88630	47.51260
Ethane	12.6295	16.0937
Propane	8.8736	16.5824
Isobutane	0.8623	2.1240
n-Butane	2.7897	6.8715
Isopentane	0.4482	1.3704
n-Pentane	0.5479	1.6752
Cyclopentane	0.0373	0.1109
n-Hexane	0.0941	0.3436
Cyclohexane	0.0230	0.0820
Other Hexanes	0.1657	0.6010
Heptanes	0.0767	0.3235
Methycyclohexane	0.0180	0.0749
2,2,4 Trimethylpentane	0.0002	0.0010
Benzene	0.0000	0.0000
Toluene	0.0101	0.0395
Ethylbenzene	0.0016	0.0072
Xylenes	0.0029	0.0131
C8+ Heavies	0.0515	0.2663
Subtotal	99.96860	99.92280
Oxygen/Argon	0.01	0.01
Alcohols	0.0214	0.0672
Total	100.00000	100.00000



EXTENDED NATURAL GAS ANALYSIS (*DHA)

DHA COMPONENT LIST

PROJECT NO. :	201410118	ANALYSIS NO. :	05
COMPANY NAME :	CARRIZO OIL & GAS	ANALYSIS DATE:	OCTOBER 27, 2014
ACCOUNT NO. :		SAMPLE DATE :	OCTOBER 20, 2014
PRODUCER :		CYLINDER NO. :	1869
LEASE NO. :		SAMPLED BY :	JOHN MOSER - EMPACT
NAME/DESCRIP :	SALES GAS 16:05 HEMBERGER 5-25-8-60		
FIELD DATA		SAMPLE TEMP. :	87
SAMPLE PRES. :	121	AMBIENT TEMP.:	
VAPOR PRES. :		GRAVITY :	
COMMENTS :	SPOT; PROBE; LENGTH OF H2S STAIN 1.0 PPM (1-7PPM) 16:10		

COMPONENT	PIANO #	MOLE %	MASS %	GPM @ 14.650	GPM @ 14.730
Helium	---	0.01	0.00	---	---
Hydrogen	---	0.00	0.00	---	---
Oxygen/Argon	---	0.01	0.01	---	---
Nitrogen	---	0.86	1.02	---	---
Carbon Dioxide	---	2.58	4.81	---	---
Methane	P1	69.88630	47.51260	---	---
Ethane	P2	12.6295	16.0937	3.373	3.391
Propane	P3	8.8736	16.5824	2.441	2.454
i-Butane	I4	0.8623	2.1240	0.281	0.283
n-Butane	P4	2.7897	6.8715	0.878	0.883
2,2-Dimethylpropane	I5	0.0022	0.0067	0.001	0.001
i-Pentane	I5	0.4460	1.3637	0.163	0.164
n-Pentane	P5	0.5479	1.6752	0.198	0.199
2,2-Dimethylbutane	I6	0.0011	0.0040	0.000	0.000
Cyclopentane	N5	0.0373	0.1109	0.011	0.011
2,3-Dimethylbutane	I6	0.0067	0.0245	0.003	0.003
2-Methylpentane	I6	0.0721	0.2633	0.030	0.030
3-Methylpentane	I6	0.0362	0.1322	0.015	0.015
n-Hexane	P6	0.0941	0.3436	0.039	0.039
2,2-Dimethylpentane	I7	0.0003	0.0013	0.000	0.000
Methylcyclopentane	N6	0.0495	0.1766	0.017	0.017
2,4-Dimethylpentane	I7	0.0021	0.0089	0.001	0.001
n-Butanol	X4	0.0214	0.0672	0.008	0.008
Cyclohexane	N6	0.0230	0.0820	0.008	0.008
2-Methylhexane	I7	0.0084	0.0357	0.004	0.004
2,3-Dimethylpentane	I7	0.0045	0.0191	0.002	0.002
1,1-Dimethylcyclopentane	N7	0.0027	0.0112	0.001	0.001
3-Methylhexane	I7	0.0110	0.0467	0.005	0.005
1c,3-Dimethylcyclopentane	N7	0.0054	0.0225	0.002	0.002
1t,3-Dimethylcyclopentane	N7	0.0041	0.0171	0.002	0.002
3-Ethylpentane	I7	0.0006	0.0025	0.000	0.000
1t,2-Dimethylcyclopentane	N7	0.0111	0.0462	0.005	0.005
2,2,4-Trimethylpentane	I8	0.0002	0.0010	0.000	0.000
UnknownC6s	U6	0.0001	0.0004	0.000	0.000
n-Heptane	P7	0.0230	0.0977	0.011	0.011
1c,2-Dimethylcyclopentane	N7	0.0007	0.0029	0.000	0.000
Methylcyclohexane	N7	0.0180	0.0749	0.007	0.007
2,2-Dimethylhexane	I8	0.0011	0.0053	0.001	0.001
Ethylcyclopentane	N7	0.0028	0.0117	0.001	0.001
2,5-Dimethylhexane	I8	0.0003	0.0014	0.000	0.000
2,2,3-Trimethylpentane	I8	0.0002	0.0010	0.000	0.000

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2,4-Dimethylhexane	I8	0.0009	0.0044	0.000	0.000
1c,2t,4-Trimethylcyclopentane	N8	0.0014	0.0067	0.001	0.001
3,3-Dimethylhexane	I8	0.0001	0.0005	0.000	0.000
1t,2c,4-Trimethylcyclopentane	N8	0.0017	0.0081	0.001	0.001
2,3,4-Trimethylpentane	I8	0.0004	0.0020	0.000	0.000
Toluene	A7	0.0101	0.0395	0.003	0.003
2,3-Dimethylhexane	I8	0.0006	0.0029	0.000	0.000
2-Methyl-3-ethylpentane	I8	0.0004	0.0020	0.000	0.000
1,1,2-Trimethylcyclopentane	N8	0.0001	0.0005	0.000	0.000
2-Methylheptane	I8	0.0038	0.0184	0.002	0.002
4-Methylheptane	I8	0.0011	0.0053	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	0.0011	0.0053	0.001	0.001
1c,2t,3-Trimethylcyclopentane	N8	0.0030	0.0143	0.002	0.002
3-Ethylhexane	I8	0.0004	0.0020	0.000	0.000
1t,4-Dimethylcyclohexane	N8	0.0008	0.0038	0.000	0.000
1,1-Dimethylcyclohexane	N8	0.0003	0.0014	0.000	0.000
3t-Ethylmethylcyclopentane	N8	0.0006	0.0028	0.000	0.000
2t-Ethylmethylcyclopentane	N8	0.0006	0.0028	0.000	0.000
1,1-Methylethylcyclopentane	N8	0.0016	0.0076	0.001	0.001
2,2,4-Trimethylhexane	I9	0.0001	0.0006	0.000	0.000
1t,2-Dimethylcyclohexane	N8	0.0013	0.0062	0.001	0.001
n-Octane	P8	0.0040	0.0194	0.002	0.002
1c,4-Dimethylcyclohexane	N8	0.0026	0.0124	0.001	0.001
i-Propylcyclopentane	I8	0.0001	0.0005	0.000	0.000
2,2,3,4-Tetramethylpentane	I9	0.0002	0.0011	0.000	0.000
1c,2-Dimethylcyclohexane	N8	0.0003	0.0014	0.000	0.000
1,1,4-Trimethylcyclohexane	N9	0.0015	0.0080	0.001	0.001
2,2,3-Trimethylhexane	I9	0.0006	0.0033	0.000	0.000
2,4-Dimethylheptane	I9	0.0002	0.0011	0.000	0.000
4,4-Dimethylheptane	I9	0.0001	0.0006	0.000	0.000
Ethylcyclohexane	N8	0.0008	0.0038	0.000	0.000
n-Propylcyclopentane	N8	0.0002	0.0009	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	0.0002	0.0011	0.000	0.000
3,5-Dimethylheptane	I9	0.0001	0.0006	0.000	0.000
2,6-Dimethylheptane	I9	0.0001	0.0006	0.000	0.000
1,1,3-Trimethylcyclohexane	N9	0.0001	0.0006	0.000	0.000
Ethylbenzene	I8	0.0016	0.0072	0.001	0.001
1c,2t,4t-Trimethylcyclohexane	N9	0.0002	0.0011	0.000	0.000
2,3-Dimethylheptane	I9	0.0004	0.0022	0.000	0.000
1,3-Dimethylbenzene (m-Xylene)	A8	0.0014	0.0063	0.001	0.001
1,4-Dimethylbenzene (p-Xylene)	A8	0.0006	0.0027	0.000	0.000
3,4-Dimethylheptane	I9	0.0003	0.0016	0.000	0.000
3,4-Dimethylheptane (2)	I9	0.0003	0.0016	0.000	0.000
4-Methyloctane	I9	0.0004	0.0022	0.000	0.000
2-Methyloctane	I9	0.0005	0.0027	0.000	0.000
1c,2t,3-Trimethylcyclohexane	N9	0.0001	0.0006	0.000	0.000
3-Ethylheptane	I9	0.0001	0.0006	0.000	0.000
3-Methyloctane	I9	0.0005	0.0027	0.000	0.000
1c,2t,4c-Trimethylcyclohexane	I9	0.0001	0.0006	0.000	0.000
1,2-Dimethylbenzene (o-Xylene)	A8	0.0009	0.0041	0.000	0.000
i-Butylcyclopentane	N9	0.0004	0.0021	0.000	0.000
UnknownC8s	U8	0.0002	0.0010	0.000	0.000
n-Nonane	P9	0.0016	0.0087	0.001	0.001
1,1-Methylethylcyclohexane	N9	0.0006	0.0032	0.000	0.000
i-Propylbenzene	A9	0.0004	0.0020	0.000	0.000
i-Propylcyclohexane	N9	0.0001	0.0006	0.000	0.000
2,4-Dimethyloctane	I10	0.0001	0.0006	0.000	0.000
n-Butylcyclopentane	N9	0.0004	0.0021	0.000	0.000

3,3-Dimethyloctane	I10	0.0001	0.0006	0.000	0.000
n-Propylbenzene	A9	0.0003	0.0015	0.000	0.000
3,6-Dimethyloctane	I10	0.0003	0.0018	0.000	0.000
3-Methyl-5-ethylheptane	I10	0.0004	0.0024	0.000	0.000
1,3-Methylethylbenzene	A9	0.0003	0.0015	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	0.0002	0.0012	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	0.0001	0.0006	0.000	0.000
1t-Methyl-2-n-propylcyclohexane	I10	0.0001	0.0006	0.000	0.000
UnknownC9s	U9	0.0018	0.0098	0.001	0.001
n-Decane	P10	0.0008	0.0048	0.000	0.000
1,2,3-Trimethylbenzene	A9	0.0002	0.0010	0.000	0.000
1,3-Methyl-i-propylbenzene	A10	0.0001	0.0006	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
1,2-Methyl-n-propylbenzene	A10	0.0001	0.0006	0.000	0.000
1,4-Dimethyl-2-ethylbenzene	A10	0.0001	0.0006	0.000	0.000
1,2-Dimethyl-4-ethylbenzene	A10	0.0001	0.0006	0.000	0.000
1,2-Dimethyl-3-ethylbenzene	A10	0.0001	0.0006	0.000	0.000
UnknownC10s	U10	0.0018	0.0109	0.001	0.001
n-Undecane	P11	0.0004	0.0027	0.000	0.000
n-Pentylbenzene	A11	0.0001	0.0006	0.000	0.000
Tetrahydronaphthalene	A10	0.0001	0.0006	0.000	0.000
UnknownC11s	U11	0.0004	0.0027	0.000	0.000
n-Dodecane	P12	0.0002	0.0014	0.000	0.000
1,2,4-Triethylbenzene	A12	0.0001	0.0007	0.000	0.000
2-Methylnaphthalene	A11	0.0001	0.0006	0.000	0.000
1-Methylnaphthalene	A11	0.0001	0.0006	0.000	0.000
UnknownC12s	U12	0.0002	0.0013	0.000	0.000
n-Tridecane	P13	0.0001	0.0008	0.000	0.000
UnknownC13s	U13	0.0001	0.0008	0.000	0.000
n-Tetradecane	P14	0.0001	0.0009	0.000	0.000
TOTAL		100.00000	100.00000	7.5304	7.5716

BTEX COMPONENTS	**MOLE%**	**WT%**
BENZENE	0.0000	0.0000
TOLUENE	0.0101	0.0395
ETHYLBENZENE	0.0016	0.0072
XYLENES	0.0029	0.0131
TOTAL BTEX	0.0146	0.0598

		BTU @	14.650	14.730
LOW	NET DRY REAL :		1215.6 **/scf**	1222.2 **/scf**
	NET WET REAL :		1194.3 **/scf**	1201.0 **/scf**
HIGH	GROSS DRY REAL :		1336.4 **/scf**	1343.7 **/scf**
	GROSS WET REAL :		1313.0 **/scf**	1320.4 **/scf**
	NET DRY REAL :		19568.7 **/lb**	19675.5 **/lb**
	GROSS DRY REAL :		21520.1 **/lb**	21637.6 **/lb**
	RELATIVE DENSITY (AIR=1):			0.8138
	COMPRESSIBILITY FACTOR :			0.99572

(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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CRUDE OIL ASSAY

PROJECT NO. :	201410118	ANALYSIS NO. :	06
COMPANY NAME :	CARRIZO OIL & GAS	ANALYSIS DATE:	OCTOBER 24, 2014
ACCOUNT NO. :		SAMPLE DATE :	OCTOBER 20, 2014
PRODUCER :		CYLINDER NO. :	1L GLASS JAR
LEASE NO. :		SAMPLED BY :	JOHN MOSER
NAME/DESCRIP :	PRODUCTION TANK 16:25 HEMBERGER 5-25-8-60		EMPACT
FIELD DATA		SAMPLE TEMP. :	90
SAMPLE PRES. :		AMBIENT TEMP.:	
VAPOR PRES. :		GRAVITY :	
COMMENTS :	SPOT		

SPECIFICATION		TEST METHOD	UNITS	RESULTS
API GRAVITY			API 60/60	36.1
RVP @100 DEG F		D323	PSIG	7.5
TOTAL SULFUR		D2622	WT %	0.338
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				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