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

303-637-0150

EXTENDED NATURAL GAS LIQUID ANALYSIS (*DHA)

MAIN PAGE

PROJECT NO. :	201310067	ANALYSIS NO. :	01
COMPANY NAME :	CARRIZO OIL & GAS	ANALYSIS DATE:	OCTOBER 12, 2013
ACCOUNT NO. :		SAMPLE DATE :	OCTOBER 9, 2013
PRODUCER :		CYLINDER NO. :	13005
LEASE NO. :		SAMPLED BY :	JOHN MOSER
NAME/DESCRIP :	TREATER @ 11:30		EMPACT
	PERGAMOS 1-4-34-7-60		
FIELD DATA		SAMPLE TEMP. :	157
SAMPLE PRES. :	18	AMBIENT TEMP.:	
VAPOR PRES. :		GRAVITY :	
COMMENTS :	SPOT; NO PROBE		

COMPONENT	MOLE %	MASS %	VOL %
NITROGEN (AIR)	0.0334	0.0089	0.0081
CARBON DIOXIDE	0.0222	0.0093	0.0084
METHANE	0.0588	0.0090	0.0221
ETHANE	0.2810	0.0806	0.1665
PROPANE	1.2634	0.5313	0.7713
I-BUTANE	0.3674	0.2036	0.2662
N-BUTANE	1.8727	1.0379	1.3081
I-PENTANE	0.9177	0.6314	0.7442
N-PENTANE	1.5562	1.0707	1.2487
HEXANES PLUS	93.6272	96.4173	95.4564
TOTALS	100.0000	100.0000	100.0000

BTEX COMPONENTS	**MOLE%**	**MASS%**
BENZENE	1.7338	1.2915
TOLUENE	3.1954	2.8077
ETHYLBENZENE	0.4907	0.4968
XYLENE	1.7836	1.8058
TOTAL BTEX	7.2035	6.4018

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

	TOTAL SAMPLE	**C6+ FRACTION**	
Specific Gravity (H2O=1) =	0.7364	0.7437	60/60
API Gravity =	60.65	58.76	60/60
Molecular Weight =	104.86	108.76	
Absolute Density =	6.14	6.2	LBS/GAL
Heating Value Liq. Idl Gas=	125208	126425	BTU/GAL
Vapor/Liquid =	22.24	21.68	CUFT/GAL
Vapor Pressure =	11.26	2.10	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. :	201310067	ANALYSIS NO. :	01
COMPANY NAME :	CARRIZO OIL & GAS	ANALYSIS DATE:	OCTOBER 12, 2013
ACCOUNT NO. :		SAMPLE DATE :	OCTOBER 9, 2013
PRODUCER :		CYLINDER NO. :	13005
LEASE NO. :		SAMPLED BY :	JOHN MOSER
NAME/DESCRIP :	TREATER @ 11:30		EMPACT
	PERGAMOS 1-4-34-7-60		
FIELD DATA		SAMPLE TEMP. :	157
SAMPLE PRES. :	18	AMBIENT TEMP.:	
VAPOR PRES. :		GRAVITY :	
COMMENTS :	SPOT; NO PROBE		

COMPONENT	Mole %		Wt %		LV %	
CARBON DIOXIDE	0.0222		0.0093		0.0084	
NITROGEN (AIR)	0.0334		0.0089		0.0081	
METHANE	0.0588		0.0090		0.0221	
ETHANE	0.2810		0.0806		0.1665	
PROPANE	1.2634		0.5313		0.7713	
I-BUTANE	0.3674		0.2036		0.2662	
N-BUTANE	1.8727		1.0379		1.3081	
I-PENTANE	0.9177		0.6314		0.7442	
N-PENTANE	1.5562		1.0707		1.2487	
CYCLOPENTANE (N-C5)	1.8538		1.2398		1.2004	
N-HEXANE	8.6945		7.1450		7.9238	
CYCLOHEXANE (OTHER C6)	3.5245		2.8287		2.6576	
OTHER HEXANES	13.2590		10.7885		11.3840	
OTHER HEPTANES	15.9087		15.0983		15.6406	
METHYLCYCLOHEXANE (OTHER C7)	4.9058		4.5936		4.3644	
2,2,4 TRIMETHYLPENTANE	0.9482		0.8879		0.8674	
BENZENE	1.7338		1.2915		1.0767	
TOLUENE	3.1954		2.8077		2.3639	
ETHYLBENZENE	0.4907		0.4968		0.4182	
XYLENES	1.7836		1.8058		1.5222	
OTHER OCTANES	11.2551		12.3003		12.2755	
OCTANES PLUS	----	40.5517	----	50.6242	----	48.8450
NONANES	10.0910		12.2256		11.9490	
DECANES PLUS	15.9831		22.9078		21.8127	
SUB TOTAL	100.0000		100.0000		100.0000	
TOTAL	100.0000		100.0000		100.0000	

API Gravity =	**60.65**	60/60
Vapor Pressure =	**11.26**	PSIA & 100 F
Average Molecular Weight of Decanes plus =	**150.29**	
Average Specific Gravity of Decanes plus =	**0.7690**	

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BY CARBON NUMBER

PROJECT NO. :	201310067	ANALYSIS NO. :	01
COMPANY NAME :	CARRIZO OIL & GAS	ANALYSIS DATE:	OCTOBER 12, 2013
ACCOUNT NO. :		SAMPLE DATE :	OCTOBER 9, 2013
PRODUCER :		CYLINDER NO. :	13005
LEASE NO. :		SAMPLED BY :	JOHN MOSER
NAME/DESCRIP :	TREATER @ 11:30		EMPACT
	PERGAMOS 1-4-34-7-60		
FIELD DATA		SAMPLE TEMP. :	157
SAMPLE PRES. :	18	AMBIENT TEMP.:	
VAPOR PRES. :		GRAVITY :	
COMMENTS :	SPOT; NO PROBE		

COMPONENT / CARBON NUMBER		MOLE%	MASS %	VOLUME %
NITROGEN		0.0334	0.0089	0.0081
CARBON DIOXIDE		0.0222	0.0093	0.0084
	C1	0.0588	0.0090	0.0221
	C2	0.2810	0.0806	0.1665
	C3	1.2634	0.5313	0.7713
	C4	2.2401	1.2415	1.5743
	C5	4.3277	2.9419	3.1933
	C6	27.2118	22.0537	23.0421
	C7	24.0099	22.4996	22.3689
	C8	14.4776	15.4908	15.0833
	C9	10.0910	12.2256	11.9490
	C10	7.8604	10.2790	9.8047
	C11	4.1407	5.9530	5.6268
	C12	2.2997	3.5407	3.3786
	C13	0.8426	1.4512	1.3917
	C14	0.4632	0.8763	0.8451
	C15	0.1332	0.2698	0.2572
	C16	0.1526	0.3295	0.3120
	C17	0.0886	0.2032	0.1918
	C18	0.0021	0.0051	0.0048
	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. :	201310067	ANALYSIS NO. :	01
COMPANY NAME :	CARRIZO OIL & GAS	ANALYSIS DATE:	OCTOBER 12, 2013
ACCOUNT NO. :		SAMPLE DATE :	OCTOBER 9, 2013
PRODUCER :		CYLINDER NO. :	13005
LEASE NO. :		SAMPLED BY :	JOHN MOSER
NAME/DESCRIP :	TREATER @ 11:30		EMPACT
	PERGAMOS 1-4-34-7-60		
FIELD DATA		SAMPLE TEMP. :	157
SAMPLE PRES. :	18	AMBIENT TEMP.:	
VAPOR PRES. :		GRAVITY :	
COMMENTS :	SPOT; NO PROBE		

COMPONENT	PIANO #	MOLE %	MASS %	VOL %
Nitrogen	NHC	0.0334	0.0089	0.0081
Carbon Dioxide	NHC	0.0222	0.0093	0.0084
Methane	P1	0.0588	0.0090	0.0221
Ethane	P2	0.2810	0.0806	0.1665
Propane	P3	1.2634	0.5313	0.7713
i-Butane	I4	0.3674	0.2036	0.2662
n-Butane	P4	1.8727	1.0379	1.3081
2,2-Dimethylpropane	I5	0.0072	0.0049	0.0060
i-Pentane	I5	0.9105	0.6265	0.7382
n-Pentane	P5	1.5562	1.0707	1.2487
2,2-Dimethylbutane	I6	0.0753	0.0619	0.0697
Cyclopentane	N5	1.8538	1.2398	1.2004
2,3-Dimethylbutane	I6	0.4053	0.3331	0.3676
2-Methylpentane	I6	4.5568	3.7449	4.1907
3-Methylpentane	I6	2.6006	2.1373	2.3518
n-Hexane	P6	8.6945	7.1450	7.9238
2,2-Dimethylpentane	I7	0.0364	0.0348	0.0376
Methylcyclopentane	N6	5.6210	4.5113	4.4042
2,4-Dimethylpentane	I7	0.3193	0.3051	0.3320
2,2,3-Trimethylbutane	I7	0.0400	0.0382	0.0404
Benzene	A6	1.7338	1.2915	1.0767
3,3-Dimethylpentane	I7	0.0300	0.0287	0.0303
Cyclohexane	N6	3.5245	2.8287	2.6576
2-Methylhexane	I7	1.4367	1.3728	1.4809
2,3-Dimethylpentane	I7	0.8820	0.8428	0.8832
1,1-Dimethylcyclopentane	N7	0.4525	0.4237	0.4108
3-Methylhexane	I7	2.0352	1.9447	2.0662
1c,3-Dimethylcyclopentane	N7	1.0477	0.9810	0.9634
1t,3-Dimethylcyclopentane	N7	0.9482	0.8879	0.8674
3-Ethylpentane	I7	0.1393	0.1331	0.1391
1t,2-Dimethylcyclopentane	N7	2.0799	1.9475	1.8958
2,2,4-Trimethylpentane	I8	0.0707	0.0770	0.0811
n-Heptane	P7	5.6137	5.3641	5.7369
1c,2-Dimethylcyclopentane	N7	0.1781	0.1668	0.1580
Methylcyclohexane	N7	4.9058	4.5936	4.3644
2,2-Dimethylhexane	I8	0.5377	0.5857	0.6158
Ethylcyclopentane	N7	0.6697	0.6271	0.5986
2,5-Dimethylhexane	I8	0.1167	0.1271	0.1340
2,2,3-Trimethylpentane	I8	0.0415	0.0452	0.0462
2,4-Dimethylhexane	I8	0.2637	0.2873	0.3014
1c,2t,4-Trimethylcyclopentane	N8	0.4248	0.4546	0.4357

3,3-Dimethylhexane	I8	0.0578	0.0630	0.0649
2,3,4-Trimethylpentane	I8	0.1162	0.1266	0.1287
2,3,3-Trimethylpentane	I8	0.0019	0.0021	0.0021
Toluene	A7	3.1954	2.8077	2.3639
2,3-Dimethylhexane	I8	0.2247	0.2448	0.2516
2-Methyl-3-ethylpentane	I8	0.1748	0.1904	0.1936
1,1,2-Trimethylcyclopentane	N8	0.0088	0.0094	0.0089
2-Methylheptane	I8	1.3510	1.4717	1.5396
4-Methylheptane	I8	0.4570	0.4978	0.5082
3-Methyl-3-ethylpentane	I8	0.1033	0.1125	0.1132
3,4-Dimethylhexane	I8	0.0752	0.0819	0.0832
1c,3-Dimethylcyclohexane	N8	0.0354	0.0379	0.0362
3-Methylheptane	I8	0.5431	0.5916	0.6136
1c,2t,3-Trimethylcyclopentane	N8	0.9402	1.0061	0.9556
3-Ethylhexane	I8	0.2723	0.2966	0.3044
1t,4-Dimethylcyclohexane	N8	0.5147	0.5508	0.5286
1,1-Dimethylcyclohexane	N8	0.1180	0.1263	0.1184
3t-Ethylmethylcyclopentane	N8	0.1979	0.2118	0.2021
2t-Ethylmethylcyclopentane	N8	0.1639	0.1754	0.1669
1,1-Methylethylcyclopentane	N8	0.6182	0.6615	0.6200
2,2,4-Trimethylhexane	I9	0.0548	0.0670	0.0685
1t,2-Dimethylcyclohexane	N8	0.6145	0.6576	0.6204
1t,3-Dimethylcyclohexane	N8	0.0045	0.0048	0.0045
n-Octane	P8	2.2752	2.4784	2.5805
1c,4-Dimethylcyclohexane	N8	0.8546	0.9145	0.8550
i-Propylcyclopentane	I8	0.0532	0.0569	0.0536
2,4,4-Trimethylhexane	I9	0.0215	0.0263	0.0267
2,2,3,4-Tetramethylpentane	I9	0.0166	0.0203	0.0207
2,3,4-Trimethylhexane	I9	0.0200	0.0245	0.0248
1c,2-Dimethylcyclohexane	N8	0.2233	0.2389	0.2196
2,3,5-Trimethylhexane	I9	0.0680	0.0832	0.0843
2,2-Dimethylheptane	I9	0.0166	0.0203	0.0209
1,1,4-Trimethylcyclohexane	N9	0.9430	1.1353	1.0765
2,2,3-Trimethylhexane	I9	0.4429	0.5417	0.5435
2,4-Dimethylheptane	I9	0.0469	0.0574	0.0587
4,4-Dimethylheptane	I9	0.0849	0.1038	0.1062
Ethylcyclohexane	N8	0.4803	0.5139	0.4775
n-Propylcyclopentane	N8	0.2095	0.2242	0.2113
1c,3c,5-Trimethylcyclohexane	N9	0.0374	0.0450	0.0427
2,5-Dimethylheptane	I9	0.0853	0.1043	0.1065
3,3-Dimethylheptane	I9	0.0973	0.1190	0.1215
3,5-Dimethylheptane	I9	0.0595	0.0728	0.0743
2,6-Dimethylheptane	I9	0.0531	0.0650	0.0671
1,1,3-Trimethylcyclohexane	N9	0.1018	0.1226	0.1163
Ethylbenzene	A8	0.4907	0.4968	0.4182
1c,2t,4t-Trimethylcyclohexane	N9	0.3454	0.4158	0.3868
2,3-Dimethylheptane	I9	0.0020	0.0025	0.0025
1,3-Dimethylbenzene (m-Xylene)	A8	0.4576	0.4633	0.3923
1,4-Dimethylbenzene (p-Xylene)	A8	0.7394	0.7486	0.6358
3,4-Dimethylheptane	I9	0.4914	0.6010	0.6014
3,4-Dimethylheptane (2)	I9	0.1859	0.2274	0.2275
4-Ethylheptane	I9	0.0262	0.0320	0.0327
4-Methyloctane	I9	0.2308	0.2823	0.2867
2-Methyloctane	I9	0.2636	0.3224	0.3306
1c,2t,4c-Trimethylcyclohexane	I9	0.0725	0.0887	0.0895
3-Ethylheptane	I9	0.0688	0.0841	0.0847
3-Methyloctane	I9	0.3560	0.4354	0.4421
3,3-Diethylpentane	I9	0.0410	0.0502	0.0487
1c,2t,3-Trimethylcyclohexane	N9	0.0935	0.1126	0.1047
1,1,2-Trimethylcyclohexane	N9	0.0222	0.0267	0.0248
1,2-Dimethylbenzene (o-Xylene)	A8	0.5866	0.5939	0.4941
i-Butylcyclopentane	N9	0.1801	0.2168	0.2032
UnknownC8s	U8	0.0587	0.0639	0.0665
n-Nonane	P9	1.4308	1.7500	1.7845
1,1-Methylethylcyclohexane	N9	0.5490	0.6715	0.6868
i-Propylbenzene	A9	0.2963	0.3396	0.2879
i-Propylcyclohexane	N9	0.0934	0.1124	0.1026
2,2-Dimethyloctane	I10	0.0529	0.0718	0.0711
2,4-Dimethyloctane	I10	0.0706	0.0958	0.0948
2,6-Dimethyloctane	I10	0.0066	0.0090	0.0092
2,5-Dimethyloctane	I10	0.0306	0.0415	0.0411
n-Butylcyclopentane	N9	0.2239	0.2995	0.2744
3,3-Dimethyloctane	I10	0.0965	0.1309	0.1296

n-Propylbenzene	A9	0.2577	0.2954	0.2504
3,6-Dimethyloctane	I10	0.1829	0.2482	0.2457
3-Methyl-5-ethylheptane	I10	0.2943	0.3600	0.3631
1,3-Methylethylbenzene	A9	0.2047	0.2346	0.1972
1,4-Methylethylbenzene	A9	0.0702	0.0805	0.0677
1,3,5-Trimethylbenzene	A9	0.1237	0.1418	0.1200
2,3-Dimethyloctane	I10	0.0649	0.0881	0.0872
5-Methylnonane	I10	0.1629	0.2210	0.2208
1,2-Methylethylbenzene	A9	0.2752	0.3154	0.2637
2-Methylnonane	I10	0.0986	0.1338	0.1348
3-Ethyloctane	I10	0.0901	0.1223	0.1211
3-Methylnonane	I10	0.1200	0.1628	0.1625
1,2,4-Trimethylbenzene	A9	0.0222	0.0254	0.0212
t-Butylbenzene	A10	0.2023	0.2589	0.2189
i-Butylcyclohexane	N10	0.2032	0.2718	0.2451
1t-Methyl-2-n-propylcyclohexane	I10	0.0771	0.0943	0.0951
i-Butylbenzene	A10	0.0558	0.0714	0.0613
sec-Butylbenzene	A10	0.0929	0.1189	0.1010
UnknownC9s	U9	1.8669	2.2835	2.3286
n-Decane	P10	0.7772	1.0545	1.0572
1,2,3-Trimethylbenzene	A9	0.1480	0.1696	0.1389
1,3-Methyl-i-propylbenzene	A10	0.0863	0.0989	0.0827
1,4-Methyl-i-propylbenzene	A10	0.0761	0.0872	0.0729
Sec-Butylcyclohexane	N10	0.2464	0.3296	0.2969
1,2-Methyl-i-propylbenzene	A10	0.1191	0.1524	0.1273
3-Ethylnonane	I10	0.0544	0.0738	0.0744
1,3-Diethylbenzene	A10	0.1000	0.1280	0.1085
1,3-Methyl-n-propylbenzene	A10	0.0182	0.0233	0.0198
1,4-Diethylbenzene	A10	0.0961	0.1230	0.1045
1,4-Methyl-n-propylbenzene	A10	0.0317	0.0406	0.0346
n-Butylbenzene	A10	0.0938	0.1201	0.1021
1,3-Dimethyl-5-ethylbenzene	A10	0.0635	0.0813	0.0688
1,2-Diethylbenzene	A10	0.1102	0.1411	0.1175
1,2-Methyl-n-propylbenzene	A10	0.0826	0.1057	0.0886
1,4-Dimethyl-2-ethylbenzene	A10	0.1079	0.1381	0.1153
1,3-Dimethyl-4-ethylbenzene	A10	0.0184	0.0236	0.0197
1,2-Dimethyl-4-ethylbenzene	A10	0.0934	0.1195	0.1001
1,3-Dimethyl-2-ethylbenzene	A10	0.1696	0.2171	0.1786
1t,2c,4-Trimethylcyclopentane	A10	0.5104	0.5462	0.5348
1,2-Dimethyl-3-ethylbenzene	A10	0.0913	0.1169	0.0960
1,2-Ethyl-i-propylbenzene	A10	0.0493	0.0631	0.0527
1,4-Methyl-t-butylbenzene	A11	0.1118	0.1431	0.1196
UnknownC10s	U10	2.6994	3.6626	3.6720
n-Undecane	P11	0.7827	1.1667	1.1535
1,4-Ethyl-i-propylbenzene	A11	0.0606	0.0776	0.0648
1,2,4,5-Tetramethylbenzene	A11	0.0593	0.0759	0.0627
1,2-Methyl-n-butylbenzene	A11	0.0545	0.0698	0.0583
1,2,3,5-Tetramethylbenzene	A11	0.0598	0.0765	0.0629
1,2-Methyl-t-butylbenzene	A11	0.0723	0.0925	0.0773
5-Methylindan	A11	0.0217	0.0352	0.0344
4-Methylindan	A11	0.0126	0.0205	0.0200
1,2-Ethyl-n-propylbenzene	A11	0.0803	0.1028	0.0859
2-Methylindan	A11	0.0732	0.1189	0.1163
1,3-Methyl-n-butylbenzene	A11	0.0742	0.0950	0.0794
1,3-Di-i-propylbenzene	A11	0.0526	0.0673	0.0562
sec-Pentylbenzene	A11	0.1339	0.1714	0.1432
n-Pentylbenzene	A11	0.0427	0.0604	0.0515
1t-M-2-(4MP)cyclopentane	P12	0.0221	0.0359	0.0351
1,2-Di-n-propylbenzene	A11	0.0781	0.1000	0.0835
1,4-Di-i-propylbenzene	A11	0.0961	0.1230	0.1028
Tetrahydronaphthalene	A10	0.1036	0.1326	0.1108
t-Decahydronaphthalene	A10	0.0797	0.1020	0.0852
Naphthalene	A10	0.0796	0.0973	0.0813
1-t-Butyl-3,5-dimethylbenzene	A12	0.1023	0.1309	0.1094
1,4-Ethyl-t-butylbenzene	A11	0.0415	0.0531	0.0444
UnknownC11s	U11	2.0472	3.0516	3.0171
n-Dodecane	P12	0.5896	0.9577	0.9365
1,3-Di-n-propylbenzene	A12	0.0560	0.0717	0.0599
1,3,5-Triethylbenzene	A12	0.0407	0.0467	0.0395
1,2,4-Triethylbenzene	A12	0.2332	0.2673	0.2234
1,4-Methyl-n-pentylbenzene	A12	0.0190	0.0243	0.0203
n-Hexylbenzene	A12	0.0376	0.0582	0.0497
1,2,3,4,5-Pentamethylbenzene	A13	0.0630	0.0806	0.0673

2-Methylnaphthalene	A11	0.0771	0.1046	0.0874
1-Methylnaphthalene	A11	0.1085	0.1471	0.1056
UnknownC12s	U12	1.1992	1.9480	1.9048
n-Tridecane	P13	0.1365	0.2400	0.2319
UnknownC13s	U13	0.6431	1.1306	1.0925
n-Tetradecane	P14	0.0126	0.0238	0.0230
UnknownC14s	U14	0.4506	0.8525	0.8221
n-Pentadecane	P15	0.0563	0.1140	0.1087
UnknownC15s	U15	0.0769	0.1558	0.1485
n-Hexadecane	P16	0.0591	0.1276	0.1208
UnknownC16s	U16	0.0935	0.2019	0.1912
n-Heptadecane	P17	0.0030	0.0069	0.0065
UnknownC17s	U17	0.0856	0.1963	0.1853
UnknownC18s	U18	0.0021	0.0051	0.0048
TOTAL		100.0000	100.0000	100.0000

CRUDE OIL ASSAY

PROJECT NO. :	201310067	ANALYSIS NO. :	02
COMPANY NAME :	CARRIZO OIL & GAS	ANALYSIS DATE:	OCTOBER 18, 2013
ACCOUNT NO. :		SAMPLE DATE :	OCTOBER 9, 2013
PRODUCER :		CYLINDER NO. :	1L GLASS JAR
LEASE NO. :		SAMPLED BY :	JOHN MOSER
NAME/DESCRIP :	PRODUCTION TANK @ 11:40 PERGAMOS 1-4-34-7-60		EMPACT
FIELD DATA		SAMPLE TEMP. :	69
SAMPLE PRES. :		AMBIENT TEMP.:	
VAPOR PRES. :		GRAVITY :	
COMMENTS :	SPOT		

SPECIFICATION		TEST METHOD	UNITS	RESULTS
API GRAVITY			API 60/60	37.4
RVP @100 DEG F		D323	PSIG	7.2
TOTAL SULFUR		D2622	WT %	0.272
TOTAL CHLORIDE		D4929	ug/g	N/A
ORGANIC CHLORIDE		D4929	ug/g	N/A
FLASH POINT		D93	° F	N/A
HEATING VALUE		D4809	BTU/ LB	N/A
VISUAL APPEARANCE				DARK BROWN
BS&W		D96		
Crude Oil			VOL %	N/A
Water			VOL %	N/A
Emulsion			VOL %	N/A
Sediment			VOL %	N/A
DISTILLATION:		D86		
INITIAL POINT			DEG F	N/A
50%			DEG F	N/A
90%			DEG F	N/A
END POINT			DEG F	N/A
DISTILLATION:	@TEMP	D445		
Average Centipoise	20°C			N/A
Average Centipoise	30°C			N/A
Average Centipoise	80°C			N/A
Kinetic Viscosity	20°C		cSt (mm2/s)	N/A
Kinetic Viscosity	30°C		cSt (mm2/s)	N/A
Kinetic Viscosity	80°C		cSt (mm2/s)	N/A

ND: NOT DETECTED
N/A: NO TEST PREFORMED FOR THIS PARAMETER

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303-637-0150

EXTENDED NATURAL GAS ANALYSIS (*DHA)

MAIN PAGE

PROJECT NO. :	201310067	ANALYSIS NO. :	03
COMPANY NAME :	CARRIZO OIL & GAS	ANALYSIS DATE:	OCTOBER 2, 2013
ACCOUNT NO. :		SAMPLE DATE :	OCTOBER 9, 2013
PRODUCER :		CYLINDER NO. :	1245
LEASE NO. :		SAMPLED BY :	JOHN MOSER - EMPACT
NAME/DESCRIP :	SALES GAS @ 11:45 PERGAMOS 1-4-34-7-60		
FIELD DATA		SAMPLE TEMP. :	84
SAMPLE PRES. :	71	AMBIENT TEMP.:	
VAPOR PRES. :		GRAVITY :	
COMMENTS :	SPOT; NO PROBE; LENGTH OF H2S STAIN @ 7PPM @ 11:50		

COMPONENT	MOLE %	MASS %	GPM @ 14.650	GPM @ 14.730
ALCOHOLS	0.0014	0.0034		
HELIUM	0.02	0.00	---	---
OXYGEN/ARGON	0.01	0.01	---	---
NITROGEN	0.86	0.99	---	---
CARBON DIOXIDE	2.56	4.62	---	---
METHANE	68.46360	45.03860	---	---
ETHANE	12.4821	15.3909	3.3346	3.3529
PROPANE	9.1168	16.4852	2.5085	2.5222
I-BUTANE	0.9730	2.3191	0.3184	0.3202
N-BUTANE	3.1819	7.5838	1.0024	1.0079
I-PENTANE	0.6873	2.0276	0.2463	0.2476
N-PENTANE	0.8039	2.3784	0.2914	0.2930
HEXANES PLUS	0.8400	3.1530	0.3292	0.3310
TOTALS	100.00000	100.00000	8.0308	8.0748

BTEX COMPONENTS	MOLE%	WT%
BENZENE	0.0304	0.0974
TOLUENE	0.0185	0.0699
ETHYLBENZENE	0.0020	0.0087
XYLENES	0.0052	0.0227
TOTAL BTEX	0.0561	0.1987

	BTU @	14.650	14.730
LOW	NET DRY REAL :	1255.2 **/scf**	1262.0 **/scf**
	NET WET REAL :	1233.3 **/scf**	1240.1 **/scf**
HIGH	GROSS DRY REAL :	1379.2 **/scf**	1386.8 **/scf**
	GROSS WET REAL :	1355.1 **/scf**	1362.6 **/scf**
	NET DRY REAL :	19556.9 **/lb**	19663.7 **/lb**
	GROSS DRY REAL :	21488.7 **/lb**	21606.0 **/lb**
	RELATIVE DENSITY (AIR=1):		0.8412
	COMPRESSIBILITY FACTOR :		0.99548

(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

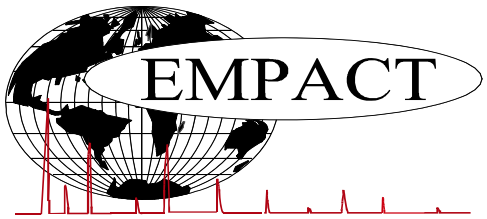
303-637-0150

EXTENDED NATURAL GAS ANALYSIS (*DHA)

GLYCALC INFORMATION

PROJECT NO. :	201310067	ANALYSIS NO. :	03
COMPANY NAME :	CARRIZO OIL & GAS	ANALYSIS DATE:	OCTOBER 2, 2013
ACCOUNT NO. :		SAMPLE DATE :	OCTOBER 9, 2013
PRODUCER :		CYLINDER NO. :	1245
LEASE NO. :		SAMPLED BY :	JOHN MOSER - EMPACT
NAME/DESCRIP :	SALES GAS @ 11:45 PERGAMOS 1-4-34-7-60		
FIELD DATA		SAMPLE TEMP. :	84
SAMPLE PRES. :	71	AMBIENT TEMP.:	
VAPOR PRES. :		GRAVITY :	
COMMENTS :	SPOT; NO PROBE; LENGTH OF H2S STAIN @ 7PPM @ 11:50		

Componet	Mole %	Wt %
Helium	0.02	0.00
Hydrogen	0.00	0.00
Carbon Dioxide	2.56	4.62
Carbon Monoxide	0.00	0.00
Nitrogen	0.86	0.99
Methane	68.46360	45.03860
Ethane	12.4821	15.3909
Propane	9.1168	16.4852
Isobutane	0.9730	2.3191
n-Butane	3.1819	7.5838
Isopentane	0.6164	1.8237
n-Pentane	0.8039	2.3784
Cyclopentane	0.0709	0.2039
n-Hexane	0.1735	0.6131
Cyclohexane	0.0471	0.1625
Other Hexanes	0.3063	1.0740
Heptanes	0.1468	0.5990
Methycyclohexane	0.0356	0.1433
2,2,4 Trimethylpentane	0.0001	0.0005
Benzene	0.0304	0.0974
Toluene	0.0185	0.0699
Ethylbenzene	0.0020	0.0087
Xylenes	0.0052	0.0227
C8+ Heavies	0.0745	0.3619
Subtotal	99.98860	99.98660
Oxygen/Argon	0.01	0.01
Alcohols	0.0014	0.0034
Glycols	0.0000	0.0000
Total	100.00000	100.00000



EXTENDED NATURAL GAS ANALYSIS (*DHA)

DHA COMPONENT LIST

PROJECT NO. :	201310067	ANALYSIS NO. :	03
COMPANY NAME :	CARRIZO OIL & GAS	ANALYSIS DATE:	OCTOBER 2, 2013
ACCOUNT NO. :		SAMPLE DATE :	OCTOBER 9, 2013
PRODUCER :		CYLINDER NO. :	1245
LEASE NO. :		SAMPLED BY :	JOHN MOSER - EMPACT
NAME/DESCRIP :	SALES GAS @ 11:45 PERGAMOS 1-4-34-7-60		
FIELD DATA		SAMPLE TEMP. :	84
SAMPLE PRES. :	71	AMBIENT TEMP.:	
VAPOR PRES. :		GRAVITY :	
COMMENTS :	SPOT; NO PROBE; LENGTH OF H2S STAIN @ 7PPM @ 11:50		

COMPONENT	PIANO #	MOLE %	MASS %	GPM @ 14.650	GPM @ 14.730
Helium	---	0.02	0.00	---	---
Oxygen/Argon	---	0.01	0.01	---	---
Nitrogen	---	0.86	0.99	---	---
Carbon Dioxide	---	2.56	4.62	---	---
Methane	P1	68.46360	45.03860	---	---
Ethane	P2	12.4821	15.3909	3.335	3.353
Propane	P3	9.1168	16.4852	2.509	2.522
i-Butane	I4	0.9730	2.3191	0.318	0.320
n-Butane	P4	3.1819	7.5838	1.002	1.008
2,2-Dimethylpropane	I5	0.0030	0.0089	0.001	0.001
Ethanol	X2	0.0001	0.0002	0.000	0.000
i-Pentane	I5	0.6134	1.8148	0.224	0.226
Acetone	X3	0.0009	0.0021	0.000	0.000
i-Propanol	X3	0.0002	0.0005	0.000	0.000
n-Pentane	P5	0.8039	2.3784	0.291	0.293
t-Butanol	X4	0.0002	0.0006	0.000	0.000
2,2-Dimethylbutane	I6	0.0020	0.0071	0.001	0.001
Cyclopentane	N5	0.0709	0.2039	0.021	0.021
2,3-Dimethylbutane	I6	0.0106	0.0374	0.004	0.004
2-Methylpentane	I6	0.1279	0.4520	0.053	0.053
3-Methylpentane	I6	0.0653	0.2307	0.027	0.027
n-Hexane	P6	0.1735	0.6131	0.071	0.072
2,2-Dimethylpentane	I7	0.0007	0.0029	0.000	0.000
Methylcyclopentane	N6	0.1005	0.3468	0.035	0.035
2,4-Dimethylpentane	I7	0.0043	0.0177	0.002	0.002
2,2,3-Trimethylbutane	I7	0.0001	0.0004	0.000	0.000
Benzene	A6	0.0304	0.0974	0.008	0.008
3,3-Dimethylpentane	I7	0.0005	0.0021	0.000	0.000
Cyclohexane	N6	0.0471	0.1625	0.016	0.016
2-Methylhexane	I7	0.0177	0.0727	0.008	0.008
2,3-Dimethylpentane	I7	0.0083	0.0341	0.004	0.004
1,1-Dimethylcyclopentane	N7	0.0047	0.0189	0.002	0.002
3-Methylhexane	I7	0.0203	0.0834	0.009	0.009
1c,3-Dimethylcyclopentane	N7	0.0110	0.0443	0.005	0.005
1t,3-Dimethylcyclopentane	N7	0.0098	0.0395	0.005	0.005
3-Ethylpentane	I7	0.0017	0.0070	0.001	0.001
1t,2-Dimethylcyclopentane	N7	0.0195	0.0785	0.009	0.009
2,2,4-Trimethylpentane	I8	0.0001	0.0005	0.000	0.000
n-Heptane	P7	0.0417	0.1713	0.019	0.019
1c,2-Dimethylcyclopentane	N7	0.0017	0.0069	0.001	0.001
Methylcyclohexane	N7	0.0356	0.1433	0.014	0.014
2,2-Dimethylhexane	I8	0.0026	0.0122	0.001	0.001
Ethylcyclopentane	N7	0.0048	0.0193	0.002	0.002
2,5-Dimethylhexane	I8	0.0008	0.0037	0.000	0.000
2,2,3-Trimethylpentane	I8	0.0001	0.0005	0.000	0.000
2,4-Dimethylhexane	I8	0.0015	0.0070	0.001	0.001
1c,2t,4-Trimethylcyclopentane	N8	0.0028	0.0129	0.001	0.001
3,3-Dimethylhexane	I8	0.0002	0.0009	0.000	0.000

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1t,2c,4-Trimethylcyclopentane	N8	0.0031	0.0143	0.001	0.001
2,3,4-Trimethylpentane	I8	0.0006	0.0028	0.000	0.000
2,3,3-Trimethylpentane	I8	0.0001	0.0005	0.000	0.000
Toluene	A7	0.0185	0.0699	0.006	0.006
2,3-Dimethylhexane	I8	0.0008	0.0037	0.000	0.000
2-Methyl-3-ethylpentane	I8	0.0009	0.0042	0.000	0.000
2-Methylheptane	I8	0.0066	0.0309	0.003	0.003
4-Methylheptane	I8	0.0019	0.0089	0.001	0.001
3-Methyl-3-ethylpentane	I8	0.0002	0.0009	0.000	0.000
3,4-Dimethylhexane	I8	0.0002	0.0009	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	0.0031	0.0145	0.002	0.002
1c,2t,3-Trimethylcyclopentane	N8	0.0044	0.0203	0.002	0.002
3-Ethylhexane	I8	0.0005	0.0023	0.000	0.000
1t,4-Dimethylcyclohexane	N8	0.0016	0.0074	0.001	0.001
1,1-Dimethylcyclohexane	N8	0.0006	0.0028	0.000	0.000
3t-Ethylmethylcyclopentane	N8	0.0009	0.0041	0.000	0.000
2t-Ethylmethylcyclopentane	N8	0.0008	0.0037	0.000	0.000
1,1-Methylethylcyclopentane	N8	0.0026	0.0120	0.001	0.001
2,2,4-Trimethylhexane	I9	0.0002	0.0011	0.000	0.000
1t,2-Dimethylcyclohexane	N8	0.0024	0.0110	0.001	0.001
1t,3-Dimethylcyclohexane	N8	0.0001	0.0005	0.000	0.000
n-Octane	P8	0.0090	0.0422	0.005	0.005
1c,4-Dimethylcyclohexane	N8	0.0009	0.0041	0.000	0.000
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	0.0003	0.0016	0.000	0.000
2,2,3,4-Tetramethylpentane	I9	0.0001	0.0005	0.000	0.000
2,3,4-Trimethylhexane	I9	0.0001	0.0005	0.000	0.000
1c,2-Dimethylcyclohexane	N8	0.0005	0.0023	0.000	0.000
1,1,4-Trimethylcyclohexane	N9	0.0027	0.0140	0.001	0.001
2,2,3-Trimethylhexane	I9	0.0009	0.0047	0.000	0.000
2,4-Dimethylheptane	I9	0.0004	0.0021	0.000	0.000
4,4-Dimethylheptane	I9	0.0001	0.0005	0.000	0.000
Ethylcyclohexane	N8	0.0015	0.0069	0.001	0.001
n-Propylcyclopentane	N8	0.0005	0.0023	0.000	0.000
1c,3c,5-Trimethylcyclohexane	N9	0.0001	0.0005	0.000	0.000
2,5-Dimethylheptane	I9	0.0002	0.0011	0.000	0.000
3,3-Dimethylheptane	I9	0.0002	0.0011	0.000	0.000
3,5-Dimethylheptane	I9	0.0002	0.0011	0.000	0.000
2,6-Dimethylheptane	I9	0.0002	0.0011	0.000	0.000
1,1,3-Trimethylcyclohexane	N9	0.0005	0.0026	0.000	0.000
Ethylbenzene	I8	0.0020	0.0087	0.001	0.001
1c,2t,4t-Trimethylcyclohexane	N9	0.0001	0.0005	0.000	0.000
1,3-Dimethylbenzene (m-Xylene)	A8	0.0034	0.0148	0.001	0.001
1,4-Dimethylbenzene (p-Xylene)	A8	0.0005	0.0022	0.000	0.000
3,4-Dimethylheptane	I9	0.0001	0.0005	0.000	0.000
3,4-Dimethylheptane (2)	I9	0.0003	0.0016	0.000	0.000
4-Methyloctane	I9	0.0005	0.0026	0.000	0.000
2-Methyloctane	I9	0.0006	0.0032	0.000	0.000
1c,2t,3-Trimethylcyclohexane	N9	0.0001	0.0005	0.000	0.000
3-Ethylheptane	I9	0.0003	0.0016	0.000	0.000
3-Methyloctane	I9	0.0007	0.0037	0.000	0.000
1c,2t,4c-Trimethylcyclohexane	I9	0.0001	0.0005	0.000	0.000
3,3-Diethylpentane	I9	0.0001	0.0005	0.000	0.000
1,2-Dimethylbenzene (o-Xylene)	A8	0.0013	0.0057	0.000	0.000
i-Butylcyclopentane	N9	0.0005	0.0026	0.000	0.000
UnknownC8s	U8	0.0004	0.0019	0.000	0.000
n-Nonane	P9	0.0019	0.0100	0.001	0.001
1,1-Methylethylcyclohexane	N9	0.0004	0.0021	0.000	0.000
i-Propylbenzene	A9	0.0004	0.0020	0.000	0.000
i-Propylcyclohexane	N9	0.0001	0.0005	0.000	0.000
2,2-Dimethyloctane	I10	0.0001	0.0006	0.000	0.000
2,4-Dimethyloctane	I10	0.0002	0.0012	0.000	0.000
2,5-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	0.0004	0.0020	0.000	0.000
3,6-Dimethyloctane	I10	0.0001	0.0006	0.000	0.000
3-Methyl-5-ethylheptane	I10	0.0004	0.0023	0.000	0.000
1,3-Methylethylbenzene	A9	0.0003	0.0015	0.000	0.000
1,4-Methylethylbenzene	A9	0.0001	0.0005	0.000	0.000

1,3,5-Trimethylbenzene	A9	0.0002	0.0010	0.000	0.000
5-Methylnonane	I10	0.0002	0.0012	0.000	0.000
1,2-Methylethylbenzene	A9	0.0002	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	0.0016	0.000	0.000
i-Butylcyclohexane	N10	0.0001	0.0006	0.000	0.000
UnknownC9s	U9	0.0022	0.0116	0.001	0.001
n-Decane	P10	0.0004	0.0023	0.000	0.000
1,2,3-Trimethylbenzene	A9	0.0002	0.0010	0.000	0.000
1,3-Methyl-i-propylbenzene	A10	0.0001	0.0005	0.000	0.000
Sec-Butylcyclohexane	A10	0.0001	0.0006	0.000	0.000
1,2-Methyl-i-propylbenzene	A10	0.0001	0.0005	0.000	0.000
1,3-Diethylbenzene	A10	0.0001	0.0005	0.000	0.000
1,4-Diethylbenzene	A10	0.0001	0.0005	0.000	0.000
1,3-Dimethyl-5-ethylbenzene	A10	0.0001	0.0005	0.000	0.000
UnknownC10s	U10	0.0020	0.0117	0.001	0.001
n-Undecane	P11	0.0001	0.0007	0.000	0.000
UnknownC11s	U11	0.0003	0.0019	0.000	0.000
UnknownC12s	U12	0.0001	0.0007	0.000	0.000
TOTAL		100.00000	100.00000	8.0308	8.0748

BTEX COMPONENTS	**MOLE%**	**WT%**
BENZENE	0.0304	0.0974
TOLUENE	0.0185	0.0699
ETHYLBENZENE	0.0020	0.0087
XYLENES	0.0052	0.0227
TOTAL BTEX	0.0561	0.1987

		BTU @	14.650	14.730
LOW	NET DRY REAL :		1255.2 **/scf**	1262.0 **/scf**
	NET WET REAL :		1233.3 **/scf**	1240.1 **/scf**
HIGH	GROSS DRY REAL :		1379.2 **/scf**	1386.8 **/scf**
	GROSS WET REAL :		1355.1 **/scf**	1362.6 **/scf**
	NET DRY REAL :		19556.9 **/lb**	19663.7 **/lb**
	GROSS DRY REAL :		21488.7 **/lb**	21606.0 **/lb**
	RELATIVE DENSITY (AIR=1):			0.8412
	COMPRESSIBILITY FACTOR :			0.99548

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

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