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. :	13
COMPANY NAME :	CARRIZO OIL & GAS	ANALYSIS DATE:	OCTOBER 21, 2014
ACCOUNT NO. :		SAMPLE DATE :	OCTOBER 20, 2014
PRODUCER :		CYLINDER NO. :	11116
LEASE NO. :		SAMPLED BY :	JOHN MOSER
NAME/DESCRIP :	OIL TREATER 17:25 HEMBERGER 1-25-8-60		EMPACT
FIELD DATA		SAMPLE TEMP. :	160
SAMPLE PRES. :	28	AMBIENT TEMP.:	
VAPOR PRES. :		GRAVITY :	
COMMENTS :	SPOT; NO PROBE		

COMPONENT	MOLE %	MASS %	VOL %
NITROGEN (AIR)	0.0210	0.0053	0.0049
CARBON DIOXIDE	0.0300	0.0120	0.0109
METHANE	0.0530	0.0077	0.0191
ETHANE	0.4120	0.1126	0.2346
PROPANE	1.7140	0.6869	1.0058
I-BUTANE	0.4360	0.2303	0.3037
N-BUTANE	2.2560	1.1915	1.5146
I-PENTANE	1.0019	0.6569	0.7818
N-PENTANE	1.6750	1.0982	1.2917
UNKNOWN C1-C5	0.0004	0.0003	0.0004
HEXANES PLUS	92.4007	95.9983	94.8325
TOTALS	100.0000	100.0000	100.0000

BTEX COMPONENTS	**MOLE%**	**MASS%**
BENZENE	1.4986	1.0637
TOLUENE	2.9305	2.4536
ETHYLBENZENE	0.4650	0.4486
XYLENE	2.1079	2.0336
TOTAL BTEX	7.0020	5.9995

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

	TOTAL SAMPLE	**C6+ FRACTION**	
Specific Gravity (H2O=1) =	0.7424	0.7515	60/60
API Gravity =	59.1	56.79	60/60
Molecular Weight =	110.05	115.102	
Absolute Density =	6.19	6.26	LBS/GAL
Heating Value Liq. Idl Gas=	125982	127364	BTU/GAL
Vapor/Liquid =	21.44	20.77	CUFT/GAL
Vapor Pressure =	12.84	1.78	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. :	13
COMPANY NAME :	CARRIZO OIL & GAS	ANALYSIS DATE:	OCTOBER 21, 2014
ACCOUNT NO. :		SAMPLE DATE :	OCTOBER 20, 2014
PRODUCER :		CYLINDER NO. :	11116
LEASE NO. :		SAMPLED BY :	JOHN MOSER
NAME/DESCRIP :	OIL TREATER 17:25 HEMBERGER 1-25-8-60		EMPACT
FIELD DATA		SAMPLE TEMP. :	160
SAMPLE PRES. :	28	AMBIENT TEMP.:	
VAPOR PRES. :		GRAVITY :	
COMMENTS :	SPOT; NO PROBE		

COMPONENT	Mole %		Wt %		LV %	
CARBON DIOXIDE	0.0300		0.0120		0.0109	
NITROGEN (AIR)	0.0210		0.0053		0.0049	
METHANE	0.0530		0.0077		0.0191	
ETHANE	0.4120		0.1126		0.2346	
PROPANE	1.7140		0.6869		1.0058	
I-BUTANE	0.4360		0.2303		0.3037	
N-BUTANE	2.2560		1.1915		1.5146	
I-PENTANE	1.0019		0.6569		0.7818	
N-PENTANE	1.6750		1.0982		1.2917	
CYCLOPENTANE (N-C5)	1.5735		1.0027		0.9792	
UNKNOWN C1-C5	0.0004		0.0003		0.0004	
N-HEXANE	7.1868		5.6290		6.2951	
CYCLOHEXANE (OTHER C6)	2.8587		2.1862		2.0715	
OTHER HEXANES	10.8795		8.4358		8.9805	
OTHER HEPTANES	13.4612		12.1765		12.7338	
METHYLCYCLOHEXANE (OTHER C7)	4.1215		3.6774		3.5238	
2,2,4 TRIMETHYLPENTANE	0.7681		0.6853		0.6752	
BENZENE	1.4986		1.0637		0.8944	
TOLUENE	2.9305		2.4536		2.0834	
ETHYLBENZENE	0.4650		0.4486		0.3809	
XYLENES	2.1079		2.0336		1.7270	
OTHER OCTANES	10.7804		11.2111		11.3058	
OCTANES PLUS	----	47.8904	----	59.3734	----	57.2708
NONANES	11.1089		12.7709		12.4431	
DECANES PLUS	22.6601		32.2239		30.7388	
SUB TOTAL	100.0000		100.0000		100.0000	
TOTAL	100.0000		100.0000		100.0000	

API Gravity =	**59.10**	60/60
Vapor Pressure =	**12.84**	PSIA & 100 F
Average Molecular Weight of Decanes plus =	**156.49**	
Average Specific Gravity of Decanes plus =	**0.7800**	

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BY CARBON NUMBER

PROJECT NO. :	201410118	ANALYSIS NO. :	13
COMPANY NAME :	CARRIZO OIL & GAS	ANALYSIS DATE:	OCTOBER 21, 2014
ACCOUNT NO. :		SAMPLE DATE :	OCTOBER 20, 2014
PRODUCER :		CYLINDER NO. :	11116
LEASE NO. :		SAMPLED BY :	JOHN MOSER
NAME/DESCRIP :	OIL TREATER 17:25		EMPACT
	HEMBERGER 1-25-8-60		
FIELD DATA		SAMPLE TEMP. :	160
SAMPLE PRES. :	28	AMBIENT TEMP.:	
VAPOR PRES. :		GRAVITY :	
COMMENTS :	SPOT; NO PROBE		

COMPONENT / CARBON NUMBER	MOLE%	MASS %	VOLUME %
NITROGEN	0.0210	0.0053	0.0049
CARBON DIOXIDE	0.0300	0.0120	0.0109
C1	0.0530	0.0077	0.0191
C2	0.4120	0.1126	0.2346
C3	1.7140	0.6869	1.0058
C4	2.6920	1.4218	1.8183
C5	4.2508	2.7581	3.0531
C6	22.4236	17.3147	18.2415
C7	20.5132	18.3075	18.3410
C8	14.1214	14.3786	14.0889
C9	11.1089	12.7709	12.4431
C10	9.3406	11.6202	11.0975
C11	5.0506	6.8137	6.3616
C12	2.9791	4.3511	4.1688
C13	2.2110	3.6085	3.4828
C14	1.4685	2.6473	2.5746
C15	1.2423	2.3979	2.3053
C16	0.2505	0.5154	0.4922
C17	0.0546	0.1193	0.1136
C18	0.0348	0.0805	0.0765
C19	0.0207	0.0505	0.0477
C20	0.0040	0.0103	0.0097
C21	0.0031	0.0084	0.0078
C22	0.0003	0.0008	0.0007
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. :	201410118	ANALYSIS NO. :	13
COMPANY NAME :	CARRIZO OIL & GAS	ANALYSIS DATE:	OCTOBER 21, 2014
ACCOUNT NO. :		SAMPLE DATE :	OCTOBER 20, 2014
PRODUCER :		CYLINDER NO. :	11116
LEASE NO. :		SAMPLED BY :	JOHN MOSER
NAME/DESCRIP :	OIL TREATER 17:25		EMPACT
	HEMBERGER 1-25-8-60		
FIELD DATA		SAMPLE TEMP. :	160
SAMPLE PRES. :	28	AMBIENT TEMP.:	
VAPOR PRES. :		GRAVITY :	
COMMENTS :	SPOT; NO PROBE		

COMPONENT	PIANO #	MOLE %	MASS %	VOL %
Nitrogen	NHC	0.0210	0.0053	0.0049
Carbon Dioxide	NHC	0.0300	0.0120	0.0109
Methane	P1	0.0530	0.0077	0.0191
Ethane	P2	0.4120	0.1126	0.2346
Propane	P3	1.7140	0.6869	1.0058
i-Butane	I4	0.4360	0.2303	0.3037
n-Butane	P4	2.2560	1.1915	1.5146
2,2-Dimethylpropane	I5	0.0319	0.0209	0.0260
i-Pentane	I5	0.9700	0.6360	0.7558
n-Pentane	P5	1.6750	1.0982	1.2917
2,2-Dimethylbutane	I6	0.0348	0.0273	0.0310
Cyclopentane	N5	1.5735	1.0027	0.9792
2,3-Dimethylbutane	I6	0.3526	0.2761	0.3073
2-Methylpentane	I6	3.7579	2.9429	3.3214
3-Methylpentane	I6	2.1508	1.6843	1.8692
UnknownC5s	U5	0.0004	0.0003	0.0004
n-Hexane	P6	7.1868	5.6290	6.2951
2,2-Dimethylpentane	I7	0.0178	0.0162	0.0176
Methylcyclopentane	N6	4.5803	3.5028	3.4489
2,4-Dimethylpentane	I7	0.2238	0.2038	0.2237
2,2,3-Trimethylbutane	I7	0.0078	0.0071	0.0076
Benzene	A6	1.4986	1.0637	0.8944
3,3-Dimethylpentane	I7	0.0170	0.0155	0.0165
Cyclohexane	N6	2.8587	2.1862	2.0715
2-Methylhexane	I7	1.2577	1.1452	1.2459
2,3-Dimethylpentane	I7	0.6952	0.6330	0.6690
1,1-Dimethylcyclopentane	N7	0.3073	0.2742	0.2681
3-Methylhexane	I7	1.7401	1.5844	1.6978
1c,3-Dimethylcyclopentane	N7	0.8085	0.7214	0.7145
1t,3-Dimethylcyclopentane	N7	0.7681	0.6853	0.6752
3-Ethylpentane	I7	0.1495	0.1361	0.1435
1t,2-Dimethylcyclopentane	N7	1.6995	1.5164	1.4888
2,2,4-Trimethylpentane	I8	0.0345	0.0358	0.0380
UnknownC6s	U6	0.0031	0.0024	0.0027
n-Heptane	P7	4.8423	4.4090	4.7558
1c,2-Dimethylcyclopentane	N7	0.1536	0.1370	0.1309
Methylcyclohexane	N7	4.1215	3.6774	3.5238
2,2-Dimethylhexane	I8	0.3078	0.3195	0.3388
Ethylcyclopentane	N7	0.6521	0.5818	0.5601
2,5-Dimethylhexane	I8	0.1116	0.1158	0.1231
2,2,3-Trimethylpentane	I8	0.0427	0.0443	0.0457
2,4-Dimethylhexane	I8	0.2023	0.2100	0.2222

1c,2t,4-Trimethylcyclopentane	N8	0.3680	0.3752	0.3627
3,3-Dimethylhexane	I8	0.0459	0.0476	0.0495
2,3,4-Trimethylpentane	I8	0.1030	0.1069	0.1096
2,3,3-Trimethylpentane	I8	0.0011	0.0011	0.0011
Toluene	A7	2.9305	2.4536	2.0834
2,3-Dimethylhexane	I8	0.3842	0.3988	0.4134
2-Methylheptane	I8	1.3468	1.3980	1.4750
4-Methylheptane	I8	0.4178	0.4337	0.4466
3-Methyl-3-ethylpentane	I8	0.0635	0.0659	0.0669
3,4-Dimethylhexane	I8	0.0629	0.0653	0.0669
1c,2c,4-Trimethylcyclopentane	N8	0.0332	0.0338	0.0323
1c,3-Dimethylcyclohexane	N8	0.0155	0.0158	0.0152
3-Methylheptane	I8	0.6053	0.6283	0.6572
1c,2t,3-Trimethylcyclopentane	N8	0.8891	0.9066	0.8685
3-Ethylhexane	I8	0.1835	0.1905	0.1972
1t,4-Dimethylcyclohexane	N8	0.3603	0.3674	0.3556
1,1-Dimethylcyclohexane	N8	0.1128	0.1150	0.1087
3c-Ethylmethylcyclopentane	N8	0.0037	0.0038	0.0037
3t-Ethylmethylcyclopentane	N8	0.2219	0.2263	0.2178
2t-Ethylmethylcyclopentane	N8	0.1861	0.1898	0.1822
1,1-Methylethylcyclopentane	N8	0.6497	0.6625	0.6262
2,2,4-Trimethylhexane	I9	0.0437	0.0509	0.0525
1t,2-Dimethylcyclohexane	N8	0.5548	0.5657	0.5382
1t,3-Dimethylcyclohexane	N8	0.0055	0.0056	0.0053
UnknownC7s	U7	0.1209	0.1101	0.1188
n-Octane	P8	2.6537	2.7545	2.8925
1c,4-Dimethylcyclohexane	N8	0.5409	0.5515	0.5200
i-Propylcyclopentane	I8	0.0627	0.0639	0.0608
2,4,4-Trimethylhexane	I9	0.0183	0.0213	0.0218
2,2,3,4-Tetramethylpentane	I9	0.0195	0.0227	0.0233
2,3,4-Trimethylhexane	I9	0.0184	0.0214	0.0219
1c,2-Dimethylcyclohexane	N8	0.2047	0.2087	0.1935
2,3,5-Trimethylhexane	I9	0.0873	0.1017	0.1040
2,2-Dimethylheptane	I9	0.0100	0.0117	0.0122
1,1,4-Trimethylcyclohexane	N9	1.0280	1.1793	1.1278
2,2,3-Trimethylhexane	I9	0.4207	0.4903	0.4962
2,4-Dimethylheptane	I9	0.0085	0.0099	0.0102
4,4-Dimethylheptane	I9	0.0442	0.0515	0.0531
Ethylcyclohexane	N8	0.5254	0.5357	0.5021
n-Propylcyclopentane	N8	0.2095	0.2136	0.2030
1c,3c,5-Trimethylcyclohexane	N9	0.0369	0.0423	0.0405
2,5-Dimethylheptane	I9	0.0787	0.0917	0.0944
3,3-Dimethylheptane	I9	0.0903	0.1052	0.1083
3,5-Dimethylheptane	I9	0.0685	0.0798	0.0822
2,6-Dimethylheptane	I9	0.0611	0.0712	0.0741
1,1,3-Trimethylcyclohexane	N9	0.1353	0.1552	0.1484
Ethylbenzene	A8	0.4650	0.4486	0.3809
1c,2t,4t-Trimethylcyclohexane	N9	0.3195	0.3665	0.3438
2,3-Dimethylheptane	I9	0.4485	0.5227	0.5314
1,3-Dimethylbenzene (m-Xylene)	A8	1.0768	1.0389	0.8871
1,4-Dimethylbenzene (p-Xylene)	A8	0.3171	0.3059	0.2620
3,4-Dimethylheptane	I9	0.0718	0.0837	0.0845
3,4-Dimethylheptane (2)	I9	0.1345	0.1568	0.1582
4-Ethylheptane	I9	0.0347	0.0404	0.0417
4-Methyloctane	I9	0.3010	0.3508	0.3593
2-Methyloctane	I9	0.3043	0.3547	0.3669
1c,2t,4c-Trimethylcyclohexane	I9	0.0694	0.0809	0.0823
3-Ethylheptane	I9	0.0615	0.0717	0.0728
3-Methyloctane	I9	0.4396	0.5123	0.5246
3,3-Diethylpentane	I9	0.0515	0.0600	0.0587
1c,2t,3-Trimethylcyclohexane	N9	0.0712	0.0817	0.0766
1,1,2-Trimethylcyclohexane	N9	0.0301	0.0345	0.0324
1,2-Dimethylbenzene (o-Xylene)	A8	0.7140	0.6888	0.5779
i-Butylcyclopentane	N9	0.2409	0.2763	0.2612
UnknownC8s	U8	0.0381	0.0395	0.0415
n-Nonane	P9	1.8415	2.1463	2.2074
1,1-Methylethylcyclohexane	N9	0.3236	0.3771	0.3890
i-Propylbenzene	A9	0.3936	0.4299	0.3675
i-Propylcyclohexane	N9	0.0912	0.1046	0.0963
2,2-Dimethyloctane	I10	0.0800	0.1034	0.1032
2,4-Dimethyloctane	I10	0.0737	0.0953	0.0951
2,6-Dimethyloctane	I10	0.0103	0.0133	0.0137
2,5-Dimethyloctane	I10	0.0406	0.0525	0.0524
n-Butylcyclopentane	N9	0.2625	0.3346	0.3092

3,3-Dimethyloctane	I10	0.0976	0.1262	0.1261
n-Propylbenzene	A9	0.3543	0.3869	0.3308
3,6-Dimethyloctane	I10	0.2660	0.3439	0.3433
3-Methyl-5-ethylheptane	I10	0.5105	0.5950	0.6052
1,3-Methylethylbenzene	A9	0.3894	0.4253	0.3606
1,4-Methylethylbenzene	A9	0.2367	0.2585	0.2192
1,3,5-Trimethylbenzene	A9	0.1027	0.1122	0.0958
2,3-Dimethyloctane	I10	0.0830	0.1073	0.1071
5-Methylnonane	I10	0.2251	0.2910	0.2932
1,2-Methylethylbenzene	A9	0.5448	0.5950	0.5018
2-Methylnonane	I10	0.0637	0.0824	0.0837
3-Ethyloctane	I10	0.0550	0.0711	0.0710
3-Methylnonane	I10	0.2283	0.2952	0.2971
1,2,4-Trimethylbenzene	A9	0.0470	0.0513	0.0433
t-Butylbenzene	A10	0.5354	0.6530	0.5568
i-Butylcyclohexane	N10	0.2178	0.2776	0.2525
1t-Methyl-2-n-propylcyclohexane	I10	0.0869	0.1013	0.1030
i-Butylbenzene	A10	0.0393	0.0479	0.0415
sec-Butylbenzene	A10	0.0332	0.0405	0.0347
UnknownC9s	U9	1.5401	1.7950	1.8461
n-Decane	P10	1.3063	1.6889	1.7077
1,2,3-Trimethylbenzene	A9	0.2336	0.2551	0.2108
1,3-Methyl-i-propylbenzene	A10	0.1160	0.1267	0.1069
1,4-Methyl-i-propylbenzene	A10	0.1135	0.1240	0.1046
Sec-Butylcyclohexane	N10	0.3496	0.4456	0.4048
1,2-Methyl-i-propylbenzene	A10	0.1710	0.2086	0.1758
3-Ethylnonane	I10	0.0528	0.0683	0.0694
1,3-Diethylbenzene	A10	0.1629	0.1987	0.1699
1,3-Methyl-n-propylbenzene	A10	0.0528	0.0644	0.0553
1,4-Diethylbenzene	A10	0.2150	0.2622	0.2247
1,4-Methyl-n-propylbenzene	A10	0.1135	0.1384	0.1191
n-Butylbenzene	A10	0.0627	0.0765	0.0656
1,3-Dimethyl-5-ethylbenzene	A10	0.0607	0.0740	0.0632
1,2-Diethylbenzene	A10	0.1191	0.1453	0.1220
1,2-Methyl-n-propylbenzene	A10	0.1128	0.1376	0.1163
1,4-Dimethyl-2-ethylbenzene	A10	0.1509	0.1840	0.1549
1,3-Dimethyl-4-ethylbenzene	A10	0.0045	0.0055	0.0046
1,2-Dimethyl-4-ethylbenzene	A10	0.2194	0.2676	0.2260
1,3-Dimethyl-2-ethylbenzene	A10	0.1242	0.1515	0.1257
1t,2c,4-Trimethylcyclopentane	A10	0.4646	0.4737	0.4677
1,2-Dimethyl-3-ethylbenzene	A10	0.0719	0.0877	0.0726
1,2-Ethyl-i-propylbenzene	A10	0.0583	0.0711	0.0599
1,4-Methyl-t-butylbenzene	A11	0.2075	0.2531	0.2133
UnknownC10s	U10	2.3004	2.9742	3.0074
n-Undecane	P11	1.0988	1.5607	1.5562
1,4-Ethyl-i-propylbenzene	A11	0.0657	0.0801	0.0675
1,2,4,5-Tetramethylbenzene	A11	0.1193	0.1455	0.1213
1,2-Methyl-n-butylbenzene	A11	0.0764	0.0932	0.0785
1,2,3,5-Tetramethylbenzene	A11	0.1196	0.1459	0.1211
1,2-Methyl-t-butylbenzene	A11	0.1036	0.1264	0.1065
5-Methylindan	A11	0.0220	0.0340	0.0335
4-Methylindan	A11	0.0063	0.0098	0.0097
1,2-Ethyl-n-propylbenzene	A11	0.1631	0.1989	0.1676
2-Methylindan	A11	0.0873	0.1351	0.1333
1,3-Methyl-n-butylbenzene	A11	0.0877	0.1070	0.0902
1,3-Di-i-propylbenzene	A11	0.0951	0.1160	0.0977
sec-Pentylbenzene	A11	0.0875	0.1067	0.0899
n-Pentylbenzene	A11	0.0855	0.1152	0.0991
1t-M-2-(4MP)cyclopentane	P12	0.0900	0.1393	0.1374
1,2-Di-n-propylbenzene	A11	0.1200	0.1464	0.1234
1,4-Di-i-propylbenzene	A11	0.1812	0.2210	0.1862
Tetrahydronaphthalene	A10	0.0316	0.0385	0.0324
t-Decahydronaphthalene	A10	0.1425	0.1738	0.1464
Naphthalene	A10	0.1172	0.1365	0.1150
1-t-Butyl-3,5-dimethylbenzene	A12	0.0542	0.0661	0.0557
1,4-Ethyl-t-butylbenzene	A11	0.1593	0.1943	0.1637
UnknownC11s	U11	1.7730	2.5183	2.5111
n-Dodecane	P12	0.9100	1.4086	1.3891
1,3-Di-n-propylbenzene	A12	0.1008	0.1229	0.1036
1,3,5-Triethylbenzene	A12	0.0429	0.0469	0.0400
1,2,4-Triethylbenzene	A12	0.3447	0.3765	0.3174
1,4-Methyl-n-pentylbenzene	A12	0.0732	0.0893	0.0752
n-Hexylbenzene	A12	0.1196	0.1764	0.1519
1,2,3,4,5-Pentamethylbenzene	A13	0.2097	0.2558	0.2155

2-Methylnaphthalene	A11	0.1651	0.2133	0.1797
1-Methylnaphthalene	A11	0.2266	0.2928	0.2121
UnknownC12s	U12	1.2437	1.9251	1.8985
n-Tridecane	P13	0.6826	1.1435	1.1144
UnknownC13s	U13	1.3187	2.2092	2.1529
n-Tetradecane	P14	0.3797	0.6845	0.6657
UnknownC14s	U14	1.0888	1.9628	1.9089
n-Pentadecane	P15	0.1921	0.3708	0.3565
UnknownC15s	U15	1.0502	2.0271	1.9488
n-Hexadecane	P16	0.0267	0.0549	0.0524
UnknownC16s	U16	0.2238	0.4605	0.4398
n-Heptadecane	P17	0.0204	0.0446	0.0425
UnknownC17s	U17	0.0342	0.0747	0.0711
n-Octadecane	P18	0.0199	0.0460	0.0437
UnknownC18s	U18	0.0149	0.0345	0.0328
n-Nonadecane	P19	0.0103	0.0251	0.0237
UnknownC19s	U19	0.0104	0.0254	0.0240
n-Eicosane	P20	0.0040	0.0103	0.0097
n-Heneicosane	P21	0.0031	0.0084	0.0078
n-Docosane	P22	0.0003	0.0008	0.0007
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. :	14
COMPANY NAME :	CARRIZO OIL & GAS	ANALYSIS DATE:	OCTOBER 27, 2014
ACCOUNT NO. :		SAMPLE DATE :	OCTOBER 20, 2014
PRODUCER :		CYLINDER NO. :	1399
LEASE NO. :		SAMPLED BY :	JOHN MOSER - EMPACT
NAME/DESCRIP :	SALES GAS 17:30 HEMBERGER 1-25-8-60		
FIELD DATA		SAMPLE TEMP. :	93
SAMPLE PRES. :	124	AMBIENT TEMP.:	
VAPOR PRES. :		GRAVITY :	
COMMENTS :	SPOT; PROBE; LENGTH OF H2S STAIN 3.0 PPM (1-7PPM) 17:35		

COMPONENT	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	0.87	1.04	---	---
CARBON DIOXIDE	2.58	4.84	---	---
METHANE	70.50390	48.22650	---	---
ETHANE	12.5554	16.0980	3.3526	3.3709
PROPANE	8.4695	15.9249	2.3295	2.3422
I-BUTANE	0.7962	1.9733	0.2603	0.2617
N-BUTANE	2.5766	6.3858	0.8109	0.8153
I-PENTANE	0.4916	1.5086	0.1772	0.1782
N-PENTANE	0.5737	1.7650	0.2072	0.2084
HEXANES PLUS	0.5631	2.2279	0.2201	0.2210
TOTALS	100.00000	100.00000	7.3578	7.3977

BTEX COMPONENTS	MOLE%	WT%
BENZENE	0.0179	0.0596
TOLUENE	0.0121	0.0475
ETHYLBENZENE	0.0017	0.0077
XYLENES	0.0033	0.0150
TOTAL BTEX	0.0350	0.1298

	BTU @	14.650	14.730
LOW	NET DRY REAL :	1207.7 **/scf**	1214.3 **/scf**
	NET WET REAL :	1186.6 **/scf**	1193.2 **/scf**
HIGH	GROSS DRY REAL :	1328.5 **/scf**	1335.8 **/scf**
	GROSS WET REAL :	1305.3 **/scf**	1312.6 **/scf**
	NET DRY REAL :	19566.2 **/lb**	19673.0 **/lb**
	GROSS DRY REAL :	21520.0 **/lb**	21637.5 **/lb**
	RELATIVE DENSITY (AIR=1):		0.8087
	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

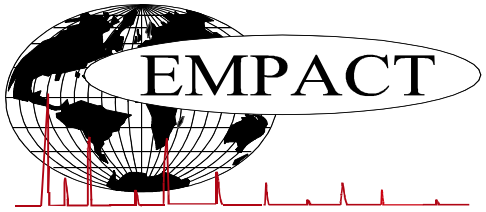
303-637-0150

EXTENDED NATURAL GAS ANALYSIS (*DHA)

GLYCALC INFORMATION

PROJECT NO. :	201410118	ANALYSIS NO. :	14
COMPANY NAME :	CARRIZO OIL & GAS	ANALYSIS DATE:	OCTOBER 27, 2014
ACCOUNT NO. :		SAMPLE DATE :	OCTOBER 20, 2014
PRODUCER :		CYLINDER NO. :	1399
LEASE NO. :		SAMPLED BY :	JOHN MOSER - EMPACT
NAME/DESCRIP :	SALES GAS 17:30 HEMBERGER 1-25-8-60		
FIELD DATA		SAMPLE TEMP. :	93
SAMPLE PRES. :	124	AMBIENT TEMP.:	
VAPOR PRES. :		GRAVITY :	
COMMENTS :	SPOT; PROBE; LENGTH OF H2S STAIN 3.0 PPM (1-7PPM) 17:35		

Componet	Mole %	Wt %
Helium	0.01	0.00
Hydrogen	0.00	0.00
Carbon Dioxide	2.58	4.84
Nitrogen	0.87	1.04
Methane	70.50390	48.22650
Ethane	12.5554	16.0980
Propane	8.4695	15.9249
Isobutane	0.7962	1.9733
n-Butane	2.5766	6.3858
Isopentane	0.4481	1.3785
n-Pentane	0.5737	1.7650
Cyclopentane	0.0435	0.1301
n-Hexane	0.1181	0.4340
Cyclohexane	0.0286	0.1026
Other Hexanes	0.2016	0.7355
Heptanes	0.0970	0.4117
Methycyclohexane	0.0220	0.0921
2,2,4 Trimethylpentane	0.0002	0.0010
Benzene	0.0179	0.0596
Toluene	0.0121	0.0475
Ethylbenzene	0.0017	0.0077
Xylenes	0.0033	0.0150
C8+ Heavies	0.0606	0.3212
Subtotal	99.99000	99.99000
Oxygen/Argon	0.01	0.01
Total	100.00000	100.00000



EXTENDED NATURAL GAS ANALYSIS (*DHA)

DHA COMPONENT LIST

PROJECT NO. :	201410118	ANALYSIS NO. :	14
COMPANY NAME :	CARRIZO OIL & GAS	ANALYSIS DATE:	OCTOBER 27, 2014
ACCOUNT NO. :		SAMPLE DATE :	OCTOBER 20, 2014
PRODUCER :		CYLINDER NO. :	1399
LEASE NO. :		SAMPLED BY :	JOHN MOSER - EMPACT
NAME/DESCRIP :	SALES GAS 17:30 HEMBERGER 1-25-8-60		
FIELD DATA		SAMPLE TEMP. :	93
SAMPLE PRES. :	124	AMBIENT TEMP.:	
VAPOR PRES. :		GRAVITY :	
COMMENTS :	SPOT; PROBE; LENGTH OF H2S STAIN 3.0 PPM (1-7PPM) 17:35		

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	---	0.87	1.04	---	---
Carbon Dioxide	---	2.58	4.84	---	---
Methane	P1	70.50390	48.22650	---	---
Ethane	P2	12.5554	16.0980	3.353	3.371
Propane	P3	8.4695	15.9249	2.330	2.342
i-Butane	I4	0.7962	1.9733	0.260	0.262
n-Butane	P4	2.5766	6.3858	0.811	0.815
2,2-Dimethylpropane	I5	0.0020	0.0061	0.001	0.001
i-Pentane	I5	0.4461	1.3724	0.163	0.164
n-Pentane	P5	0.5737	1.7650	0.207	0.208
2,2-Dimethylbutane	I6	0.0012	0.0044	0.000	0.000
Cyclopentane	N5	0.0435	0.1301	0.013	0.013
2,3-Dimethylbutane	I6	0.0079	0.0290	0.003	0.003
2-Methylpentane	I6	0.0866	0.3182	0.036	0.036
3-Methylpentane	I6	0.0440	0.1617	0.018	0.018
n-Hexane	P6	0.1181	0.4340	0.048	0.048
2,2-Dimethylpentane	I7	0.0002	0.0009	0.000	0.000
Methylcyclopentane	N6	0.0618	0.2218	0.022	0.022
2,4-Dimethylpentane	I7	0.0028	0.0120	0.001	0.001
2,2,3-Trimethylbutane	I7	0.0001	0.0004	0.000	0.000
Benzene	A6	0.0179	0.0596	0.005	0.005
Cyclohexane	N6	0.0286	0.1026	0.010	0.010
2-Methylhexane	I7	0.0107	0.0457	0.005	0.005
2,3-Dimethylpentane	I7	0.0057	0.0244	0.003	0.003
1,1-Dimethylcyclopentane	N7	0.0036	0.0151	0.001	0.001
3-Methylhexane	I7	0.0140	0.0598	0.006	0.006
1c,3-Dimethylcyclopentane	N7	0.0065	0.0272	0.003	0.003
1t,3-Dimethylcyclopentane	N7	0.0054	0.0226	0.002	0.002
3-Ethylpentane	I7	0.0005	0.0021	0.000	0.000
1t,2-Dimethylcyclopentane	N7	0.0137	0.0574	0.006	0.006
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	0.0293	0.1252	0.013	0.013
1c,2-Dimethylcyclopentane	N7	0.0009	0.0038	0.000	0.000
Methylcyclohexane	N7	0.0220	0.0921	0.009	0.009
2,2-Dimethylhexane	I8	0.0015	0.0073	0.001	0.001
Ethylcyclopentane	N7	0.0034	0.0142	0.001	0.001
2,5-Dimethylhexane	I8	0.0003	0.0015	0.000	0.000

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2,2,3-Trimethylpentane	I8	0.0003	0.0015	0.000	0.000
2,4-Dimethylhexane	I8	0.0011	0.0054	0.001	0.001
1c,2t,4-Trimethylcyclopentane	N8	0.0018	0.0086	0.001	0.001
3,3-Dimethylhexane	I8	0.0001	0.0005	0.000	0.000
1t,2c,4-Trimethylcyclopentane	N8	0.0019	0.0091	0.001	0.001
2,3,4-Trimethylpentane	I8	0.0004	0.0020	0.000	0.000
2,3,3-Trimethylpentane	I8	0.0001	0.0005	0.000	0.000
Toluene	A7	0.0121	0.0475	0.004	0.004
2,3-Dimethylhexane	I8	0.0007	0.0034	0.000	0.000
2-Methyl-3-ethylpentane	I8	0.0005	0.0024	0.000	0.000
1,1,2-Trimethylcyclopentane	N8	0.0001	0.0005	0.000	0.000
2-Methylheptane	I8	0.0046	0.0224	0.002	0.002
4-Methylheptane	I8	0.0013	0.0064	0.001	0.001
3-Methyl-3-ethylpentane	I8	0.0003	0.0015	0.000	0.000
3,4-Dimethylhexane	I8	0.0001	0.0005	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	0.0013	0.0064	0.001	0.001
1c,2t,3-Trimethylcyclopentane	N8	0.0033	0.0158	0.002	0.002
3-Ethylhexane	I8	0.0007	0.0034	0.000	0.000
1t,4-Dimethylcyclohexane	N8	0.0010	0.0048	0.001	0.001
1,1-Dimethylcyclohexane	N8	0.0004	0.0019	0.000	0.000
3t-Ethylmethylcyclopentane	N8	0.0007	0.0034	0.000	0.000
2t-Ethylmethylcyclopentane	N8	0.0006	0.0029	0.000	0.000
1,1-Methylethylcyclopentane	N8	0.0018	0.0086	0.001	0.001
2,2,4-Trimethylhexane	I9	0.0001	0.0006	0.000	0.000
1t,2-Dimethylcyclohexane	N8	0.0015	0.0072	0.001	0.001
UnknownC7s	U7	0.0002	0.0009	0.000	0.000
n-Octane	P8	0.0044	0.0215	0.002	0.002
1c,4-Dimethylcyclohexane	N8	0.0035	0.0168	0.002	0.002
i-Propylcyclopentane	I8	0.0001	0.0005	0.000	0.000
2,3,5-Trimethylhexane	I9	0.0001	0.0006	0.000	0.000
2,2,3,4-Tetramethylpentane	I9	0.0002	0.0011	0.000	0.000
1c,2-Dimethylcyclohexane	N8	0.0003	0.0015	0.000	0.000
1,1,4-Trimethylcyclohexane	N9	0.0016	0.0086	0.001	0.001
2,2,3-Trimethylhexane	I9	0.0006	0.0033	0.000	0.000
2,4-Dimethylheptane	I9	0.0003	0.0016	0.000	0.000
4,4-Dimethylheptane	I9	0.0001	0.0006	0.000	0.000
Ethylcyclohexane	N8	0.0009	0.0043	0.000	0.000
n-Propylcyclopentane	N8	0.0003	0.0015	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	0.0001	0.0006	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	0.0017	0.0077	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	0.0016	0.0073	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-Ethylheptane	I9	0.0001	0.0006	0.000	0.000
4-Methyloctane	I9	0.0005	0.0027	0.000	0.000
2-Methyloctane	I9	0.0005	0.0027	0.000	0.000
1c,2t,3-Trimethylcyclohexane	N9	0.0002	0.0011	0.000	0.000
3-Ethylheptane	I9	0.0001	0.0006	0.000	0.000
3-Methyloctane	I9	0.0006	0.0033	0.000	0.000
1,2-Dimethylbenzene (o-Xylene)	A8	0.0011	0.0050	0.000	0.000
i-Butylcyclopentane	N9	0.0003	0.0016	0.000	0.000
UnknownC8s	U8	0.0002	0.0010	0.000	0.000
n-Nonane	P9	0.0019	0.0104	0.001	0.001
1,1-Methylethylcyclohexane	N9	0.0007	0.0038	0.000	0.000

i-Propylbenzene	A9	0.0004	0.0021	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
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	0.0004	0.0021	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
t-Butylbenzene	A10	0.0003	0.0017	0.000	0.000
i-Butylcyclohexane	N10	0.0002	0.0012	0.000	0.000
i-Butylbenzene	A10	0.0001	0.0006	0.000	0.000
UnknownC9s	U9	0.0023	0.0126	0.001	0.001
n-Decane	P10	0.0009	0.0055	0.001	0.001
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
1,4-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
1,3-Methyl-n-propylbenzene	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
1,3-Dimethyl-2-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	0.0020	0.0122	0.001	0.001
n-Undecane	P11	0.0004	0.0027	0.000	0.000
UnknownC11s	U11	0.0006	0.0040	0.000	0.000
n-Dodecane	P12	0.0002	0.0015	0.000	0.000
UnknownC12s	U12	0.0002	0.0013	0.000	0.000
n-Tridecane	P13	0.0003	0.0024	0.000	0.000
UnknownC13s	U13	0.0001	0.0008	0.000	0.000
n-Tetradecane	P14	0.0004	0.0034	0.000	0.000
UnknownC14s	U14	0.0002	0.0017	0.000	0.000
n-Pentadecane	P15	0.0004	0.0036	0.000	0.000
UnknownC15s	U15	0.0003	0.0027	0.000	0.000
n-Hexadecane	P16	0.0002	0.0019	0.000	0.000
UnknownC16s	U16	0.0002	0.0019	0.000	0.000
n-Heptadecane	P17	0.0001	0.0010	0.000	0.000
TOTAL		100.00000	100.00000	7.3578	7.3977

BTEX COMPONENTS	**MOLE%**	**WT%**
BENZENE	0.0179	0.0596
TOLUENE	0.0121	0.0475
ETHYLBENZENE	0.0017	0.0077
XYLENES	0.0033	0.0150
TOTAL BTEX	0.0350	0.1298

	BTU @	14.650	14.730
LOW	NET DRY REAL :	1207.7 **/scf**	1214.3 **/scf**
	NET WET REAL :	1186.6 **/scf**	1193.2 **/scf**
HIGH	GROSS DRY REAL :	1328.5 **/scf**	1335.8 **/scf**
	GROSS WET REAL :	1305.3 **/scf**	1312.6 **/scf**
	NET DRY REAL :	19566.2 **/lb**	19673.0 **/lb**
	GROSS DRY REAL :	21520.0 **/lb**	21637.5 **/lb**

RELATIVE DENSITY (AIR=1): 0.8087

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.

CRUDE OIL ASSAY

PROJECT NO. :	201410118	ANALYSIS NO. :	15
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 17:55 HEMBERGER 1-25-8-60		EMPACT
FIELD DATA		SAMPLE TEMP. :	92
SAMPLE PRES. :		AMBIENT TEMP.:	
VAPOR PRES. :		GRAVITY :	
COMMENTS :	SPOT		

SPECIFICATION		TEST METHOD	UNITS	RESULTS
API GRAVITY			API 60/60	36
RVP @100 DEG F		D323	PSIG	7.7
TOTAL SULFUR		D2622	WT %	0.336
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