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. :	10
COMPANY NAME :	CARRIZO OIL & GAS	ANALYSIS DATE:	OCTOBER 21, 2014
ACCOUNT NO. :		SAMPLE DATE :	OCTOBER 20, 2014
PRODUCER :		CYLINDER NO. :	10411
LEASE NO. :		SAMPLED BY :	JOHN MOSER
NAME/DESCRIP :	OIL TREATER 17:00 HEMBERGER 3-25-8-60		EMPACT
FIELD DATA		SAMPLE TEMP. :	169
SAMPLE PRES. :	28	AMBIENT TEMP.:	
VAPOR PRES. :		GRAVITY :	
COMMENTS :	SPOT; NO PROBE		

COMPONENT	MOLE %	MASS %	VOL %
NITROGEN (AIR)	0.0160	0.0040	0.0037
CARBON DIOXIDE	0.0220	0.0087	0.0079
METHANE	0.0440	0.0064	0.0159
ETHANE	0.4220	0.1144	0.2385
PROPANE	1.8340	0.7293	1.0684
I-BUTANE	0.4790	0.2510	0.3312
N-BUTANE	2.4340	1.2757	1.6224
I-PENTANE	1.0545	0.6861	0.8160
N-PENTANE	1.7860	1.1620	1.3674
HEXANES PLUS	91.9085	95.7624	94.5286
TOTALS	100.0000	100.0000	100.0000

BTEX COMPONENTS	**MOLE%**	**MASS%**
BENZENE	1.4569	1.0262
TOLUENE	2.8876	2.3993
ETHYLBENZENE	0.4084	0.3910
XYLENE	2.0858	1.9969
TOTAL BTEX	6.8387	5.8134

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

	TOTAL SAMPLE	**C6+ FRACTION**	
Specific Gravity (H2O=1) =	0.7431	0.7529	60/60
API Gravity =	58.92	56.44	60/60
Molecular Weight =	110.89	116.306	
Absolute Density =	6.2	6.27	LBS/GAL
Heating Value Liq. Idl Gas=	125877	127437	BTU/GAL
Vapor/Liquid =	21.30	20.61	CUFT/GAL
Vapor Pressure =	12.81	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. :	10
COMPANY NAME :	CARRIZO OIL & GAS	ANALYSIS DATE:	OCTOBER 21, 2014
ACCOUNT NO. :		SAMPLE DATE :	OCTOBER 20, 2014
PRODUCER :		CYLINDER NO. :	10411
LEASE NO. :		SAMPLED BY :	JOHN MOSER
NAME/DESCRIP :	OIL TREATER 17:00		EMPACT
	HEMBERGER 3-25-8-60		
FIELD DATA		SAMPLE TEMP. :	169
SAMPLE PRES. :	28	AMBIENT TEMP.:	
VAPOR PRES. :		GRAVITY :	
COMMENTS :	SPOT; NO PROBE		

COMPONENT	Mole %		Wt %		LV %	
CARBON DIOXIDE	0.0220		0.0087		0.0079	
NITROGEN (AIR)	0.0160		0.0040		0.0037	
METHANE	0.0440		0.0064		0.0159	
ETHANE	0.4220		0.1144		0.2385	
PROPANE	1.8340		0.7293		1.0684	
I-BUTANE	0.4790		0.2510		0.3312	
N-BUTANE	2.4340		1.2757		1.6224	
I-PENTANE	1.0545		0.6861		0.8160	
N-PENTANE	1.7860		1.1620		1.3674	
CYCLOPENTANE (N-C5)	1.5244		0.9640		0.9418	
N-HEXANE	7.0635		5.4897		6.1427	
CYCLOHEXANE (OTHER C6)	2.8328		2.1499		2.0381	
OTHER HEXANES	10.7816		8.2966		8.8395	
OTHER HEPTANES	13.2397		11.8836		12.4287	
METHYLCYCLOHEXANE (OTHER C7)	4.1192		3.6473		3.4967	
2,2,4 TRIMETHYLPENTANE	0.7647		0.6771		0.6674	
BENZENE	1.4569		1.0262		0.8633	
TOLUENE	2.8876		2.3993		2.0383	
ETHYLBENZENE	0.4084		0.3910		0.3321	
XYLENES	2.0858		1.9969		1.6969	
OTHER OCTANES	10.5237		10.8621		10.9543	
OCTANES PLUS	----	48.0028	----	59.9058	----	57.7395
NONANES	11.1525		12.7139		12.3601	
DECANES PLUS	23.0677		33.2648		31.7287	
SUB TOTAL	100.0000		100.0000		100.0000	
TOTAL	100.0000		100.0000		100.0000	

API Gravity =	**58.92**	60/60
Vapor Pressure =	**12.81**	PSIA & 100 F
Average Molecular Weight of Decanes plus =	**159.91**	
Average Specific Gravity of Decanes plus =	**0.7770**	

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BY CARBON NUMBER

PROJECT NO. :	201410118	ANALYSIS NO. :	10
COMPANY NAME :	CARRIZO OIL & GAS	ANALYSIS DATE:	OCTOBER 21, 2014
ACCOUNT NO. :		SAMPLE DATE :	OCTOBER 20, 2014
PRODUCER :		CYLINDER NO. :	10411
LEASE NO. :		SAMPLED BY :	JOHN MOSER
NAME/DESCRIP :	OIL TREATER 17:00		EMPACT
	HEMBERGER 3-25-8-60		
FIELD DATA		SAMPLE TEMP. :	169
SAMPLE PRES. :	28	AMBIENT TEMP.:	
VAPOR PRES. :		GRAVITY :	
COMMENTS :	SPOT; NO PROBE		

COMPONENT / CARBON NUMBER	MOLE%	MASS %	VOLUME %
NITROGEN	0.0160	0.0040	0.0037
CARBON DIOXIDE	0.0220	0.0087	0.0079
C1	0.0440	0.0064	0.0159
C2	0.4220	0.1144	0.2385
C3	1.8340	0.7293	1.0684
C4	2.9130	1.5267	1.9536
C5	4.3649	2.8121	3.1252
C6	22.1348	16.9624	17.8836
C7	20.2465	17.9302	17.9637
C8	13.7826	13.9271	13.6507
C9	11.1525	12.7139	12.3601
C10	8.9868	11.1006	10.5846
C11	4.8963	6.5511	6.1058
C12	2.8468	4.1399	3.9735
C13	2.2127	3.5803	3.4561
C14	1.7194	3.0760	2.9931
C15	1.5580	2.9844	2.8706
C16	0.4144	0.8462	0.8086
C17	0.1784	0.3869	0.3686
C18	0.1749	0.4014	0.3813
C19	0.0591	0.1432	0.1352
C20	0.0122	0.0311	0.0292
C21	0.0058	0.0155	0.0145
C22	0.0019	0.0053	0.0049
C23	0.0010	0.0029	0.0027
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. :	10
COMPANY NAME :	CARRIZO OIL & GAS	ANALYSIS DATE:	OCTOBER 21, 2014
ACCOUNT NO. :		SAMPLE DATE :	OCTOBER 20, 2014
PRODUCER :		CYLINDER NO. :	10411
LEASE NO. :		SAMPLED BY :	JOHN MOSER
NAME/DESCRIP :	OIL TREATER 17:00		EMPACT
	HEMBERGER 3-25-8-60		
FIELD DATA		SAMPLE TEMP. :	169
SAMPLE PRES. :	28	AMBIENT TEMP.:	
VAPOR PRES. :		GRAVITY :	
COMMENTS :	SPOT; NO PROBE		

COMPONENT	PIANO #	MOLE %	MASS %	VOL %
Nitrogen	NHC	0.0160	0.0040	0.0037
Carbon Dioxide	NHC	0.0220	0.0087	0.0079
Methane	P1	0.0440	0.0064	0.0159
Ethane	P2	0.4220	0.1144	0.2385
Propane	P3	1.8340	0.7293	1.0684
i-Butane	I4	0.4790	0.2510	0.3312
n-Butane	P4	2.4340	1.2757	1.6224
2,2-Dimethylpropane	I5	0.0085	0.0055	0.0068
i-Pentane	I5	1.0460	0.6806	0.8092
n-Pentane	P5	1.7860	1.1620	1.3674
2,2-Dimethylbutane	I6	0.0380	0.0295	0.0335
Cyclopentane	N5	1.5244	0.9640	0.9418
2,3-Dimethylbutane	I6	0.3696	0.2872	0.3198
2-Methylpentane	I6	3.7226	2.8930	3.2667
3-Methylpentane	I6	2.1390	1.6623	1.8457
n-Hexane	P6	7.0635	5.4897	6.1427
2,2-Dimethylpentane	I7	0.0190	0.0172	0.0187
Methylcyclopentane	N6	4.5105	3.4231	3.3721
2,4-Dimethylpentane	I7	0.2262	0.2044	0.2245
2,2,3-Trimethylbutane	I7	0.0128	0.0116	0.0124
Benzene	A6	1.4569	1.0262	0.8633
3,3-Dimethylpentane	I7	0.0184	0.0166	0.0177
Cyclohexane	N6	2.8328	2.1499	2.0381
2-Methylhexane	I7	1.2409	1.1212	1.2204
2,3-Dimethylpentane	I7	0.6520	0.5891	0.6229
1,1-Dimethylcyclopentane	N7	0.3080	0.2727	0.2668
3-Methylhexane	I7	1.7134	1.5482	1.6598
1c,3-Dimethylcyclopentane	N7	0.8363	0.7405	0.7338
1t,3-Dimethylcyclopentane	N7	0.7647	0.6771	0.6674
3-Ethylpentane	I7	0.1404	0.1269	0.1338
1t,2-Dimethylcyclopentane	N7	1.6912	1.4975	1.4710
2,2,4-Trimethylpentane	I8	0.0222	0.0229	0.0243
UnknownC6s	U6	0.0019	0.0015	0.0017
n-Heptane	P7	4.7226	4.2672	4.6051
1c,2-Dimethylcyclopentane	N7	0.1479	0.1310	0.1252
Methylcyclohexane	N7	4.1192	3.6473	3.4967
2,2-Dimethylhexane	I8	0.3090	0.3183	0.3377
Ethylcyclopentane	N7	0.6390	0.5658	0.5450
2,5-Dimethylhexane	I8	0.1115	0.1149	0.1222
2,2,3-Trimethylpentane	I8	0.0391	0.0403	0.0416
2,4-Dimethylhexane	I8	0.1988	0.2048	0.2168
1c,2t,4-Trimethylcyclopentane	N8	0.3663	0.3707	0.3585

3,3-Dimethylhexane	I8	0.0417	0.0430	0.0447
2,3,4-Trimethylpentane	I8	0.1072	0.1104	0.1133
2,3,3-Trimethylpentane	I8	0.0010	0.0010	0.0010
Toluene	A7	2.8876	2.3993	2.0383
2,3-Dimethylhexane	I8	0.2157	0.2222	0.2304
2-Methyl-3-ethylpentane	I8	0.1317	0.1357	0.1392
1,1,2-Trimethylcyclopentane	N8	0.0245	0.0248	0.0237
2-Methylheptane	I8	1.3117	1.3512	1.4264
4-Methylheptane	I8	0.3930	0.4048	0.4170
3-Methyl-3-ethylpentane	I8	0.0763	0.0786	0.0798
3,4-Dimethylhexane	I8	0.0600	0.0618	0.0634
1c,2c,4-Trimethylcyclopentane	N8	0.0311	0.0315	0.0302
1c,3-Dimethylcyclohexane	N8	0.0176	0.0178	0.0172
3-Methylheptane	I8	0.5901	0.6079	0.6362
1c,2t,3-Trimethylcyclopentane	N8	0.9206	0.9315	0.8928
3-Ethylhexane	I8	0.1329	0.1369	0.1418
1t,4-Dimethylcyclohexane	N8	0.3697	0.3741	0.3622
1,1-Dimethylcyclohexane	N8	0.1142	0.1156	0.1093
3c-Ethylmethylcyclopentane	N8	0.0034	0.0034	0.0033
3t-Ethylmethylcyclopentane	N8	0.2173	0.2199	0.2118
2t-Ethylmethylcyclopentane	N8	0.1855	0.1877	0.1803
1,1-Methylethylcyclopentane	N8	0.6341	0.6416	0.6068
2,2,4-Trimethylhexane	I9	0.0435	0.0503	0.0519
1t,2-Dimethylcyclohexane	N8	0.5500	0.5565	0.5298
1c,2c,3-Trimethylcyclopentane	N8	0.0010	0.0010	0.0009
1t,3-Dimethylcyclohexane	N8	0.0041	0.0041	0.0039
UnknownC7s	U7	0.1069	0.0966	0.1042
n-Octane	P8	2.6125	2.6911	2.8273
1c,4-Dimethylcyclohexane	N8	0.4937	0.4996	0.4713
i-Propylcyclopentane	I8	0.0565	0.0572	0.0544
2,4,4-Trimethylhexane	I9	0.0201	0.0232	0.0237
2,2,3,4-Tetramethylpentane	I9	0.0189	0.0219	0.0225
2,3,4-Trimethylhexane	I9	0.0174	0.0201	0.0206
1c,2-Dimethylcyclohexane	N8	0.1920	0.1943	0.1803
2,3,5-Trimethylhexane	I9	0.0908	0.1050	0.1074
2,2-Dimethylheptane	I9	0.0111	0.0128	0.0133
1,1,4-Trimethylcyclohexane	N9	0.9811	1.1169	1.0687
2,2,3-Trimethylhexane	I9	0.3957	0.4577	0.4634
2,4-Dimethylheptane	I9	0.0507	0.0586	0.0605
4,4-Dimethylheptane	I9	0.0399	0.0461	0.0476
Ethylcyclohexane	N8	0.5045	0.5105	0.4787
n-Propylcyclopentane	N8	0.2087	0.2112	0.2008
1c,3c,5-Trimethylcyclohexane	N9	0.0377	0.0429	0.0410
2,5-Dimethylheptane	I9	0.0753	0.0871	0.0897
3,3-Dimethylheptane	I9	0.0857	0.0991	0.1021
3,5-Dimethylheptane	I9	0.0556	0.0643	0.0662
2,6-Dimethylheptane	I9	0.0604	0.0699	0.0728
1,1,3-Trimethylcyclohexane	N9	0.1556	0.1771	0.1695
Ethylbenzene	A8	0.4084	0.3910	0.3321
1c,2t,4t-Trimethylcyclohexane	N9	0.4213	0.4796	0.4501
2,3-Dimethylheptane	I9	0.4539	0.5250	0.5340
1,3-Dimethylbenzene (m-Xylene)	A8	1.0520	1.0072	0.8605
1,4-Dimethylbenzene (p-Xylene)	A8	0.3352	0.3209	0.2750
3,4-Dimethylheptane	I9	0.0513	0.0593	0.0599
3,4-Dimethylheptane (2)	I9	0.1378	0.1594	0.1609
4-Ethylheptane	I9	0.0402	0.0465	0.0480
4-Methyloctane	I9	0.2886	0.3338	0.3420
2-Methyloctane	I9	0.3220	0.3724	0.3854
1c,2t,4c-Trimethylcyclohexane	I9	0.0332	0.0384	0.0391
3-Ethylheptane	I9	0.0630	0.0729	0.0741
3-Methyloctane	I9	0.4619	0.5342	0.5473
3,3-Diethylpentane	I9	0.0346	0.0400	0.0392
1c,2t,3-Trimethylcyclohexane	N9	0.0783	0.0891	0.0836
1,1,2-Trimethylcyclohexane	N9	0.0247	0.0281	0.0264
1,2-Dimethylbenzene (o-Xylene)	A8	0.6986	0.6688	0.5614
i-Butylcyclopentane	N9	0.2416	0.2750	0.2601
UnknownC8s	U8	0.0392	0.0404	0.0424
n-Nonane	P9	1.7923	2.0730	2.1331
1,1-Methylethylcyclohexane	N9	0.3407	0.3941	0.4067
i-Propylbenzene	A9	0.3827	0.4148	0.3548
i-Propylcyclohexane	N9	0.0918	0.1045	0.0963
2,2-Dimethyloctane	I10	0.0785	0.1007	0.1006
2,4-Dimethyloctane	I10	0.0737	0.0946	0.0945
2,6-Dimethyloctane	I10	0.0103	0.0132	0.0136

2,5-Dimethyloctane	I10	0.0399	0.0512	0.0511
n-Butylcyclopentane	N9	0.2748	0.3476	0.3214
3,3-Dimethyloctane	I10	0.0941	0.1207	0.1206
n-Propylbenzene	A9	0.3949	0.4280	0.3661
3,6-Dimethyloctane	I10	0.2534	0.3251	0.3247
3-Methyl-5-ethylheptane	I10	0.3405	0.3938	0.4007
1,3-Methylethylbenzene	A9	0.3830	0.4151	0.3521
1,4-Methylethylbenzene	A9	0.2617	0.2837	0.2407
1,3,5-Trimethylbenzene	A9	0.1387	0.1503	0.1284
2,3-Dimethyloctane	I10	0.0782	0.1003	0.1002
5-Methylnonane	I10	0.2275	0.2919	0.2943
1,2-Methylethylbenzene	A9	0.5816	0.6304	0.5319
2-Methylnonane	I10	0.0417	0.0535	0.0544
3-Ethyloctane	I10	0.0567	0.0728	0.0727
3-Methylnonane	I10	0.2377	0.3050	0.3072
1,2,4-Trimethylbenzene	A9	0.0425	0.0461	0.0389
t-Butylbenzene	A10	0.4763	0.5765	0.4918
i-Butylcyclohexane	N10	0.2203	0.2787	0.2536
1t-Methyl-2-n-propylcyclohexane	I10	0.0877	0.1014	0.1032
i-Butylbenzene	A10	0.0392	0.0474	0.0411
sec-Butylbenzene	A10	0.0430	0.0520	0.0446
UnknownC9s	U9	1.4182	1.6403	1.6878
n-Decane	P10	1.2761	1.6373	1.6564
1,2,3-Trimethylbenzene	A9	0.2577	0.2793	0.2309
1,3-Methyl-i-propylbenzene	A10	0.1188	0.1288	0.1087
1,4-Methyl-i-propylbenzene	A10	0.1209	0.1310	0.1105
Sec-Butylcyclohexane	N10	0.3430	0.4339	0.3944
1,2-Methyl-i-propylbenzene	A10	0.1761	0.2131	0.1797
3-Ethylnonane	I10	0.0387	0.0497	0.0505
1,3-Diethylbenzene	A10	0.1615	0.1955	0.1672
1,3-Methyl-n-propylbenzene	A10	0.0560	0.0678	0.0582
1,4-Diethylbenzene	A10	0.1437	0.1739	0.1491
1,4-Methyl-n-propylbenzene	A10	0.1597	0.1933	0.1664
n-Butylbenzene	A10	0.0610	0.0738	0.0633
1,3-Dimethyl-5-ethylbenzene	A10	0.0525	0.0635	0.0543
1,2-Diethylbenzene	A10	0.1181	0.1429	0.1201
1,2-Methyl-n-propylbenzene	A10	0.1103	0.1335	0.1129
1,4-Dimethyl-2-ethylbenzene	A10	0.1474	0.1784	0.1503
1,3-Dimethyl-4-ethylbenzene	A10	0.0050	0.0061	0.0051
1,2-Dimethyl-4-ethylbenzene	A10	0.2067	0.2502	0.2115
1,3-Dimethyl-2-ethylbenzene	A10	0.1276	0.1544	0.1282
1t,2c,4-Trimethylcyclopentane	A10	0.4606	0.4661	0.4605
1,2-Dimethyl-3-ethylbenzene	A10	0.0820	0.0992	0.0822
1,2-Ethyl-i-propylbenzene	A10	0.0552	0.0668	0.0563
1,4-Methyl-t-butylbenzene	A11	0.1982	0.2399	0.2022
UnknownC10s	U10	2.2162	2.8435	2.8766
n-Undecane	P11	1.0530	1.4843	1.4808
1,4-Ethyl-i-propylbenzene	A11	0.0647	0.0783	0.0660
1,2,4,5-Tetramethylbenzene	A11	0.1207	0.1461	0.1219
1,2-Methyl-n-butylbenzene	A11	0.0734	0.0888	0.0749
1,2,3,5-Tetramethylbenzene	A11	0.1159	0.1403	0.1165
1,2-Methyl-t-butylbenzene	A11	0.0978	0.1184	0.0998
5-Methylindan	A11	0.0213	0.0327	0.0323
4-Methylindan	A11	0.0079	0.0121	0.0119
1,2-Ethyl-n-propylbenzene	A11	0.1562	0.1891	0.1594
2-Methylindan	A11	0.0876	0.1346	0.1328
1,3-Methyl-n-butylbenzene	A11	0.0822	0.0995	0.0839
1,3-Di-i-propylbenzene	A11	0.0800	0.0968	0.0816
sec-Pentylbenzene	A11	0.0838	0.1014	0.0855
n-Pentylbenzene	A11	0.0780	0.1043	0.0898
1t-M-2-(4MP)cyclopentane	P12	0.0912	0.1401	0.1383
1,2-Di-n-propylbenzene	A11	0.1141	0.1381	0.1164
1,4-Di-i-propylbenzene	A11	0.1827	0.2211	0.1864
Tetrahydronaphthalene	A10	0.0930	0.1126	0.0949
t-Decahydronaphthalene	A10	0.1521	0.1841	0.1552
Naphthalene	A10	0.1059	0.1224	0.1032
1-t-Butyl-3,5-dimethylbenzene	A12	0.0636	0.0770	0.0649
1,4-Ethyl-t-butylbenzene	A11	0.1173	0.1420	0.1197
UnknownC11s	U11	1.6628	2.3438	2.3383
n-Dodecane	P12	0.8765	1.3464	1.3285
1,3-Di-n-propylbenzene	A12	0.0787	0.0953	0.0803
1,3,5-Triethylbenzene	A12	0.0436	0.0473	0.0404
1,2,4-Triethylbenzene	A12	0.3094	0.3353	0.2828
1,4-Methyl-n-pentylbenzene	A12	0.0559	0.0677	0.0571

n-Hexylbenzene	A12	0.1228	0.1797	0.1548
1,2,3,4,5-Pentamethylbenzene	A13	0.2176	0.2634	0.2221
2-Methylnaphthalene	A11	0.2790	0.3578	0.3016
1-Methylnaphthalene	A11	0.2197	0.2817	0.2041
UnknownC12s	U12	1.2051	1.8511	1.8264
n-Tridecane	P13	0.7390	1.2286	1.1979
UnknownC13s	U13	1.2561	2.0883	2.0361
n-Tetradecane	P14	0.5148	0.9210	0.8962
UnknownC14s	U14	1.2046	2.1550	2.0969
n-Pentadecane	P15	0.3385	0.6484	0.6237
UnknownC15s	U15	1.2195	2.3360	2.2469
n-Hexadecane	P16	0.0840	0.1715	0.1639
UnknownC16s	U16	0.3304	0.6747	0.6447
n-Heptadecane	P17	0.0670	0.1453	0.1384
UnknownC17s	U17	0.1114	0.2416	0.2302
n-Octadecane	P18	0.0755	0.1733	0.1646
UnknownC18s	U18	0.0994	0.2281	0.2167
n-Nonadecane	P19	0.0139	0.0337	0.0318
UnknownC19s	U19	0.0452	0.1095	0.1034
n-Eicosane	P20	0.0105	0.0268	0.0252
UnknownC20s	U20	0.0017	0.0043	0.0040
n-Heneicosane	P21	0.0058	0.0155	0.0145
n-Docosane	P22	0.0019	0.0053	0.0049
n-Tricosane	P23	0.0010	0.0029	0.0027
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. :	11
COMPANY NAME :	CARRIZO OIL & GAS	ANALYSIS DATE:	OCTOBER 27, 2014
ACCOUNT NO. :		SAMPLE DATE :	OCTOBER 20, 2014
PRODUCER :		CYLINDER NO. :	0720
LEASE NO. :		SAMPLED BY :	JOHN MOSER - EMPACT
NAME/DESCRIP :	SALES GAS 17:10 HEMBERGER 3-25-8-60		
FIELD DATA		SAMPLE TEMP. :	90
SAMPLE PRES. :	124	AMBIENT TEMP.:	
VAPOR PRES. :		GRAVITY :	
COMMENTS :	SPOT; PROBE; LENGTH OF H2S STAIN 1.0 PPM (1-7PPM) 17:15		

COMPONENT	MOLE %	MASS %	GPM @ 14.650	GPM @ 14.730
ALCOHOLS	0.0002	0.0006		
HELIUM	0.01	0.00	---	---
HYDROGEN	0.00	0.00	---	---
OXYGEN/ARGON	0.02	0.03	---	---
NITROGEN	0.90	1.07	---	---
CARBON DIOXIDE	2.58	4.83	---	---
METHANE	70.44520	48.11220	---	---
ETHANE	12.4989	16.0005	3.3376	3.3558
PROPANE	8.4641	15.8898	2.3285	2.3412
I-BUTANE	0.8068	1.9964	0.2633	0.2647
N-BUTANE	2.6131	6.4661	0.8229	0.8274
I-PENTANE	0.4964	1.5210	0.1782	0.1792
N-PENTANE	0.5823	1.7886	0.2112	0.2124
HEXANES PLUS	0.5830	2.2948	0.2301	0.2311
TOTALS	100.00000	100.00000	7.3718	7.4118

BTEX COMPONENTS	**MOLE%**	**WT%**
BENZENE	0.0185	0.0615
TOLUENE	0.0136	0.0533
ETHYLBENZENE	0.0021	0.0095
XYLENES	0.0040	0.0181
TOTAL BTEX	0.0382	0.1424

BTU @		14.650	14.730
LOW	NET DRY REAL :	1209.4 **/scf**	1216.0 **/scf**
	NET WET REAL :	1188.3 **/scf**	1194.9 **/scf**
HIGH	GROSS DRY REAL :	1329.6 **/scf**	1336.9 **/scf**
	GROSS WET REAL :	1306.4 **/scf**	1313.7 **/scf**
	NET DRY REAL :	19555.1 **/lb**	19661.9 **/lb**
	GROSS DRY REAL :	21507.1 **/lb**	21624.5 **/lb**
	RELATIVE DENSITY (AIR=1):		0.8100
	COMPRESSIBILITY FACTOR :		0.99580

(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

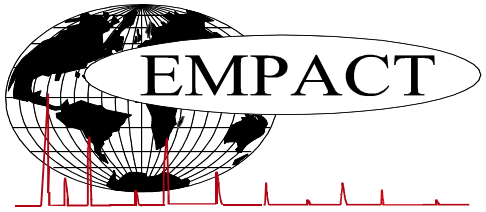
303-637-0150

EXTENDED NATURAL GAS ANALYSIS (*DHA)

GLYCALC INFORMATION

PROJECT NO. :	201410118	ANALYSIS NO. :	11
COMPANY NAME :	CARRIZO OIL & GAS	ANALYSIS DATE:	OCTOBER 27, 2014
ACCOUNT NO. :		SAMPLE DATE :	OCTOBER 20, 2014
PRODUCER :		CYLINDER NO. :	0720
LEASE NO. :		SAMPLED BY :	JOHN MOSER - EMPACT
NAME/DESCRIP :	SALES GAS 17:10 HEMBERGER 3-25-8-60		
FIELD DATA		SAMPLE TEMP. :	90
SAMPLE PRES. :	124	AMBIENT TEMP.:	
VAPOR PRES. :		GRAVITY :	
COMMENTS :	SPOT; PROBE; LENGTH OF H2S STAIN 1.0 PPM (1-7PPM) 17:15		

Componet	Mole %	Wt %
Helium	0.01	0.00
Hydrogen	0.00	0.00
Carbon Dioxide	2.58	4.83
Nitrogen	0.90	1.07
Methane	70.44520	48.11220
Ethane	12.4989	16.0005
Propane	8.4641	15.8898
Isobutane	0.8068	1.9964
n-Butane	2.6131	6.4661
Isopentane	0.4519	1.3881
n-Pentane	0.5823	1.7886
Cyclopentane	0.0445	0.1329
n-Hexane	0.1199	0.4399
Cyclohexane	0.0302	0.1082
Other Hexanes	0.2061	0.7506
Heptanes	0.1013	0.4293
Methycyclohexane	0.0239	0.0999
2,2,4 Trimethylpentane	0.0001	0.0005
Benzene	0.0185	0.0615
Toluene	0.0136	0.0533
Ethylbenzene	0.0021	0.0095
Xylenes	0.0040	0.0181
C8+ Heavies	0.0633	0.3240
Subtotal	99.97980	99.96940
Oxygen/Argon	0.02	0.03
Alcohols	0.0002	0.0006
Total	100.00000	100.00000



EXTENDED NATURAL GAS ANALYSIS (*DHA)

DHA COMPONENT LIST

PROJECT NO. :	201410118	ANALYSIS NO. :	11
COMPANY NAME :	CARRIZO OIL & GAS	ANALYSIS DATE:	OCTOBER 27, 2014
ACCOUNT NO. :		SAMPLE DATE :	OCTOBER 20, 2014
PRODUCER :		CYLINDER NO. :	0720
LEASE NO. :		SAMPLED BY :	JOHN MOSER - EMPACT
NAME/DESCRIP :	SALES GAS 17:10 HEMBERGER 3-25-8-60		
FIELD DATA		SAMPLE TEMP. :	90
SAMPLE PRES. :	124	AMBIENT TEMP.:	
VAPOR PRES. :		GRAVITY :	
COMMENTS :	SPOT; PROBE; LENGTH OF H2S STAIN 1.0 PPM (1-7PPM) 17:15		

COMPONENT	PIANO #	MOLE %	MASS %	GPM @ 14.650	GPM @ 14.730
Helium	---	0.01	0.00	---	---
Hydrogen	---	0.00	0.00	---	---
Oxygen/Argon	---	0.02	0.03	---	---
Nitrogen	---	0.90	1.07	---	---
Carbon Dioxide	---	2.58	4.83	---	---
Methane	P1	70.44520	48.11220	---	---
Ethane	P2	12.4989	16.0005	3.338	3.356
Propane	P3	8.4641	15.8898	2.329	2.341
i-Butane	I4	0.8068	1.9964	0.263	0.265
n-Butane	P4	2.6131	6.4661	0.823	0.827
2,2-Dimethylpropane	I5	0.0021	0.0065	0.001	0.001
i-Pentane	I5	0.4498	1.3816	0.164	0.165
Acetone	X3	0.0001	0.0003	0.000	0.000
n-Pentane	P5	0.5823	1.7886	0.211	0.212
t-Butanol	X4	0.0001	0.0003	0.000	0.000
2,2-Dimethylbutane	I6	0.0012	0.0044	0.000	0.000
Cyclopentane	N5	0.0445	0.1329	0.013	0.013
2,3-Dimethylbutane	I6	0.0080	0.0293	0.003	0.003
2-Methylpentane	I6	0.0879	0.3225	0.036	0.036
3-Methylpentane	I6	0.0450	0.1651	0.018	0.018
n-Hexane	P6	0.1199	0.4399	0.049	0.049
2,2-Dimethylpentane	I7	0.0002	0.0009	0.000	0.000
Methylcyclopentane	N6	0.0640	0.2293	0.023	0.023
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	0.0185	0.0615	0.005	0.005
Cyclohexane	N6	0.0302	0.1082	0.010	0.010
2-Methylhexane	I7	0.0111	0.0473	0.005	0.005
2,3-Dimethylpentane	I7	0.0059	0.0252	0.003	0.003
1,1-Dimethylcyclopentane	N7	0.0036	0.0150	0.001	0.001
3-Methylhexane	I7	0.0145	0.0619	0.007	0.007
1c,3-Dimethylcyclopentane	N7	0.0071	0.0297	0.003	0.003
1t,3-Dimethylcyclopentane	N7	0.0055	0.0230	0.003	0.003
3-Ethylpentane	I7	0.0008	0.0034	0.000	0.000
1t,2-Dimethylcyclopentane	N7	0.0146	0.0611	0.007	0.007
2,2,4-Trimethylpentane	I8	0.0001	0.0005	0.000	0.000
n-Heptane	P7	0.0305	0.1301	0.014	0.014
1c,2-Dimethylcyclopentane	N7	0.0009	0.0038	0.000	0.000
Methylcyclohexane	N7	0.0239	0.0999	0.010	0.010
2,2-Dimethylhexane	I8	0.0016	0.0078	0.001	0.001
Ethylcyclopentane	N7	0.0037	0.0155	0.001	0.001

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2,5-Dimethylhexane	I8	0.0004	0.0020	0.000	0.000
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	0.0019	0.0091	0.001	0.001
3,3-Dimethylhexane	I8	0.0002	0.0010	0.000	0.000
1t,2c,4-Trimethylcyclopentane	N8	0.0022	0.0105	0.001	0.001
2,3,4-Trimethylpentane	I8	0.0005	0.0024	0.000	0.000
2,3,3-Trimethylpentane	I8	0.0001	0.0005	0.000	0.000
Toluene	A7	0.0136	0.0533	0.005	0.005
2,3-Dimethylhexane	I8	0.0008	0.0039	0.000	0.000
2-Methyl-3-ethylpentane	I8	0.0005	0.0024	0.000	0.000
2-Methylheptane	I8	0.0050	0.0243	0.003	0.003
4-Methylheptane	I8	0.0013	0.0063	0.001	0.001
3-Methyl-3-ethylpentane	I8	0.0004	0.0020	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	0.0014	0.0068	0.001	0.001
1c,2t,3-Trimethylcyclopentane	N8	0.0036	0.0172	0.002	0.002
3-Ethylhexane	I8	0.0009	0.0044	0.000	0.000
1t,4-Dimethylcyclohexane	N8	0.0012	0.0058	0.001	0.001
1,1-Dimethylcyclohexane	N8	0.0004	0.0019	0.000	0.000
3t-Ethylmethylcyclopentane	N8	0.0008	0.0038	0.000	0.000
2t-Ethylmethylcyclopentane	N8	0.0007	0.0034	0.000	0.000
1,1-Methylethylcyclopentane	N8	0.0021	0.0101	0.001	0.001
2,2,4-Trimethylhexane	I9	0.0001	0.0006	0.000	0.000
1t,2-Dimethylcyclohexane	N8	0.0017	0.0081	0.001	0.001
n-Octane	P8	0.0053	0.0258	0.003	0.003
1c,4-Dimethylcyclohexane	N8	0.0034	0.0163	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	0.0004	0.0019	0.000	0.000
1,1,4-Trimethylcyclohexane	N9	0.0021	0.0113	0.001	0.001
2,2,3-Trimethylhexane	I9	0.0007	0.0038	0.000	0.000
2,4-Dimethylheptane	I9	0.0002	0.0011	0.000	0.000
4,4-Dimethylheptane	I9	0.0002	0.0011	0.000	0.000
Ethylcyclohexane	N8	0.0010	0.0048	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	0.0003	0.0016	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	0.0001	0.0006	0.000	0.000
1,1,3-Trimethylcyclohexane	N9	0.0001	0.0006	0.000	0.000
Ethylbenzene	I8	0.0021	0.0095	0.001	0.001
1c,2t,4t-Trimethylcyclohexane	N9	0.0003	0.0016	0.000	0.000
2,3-Dimethylheptane	I9	0.0005	0.0027	0.000	0.000
1,3-Dimethylbenzene (m-Xylene)	A8	0.0019	0.0086	0.001	0.001
1,4-Dimethylbenzene (p-Xylene)	A8	0.0008	0.0036	0.000	0.000
3,4-Dimethylheptane	I9	0.0004	0.0022	0.000	0.000
3,4-Dimethylheptane (2)	I9	0.0004	0.0022	0.000	0.000
4-Ethylheptane	I9	0.0001	0.0006	0.000	0.000
4-Methyloctane	I9	0.0006	0.0033	0.000	0.000
2-Methyloctane	I9	0.0006	0.0033	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
1c,2t,4c-Trimethylcyclohexane	I9	0.0001	0.0006	0.000	0.000
1,2-Dimethylbenzene (o-Xylene)	A8	0.0013	0.0059	0.000	0.000
i-Butylcyclopentane	N9	0.0004	0.0021	0.000	0.000
UnknownC8s	U8	0.0003	0.0015	0.000	0.000
n-Nonane	P9	0.0019	0.0104	0.001	0.001
1,1-Methylethylcyclohexane	N9	0.0009	0.0049	0.001	0.001

i-Propylbenzene	A9	0.0004	0.0020	0.000	0.000
i-Propylcyclohexane	N9	0.0001	0.0006	0.000	0.000
2,2-Dimethyloctane	I10	0.0001	0.0006	0.000	0.000
2,4-Dimethyloctane	I10	0.0001	0.0006	0.000	0.000
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	0.0004	0.0020	0.000	0.000
1,4-Methylethylbenzene	A9	0.0002	0.0010	0.000	0.000
1,3,5-Trimethylbenzene	A9	0.0001	0.0005	0.000	0.000
2,3-Dimethyloctane	I10	0.0001	0.0006	0.000	0.000
5-Methylnonane	I10	0.0002	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	0.0001	0.0006	0.000	0.000
UnknownC9s	U9	0.0025	0.0137	0.001	0.001
n-Decane	P10	0.0008	0.0049	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
1,2-Diethylbenzene	A10	0.0001	0.0006	0.000	0.000
t-Decahydronaphthalene	A9	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	0.0020	0.0121	0.001	0.001
n-Undecane	P11	0.0002	0.0013	0.000	0.000
UnknownC11s	U11	0.0003	0.0020	0.000	0.000
n-Dodecane	P12	0.0001	0.0007	0.000	0.000
UnknownC12s	U12	0.0001	0.0007	0.000	0.000
TOTAL		100.00000	100.00000	7.3718	7.4118

BTEX COMPONENTS	**MOLE%**	**WT%**
BENZENE	0.0185	0.0615
TOLUENE	0.0136	0.0533
ETHYLBENZENE	0.0021	0.0095
XYLENES	0.0040	0.0181
TOTAL BTEX	0.0382	0.1424

	BTU @	14.650	14.730
LOW	NET DRY REAL :	1209.4 **/scf**	1216.0 **/scf**
	NET WET REAL :	1188.3 **/scf**	1194.9 **/scf**
HIGH	GROSS DRY REAL :	1329.6 **/scf**	1336.9 **/scf**
	GROSS WET REAL :	1306.4 **/scf**	1313.7 **/scf**
	NET DRY REAL :	19555.1 **/lb**	19661.9 **/lb**
	GROSS DRY REAL :	21507.1 **/lb**	21624.5 **/lb**
	RELATIVE DENSITY (AIR=1):		0.8100
	COMPRESSIBILITY FACTOR :		0.99580

(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. :	12
COMPANY NAME :	CARRIZO OIL & GAS	ANALYSIS DATE:	OCTOBER 25, 2014
ACCOUNT NO. :		SAMPLE DATE :	OCTOBER 20, 2014
PRODUCER :		CYLINDER NO. :	1L GLASS JAR
LEASE NO. :		SAMPLED BY :	JOHN MOSER
NAME/DESCRIP :	PRODUCTION TANK 17:50 HEMBERGER 3-25-8-60		EMPACT
FIELD DATA		SAMPLE TEMP. :	106
SAMPLE PRES. :		AMBIENT TEMP.:	
VAPOR PRES. :		GRAVITY :	
COMMENTS :	SPOT		

SPECIFICATION		TEST METHOD	UNITS	RESULTS
API GRAVITY			API 60/60	36.2
RVP @100 DEG F		D323	PSIG	7.7
TOTAL SULFUR		D2622	WT %	N/A
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