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

303-637-0150

EXTENDED NATURAL GAS LIQUID ANALYSIS (*DHA)

MAIN PAGE

PROJECT NO. :	201406097	ANALYSIS NO. :	13
COMPANY NAME :	CARRIZO OIL & GAS	ANALYSIS DATE:	JUNE 16, 2014
ACCOUNT NO. :		SAMPLE DATE :	JUNE 13, 2014
PRODUCER :		CYLINDER NO. :	6016
LEASE NO. :		SAMPLED BY :	JOHN MOSER
NAME/DESCRIP :	OIL TREATER @ 15:30		EMPACT
	BRINGELSON RANCH 7-20-9-58		
FIELD DATA		SAMPLE TEMP. :	132
SAMPLE PRES. :	20	AMBIENT TEMP.:	
VAPOR PRES. :		GRAVITY :	
COMMENTS :	SPOT; NO PROBE		

COMPONENT	MOLE %	MASS %	VOL %
ALCOHOLS	0.0021	0.0014	0.0013
NITROGEN (AIR)	0.0260	0.0065	0.0060
CARBON DIOXIDE	0.0340	0.0133	0.0121
METHANE	0.1370	0.0196	0.0486
ETHANE	0.5350	0.1432	0.2989
PROPANE	1.9180	0.7532	1.1046
I-BUTANE	0.4760	0.2463	0.3253
N-BUTANE	2.3760	1.2296	1.5655
I-PENTANE	0.9996	0.6422	0.7646
N-PENTANE	1.6110	1.0350	1.2193
HEXANES PLUS	91.8853	95.9097	94.6538
TOTALS	100.0000	100.0000	100.0000

BTEX COMPONENTS	**MOLE%**	**MASS%**
BENZENE	0.9746	0.6778
TOLUENE	2.4810	2.0355
ETHYLBENZENE	0.7219	0.6825
XYLENE	2.2325	2.1105
TOTAL BTEX	6.4100	5.5063

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

	TOTAL SAMPLE	**C6+ FRACTION**	
Specific Gravity (H2O=1) =	0.7437	0.7543	60/60
API Gravity =	58.76	56.09	60/60
Molecular Weight =	112.31	117.829	
Absolute Density =	6.2	6.28	LBS/GAL
Heating Value Liq. Idl Gas=	125932	127664	BTU/GAL
Vapor/Liquid =	21.04	20.37	CUFT/GAL
Vapor Pressure =	18.29	1.62	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. :	201406097	ANALYSIS NO. :	13
COMPANY NAME :	CARRIZO OIL & GAS	ANALYSIS DATE:	JUNE 16, 2014
ACCOUNT NO. :		SAMPLE DATE :	JUNE 13, 2014
PRODUCER :		CYLINDER NO. :	6016
LEASE NO. :		SAMPLED BY :	JOHN MOSER
NAME/DESCRIP :	OIL TREATER @ 15:30 BRINGELSON RANCH 7-20-9-58		EMPACT
FIELD DATA		SAMPLE TEMP. :	132
SAMPLE PRES. :	20	AMBIENT TEMP.:	
VAPOR PRES. :		GRAVITY :	
COMMENTS :	SPOT; NO PROBE		

COMPONENT	Mole %		Wt %		LV %	
CARBON DIOXIDE	0.0340		0.0133		0.0121	
NITROGEN (AIR)	0.0260		0.0065		0.0060	
METHANE	0.1370		0.0196		0.0486	
ETHANE	0.5350		0.1432		0.2989	
PROPANE	1.9180		0.7532		1.1046	
I-BUTANE	0.4760		0.2463		0.3253	
N-BUTANE	2.3760		1.2296		1.5655	
I-PENTANE	0.9996		0.6422		0.7646	
N-PENTANE	1.6110		1.0350		1.2193	
CYCLOPENTANE (N-C5)	1.1666		0.7285		0.7125	
N-HEXANE	5.9499		4.5662		5.1159	
CYCLOHEXANE (OTHER C6)	2.5274		1.8940		1.7974	
OTHER HEXANES	9.5188		7.2310		7.7017	
OTHER HEPTANES	13.5172		11.9736		12.5125	
METHYLCYCLOHEXANE (OTHER C7)	4.7191		4.1259		3.9598	
2,2,4 TRIMETHYLPENTANE	0.9610		0.8402		0.8291	
BENZENE	0.9746		0.6778		0.5708	
TOLUENE	2.4810		2.0355		1.7311	
ETHYLBENZENE	0.7219		0.6825		0.5803	
XYLENES	2.2325		2.1105		1.7975	
OTHER OCTANES	11.9658		12.2021		12.3000	
OCTANES PLUS	----	51.0307	----	62.6772	----	60.5521
NONANES	10.7961		12.1701		11.8903	
DECANES PLUS	24.3534		34.6718		33.1549	
SUB TOTAL	99.9979		99.9986		99.9987	
ALCOHOLS	0.0021		0.0014		0.0013	
TOTAL	100.0000		100.0000		100.0000	

API Gravity	=	**58.76**	60/60
Vapor Pressure	=	**18.29**	PSIA & 100 F
Average Molecular Weight of Decanes plus	=	**159.89**	
Average Specific Gravity of Decanes plus	=	**0.7830**	

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BY CARBON NUMBER

PROJECT NO. :	201406097	ANALYSIS NO. :	13
COMPANY NAME :	CARRIZO OIL & GAS	ANALYSIS DATE:	JUNE 16, 2014
ACCOUNT NO. :		SAMPLE DATE :	JUNE 13, 2014
PRODUCER :		CYLINDER NO. :	6016
LEASE NO. :		SAMPLED BY :	JOHN MOSER
NAME/DESCRIP :	OIL TREATER @ 15:30		EMPACT
	BRINGELSON RANCH 7-20-9-58		
FIELD DATA		SAMPLE TEMP. :	132
SAMPLE PRES. :	20	AMBIENT TEMP.:	
VAPOR PRES. :		GRAVITY :	
COMMENTS :	SPOT; NO PROBE		

COMPONENT / CARBON NUMBER		MOLE%	MASS %	VOLUME %
ALCOHOLS		0.0021	0.0014	0.0013
NITROGEN		0.0260	0.0065	0.0060
CARBON DIOXIDE		0.0340	0.0133	0.0121
	C1	0.1370	0.0196	0.0486
	C2	0.5350	0.1432	0.2989
	C3	1.9180	0.7532	1.1046
	C4	2.8520	1.4759	1.8908
	C5	3.7772	2.4057	2.6964
	C6	18.9707	14.3690	15.1858
	C7	20.7173	18.1350	18.2034
	C8	15.8812	15.8353	15.5069
	C9	10.7961	12.1701	11.8903
	C10	9.4379	11.5156	11.0155
	C11	5.2050	6.8884	6.4535
	C12	3.1156	4.4810	4.3091
	C13	2.3255	3.7136	3.5879
	C14	1.7231	3.0438	2.9649
	C15	1.4009	2.6497	2.5513
	C16	0.7394	1.4908	1.4261
	C17	0.2658	0.5691	0.5428
	C18	0.1257	0.2849	0.2709
	C19	0.0134	0.0321	0.0303
	C20	0.0011	0.0028	0.0026
	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. :	201406097	ANALYSIS NO. :	13
COMPANY NAME :	CARRIZO OIL & GAS	ANALYSIS DATE:	JUNE 16, 2014
ACCOUNT NO. :		SAMPLE DATE :	JUNE 13, 2014
PRODUCER :		CYLINDER NO. :	6016
LEASE NO. :		SAMPLED BY :	JOHN MOSER
NAME/DESCRIP :	OIL TREATER @ 15:30		EMPACT
	BRINGELSON RANCH 7-20-9-58		
FIELD DATA		SAMPLE TEMP. :	132
SAMPLE PRES. :	20	AMBIENT TEMP.:	
VAPOR PRES. :		GRAVITY :	
COMMENTS :	SPOT; NO PROBE		

COMPONENT	PIANO #	MOLE %	MASS %	VOL %
Nitrogen	NHC	0.0260	0.0065	0.0060
Carbon Dioxide	NHC	0.0340	0.0133	0.0121
Methane	P1	0.1370	0.0196	0.0486
Ethane	P2	0.5350	0.1432	0.2989
Propane	P3	1.9180	0.7532	1.1046
i-Butane	I4	0.4760	0.2463	0.3253
n-Butane	P4	2.3760	1.2296	1.5655
2,2-Dimethylpropane	I5	0.0086	0.0055	0.0068
i-Pentane	I5	0.9910	0.6367	0.7578
n-Pentane	P5	1.6110	1.0350	1.2193
t-Butanol	X4	0.0021	0.0014	0.0013
2,2-Dimethylbutane	I6	0.0570	0.0437	0.0497
Cyclopentane	N5	1.1666	0.7285	0.7125
2,3-Dimethylbutane	I6	0.3577	0.2745	0.3060
2-Methylpentane	I6	3.1185	2.3930	2.7050
3-Methylpentane	I6	1.9110	1.4664	1.6299
n-Hexane	P6	5.9499	4.5662	5.1159
2,2-Dimethylpentane	I7	0.0319	0.0285	0.0311
Methylcyclopentane	N6	4.0746	3.0534	3.0111
2,4-Dimethylpentane	I7	0.2410	0.2150	0.2363
2,2,3-Trimethylbutane	I7	0.0343	0.0306	0.0327
Benzene	A6	0.9746	0.6778	0.5708
3,3-Dimethylpentane	I7	0.0277	0.0247	0.0264
Cyclohexane	N6	2.5274	1.8940	1.7974
2-Methylhexane	I7	1.2320	1.0992	1.1977
2,3-Dimethylpentane	I7	0.5908	0.5271	0.5580
1,1-Dimethylcyclopentane	N7	0.4950	0.4328	0.4238
3-Methylhexane	I7	1.6681	1.4883	1.5973
1c,3-Dimethylcyclopentane	N7	1.0470	0.9154	0.9081
1t,3-Dimethylcyclopentane	N7	0.9610	0.8402	0.8291
3-Ethylpentane	I7	0.1414	0.1262	0.1332
1t,2-Dimethylcyclopentane	N7	1.7562	1.5354	1.5098
2,2,4-Trimethylpentane	I8	0.0708	0.0720	0.0766
n-Heptane	P7	4.6114	4.1143	4.4448
1c,2-Dimethylcyclopentane	N7	0.1433	0.1253	0.1199

Methylcyclohexane	N7	4.7191	4.1259	3.9598
2,2-Dimethylhexane	I8	0.6724	0.6839	0.7263
Ethylcyclopentane	N7	0.4337	0.3792	0.3656
2,5-Dimethylhexane	I8	0.1244	0.1265	0.1347
2,2,3-Trimethylpentane	I8	0.0446	0.0454	0.0469
2,4-Dimethylhexane	I8	0.2414	0.2455	0.2601
1c,2t,4-Trimethylcyclopentane	N8	0.4769	0.4765	0.4613
3,3-Dimethylhexane	I8	0.0666	0.0677	0.0705
2,3,4-Trimethylpentane	I8	0.0915	0.0931	0.0956
2,3,3-Trimethylpentane	I8	0.0094	0.0096	0.0098
Toluene	A7	2.4810	2.0355	1.7311
2,3-Dimethylhexane	I8	0.2779	0.2827	0.2935
2-Methyl-3-ethylpentane	I8	0.1136	0.1155	0.1186
1,1,2-Trimethylcyclopentane	N8	0.0064	0.0064	0.0061
2-Methylheptane	I8	1.3771	1.4007	1.4802
4-Methylheptane	I8	0.3965	0.4033	0.4159
3-Methyl-3-ethylpentane	I8	0.0739	0.0752	0.0764
3,4-Dimethylhexane	I8	0.0866	0.0881	0.0904
1c,2c,4-Trimethylcyclopentane	N8	0.0453	0.0453	0.0434
1c,3-Dimethylcyclohexane	N8	0.0338	0.0338	0.0326
3-Methylheptane	I8	0.6628	0.6742	0.7063
1c,2t,3-Trimethylcyclopentane	N8	1.2929	1.2918	1.2394
3-Ethylhexane	I8	0.1602	0.1629	0.1689
1t,4-Dimethylcyclohexane	N8	0.6293	0.6288	0.6095
1,1-Dimethylcyclohexane	N8	0.1615	0.1614	0.1528
3c-Ethylmethylcyclopentane	N8	0.0112	0.0112	0.0108
3t-Ethylmethylcyclopentane	N8	0.1593	0.1592	0.1535
2t-Ethylmethylcyclopentane	N8	0.1345	0.1344	0.1292
1,1-Methylethylcyclopentane	N8	0.4027	0.4024	0.3809
2,2,4-Trimethylhexane	I9	0.0516	0.0589	0.0609
1t,2-Dimethylcyclohexane	N8	0.7078	0.7072	0.6739
1t,3-Dimethylcyclohexane	N8	0.0154	0.0154	0.0145
UnknownC7s	U7	0.1024	0.0914	0.0987
n-Octane	P8	2.5165	2.5596	2.6920
1c,4-Dimethylcyclohexane	N8	0.6776	0.6770	0.6393
i-Propylcyclopentane	I8	0.0836	0.0835	0.0795
2,4,4-Trimethylhexane	I9	0.0266	0.0304	0.0311
2,2,3,4-Tetramethylpentane	I9	0.0199	0.0227	0.0233
2,3,4-Trimethylhexane	I9	0.0362	0.0413	0.0423
1c,2-Dimethylcyclohexane	N8	0.2385	0.2383	0.2213
2,3,5-Trimethylhexane	I9	0.0872	0.0996	0.1020
2,2-Dimethylheptane	I9	0.0216	0.0247	0.0257
1,1,4-Trimethylcyclohexane	N9	0.9656	1.0854	1.0396
2,2,3-Trimethylhexane	I9	0.4153	0.4743	0.4807
2,4-Dimethylheptane	I9	0.0345	0.0394	0.0407
4,4-Dimethylheptane	I9	0.0664	0.0758	0.0783
Ethylcyclohexane	N8	0.5811	0.5806	0.5450
n-Propylcyclopentane	N8	0.2451	0.2449	0.2331
1c,3c,5-Trimethylcyclohexane	N9	0.0484	0.0544	0.0521
2,5-Dimethylheptane	I9	0.0705	0.0805	0.0830
3,3-Dimethylheptane	I9	0.0832	0.0950	0.0980
3,5-Dimethylheptane	I9	0.0634	0.0724	0.0747
2,6-Dimethylheptane	I9	0.0445	0.0508	0.0530
1,1,3-Trimethylcyclohexane	N9	0.1227	0.1379	0.1321
Ethylbenzene	A8	0.7219	0.6825	0.5803
1c,2t,4t-Trimethylcyclohexane	N9	0.1288	0.1448	0.1361
2,3-Dimethylheptane	I9	0.1647	0.1881	0.1915
1,3-Dimethylbenzene (m-Xylene)	A8	1.2669	1.1977	1.0243
1,4-Dimethylbenzene (p-Xylene)	A8	0.3730	0.3526	0.3025
3,4-Dimethylheptane	I9	0.0673	0.0769	0.0777
3,4-Dimethylheptane (2)	I9	0.1953	0.2230	0.2254
4-Ethylheptane	I9	0.0334	0.0381	0.0394
4-Methyloctane	I9	0.2744	0.3134	0.3215
2-Methyloctane	I9	0.3878	0.4429	0.4588
1c,2t,4c-Trimethylcyclohexane	I9	0.0678	0.0774	0.0789
3-Ethylheptane	I9	0.0694	0.0793	0.0807
3-Methyloctane	I9	0.4376	0.4998	0.5126

3,3-Diethylpentane	I9	0.0654	0.0747	0.0732
1c,2t,3-Trimethylcyclohexane	N9	0.0772	0.0868	0.0816
1,1,2-Trimethylcyclohexane	N9	0.0465	0.0523	0.0491
1,2-Dimethylbenzene (o-Xylene)	A8	0.5926	0.5602	0.4707
i-Butylcyclopentane	N9	0.3279	0.3686	0.3490
UnknownC8s	U8	0.0377	0.0383	0.0403
n-Nonane	P9	1.7279	1.9733	2.0326
1,1-Methylethylcyclohexane	N9	0.4835	0.5522	0.5705
i-Propylbenzene	A9	0.3385	0.3623	0.3102
i-Propylcyclohexane	N9	0.1159	0.1303	0.1201
2,2-Dimethyloctane	I10	0.0672	0.0851	0.0851
2,4-Dimethyloctane	I10	0.1033	0.1309	0.1309
2,6-Dimethyloctane	I10	0.0193	0.0245	0.0253
2,5-Dimethyloctane	I10	0.0513	0.0650	0.0650
n-Butylcyclopentane	N9	0.2880	0.3597	0.3329
3,3-Dimethyloctane	I10	0.1154	0.1462	0.1463
n-Propylbenzene	A9	0.3921	0.4196	0.3593
3,6-Dimethyloctane	I10	0.2007	0.2543	0.2543
3-Methyl-5-ethylheptane	I10	0.4038	0.4612	0.4698
1,3-Methylethylbenzene	A9	0.2847	0.3047	0.2587
1,4-Methylethylbenzene	A9	0.2718	0.2909	0.2470
1,3,5-Trimethylbenzene	A9	0.1610	0.1723	0.1473
2,3-Dimethyloctane	I10	0.0682	0.0864	0.0864
5-Methylnonane	I10	0.2159	0.2735	0.2760
1,2-Methylethylbenzene	A9	0.4838	0.5178	0.4374
2-Methylnonane	I10	0.0587	0.0744	0.0757
3-Ethyloctane	I10	0.0831	0.1053	0.1053
3-Methylnonane	I10	0.2409	0.3052	0.3077
1,2,4-Trimethylbenzene	A9	0.0492	0.0527	0.0445
t-Butylbenzene	A10	0.5501	0.6574	0.5614
i-Butylcyclohexane	N10	0.2295	0.2866	0.2611
1t-Methyl-2-n-propylcyclohexane	I10	0.0275	0.0314	0.0320
i-Butylbenzene	A10	0.0854	0.1021	0.0885
sec-Butylbenzene	A10	0.0659	0.0788	0.0676
UnknownC9s	U9	1.4874	1.6987	1.7498
n-Decane	P10	1.4175	1.7958	1.8187
1,2,3-Trimethylbenzene	A9	0.2112	0.2260	0.1870
1,3-Methyl-i-propylbenzene	A10	0.0978	0.1047	0.0884
1,4-Methyl-i-propylbenzene	A10	0.0945	0.1011	0.0854
Sec-Butylcyclohexane	N10	0.3400	0.4247	0.3864
1,2-Methyl-i-propylbenzene	A10	0.1705	0.2038	0.1720
3-Ethylnonane	I10	0.0568	0.0720	0.0733
1,3-Diethylbenzene	A10	0.1313	0.1569	0.1344
1,3-Methyl-n-propylbenzene	A10	0.0600	0.0717	0.0616
1,4-Diethylbenzene	A10	0.1322	0.1580	0.1356
1,4-Methyl-n-propylbenzene	A10	0.1372	0.1640	0.1413
n-Butylbenzene	A10	0.0590	0.0705	0.0605
1,3-Dimethyl-5-ethylbenzene	A10	0.1427	0.1705	0.1458
1,2-Diethylbenzene	A10	0.0424	0.0507	0.0426
1,2-Methyl-n-propylbenzene	A10	0.1173	0.1402	0.1187
1,4-Dimethyl-2-ethylbenzene	A10	0.1594	0.1905	0.1607
1,3-Dimethyl-4-ethylbenzene	A10	0.0177	0.0212	0.0179
1,2-Dimethyl-4-ethylbenzene	A10	0.2001	0.2391	0.2023
1,3-Dimethyl-2-ethylbenzene	A10	0.1159	0.1385	0.1151
1t,2c,4-Trimethylcyclopentane	A10	0.5322	0.5317	0.5258
1,2-Dimethyl-3-ethylbenzene	A10	0.0905	0.1082	0.0897
1,2-Ethyl-i-propylbenzene	A10	0.0935	0.1117	0.0943
1,4-Methyl-t-butylbenzene	A11	0.1906	0.2278	0.1922
UnknownC10s	U10	2.3531	2.9811	3.0191
n-Undecane	P11	1.1746	1.6348	1.6327
1,4-Ethyl-i-propylbenzene	A11	0.0628	0.0751	0.0634
1,2,4,5-Tetramethylbenzene	A11	0.1228	0.1468	0.1226
1,2-Methyl-n-butylbenzene	A11	0.0744	0.0889	0.0750
1,2,3,5-Tetramethylbenzene	A11	0.1393	0.1665	0.1384
1,2-Methyl-t-butylbenzene	A11	0.1006	0.1202	0.1014
5-Methylindan	A11	0.0211	0.0320	0.0316
4-Methylindan	A11	0.0087	0.0132	0.0130

1,2-Ethyl-n-propylbenzene	A11	0.1737	0.2076	0.1752
2-Methylindan	A11	0.0672	0.1019	0.1007
1,3-Methyl-n-butylbenzene	A11	0.0853	0.1019	0.0860
1,3-Di-i-propylbenzene	A11	0.0798	0.0954	0.0805
sec-Pentylbenzene	A11	0.1037	0.1239	0.1046
n-Pentylbenzene	A11	0.0778	0.1027	0.0885
1t-M-2-(4MP)cyclopentane	P12	0.0566	0.0858	0.0848
1,2-Di-n-propylbenzene	A11	0.1213	0.1450	0.1224
1,4-Di-i-propylbenzene	A11	0.2025	0.2420	0.2042
Tetrahydronaphthalene	A10	0.0371	0.0443	0.0374
t-Decahydronaphthalene	A10	0.1414	0.1690	0.1426
Naphthalene	A10	0.1116	0.1274	0.1075
1-t-Butyl-3,5-dimethylbenzene	A12	0.0669	0.0800	0.0675
1,4-Ethyl-t-butylbenzene	A11	0.0935	0.1117	0.0943
UnknownC11s	U11	1.8479	2.5719	2.5686
n-Dodecane	P12	1.0201	1.5472	1.5282
1,3-Di-n-propylbenzene	A12	0.0835	0.0998	0.0842
1,3,5-Triethylbenzene	A12	0.0311	0.0333	0.0285
1,2,4-Triethylbenzene	A12	0.3452	0.3694	0.3119
1,4-Methyl-n-pentylbenzene	A12	0.0581	0.0694	0.0586
n-Hexylbenzene	A12	0.1307	0.1888	0.1628
1,2,3,4,5-Pentamethylbenzene	A13	0.2330	0.2785	0.2350
2-Methylnaphthalene	A11	0.2537	0.3212	0.2711
1-Methylnaphthalene	A11	0.2037	0.2579	0.1871
UnknownC12s	U12	1.3234	2.0073	1.9826
n-Tridecane	P13	0.8045	1.3207	1.2891
UnknownC13s	U13	1.2880	2.1144	2.0638
n-Tetradecane	P14	0.4478	0.7910	0.7705
UnknownC14s	U14	1.2753	2.2528	2.1944
n-Pentadecane	P15	0.1194	0.2258	0.2174
UnknownC15s	U15	1.2815	2.4239	2.3339
n-Hexadecane	P16	0.1966	0.3964	0.3792
UnknownC16s	U16	0.5428	1.0944	1.0469
n-Heptadecane	P17	0.0731	0.1565	0.1493
UnknownC17s	U17	0.1927	0.4126	0.3935
n-Octadecane	P18	0.0127	0.0288	0.0274
UnknownC18s	U18	0.1130	0.2561	0.2435
n-Nonadecane	P19	0.0104	0.0249	0.0235
UnknownC19s	U19	0.0030	0.0072	0.0068
n-Eicosane	P20	0.0011	0.0028	0.0026
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. :	201406094	ANALYSIS NO. :	14
COMPANY NAME :	CARRIZO OIL & GAS	ANALYSIS DATE:	JUNE 18, 2014
ACCOUNT NO. :		SAMPLE DATE :	JUNE 13, 2014
PRODUCER :		CYLINDER NO. :	1227
LEASE NO. :		SAMPLED BY :	JOHN MOSER-EMPACT
NAME/DESCRIP :	SALES GAS @ 15:35 BRINGELSON RANCH 7-20-9-58		
FIELD DATA		SAMPLE TEMP. :	114
SAMPLE PRES. :	103	AMBIENT TEMP.:	
VAPOR PRES. :		GRAVITY :	
COMMENTS :	SPOT; PROBE; LENGTH OF H2S STAIN @ 2.0 PPM (1-7 PPM) @ 15:40		

COMPONENT	MOLE %	MASS %	GPM @ 14.650	GPM @ 14.730
ALCOHOLS	0.0005	0.0012		
HELIUM	0.01	0.00	---	---
HYDROGEN	0.01	0.00	---	---
OXYGEN/ARGON	0.01	0.01	---	---
NITROGEN	0.98	1.07	---	---
CARBON DIOXIDE	2.41	4.14	---	---
METHANE	64.57710	40.49140	---	---
ETHANE	13.2337	15.5525	3.5367	3.5560
PROPANE	11.2394	19.3704	3.0948	3.1117
I-BUTANE	1.1116	2.5252	0.3637	0.3657
N-BUTANE	3.7596	8.5405	1.1842	1.1907
I-PENTANE	0.7649	2.1521	0.2755	0.2770
N-PENTANE	0.8877	2.5032	0.3216	0.3234
HEXANES PLUS	1.0055	3.6435	0.4065	0.4086
TOTALS	100.00000	100.00000	9.1830	9.2331

BTEX COMPONENTS	MOLE%	WT%
BENZENE	0.0232	0.0708
TOLUENE	0.0160	0.0576
ETHYLBENZENE	0.0016	0.0066
XYLENES	0.0045	0.0187
TOTAL BTEX	0.0453	0.1537

	BTU @	14.650	14.730
LOW	NET DRY REAL :	1317.5 /scf	1324.7 /scf
	NET WET REAL :	1294.5 /scf	1301.7 /scf
HIGH	GROSS DRY REAL :	1445.9 /scf	1453.8 /scf
	GROSS WET REAL :	1420.6 /scf	1428.5 /scf
	NET DRY REAL :	19570.7 /lb	19677.6 /lb
	GROSS DRY REAL :	21478.5 /lb	21595.8 /lb
	RELATIVE DENSITY (AIR=1):		0.8822
	COMPRESSIBILITY FACTOR :		0.99499

(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

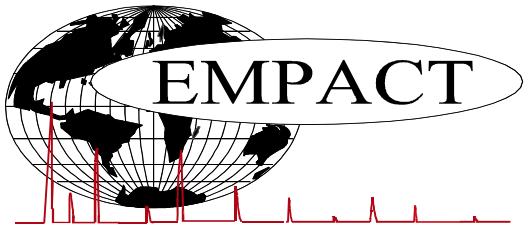
303-637-0150

EXTENDED NATURAL GAS ANALYSIS (*DHA)

GLYCALC INFORMATION

PROJECT NO. :	201406094	ANALYSIS NO. :	14
COMPANY NAME :	CARRIZO OIL & GAS	ANALYSIS DATE:	JUNE 18, 2014
ACCOUNT NO. :		SAMPLE DATE :	JUNE 13, 2014
PRODUCER :		CYLINDER NO. :	1227
LEASE NO. :		SAMPLED BY :	JOHN MOSER-EMPACT
NAME/DESCRIP :	SALES GAS @ 15:35 BRINGELSON RANCH 7-20-9-58		
FIELD DATA		SAMPLE TEMP. :	114
SAMPLE PRES. :	103	AMBIENT TEMP.:	
VAPOR PRES. :		GRAVITY :	
COMMENTS :	SPOT; PROBE; LENGTH OF H2S STAIN @ 2.0 PPM (1-7 PPM) @ 15:40		

Componet	Mole %	Wt %
Helium	0.01	0.00
Hydrogen	0.01	0.00
Carbon Dioxide	2.41	4.14
Nitrogen	0.98	1.07
Methane	64.57710	40.49140
Ethane	13.2337	15.5525
Propane	11.2394	19.3704
Isobutane	1.1116	2.5252
n-Butane	3.7596	8.5405
Isopentane	0.7043	1.9860
n-Pentane	0.8877	2.5032
Cyclopentane	0.0606	0.1661
n-Hexane	0.1969	0.6632
Cyclohexane	0.0505	0.1661
Other Hexanes	0.3633	1.2146
Heptanes	0.1915	0.7444
Methycyclohexane	0.0472	0.1811
2,2,4 Trimethylpentane	0.0001	0.0004
Benzene	0.0232	0.0708
Toluene	0.0160	0.0576
Ethylbenzene	0.0016	0.0066
Xylenes	0.0045	0.0187
C8+ Heavies	0.1107	0.5200
Subtotal	99.98950	99.98880
Oxygen/Argon	0.01	0.01
Alcohols	0.0005	0.0012
Total	100.00000	100.00000



EXTENDED NATURAL GAS ANALYSIS (*DHA)

DHA COMPONENT LIST

PROJECT NO. :	201406094	ANALYSIS NO. :	14
COMPANY NAME :	CARRIZO OIL & GAS	ANALYSIS DATE:	JUNE 18, 2014
ACCOUNT NO. :		SAMPLE DATE :	JUNE 13, 2014
PRODUCER :		CYLINDER NO. :	1227
LEASE NO. :		SAMPLED BY :	JOHN MOSER-EMPACT
NAME/DESCRIP :	SALES GAS @ 15:35 BRINGELSON RANCH 7-20-9-58		
FIELD DATA		SAMPLE TEMP. :	114
SAMPLE PRES. :	103	AMBIENT TEMP.:	
VAPOR PRES. :		GRAVITY :	
COMMENTS :	SPOT; PROBE; LENGTH OF H2S STAIN @ 2.0 PPM (1-7 PPM) @ 15:40		

COMPONENT	PIANO #	MOLE %	MASS %	GPM @ 14.650	GPM @ 14.730
Helium	---	0.01	0.00	---	---
Hydrogen	---	0.01	0.00	---	---
Oxygen/Argon	---	0.01	0.01	---	---
Nitrogen	---	0.98	1.07	---	---
Carbon Dioxide	---	2.41	4.14	---	---
Methane	P1	64.57710	40.49140	---	---
Ethane	P2	13.2337	15.5525	3.537	3.556
Propane	P3	11.2394	19.3704	3.095	3.112
i-Butane	I4	1.1116	2.5252	0.364	0.366
n-Butane	P4	3.7596	8.5405	1.184	1.191
2,2-Dimethylpropane	I5	0.0032	0.0090	0.001	0.001
Ethanol	X2	0.0002	0.0004	0.000	0.000
i-Pentane	I5	0.7011	1.9770	0.257	0.258
i-Propanol	X3	0.0001	0.0002	0.000	0.000
n-Pentane	P5	0.8877	2.5032	0.322	0.323
t-Butanol	X4	0.0002	0.0006	0.000	0.000
2,2-Dimethylbutane	I6	0.0025	0.0084	0.001	0.001
Cyclopentane	N5	0.0606	0.1661	0.018	0.018
2,3-Dimethylbutane	I6	0.0224	0.0754	0.009	0.009
2-Methylpentane	I6	0.1460	0.4918	0.060	0.060
3-Methylpentane	I6	0.0781	0.2630	0.032	0.032
n-Hexane	P6	0.1969	0.6632	0.081	0.082
2,2-Dimethylpentane	I7	0.0012	0.0047	0.001	0.001
Methylcyclopentane	N6	0.1142	0.3756	0.040	0.040
2,4-Dimethylpentane	I7	0.0053	0.0208	0.002	0.002
2,2,3-Trimethylbutane	I7	0.0002	0.0008	0.000	0.000
Benzene	A6	0.0232	0.0708	0.006	0.006
3,3-Dimethylpentane	I7	0.0006	0.0023	0.000	0.000
Cyclohexane	N6	0.0505	0.1661	0.017	0.017
2-Methylhexane	I7	0.0222	0.0870	0.010	0.010
2,3-Dimethylpentane	I7	0.0101	0.0396	0.005	0.005
1,1-Dimethylcyclopentane	N7	0.0082	0.0315	0.003	0.003
3-Methylhexane	I7	0.0258	0.1010	0.012	0.012
1c,3-Dimethylcyclopentane	N7	0.0166	0.0637	0.008	0.008
1t,3-Dimethylcyclopentane	N7	0.0149	0.0572	0.007	0.007
3-Ethylpentane	I7	0.0013	0.0051	0.001	0.001

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1t,2-Dimethylcyclopentane	N7	0.0266	0.1021	0.012	0.012
2,2,4-Trimethylpentane	I8	0.0001	0.0004	0.000	0.000
UnknownC6s	U6	0.0001	0.0004	0.000	0.000
n-Heptane	P7	0.0524	0.2052	0.024	0.024
1c,2-Dimethylcyclopentane	N7	0.0017	0.0065	0.001	0.001
Methylcyclohexane	N7	0.0472	0.1811	0.019	0.019
2,2-Dimethylhexane	I8	0.0055	0.0245	0.003	0.003
Ethylcyclopentane	N7	0.0043	0.0165	0.002	0.002
2,5-Dimethylhexane	I8	0.0012	0.0054	0.001	0.001
2,2,3-Trimethylpentane	I8	0.0002	0.0009	0.000	0.000
2,4-Dimethylhexane	I8	0.0020	0.0089	0.001	0.001
1c,2t,4-Trimethylcyclopentane	N8	0.0044	0.0193	0.002	0.002
3,3-Dimethylhexane	I8	0.0003	0.0013	0.000	0.000
1t,2c,4-Trimethylcyclopentane	N8	0.0046	0.0202	0.002	0.002
2,3,4-Trimethylpentane	I8	0.0007	0.0031	0.000	0.000
2,3,3-Trimethylpentane	I8	0.0001	0.0004	0.000	0.000
Toluene	A7	0.0160	0.0576	0.005	0.005
2,3-Dimethylhexane	I8	0.0018	0.0081	0.001	0.001
2-Methyl-3-ethylpentane	I8	0.0007	0.0031	0.000	0.000
2-Methylheptane	I8	0.0093	0.0415	0.005	0.005
4-Methylheptane	I8	0.0025	0.0112	0.001	0.001
3-Methyl-3-ethylpentane	I8	0.0002	0.0009	0.000	0.000
3,4-Dimethylhexane	I8	0.0003	0.0013	0.000	0.000
1c,2c,4-Trimethylcyclopentane	N8	0.0002	0.0009	0.000	0.000
1c,3-Dimethylcyclohexane	N8	0.0002	0.0009	0.000	0.000
3-Methylheptane	I8	0.0046	0.0205	0.002	0.002
1c,2t,3-Trimethylcyclopentane	N8	0.0073	0.0320	0.004	0.004
3-Ethylhexane	I8	0.0006	0.0027	0.000	0.000
1t,4-Dimethylcyclohexane	N8	0.0028	0.0123	0.001	0.001
1,1-Dimethylcyclohexane	N8	0.0008	0.0035	0.000	0.000
3t-Ethylmethylcyclopentane	N8	0.0009	0.0040	0.000	0.000
2t-Ethylmethylcyclopentane	N8	0.0008	0.0035	0.000	0.000
1,1-Methylethylcyclopentane	N8	0.0023	0.0101	0.001	0.001
2,2,4-Trimethylhexane	I9	0.0002	0.0010	0.000	0.000
1t,2-Dimethylcyclohexane	N8	0.0035	0.0154	0.002	0.002
UnknownC7s	U7	0.0001	0.0004	0.000	0.000
n-Octane	P8	0.0133	0.0594	0.007	0.007
1c,4-Dimethylcyclohexane	N8	0.0014	0.0061	0.001	0.001
i-Propylcyclopentane	I8	0.0003	0.0013	0.000	0.000
2,4,4-Trimethylhexane	I9	0.0001	0.0005	0.000	0.000
2,3,5-Trimethylhexane	I9	0.0006	0.0030	0.000	0.000
2,2,3,4-Tetramethylpentane	I9	0.0001	0.0005	0.000	0.000
2,3,4-Trimethylhexane	I9	0.0002	0.0010	0.000	0.000
1c,2-Dimethylcyclohexane	N8	0.0006	0.0026	0.000	0.000
2,2-Dimethylheptane	I9	0.0001	0.0005	0.000	0.000
1,1,4-Trimethylcyclohexane	N9	0.0034	0.0168	0.002	0.002
2,2,3-Trimethylhexane	I9	0.0014	0.0070	0.001	0.001
2,4-Dimethylheptane	I9	0.0005	0.0025	0.000	0.000
4,4-Dimethylheptane	I9	0.0001	0.0005	0.000	0.000
Ethylcyclohexane	N8	0.0019	0.0083	0.001	0.001
n-Propylcyclopentane	N8	0.0008	0.0035	0.000	0.000
1c,3c,5-Trimethylcyclohexane	N9	0.0001	0.0005	0.000	0.000
2,5-Dimethylheptane	I9	0.0002	0.0010	0.000	0.000
3,3-Dimethylheptane	I9	0.0003	0.0015	0.000	0.000
3,5-Dimethylheptane	I9	0.0002	0.0010	0.000	0.000
2,6-Dimethylheptane	I9	0.0001	0.0005	0.000	0.000
1,1,3-Trimethylcyclohexane	N9	0.0006	0.0030	0.000	0.000
Ethylbenzene	I8	0.0016	0.0066	0.001	0.001
1c,2t,4t-Trimethylcyclohexane	N9	0.0009	0.0045	0.001	0.001
2,3-Dimethylheptane	I9	0.0017	0.0085	0.001	0.001

1,3-Dimethylbenzene (m-Xylene)	A8	0.0024	0.0100	0.001	0.001
1,4-Dimethylbenzene (p-Xylene)	A8	0.0008	0.0033	0.000	0.000
3,4-Dimethylheptane (2)	I9	0.0004	0.0020	0.000	0.000
4-Ethylheptane	I9	0.0001	0.0005	0.000	0.000
4-Methyloctane	I9	0.0008	0.0040	0.000	0.000
2-Methyloctane	I9	0.0009	0.0045	0.001	0.001
1c,2t,3-Trimethylcyclohexane	N9	0.0001	0.0005	0.000	0.000
3-Ethylheptane	I9	0.0003	0.0015	0.000	0.000
3-Methyloctane	I9	0.0011	0.0055	0.001	0.001
1c,2t,4c-Trimethylcyclohexane	I9	0.0001	0.0005	0.000	0.000
1,1,2-Trimethylcyclohexane	N9	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	0.0054	0.000	0.000
i-Butylcyclopentane	N9	0.0007	0.0034	0.000	0.000
UnknownC8s	U8	0.0004	0.0018	0.000	0.000
n-Nonane	P9	0.0032	0.0160	0.002	0.002
1,1-Methylethylcyclohexane	N9	0.0005	0.0025	0.000	0.000
i-Propylbenzene	A9	0.0004	0.0019	0.000	0.000
i-Propylcyclohexane	N9	0.0002	0.0010	0.000	0.000
2,2-Dimethyloctane	I10	0.0001	0.0006	0.000	0.000
2,4-Dimethyloctane	I10	0.0002	0.0011	0.000	0.000
2,5-Dimethyloctane	I10	0.0001	0.0006	0.000	0.000
n-Butylcyclopentane	N9	0.0006	0.0030	0.000	0.000
3,3-Dimethyloctane	I10	0.0002	0.0011	0.000	0.000
n-Propylbenzene	A9	0.0005	0.0023	0.000	0.000
3,6-Dimethyloctane	I10	0.0001	0.0006	0.000	0.000
3-Methyl-5-ethylheptane	I10	0.0006	0.0033	0.000	0.000
1,3-Methylethylbenzene	A9	0.0004	0.0019	0.000	0.000
1,4-Methylethylbenzene	A9	0.0001	0.0005	0.000	0.000
1,3,5-Trimethylbenzene	A9	0.0002	0.0009	0.000	0.000
2,3-Dimethyloctane	I10	0.0001	0.0006	0.000	0.000
5-Methylnonane	I10	0.0002	0.0011	0.000	0.000
1,2-Methylethylbenzene	A9	0.0002	0.0009	0.000	0.000
2-Methylnonane	I10	0.0002	0.0011	0.000	0.000
3-Ethyloctane	I10	0.0001	0.0006	0.000	0.000
3-Methylnonane	I10	0.0002	0.0011	0.000	0.000
1,2,4-Trimethylbenzene	A9	0.0001	0.0005	0.000	0.000
t-Butylbenzene	A10	0.0004	0.0021	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
sec-Butylbenzene	A10	0.0001	0.0005	0.000	0.000
UnknownC9s	U9	0.0025	0.0125	0.001	0.001
n-Decane	P10	0.0008	0.0045	0.000	0.000
1,2,3-Trimethylbenzene	A9	0.0002	0.0009	0.000	0.000
1,3-Methyl-i-propylbenzene	A10	0.0001	0.0005	0.000	0.000
Sec-Butylcyclohexane	A10	0.0002	0.0011	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
1,4-Methyl-n-propylbenzene	A10	0.0001	0.0005	0.000	0.000
1,3-Dimethyl-5-ethylbenzene	A10	0.0001	0.0005	0.000	0.000
1,2-Methyl-n-propylbenzene	A10	0.0001	0.0005	0.000	0.000
1,4-Dimethyl-2-ethylbenzene	A10	0.0001	0.0005	0.000	0.000
1,2-Dimethyl-4-ethylbenzene	A10	0.0001	0.0005	0.000	0.000
1,3-Dimethyl-2-ethylbenzene	A10	0.0001	0.0005	0.000	0.000
1,4-Methyl-t-butylbenzene	A11	0.0001	0.0006	0.000	0.000
UnknownC10s	U10	0.0017	0.0095	0.001	0.001
n-Undecane	P11	0.0003	0.0018	0.000	0.000
1,2,3,5-Tetramethylbenzene	A11	0.0001	0.0005	0.000	0.000
UnknownC11s	U11	0.0003	0.0018	0.000	0.000

n-Dodecane	P12	0.0002	0.0013	0.000	0.000
UnknownC12s	U12	0.0001	0.0006	0.000	0.000
n-Tridecane	P13	0.0001	0.0007	0.000	0.000
UnknownC13s	U13	0.0001	0.0007	0.000	0.000
n-Tetradecane	P14	0.0002	0.0016	0.000	0.000
UnknownC14s	U14	0.0002	0.0016	0.000	0.000
n-Pentadecane	P15	0.0004	0.0033	0.000	0.000
UnknownC15s	U15	0.0003	0.0025	0.000	0.000
n-Hexadecane	P16	0.0003	0.0027	0.000	0.000
UnknownC16s	U16	0.0002	0.0018	0.000	0.000
n-Heptadecane	P17	0.0002	0.0019	0.000	0.000
TOTAL		100.00000	100.00000	9.1830	9.2331

BTEX COMPONENTS	**MOLE%**	**WT%**
BENZENE	0.0232	0.0708
TOLUENE	0.0160	0.0576
ETHYLBENZENE	0.0016	0.0066
XYLENES	0.0045	0.0187
TOTAL BTEX	0.0453	0.1537

		BTU @	14.650	14.730
LOW	NET DRY REAL :		1317.5 **/scf**	1324.7 **/scf**
	NET WET REAL :		1294.5 **/scf**	1301.7 **/scf**
HIGH	GROSS DRY REAL :		1445.9 **/scf**	1453.8 **/scf**
	GROSS WET REAL :		1420.6 **/scf**	1428.5 **/scf**
	NET DRY REAL :		19570.7 **/lb**	19677.6 **/lb**
	GROSS DRY REAL :		21478.5 **/lb**	21595.8 **/lb**
	RELATIVE DENSITY (AIR=1):			0.8822
	COMPRESSIBILITY FACTOR :			0.99499

(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.

EMPACT Analytical Systems, Inc 365 S. Main Street, Brighton, CO 80601 303-637-0150

CRUDE OIL ASSAY

PROJECT NO. :	201406094	ANALYSIS NO. :	15
COMPANY NAME :	CARRIZO OIL & GAS	ANALYSIS DATE:	JUNE 18, 2014
ACCOUNT NO. :		SAMPLE DATE :	JUNE 13, 2014
PRODUCER :		CYLINDER NO. :	1L GLASS JAR
LEASE NO. :		SAMPLED BY :	JOHN MOSER
NAME/DESCRIP :	PRODUCTION TANK @ 15:50 BRINGELSON RANCH @ 7-20-9-58		EMPACT
FIELD DATA		SAMPLE TEMP. :	89
SAMPLE PRES. :		AMBIENT TEMP.:	
VAPOR PRES. :		GRAVITY :	
COMMENTS :	SPOT		

SPECIFICATION		TEST METHOD	UNITS	RESULTS
API GRAVITY			API 60/60	37.8
RVP @100 DEG F		D323	PSIG	7.6
TOTAL SULFUR		D2622	WT %	0.243
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 RED/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