CRUDE OIL ASSAY

PROJECT NO. :	201403015	ANALYSIS NO. :	16
COMPANY NAME :	CARRIZO OIL & GAS	ANALYSIS DATE:	MARCH 7, 2014
ACCOUNT NO. :		SAMPLE DATE :	MARCH 4, 2014
PRODUCER :		CYLINDER NO. :	1L GLASS JAR
LEASE NO. :		SAMPLED BY :	GALE MCENDREE
NAME/DESCRIP :	TANK BATTERY @ 17:10 SPEAKER 2-27-8-61		EMPACT
FIELD DATA		SAMPLE TEMP. :	77
SAMPLE PRES. :		AMBIENT TEMP.:	
VAPOR PRES. :		GRAVITY :	
COMMENTS :	SPOT; TK# 271107		

SPECIFICATION		TEST METHOD	UNITS	RESULTS
API GRAVITY			API 60/60	36.7
RVP @100 DEG F		D323	PSIG	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				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

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

303-637-0150

EXTENDED NATURAL GAS LIQUID ANALYSIS (*DHA)

MAIN PAGE

PROJECT NO. :	201403015	ANALYSIS NO. :	17
COMPANY NAME :	CARRIZO OIL & GAS	ANALYSIS DATE:	MARCH 6, 2014
ACCOUNT NO. :		SAMPLE DATE :	MARCH 4, 2014
PRODUCER :		CYLINDER NO. :	2821
LEASE NO. :		SAMPLED BY :	GALE MCENDREE
NAME/DESCRIP :	SEPARATOR @ 16:50		EMPACT
	SPEAKER 2-27-8-61		
FIELD DATA		SAMPLE TEMP. :	170
SAMPLE PRES. :	20	AMBIENT TEMP.:	
VAPOR PRES. :		GRAVITY :	
COMMENTS :	SPOT; NO PROBE		

COMPONENT	MOLE %	MASS %	VOL %
NITROGEN (AIR)	0.0080	0.0021	0.0019
CARBON DIOXIDE	0.0279	0.0114	0.0103
METHANE	0.1109	0.0165	0.0408
ETHANE	0.3258	0.0911	0.1897
PROPANE	1.2144	0.4978	0.7282
I-BUTANE	0.4625	0.2499	0.3293
N-BUTANE	2.0143	1.0881	1.3818
I-PENTANE	0.8291	0.5560	0.6604
N-PENTANE	1.3430	0.9006	1.0583
HEXANES PLUS	93.6641	96.5865	95.5993
TOTALS	100.0000	100.0000	100.0000

BTEX COMPONENTS	**MOLE%**	**MASS%**
BENZENE	1.4960	1.0861
TOLUENE	3.1969	2.7379
ETHYLBENZENE	0.5307	0.5237
XYLENE	2.1741	2.1455
TOTAL BTEX	7.3977	6.4932

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

	TOTAL SAMPLE	**C6+ FRACTION**	
Specific Gravity (H2O=1) =	0.7418	0.7495	60/60
API Gravity =	59.25	57.29	60/60
Molecular Weight =	107.59	111.54	
Absolute Density =	6.18	6.25	LBS/GAL
Heating Value Liq. Idl Gas=	125911	127296	BTU/GAL
Vapor/Liquid =	21.85	21.34	CUFT/GAL
Vapor Pressure =	13.87	1.75	PSIA @100 F

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

EMPACT ANALYTICAL SYSTEMS INC.
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303-637-0150

EXTENDED NATURAL GAS LIQUID ANALYSIS (*DHA)

E & P TANK / GLYCALC INFORMATION

PROJECT NO. :	201403015	ANALYSIS NO. :	17
COMPANY NAME :	CARRIZO OIL & GAS	ANALYSIS DATE:	MARCH 6, 2014
ACCOUNT NO. :		SAMPLE DATE :	MARCH 4, 2014
PRODUCER :		CYLINDER NO. :	2821
LEASE NO. :		SAMPLED BY :	GALE MCENDREE
NAME/DESCRIP :	SEPARATOR @ 16:50		EMPACT
	SPEAKER 2-27-8-61		
FIELD DATA		SAMPLE TEMP. :	170
SAMPLE PRES. :	20	AMBIENT TEMP.:	
VAPOR PRES. :		GRAVITY :	
COMMENTS :	SPOT; NO PROBE		

COMPONENT	Mole %		Wt %		LV %	
CARBON DIOXIDE	0.0279		0.0114		0.0103	
NITROGEN (AIR)	0.0080		0.0021		0.0019	
METHANE	0.1109		0.0165		0.0408	
ETHANE	0.3258		0.0911		0.1897	
PROPANE	1.2144		0.4978		0.7282	
I-BUTANE	0.4625		0.2499		0.3293	
N-BUTANE	2.0143		1.0881		1.3818	
I-PENTANE	0.8291		0.5560		0.6604	
N-PENTANE	1.3430		0.9006		1.0583	
CYCLOPENTANE (N-C5)	1.3522		0.8814		0.8599	
N-HEXANE	6.7919		5.4392		6.0780	
CYCLOHEXANE (OTHER C6)	3.0322		2.3719		2.2453	
OTHER HEXANES	10.3769		8.2255		8.7216	
OTHER HEPTANES	14.6083		13.5122		14.0964	
METHYLCYCLOHEXANE (OTHER C7)	4.6210		4.2174		4.0374	
2,2,4 TRIMETHYLPENTANE	0.8678		0.7920		0.7796	
BENZENE	1.4960		1.0861		0.9123	
TOLUENE	3.1969		2.7379		2.3226	
ETHYLBENZENE	0.5307		0.5237		0.4442	
XYLENES	2.1741		2.1455		1.8216	
OTHER OCTANES	12.5851		13.3738		13.4202	
OCTANES PLUS	----	48.1887	----	58.1149	----	56.3258
NONANES	12.6039		14.8722		14.6314	
DECANES PLUS	19.4271		26.4077		25.2288	
SUB TOTAL	100.0000		100.0000		100.0000	
TOTAL	100.0000		100.0000		100.0000	

API Gravity	=	**59.25**	60/60
Vapor Pressure	=	**13.87**	PSIA & 100 F
Average Molecular Weight of Decanes plus	=	**146.24**	
Average Specific Gravity of Decanes plus	=	**0.7780**	

EMPACT ANALYTICAL SYSTEMS INC.
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303-637-0150

EXTENDED NATURAL GAS LIQUID ANALYSIS (*DHA)

BY CARBON NUMBER

PROJECT NO. :	201403015	ANALYSIS NO. :	17
COMPANY NAME :	CARRIZO OIL & GAS	ANALYSIS DATE:	MARCH 6, 2014
ACCOUNT NO. :		SAMPLE DATE :	MARCH 4, 2014
PRODUCER :		CYLINDER NO. :	2821
LEASE NO. :		SAMPLED BY :	GALE MCENDREE
NAME/DESCRIP :	SEPARATOR @ 16:50		EMPACT
	SPEAKER 2-27-8-61		
FIELD DATA		SAMPLE TEMP. :	170
SAMPLE PRES. :	20	AMBIENT TEMP.:	
VAPOR PRES. :		GRAVITY :	
COMMENTS :	SPOT; NO PROBE		

COMPONENT / CARBON NUMBER	MOLE%	MASS %	VOLUME %
NITROGEN	0.0080	0.0021	0.0019
CARBON DIOXIDE	0.0279	0.0114	0.0103
C1	0.1109	0.0165	0.0408
C2	0.3258	0.0911	0.1897
C3	1.2144	0.4978	0.7282
C4	2.4768	1.3380	1.7111
C5	3.5243	2.3380	2.5786
C6	21.6970	17.1227	17.9572
C7	22.4262	20.4675	20.4564
C8	16.1577	16.8350	16.4656
C9	12.6039	14.8722	14.6314
C10	11.0778	14.1716	13.6229
C11	4.8146	6.6492	6.2302
C12	2.1893	3.2584	3.1250
C13	0.9191	1.5361	1.4818
C14	0.3783	0.6976	0.6778
C15	0.0480	0.0948	0.0911
C16	0.0000	0.0000	0.0000
C17	0.0000	0.0000	0.0000
C18	0.0000	0.0000	0.0000
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

EMPACT ANALYTICAL SYSTEMS INC.
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303-637-0150

EXTENDED NATURAL GAS LIQUID ANALYSIS (*DHA)

DHA COMPONENT LIST

PROJECT NO. :	201403015	ANALYSIS NO. :	17
COMPANY NAME :	CARRIZO OIL & GAS	ANALYSIS DATE:	MARCH 6, 2014
ACCOUNT NO. :		SAMPLE DATE :	MARCH 4, 2014
PRODUCER :		CYLINDER NO. :	2821
LEASE NO. :		SAMPLED BY :	GALE MCENDREE
NAME/DESCRIP :	SEPARATOR @ 16:50 SPEAKER 2-27-8-61		EMPACT
FIELD DATA		SAMPLE TEMP. :	170
SAMPLE PRES. :	20	AMBIENT TEMP.:	
VAPOR PRES. :		GRAVITY :	
COMMENTS :	SPOT; NO PROBE		

COMPONENT	PIANO #	MOLE %	MASS %	VOL %
Nitrogen	NHC	0.0080	0.0021	0.0019
Carbon Dioxide	NHC	0.0279	0.0114	0.0103
Methane	P1	0.1109	0.0165	0.0408
Ethane	P2	0.3258	0.0911	0.1897
Propane	P3	1.2144	0.4978	0.7282
i-Butane	I4	0.4625	0.2499	0.3293
n-Butane	P4	2.0143	1.0881	1.3818
2,2-Dimethylpropane	I5	0.0069	0.0046	0.0057
i-Pentane	I5	0.8222	0.5514	0.6547
n-Pentane	P5	1.3430	0.9006	1.0583
2,2-Dimethylbutane	I6	0.0317	0.0254	0.0288
Cyclopentane	N5	1.3522	0.8814	0.8599
2,3-Dimethylbutane	I6	0.3365	0.2695	0.2997
2-Methylpentane	I6	3.3947	2.7192	3.0660
3-Methylpentane	I6	2.0044	1.6056	1.7802
n-Hexane	P6	6.7919	5.4392	6.0780
2,2-Dimethylpentane	I7	0.0165	0.0154	0.0167
Methylcyclopentane	N6	4.6096	3.6058	3.5469
2,4-Dimethylpentane	I7	0.2910	0.2710	0.2972
2,2,3-Trimethylbutane	I7	0.0196	0.0183	0.0195
Benzene	A6	1.4960	1.0861	0.9123
3,3-Dimethylpentane	I7	0.0298	0.0278	0.0296
Cyclohexane	N6	3.0322	2.3719	2.2453
2-Methylhexane	I7	1.2011	1.1186	1.2158
2,3-Dimethylpentane	I7	0.8494	0.7911	0.8353
1,1-Dimethylcyclopentane	N7	0.4481	0.4090	0.3995
3-Methylhexane	I7	1.8369	1.7108	1.8314
1c,3-Dimethylcyclopentane	N7	0.9570	0.8734	0.8642
1t,3-Dimethylcyclopentane	N7	0.8678	0.7920	0.7796
3-Ethylpentane	I7	0.1537	0.1431	0.1507
1t,2-Dimethylcyclopentane	N7	1.9203	1.7526	1.7191
2,2,4-Trimethylpentane	I8	0.0964	0.1024	0.1086
n-Heptane	P7	5.2222	4.8636	5.2411
1c,2-Dimethylcyclopentane	N7	0.1535	0.1401	0.1337
Methylcyclohexane	N7	4.6210	4.2174	4.0374

2,2-Dimethylhexane	I8	0.6056	0.6430	0.6811
Ethylcyclopentane	N7	0.6414	0.5854	0.5630
2,5-Dimethylhexane	I8	0.1605	0.1704	0.1810
2,2,3-Trimethylpentane	I8	0.0237	0.0252	0.0260
2,4-Dimethylhexane	I8	0.2806	0.2979	0.3149
1c,2t,4-Trimethylcyclopentane	N8	0.4316	0.4501	0.4347
3,3-Dimethylhexane	I8	0.0668	0.0709	0.0736
2,3,4-Trimethylpentane	I8	0.1283	0.1362	0.1395
2,3,3-Trimethylpentane	I8	0.0027	0.0029	0.0029
Toluene	A7	3.1969	2.7379	2.3226
2,3-Dimethylhexane	I8	0.2361	0.2507	0.2596
2-Methyl-3-ethylpentane	I8	0.1773	0.1882	0.1928
1,1,2-Trimethylcyclopentane	N8	0.0168	0.0175	0.0167
2-Methylheptane	I8	1.3457	1.4288	1.5061
4-Methylheptane	I8	0.5259	0.5584	0.5744
3-Methyl-3-ethylpentane	I8	0.1187	0.1260	0.1277
3,4-Dimethylhexane	I8	0.1389	0.1475	0.1511
1c,2c,4-Trimethylcyclopentane	N8	0.0413	0.0431	0.0412
1c,3-Dimethylcyclohexane	N8	0.0409	0.0427	0.0411
3-Methylheptane	I8	0.5625	0.5972	0.6241
1c,2t,3-Trimethylcyclopentane	N8	1.0763	1.1225	1.0743
3-Ethylhexane	I8	0.1946	0.2066	0.2136
1t,4-Dimethylcyclohexane	N8	0.6424	0.6700	0.6478
1,1-Dimethylcyclohexane	N8	0.1435	0.1497	0.1414
3c-Ethylmethylcyclopentane	N8	0.0052	0.0054	0.0052
3t-Ethylmethylcyclopentane	N8	0.2274	0.2372	0.2281
2t-Ethylmethylcyclopentane	N8	0.1743	0.1818	0.1743
1,1-Methylethylcyclopentane	N8	0.6911	0.7208	0.6807
2,2,4-Trimethylhexane	I9	0.0844	0.1006	0.1037
1t,2-Dimethylcyclohexane	N8	0.6893	0.7189	0.6834
1t,3-Dimethylcyclohexane	N8	0.0032	0.0033	0.0031
n-Octane	P8	2.4808	2.6340	2.7633
1c,4-Dimethylcyclohexane	N8	0.8518	0.8884	0.8369
i-Propylcyclopentane	I8	0.0847	0.0883	0.0839
2,4,4-Trimethylhexane	I9	0.0222	0.0265	0.0271
2,2,3,4-Tetramethylpentane	I9	0.0184	0.0219	0.0225
2,3,4-Trimethylhexane	I9	0.0236	0.0281	0.0287
1c,2-Dimethylcyclohexane	N8	0.2563	0.2673	0.2476
2,3,5-Trimethylhexane	I9	0.0777	0.0926	0.0946
2,2-Dimethylheptane	I9	0.0182	0.0217	0.0225
1,1,4-Trimethylcyclohexane	N9	1.0355	1.2150	1.1608
2,2,3-Trimethylhexane	I9	0.5505	0.6563	0.6635
2,4-Dimethylheptane	I9	0.0402	0.0479	0.0494
4,4-Dimethylheptane	I9	0.1055	0.1258	0.1296
Ethylcyclohexane	N8	0.6436	0.6712	0.6284
n-Propylcyclopentane	N8	0.2446	0.2551	0.2422
1c,3c,5-Trimethylcyclohexane	N9	0.0498	0.0584	0.0558
2,5-Dimethylheptane	I9	0.0929	0.1107	0.1139
3,3-Dimethylheptane	I9	0.1078	0.1285	0.1322
3,5-Dimethylheptane	I9	0.0877	0.1045	0.1075
2,6-Dimethylheptane	I9	0.0604	0.0720	0.0749
1,1,3-Trimethylcyclohexane	N9	0.1048	0.1230	0.1175
Ethylbenzene	A8	0.5307	0.5237	0.4442
1c,2t,4t-Trimethylcyclohexane	N9	0.4446	0.5217	0.4889
2,3-Dimethylheptane	I9	0.0055	0.0066	0.0067
1,3-Dimethylbenzene (m-Xylene)	A8	0.4482	0.4423	0.3773
1,4-Dimethylbenzene (p-Xylene)	A8	0.9562	0.9436	0.8076
3,4-Dimethylheptane	I9	0.1675	0.1997	0.2013
3,4-Dimethylheptane (2)	I9	0.2596	0.3095	0.3120
4-Ethylheptane	I9	0.0431	0.0514	0.0530
4-Methyloctane	I9	0.2697	0.3215	0.3290
2-Methyloctane	I9	0.3678	0.4385	0.4531
1c,2t,4c-Trimethylcyclohexane	I9	0.1155	0.1377	0.1399
3-Ethylheptane	I9	0.1107	0.1320	0.1340
3-Methyloctane	I9	0.4579	0.5459	0.5585
3,3-Diethylpentane	I9	0.0857	0.1022	0.0999
1c,2t,3-Trimethylcyclohexane	N9	0.1307	0.1534	0.1438

1,1,2-Trimethylcyclohexane	N9	0.0404	0.0474	0.0444
1,2-Dimethylbenzene (o-Xylene)	A8	0.7697	0.7596	0.6367
i-Butylcyclopentane	N9	0.2801	0.3287	0.3104
UnknownC8s	U8	0.0435	0.0462	0.0485
n-Nonane	P9	1.7858	2.1289	2.1874
1,1-Methylethylcyclohexane	N9	0.6305	0.7516	0.7746
i-Propylbenzene	A9	0.3701	0.4134	0.3531
i-Propylcyclohexane	N9	0.1271	0.1491	0.1371
2,2-Dimethyloctane	I10	0.0737	0.0975	0.0972
2,4-Dimethyloctane	I10	0.0891	0.1178	0.1175
2,6-Dimethyloctane	I10	0.0170	0.0225	0.0232
2,5-Dimethyloctane	I10	0.0385	0.0509	0.0508
n-Butylcyclopentane	N9	0.2536	0.3306	0.3052
3,3-Dimethyloctane	I10	0.1487	0.1967	0.1963
n-Propylbenzene	A9	0.2778	0.3103	0.2650
3,6-Dimethyloctane	I10	0.2379	0.3146	0.3138
3-Methyl-5-ethylheptane	I10	0.4051	0.4829	0.4907
1,3-Methylethylbenzene	A9	0.2781	0.3107	0.2632
1,4-Methylethylbenzene	A9	0.1354	0.1513	0.1282
1,3,5-Trimethylbenzene	A9	0.1299	0.1451	0.1238
2,3-Dimethyloctane	I10	0.0754	0.0997	0.0994
5-Methylnonane	I10	0.2573	0.3403	0.3426
1,2-Methylethylbenzene	A9	0.3766	0.4207	0.3545
2-Methylnonane	I10	0.1814	0.2399	0.2435
3-Ethyloctane	I10	0.1112	0.1471	0.1467
3-Methylnonane	I10	0.3009	0.3979	0.4001
1,2,4-Trimethylbenzene	A9	0.0235	0.0263	0.0222
t-Butylbenzene	A10	0.3866	0.4823	0.4108
i-Butylcyclohexane	N10	0.2863	0.3733	0.3392
1t-Methyl-2-n-propylcyclohexane	I10	0.1228	0.1464	0.1488
i-Butylbenzene	A10	0.0833	0.1039	0.0899
sec-Butylbenzene	A10	0.1254	0.1564	0.1339
UnknownC9s	U9	2.6792	3.1940	3.2817
n-Decane	P10	1.5206	2.0109	2.0314
1,2,3-Trimethylbenzene	A9	0.2779	0.3105	0.2563
1,3-Methyl-i-propylbenzene	A10	0.1158	0.1294	0.1090
1,4-Methyl-i-propylbenzene	A10	0.0989	0.1105	0.0931
Sec-Butylcyclohexane	N10	0.3132	0.4083	0.3706
1,2-Methyl-i-propylbenzene	A10	0.1345	0.1678	0.1413
3-Ethylnonane	I10	0.0685	0.0906	0.0920
1,3-Diethylbenzene	A10	0.1393	0.1738	0.1485
1,3-Methyl-n-propylbenzene	A10	0.0546	0.0681	0.0584
1,4-Diethylbenzene	A10	0.1120	0.1397	0.1196
1,4-Methyl-n-propylbenzene	A10	0.0525	0.0655	0.0563
n-Butylbenzene	A10	0.1364	0.1702	0.1458
1,3-Dimethyl-5-ethylbenzene	A10	0.0789	0.0984	0.0840
1,2-Diethylbenzene	A10	0.1462	0.1824	0.1530
1,2-Methyl-n-propylbenzene	A10	0.1044	0.1302	0.1100
1,4-Dimethyl-2-ethylbenzene	A10	0.1518	0.1894	0.1593
1,3-Dimethyl-4-ethylbenzene	A10	0.0192	0.0240	0.0202
1,2-Dimethyl-4-ethylbenzene	A10	0.1783	0.2224	0.1877
1,3-Dimethyl-2-ethylbenzene	A10	0.2228	0.2780	0.2304
1t,2c,4-Trimethylcyclopentane	A10	0.5227	0.5452	0.5378
1,2-Dimethyl-3-ethylbenzene	A10	0.1183	0.1476	0.1221
1,2-Ethyl-i-propylbenzene	A10	0.0709	0.0884	0.0744
1,4-Methyl-t-butylbenzene	A11	0.1540	0.1921	0.1617
UnknownC10s	U10	3.4025	4.4997	4.5455
n-Undecane	P11	1.0926	1.5874	1.5813
1,4-Ethyl-i-propylbenzene	A11	0.1032	0.1288	0.1084
1,2,4,5-Tetramethylbenzene	A11	0.1800	0.2246	0.1871
1,2-Methyl-n-butylbenzene	A11	0.1156	0.1442	0.1214
1,2,3,5-Tetramethylbenzene	A11	0.0969	0.1209	0.1002
1,2-Methyl-t-butylbenzene	A11	0.1211	0.1511	0.1272
5-Methylindan	A11	0.0241	0.0382	0.0376
4-Methylindan	A11	0.0078	0.0124	0.0122
1,2-Ethyl-n-propylbenzene	A11	0.1315	0.1641	0.1381
2-Methylindan	A11	0.1136	0.1799	0.1773

1,3-Methyl-n-butylbenzene	A11	0.0954	0.1190	0.1002
1,3-Di-i-propylbenzene	A11	0.0738	0.0921	0.0775
sec-Pentylbenzene	A11	0.0810	0.1011	0.0851
n-Pentylbenzene	A11	0.0420	0.0579	0.0498
1t-M-2-(4MP)cyclopentane	P12	0.0955	0.1512	0.1490
1,2-Di-n-propylbenzene	A11	0.1195	0.1491	0.1255
1,4-Di-i-propylbenzene	A11	0.1507	0.1880	0.1583
Tetrahydronaphthalene	A10	0.1247	0.1556	0.1310
t-Decahydronaphthalene	A10	0.1296	0.1617	0.1361
Naphthalene	A10	0.1206	0.1437	0.1210
1-t-Butyl-3,5-dimethylbenzene	A12	0.0395	0.0493	0.0415
1,4-Ethyl-t-butylbenzene	A11	0.1988	0.2480	0.2088
UnknownC11s	U11	1.6914	2.4574	2.4480
n-Dodecane	P12	0.5425	0.8589	0.8462
1,3-Di-n-propylbenzene	A12	0.0647	0.0807	0.0679
1,3,5-Triethylbenzene	A12	0.0949	0.1060	0.0904
1,2,4-Triethylbenzene	A12	0.2437	0.2722	0.2292
1,4-Methyl-n-pentylbenzene	A12	0.0363	0.0453	0.0381
n-Hexylbenzene	A12	0.0373	0.0563	0.0484
1,2,3,4,5-Pentamethylbenzene	A13	0.0835	0.1042	0.0877
2-Methylnaphthalene	A11	0.0805	0.1064	0.0896
1-Methylnaphthalene	A11	0.1411	0.1865	0.1349
UnknownC12s	U12	1.0349	1.6385	1.6143
n-Tridecane	P13	0.1304	0.2235	0.2176
UnknownC13s	U13	0.7052	1.2084	1.1765
n-Tetradecane	P14	0.0112	0.0207	0.0201
UnknownC14s	U14	0.3671	0.6769	0.6577
n-Pentadecane	P15	0.0013	0.0026	0.0025
UnknownC15s	U15	0.0467	0.0922	0.0886
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. :	201403015	ANALYSIS NO. :	18
COMPANY NAME :	CARRIZO OIL & GAS	ANALYSIS DATE:	MARCH 7, 2014
ACCOUNT NO. :		SAMPLE DATE :	MARCH 4, 2014
PRODUCER :		CYLINDER NO. :	0538
LEASE NO. :		SAMPLED BY :	BRIAN MORROW-EMPACT
NAME/DESCRIP :	SALES GAS @ 16:55 SPEAKER 2-27-8-61		
FIELD DATA		SAMPLE TEMP. :	65 F
SAMPLE PRES. :	70	AMBIENT TEMP.:	
VAPOR PRES. :		GRAVITY :	
COMMENTS :	SPOT; NO PROBE; LENGTH OF H2S STAIN @ 7PPM (1-7PPM) @ 17:00 WITNESSED BY GALE MCENDREE-EMPACT		

COMPONENT	MOLE %	MASS %	GPM @ 14.650	GPM @ 14.730
ALCOHOLS	0.0132	0.0151		
HELIUM	0.00	0.00	---	---
HYDROGEN	0.00	0.00	---	---
OXYGEN/ARGON	0.06	0.05	---	---
NITROGEN	0.37	0.29	---	---
CARBON DIOXIDE	3.49	4.26	---	---
METHANE	30.93660	13.75330	---	---
ETHANE	21.5651	17.9691	5.7955	5.8271
PROPANE	25.2205	30.8180	6.9812	7.0193
I-BUTANE	2.8863	4.6488	0.9490	0.9541
N-BUTANE	9.4097	15.1556	2.9809	2.9971
I-PENTANE	1.9326	3.8522	0.6951	0.6989
N-PENTANE	2.1931	4.3847	0.7989	0.8032
HEXANES PLUS	1.9229	4.8032	0.7784	0.7828
TOTALS	100.00000	100.00000	18.9790	19.0825

BTEX COMPONENTS	**MOLE%**	**WT%**
BENZENE	0.0754	0.1632
TOLUENE	0.0377	0.0963
ETHYLBENZENE	0.0024	0.0071
XYLENES	0.0058	0.0170
TOTAL BTEX	0.1213	0.2836

	BTU @	14.650	14.730
LOW	NET DRY REAL :	1836.8 **/scf**	1846.8 **/scf**
	NET WET REAL :	1804.7 **/scf**	1814.7 **/scf**
HIGH	GROSS DRY REAL :	2002.7 **/scf**	2013.6 **/scf**
	GROSS WET REAL :	1967.7 **/scf**	1978.6 **/scf**
	NET DRY REAL :	19335.9 **/lb**	19441.5 **/lb**
	GROSS DRY REAL :	21076.5 **/lb**	21191.5 **/lb**
	RELATIVE DENSITY (AIR=1):		1.2452
	COMPRESSIBILITY FACTOR :		0.98956

(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

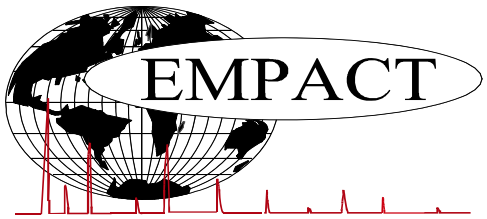
303-637-0150

EXTENDED NATURAL GAS ANALYSIS (*DHA)

GLYCALC INFORMATION

PROJECT NO. :	201403015	ANALYSIS NO. :	18
COMPANY NAME :	CARRIZO OIL & GAS	ANALYSIS DATE:	MARCH 7, 2014
ACCOUNT NO. :		SAMPLE DATE :	MARCH 4, 2014
PRODUCER :		CYLINDER NO. :	0538
LEASE NO. :		SAMPLED BY :	BRIAN MORROW-EMPACT
NAME/DESCRIP :	SALES GAS @ 16:55 SPEAKER 2-27-8-61		
FIELD DATA		SAMPLE TEMP. :	65 F
SAMPLE PRES. :	70	AMBIENT TEMP.:	
VAPOR PRES. :		GRAVITY :	
COMMENTS :	SPOT; NO PROBE; LENGTH OF H2S STAIN @ 7PPM (1-7PPM) @ 17:00 WITNESSED BY GALE MCENDREE-EMPACT		

Componet	Mole %	Wt %
Helium	0.00	0.00
Hydrogen	0.00	0.00
Carbon Dioxide	3.49	4.26
Nitrogen	0.37	0.29
Methane	30.93660	13.75330
Ethane	21.5651	17.9691
Propane	25.2205	30.8180
Isobutane	2.8863	4.6488
n-Butane	9.4097	15.1556
Isopentane	1.7220	3.4429
n-Pentane	2.1931	4.3847
Cyclopentane	0.2106	0.4093
n-Hexane	0.4306	1.0283
Cyclohexane	0.1110	0.2589
Other Hexanes	0.7586	1.7977
Heptanes	0.3159	0.8706
Methycyclohexane	0.0728	0.1981
2,2,4 Trimethylpentane	0.0001	0.0003
Benzene	0.0754	0.1632
Toluene	0.0377	0.0963
Ethylbenzene	0.0024	0.0071
Xylenes	0.0058	0.0170
C8+ Heavies	0.1126	0.3657
Subtotal	99.92680	99.93490
Oxygen/Argon	0.06	0.05
Alcohols	0.0132	0.0151
Total	100.00000	100.00000



EXTENDED NATURAL GAS ANALYSIS (*DHA)

DHA COMPONENT LIST

PROJECT NO. :	201403015	ANALYSIS NO. :	18
COMPANY NAME :	CARRIZO OIL & GAS	ANALYSIS DATE:	MARCH 7, 2014
ACCOUNT NO. :		SAMPLE DATE :	MARCH 4, 2014
PRODUCER :		CYLINDER NO. :	0538
LEASE NO. :		SAMPLED BY :	BRIAN MORROW-EMPACT
NAME/DESCRIP :	SALES GAS @ 16:55 SPEAKER 2-27-8-61		
FIELD DATA		SAMPLE TEMP. :	65 F
SAMPLE PRES. :	70	AMBIENT TEMP.:	
VAPOR PRES. :		GRAVITY :	
COMMENTS :	SPOT; NO PROBE; LENGTH OF H2S STAIN @ 7PPM (1-7PPM) @ 17:00 WITNESSED BY GALE MCENDREE-EMPACT		

COMPONENT	PIANO #	MOLE %	MASS %	GPM @ 14.650	GPM @ 14.730
Helium	---	0.00	0.00	---	---
Hydrogen	---	0.00	0.00	---	---
Oxygen/Argon	---	0.06	0.05	---	---
Nitrogen	---	0.37	0.29	---	---
Carbon Dioxide	---	3.49	4.26	---	---
Methane	P1	30.93660	13.75330	---	---
Ethane	P2	21.5651	17.9691	5.796	5.827
Propane	P3	25.2205	30.8180	6.981	7.019
i-Butane	I4	2.8863	4.6488	0.949	0.954
Methanol	X1	0.0087	0.0077	0.001	0.001
n-Butane	P4	9.4097	15.1556	2.981	2.997
2,2-Dimethylpropane	I5	0.0076	0.0152	0.003	0.003
i-Pentane	I5	1.7144	3.4277	0.630	0.633
Acetone	X3	0.0042	0.0068	0.002	0.002
n-Pentane	P5	2.1930	4.3845	0.799	0.803
t-Butanol	X4	0.0003	0.0006	0.000	0.000
2,2-Dimethylbutane	I6	0.0053	0.0127	0.002	0.002
Cyclopentane	N5	0.2106	0.4093	0.063	0.063
2,3-Dimethylbutane	I6	0.0113	0.0270	0.005	0.005
2-Methylpentane	I6	0.3275	0.7821	0.137	0.138
3-Methylpentane	I6	0.1649	0.3938	0.068	0.068
UnknownC5s	U5	0.0001	0.0002	0.000	0.000
n-Hexane	P6	0.4306	1.0283	0.178	0.179
2,2-Dimethylpentane	I7	0.0016	0.0044	0.001	0.001
Methylcyclopentane	N6	0.2492	0.5812	0.089	0.089
2,4-Dimethylpentane	I7	0.0101	0.0280	0.005	0.005
2,2,3-Trimethylbutane	I7	0.0003	0.0008	0.000	0.000
Benzene	A6	0.0754	0.1632	0.021	0.021
3,3-Dimethylpentane	I7	0.0011	0.0030	0.000	0.000
Cyclohexane	N6	0.1110	0.2589	0.038	0.039
2-Methylhexane	I7	0.0382	0.1061	0.018	0.018
2,3-Dimethylpentane	I7	0.0190	0.0528	0.009	0.009
1,1-Dimethylcyclopentane	N7	0.0108	0.0294	0.004	0.004
3-Methylhexane	I7	0.0437	0.1213	0.020	0.020
1c,3-Dimethylcyclopentane	N7	0.0246	0.0669	0.011	0.011
1t,3-Dimethylcyclopentane	N7	0.0219	0.0596	0.010	0.010
3-Ethylpentane	I7	0.0016	0.0044	0.001	0.001
1t,2-Dimethylcyclopentane	N7	0.0454	0.1235	0.021	0.021
2,2,4-Trimethylpentane	I8	0.0001	0.0003	0.000	0.000
UnknownC6s	U6	0.0004	0.0009	0.000	0.000
n-Heptane	P7	0.0853	0.2369	0.039	0.040
1c,2-Dimethylcyclopentane	N7	0.0028	0.0076	0.001	0.001
Methylcyclohexane	N7	0.0728	0.1981	0.029	0.029
2,2-Dimethylhexane	I8	0.0052	0.0165	0.002	0.002
Ethylcyclopentane	N7	0.0094	0.0256	0.004	0.004
2,5-Dimethylhexane	I8	0.0015	0.0047	0.001	0.001
2,2,3-Trimethylpentane	I8	0.0003	0.0009	0.000	0.000
2,4-Dimethylhexane	I8	0.0027	0.0085	0.001	0.001

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

1c,2t,4-Trimethylcyclopentane	N8	0.0052	0.0162	0.002	0.002
3,3-Dimethylhexane	I8	0.0003	0.0009	0.000	0.000
1t,2c,4-Trimethylcyclopentane	N8	0.0057	0.0177	0.003	0.003
2,3,4-Trimethylpentane	I8	0.0011	0.0035	0.001	0.001
2,3,3-Trimethylpentane	I8	0.0001	0.0003	0.000	0.000
Toluene	A7	0.0377	0.0963	0.013	0.013
2,3-Dimethylhexane	I8	0.0015	0.0047	0.001	0.001
2-Methyl-3-ethylpentane	I8	0.0014	0.0044	0.001	0.001
2-Methylheptane	I8	0.0107	0.0339	0.006	0.006
4-Methylheptane	I8	0.0030	0.0095	0.002	0.002
3-Methyl-3-ethylpentane	I8	0.0002	0.0006	0.000	0.000
3,4-Dimethylhexane	I8	0.0005	0.0016	0.000	0.000
1c,2c,4-Trimethylcyclopentane	N8	0.0003	0.0009	0.000	0.000
1c,3-Dimethylcyclohexane	N8	0.0002	0.0006	0.000	0.000
3-Methylheptane	I8	0.0051	0.0162	0.003	0.003
1c,2t,3-Trimethylcyclopentane	N8	0.0071	0.0221	0.004	0.004
3-Ethylhexane	I8	0.0008	0.0025	0.000	0.000
1t,4-Dimethylcyclohexane	N8	0.0026	0.0081	0.001	0.001
1,1-Dimethylcyclohexane	N8	0.0009	0.0028	0.000	0.000
3t-Ethylmethylcyclopentane	N8	0.0015	0.0047	0.001	0.001
2t-Ethylmethylcyclopentane	N8	0.0013	0.0040	0.001	0.001
1,1-Methylethylcyclopentane	N8	0.0041	0.0127	0.002	0.002
2,2,4-Trimethylhexane	I9	0.0003	0.0010	0.000	0.000
1t,2-Dimethylcyclohexane	N8	0.0038	0.0118	0.002	0.002
1t,3-Dimethylcyclohexane	N8	0.0001	0.0003	0.000	0.000
UnknownC7s	U7	0.0001	0.0003	0.000	0.000
n-Octane	P8	0.0138	0.0437	0.007	0.007
1c,4-Dimethylcyclohexane	N8	0.0013	0.0040	0.001	0.001
i-Propylcyclopentane	I8	0.0003	0.0009	0.000	0.000
2,4,4-Trimethylhexane	I9	0.0001	0.0004	0.000	0.000
2,3,5-Trimethylhexane	I9	0.0006	0.0021	0.000	0.000
2,2,3,4-Tetramethylpentane	I9	0.0001	0.0004	0.000	0.000
2,3,4-Trimethylhexane	I9	0.0001	0.0004	0.000	0.000
1c,2-Dimethylcyclohexane	N8	0.0005	0.0015	0.000	0.000
2,2-Dimethylheptane	I9	0.0001	0.0004	0.000	0.000
1,1,4-Trimethylcyclohexane	N9	0.0038	0.0133	0.002	0.002
2,2,3-Trimethylhexane	I9	0.0014	0.0050	0.001	0.001
2,4-Dimethylheptane	I9	0.0003	0.0010	0.000	0.000
4,4-Dimethylheptane	I9	0.0001	0.0004	0.000	0.000
Ethylcyclohexane	N8	0.0019	0.0059	0.001	0.001
n-Propylcyclopentane	N8	0.0007	0.0022	0.000	0.000
1c,3c,5-Trimethylcyclohexane	N9	0.0001	0.0004	0.000	0.000
2,5-Dimethylheptane	I9	0.0002	0.0007	0.000	0.000
3,3-Dimethylheptane	I9	0.0003	0.0010	0.000	0.000
3,5-Dimethylheptane	I9	0.0002	0.0007	0.000	0.000
2,6-Dimethylheptane	I9	0.0002	0.0007	0.000	0.000
1,1,3-Trimethylcyclohexane	N9	0.0007	0.0024	0.000	0.000
Ethylbenzene	I8	0.0024	0.0071	0.001	0.001
1c,2t,4t-Trimethylcyclohexane	N9	0.0006	0.0021	0.000	0.000
2,3-Dimethylheptane	I9	0.0015	0.0053	0.001	0.001
1,3-Dimethylbenzene (m-Xylene)	A8	0.0031	0.0091	0.001	0.001
1,4-Dimethylbenzene (p-Xylene)	A8	0.0010	0.0029	0.000	0.000
3,4-Dimethylheptane (2)	I9	0.0004	0.0014	0.000	0.000
4-Ethylheptane	I9	0.0001	0.0004	0.000	0.000
4-Methyloctane	I9	0.0006	0.0021	0.000	0.000
2-Methyloctane	I9	0.0007	0.0025	0.000	0.000
1c,2t,3-Trimethylcyclohexane	N9	0.0001	0.0004	0.000	0.000
3-Ethylheptane	I9	0.0003	0.0010	0.000	0.000
3-Methyloctane	I9	0.0008	0.0028	0.000	0.000
1c,2t,4c-Trimethylcyclohexane	I9	0.0001	0.0004	0.000	0.000
1,1,2-Trimethylcyclohexane	N9	0.0001	0.0004	0.000	0.000
3,3-Diethylpentane	I9	0.0001	0.0004	0.000	0.000
1,2-Dimethylbenzene (o-Xylene)	A8	0.0017	0.0050	0.001	0.001
i-Butylcyclopentane	N9	0.0005	0.0017	0.000	0.000
UnknownC8s	U8	0.0007	0.0022	0.000	0.000
n-Nonane	P9	0.0022	0.0078	0.001	0.001
1,1-Methylethylcyclohexane	N9	0.0003	0.0010	0.000	0.000
i-Propylbenzene	A9	0.0004	0.0013	0.000	0.000
i-Propylcyclohexane	N9	0.0001	0.0004	0.000	0.000
2,2-Dimethyloctane	I10	0.0001	0.0004	0.000	0.000
2,4-Dimethyloctane	I10	0.0001	0.0004	0.000	0.000
n-Butylcyclopentane	N9	0.0004	0.0014	0.000	0.000
3,3-Dimethyloctane	I10	0.0002	0.0008	0.000	0.000

n-Propylbenzene	A9	0.0003	0.0010	0.000	0.000
3,6-Dimethyloctane	I10	0.0001	0.0004	0.000	0.000
3-Methyl-5-ethylheptane	I10	0.0006	0.0024	0.000	0.000
1,3-Methylethylbenzene	A9	0.0003	0.0010	0.000	0.000
1,4-Methylethylbenzene	A9	0.0001	0.0003	0.000	0.000
1,3,5-Trimethylbenzene	A9	0.0001	0.0003	0.000	0.000
2,3-Dimethyloctane	I10	0.0001	0.0004	0.000	0.000
5-Methylnonane	I10	0.0002	0.0008	0.000	0.000
1,2-Methylethylbenzene	A9	0.0002	0.0007	0.000	0.000
2-Methylnonane	I10	0.0002	0.0008	0.000	0.000
3-Ethyloctane	I10	0.0001	0.0004	0.000	0.000
3-Methylnonane	I10	0.0001	0.0004	0.000	0.000
1,2,4-Trimethylbenzene	A9	0.0001	0.0003	0.000	0.000
t-Butylbenzene	A10	0.0003	0.0011	0.000	0.000
i-Butylcyclohexane	N10	0.0001	0.0004	0.000	0.000
UnknownC9s	U9	0.0023	0.0082	0.001	0.001
n-Decane	P10	0.0004	0.0016	0.000	0.000
1,2,3-Trimethylbenzene	A9	0.0001	0.0003	0.000	0.000
Sec-Butylcyclohexane	A10	0.0001	0.0004	0.000	0.000
1,2-Methyl-i-propylbenzene	A10	0.0001	0.0004	0.000	0.000
UnknownC10s	U10	0.0013	0.0051	0.001	0.001
n-Undecane	P11	0.0001	0.0004	0.000	0.000
UnknownC11s	U11	0.0001	0.0004	0.000	0.000
n-Dodecane	P12	0.0001	0.0005	0.000	0.000
n-Tridecane	P13	0.0001	0.0005	0.000	0.000
UnknownC13s	U13	0.0001	0.0005	0.000	0.000
n-Tetradecane	P14	0.0001	0.0005	0.000	0.000
UnknownC14s	U14	0.0001	0.0005	0.000	0.000
TOTAL		100.00000	100.00000	18.9820	19.0855

BTEX COMPONENTS	MOLE%	WT%
BENZENE	0.0754	0.1632
TOLUENE	0.0377	0.0963
ETHYLBENZENE	0.0024	0.0071
XYLENES	0.0058	0.0170
TOTAL BTEX	0.1213	0.2836

	BTU @	14.650	14.730
LOW	NET DRY REAL :	1836.8 **/scf**	1846.8 **/scf**
	NET WET REAL :	1804.7 **/scf**	1814.7 **/scf**
HIGH	GROSS DRY REAL :	2002.7 **/scf**	2013.6 **/scf**
	GROSS WET REAL :	1967.7 **/scf**	1978.6 **/scf**
	NET DRY REAL :	19335.9 **/lb**	19441.5 **/lb**
	GROSS DRY REAL :	21076.5 **/lb**	21191.5 **/lb**

RELATIVE DENSITY (AIR=1): 1.2452

COMPRESSIBILITY FACTOR : 0.98956

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

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

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