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

303-637-0150

EXTENDED NATURAL GAS LIQUID ANALYSIS (*DHA)

MAIN PAGE

PROJECT NO. :	201312093	ANALYSIS NO. :	01
COMPANY NAME :	CARRIZO OIL & GAS	ANALYSIS DATE:	DECEMBER 19, 2013
ACCOUNT NO. :		SAMPLE DATE :	DECEMBER 18, 2013
PRODUCER :		CYLINDER NO. :	6016
LEASE NO. :		SAMPLED BY :	JOHN MOSER
NAME/DESCRIP :	TREATER @ 13:00		EMPACT
	BOB WHITE 3-36-8-62		
FIELD DATA		SAMPLE TEMP. :	133
SAMPLE PRES. :	24	AMBIENT TEMP.:	
VAPOR PRES. :		GRAVITY :	
COMMENTS :	SPOT; NO PROBE		

COMPONENT	MOLE %	MASS %	VOL %
ALCOHOLS	3.0482	2.0623	1.9093
NITROGEN (AIR)	0.0530	0.0136	0.0125
CARBON DIOXIDE	0.0408	0.0164	0.0149
METHANE	0.1009	0.0148	0.0368
ETHANE	0.4675	0.1283	0.2685
PROPANE	1.5984	0.6434	0.9460
I-BUTANE	0.4285	0.2273	0.3010
N-BUTANE	2.0859	1.1066	1.4125
I-PENTANE	0.9623	0.6338	0.7569
N-PENTANE	1.5890	1.0465	1.2360
HEXANES PLUS	89.6255	94.1070	93.1056
TOTALS	100.0000	100.0000	100.0000

BTEX COMPONENTS	**MOLE%**	**MASS%**
BENZENE	1.3183	0.9399
TOLUENE	2.8571	2.4030
ETHYLBENZENE	0.4121	0.3994
XYLENE	2.0294	1.9667
TOTAL BTEX	6.6169	5.7090

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

	TOTAL SAMPLE	**C6+ FRACTION**	
Specific Gravity (H2O=1) =	0.7457	0.7535	60/60
API Gravity =	58.25	56.29	60/60
Molecular Weight =	109.55	115.634	
Absolute Density =	6.22	6.28	LBS/GAL
Heating Value Liq. Idl Gas=	128946	127938	BTU/GAL
Vapor/Liquid =	22.34	20.70	CUFT/GAL
Vapor Pressure =	15.10	1.58	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. :	201312093	ANALYSIS NO. :	01
COMPANY NAME :	CARRIZO OIL & GAS	ANALYSIS DATE:	DECEMBER 19, 2013
ACCOUNT NO. :		SAMPLE DATE :	DECEMBER 18, 2013
PRODUCER :		CYLINDER NO. :	6016
LEASE NO. :		SAMPLED BY :	JOHN MOSER
NAME/DESCRIP :	TREATER @ 13:00		EMPACT
	BOB WHITE 3-36-8-62		
FIELD DATA		SAMPLE TEMP. :	133
SAMPLE PRES. :	24	AMBIENT TEMP.:	
VAPOR PRES. :		GRAVITY :	
COMMENTS :	SPOT; NO PROBE		

COMPONENT	Mole %		Wt %		LV %	
CARBON DIOXIDE	0.0408		0.0164		0.0149	
NITROGEN (AIR)	0.0530		0.0136		0.0125	
METHANE	0.1009		0.0148		0.0368	
ETHANE	0.4675		0.1283		0.2685	
PROPANE	1.5984		0.6434		0.9460	
I-BUTANE	0.4285		0.2273		0.3010	
N-BUTANE	2.0859		1.1066		1.4125	
I-PENTANE	0.9623		0.6338		0.7569	
N-PENTANE	1.5890		1.0465		1.2360	
CYCLOPENTANE (N-C5)	1.1843		0.7581		0.7434	
N-HEXANE	6.1968		4.8744		5.4738	
CYCLOHEXANE (OTHER C6)	2.7428		2.1070		2.0047	
OTHER HEXANES	7.7306		6.0080		6.3633	
OTHER HEPTANES	13.1499		11.9407		12.4996	
METHYLCYCLOHEXANE (OTHER C7)	3.9172		3.5109		3.3782	
2,2,4 TRIMETHYLPENTANE	0.7930		0.7107		0.7031	
BENZENE	1.3183		0.9399		0.7936	
TOLUENE	2.8571		2.4030		2.0489	
ETHYLBENZENE	0.4121		0.3994		0.3405	
XYLENES	2.0294		1.9667		1.6806	
OTHER OCTANES	12.8711		13.3976		13.3900	
OCTANES PLUS	----	50.5285	----	61.5650	----	59.8001
NONANES	10.6820		12.3470		12.1110	
DECANES PLUS	23.7409		32.7436		31.5749	
SUB TOTAL	96.9518		97.9377		98.0907	
ALCOHOLS	3.0482		2.0623		1.9093	
TOTAL	100.0000		100.0000		100.0000	

API Gravity	=	**58.25**	60/60
Vapor Pressure	=	**15.10**	PSIA & 100 F
Average Molecular Weight of Decanes plus	=	**151.10**	
Average Specific Gravity of Decanes plus	=	**0.7780**	

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EXTENDED NATURAL GAS LIQUID ANALYSIS (*DHA)

BY CARBON NUMBER

PROJECT NO. :	201312093	ANALYSIS NO. :	01
COMPANY NAME :	CARRIZO OIL & GAS	ANALYSIS DATE:	DECEMBER 19, 2013
ACCOUNT NO. :		SAMPLE DATE :	DECEMBER 18, 2013
PRODUCER :		CYLINDER NO. :	6016
LEASE NO. :		SAMPLED BY :	JOHN MOSER
NAME/DESCRIP :	TREATER @ 13:00		EMPACT
	BOB WHITE 3-36-8-62		
FIELD DATA		SAMPLE TEMP. :	133
SAMPLE PRES. :	24	AMBIENT TEMP.:	
VAPOR PRES. :		GRAVITY :	
COMMENTS :	SPOT; NO PROBE		

COMPONENT / CARBON NUMBER		MOLE%	MASS %	VOLUME %
ALCOHOLS		3.0482	2.0623	1.9093
NITROGEN		0.0530	0.0136	0.0125
CARBON DIOXIDE		0.0408	0.0164	0.0149
	C1	0.1009	0.0148	0.0368
	C2	0.4675	0.1283	0.2685
	C3	1.5984	0.6434	0.9460
	C4	2.5144	1.3339	1.7135
	C5	3.7356	2.4384	2.7363
	C6	17.9885	13.9293	14.6354
	C7	19.9242	17.8546	17.9267
	C8	16.1056	16.4744	16.1142
	C9	10.6820	12.3470	12.1110
	C10	11.1497	14.0426	13.6585
	C11	6.2207	8.4825	8.0371
	C12	2.9122	4.1968	4.0203
	C13	1.8280	3.0213	2.9371
	C14	1.2542	2.2712	2.2180
	C15	0.3761	0.7292	0.7039
	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

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EXTENDED NATURAL GAS LIQUID ANALYSIS (*DHA)

DHA COMPONENT LIST

PROJECT NO. :	201312093	ANALYSIS NO. :	01
COMPANY NAME :	CARRIZO OIL & GAS	ANALYSIS DATE:	DECEMBER 19, 2013
ACCOUNT NO. :		SAMPLE DATE :	DECEMBER 18, 2013
PRODUCER :		CYLINDER NO. :	6016
LEASE NO. :		SAMPLED BY :	JOHN MOSER
NAME/DESCRIP :	TREATER @ 13:00		EMPACT
	BOB WHITE 3-36-8-62		
FIELD DATA		SAMPLE TEMP. :	133
SAMPLE PRES. :	24	AMBIENT TEMP.:	
VAPOR PRES. :		GRAVITY :	
COMMENTS :	SPOT; NO PROBE		

COMPONENT	PIANO #	MOLE %	MASS %	VOL %
Nitrogen	NHC	0.0530	0.0136	0.0125
Carbon Dioxide	NHC	0.0408	0.0164	0.0149
Methane	P1	0.1009	0.0148	0.0368
Ethane	P2	0.4675	0.1283	0.2685
Propane	P3	1.5984	0.6434	0.9460
i-Butane	I4	0.4285	0.2273	0.3010
n-Butane	P4	2.0859	1.1066	1.4125
2,2-Dimethylpropane	I5	0.0132	0.0087	0.0109
i-Pentane	I5	0.9491	0.6251	0.7460
n-Pentane	P5	1.5890	1.0465	1.2360
2,2-Dimethylbutane	I6	0.1417	0.1115	0.1271
Cyclopentane	N5	1.1843	0.7581	0.7434
2,3-Dimethylbutane	I6	0.3488	0.2744	0.3067
2-Methylpentane	I6	3.2618	2.5659	2.9079
i-butanol	X4	3.0482	2.0623	1.9093
n-Hexane	P6	6.1968	4.8744	5.4738
2,2-Dimethylpentane	I7	0.0411	0.0376	0.0411
Methylcyclopentane	N6	3.9783	3.0562	3.0216
2,4-Dimethylpentane	I7	0.3229	0.2953	0.3255
2,2,3-Trimethylbutane	I7	0.1051	0.0961	0.1030
Benzene	A6	1.3183	0.9399	0.7936
3,3-Dimethylpentane	I7	0.0235	0.0215	0.0230
Cyclohexane	N6	2.7428	2.1070	2.0047
2-Methylhexane	I7	0.7881	0.7208	0.7874
2,3-Dimethylpentane	I7	0.7944	0.7266	0.7711
1,1-Dimethylcyclopentane	N7	0.5974	0.5354	0.5257
3-Methylhexane	I7	1.6323	1.4929	1.6063
1c,3-Dimethylcyclopentane	N7	0.8778	0.7867	0.7824
1t,3-Dimethylcyclopentane	N7	0.7930	0.7107	0.7031
3-Ethylpentane	I7	0.0741	0.0678	0.0718
1t,2-Dimethylcyclopentane	N7	1.6639	1.4913	1.4702
2,2,4-Trimethylpentane	I8	0.4007	0.4178	0.4455
n-Heptane	P7	4.6660	4.2676	4.6223
1c,2-Dimethylcyclopentane	N7	0.1064	0.0954	0.0915
Methylcyclohexane	N7	3.9172	3.5109	3.3782

2,2-Dimethylhexane	I8	0.7971	0.8311	0.8849
Ethylcyclopentane	N7	0.6639	0.5950	0.5752
2,5-Dimethylhexane	I8	0.0917	0.0956	0.1020
2,2,3-Trimethylpentane	I8	0.0624	0.0651	0.0674
2,4-Dimethylhexane	I8	0.3104	0.3236	0.3438
1c,2t,4-Trimethylcyclopentane	N8	0.3906	0.4001	0.3883
3,3-Dimethylhexane	I8	0.1231	0.1284	0.1340
2,3,4-Trimethylpentane	I8	0.1139	0.1188	0.1223
2,3,3-Trimethylpentane	I8	0.0467	0.0487	0.0497
Toluene	A7	2.8571	2.4030	2.0489
2,3-Dimethylhexane	I8	0.1277	0.1331	0.1385
2-Methyl-3-ethylpentane	I8	0.2297	0.2395	0.2466
1,1,2-Trimethylcyclopentane	N8	0.0672	0.0688	0.0660
2-Methylheptane	I8	1.0566	1.1017	1.1672
4-Methylheptane	I8	0.3426	0.3572	0.3693
3-Methyl-3-ethylpentane	I8	0.2128	0.2219	0.2261
3,4-Dimethylhexane	I8	0.1966	0.2050	0.2110
1c,2c,4-Trimethylcyclopentane	N8	0.0837	0.0857	0.0823
1c,3-Dimethylcyclohexane	N8	0.0578	0.0592	0.0573
3-Methylheptane	I8	0.1127	0.1175	0.1234
1c,2t,3-Trimethylcyclopentane	N8	0.6240	0.6391	0.6148
3-Ethylhexane	I8	0.6497	0.6774	0.7040
1t,4-Dimethylcyclohexane	N8	0.9212	0.9435	0.9169
1,1-Dimethylcyclohexane	N8	0.2484	0.2544	0.2415
3c-Ethylmethylcyclopentane	N8	0.2433	0.2492	0.2409
3t-Ethylmethylcyclopentane	N8	0.1436	0.1471	0.1422
2t-Ethylmethylcyclopentane	N8	0.6677	0.6839	0.6592
1,1-Methylethylcyclopentane	N8	0.1347	0.1380	0.1310
1t,2-Dimethylcyclohexane	N8	0.7748	0.7936	0.7582
1t,3-Dimethylcyclohexane	N8	0.0060	0.0061	0.0058
n-Octane	P8	1.1517	1.2009	1.2663
1c,4-Dimethylcyclohexane	N8	2.0945	2.1453	2.0312
i-Propylcyclopentane	I8	0.1603	0.1642	0.1568
2,4,4-Trimethylhexane	I9	0.0461	0.0540	0.0554
2,2,3,4-Tetramethylpentane	I9	0.0852	0.0997	0.1027
2,3,4-Trimethylhexane	I9	0.0224	0.0262	0.0269
1c,2-Dimethylcyclohexane	N8	0.1297	0.1328	0.1236
2,3,5-Trimethylhexane	I9	0.0762	0.0892	0.0916
2,2-Dimethylheptane	I9	0.0201	0.0235	0.0245
1,1,4-Trimethylcyclohexane	N9	0.7894	0.9096	0.8735
2,2,3-Trimethylhexane	I9	0.3202	0.3749	0.3810
2,4-Dimethylheptane	I9	0.2074	0.2428	0.2515
4,4-Dimethylheptane	I9	0.1521	0.1781	0.1845
Ethylcyclohexane	N8	0.6199	0.6349	0.5975
n-Propylcyclopentane	N8	0.1627	0.1666	0.1590
1c,3c,5-Trimethylcyclohexane	N9	0.0540	0.0622	0.0597
2,5-Dimethylheptane	I9	0.1054	0.1234	0.1276
3,3-Dimethylheptane	I9	0.0955	0.1118	0.1156
3,5-Dimethylheptane	I9	0.0754	0.0883	0.0913
2,6-Dimethylheptane	I9	0.0503	0.0589	0.0616
1,1,3-Trimethylcyclohexane	N9	0.0518	0.0597	0.0573
Ethylbenzene	A8	0.4121	0.3994	0.3405
1c,2t,4t-Trimethylcyclohexane	N9	0.4661	0.5371	0.5060
2,3-Dimethylheptane	I9	0.0057	0.0067	0.0068
1,3-Dimethylbenzene (m-Xylene)	A8	0.6200	0.6008	0.5152
1,4-Dimethylbenzene (p-Xylene)	A8	0.8531	0.8268	0.7112
3,4-Dimethylheptane	I9	0.2114	0.2475	0.2508
3,4-Dimethylheptane (2)	I9	0.2703	0.3164	0.3206
4-Ethylheptane	I9	0.0917	0.1074	0.1112
4-Methyloctane	I9	0.2125	0.2488	0.2559
2-Methyloctane	I9	0.2148	0.2515	0.2612
1c,2t,4c-Trimethylcyclohexane	I9	0.0887	0.1038	0.1060
3-Ethylheptane	I9	0.0738	0.0864	0.0881
3-Methyloctane	I9	0.2018	0.2363	0.2430
3,3-Diethylpentane	I9	0.0762	0.0892	0.0876
1c,2t,3-Trimethylcyclohexane	N9	0.1823	0.2101	0.1979
1,1,2-Trimethylcyclohexane	N9	0.0556	0.0641	0.0604

1,2-Dimethylbenzene (o-Xylene)	A8	0.5563	0.5391	0.4542
i-Butylcyclopentane	N9	0.2183	0.2515	0.2387
UnknownC8s	U8	0.1079	0.1125	0.1186
n-Nonane	P9	0.8232	0.9638	0.9953
1,1-Methylethylcyclohexane	N9	0.7937	0.9292	0.9625
i-Propylbenzene	A9	0.3750	0.4114	0.3532
i-Propylcyclohexane	N9	0.1383	0.1594	0.1474
2,2-Dimethyloctane	I10	0.0827	0.1074	0.1077
2,4-Dimethyloctane	I10	0.0508	0.0660	0.0662
2,6-Dimethyloctane	I10	0.0206	0.0268	0.0278
2,5-Dimethyloctane	I10	0.0439	0.0570	0.0571
n-Butylcyclopentane	N9	0.2299	0.2944	0.2732
3,3-Dimethyloctane	I10	0.0888	0.1153	0.1156
n-Propylbenzene	A9	0.2421	0.2656	0.2280
3,6-Dimethyloctane	I10	0.1681	0.2183	0.2188
3-Methyl-5-ethylheptane	I10	0.3629	0.4249	0.4340
1,3-Methylethylbenzene	A9	0.3503	0.3843	0.3272
1,4-Methylethylbenzene	A9	0.3471	0.3808	0.3242
1,3,5-Trimethylbenzene	A9	0.0766	0.0840	0.0720
2,3-Dimethyloctane	I10	0.0638	0.0829	0.0831
5-Methylnonane	I10	0.0899	0.1168	0.1182
1,2-Methylethylbenzene	A9	0.3028	0.3322	0.2813
2-Methylnonane	I10	0.1020	0.1325	0.1352
3-Ethyloctane	I10	0.1037	0.1347	0.1350
3-Methylnonane	I10	0.1868	0.2426	0.2452
1,2,4-Trimethylbenzene	A9	0.0602	0.0660	0.0559
t-Butylbenzene	A10	0.1684	0.2063	0.1766
i-Butylcyclohexane	N10	0.2658	0.3403	0.3108
1t-Methyl-2-n-propylcyclohexane	I10	0.1282	0.1501	0.1533
i-Butylbenzene	A10	0.0614	0.0752	0.0654
sec-Butylbenzene	A10	0.1011	0.1239	0.1066
UnknownC9s	U9	2.1659	2.5357	2.6187
n-Decane	P10	1.3052	1.6951	1.7211
1,2,3-Trimethylbenzene	A9	0.2562	0.2811	0.2332
1,3-Methyl-i-propylbenzene	A10	0.1370	0.1503	0.1273
1,4-Methyl-i-propylbenzene	A10	0.1003	0.1100	0.0932
Sec-Butylcyclohexane	N10	0.2638	0.3378	0.3081
1,2-Methyl-i-propylbenzene	A10	0.2035	0.2493	0.2109
3-Ethylnonane	I10	0.0701	0.0910	0.0929
1,3-Diethylbenzene	A10	0.1394	0.1708	0.1466
1,3-Methyl-n-propylbenzene	A10	0.0590	0.0723	0.0623
1,4-Diethylbenzene	A10	0.1452	0.1779	0.1531
1,4-Methyl-n-propylbenzene	A10	0.1016	0.1245	0.1076
n-Butylbenzene	A10	0.0778	0.0953	0.0820
1,3-Dimethyl-5-ethylbenzene	A10	0.1734	0.2124	0.1822
1,2-Diethylbenzene	A10	0.1255	0.1538	0.1297
1,2-Methyl-n-propylbenzene	A10	0.0631	0.0773	0.0656
1,4-Dimethyl-2-ethylbenzene	A10	0.0881	0.1079	0.0912
1,3-Dimethyl-4-ethylbenzene	A10	0.1458	0.1786	0.1512
1,2-Dimethyl-4-ethylbenzene	A10	0.1734	0.2124	0.1802
1,3-Dimethyl-2-ethylbenzene	A10	0.0890	0.1090	0.0908
1t,2c,4-Trimethylcyclopentane	A10	0.5214	0.5340	0.5295
1,2-Dimethyl-3-ethylbenzene	A10	0.1360	0.1666	0.1385
1,2-Ethyl-i-propylbenzene	A10	0.0781	0.0957	0.0810
1,4-Methyl-t-butylbenzene	A11	0.0695	0.0851	0.0720
UnknownC10s	U10	4.6715	6.0670	6.1601
n-Undecane	P11	0.9650	1.3768	1.3786
1,4-Ethyl-i-propylbenzene	A11	0.4871	0.5968	0.5050
1,2,4,5-Tetramethylbenzene	A11	0.1488	0.1823	0.1526
1,2-Methyl-n-butylbenzene	A11	0.0264	0.0323	0.0273
1,2,3,5-Tetramethylbenzene	A11	0.1622	0.1987	0.1656
1,2-Methyl-t-butylbenzene	A11	0.0570	0.0698	0.0591
4-Methylindan	A11	0.0206	0.0320	0.0317
1,2-Ethyl-n-propylbenzene	A11	0.2249	0.2755	0.2331
2-Methylindan	A11	0.1125	0.1749	0.1732
1,3-Methyl-n-butylbenzene	A11	0.0451	0.0553	0.0468
1,3-Di-i-propylbenzene	A11	0.0297	0.0364	0.0308

sec-Pentylbenzene	A11	0.1057	0.1295	0.1096
n-Pentylbenzene	A11	0.0552	0.0747	0.0645
1t-M-2-(4MP)cyclopentane	P12	0.0215	0.0334	0.0331
1,2-Di-n-propylbenzene	A11	0.1987	0.2434	0.2059
1,4-Di-i-propylbenzene	A11	0.1172	0.1436	0.1215
Tetrahydronaphthalene	A10	0.0451	0.0553	0.0468
t-Decahydronaphthalene	A10	0.0855	0.1048	0.0887
Naphthalene	A10	0.0620	0.0725	0.0613
1-t-Butyl-3,5-dimethylbenzene	A12	0.0325	0.0398	0.0337
1,4-Ethyl-t-butylbenzene	A11	0.1255	0.1538	0.1301
UnknownC11s	U11	2.9322	4.1836	4.1889
n-Dodecane	P12	0.7490	1.1646	1.1533
1,3-Di-n-propylbenzene	A12	0.1020	0.1250	0.1058
1,3,5-Triethylbenzene	A12	0.1896	0.2080	0.1783
1,2,4-Triethylbenzene	A12	0.3601	0.3951	0.3344
1,4-Methyl-n-pentylbenzene	A12	0.0938	0.1149	0.0972
n-Hexylbenzene	A12	0.0584	0.0865	0.0748
1,2,3,4,5-Pentamethylbenzene	A13	0.1199	0.1469	0.1243
2-Methylnaphthalene	A11	0.1439	0.1868	0.1581
1-Methylnaphthalene	A11	0.1935	0.2512	0.1827
UnknownC12s	U12	1.3053	2.0295	2.0097
n-Tridecane	P13	0.4199	0.7066	0.6915
UnknownC13s	U13	1.2882	2.1678	2.1213
n-Tetradecane	P14	0.3130	0.5668	0.5535
UnknownC14s	U14	0.9412	1.7044	1.6645
UnknownC15s	U15	0.3761	0.7292	0.7039
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. :	201312093	ANALYSIS NO. :	02
COMPANY NAME :	CARRIZO OIL & GAS	ANALYSIS DATE:	DECEMBER 20, 2013
ACCOUNT NO. :		SAMPLE DATE :	DECEMBER 18, 2013
PRODUCER :		CYLINDER NO. :	1305
LEASE NO. :		SAMPLED BY :	JOHN MOSER-EMPACT
NAME/DESCRIP :	SALES GAS @ 13:20 BOB WHITE 3-36-8-62		
FIELD DATA		SAMPLE TEMP. :	64
SAMPLE PRES. :	25	AMBIENT TEMP.:	
VAPOR PRES. :		GRAVITY :	
COMMENTS :	SPOT; NO PROBE; PULLED FROM SALES GAS TO FLARE LENGTH OF H2S STAIN @ 10PPM @ 13:25		

COMPONENT	MOLE %	MASS %	GPM @ 14.650	GPM @ 14.730
ALCOHOLS	0.0007	0.0018		
HELIUM	0.02	0.00	---	---
HYDROGEN	0.00	0.00	---	---
OXYGEN/ARGON	0.01	0.01	---	---
NITROGEN	0.89	1.05	---	---
CARBON DIOXIDE	2.68	4.96	---	---
METHANE	70.12010	47.32490	---	---
ETHANE	11.9669	15.1385	3.1958	3.2132
PROPANE	8.6622	16.0696	2.3828	2.3958
I-BUTANE	0.8899	2.1760	0.2903	0.2919
N-BUTANE	2.8663	7.0089	0.9021	0.9070
I-PENTANE	0.5859	1.7736	0.2102	0.2114
N-PENTANE	0.6682	2.0282	0.2423	0.2436
HEXANES PLUS	0.6398	2.4585	0.2521	0.2533
TOTALS	100.00000	100.00000	7.4756	7.5162

BTEX COMPONENTS	**MOLE%**	**WT%**
BENZENE	0.0229	0.0753
TOLUENE	0.0132	0.0512
ETHYLBENZENE	0.0013	0.0058
XYLENES	0.0035	0.0156
TOTAL BTEX	0.0409	0.1479

	BTU @	14.650	14.730
LOW	NET DRY REAL :	1221.4 **/scf**	1228.1 **/scf**
	NET WET REAL :	1200.0 **/scf**	1206.8 **/scf**
HIGH	GROSS DRY REAL :	1342.6 **/scf**	1349.9 **/scf**
	GROSS WET REAL :	1319.1 **/scf**	1326.4 **/scf**
	NET DRY REAL :	19517.0 **/lb**	19623.6 **/lb**
	GROSS DRY REAL :	21458.8 **/lb**	21576.0 **/lb**
	RELATIVE DENSITY (AIR=1):		0.8198
	COMPRESSIBILITY FACTOR :		0.99570

(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

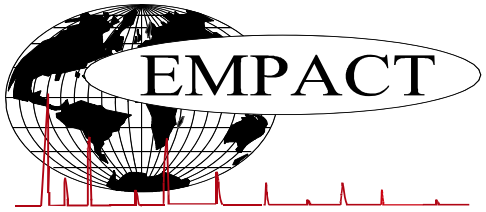
303-637-0150

EXTENDED NATURAL GAS ANALYSIS (*DHA)

GLYCALC INFORMATION

PROJECT NO. :	201312093	ANALYSIS NO. :	02
COMPANY NAME :	CARRIZO OIL & GAS	ANALYSIS DATE:	DECEMBER 20, 2013
ACCOUNT NO. :		SAMPLE DATE :	DECEMBER 18, 2013
PRODUCER :		CYLINDER NO. :	1305
LEASE NO. :		SAMPLED BY :	JOHN MOSER-EMPACT
NAME/DESCRIP :	SALES GAS @ 13:20 BOB WHITE 3-36-8-62		
FIELD DATA		SAMPLE TEMP. :	64
SAMPLE PRES. :	25	AMBIENT TEMP.:	
VAPOR PRES. :		GRAVITY :	
COMMENTS :	SPOT; NO PROBE; PULLED FROM SALES GAS TO FLARE LENGTH OF H2S STAIN @ 10PPM @ 13:25		

Componet	Mole %	Wt %
Helium	0.02	0.00
Hydrogen	0.00	0.00
Carbon Dioxide	2.68	4.96
Nitrogen	0.89	1.05
Methane	70.12010	47.32490
Ethane	11.9669	15.1385
Propane	8.6622	16.0696
Isobutane	0.8899	2.1760
n-Butane	2.8663	7.0089
Isopentane	0.5284	1.6039
n-Pentane	0.6682	2.0282
Cyclopentane	0.0575	0.1697
n-Hexane	0.1332	0.4829
Cyclohexane	0.0352	0.1246
Other Hexanes	0.2426	0.8728
Heptanes	0.1085	0.4541
Methycyclohexane	0.0259	0.1070
2,2,4 Trimethylpentane	0.0001	0.0005
Benzene	0.0229	0.0753
Toluene	0.0132	0.0512
Ethylbenzene	0.0013	0.0058
Xylenes	0.0035	0.0156
C8+ Heavies	0.0534	0.2687
Subtotal	99.98930	99.98820
Oxygen/Argon	0.01	0.01
Alcohols	0.0007	0.0018
Total	100.00000	100.00000



EXTENDED NATURAL GAS ANALYSIS (*DHA)

DHA COMPONENT LIST

PROJECT NO. :	201312093	ANALYSIS NO. :	02
COMPANY NAME :	CARRIZO OIL & GAS	ANALYSIS DATE:	DECEMBER 20, 2013
ACCOUNT NO. :		SAMPLE DATE :	DECEMBER 18, 2013
PRODUCER :		CYLINDER NO. :	1305
LEASE NO. :		SAMPLED BY :	JOHN MOSER-EMPACT
NAME/DESCRIP :	SALES GAS @ 13:20 BOB WHITE 3-36-8-62		
FIELD DATA		SAMPLE TEMP. :	64
SAMPLE PRES. :	25	AMBIENT TEMP.:	
VAPOR PRES. :		GRAVITY :	
COMMENTS :	SPOT; NO PROBE; PULLED FROM SALES GAS TO FLARE LENGTH OF H2S STAIN @ 10PPM @ 13:25		

COMPONENT	PIANO #	MOLE %	MASS %	GPM @ 14.650	GPM @ 14.730
Helium	---	0.02	0.00	---	---
Hydrogen	---	0.00	0.00	---	---
Oxygen/Argon	---	0.01	0.01	---	---
Nitrogen	---	0.89	1.05	---	---
Carbon Dioxide	---	2.68	4.96	---	---
Methane	P1	70.12010	47.32490	---	---
Ethane	P2	11.9669	15.1385	3.196	3.213
Propane	P3	8.6622	16.0696	2.383	2.396
i-Butane	I4	0.8899	2.1760	0.290	0.292
n-Butane	P4	2.8663	7.0089	0.902	0.907
2,2-Dimethylpropane	I5	0.0027	0.0082	0.001	0.001
i-Pentane	I5	0.5257	1.5957	0.192	0.193
Acetone	X3	0.0004	0.0010	0.000	0.000
i-Propanol	X3	0.0002	0.0005	0.000	0.000
n-Pentane	P5	0.6682	2.0282	0.242	0.244
t-Butanol	X4	0.0001	0.0003	0.000	0.000
2,2-Dimethylbutane	I6	0.0016	0.0058	0.001	0.001
Cyclopentane	N5	0.0575	0.1697	0.017	0.017
2,3-Dimethylbutane	I6	0.0094	0.0341	0.004	0.004
2-Methylpentane	I6	0.1009	0.3658	0.042	0.042
3-Methylpentane	I6	0.0513	0.1860	0.021	0.021
n-Hexane	P6	0.1332	0.4829	0.055	0.055
2,2-Dimethylpentane	I7	0.0005	0.0021	0.000	0.000
Methylcyclopentane	N6	0.0794	0.2811	0.028	0.028
2,4-Dimethylpentane	I7	0.0032	0.0135	0.001	0.001
2,2,3-Trimethylbutane	I7	0.0001	0.0004	0.000	0.000
Benzene	A6	0.0229	0.0753	0.006	0.006
3,3-Dimethylpentane	I7	0.0003	0.0013	0.000	0.000
Cyclohexane	N6	0.0352	0.1246	0.012	0.012
2-Methylhexane	I7	0.0130	0.0548	0.006	0.006
2,3-Dimethylpentane	I7	0.0061	0.0257	0.003	0.003
1,1-Dimethylcyclopentane	N7	0.0035	0.0145	0.001	0.001
3-Methylhexane	I7	0.0149	0.0628	0.007	0.007
1c,3-Dimethylcyclopentane	N7	0.0085	0.0351	0.004	0.004
1t,3-Dimethylcyclopentane	N7	0.0076	0.0314	0.003	0.003
3-Ethylpentane	I7	0.0011	0.0046	0.000	0.000
1t,2-Dimethylcyclopentane	N7	0.0151	0.0624	0.007	0.007
2,2,4-Trimethylpentane	I8	0.0001	0.0005	0.000	0.000
n-Heptane	P7	0.0301	0.1269	0.014	0.014
1c,2-Dimethylcyclopentane	N7	0.0010	0.0041	0.000	0.000
Methylcyclohexane	N7	0.0259	0.1070	0.010	0.010

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2,2-Dimethylhexane	I8	0.0019	0.0091	0.001	0.001
Ethylcyclopentane	N7	0.0035	0.0145	0.001	0.001
2,5-Dimethylhexane	I8	0.0007	0.0034	0.000	0.000
2,4-Dimethylhexane	I8	0.0010	0.0048	0.001	0.001
1c,2t,4-Trimethylcyclopentane	N8	0.0021	0.0099	0.001	0.001
3,3-Dimethylhexane	I8	0.0001	0.0005	0.000	0.000
1t,2c,4-Trimethylcyclopentane	N8	0.0023	0.0109	0.001	0.001
2,3,4-Trimethylpentane	I8	0.0004	0.0019	0.000	0.000
Toluene	A7	0.0132	0.0512	0.004	0.004
2,3-Dimethylhexane	I8	0.0008	0.0038	0.000	0.000
2-Methyl-3-ethylpentane	I8	0.0005	0.0024	0.000	0.000
2-Methylheptane	I8	0.0046	0.0221	0.002	0.002
4-Methylheptane	I8	0.0013	0.0063	0.001	0.001
3-Methyl-3-ethylpentane	I8	0.0001	0.0005	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	0.0022	0.0106	0.001	0.001
1c,2t,3-Trimethylcyclopentane	N8	0.0032	0.0151	0.002	0.002
3-Ethylhexane	I8	0.0003	0.0014	0.000	0.000
1t,4-Dimethylcyclohexane	N8	0.0011	0.0052	0.001	0.001
1,1-Dimethylcyclohexane	N8	0.0004	0.0019	0.000	0.000
3t-Ethylmethylcyclopentane	N8	0.0007	0.0033	0.000	0.000
2t-Ethylmethylcyclopentane	N8	0.0006	0.0028	0.000	0.000
1,1-Methylethylcyclopentane	N8	0.0018	0.0085	0.001	0.001
2,2,4-Trimethylhexane	I9	0.0001	0.0006	0.000	0.000
1t,2-Dimethylcyclohexane	N8	0.0017	0.0080	0.001	0.001
n-Octane	P8	0.0067	0.0322	0.003	0.003
1c,4-Dimethylcyclohexane	N8	0.0005	0.0024	0.000	0.000
i-Propylcyclopentane	I8	0.0002	0.0009	0.000	0.000
2,4,4-Trimethylhexane	I9	0.0001	0.0006	0.000	0.000
2,3,5-Trimethylhexane	I9	0.0001	0.0006	0.000	0.000
2,2,3,4-Tetramethylpentane	I9	0.0001	0.0006	0.000	0.000
1c,2-Dimethylcyclohexane	N8	0.0005	0.0024	0.000	0.000
1,1,4-Trimethylcyclohexane	N9	0.0020	0.0106	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	0.0001	0.0006	0.000	0.000
Ethylcyclohexane	N8	0.0010	0.0047	0.000	0.000
n-Propylcyclopentane	N8	0.0004	0.0019	0.000	0.000
1c,3c,5-Trimethylcyclohexane	N9	0.0001	0.0006	0.000	0.000
2,5-Dimethylheptane	I9	0.0001	0.0006	0.000	0.000
3,3-Dimethylheptane	I9	0.0002	0.0011	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	0.0003	0.0016	0.000	0.000
Ethylbenzene	I8	0.0013	0.0058	0.001	0.001
1c,2t,4t-Trimethylcyclohexane	N9	0.0003	0.0016	0.000	0.000
2,3-Dimethylheptane	I9	0.0002	0.0011	0.000	0.000
1,3-Dimethylbenzene (m-Xylene)	A8	0.0021	0.0094	0.001	0.001
1,4-Dimethylbenzene (p-Xylene)	A8	0.0005	0.0022	0.000	0.000
3,4-Dimethylheptane (2)	I9	0.0002	0.0011	0.000	0.000
4-Ethylheptane	I9	0.0001	0.0006	0.000	0.000
4-Methyloctane	I9	0.0004	0.0022	0.000	0.000
2-Methyloctane	I9	0.0004	0.0022	0.000	0.000
1c,2t,3-Trimethylcyclohexane	N9	0.0001	0.0006	0.000	0.000
3-Ethylheptane	I9	0.0001	0.0006	0.000	0.000
3-Methyloctane	I9	0.0005	0.0027	0.000	0.000
3,3-Diethylpentane	I9	0.0001	0.0006	0.000	0.000
1,2-Dimethylbenzene (o-Xylene)	A8	0.0009	0.0040	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	0.0015	0.0081	0.001	0.001
1,1-Methylethylcyclohexane	N9	0.0002	0.0011	0.000	0.000

i-Propylbenzene	A9	0.0003	0.0015	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	0.0003	0.0016	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	0.0002	0.0012	0.000	0.000
3-Methyl-5-ethylheptane	I10	0.0003	0.0018	0.000	0.000
1,3-Methylethylbenzene	A9	0.0002	0.0010	0.000	0.000
1,4-Methylethylbenzene	A9	0.0001	0.0005	0.000	0.000
1,3,5-Trimethylbenzene	A9	0.0001	0.0005	0.000	0.000
5-Methylnonane	I10	0.0001	0.0006	0.000	0.000
1,2-Methylethylbenzene	A9	0.0003	0.0015	0.000	0.000
3-Ethyloctane	I10	0.0001	0.0006	0.000	0.000
3-Methylnonane	I10	0.0001	0.0006	0.000	0.000
t-Butylbenzene	A10	0.0002	0.0011	0.000	0.000
i-Butylcyclohexane	N10	0.0001	0.0006	0.000	0.000
UnknownC9s	U9	0.0014	0.0076	0.001	0.001
n-Decane	P10	0.0003	0.0018	0.000	0.000
1,2,3-Trimethylbenzene	A9	0.0001	0.0005	0.000	0.000
Sec-Butylcyclohexane	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
UnknownC10s	U10	0.0011	0.0066	0.001	0.001
n-Undecane	P11	0.0001	0.0007	0.000	0.000
UnknownC11s	U11	0.0002	0.0013	0.000	0.000
n-Pentadecane	P15	0.0001	0.0009	0.000	0.000
n-Hexadecane	P16	0.0002	0.0019	0.000	0.000
n-Heptadecane	P17	0.0001	0.0010	0.000	0.000
TOTAL		100.00000	100.00000	7.4756	7.5162

BTEX COMPONENTS	**MOLE%**	**WT%**
BENZENE	0.0229	0.0753
TOLUENE	0.0132	0.0512
ETHYLBENZENE	0.0013	0.0058
XYLENES	0.0035	0.0156
TOTAL BTEX	0.0409	0.1479

	BTU @	14.650	14.730
LOW	NET DRY REAL :	1221.4 **/scf**	1228.1 **/scf**
	NET WET REAL :	1200.0 **/scf**	1206.8 **/scf**
HIGH	GROSS DRY REAL :	1342.6 **/scf**	1349.9 **/scf**
	GROSS WET REAL :	1319.1 **/scf**	1326.4 **/scf**
	NET DRY REAL :	19517.0 **/lb**	19623.6 **/lb**
	GROSS DRY REAL :	21458.8 **/lb**	21576.0 **/lb**

RELATIVE DENSITY (AIR=1): 0.8198

COMPRESSIBILITY FACTOR : 0.99570

(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. :	201312093	ANALYSIS NO. :	03
COMPANY NAME :	CARRIZO OIL & GAS	ANALYSIS DATE:	DECEMBER 19, 2013
ACCOUNT NO. :		SAMPLE DATE :	DECEMBER 18, 2013
PRODUCER :		CYLINDER NO. :	1L GLASS JAR
LEASE NO. :		SAMPLED BY :	JOHN MOSER
NAME/DESCRIP :	PRODUCTION TANK @ 14:05 BOB WHITE 3-36-8-62		EMPACT
FIELD DATA		SAMPLE TEMP. :	65
SAMPLE PRES. :		AMBIENT TEMP.:	
VAPOR PRES. :		GRAVITY :	
COMMENTS :	SPOT		

SPECIFICATION	TEST METHOD	UNITS	RESULTS
API GRAVITY		API 60/60	37.5
RVP @100 DEG F	D323	PSIG	8.8
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			DARK REDDISH/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