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

303-637-0150

EXTENDED NATURAL GAS LIQUID ANALYSIS (*DHA)

MAIN PAGE

PROJECT NO. :	201411074	ANALYSIS NO. :	01
COMPANY NAME :	CARRIZO OIL & GAS	ANALYSIS DATE:	NOVEMBER 16, 2014
ACCOUNT NO. :		SAMPLE DATE :	NOVEMBER 14, 2014
PRODUCER :		CYLINDER NO. :	2064
LEASE NO. :		SAMPLED BY :	GALE MCENDREE
NAME/DESCRIP :	SEPARATOR 13:15 SHULL 3-35-9-60		EMPACT
FIELD DATA		SAMPLE TEMP. :	160
SAMPLE PRES. :	40	AMBIENT TEMP.:	
VAPOR PRES. :		GRAVITY :	
COMMENTS :	SPOT; NO PROBE		

COMPONENT	MOLE %	MASS %	VOL %
NITROGEN (AIR)	0.0160	0.0040	0.0037
CARBON DIOXIDE	0.0400	0.0158	0.0144
METHANE	0.1320	0.0190	0.0471
ETHANE	0.4310	0.1164	0.2428
PROPANE	1.6030	0.6350	0.9308
I-BUTANE	0.3930	0.2052	0.2709
N-BUTANE	1.9890	1.0384	1.3214
I-PENTANE	0.8521	0.5523	0.6573
N-PENTANE	1.3990	0.9067	1.0676
HEXANES PLUS	93.1449	96.5072	95.4440
TOTALS	100.0000	100.0000	100.0000

BTEX COMPONENTS	**MOLE%**	**MASS%**
BENZENE	1.3689	0.9605
TOLUENE	2.7823	2.3028
ETHYLBENZENE	0.3136	0.2991
XYLENE	1.2146	1.1583
TOTAL BTEX	5.6794	4.7207

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

	TOTAL SAMPLE	**C6+ FRACTION**	
Specific Gravity (H2O=1) =	0.7433	0.7512	60/60
API Gravity =	58.87	56.87	60/60
Molecular Weight =	111.32	116.055	
Absolute Density =	6.2	6.26	LBS/GAL
Heating Value Liq. Idl Gas=	126176	127579	BTU/GAL
Vapor/Liquid =	21.19	20.59	CUFT/GAL
Vapor Pressure =	16.40	1.70	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. :	201411074	ANALYSIS NO. :	01
COMPANY NAME :	CARRIZO OIL & GAS	ANALYSIS DATE:	NOVEMBER 16, 2014
ACCOUNT NO. :		SAMPLE DATE :	NOVEMBER 14, 2014
PRODUCER :		CYLINDER NO. :	2064
LEASE NO. :		SAMPLED BY :	GALE MCENDREE
NAME/DESCRIP :	SEPARATOR 13:15		EMPACT
	SHULL 3-35-9-60		
FIELD DATA		SAMPLE TEMP. :	160
SAMPLE PRES. :	40	AMBIENT TEMP.:	
VAPOR PRES. :		GRAVITY :	
COMMENTS :	SPOT; NO PROBE		

COMPONENT	Mole %		Wt %		LV %	
CARBON DIOXIDE	0.0400		0.0158		0.0144	
NITROGEN (AIR)	0.0160		0.0040		0.0037	
METHANE	0.1320		0.0190		0.0471	
ETHANE	0.4310		0.1164		0.2428	
PROPANE	1.6030		0.6350		0.9308	
I-BUTANE	0.3930		0.2052		0.2709	
N-BUTANE	1.9890		1.0384		1.3214	
I-PENTANE	0.8521		0.5523		0.6573	
N-PENTANE	1.3990		0.9067		1.0676	
CYCLOPENTANE (N-C5)	1.4290		0.9002		0.8800	
N-HEXANE	6.6842		5.1745		5.7924	
CYCLOHEXANE (OTHER C6)	2.6251		1.9845		1.8824	
OTHER HEXANES	10.5907		8.1170		8.6454	
OTHER HEPTANES	13.5253		12.0894		12.6314	
METHYLCYCLOHEXANE (OTHER C7)	3.8573		3.4022		3.2636	
2,2,4 TRIMETHYLPENTANE	0.7947		0.7009		0.6913	
BENZENE	1.3689		0.9605		0.8085	
TOLUENE	2.7823		2.3028		1.9574	
ETHYLBENZENE	0.3136		0.2991		0.2542	
XYLENES	1.2146		1.1583		0.9816	
OTHER OCTANES	11.0571		11.3635		11.4447	
OCTANES PLUS	----	50.2821	----	61.5761	----	59.5829
NONANES	12.5469		14.2616		13.9404	
DECANES PLUS	24.3552		33.7927		32.2707	
SUB TOTAL	100.0000		100.0000		100.0000	
TOTAL	100.0000		100.0000		100.0000	

API Gravity	=	**58.87**	60/60
Vapor Pressure	=	**16.40**	PSIA & 100 F
Average Molecular Weight of Decanes plus	=	**154.46**	
Average Specific Gravity of Decanes plus	=	**0.7810**	

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BY CARBON NUMBER

PROJECT NO. :	201411074	ANALYSIS NO. :	01
COMPANY NAME :	CARRIZO OIL & GAS	ANALYSIS DATE:	NOVEMBER 16, 2014
ACCOUNT NO. :		SAMPLE DATE :	NOVEMBER 14, 2014
PRODUCER :		CYLINDER NO. :	2064
LEASE NO. :		SAMPLED BY :	GALE MCENDREE
NAME/DESCRIP :	SEPARATOR 13:15		EMPACT
	SHULL 3-35-9-60		
FIELD DATA		SAMPLE TEMP. :	160
SAMPLE PRES. :	40	AMBIENT TEMP.:	
VAPOR PRES. :		GRAVITY :	
COMMENTS :	SPOT; NO PROBE		

COMPONENT / CARBON NUMBER	MOLE%	MASS %	VOLUME %
NITROGEN	0.0160	0.0040	0.0037
CARBON DIOXIDE	0.0400	0.0158	0.0144
C1	0.1320	0.0190	0.0471
C2	0.4310	0.1164	0.2428
C3	1.6030	0.6350	0.9308
C4	2.3820	1.2436	1.5923
C5	3.6801	2.3592	2.6049
C6	21.2689	16.2365	17.1287
C7	20.1649	17.7944	17.8524
C8	13.3800	13.5218	13.3718
C9	12.5469	14.2616	13.9404
C10	10.2084	12.5659	12.0165
C11	5.6996	7.6228	7.1473
C12	3.5065	5.0462	4.8331
C13	2.3588	3.7964	3.6647
C14	1.4017	2.4980	2.4320
C15	1.0897	2.0792	2.0010
C16	0.0897	0.1825	0.1745
C17	0.0008	0.0017	0.0016
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. :	201411074	ANALYSIS NO. :	01
COMPANY NAME :	CARRIZO OIL & GAS	ANALYSIS DATE:	NOVEMBER 16, 2014
ACCOUNT NO. :		SAMPLE DATE :	NOVEMBER 14, 2014
PRODUCER :		CYLINDER NO. :	2064
LEASE NO. :		SAMPLED BY :	GALE MCENDREE
NAME/DESCRIP :	SEPARATOR 13:15		EMPACT
	SHULL 3-35-9-60		
FIELD DATA		SAMPLE TEMP. :	160
SAMPLE PRES. :	40	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	0.0400	0.0158	0.0144
Methane	P1	0.1320	0.0190	0.0471
Ethane	P2	0.4310	0.1164	0.2428
Propane	P3	1.6030	0.6350	0.9308
i-Butane	I4	0.3930	0.2052	0.2709
n-Butane	P4	1.9890	1.0384	1.3214
2,2-Dimethylpropane	I5	0.0061	0.0040	0.0050
i-Pentane	I5	0.8460	0.5483	0.6523
n-Pentane	P5	1.3990	0.9067	1.0676
2,2-Dimethylbutane	I6	0.0313	0.0242	0.0275
Cyclopentane	N5	1.4290	0.9002	0.8800
2,3-Dimethylbutane	I6	0.3533	0.2735	0.3047
2-Methylpentane	I6	3.5701	2.7637	3.1224
3-Methylpentane	I6	2.1402	1.6568	1.8406
n-Hexane	P6	6.6842	5.1745	5.7924
2,2-Dimethylpentane	I7	0.0182	0.0164	0.0179
Methylcyclopentane	N6	4.4942	3.3976	3.3489
2,4-Dimethylpentane	I7	0.2226	0.2004	0.2202
2,2,3-Trimethylbutane	I7	0.0193	0.0174	0.0186
Benzene	A6	1.3689	0.9605	0.8085
3,3-Dimethylpentane	I7	0.0151	0.0136	0.0145
Cyclohexane	N6	2.6251	1.9845	1.8824
2-Methylhexane	I7	1.1452	1.0308	1.1226
2,3-Dimethylpentane	I7	0.6788	0.6110	0.6465
1,1-Dimethylcyclopentane	N7	0.2972	0.2621	0.2565
3-Methylhexane	I7	1.7672	1.5906	1.7062
1c,3-Dimethylcyclopentane	N7	0.8258	0.7284	0.7222
1t,3-Dimethylcyclopentane	N7	0.7947	0.7009	0.6913
3-Ethylpentane	I7	0.1518	0.1366	0.1442
1t,2-Dimethylcyclopentane	N7	1.8627	1.6429	1.6147
2,2,4-Trimethylpentane	I8	0.0604	0.0620	0.0659
UnknownC6s	U6	0.0016	0.0012	0.0013
n-Heptane	P7	4.6394	4.1758	4.5090
1c,2-Dimethylcyclopentane	N7	0.1726	0.1522	0.1456
Methylcyclohexane	N7	3.8573	3.4022	3.2636
2,2-Dimethylhexane	I8	0.3416	0.3505	0.3720
Ethylcyclopentane	N7	0.7189	0.6341	0.6111
2,5-Dimethylhexane	I8	0.1203	0.1234	0.1313
2,2,3-Trimethylpentane	I8	0.0507	0.0520	0.0536
2,4-Dimethylhexane	I8	0.1941	0.1992	0.2110
1c,2t,4-Trimethylcyclopentane	N8	0.3894	0.3925	0.3798

3,3-Dimethylhexane	I8	0.0414	0.0425	0.0442
2,3,4-Trimethylpentane	I8	0.0933	0.0957	0.0982
2,3,3-Trimethylpentane	I8	0.0021	0.0022	0.0022
Toluene	A7	2.7823	2.3028	1.9574
2,3-Dimethylhexane	I8	0.1854	0.1902	0.1974
2-Methyl-3-ethylpentane	I8	0.1631	0.1674	0.1718
1,1,2-Trimethylcyclopentane	N8	0.0292	0.0294	0.0281
2-Methylheptane	I8	1.3100	1.3442	1.4198
4-Methylheptane	I8	0.3814	0.3914	0.4034
3-Methyl-3-ethylpentane	I8	0.1419	0.1456	0.1479
3,4-Dimethylhexane	I8	0.0920	0.0944	0.0969
1c,2c,4-Trimethylcyclopentane	N8	0.0359	0.0362	0.0347
1c,3-Dimethylcyclohexane	N8	0.0238	0.0240	0.0232
3-Methylheptane	I8	0.5669	0.5817	0.6091
1c,2t,3-Trimethylcyclopentane	N8	0.8921	0.8992	0.8623
3-Ethylhexane	I8	0.1934	0.1984	0.2056
1t,4-Dimethylcyclohexane	N8	0.4187	0.4220	0.4089
1,1-Dimethylcyclohexane	N8	0.1117	0.1126	0.1065
2,2,5-Trimethylhexane	I9	0.0048	0.0055	0.0057
3c-Ethylmethylcyclopentane	N8	0.0044	0.0044	0.0042
3t-Ethylmethylcyclopentane	N8	0.2491	0.2511	0.2420
2t-Ethylmethylcyclopentane	N8	0.2041	0.2057	0.1977
1,1-Methylethylcyclopentane	N8	0.7477	0.7536	0.7131
2,2,4-Trimethylhexane	I9	0.0467	0.0538	0.0556
1t,2-Dimethylcyclohexane	N8	0.5619	0.5664	0.5395
1c,2c,3-Trimethylcyclopentane	N8	0.0038	0.0038	0.0036
1t,3-Dimethylcyclohexane	N8	0.0124	0.0125	0.0118
UnknownC7s	U7	0.1958	0.1762	0.1903
n-Octane	P8	2.4936	2.5587	2.6897
1c,4-Dimethylcyclohexane	N8	0.6446	0.6497	0.6133
i-Propylcyclopentane	I8	0.0774	0.0780	0.0742
2,4,4-Trimethylhexane	I9	0.0169	0.0195	0.0200
2,2,3,4-Tetramethylpentane	I9	0.0192	0.0221	0.0227
2,3,4-Trimethylhexane	I9	0.0150	0.0173	0.0177
1c,2-Dimethylcyclohexane	N8	0.1402	0.1413	0.1312
2,3,5-Trimethylhexane	I9	0.1065	0.1227	0.1256
2,2-Dimethylheptane	I9	0.0128	0.0147	0.0153
1,1,4-Trimethylcyclohexane	N9	1.0008	1.1349	1.0865
2,2,3-Trimethylhexane	I9	0.4550	0.5242	0.5310
2,4-Dimethylheptane	I9	0.0284	0.0327	0.0338
4,4-Dimethylheptane	I9	0.0631	0.0727	0.0751
Ethylcyclohexane	N8	0.5604	0.5649	0.5300
n-Propylcyclopentane	N8	0.2178	0.2195	0.2088
1c,3c,5-Trimethylcyclohexane	N9	0.0432	0.0490	0.0469
2,5-Dimethylheptane	I9	0.0896	0.1032	0.1064
3,3-Dimethylheptane	I9	0.0908	0.1046	0.1078
3,5-Dimethylheptane	I9	0.0641	0.0738	0.0761
2,6-Dimethylheptane	I9	0.0766	0.0883	0.0920
1,1,3-Trimethylcyclohexane	N9	0.1698	0.1926	0.1844
Ethylbenzene	A8	0.3136	0.2991	0.2542
1c,2t,4t-Trimethylcyclohexane	N9	0.5265	0.5970	0.5607
2,3-Dimethylheptane	I9	1.0369	1.1946	1.2158
1,3-Dimethylbenzene (m-Xylene)	A8	0.2021	0.1927	0.1647
1,4-Dimethylbenzene (p-Xylene)	A8	0.3477	0.3316	0.2844
3,4-Dimethylheptane	I9	0.1107	0.1275	0.1288
3,4-Dimethylheptane (2)	I9	0.1489	0.1716	0.1734
4-Ethylheptane	I9	0.0551	0.0635	0.0656
4-Methyloctane	I9	0.2815	0.3243	0.3325
2-Methyloctane	I9	0.3225	0.3716	0.3848
1c,2t,4c-Trimethylcyclohexane	I9	0.0706	0.0813	0.0828
3-Ethylheptane	I9	0.0709	0.0817	0.0831
3-Methyloctane	I9	0.4560	0.5254	0.5386
3,3-Diethylpentane	I9	0.0467	0.0538	0.0527
1c,2t,3-Trimethylcyclohexane	N9	0.0994	0.1127	0.1058
1,1,2-Trimethylcyclohexane	N9	0.0274	0.0311	0.0292
1,2-Dimethylbenzene (o-Xylene)	A8	0.6648	0.6340	0.5325
i-Butylcyclopentane	N9	0.2392	0.2713	0.2567
UnknownC8s	U8	0.0956	0.0981	0.1031
n-Nonane	P9	1.7631	2.0313	2.0913
1,1-Methylethylcyclohexane	N9	0.3758	0.4330	0.4471
i-Propylbenzene	A9	0.3598	0.3885	0.3325
i-Propylcyclohexane	N9	0.1010	0.1145	0.1055
2,2-Dimethyloctane	I10	0.0782	0.1000	0.0999
2,4-Dimethyloctane	I10	0.0654	0.0836	0.0835

2,6-Dimethyloctane	I10	0.0108	0.0138	0.0143
2,5-Dimethyloctane	I10	0.0346	0.0442	0.0442
n-Butylcyclopentane	N9	0.2194	0.2764	0.2557
3,3-Dimethyloctane	I10	0.0909	0.1162	0.1162
n-Propylbenzene	A9	0.4573	0.4937	0.4226
3,6-Dimethyloctane	I10	0.3108	0.3972	0.3969
3-Methyl-5-ethylheptane	I10	0.4072	0.4691	0.4776
1,3-Methylethylbenzene	A9	0.3247	0.3506	0.2976
1,4-Methylethylbenzene	A9	0.2841	0.3067	0.2603
1,3,5-Trimethylbenzene	A9	0.1021	0.1102	0.0942
2,3-Dimethyloctane	I10	0.0923	0.1180	0.1179
5-Methylnonane	I10	0.2335	0.2984	0.3010
1,2-Methylethylbenzene	A9	0.5966	0.6441	0.5438
2-Methylnonane	I10	0.0875	0.1118	0.1137
3-Ethyloctane	I10	0.0904	0.1155	0.1154
3-Methylnonane	I10	0.2434	0.3111	0.3135
1,2,4-Trimethylbenzene	A9	0.0549	0.0593	0.0501
t-Butylbenzene	A10	0.4590	0.5534	0.4723
i-Butylcyclohexane	N10	0.2355	0.2967	0.2702
1t-Methyl-2-n-propylcyclohexane	I10	0.0889	0.1024	0.1043
i-Butylbenzene	A10	0.0397	0.0479	0.0415
sec-Butylbenzene	A10	0.0325	0.0392	0.0336
UnknownC9s	U9	1.8426	2.1229	2.1856
n-Decane	P10	1.1993	1.5328	1.5515
1,2,3-Trimethylbenzene	A9	0.2699	0.2914	0.2410
1,3-Methyl-i-propylbenzene	A10	0.0982	0.1060	0.0895
1,4-Methyl-i-propylbenzene	A10	0.1312	0.1417	0.1196
Sec-Butylcyclohexane	N10	0.3836	0.4833	0.4395
1,2-Methyl-i-propylbenzene	A10	0.1820	0.2194	0.1851
3-Ethylnonane	I10	0.0406	0.0519	0.0528
1,3-Diethylbenzene	A10	0.1795	0.2164	0.1852
1,3-Methyl-n-propylbenzene	A10	0.0575	0.0693	0.0595
1,4-Diethylbenzene	A10	0.1278	0.1541	0.1322
1,4-Methyl-n-propylbenzene	A10	0.2440	0.2942	0.2534
n-Butylbenzene	A10	0.0623	0.0751	0.0644
1,3-Dimethyl-5-ethylbenzene	A10	0.0508	0.0612	0.0523
1,2-Diethylbenzene	A10	0.1384	0.1669	0.1403
1,2-Methyl-n-propylbenzene	A10	0.1221	0.1472	0.1246
1,4-Dimethyl-2-ethylbenzene	A10	0.1608	0.1939	0.1635
1,3-Dimethyl-4-ethylbenzene	A10	0.0232	0.0280	0.0236
1,2-Dimethyl-4-ethylbenzene	A10	0.2247	0.2709	0.2291
1,3-Dimethyl-2-ethylbenzene	A10	0.1523	0.1836	0.1525
1t,2c,4-Trimethylcyclopentane	A10	0.5557	0.5601	0.5537
1,2-Dimethyl-3-ethylbenzene	A10	0.0870	0.1049	0.0869
1,2-Ethyl-i-propylbenzene	A10	0.0590	0.0711	0.0600
1,4-Methyl-t-butylbenzene	A11	0.2169	0.2615	0.2206
UnknownC10s	U10	2.9018	3.7087	3.7540
n-Undecane	P11	1.1610	1.6302	1.6273
1,4-Ethyl-i-propylbenzene	A11	0.0595	0.0717	0.0605
1,2,4,5-Tetramethylbenzene	A11	0.0685	0.0826	0.0689
1,2-Methyl-n-butylbenzene	A11	0.0888	0.1071	0.0903
1,2,3,5-Tetramethylbenzene	A11	0.0615	0.0742	0.0616
1,2-Methyl-t-butylbenzene	A11	0.1284	0.1548	0.1306
5-Methylindan	A11	0.0222	0.0340	0.0336
4-Methylindan	A11	0.0106	0.0162	0.0160
1,2-Ethyl-n-propylbenzene	A11	0.1704	0.2054	0.1733
2-Methylindan	A11	0.0960	0.1469	0.1450
1,3-Methyl-n-butylbenzene	A11	0.0928	0.1119	0.0944
1,3-Di-i-propylbenzene	A11	0.1287	0.1552	0.1309
sec-Pentylbenzene	A11	0.1301	0.1569	0.1323
n-Pentylbenzene	A11	0.0568	0.0756	0.0651
1t-M-2-(4MP)cyclopentane	P12	0.0935	0.1431	0.1413
1,2-Di-n-propylbenzene	A11	0.1189	0.1434	0.1210
1,4-Di-i-propylbenzene	A11	0.2096	0.2527	0.2132
Tetrahydronaphthalene	A10	0.1317	0.1588	0.1339
t-Decahydronaphthalene	A10	0.1679	0.2024	0.1707
Naphthalene	A10	0.1264	0.1455	0.1227
1-t-Butyl-3,5-dimethylbenzene	A12	0.0796	0.0960	0.0810
1,4-Ethyl-t-butylbenzene	A11	0.1709	0.2060	0.1738
UnknownC11s	U11	2.1883	3.0726	3.0671
n-Dodecane	P12	0.9727	1.4884	1.4694
1,3-Di-n-propylbenzene	A12	0.0987	0.1190	0.1004
1,3,5-Triethylbenzene	A12	0.0591	0.0638	0.0545
1,2,4-Triethylbenzene	A12	0.4363	0.4710	0.3975

1,4-Methyl-n-pentylbenzene	A12	0.0849	0.1024	0.0864
n-Hexylbenzene	A12	0.1487	0.2168	0.1869
1,2,3,4,5-Pentamethylbenzene	A13	0.2441	0.2943	0.2482
2-Methylnaphthalene	A11	0.2671	0.3412	0.2878
1-Methylnaphthalene	A11	0.2526	0.3227	0.2340
UnknownC12s	U12	1.5330	2.3457	2.3157
n-Tridecane	P13	0.6943	1.1498	1.1217
UnknownC13s	U13	1.4204	2.3523	2.2948
n-Tetradecane	P14	0.2076	0.3700	0.3602
UnknownC14s	U14	1.1941	2.1280	2.0718
n-Pentadecane	P15	0.0518	0.0988	0.0951
UnknownC15s	U15	1.0379	1.9804	1.9059
n-Hexadecane	P16	0.0025	0.0051	0.0049
UnknownC16s	U16	0.0872	0.1774	0.1696
n-Heptadecane	P17	0.0008	0.0017	0.0016
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. :	201411074	ANALYSIS NO. :	02
COMPANY NAME :	CARRIZO OIL & GAS	ANALYSIS DATE:	NOVEMBER 20, 2014
ACCOUNT NO. :		SAMPLE DATE :	NOVEMBER 14, 2014
PRODUCER :		CYLINDER NO. :	0441
LEASE NO. :		SAMPLED BY :	GALE MCENDREE - EMPACT
NAME/DESCRIP :	SEPARATOR GAS 13:25 SHULL 3-35-9-60		
FIELD DATA		SAMPLE TEMP. :	108
SAMPLE PRES. :	130	AMBIENT TEMP.:	
VAPOR PRES. :		GRAVITY :	
COMMENTS :	SPOT; PROBE; LENGTH OF H2S STAIN @ 0.50 PPM (1-7PPM) 13:30 POSSIBLE MOISTURE IN SAMPLE - EMPACT		

COMPONENT	MOLE %	MASS %	GPM @ 14.650	GPM @ 14.730
HELIUM	0.02	0.00	---	---
HYDROGEN	0.01	0.00	---	---
OXYGEN/ARGON	0.01	0.01	---	---
NITROGEN	1.20	1.39	---	---
CARBON DIOXIDE	2.49	4.53	---	---
METHANE	69.52300	46.15230	---	---
ETHANE	11.2542	14.0029	3.0058	3.0222
PROPANE	9.1771	16.7450	2.5252	2.5390
I-BUTANE	0.9260	2.2271	0.3024	0.3040
N-BUTANE	3.1210	7.5062	0.9823	0.9876
I-PENTANE	0.6613	1.9685	0.2363	0.2375
N-PENTANE	0.7840	2.3406	0.2834	0.2849
HEXANES PLUS	0.8234	3.1274	0.3272	0.3289
TOTALS	100.00000	100.00000	7.6626	7.7041

BTEX COMPONENTS	MOLE%	WT%
BENZENE	0.0298	0.0963
TOLUENE	0.0182	0.0694
ETHYLBENZENE	0.0021	0.0092
XYLENES	0.0031	0.0137
TOTAL BTEX	0.0532	0.1886

BTU @		14.650	14.730
LOW	NET DRY REAL :	1240.9 **/scf**	1247.7 **/scf**
	NET WET REAL :	1219.2 **/scf**	1226.0 **/scf**
HIGH	GROSS DRY REAL :	1363.7 **/scf**	1371.2 **/scf**
	GROSS WET REAL :	1339.9 **/scf**	1347.3 **/scf**
	NET DRY REAL :	19503.9 **/lb**	19610.5 **/lb**
	GROSS DRY REAL :	21435.4 **/lb**	21552.5 **/lb**
	RELATIVE DENSITY (AIR=1):		0.8332
	COMPRESSIBILITY FACTOR :		0.99560

(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

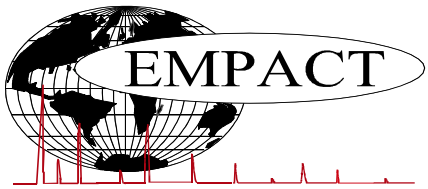
303-637-0150

EXTENDED NATURAL GAS ANALYSIS (*DHA)

GLYCALC INFORMATION

PROJECT NO. :	201411074	ANALYSIS NO. :	02
COMPANY NAME :	CARRIZO OIL & GAS	ANALYSIS DATE:	NOVEMBER 20, 2014
ACCOUNT NO. :		SAMPLE DATE :	NOVEMBER 14, 2014
PRODUCER :		CYLINDER NO. :	0441
LEASE NO. :		SAMPLED BY :	GALE MCENDREE - EMPACT
NAME/DESCRIP :	SEPARATOR GAS 13:25 SHULL 3-35-9-60		
FIELD DATA		SAMPLE TEMP. :	108
SAMPLE PRES. :	130	AMBIENT TEMP.:	
VAPOR PRES. :		GRAVITY :	
COMMENTS :	SPOT; PROBE; LENGTH OF H2S STAIN @ 0.50 PPM (1-7PPM) 13:30 POSSIBLE MOISTURE IN SAMPLE - EMPACT		

Componet	Mole %	Wt %
Helium	0.02	0.00
Hydrogen	0.01	0.00
Carbon Dioxide	2.49	4.53
Nitrogen	1.20	1.39
Methane	69.52300	46.15230
Ethane	11.2542	14.0029
Propane	9.1771	16.7450
Isobutane	0.9260	2.2271
n-Butane	3.1210	7.5062
Isopentane	0.5923	1.7683
n-Pentane	0.7840	2.3406
Cyclopentane	0.0690	0.2002
n-Hexane	0.1710	0.6098
Cyclohexane	0.0438	0.1525
Other Hexanes	0.3027	1.0710
Heptanes	0.1440	0.5929
Methycyclohexane	0.0317	0.1288
2,2,4 Trimethylpentane	0.0011	0.0052
Benzene	0.0298	0.0963
Toluene	0.0182	0.0694
Ethylbenzene	0.0021	0.0092
Xylenes	0.0031	0.0137
C8+ Heavies	0.0759	0.3786
Subtotal	99.99000	99.99000
Oxygen/Argon	0.01	0.01
Total	100.00000	100.00000



EXTENDED NATURAL GAS ANALYSIS (*DHA)

DHA COMPONENT LIST

PROJECT NO. :	201411074	ANALYSIS NO. :	02
COMPANY NAME :	CARRIZO OIL & GAS	ANALYSIS DATE:	NOVEMBER 20, 2014
ACCOUNT NO. :		SAMPLE DATE :	NOVEMBER 14, 2014
PRODUCER :		CYLINDER NO. :	0441
LEASE NO. :		SAMPLED BY :	GALE MCENDREE - EMPACT
NAME/DESCRIP :	SEPARATOR GAS 13:25 SHULL 3-35-9-60		
FIELD DATA		SAMPLE TEMP. :	108
SAMPLE PRES. :	130	AMBIENT TEMP.:	
VAPOR PRES. :		GRAVITY :	
COMMENTS :	SPOT; PROBE; LENGTH OF H2S STAIN @ 0.50 PPM (1-7PPM) 13:30 POSSIBLE MOISTURE IN SAMPLE - EMPACT		

COMPONENT	PIANO #	MOLE %	MASS %	GPM @ 14.650	GPM @ 14.730
Helium	---	0.02	0.00	---	---
Hydrogen	---	0.01	0.00	---	---
Oxygen/Argon	---	0.01	0.01	---	---
Nitrogen	---	1.20	1.39	---	---
Carbon Dioxide	---	2.49	4.53	---	---
Methane	P1	69.52300	46.15230	---	---
Ethane	P2	11.2542	14.0029	3.006	3.022
Propane	P3	9.1771	16.7450	2.525	2.539
i-Butane	I4	0.9260	2.2271	0.302	0.304
n-Butane	P4	3.1210	7.5062	0.982	0.988
2,2-Dimethylpropane	I5	0.0023	0.0069	0.001	0.001
i-Pentane	I5	0.5900	1.7614	0.215	0.216
n-Pentane	P5	0.7840	2.3406	0.283	0.285
2,2-Dimethylbutane	I6	0.0016	0.0057	0.001	0.001
Cyclopentane	N5	0.0690	0.2002	0.020	0.020
2,3-Dimethylbutane	I6	0.0081	0.0289	0.003	0.003
2-Methylpentane	I6	0.1245	0.4440	0.052	0.052
3-Methylpentane	I6	0.0651	0.2321	0.027	0.027
n-Hexane	P6	0.1710	0.6098	0.070	0.071
2,2-Dimethylpentane	I7	0.0002	0.0008	0.000	0.000
Methylcyclopentane	N6	0.1007	0.3507	0.036	0.036
2,4-Dimethylpentane	I7	0.0037	0.0154	0.002	0.002
2,2,3-Trimethylbutane	I7	0.0001	0.0004	0.000	0.000
Benzene	A6	0.0298	0.0963	0.008	0.008
Cyclohexane	N6	0.0438	0.1525	0.015	0.015
2-Methylhexane	I7	0.0150	0.0622	0.007	0.007
2,3-Dimethylpentane	I7	0.0084	0.0348	0.004	0.004
1,1-Dimethylcyclopentane	N7	0.0055	0.0223	0.002	0.002
3-Methylhexane	I7	0.0199	0.0825	0.009	0.009
1c,3-Dimethylcyclopentane	N7	0.0090	0.0366	0.004	0.004
1t,3-Dimethylcyclopentane	N7	0.0066	0.0268	0.003	0.003
3-Ethylpentane	I7	0.0029	0.0120	0.001	0.001
1t,2-Dimethylcyclopentane	N7	0.0213	0.0865	0.010	0.010
2,2,4-Trimethylpentane	I8	0.0011	0.0052	0.001	0.001
UnknownC6s	U6	0.0027	0.0096	0.001	0.001
n-Heptane	P7	0.0417	0.1729	0.019	0.019
1c,2-Dimethylcyclopentane	N7	0.0015	0.0061	0.001	0.001
Methylcyclohexane	N7	0.0317	0.1288	0.013	0.013
2,2-Dimethylhexane	I8	0.0018	0.0085	0.001	0.001
1,1,3-Trimethylcyclopentane	N7	0.0002	0.0009	0.000	0.000
Ethylcyclopentane	N7	0.0057	0.0232	0.002	0.002
2,5-Dimethylhexane	I8	0.0008	0.0038	0.000	0.000
2,2,3-Trimethylpentane	I8	0.0009	0.0043	0.000	0.000
2,4-Dimethylhexane	I8	0.0006	0.0029	0.000	0.000
1c,2t,4-Trimethylcyclopentane	N8	0.0026	0.0121	0.001	0.001
3,3-Dimethylhexane	I8	0.0001	0.0005	0.000	0.000
1t,2c,4-Trimethylcyclopentane	N8	0.0032	0.0149	0.001	0.001
2,3,4-Trimethylpentane	I8	0.0002	0.0010	0.000	0.000
2,3,3-Trimethylpentane	I8	0.0002	0.0010	0.000	0.000

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Toluene	A7	0.0182	0.0694	0.006	0.006
2,3-Dimethylhexane	I8	0.0013	0.0062	0.001	0.001
2-Methyl-3-ethylpentane	I8	0.0003	0.0014	0.000	0.000
2-Methylheptane	I8	0.0061	0.0288	0.003	0.003
4-Methylheptane	I8	0.0017	0.0080	0.001	0.001
3-Methyl-3-ethylpentane	I8	0.0006	0.0029	0.000	0.000
3,4-Dimethylhexane	I8	0.0002	0.0010	0.000	0.000
1c,2c,4-Trimethylcyclopentane	N8	0.0002	0.0009	0.000	0.000
1c,3-Dimethylcyclohexane	N8	0.0001	0.0005	0.000	0.000
3-Methylheptane	I8	0.0013	0.0062	0.001	0.001
1c,2t,3-Trimethylcyclopentane	N8	0.0052	0.0241	0.003	0.003
3-Ethylhexane	I8	0.0006	0.0029	0.000	0.000
1t,4-Dimethylcyclohexane	N8	0.0014	0.0065	0.001	0.001
1,1-Dimethylcyclohexane	N8	0.0004	0.0019	0.000	0.000
3t-Ethylmethylcyclopentane	N8	0.0010	0.0046	0.001	0.001
2t-Ethylmethylcyclopentane	N8	0.0009	0.0042	0.000	0.000
1,1-Methylethylcyclopentane	N8	0.0027	0.0125	0.001	0.001
2,2,4-Trimethylhexane	I9	0.0001	0.0005	0.000	0.000
1t,2-Dimethylcyclohexane	N8	0.0020	0.0093	0.001	0.001
UnknownC7s	U7	0.0023	0.0095	0.001	0.001
n-Octane	P8	0.0056	0.0265	0.003	0.003
1c,4-Dimethylcyclohexane	N8	0.0045	0.0209	0.002	0.002
i-Propylcyclopentane	I8	0.0002	0.0009	0.000	0.000
2,4,4-Trimethylhexane	I9	0.0001	0.0005	0.000	0.000
2,3,5-Trimethylhexane	I9	0.0001	0.0005	0.000	0.000
2,2,3,4-Tetramethylpentane	I9	0.0003	0.0016	0.000	0.000
2,3,4-Trimethylhexane	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	0.0024	0.0125	0.001	0.001
2,2,3-Trimethylhexane	I9	0.0007	0.0037	0.000	0.000
2,4-Dimethylheptane	I9	0.0003	0.0016	0.000	0.000
4,4-Dimethylheptane	I9	0.0001	0.0005	0.000	0.000
Ethylcyclohexane	N8	0.0009	0.0042	0.000	0.000
n-Propylcyclopentane	N8	0.0003	0.0014	0.000	0.000
1c,3c,5-Trimethylcyclohexane	N9	0.0002	0.0010	0.000	0.000
3,3-Dimethylheptane	I9	0.0002	0.0011	0.000	0.000
3,5-Dimethylheptane	I9	0.0001	0.0005	0.000	0.000
2,6-Dimethylheptane	I9	0.0001	0.0005	0.000	0.000
1,1,3-Trimethylcyclohexane	N9	0.0001	0.0005	0.000	0.000
Ethylbenzene	I8	0.0021	0.0092	0.001	0.001
1c,2t,4t-Trimethylcyclohexane	N9	0.0003	0.0016	0.000	0.000
2,3-Dimethylheptane	I9	0.0003	0.0016	0.000	0.000
1,3-Dimethylbenzene (m-Xylene)	A8	0.0014	0.0062	0.001	0.001
1,4-Dimethylbenzene (p-Xylene)	A8	0.0005	0.0022	0.000	0.000
3,4-Dimethylheptane (2)	I9	0.0008	0.0043	0.000	0.000
4-Methyloctane	I9	0.0005	0.0027	0.000	0.000
2-Methyloctane	I9	0.0005	0.0027	0.000	0.000
1c,2t,3-Trimethylcyclohexane	N9	0.0002	0.0010	0.000	0.000
3-Ethylheptane	I9	0.0001	0.0005	0.000	0.000
3-Methyloctane	I9	0.0007	0.0037	0.000	0.000
1c,2t,4c-Trimethylcyclohexane	I9	0.0001	0.0005	0.000	0.000
1,2-Dimethylbenzene (o-Xylene)	A8	0.0012	0.0053	0.000	0.000
i-Butylcyclopentane	N9	0.0004	0.0021	0.000	0.000
UnknownC8s	U8	0.0004	0.0019	0.000	0.000
n-Nonane	P9	0.0021	0.0111	0.001	0.001
1,1-Methylethylcyclohexane	N9	0.0005	0.0026	0.000	0.000
i-Propylbenzene	A9	0.0006	0.0030	0.000	0.000
i-Propylcyclohexane	N9	0.0001	0.0005	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	0.0003	0.0018	0.000	0.000
3-Methyl-5-ethylheptane	I10	0.0003	0.0018	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	0.0003	0.0015	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
1t-Methyl-2-n-propylcyclohexane	I10	0.0001	0.0006	0.000	0.000
i-Butylbenzene	A10	0.0001	0.0005	0.000	0.000
sec-Butylbenzene	A10	0.0001	0.0005	0.000	0.000
UnknownC9s	U9	0.0026	0.0138	0.001	0.001
n-Decane	P10	0.0010	0.0059	0.001	0.001
1,2,3-Trimethylbenzene	A9	0.0002	0.0010	0.000	0.000
1,3-Methyl-i-propylbenzene	A10	0.0001	0.0005	0.000	0.000
1,4-Methyl-i-propylbenzene	A10	0.0001	0.0005	0.000	0.000
Sec-Butylcyclohexane	A10	0.0002	0.0012	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
1,3-Methyl-n-propylbenzene	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	0.0002	0.0011	0.000	0.000
n-Butylbenzene	A10	0.0001	0.0005	0.000	0.000
1,2-Diethylbenzene	A10	0.0001	0.0005	0.000	0.000
t-Decahydronaphthalene	A9	0.0001	0.0006	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
1,2-Dimethyl-3-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	0.0023	0.0135	0.001	0.001
n-Undecane	P11	0.0006	0.0039	0.000	0.000
1,2,4,5-Tetramethylbenzene	A11	0.0001	0.0005	0.000	0.000
1,2,3,5-Tetramethylbenzene	A11	0.0001	0.0005	0.000	0.000
1,2-Methyl-t-butylbenzene	A11	0.0001	0.0006	0.000	0.000
1,2-Ethyl-n-propylbenzene	A11	0.0001	0.0006	0.000	0.000
2-Methylindan	A11	0.0001	0.0005	0.000	0.000
1,4-Di-i-propylbenzene	A11	0.0001	0.0007	0.000	0.000
Naphthalene	A10	0.0001	0.0005	0.000	0.000
UnknownC11s	U11	0.0008	0.0052	0.001	0.001
n-Dodecane	P12	0.0003	0.0021	0.000	0.000
1,2,4-Triethylbenzene	A12	0.0001	0.0007	0.000	0.000
UnknownC12s	U12	0.0004	0.0026	0.000	0.000
n-Tridecane	P13	0.0001	0.0007	0.000	0.000
UnknownC13s	U13	0.0002	0.0015	0.000	0.000
n-Tetradecane	P14	0.0001	0.0008	0.000	0.000
TOTAL		100.00000	100.00000	7.6626	7.7041

BTEX COMPONENTS	MOLE%	WT%
BENZENE	0.0298	0.0963
TOLUENE	0.0182	0.0694
ETHYLBENZENE	0.0021	0.0092
XYLENES	0.0031	0.0137
TOTAL BTEX	0.0532	0.1886

	BTU @	14.650	14.730
LOW	NET DRY REAL :	1240.9 **/scf**	1247.7 **/scf**
	NET WET REAL :	1219.2 **/scf**	1226.0 **/scf**
HIGH	GROSS DRY REAL :	1363.7 **/scf**	1371.2 **/scf**
	GROSS WET REAL :	1339.9 **/scf**	1347.3 **/scf**
	NET DRY REAL :	19503.9 **/lb**	19610.5 **/lb**
	GROSS DRY REAL :	21435.4 **/lb**	21552.5 **/lb**

RELATIVE DENSITY (AIR=1): 0.8332

COMPRESSIBILITY FACTOR : 0.99560

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

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

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