CRUDE OIL ASSAY

PROJECT NO. :	201312083	ANALYSIS NO. :	04
COMPANY NAME :	CARRIZO OIL & GAS	ANALYSIS DATE:	DECEMBER 18, 2013
ACCOUNT NO. :		SAMPLE DATE :	DECEMBER 17, 2013
PRODUCER :		CYLINDER NO. :	1L GLASS JAR
LEASE NO. :		SAMPLED BY :	GALE MCENDREE
NAME/DESCRIP :	TANK BATTERY @ 11:45 NELSON RANCHES 4-27-10-59		EMPACT
FIELD DATA		SAMPLE TEMP. :	101
SAMPLE PRES. :		AMBIENT TEMP.:	
VAPOR PRES. :		GRAVITY :	
COMMENTS :	SPOT; TK#33105		

SPECIFICATION		TEST METHOD	UNITS	RESULTS
API GRAVITY			API 60/60	34.1
RVP @100 DEG F		D323	PSIG	5.4
TOTAL SULFUR		D2622	WT %	0.448
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 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. :	201312083	ANALYSIS NO. :	05
COMPANY NAME :	CARRIZO OIL & GAS	ANALYSIS DATE:	DECEMBER 19, 2013
ACCOUNT NO. :		SAMPLE DATE :	DECEMBER 17, 2013
PRODUCER :	NELSON RANCHES 33CTB	CYLINDER NO. :	5984
LEASE NO. :		SAMPLED BY :	GALE MCENDREE
NAME/DESCRIP :	SEPARATOR @ 10:50		EMPACT
	NELSON RANCHES 4-27-10-59		
FIELD DATA		SAMPLE TEMP. :	154
SAMPLE PRES. :	40	AMBIENT TEMP.:	
VAPOR PRES. :		GRAVITY :	
COMMENTS :	SPOT; NO PROBE		

COMPONENT	MOLE %	MASS %	VOL %
NITROGEN (AIR)	0.0225	0.0058	0.0053
CARBON DIOXIDE	0.0246	0.0099	0.0090
METHANE	0.2803	0.0412	0.1018
ETHANE	0.3450	0.0951	0.1979
PROPANE	1.0953	0.4429	0.6475
I-BUTANE	0.2844	0.1516	0.1996
N-BUTANE	1.4979	0.7983	1.0132
I-PENTANE	0.7089	0.4690	0.5569
N-PENTANE	1.2468	0.8249	0.9688
HEXANES PLUS	94.4943	97.1613	96.3000
TOTALS	100.0000	100.0000	100.0000

BTEX COMPONENTS	**MOLE%**	**MASS%**
BENZENE	1.4549	1.0420
TOLUENE	3.2432	2.7401
ETHYLBENZENE	0.5641	0.5492
XYLENE	2.2888	2.2282
TOTAL BTEX	7.5510	6.5595

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

	TOTAL SAMPLE	**C6+ FRACTION**	
Specific Gravity (H2O=1) =	0.7416	0.7484	60/60
API Gravity =	59.3	57.57	60/60
Molecular Weight =	109.06	112.68	
Absolute Density =	6.18	6.23	LBS/GAL
Heating Value Liq. Idl Gas=	126042	127249	BTU/GAL
Vapor/Liquid =	21.51	21.04	CUFT/GAL
Vapor Pressure =	21.82	1.73	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. :	201312083	ANALYSIS NO. :	05
COMPANY NAME :	CARRIZO OIL & GAS	ANALYSIS DATE:	DECEMBER 19, 2013
ACCOUNT NO. :		SAMPLE DATE :	DECEMBER 17, 2013
PRODUCER :	NELSON RANCHES 33CTB	CYLINDER NO. :	5984
LEASE NO. :		SAMPLED BY :	GALE MCENDREE
NAME/DESCRIP :	SEPARATOR @ 10:50		EMPACT
	NELSON RANCHES 4-27-10-59		
FIELD DATA		SAMPLE TEMP. :	154
SAMPLE PRES. :	40	AMBIENT TEMP.:	
VAPOR PRES. :		GRAVITY :	
COMMENTS :	SPOT; NO PROBE		

COMPONENT	Mole %		Wt %		LV %	
CARBON DIOXIDE	0.0246		0.0099		0.0090	
NITROGEN (AIR)	0.0225		0.0058		0.0053	
METHANE	0.2803		0.0412		0.1018	
ETHANE	0.3450		0.0951		0.1979	
PROPANE	1.0953		0.4429		0.6475	
I-BUTANE	0.2844		0.1516		0.1996	
N-BUTANE	1.4979		0.7983		1.0132	
I-PENTANE	0.7089		0.4690		0.5569	
N-PENTANE	1.2468		0.8249		0.9688	
CYCLOPENTANE (N-C5)	1.2082		0.7769		0.7575	
N-HEXANE	6.6861		5.2830		5.8999	
CYCLOHEXANE (OTHER C6)	2.9273		2.2590		2.1372	
OTHER HEXANES	10.1153		7.9128		8.4006	
OTHER HEPTANES	14.8454		13.5420		14.0990	
METHYLCYCLOHEXANE (OTHER C7)	4.2681		3.8428		3.6768	
2,2,4 TRIMETHYLPENTANE	0.8716		0.7847		0.7719	
BENZENE	1.4549		1.0420		0.8748	
TOLUENE	3.2432		2.7401		2.3232	
ETHYLBENZENE	0.5641		0.5492		0.4656	
XYLENES	2.2888		2.2282		1.8924	
OTHER OCTANES	12.5584		13.1568		13.1513	
OCTANES PLUS	----	49.7458	----	59.7627	----	58.1310
NONANES	12.7972		14.9048		14.7168	
DECANES PLUS	20.6657		28.1390		27.1330	
SUB TOTAL	100.0000		100.0000		100.0000	
TOTAL	100.0000		100.0000		100.0000	

API Gravity =	**59.30**	60/60
Vapor Pressure =	**21.82**	PSIA & 100 F
Average Molecular Weight of Decanes plus =	**148.49**	
Average Specific Gravity of Decanes plus =	**0.7690**	

EMPACT ANALYTICAL SYSTEMS INC.
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303-637-0150

EXTENDED NATURAL GAS LIQUID ANALYSIS (*DHA)

BY CARBON NUMBER

PROJECT NO. :	201312083	ANALYSIS NO. :	05
COMPANY NAME :	CARRIZO OIL & GAS	ANALYSIS DATE:	DECEMBER 19, 2013
ACCOUNT NO. :		SAMPLE DATE :	DECEMBER 17, 2013
PRODUCER :	NELSON RANCHES 33CTB	CYLINDER NO. :	5984
LEASE NO. :		SAMPLED BY :	GALE MCENDREE
NAME/DESCRIP :	SEPARATOR @ 10:50		EMPACT
	NELSON RANCHES 4-27-10-59		
FIELD DATA		SAMPLE TEMP. :	154
SAMPLE PRES. :	40	AMBIENT TEMP.:	
VAPOR PRES. :		GRAVITY :	
COMMENTS :	SPOT; NO PROBE		

COMPONENT / CARBON NUMBER		MOLE%	MASS %	VOLUME %
NITROGEN		0.0225	0.0058	0.0053
CARBON DIOXIDE		0.0246	0.0099	0.0090
	C1	0.2803	0.0412	0.1018
	C2	0.3450	0.0951	0.1979
	C3	1.0953	0.4429	0.6475
	C4	1.7823	0.9499	1.2128
	C5	3.1639	2.0708	2.2832
	C6	21.1836	16.4968	17.3125
	C7	22.3567	20.1249	20.0990
	C8	16.2829	16.7189	16.2812
	C9	12.7972	14.9048	14.7168
	C10	10.9238	13.8484	13.4408
	C11	5.6620	7.8237	7.4615
	C12	2.1644	3.1749	3.0440
	C13	1.3276	2.2095	2.1377
	C14	0.4871	0.8861	0.8605
	C15	0.1008	0.1964	0.1885
	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. :	201312083	ANALYSIS NO. :	05
COMPANY NAME :	CARRIZO OIL & GAS	ANALYSIS DATE:	DECEMBER 19, 2013
ACCOUNT NO. :		SAMPLE DATE :	DECEMBER 17, 2013
PRODUCER :	NELSON RANCHES 33CTB	CYLINDER NO. :	5984
LEASE NO. :		SAMPLED BY :	GALE MCENDREE
NAME/DESCRIP :	SEPARATOR @ 10:50		EMPACT
	NELSON RANCHES 4-27-10-59		
FIELD DATA		SAMPLE TEMP. :	154
SAMPLE PRES. :	40	AMBIENT TEMP.:	
VAPOR PRES. :		GRAVITY :	
COMMENTS :	SPOT; NO PROBE		

COMPONENT	PIANO #	MOLE %	MASS %	VOL %
Nitrogen	NHC	0.0225	0.0058	0.0053
Carbon Dioxide	NHC	0.0246	0.0099	0.0090
Methane	P1	0.2803	0.0412	0.1018
Ethane	P2	0.3450	0.0951	0.1979
Propane	P3	1.0953	0.4429	0.6475
i-Butane	I4	0.2844	0.1516	0.1996
n-Butane	P4	1.4979	0.7983	1.0132
2,2-Dimethylpropane	I5	0.0093	0.0062	0.0077
i-Pentane	I5	0.6996	0.4628	0.5492
n-Pentane	P5	1.2468	0.8249	0.9688
2,2-Dimethylbutane	I6	0.1043	0.0824	0.0934
Cyclopentane	N5	1.2082	0.7769	0.7575
2,3-Dimethylbutane	I6	0.3478	0.2748	0.3054
2-Methylpentane	I6	3.2789	2.5911	2.9199
3-Methylpentane	I6	2.0364	1.6092	1.7832
n-Hexane	P6	6.6861	5.2830	5.8999
2,2-Dimethylpentane	I7	0.0103	0.0095	0.0103
Methylcyclopentane	N6	4.3479	3.3553	3.2987
2,4-Dimethylpentane	I7	0.3923	0.3604	0.3950
2,2,3-Trimethylbutane	I7	0.0942	0.0866	0.0923
Benzene	A6	1.4549	1.0420	0.8748
3,3-Dimethylpentane	I7	0.0200	0.0184	0.0196
Cyclohexane	N6	2.9273	2.2590	2.1372
2-Methylhexane	I7	0.9775	0.8981	0.9756
2,3-Dimethylpentane	I7	0.8286	0.7613	0.8034
1,1-Dimethylcyclopentane	N7	0.6061	0.5457	0.5328
3-Methylhexane	I7	1.8302	1.6815	1.7991
1c,3-Dimethylcyclopentane	N7	0.9628	0.8669	0.8573
1t,3-Dimethylcyclopentane	N7	0.8716	0.7847	0.7719
3-Ethylpentane	I7	0.0511	0.0469	0.0494
1t,2-Dimethylcyclopentane	N7	1.9204	1.7290	1.6950
2,2,4-Trimethylpentane	I8	0.3394	0.3555	0.3769
n-Heptane	P7	5.3427	4.9088	5.2868
1c,2-Dimethylcyclopentane	N7	0.1495	0.1346	0.1284
Methylcyclohexane	N7	4.2681	3.8428	3.6768

2,2-Dimethylhexane	I8	0.7783	0.8152	0.8631
Ethylcyclopentane	N7	0.7881	0.7096	0.6821
2,5-Dimethylhexane	I8	0.1017	0.1065	0.1130
2,2,3-Trimethylpentane	I8	0.0725	0.0759	0.0781
2,4-Dimethylhexane	I8	0.3161	0.3311	0.3498
1c,2t,4-Trimethylcyclopentane	N8	0.4262	0.4385	0.4232
3,3-Dimethylhexane	I8	0.1176	0.1232	0.1279
2,3,4-Trimethylpentane	I8	0.0936	0.0980	0.1003
2,3,3-Trimethylpentane	I8	0.0348	0.0364	0.0370
Toluene	A7	3.2432	2.7401	2.3232
2,3-Dimethylhexane	I8	0.1414	0.1481	0.1533
2-Methyl-3-ethylpentane	I8	0.1789	0.1874	0.1919
1,1,2-Trimethylcyclopentane	N8	0.0520	0.0535	0.0510
2-Methylheptane	I8	1.2313	1.2897	1.3587
4-Methylheptane	I8	0.3650	0.3823	0.3930
3-Methyl-3-ethylpentane	I8	0.2585	0.2708	0.2744
3,4-Dimethylhexane	I8	0.1834	0.1921	0.1966
1c,2c,4-Trimethylcyclopentane	N8	0.0679	0.0699	0.0668
1c,3-Dimethylcyclohexane	N8	0.0546	0.0562	0.0541
3-Methylheptane	I8	0.1550	0.1624	0.1696
1c,2t,3-Trimethylcyclopentane	N8	0.8963	0.9222	0.8821
3-Ethylhexane	I8	0.5713	0.5984	0.6184
1t,4-Dimethylcyclohexane	N8	0.9592	0.9869	0.9537
1,1-Dimethylcyclohexane	N8	0.1930	0.1986	0.1874
3c-Ethylmethylcyclopentane	N8	0.2348	0.2416	0.2322
3t-Ethylmethylcyclopentane	N8	0.1447	0.1489	0.1431
2t-Ethylmethylcyclopentane	N8	0.6827	0.7024	0.6732
1,1-Methylethylcyclopentane	N8	0.1068	0.1099	0.1037
1t,2-Dimethylcyclohexane	N8	0.6609	0.6800	0.6460
1t,3-Dimethylcyclohexane	N8	0.0015	0.0015	0.0014
n-Octane	P8	1.6114	1.6878	1.7697
1c,4-Dimethylcyclohexane	N8	1.2162	1.2514	1.1782
i-Propylcyclopentane	I8	0.0356	0.0366	0.0347
2,4,4-Trimethylhexane	I9	0.0263	0.0309	0.0315
2,2,3,4-Tetramethylpentane	I9	0.0548	0.0645	0.0661
2,3,4-Trimethylhexane	I9	0.0248	0.0292	0.0298
1c,2-Dimethylcyclohexane	N8	0.1501	0.1544	0.1429
2,3,5-Trimethylhexane	I9	0.0785	0.0923	0.0942
2,2-Dimethylheptane	I9	0.0246	0.0289	0.0300
1,1,4-Trimethylcyclohexane	N9	0.9385	1.0864	1.0374
2,2,3-Trimethylhexane	I9	0.3935	0.4628	0.4676
2,4-Dimethylheptane	I9	0.1624	0.1910	0.1967
4,4-Dimethylheptane	I9	0.1602	0.1884	0.1940
Ethylcyclohexane	N8	0.7015	0.7218	0.6754
n-Propylcyclopentane	N8	0.1844	0.1897	0.1800
1c,3c,5-Trimethylcyclohexane	N9	0.0760	0.0880	0.0840
2,5-Dimethylheptane	I9	0.1184	0.1392	0.1431
3,3-Dimethylheptane	I9	0.1113	0.1309	0.1346
3,5-Dimethylheptane	I9	0.0828	0.0974	0.1001
2,6-Dimethylheptane	I9	0.0505	0.0594	0.0617
1,1,3-Trimethylcyclohexane	N9	0.0456	0.0528	0.0504
Ethylbenzene	A8	0.5641	0.5492	0.4656
1c,2t,4t-Trimethylcyclohexane	N9	0.4157	0.4812	0.4507
2,3-Dimethylheptane	I9	0.0094	0.0111	0.0113
1,3-Dimethylbenzene (m-Xylene)	A8	0.6642	0.6466	0.5513
1,4-Dimethylbenzene (p-Xylene)	A8	0.9418	0.9169	0.7843
3,4-Dimethylheptane	I9	0.1899	0.2233	0.2250
3,4-Dimethylheptane (2)	I9	0.3147	0.3701	0.3729
4-Ethylheptane	I9	0.0994	0.1169	0.1204
4-Methyloctane	I9	0.2618	0.3079	0.3149
2-Methyloctane	I9	0.3145	0.3699	0.3820
1c,2t,4c-Trimethylcyclohexane	I9	0.1092	0.1284	0.1304
3-Ethylheptane	I9	0.0956	0.1124	0.1140
3-Methyloctane	I9	0.2367	0.2784	0.2847
3,3-Diethylpentane	I9	0.0982	0.1155	0.1128
1c,2t,3-Trimethylcyclohexane	N9	0.1362	0.1577	0.1477
1,1,2-Trimethylcyclohexane	N9	0.0831	0.0962	0.0901

1,2-Dimethylbenzene (o-Xylene)	A8	0.6828	0.6647	0.5568
i-Butylcyclopentane	N9	0.2862	0.3313	0.3127
UnknownC8s	U8	0.1114	0.1167	0.1224
n-Nonane	P9	1.0462	1.2304	1.2635
1,1-Methylethylcyclohexane	N9	1.0039	1.1806	1.2160
i-Propylbenzene	A9	0.2826	0.3114	0.2658
i-Propylcyclohexane	N9	0.0889	0.1029	0.0946
2,2-Dimethyloctane	I10	0.0661	0.0862	0.0859
2,4-Dimethyloctane	I10	0.0523	0.0682	0.0680
2,6-Dimethyloctane	I10	0.0100	0.0130	0.0134
2,5-Dimethyloctane	I10	0.0356	0.0464	0.0463
n-Butylcyclopentane	N9	0.1912	0.2459	0.2269
3,3-Dimethyloctane	I10	0.0799	0.1042	0.1039
n-Propylbenzene	A9	0.2450	0.2700	0.2305
3,6-Dimethyloctane	I10	0.1896	0.2474	0.2466
3-Methyl-5-ethylheptane	I10	0.3173	0.3732	0.3790
1,3-Methylethylbenzene	A9	0.2372	0.2614	0.2213
1,4-Methylethylbenzene	A9	0.2809	0.3096	0.2621
1,3,5-Trimethylbenzene	A9	0.1136	0.1252	0.1067
2,3-Dimethyloctane	I10	0.0655	0.0855	0.0852
5-Methylnonane	I10	0.0814	0.1062	0.1069
1,2-Methylethylbenzene	A9	0.3208	0.3536	0.2978
2-Methylnonane	I10	0.0981	0.1280	0.1299
3-Ethyloctane	I10	0.0866	0.1130	0.1126
3-Methylnonane	I10	0.1442	0.1881	0.1890
1,2,4-Trimethylbenzene	A9	0.0390	0.0430	0.0362
t-Butylbenzene	A10	0.1484	0.1826	0.1555
i-Butylcyclohexane	N10	0.1999	0.2571	0.2335
1t-Methyl-2-n-propylcyclohexane	I10	0.1003	0.1180	0.1198
i-Butylbenzene	A10	0.0551	0.0678	0.0586
sec-Butylbenzene	A10	0.1062	0.1307	0.1119
UnknownC9s	U9	3.7317	4.3888	4.5069
n-Decane	P10	1.2061	1.5735	1.5886
1,2,3-Trimethylbenzene	A9	0.2174	0.2396	0.1977
1,3-Methyl-i-propylbenzene	A10	0.0902	0.0994	0.0837
1,4-Methyl-i-propylbenzene	A10	0.0907	0.1000	0.0842
Sec-Butylcyclohexane	N10	0.2622	0.3372	0.3059
1,2-Methyl-i-propylbenzene	A10	0.2012	0.2476	0.2083
3-Ethylnonane	I10	0.0590	0.0770	0.0781
1,3-Diethylbenzene	A10	0.1314	0.1617	0.1380
1,3-Methyl-n-propylbenzene	A10	0.0367	0.0452	0.0387
1,4-Diethylbenzene	A10	0.1276	0.1570	0.1343
1,4-Methyl-n-propylbenzene	A10	0.0919	0.1131	0.0972
n-Butylbenzene	A10	0.0797	0.0981	0.0840
1,3-Dimethyl-5-ethylbenzene	A10	0.1409	0.1734	0.1479
1,2-Diethylbenzene	A10	0.0938	0.1154	0.0968
1,2-Methyl-n-propylbenzene	A10	0.0744	0.0916	0.0773
1,4-Dimethyl-2-ethylbenzene	A10	0.1008	0.1241	0.1043
1,3-Dimethyl-4-ethylbenzene	A10	0.0907	0.1116	0.0939
1,2-Dimethyl-4-ethylbenzene	A10	0.1490	0.1834	0.1547
1,3-Dimethyl-2-ethylbenzene	A10	0.0910	0.1120	0.0928
1t,2c,4-Trimethylcyclopentane	A10	0.5219	0.5370	0.5295
1,2-Dimethyl-3-ethylbenzene	A10	0.1343	0.1653	0.1367
1,2-Ethyl-i-propylbenzene	A10	0.0865	0.1065	0.0896
1,4-Methyl-t-butylbenzene	A11	0.0532	0.0655	0.0551
UnknownC10s	U10	5.0415	6.5773	6.6406
n-Undecane	P11	0.9431	1.3517	1.3458
1,4-Ethyl-i-propylbenzene	A11	0.3019	0.3716	0.3126
1,2,4,5-Tetramethylbenzene	A11	0.1026	0.1263	0.1052
1,2-Methyl-n-butylbenzene	A11	0.0244	0.0300	0.0252
1,2,3,5-Tetramethylbenzene	A11	0.1574	0.1937	0.1605
1,2-Methyl-t-butylbenzene	A11	0.0533	0.0656	0.0552
5-Methylindan	A11	0.0216	0.0337	0.0332
4-Methylindan	A11	0.0124	0.0194	0.0191
1,2-Ethyl-n-propylbenzene	A11	0.2164	0.2663	0.2240
2-Methylindan	A11	0.0333	0.0520	0.0512
1,3-Methyl-n-butylbenzene	A11	0.0396	0.0487	0.0410

1,3-Di-i-propylbenzene	A11	0.0259	0.0319	0.0268
sec-Pentylbenzene	A11	0.0905	0.1114	0.0937
n-Pentylbenzene	A11	0.0616	0.0837	0.0719
1t-M-2-(4MP)cyclopentane	P12	0.0134	0.0209	0.0206
1,2-Di-n-propylbenzene	A11	0.1165	0.1434	0.1207
1,4-Di-i-propylbenzene	A11	0.0992	0.1221	0.1027
Tetrahydronaphthalene	A10	0.0421	0.0518	0.0436
t-Decahydronaphthalene	A10	0.0850	0.1046	0.0880
Naphthalene	A10	0.0587	0.0690	0.0581
1-t-Butyl-3,5-dimethylbenzene	A12	0.0155	0.0191	0.0161
1,4-Ethyl-t-butylbenzene	A11	0.0495	0.0609	0.0512
UnknownC11s	U11	3.0579	4.3828	4.3637
n-Dodecane	P12	0.3581	0.5593	0.5507
1,3-Di-n-propylbenzene	A12	0.0478	0.0588	0.0495
1,3,5-Triethylbenzene	A12	0.1021	0.1125	0.0959
1,2,4-Triethylbenzene	A12	0.2507	0.2763	0.2326
1,4-Methyl-n-pentylbenzene	A12	0.0605	0.0745	0.0627
n-Hexylbenzene	A12	0.0330	0.0491	0.0422
1,2,3,4,5-Pentamethylbenzene	A13	0.0756	0.0930	0.0782
2-Methylnaphthalene	A11	0.0809	0.1055	0.0888
1-Methylnaphthalene	A11	0.1208	0.1575	0.1139
UnknownC12s	U12	1.2833	2.0044	1.9737
n-Tridecane	P13	0.2069	0.3498	0.3404
UnknownC13s	U13	1.0451	1.7667	1.7191
n-Tetradecane	P14	0.0425	0.0773	0.0751
UnknownC14s	U14	0.4446	0.8088	0.7854
n-Pentadecane	P15	0.0083	0.0162	0.0155
UnknownC15s	U15	0.0925	0.1802	0.1730
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. :	201312083	ANALYSIS NO. :	06
COMPANY NAME :	CARRIZO OIL & GAS	ANALYSIS DATE:	DECEMBER 20, 2013
ACCOUNT NO. :		SAMPLE DATE :	DECEMBER 17, 2013
PRODUCER :	NELSON RANCHES 33CTB	CYLINDER NO. :	0794
LEASE NO. :		SAMPLED BY :	GALE MCENDREE-EMPACT
NAME/DESCRIP :	SALES GAS @ 9:50 NELSON RANCHES 4-27-10-59		
FIELD DATA		SAMPLE TEMP. :	154
SAMPLE PRES. :	40	AMBIENT TEMP.:	
VAPOR PRES. :		GRAVITY :	
COMMENTS :	SPOT; NO PROBE; LENGTH OF H2S STAIN @ MAX (1-7PPM) @ 11:25 LENGTH OF STAIN @ 20PPM (2.5-60PPM) @ 11:30		

COMPONENT	MOLE %	MASS %	GPM @ 14.650	GPM @ 14.730
ALCOHOLS	0.0086	0.0175		
HELIUM	0.01	0.00	---	---
HYDROGEN	0.02	0.00	---	---
OXYGEN/ARGON	0.02	0.02	---	---
NITROGEN	0.99	0.95	---	---
CARBON DIOXIDE	2.41	3.62	---	---
METHANE	57.44730	31.48800	---	---
ETHANE	12.3985	12.7379	3.3176	3.3358
PROPANE	13.3425	20.1022	3.6778	3.6979
I-BUTANE	1.5636	3.1051	0.5116	0.5144
N-BUTANE	5.9666	11.8490	1.8820	1.8923
I-PENTANE	1.4882	3.6564	0.5327	0.5356
N-PENTANE	1.8498	4.5600	0.6712	0.6748
HEXANES PLUS	2.4849	7.8939	1.0246	1.0302
TOTALS	100.00000	100.00000	11.6175	11.6810

BTEX COMPONENTS	**MOLE%**	**WT%**
BENZENE	0.0840	0.2242
TOLUENE	0.0606	0.1908
ETHYLBENZENE	0.0064	0.0232
XYLENES	0.0171	0.0621
TOTAL BTEX	0.1681	0.5003

	BTU @	14.650	14.730
LOW	NET DRY REAL :	1502.1 **/scf**	1510.3 **/scf**
	NET WET REAL :	1475.8 **/scf**	1484.1 **/scf**
HIGH	GROSS DRY REAL :	1643.2 **/scf**	1652.2 **/scf**
	GROSS WET REAL :	1614.5 **/scf**	1623.4 **/scf**
	NET DRY REAL :	19512.6 **/lb**	19619.2 **/lb**
	GROSS DRY REAL :	21349.1 **/lb**	21465.7 **/lb**
	RELATIVE DENSITY (AIR=1):		1.0094
	COMPRESSIBILITY FACTOR :		0.99367

(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

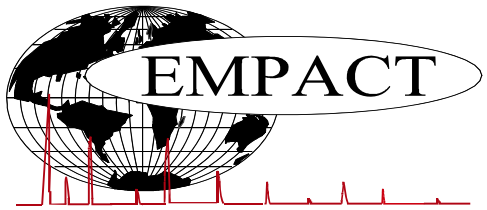
303-637-0150

EXTENDED NATURAL GAS ANALYSIS (*DHA)

GLYCALC INFORMATION

PROJECT NO. :	201312083	ANALYSIS NO. :	06
COMPANY NAME :	CARRIZO OIL & GAS	ANALYSIS DATE:	DECEMBER 20, 2013
ACCOUNT NO. :		SAMPLE DATE :	DECEMBER 17, 2013
PRODUCER :	NELSON RANCHES 33CTB	CYLINDER NO. :	0794
LEASE NO. :		SAMPLED BY :	GALE MCENDREE-EMPACT
NAME/DESCRIP :	SALES GAS @ 9:50 NELSON RANCHES 4-27-10-59		
FIELD DATA		SAMPLE TEMP. :	154
SAMPLE PRES. :	40	AMBIENT TEMP.:	
VAPOR PRES. :		GRAVITY :	
COMMENTS :	SPOT; NO PROBE; LENGTH OF H2S STAIN @ MAX (1-7PPM) @ 11:25 LENGTH OF STAIN @ 20PPM (2.5-60PPM) @ 11:30		

Componet	Mole %	Wt %
Helium	0.01	0.00
Hydrogen	0.02	0.00
Carbon Dioxide	2.41	3.62
Nitrogen	0.99	0.95
Methane	57.44730	31.48800
Ethane	12.3985	12.7379
Propane	13.3425	20.1022
Isobutane	1.5636	3.1051
n-Butane	5.9666	11.8490
Isopentane	1.3099	3.2291
n-Pentane	1.8498	4.5600
Cyclopentane	0.1783	0.4273
n-Hexane	0.4784	1.4086
Cyclohexane	0.1309	0.3764
Other Hexanes	0.8266	2.4139
Heptanes	0.4728	1.6071
Methycyclohexane	0.1095	0.3673
2,2,4 Trimethylpentane	0.0003	0.0012
Benzene	0.0840	0.2242
Toluene	0.0606	0.1908
Ethylbenzene	0.0064	0.0232
Xylenes	0.0171	0.0621
C8+ Heavies	0.2983	1.2191
Subtotal	99.97140	99.96250
Oxygen/Argon	0.02	0.02
Alcohols	0.0086	0.0175
Total	100.00000	100.00000



EXTENDED NATURAL GAS ANALYSIS (*DHA)

DHA COMPONENT LIST

PROJECT NO. :	201312083	ANALYSIS NO. :	06
COMPANY NAME :	CARRIZO OIL & GAS	ANALYSIS DATE:	DECEMBER 20, 2013
ACCOUNT NO. :		SAMPLE DATE :	DECEMBER 17, 2013
PRODUCER :	NELSON RANCHES 33CTB	CYLINDER NO. :	0794
LEASE NO. :		SAMPLED BY :	GALE MCENDREE-EMPACT
NAME/DESCRIP :	SALES GAS @ 9:50 NELSON RANCHES 4-27-10-59		
FIELD DATA		SAMPLE TEMP. :	154
SAMPLE PRES. :	40	AMBIENT TEMP.:	
VAPOR PRES. :		GRAVITY :	
COMMENTS :	SPOT; NO PROBE; LENGTH OF H2S STAIN @ MAX (1-7PPM) @ 11:25 LENGTH OF STAIN @ 20PPM (2.5-60PPM) @ 11:30		

COMPONENT	PIANO #	MOLE %	MASS %	GPM @ 14.650	GPM @ 14.730
Helium	---	0.01	0.00	---	---
Hydrogen	---	0.02	0.00	---	---
Oxygen/Argon	---	0.02	0.02	---	---
Nitrogen	---	0.99	0.95	---	---
Carbon Dioxide	---	2.41	3.62	---	---
Methane	P1	57.44730	31.48800	---	---
Ethane	P2	12.3985	12.7379	3.318	3.336
Propane	P3	13.3425	20.1022	3.678	3.698
i-Butane	I4	1.5636	3.1051	0.512	0.514
n-Butane	P4	5.9665	11.8488	1.882	1.892
2,2-Dimethylpropane	I5	0.0049	0.0121	0.002	0.002
Ethanol	X2	0.0001	0.0002	0.000	0.000
i-Pentane	I5	1.3050	3.2170	0.478	0.480
Acetone	X3	0.0057	0.0113	0.002	0.002
i-Propanol	X3	0.0021	0.0043	0.001	0.001
UnknownC4s	U4	0.0001	0.0002	0.000	0.000
n-Pentane	P5	1.8496	4.5595	0.671	0.675
t-Butanol	X4	0.0006	0.0015	0.000	0.000
2,2-Dimethylbutane	I6	0.0044	0.0130	0.002	0.002
n-Propanol	X3	0.0001	0.0002	0.000	0.000
Cyclopentane	N5	0.1783	0.4273	0.053	0.054
2,3-Dimethylbutane	I6	0.0300	0.0883	0.012	0.012
2-Methylpentane	I6	0.3277	0.9649	0.136	0.137
3-Methylpentane	I6	0.1743	0.5132	0.071	0.072
UnknownC5s	U5	0.0002	0.0005	0.000	0.000
n-Hexane	P6	0.4784	1.4086	0.197	0.198
2,2-Dimethylpentane	I7	0.0019	0.0065	0.001	0.001
Methylcyclopentane	N6	0.2899	0.8336	0.102	0.103
2,4-Dimethylpentane	I7	0.0118	0.0404	0.006	0.006
2,2,3-Trimethylbutane	I7	0.0003	0.0010	0.000	0.000
Benzene	A6	0.0840	0.2242	0.023	0.023
3,3-Dimethylpentane	I7	0.0011	0.0038	0.000	0.000
Cyclohexane	N6	0.1309	0.3764	0.044	0.044
2-Methylhexane	I7	0.0555	0.1900	0.026	0.026
2,3-Dimethylpentane	I7	0.0252	0.0863	0.011	0.011
1,1-Dimethylcyclopentane	N7	0.0129	0.0433	0.005	0.005
3-Methylhexane	I7	0.0642	0.2198	0.029	0.029
1c,3-Dimethylcyclopentane	N7	0.0358	0.1201	0.016	0.016
1t,3-Dimethylcyclopentane	N7	0.0322	0.1080	0.015	0.015
3-Ethylpentane	I7	0.0049	0.0168	0.002	0.002
1t,2-Dimethylcyclopentane	N7	0.0645	0.2164	0.030	0.030
2,2,4-Trimethylpentane	I8	0.0003	0.0012	0.000	0.000

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UnknownC6s	U6	0.0003	0.0009	0.000	0.000
n-Heptane	P7	0.1385	0.4742	0.064	0.065
1c,2-Dimethylcyclopentane	N7	0.0049	0.0164	0.002	0.002
Methylcyclohexane	N7	0.1095	0.3673	0.044	0.044
2,2-Dimethylhexane	I8	0.0086	0.0336	0.004	0.004
Ethylcyclopentane	N7	0.0189	0.0634	0.008	0.008
2,5-Dimethylhexane	I8	0.0034	0.0133	0.002	0.002
2,2,3-Trimethylpentane	I8	0.0002	0.0008	0.000	0.000
2,4-Dimethylhexane	I8	0.0051	0.0199	0.003	0.003
1c,2t,4-Trimethylcyclopentane	N8	0.0101	0.0387	0.005	0.005
3,3-Dimethylhexane	I8	0.0006	0.0024	0.000	0.000
1t,2c,4-Trimethylcyclopentane	N8	0.0114	0.0437	0.005	0.005
2,3,4-Trimethylpentane	I8	0.0020	0.0078	0.001	0.001
2,3,3-Trimethylpentane	I8	0.0002	0.0008	0.000	0.000
Toluene	A7	0.0606	0.1908	0.020	0.020
2,3-Dimethylhexane	I8	0.0030	0.0117	0.002	0.002
2-Methyl-3-ethylpentane	I8	0.0025	0.0098	0.001	0.001
2-Methylheptane	I8	0.0241	0.0941	0.012	0.012
4-Methylheptane	I8	0.0069	0.0269	0.004	0.004
3-Methyl-3-ethylpentane	I8	0.0005	0.0020	0.000	0.000
3,4-Dimethylhexane	I8	0.0009	0.0035	0.000	0.000
1c,2c,4-Trimethylcyclopentane	N8	0.0005	0.0019	0.000	0.000
1c,3-Dimethylcyclohexane	N8	0.0005	0.0019	0.000	0.000
3-Methylheptane	I8	0.0117	0.0457	0.006	0.006
1c,2t,3-Trimethylcyclopentane	N8	0.0167	0.0640	0.009	0.009
3-Ethylhexane	I8	0.0014	0.0055	0.001	0.001
1t,4-Dimethylcyclohexane	N8	0.0058	0.0222	0.003	0.003
1,1-Dimethylcyclohexane	N8	0.0020	0.0077	0.001	0.001
3c-Ethylmethylcyclopentane	N8	0.0001	0.0004	0.000	0.000
3t-Ethylmethylcyclopentane	N8	0.0035	0.0134	0.002	0.002
2t-Ethylmethylcyclopentane	N8	0.0031	0.0119	0.002	0.002
1,1-Methylethylcyclopentane	N8	0.0097	0.0372	0.005	0.005
2,2,4-Trimethylhexane	I9	0.0005	0.0022	0.000	0.000
1t,2-Dimethylcyclohexane	N8	0.0082	0.0314	0.004	0.004
1t,3-Dimethylcyclohexane	N8	0.0001	0.0004	0.000	0.000
UnknownC7s	U7	0.0002	0.0007	0.000	0.000
n-Octane	P8	0.0382	0.1491	0.020	0.020
1c,4-Dimethylcyclohexane	N8	0.0026	0.0100	0.001	0.001
i-Propylcyclopentane	I8	0.0011	0.0042	0.000	0.000
2,4,4-Trimethylhexane	I9	0.0003	0.0013	0.000	0.000
2,3,5-Trimethylhexane	I9	0.0004	0.0017	0.000	0.000
2,2,3,4-Tetramethylpentane	I9	0.0002	0.0009	0.000	0.000
2,3,4-Trimethylhexane	I9	0.0003	0.0013	0.000	0.000
1c,2-Dimethylcyclohexane	N8	0.0030	0.0115	0.002	0.002
2,2-Dimethylheptane	I9	0.0001	0.0004	0.000	0.000
1,1,4-Trimethylcyclohexane	N9	0.0101	0.0436	0.005	0.005
2,2,3-Trimethylhexane	I9	0.0039	0.0171	0.002	0.002
2,4-Dimethylheptane	I9	0.0012	0.0053	0.001	0.001
4,4-Dimethylheptane	I9	0.0003	0.0013	0.000	0.000
Ethylcyclohexane	N8	0.0056	0.0215	0.003	0.003
n-Propylcyclopentane	N8	0.0023	0.0088	0.001	0.001
1c,3c,5-Trimethylcyclohexane	N9	0.0004	0.0017	0.000	0.000
2,5-Dimethylheptane	I9	0.0007	0.0031	0.000	0.000
3,3-Dimethylheptane	I9	0.0009	0.0039	0.000	0.000
3,5-Dimethylheptane	I9	0.0006	0.0026	0.000	0.000
2,6-Dimethylheptane	I9	0.0006	0.0026	0.000	0.000
1,1,3-Trimethylcyclohexane	N9	0.0018	0.0078	0.001	0.001
Ethylbenzene	I8	0.0064	0.0232	0.002	0.002
1c,2t,4t-Trimethylcyclohexane	N9	0.0029	0.0125	0.002	0.002
2,3-Dimethylheptane	I9	0.0021	0.0092	0.001	0.001
1,3-Dimethylbenzene (m-Xylene)	A8	0.0100	0.0363	0.004	0.004
1,4-Dimethylbenzene (p-Xylene)	A8	0.0022	0.0080	0.001	0.001
3,4-Dimethylheptane	I9	0.0002	0.0009	0.000	0.000
3,4-Dimethylheptane (2)	I9	0.0012	0.0053	0.001	0.001
4-Ethylheptane	I9	0.0002	0.0009	0.000	0.000

4-Methyloctane	I9	0.0023	0.0101	0.001	0.001
2-Methyloctane	I9	0.0027	0.0118	0.002	0.002
1c,2t,3-Trimethylcyclohexane	N9	0.0006	0.0026	0.000	0.000
3-Ethylheptane	I9	0.0006	0.0026	0.000	0.000
3-Methyloctane	I9	0.0033	0.0145	0.002	0.002
1c,2t,4c-Trimethylcyclohexane	I9	0.0002	0.0009	0.000	0.000
1,1,2-Trimethylcyclohexane	N9	0.0002	0.0009	0.000	0.000
3,3-Diethylpentane	I9	0.0005	0.0022	0.000	0.000
1,2-Dimethylbenzene (o-Xylene)	A8	0.0049	0.0178	0.002	0.002
i-Butylcyclopentane	N9	0.0018	0.0078	0.001	0.001
UnknownC8s	U8	0.0016	0.0063	0.001	0.001
n-Nonane	P9	0.0100	0.0438	0.006	0.006
1,1-Methylethylcyclohexane	N9	0.0014	0.0061	0.001	0.001
i-Propylbenzene	A9	0.0019	0.0078	0.001	0.001
i-Propylcyclohexane	N9	0.0006	0.0026	0.000	0.000
2,2-Dimethyloctane	I10	0.0004	0.0020	0.000	0.000
2,4-Dimethyloctane	I10	0.0004	0.0020	0.000	0.000
2,5-Dimethyloctane	I10	0.0002	0.0010	0.000	0.000
n-Butylcyclopentane	N9	0.0018	0.0078	0.001	0.001
3,3-Dimethyloctane	I10	0.0004	0.0020	0.000	0.000
n-Propylbenzene	A9	0.0017	0.0070	0.001	0.001
3,6-Dimethyloctane	I10	0.0015	0.0073	0.001	0.001
3-Methyl-5-ethylheptane	I10	0.0015	0.0073	0.001	0.001
1,3-Methylethylbenzene	A9	0.0014	0.0057	0.001	0.001
1,4-Methylethylbenzene	A9	0.0005	0.0021	0.000	0.000
1,3,5-Trimethylbenzene	A9	0.0003	0.0012	0.000	0.000
2,3-Dimethyloctane	I10	0.0002	0.0010	0.000	0.000
5-Methylnonane	I10	0.0009	0.0044	0.001	0.001
1,2-Methylethylbenzene	A9	0.0020	0.0082	0.001	0.001
3-Ethyloctane	I10	0.0002	0.0010	0.000	0.000
3-Methylnonane	I10	0.0008	0.0039	0.000	0.000
1,2,4-Trimethylbenzene	A9	0.0001	0.0004	0.000	0.000
t-Butylbenzene	A10	0.0014	0.0064	0.001	0.001
i-Butylcyclohexane	N10	0.0006	0.0029	0.000	0.000
1t-Methyl-2-n-propylcyclohexane	I10	0.0001	0.0005	0.000	0.000
i-Butylbenzene	A10	0.0002	0.0009	0.000	0.000
sec-Butylbenzene	A10	0.0001	0.0004	0.000	0.000
UnknownC9s	U9	0.0080	0.0351	0.004	0.004
n-Decane	P10	0.0030	0.0146	0.002	0.002
1,2,3-Trimethylbenzene	A9	0.0006	0.0025	0.000	0.000
1,3-Methyl-i-propylbenzene	A10	0.0003	0.0014	0.000	0.000
1,4-Methyl-i-propylbenzene	A10	0.0002	0.0009	0.000	0.000
Sec-Butylcyclohexane	A10	0.0007	0.0034	0.000	0.000
1,2-Methyl-i-propylbenzene	A10	0.0004	0.0018	0.000	0.000
3-Ethylnonane	I10	0.0001	0.0006	0.000	0.000
1,3-Diethylbenzene	A10	0.0003	0.0014	0.000	0.000
1,3-Methyl-n-propylbenzene	A10	0.0001	0.0004	0.000	0.000
1,4-Diethylbenzene	A10	0.0004	0.0018	0.000	0.000
1,4-Methyl-n-propylbenzene	A10	0.0001	0.0004	0.000	0.000
n-Butylbenzene	A10	0.0002	0.0009	0.000	0.000
1,3-Dimethyl-5-ethylbenzene	A10	0.0001	0.0004	0.000	0.000
1,2-Diethylbenzene	A10	0.0002	0.0009	0.000	0.000
t-Decahydronaphthalene	A9	0.0002	0.0011	0.000	0.000
1,2-Methyl-n-propylbenzene	A10	0.0002	0.0009	0.000	0.000
1,4-Dimethyl-2-ethylbenzene	A10	0.0002	0.0009	0.000	0.000
1,3-Dimethyl-4-ethylbenzene	A10	0.0001	0.0004	0.000	0.000
1,2-Dimethyl-4-ethylbenzene	A10	0.0003	0.0014	0.000	0.000
1,3-Dimethyl-2-ethylbenzene	A10	0.0002	0.0009	0.000	0.000
1,2-Dimethyl-3-ethylbenzene	A10	0.0001	0.0004	0.000	0.000
1,2-Ethyl-i-propylbenzene	A10	0.0001	0.0005	0.000	0.000
1,4-Methyl-t-butylbenzene	A11	0.0002	0.0010	0.000	0.000
UnknownC10s	U10	0.0072	0.0350	0.004	0.004
n-Undecane	P11	0.0012	0.0064	0.001	0.001
1,4-Ethyl-i-propylbenzene	A11	0.0001	0.0005	0.000	0.000
1,2,4,5-Tetramethylbenzene	A11	0.0002	0.0009	0.000	0.000

1,2-Methyl-n-butylbenzene	A11	0.0001	0.0005	0.000	0.000
1,2,3,5-Tetramethylbenzene	A11	0.0002	0.0009	0.000	0.000
1,2-Methyl-t-butylbenzene	A11	0.0001	0.0005	0.000	0.000
1,2-Ethyl-n-propylbenzene	A11	0.0001	0.0005	0.000	0.000
2-Methylindan	A11	0.0001	0.0004	0.000	0.000
1,3-Methyl-n-butylbenzene	A11	0.0001	0.0005	0.000	0.000
1,3-Di-i-propylbenzene	A11	0.0001	0.0006	0.000	0.000
1,4-Di-i-propylbenzene	A11	0.0001	0.0006	0.000	0.000
UnknownC11s	U11	0.0024	0.0128	0.002	0.002
n-Dodecane	P12	0.0004	0.0023	0.000	0.000
1,2,4-Triethylbenzene	A12	0.0001	0.0006	0.000	0.000
1,2,3,4,5-Pentamethylbenzene	A13	0.0001	0.0005	0.000	0.000
UnknownC12s	U12	0.0003	0.0016	0.000	0.000
n-Tridecane	P13	0.0001	0.0006	0.000	0.000
n-Tetradecane	P14	0.0001	0.0007	0.000	0.000
TOTAL		100.00000	100.00000	11.6205	11.6840

BTEX COMPONENTS	**MOLE%**	**WT%**
BENZENE	0.0840	0.2242
TOLUENE	0.0606	0.1908
ETHYLBENZENE	0.0064	0.0232
XYLENES	0.0171	0.0621
TOTAL BTEX	0.1681	0.5003

	BTU @	14.650	14.730
LOW	NET DRY REAL :	1502.1 **/scf**	1510.3 **/scf**
	NET WET REAL :	1475.8 **/scf**	1484.1 **/scf**
HIGH	GROSS DRY REAL :	1643.2 **/scf**	1652.2 **/scf**
	GROSS WET REAL :	1614.5 **/scf**	1623.4 **/scf**
	NET DRY REAL :	19512.6 **/lb**	19619.2 **/lb**
	GROSS DRY REAL :	21349.1 **/lb**	21465.7 **/lb**
	RELATIVE DENSITY (AIR=1):		1.0094
	COMPRESSIBILITY FACTOR :		0.99367

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

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

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