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

303-637-0150

EXTENDED NATURAL GAS ANALYSIS (*DHA)

MAIN PAGE

PROJECT NO. :	201512042	ANALYSIS NO. :	10
COMPANY NAME :	CARRIZO OIL & GAS, INC.	ANALYSIS DATE:	DECEMBER 10, 2015 11:16
ACCOUNT NO. :		SAMPLE DATE :	DECEMBER 04, 2015 14:30
PRODUCER :	CARRIZO OIL & GAS, INC.	CYLINDER NO. :	1159
LEASE NO. :		SAMPLED BY :	JOHN MOSER - EMPACT
NAME/DESCRIP :	SEPARATOR SALES GAS BRINGELSON 16-20-9-58		
FIELD DATA		SAMPLE TEMP. :	85.0
SAMPLE PRES. :	86.0	AMBIENT TEMP.:	
VAPOR PRES. :		GRAVITY :	
COMMENTS :	SPOT; PROBE; LENGTH OF H2S STAIN @ 2.0 PPM (1-7 PPM) @ 14:35		

COMPONENT	MOLE %	MASS %	GPM @ 14.650	GPM @ 14.730
ALCOHOLS	0.0009	0.0021		
GLYCOLS	0.0002	0.0013		
HELIUM	0.02	0.00	---	---
HYDROGEN	0.00	0.00	---	---
OXYGEN/ARGON	0.02	0.03	---	---
NITROGEN	1.04	1.22	---	---
CARBON DIOXIDE	2.43	4.47	---	---
METHANE	70.01150	46.98010	---	---
ETHANE	11.5827	14.5684	3.0938	3.1106
PROPANE	8.9844	16.5717	2.4720	2.4855
I-BUTANE	0.8757	2.1290	0.2863	0.2879
N-BUTANE	3.0089	7.3153	0.9471	0.9523
I-PENTANE	0.5986	1.8014	0.2152	0.2164
N-PENTANE	0.7054	2.1289	0.2553	0.2567
HEXANES PLUS	0.7217	2.7818	0.2902	0.2916
TOTALS	100.00000	100.00000	7.5599	7.6010

BTEX COMPONENTS	MOLE%	WT%
BENZENE	0.0245	0.0801
TOLUENE	0.0149	0.0574
ETHYLBENZENE	0.0013	0.0058
XYLENES	0.0032	0.0142
TOTAL BTEX	0.0439	0.1575

	BTU @	14.650	14.730
LOW	NET DRY REAL :	1231.2 **/scf**	1237.9 **/scf**
	NET WET REAL :	1209.7 **/scf**	1216.4 **/scf**
HIGH	GROSS DRY REAL :	1353.6 **/scf**	1361.0 **/scf**
	GROSS WET REAL :	1329.9 **/scf**	1337.4 **/scf**
	NET DRY REAL :	19566.6 **/lb**	19673.5 **/lb**
	GROSS DRY REAL :	21509.8 **/lb**	21627.3 **/lb**
	RELATIVE DENSITY (AIR=1):		0.8246
	COMPRESSIBILITY FACTOR :		0.99566

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

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

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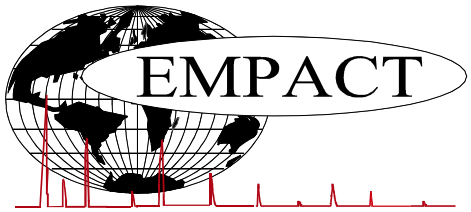
EXTENDED NATURAL GAS ANALYSIS (*DHA)

GLYCALC INFORMATION

PROJECT NO. :	201512042	ANALYSIS NO. :	10
COMPANY NAME :	CARRIZO OIL & GAS, INC.	ANALYSIS DATE:	DECEMBER 10, 2015 11:16
ACCOUNT NO. :		SAMPLE DATE :	DECEMBER 04, 2015 14:30
PRODUCER :	CARRIZO OIL & GAS, INC.	CYLINDER NO. :	1159
LEASE NO. :		SAMPLED BY :	JOHN MOSER - EMPACT
NAME/DESCRIP :	SEPARATOR SALES GAS BRINGELSON 16-20-9-58		
FIELD DATA		SAMPLE TEMP. :	85.0
SAMPLE PRES. :	86.0	AMBIENT TEMP.:	
VAPOR PRES. :		GRAVITY :	
COMMENTS :	SPOT; PROBE; LENGTH OF H2S STAIN @ 2.0 PPM (1-7 PPM) @ 14:35		

Componet	Mole %	Wt %
Helium	0.02	0.00
Hydrogen	0.00	0.00
Carbon Dioxide	2.43	4.47
Nitrogen	1.04	1.22
Methane	70.01150	46.98010
Ethane	11.5827	14.5684
Propane	8.9844	16.5717
Isobutane	0.8757	2.1290
n-Butane	3.0089	7.3153
Isopentane	0.5383	1.6245
n-Pentane	0.7054	2.1289
Cyclopentane	0.0603	0.1769
n-Hexane	0.1475	0.5317
Cyclohexane	0.0382	0.1345
Other Hexanes	0.2644	0.9459
Heptanes	0.1276	0.5322
Methycyclohexane	0.0293	0.1203
2,2,4 Trimethylpentane	0.0018	0.0086
Benzene	0.0245	0.0801
Toluene	0.0149	0.0574
Ethylbenzene	0.0013	0.0058
Xylenes	0.0032	0.0142
C8+ Heavies	0.0690	0.3511
Subtotal	99.97890	99.96660
Oxygen/Argon	0.02	0.03
Alcohols	0.0009	0.0021
Glycols	0.0002	0.0013
Total	100.00000	100.00000



EXTENDED NATURAL GAS ANALYSIS (*DHA)

DHA COMPONENT LIST

PROJECT NO. :	201512042	ANALYSIS NO. :	10
COMPANY NAME :	CARRIZO OIL & GAS, INC.	ANALYSIS DATE:	DECEMBER 10, 2015 11:16
ACCOUNT NO. :		SAMPLE DATE :	DECEMBER 04, 2015 14:30
PRODUCER :	CARRIZO OIL & GAS, INC.	CYLINDER NO. :	1159
LEASE NO. :		SAMPLED BY :	JOHN MOSER - EMPACT
NAME/DESCRIP :	SEPARATOR SALES GAS BRINGELSON 16-20-9-58		
FIELD DATA		SAMPLE TEMP. :	85.0
SAMPLE PRES. :	86.0	AMBIENT TEMP.:	
VAPOR PRES. :		GRAVITY :	
COMMENTS :	SPOT; PROBE; LENGTH OF H2S STAIN @ 2.0 PPM (1-7 PPM) @ 14:35		

COMPONENT	PIANO #	MOLE %	MASS %	GPM @ 14.650	GPM @ 14.730
Helium	---	0.02	0.00	---	---
Hydrogen	---	0.00	0.00	---	---
Oxygen/Argon	---	0.02	0.03	---	---
Nitrogen	---	1.04	1.22	---	---
Carbon Dioxide	---	2.43	4.47	---	---
Methane	P1	70.01150	46.98010	---	---
Ethane	P2	11.5827	14.5684	3.094	3.111
Propane	P3	8.9844	16.5717	2.472	2.486
i-Butane	I4	0.8757	2.1290	0.286	0.288
n-Butane	P4	3.0088	7.3150	0.947	0.952
2,2-Dimethylpropane	I5	0.0023	0.0069	0.001	0.001
Ethanol	X2	0.0002	0.0004	0.000	0.000
i-Pentane	I5	0.5360	1.6176	0.196	0.197
Acetone	X3	0.0005	0.0012	0.000	0.000
i-Propanol	X3	0.0002	0.0005	0.000	0.000
UnknownC4s	U4	0.0001	0.0003	0.000	0.000
n-Pentane	P5	0.7054	2.1289	0.255	0.257
2,2-Dimethylbutane	I6	0.0016	0.0058	0.001	0.001
Cyclopentane	N5	0.0603	0.1769	0.018	0.018
2,3-Dimethylbutane	I6	0.0069	0.0249	0.003	0.003
2-Methylpentane	I6	0.1092	0.3937	0.045	0.045
3-Methylpentane	I6	0.0565	0.2037	0.023	0.023
n-Hexane	P6	0.1475	0.5317	0.061	0.061
Methylcyclopentane	N6	0.0873	0.3073	0.031	0.031
2,4-Dimethylpentane	I7	0.0035	0.0147	0.002	0.002
2,2,3-Trimethylbutane	I7	0.0002	0.0008	0.000	0.000
Benzene	A6	0.0245	0.0801	0.007	0.007
3,3-Dimethylpentane	I7	0.0002	0.0008	0.000	0.000
Cyclohexane	N6	0.0382	0.1345	0.013	0.013
2-Methylhexane	I7	0.0120	0.0503	0.006	0.006
2,3-Dimethylpentane	I7	0.0075	0.0315	0.003	0.003
1,1-Dimethylcyclopentane	N7	0.0054	0.0222	0.002	0.002
3-Methylhexane	I7	0.0167	0.0700	0.008	0.008
1c,3-Dimethylcyclopentane	N7	0.0067	0.0275	0.003	0.003
1t,3-Dimethylcyclopentane	N7	0.0071	0.0292	0.003	0.003
3-Ethylpentane	I7	0.0018	0.0075	0.001	0.001
1t,2-Dimethylcyclopentane	N7	0.0172	0.0707	0.008	0.008
2,2,4-Trimethylpentane	I8	0.0018	0.0086	0.001	0.001
UnknownC6s	U6	0.0029	0.0105	0.001	0.001
n-Heptane	P7	0.0363	0.1521	0.017	0.017
1c,2-Dimethylcyclopentane	N7	0.0012	0.0049	0.001	0.001
Methylcyclohexane	N7	0.0293	0.1203	0.012	0.012

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2,2-Dimethylhexane	I8	0.0006	0.0029	0.000	0.000
1,1,3-Trimethylcyclopentane	N7	0.0017	0.0080	0.001	0.001
Ethylcyclopentane	N7	0.0045	0.0185	0.002	0.002
2,5-Dimethylhexane	I8	0.0009	0.0043	0.000	0.000
2,2,3-Trimethylpentane	I8	0.0005	0.0024	0.000	0.000
2,4-Dimethylhexane	I8	0.0001	0.0005	0.000	0.000
1c,2t,4-Trimethylcyclopentane	N8	0.0021	0.0099	0.001	0.001
3,3-Dimethylhexane	I8	0.0005	0.0024	0.000	0.000
1t,2c,4-Trimethylcyclopentane	N8	0.0028	0.0131	0.001	0.001
2,3,4-Trimethylpentane	I8	0.0001	0.0005	0.000	0.000
2,3,3-Trimethylpentane	I8	0.0003	0.0014	0.000	0.000
Toluene	A7	0.0149	0.0574	0.005	0.005
2,3-Dimethylhexane	I8	0.0011	0.0053	0.001	0.001
2-Methyl-3-ethylpentane	I8	0.0003	0.0014	0.000	0.000
1,1,2-Trimethylcyclopentane	N8	0.0001	0.0005	0.000	0.000
2-Methylheptane	I8	0.0057	0.0272	0.003	0.003
4-Methylheptane	I8	0.0011	0.0053	0.001	0.001
3-Methyl-3-ethylpentane	I8	0.0009	0.0043	0.000	0.000
3,4-Dimethylhexane	I8	0.0003	0.0014	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	0.0007	0.0034	0.000	0.000
1c,2t,3-Trimethylcyclopentane	N8	0.0050	0.0235	0.003	0.003
3-Ethylhexane	I8	0.0012	0.0057	0.001	0.001
1t,4-Dimethylcyclohexane	N8	0.0012	0.0057	0.001	0.001
1,1-Dimethylcyclohexane	N8	0.0003	0.0014	0.000	0.000
2,2,5-Trimethylhexane	I9	0.0001	0.0005	0.000	0.000
3c-Ethylmethylcyclopentane	N8	0.0008	0.0038	0.000	0.000
2t-Ethylmethylcyclopentane	N8	0.0008	0.0038	0.000	0.000
1,1-Methylethylcyclopentane	N8	0.0017	0.0080	0.001	0.001
2,2,4-Trimethylhexane	I9	0.0001	0.0005	0.000	0.000
1t,2-Dimethylcyclohexane	N8	0.0014	0.0066	0.001	0.001
1c,2c,3-Trimethylcyclopentane	N8	0.0006	0.0028	0.000	0.000
UnknownC7s	U7	0.0056	0.0235	0.003	0.003
n-Octane	P8	0.0094	0.0449	0.005	0.005
1c,4-Dimethylcyclohexane	N8	0.0002	0.0009	0.000	0.000
i-Propylcyclopentane	I8	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	0.0002	0.0011	0.000	0.000
2,3,4-Trimethylhexane	I9	0.0002	0.0011	0.000	0.000
1c,2-Dimethylcyclohexane	N8	0.0003	0.0014	0.000	0.000
1,1,4-Trimethylcyclohexane	N9	0.0020	0.0105	0.001	0.001
2,2,3-Trimethylhexane	I9	0.0006	0.0032	0.000	0.000
2,4-Dimethylheptane	I9	0.0003	0.0016	0.000	0.000
4,4-Dimethylheptane	I9	0.0003	0.0016	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	0.0011	0.000	0.000
2,5-Dimethylheptane	I9	0.0002	0.0011	0.000	0.000
3,3-Dimethylheptane	I9	0.0002	0.0011	0.000	0.000
3,5-Dimethylheptane	I9	0.0002	0.0011	0.000	0.000
2,6-Dimethylheptane	I9	0.0001	0.0005	0.000	0.000
1,1,3-Trimethylcyclohexane	N9	0.0005	0.0026	0.000	0.000
Ethylbenzene	I8	0.0013	0.0058	0.001	0.001
1c,2t,4t-Trimethylcyclohexane	N9	0.0002	0.0011	0.000	0.000
2,3-Dimethylheptane	I9	0.0002	0.0011	0.000	0.000
1,3-Dimethylbenzene (m-Xylene)	A8	0.0015	0.0067	0.001	0.001
1,4-Dimethylbenzene (p-Xylene)	A8	0.0005	0.0022	0.000	0.000
3,4-Dimethylheptane	I9	0.0001	0.0005	0.000	0.000
3,4-Dimethylheptane (2)	I9	0.0006	0.0032	0.000	0.000
4-Methyloctane	I9	0.0005	0.0027	0.000	0.000
2-Methyloctane	I9	0.0004	0.0021	0.000	0.000
1c,2t,3-Trimethylcyclohexane	N9	0.0002	0.0011	0.000	0.000
3-Ethylheptane	I9	0.0002	0.0011	0.000	0.000
3-Methyloctane	I9	0.0006	0.0032	0.000	0.000
1,1,2-Trimethylcyclohexane	N9	0.0001	0.0005	0.000	0.000

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3,3-Diethylpentane	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	0.0005	0.0026	0.000	0.000
UnknownC8s	U8	0.0021	0.0100	0.001	0.001
n-Nonane	P9	0.0023	0.0123	0.001	0.001
1,1-Methylethylcyclohexane	N9	0.0001	0.0005	0.000	0.000
i-Propylbenzene	A9	0.0004	0.0020	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
n-Butylcyclopentane	N9	0.0003	0.0016	0.000	0.000
3,3-Dimethyloctane	I10	0.0002	0.0012	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	0.0003	0.0015	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
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	0.0001	0.0005	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	0.0042	0.0226	0.002	0.002
n-Decane	P10	0.0005	0.0030	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
1,2-Methyl-i-propylbenzene	A10	0.0001	0.0005	0.000	0.000
1,4-Methyl-n-propylbenzene	A10	0.0001	0.0005	0.000	0.000
1,2-Dimethyl-4-ethylbenzene	A10	0.0001	0.0005	0.000	0.000
UnknownC10s	U10	0.0020	0.0119	0.001	0.001
n-Undecane	P11	0.0002	0.0013	0.000	0.000
Triethylene Glycol	GL6	0.0002	0.0013	0.000	0.000
UnknownC11s	U11	0.0004	0.0026	0.000	0.000
n-Dodecane	P12	0.0002	0.0014	0.000	0.000
UnknownC12s	U12	0.0002	0.0013	0.000	0.000
n-Tridecane	P13	0.0001	0.0008	0.000	0.000
UnknownC13s	U13	0.0001	0.0008	0.000	0.000
n-Tetradecane	P14	0.0001	0.0008	0.000	0.000
UnknownC14s	U14	0.0001	0.0008	0.000	0.000
n-Pentadecane	P15	0.0001	0.0009	0.000	0.000
UnknownC15s	U15	0.0002	0.0018	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
UnknownC17s	U17	0.0004	0.0040	0.000	0.000
UnknownC18s	U18	0.0001	0.0011	0.000	0.000
TOTAL		100.00000	100.00000	7.5599	7.6010

BTEX COMPONENTS	**MOLE%**	**WT%**
BENZENE	0.0245	0.0801
TOLUENE	0.0149	0.0574
ETHYLBENZENE	0.0013	0.0058
XYLENES	0.0032	0.0142
TOTAL BTEX	0.0439	0.1575

	BTU @	14.650	14.730
LOW	NET DRY REAL :	1231.2 **/scf**	1237.9 **/scf**
	NET WET REAL :	1209.7 **/scf**	1216.4 **/scf**
HIGH	GROSS DRY REAL :	1353.6 **/scf**	1361.0 **/scf**
	GROSS WET REAL :	1329.9 **/scf**	1337.4 **/scf**
	NET DRY REAL :	19566.6 **/lb**	19673.5 **/lb**
	GROSS DRY REAL :	21509.8 **/lb**	21627.3 **/lb**

RELATIVE DENSITY (AIR=1): 0.8246

COMPRESSIBILITY FACTOR : 0.99566

(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.

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EXTENDED NATURAL GAS LIQUID ANALYSIS (*DHA)

MAIN PAGE

PROJECT NO. :	201512042	ANALYSIS NO. :	11
COMPANY NAME :	CARRIZO OIL & GAS, INC.	ANALYSIS DATE:	DECEMBER 09, 2015 14:31
ACCOUNT NO. :		SAMPLE DATE :	DECEMBER 04, 2015 14:25
PRODUCER :	CARRIZO OIL & GAS, INC.	CYLINDER NO. :	6016
LEASE NO. :		SAMPLED BY :	JOHN MOSER
NAME/DESCRIP :	SEPARATOR BRINGELSON 16-20-9-58		EMPACT
FIELD DATA		SAMPLE TEMP. :	156.0
SAMPLE PRES. :	20.0	AMBIENT TEMP.:	
VAPOR PRES. :		GRAVITY :	
COMMENTS :	SPOT; NO PROBE		

COMPONENT	MOLE %	MASS %	VOL %
ALCOHOLS	0.0740	0.0356	0.0337
NITROGEN (AIR)	0.0560	0.0126	0.0117
CARBON DIOXIDE	0.0140	0.0049	0.0045
METHANE	0.0210	0.0027	0.0068
ETHANE	0.1910	0.0460	0.0969
PROPANE	1.1490	0.4058	0.6007
I-BUTANE	0.3410	0.1587	0.2116
N-BUTANE	1.9510	0.9080	1.1669
I-PENTANE	0.9160	0.5293	0.6370
N-PENTANE	1.5670	0.9054	1.0766
HEXANES PLUS	93.7200	96.9910	96.1536
TOTALS	100.0000	100.0000	100.0000

BTEX COMPONENTS	**MOLE%**	**MASS%**
BENZENE	1.0275	0.6427
TOLUENE	2.2387	1.6518
ETHYLBENZENE	0.6885	0.5854
XYLENE	1.5354	1.3054
TOTAL BTEX	5.4901	4.1853

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

	TOTAL SAMPLE	**C6+ FRACTION**	
Specific Gravity (H2O=1) =	0.7506	0.7571	60/60
API Gravity =	57.02	55.4	60/60
Molecular Weight =	124.88	129.999	
Absolute Density =	6.26	6.31	LBS/GAL
Heating Value Liq. Idl Gas=	126614	127734	BTU/GAL
Vapor/Liquid =	19.21	18.65	CUFT/GAL
Vapor Pressure =	7.70	1.33	PSIA @100 F

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

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80601

303-637-0150

EXTENDED NATURAL GAS LIQUID ANALYSIS (*DHA)

E & P TANK / GLYCALC INFORMATION

PROJECT NO. :	201512042	ANALYSIS NO. :	11
COMPANY NAME :	CARRIZO OIL & GAS, INC.	ANALYSIS DATE:	DECEMBER 09, 2015 14:31
ACCOUNT NO. :		SAMPLE DATE :	DECEMBER 04, 2015 14:25
PRODUCER :	CARRIZO OIL & GAS, INC.	CYLINDER NO. :	6016
LEASE NO. :		SAMPLED BY :	JOHN MOSER
NAME/DESCRIP :	SEPARATOR BRINGELSON 16-20-9-58		EMPACT
FIELD DATA		SAMPLE TEMP. :	156.0
SAMPLE PRES. :	20.0	AMBIENT TEMP.:	
VAPOR PRES. :		GRAVITY :	
COMMENTS :	SPOT; NO PROBE		

COMPONENT	Mole %		Wt %		LV %	
CARBON DIOXIDE	0.0140		0.0049		0.0045	
NITROGEN (AIR)	0.0560		0.0126		0.0117	
METHANE	0.0210		0.0027		0.0068	
ETHANE	0.1910		0.0460		0.0969	
PROPANE	1.1490		0.4058		0.6007	
I-BUTANE	0.3410		0.1587		0.2116	
N-BUTANE	1.9510		0.9080		1.1669	
I-PENTANE	0.9160		0.5293		0.6370	
N-PENTANE	1.5670		0.9054		1.0766	
CYCLOPENTANE (N-C5)	1.2097		0.6794		0.6707	
N-HEXANE	5.3187		3.6703		4.1506	
CYCLOHEXANE (OTHER C6)	2.2041		1.4854		1.4229	
OTHER HEXANES	8.2268		5.6182		6.0128	
OTHER HEPTANES	10.6919		8.5321		9.0298	
METHYLCYCLOHEXANE (OTHER C7)	3.5287		2.7746		2.6879	
2,2,4 TRIMETHYLPENTANE	0.3344		0.3059		0.3284	
BENZENE	1.0275		0.6427		0.5463	
TOLUENE	2.2387		1.6518		1.4180	
ETHYLBENZENE	0.6885		0.5854		0.5025	
XYLENES	1.5354		1.3054		1.1192	
OTHER OCTANES	10.4384		9.4810		9.6835	
OCTANES PLUS	----	59.2739	----	71.9365	----	70.2146
NONANES	10.7861		10.9725		10.9477	
DECANES PLUS	35.4911		49.2863		47.6333	
SUB TOTAL	99.9260		99.9644		99.9663	
ALCOHOLS	0.0740		0.0356		0.0337	
TOTAL	100.0000		100.0000		100.0000	

API Gravity =	**57.02**	60/60
Vapor Pressure =	**7.70**	PSIA & 100 F
Average Molecular Weight of Decanes plus =	**173.41**	
Average Specific Gravity of Decanes plus =	**0.7720**	

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

303-637-0150

EXTENDED NATURAL GAS LIQUID ANALYSIS (*DHA)

BY CARBON NUMBER

PROJECT NO. :	201512042	ANALYSIS NO. :	11
COMPANY NAME :	CARRIZO OIL & GAS, INC.	ANALYSIS DATE:	DECEMBER 09, 2015 14:31
ACCOUNT NO. :		SAMPLE DATE :	DECEMBER 04, 2015 14:25
PRODUCER :	CARRIZO OIL & GAS, INC.	CYLINDER NO. :	6016
LEASE NO. :		SAMPLED BY :	JOHN MOSER
NAME/DESCRIP :	SEPARATOR		EMPACT
	BRINGELSON 16-20-9-58		
FIELD DATA		SAMPLE TEMP. :	156.0
SAMPLE PRES. :	20.0	AMBIENT TEMP.:	
VAPOR PRES. :		GRAVITY :	
COMMENTS :	SPOT; NO PROBE		

COMPONENT / CARBON NUMBER		MOLE%	MASS %	VOLUME %
ALCOHOLS		0.0740	0.0356	0.0337
NITROGEN		0.0560	0.0126	0.0117
CARBON DIOXIDE		0.0140	0.0049	0.0045
	C1	0.0210	0.0027	0.0068
	C2	0.1910	0.0460	0.0969
	C3	1.1490	0.4058	0.6007
	C4	2.2920	1.0667	1.3785
	C5	3.6927	2.1141	2.3843
	C6	16.7771	11.4166	12.1326
	C7	16.4593	12.9585	13.1357
	C8	12.9967	11.6777	11.6336
	C9	10.7861	10.9725	10.9477
	C10	9.8622	10.9168	10.6228
	C11	7.2780	8.6937	8.2466
	C12	4.2252	5.4222	5.2471
	C13	3.2976	4.7331	4.6150
	C14	2.8162	4.4740	4.3990
	C15	2.6195	4.4559	4.3308
	C16	1.8743	3.3986	3.2818
	C17	1.4659	2.8228	2.7174
	C18	1.1568	2.3576	2.2629
	C19	0.5345	1.1493	1.0961
	C20	0.1766	0.3996	0.3790
	C21	0.0804	0.1909	0.1802
	C22	0.0476	0.1184	0.1113
	C23	0.0304	0.0790	0.0740
	C24	0.0115	0.0312	0.0292
	C25	0.0036	0.0101	0.0094
	C26	0.0044	0.0129	0.0120
	C27	0.0033	0.0101	0.0094
	C28	0.0016	0.0051	0.0047
	C29	0.0010	0.0033	0.0030
	C30+	0.0005	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 LIQUID ANALYSIS (*DHA)

DHA COMPONENT LIST

PROJECT NO. :	201512042	ANALYSIS NO. :	11
COMPANY NAME :	CARRIZO OIL & GAS, INC.	ANALYSIS DATE:	DECEMBER 09, 2015 14:31
ACCOUNT NO. :		SAMPLE DATE :	DECEMBER 04, 2015 14:25
PRODUCER :	CARRIZO OIL & GAS, INC.	CYLINDER NO. :	6016
LEASE NO. :		SAMPLED BY :	JOHN MOSER
NAME/DESCRIP :	SEPARATOR BRINGELSON 16-20-9-58		EMPACT
FIELD DATA		SAMPLE TEMP. :	156.0
SAMPLE PRES. :	20.0	AMBIENT TEMP.:	
VAPOR PRES. :		GRAVITY :	
COMMENTS :	SPOT; NO PROBE		

COMPONENT	PIANO #	MOLE %	MASS %	VOL %
Nitrogen	NHC	0.0560	0.0126	0.0117
Carbon Dioxide	NHC	0.0140	0.0049	0.0045
Methane	P1	0.0210	0.0027	0.0068
Ethane	P2	0.1910	0.0460	0.0969
Propane	P3	1.1490	0.4058	0.6007
i-Butane	I4	0.3410	0.1587	0.2116
n-Butane	P4	1.9510	0.9080	1.1669
2,2-Dimethylpropane	I5	0.0330	0.0191	0.0240
i-Pentane	I5	0.8830	0.5102	0.6130
i-Propanol	X3	0.0740	0.0356	0.0337
n-Pentane	P5	1.5670	0.9054	1.0766
2,2-Dimethylbutane	I6	0.0212	0.0146	0.0168
Cyclopentane	N5	1.2097	0.6794	0.6707
2,3-Dimethylbutane	I6	0.2015	0.1391	0.1565
2-Methylpentane	I6	1.6082	1.1098	1.2663
3-Methylpentane	I6	2.7231	1.8793	2.1085
n-Hexane	P6	5.3187	3.6703	4.1506
2,2-Dimethylpentane	I7	0.0012	0.0010	0.0011
Methylcyclopentane	N6	3.6660	2.4707	2.4594
2,4-Dimethylpentane	I7	0.1115	0.0895	0.0993
2,2,3-Trimethylbutane	I7	0.0083	0.0067	0.0072
Benzene	A6	1.0275	0.6427	0.5463
3,3-Dimethylpentane	I7	0.0114	0.0091	0.0098
Cyclohexane	N6	2.2041	1.4854	1.4229
2-Methylhexane	I7	0.6345	0.5091	0.5599
2,3-Dimethylpentane	I7	0.6485	0.5203	0.5559
1,1-Dimethylcyclopentane	N7	0.2753	0.2165	0.2140
3-Methylhexane	I7	0.3892	0.3123	0.3383
1c,3-Dimethylcyclopentane	N7	0.7643	0.6010	0.6018
1t,3-Dimethylcyclopentane	N7	0.5646	0.4439	0.4421
3-Ethylpentane	I7	0.1379	0.1107	0.1180
1t,2-Dimethylcyclopentane	N7	1.0956	0.8615	0.8551
2,2,4-Trimethylpentane	I8	0.3344	0.3059	0.3284
UnknownC6s	U6	0.0068	0.0047	0.0053
n-Heptane	P7	3.8376	3.0792	3.3578
1c,2-Dimethylcyclopentane	N7	0.1123	0.0883	0.0853
Methylcyclohexane	N7	3.5287	2.7746	2.6879
2,2-Dimethylhexane	I8	0.2335	0.2136	0.2290
1,1,3-Trimethylcyclopentane	N7	0.0647	0.0581	0.0579
Ethylcyclopentane	N7	0.4946	0.3889	0.3785
2,5-Dimethylhexane	I8	0.0672	0.0615	0.0661
2,2,3-Trimethylpentane	I8	0.0289	0.0264	0.0275
2,4-Dimethylhexane	I8	0.1658	0.1517	0.1623

1c,2t,4-Trimethylcyclopentane	N8	0.2506	0.2252	0.2201
3,3-Dimethylhexane	I8	0.0294	0.0269	0.0283
2,3,4-Trimethylpentane	I8	0.0234	0.0214	0.0222
2,3,3-Trimethylpentane	I8	0.0653	0.0597	0.0614
Toluene	A7	2.2387	1.6518	1.4180
2,3-Dimethylhexane	I8	0.1203	0.1100	0.1153
2-Methyl-3-ethylpentane	I8	0.1190	0.1089	0.1129
1,1,2-Trimethylcyclopentane	N8	0.0393	0.0353	0.0341
2-Methylheptane	I8	0.8747	0.8001	0.8535
4-Methylheptane	I8	0.2641	0.2416	0.2515
3-Methyl-3-ethylpentane	I8	0.1394	0.1275	0.1308
3,4-Dimethylhexane	I8	0.0615	0.0563	0.0583
1c,2c,4-Trimethylcyclopentane	N8	0.0146	0.0131	0.0127
1c,3-Dimethylcyclohexane	N8	0.0314	0.0282	0.0275
3-Methylheptane	I8	0.0706	0.0646	0.0683
1c,2t,3-Trimethylcyclopentane	N8	1.0332	0.9284	0.8991
3-Ethylhexane	I8	0.3283	0.3003	0.3142
1t,4-Dimethylcyclohexane	N8	0.3760	0.3379	0.3306
1,1-Dimethylcyclohexane	N8	0.0667	0.0599	0.0572
2,2,5-Trimethylhexane	I9	0.0297	0.0305	0.0320
3t-Ethylmethylcyclopentane	N8	0.1969	0.1769	0.1721
2t-Ethylmethylcyclopentane	N8	0.1789	0.1607	0.1559
1,1-Methylethylcyclopentane	N8	0.5522	0.4962	0.4742
2,2,4-Trimethylhexane	I9	0.0360	0.0370	0.0386
1t,2-Dimethylcyclohexane	N8	0.4067	0.3654	0.3515
1c,2c,3-Trimethylcyclopentane	N8	0.0959	0.0862	0.0826
1t,3-Dimethylcyclohexane	N8	0.0351	0.0315	0.0300
UnknownC7s	U7	1.5404	1.2360	1.3478
n-Octane	P8	2.7159	2.4843	2.6374
1c,4-Dimethylcyclohexane	N8	0.2823	0.2537	0.2418
i-Propylcyclopentane	I8	0.0341	0.0306	0.0294
2,4,4-Trimethylhexane	I9	0.0168	0.0173	0.0179
2,2,3,4-Tetramethylpentane	I9	0.0518	0.0532	0.0552
2,3,4-Trimethylhexane	I9	0.0209	0.0215	0.0222
1c,2-Dimethylcyclohexane	N8	0.1232	0.1107	0.1038
2,3,5-Trimethylhexane	I9	0.0512	0.0526	0.0544
2,2-Dimethylheptane	I9	0.0195	0.0200	0.0210
1,1,4-Trimethylcyclohexane	N9	0.5575	0.5636	0.5449
2,2,3-Trimethylhexane	I9	0.2281	0.2343	0.2397
2,4-Dimethylheptane	I9	0.0249	0.0256	0.0267
4,4-Dimethylheptane	I9	0.0770	0.0791	0.0825
Ethylcyclohexane	N8	0.3321	0.2984	0.2827
n-Propylcyclopentane	N8	0.1054	0.0947	0.0910
1c,3c,5-Trimethylcyclohexane	N9	0.0546	0.0552	0.0534
2,5-Dimethylheptane	I9	0.1163	0.1194	0.1243
3,3-Dimethylheptane	I9	0.0836	0.0859	0.0894
3,5-Dimethylheptane	I9	0.0331	0.0340	0.0354
2,6-Dimethylheptane	I9	0.0422	0.0433	0.0456
1,1,3-Trimethylcyclohexane	N9	0.0152	0.0154	0.0149
Ethylbenzene	A8	0.6885	0.5854	0.5025
1c,2t,4t-Trimethylcyclohexane	N9	0.2390	0.2416	0.2291
2,3-Dimethylheptane	I9	0.1360	0.1397	0.1436
1,3-Dimethylbenzene (m-Xylene)	A8	0.3612	0.3071	0.2651
1,4-Dimethylbenzene (p-Xylene)	A8	0.4846	0.4120	0.3568
3,4-Dimethylheptane	I9	0.4396	0.4515	0.4607
3,4-Dimethylheptane (2)	I9	0.2758	0.2833	0.2890
4-Ethylheptane	I9	0.0313	0.0321	0.0335
4-Methyloctane	I9	0.1913	0.1965	0.2035
2-Methyloctane	I9	0.2355	0.2419	0.2529
1c,2t,4c-Trimethylcyclohexane	I9	0.1369	0.1406	0.1446
3-Ethylheptane	I9	0.0849	0.0872	0.0896
3-Methyloctane	I9	0.2137	0.2195	0.2272
3,3-Diethylpentane	I9	0.0710	0.0729	0.0721
1c,2t,3-Trimethylcyclohexane	N9	0.1094	0.1106	0.1049
1,1,2-Trimethylcyclohexane	N9	0.0932	0.0942	0.0893
1,2-Dimethylbenzene (o-Xylene)	A8	0.6896	0.5863	0.4973
i-Butylcyclopentane	N9	0.1939	0.1960	0.1873
UnknownC8s	U8	0.9765	0.8932	0.9482
n-Nonane	P9	2.2326	2.2931	2.3843
1,1-Methylethylcyclohexane	N9	0.2362	0.2426	0.2530
i-Propylbenzene	A9	0.2444	0.2352	0.2033
i-Propylcyclohexane	N9	0.0885	0.0895	0.0833
2,2-Dimethyloctane	I10	0.0435	0.0496	0.0501

2,4-Dimethyloctane	I10	0.0353	0.0402	0.0406
2,6-Dimethyloctane	I10	0.0624	0.0711	0.0741
2,5-Dimethyloctane	I10	0.0545	0.0621	0.0627
n-Butylcyclopentane	N9	0.2423	0.2722	0.2543
3,3-Dimethyloctane	I10	0.1496	0.1705	0.1722
n-Propylbenzene	A9	0.2258	0.2173	0.1878
3,6-Dimethyloctane	I10	0.2017	0.2298	0.2319
3-Methyl-5-ethylheptane	I10	0.2414	0.2479	0.2549
1,3-Methylethylbenzene	A9	0.2166	0.2085	0.1787
1,4-Methylethylbenzene	A9	0.1873	0.1803	0.1545
1,3,5-Trimethylbenzene	A9	0.1380	0.1328	0.1146
2,3-Dimethyloctane	I10	0.2236	0.2548	0.2572
5-Methylnonane	I10	0.0896	0.1021	0.1040
1,2-Methylethylbenzene	A9	0.4334	0.4172	0.3557
2-Methylnonane	I10	0.1189	0.1355	0.1392
3-Ethyloctane	I10	0.0807	0.0919	0.0928
3-Methylnonane	I10	0.1039	0.1184	0.1205
1,2,4-Trimethylbenzene	A9	0.0151	0.0145	0.0124
t-Butylbenzene	A10	0.2458	0.2642	0.2277
i-Butylcyclohexane	N10	0.1819	0.2043	0.1879
1t-Methyl-2-n-propylcyclohexane	I10	0.0609	0.0625	0.0643
i-Butylbenzene	A10	0.0469	0.0504	0.0441
sec-Butylbenzene	A10	0.0824	0.0886	0.0768
UnknownC9s	U9	2.4143	2.4797	2.5783
n-Decane	P10	1.5539	1.7704	1.8098
1,2,3-Trimethylbenzene	A9	0.2017	0.1941	0.1621
1,3-Methyl-i-propylbenzene	A10	0.0934	0.0899	0.0767
1,4-Methyl-i-propylbenzene	A10	0.1584	0.1525	0.1300
Sec-Butylcyclohexane	N10	0.0766	0.0860	0.0790
1,2-Methyl-i-propylbenzene	A10	0.2332	0.2506	0.2135
3-Ethylnonane	I10	0.0845	0.0963	0.0989
1,3-Diethylbenzene	A10	0.1788	0.1922	0.1661
1,3-Methyl-n-propylbenzene	A10	0.1036	0.1113	0.0965
1,4-Diethylbenzene	A10	0.0780	0.0838	0.0726
1,4-Methyl-n-propylbenzene	A10	0.0153	0.0164	0.0143
n-Butylbenzene	A10	0.1556	0.1672	0.1449
1,3-Dimethyl-5-ethylbenzene	A10	0.0768	0.0825	0.0712
1,2-Diethylbenzene	A10	0.2216	0.2382	0.2023
1,2-Methyl-n-propylbenzene	A10	0.0434	0.0466	0.0398
1,4-Dimethyl-2-ethylbenzene	A10	0.0822	0.0884	0.0753
1,3-Dimethyl-4-ethylbenzene	A10	0.0576	0.0619	0.0527
1,2-Dimethyl-4-ethylbenzene	A10	0.1258	0.1352	0.1155
1,3-Dimethyl-2-ethylbenzene	A10	0.0855	0.0919	0.0771
1t,2c,4-Trimethylcyclopentane	A10	0.2982	0.2679	0.2674
1,2-Dimethyl-3-ethylbenzene	A10	0.1726	0.1855	0.1553
1,2-Ethyl-i-propylbenzene	A10	0.1345	0.1446	0.1232
1,4-Methyl-t-butylbenzene	A11	0.2351	0.2527	0.2153
UnknownC10s	U10	3.4256	3.9030	3.9899
n-Undecane	P11	1.3540	1.6948	1.7085
1,4-Ethyl-i-propylbenzene	A11	0.0495	0.0532	0.0453
1,2,4,5-Tetramethylbenzene	A11	0.1501	0.1613	0.1360
1,2-Methyl-n-butylbenzene	A11	0.1681	0.1807	0.1539
1,2,3,5-Tetramethylbenzene	A11	0.1585	0.1704	0.1430
1,2-Methyl-t-butylbenzene	A11	0.1790	0.1924	0.1639
5-Methylindan	A11	0.0437	0.0596	0.0594
4-Methylindan	A11	0.0611	0.0833	0.0831
1,2-Ethyl-n-propylbenzene	A11	0.2425	0.2606	0.2220
2-Methylindan	A11	0.0878	0.1198	0.1195
1,3-Methyl-n-butylbenzene	A11	0.1052	0.1131	0.0963
1,3-Di-i-propylbenzene	A11	0.1413	0.1519	0.1294
sec-Pentylbenzene	A11	0.1199	0.1289	0.1098
n-Pentylbenzene	A11	0.1216	0.1444	0.1256
1t-M-2-(4MP)cyclopentane	P12	0.1154	0.1574	0.1570
1,2-Di-n-propylbenzene	A11	0.1724	0.1853	0.1579
1,4-Di-i-propylbenzene	A11	0.1818	0.1954	0.1665
Tetrahydronaphthalene	A10	0.1476	0.1586	0.1351
t-Decahydronaphthalene	A10	0.1910	0.2053	0.1749
Naphthalene	A10	0.0455	0.0467	0.0398
1-t-Butyl-3,5-dimethylbenzene	A12	0.1643	0.1766	0.1504
1,4-Ethyl-t-butylbenzene	A11	0.1430	0.1537	0.1309
UnknownC11s	U11	2.9597	3.7047	3.7347
n-Dodecane	P12	1.2530	1.7092	1.7041
1,3-Di-n-propylbenzene	A12	0.1236	0.1328	0.1131
1,3,5-Triethylbenzene	A12	0.4324	0.4162	0.3591

1,2,4-Triethylbenzene	A12	0.0831	0.0800	0.0682
1,4-Methyl-n-pentylbenzene	A12	0.1437	0.1545	0.1316
n-Hexylbenzene	A12	0.1468	0.1908	0.1661
1,2,3,4,5-Pentamethylbenzene	A13	0.3367	0.3619	0.3083
2-Methylnaphthalene	A11	0.3099	0.3529	0.3006
1-Methylnaphthalene	A11	0.2938	0.3346	0.2450
UnknownC12s	U12	1.7629	2.4047	2.3975
n-Tridecane	P13	1.1715	1.7295	1.7040
UnknownC13s	U13	1.7894	2.6417	2.6027
n-Tetradecane	P14	1.1225	1.7833	1.7534
UnknownC14s	U14	1.6937	2.6907	2.6456
n-Pentadecane	P15	0.9086	1.5456	1.5022
UnknownC15s	U15	1.7109	2.9103	2.8286
n-Hexadecane	P16	0.7042	1.2769	1.2330
UnknownC16s	U16	1.1701	2.1217	2.0488
n-Heptadecane	P17	0.5755	1.1082	1.0668
UnknownC17s	U17	0.8904	1.7146	1.6506
n-Octadecane	P18	0.3515	0.7164	0.6876
UnknownC18s	U18	0.8053	1.6412	1.5753
n-Nonadecane	P19	0.1400	0.3010	0.2871
UnknownC19s	U19	0.3945	0.8483	0.8090
n-Eicosane	P20	0.0537	0.1215	0.1152
UnknownC20s	U20	0.1229	0.2781	0.2638
n-Heneicosane	P21	0.0392	0.0931	0.0879
UnknownC21s	U21	0.0412	0.0978	0.0923
n-Docosane	P22	0.0186	0.0463	0.0435
UnknownC22s	U22	0.0290	0.0721	0.0678
n-Tricosane	P23	0.0127	0.0330	0.0309
UnknownC23s	U23	0.0177	0.0460	0.0431
n-Tetracosane	P24	0.0046	0.0125	0.0117
UnknownC24s	U24	0.0069	0.0187	0.0175
n-Pentacosane	P25	0.0032	0.0090	0.0084
UnknownC25s	U25	0.0004	0.0011	0.0010
n-Hexacosane	P26	0.0044	0.0129	0.0120
n-Heptacosane	P27	0.0033	0.0101	0.0094
n-Octacosane	P28	0.0016	0.0051	0.0047
n-Nonacosane	P29	0.0010	0.0033	0.0030
n-Triacontane Plus	P30	0.0005	0.0017	0.0016
TOTAL		100.0000	100.0000	100.0000

CRUDE OIL ASSAY

PROJECT NO. :	201512042	ANALYSIS NO. :	12
COMPANY NAME :	CARRIZO OIL & GAS, INC.	ANALYSIS DATE:	DECEMBER 14, 2015
ACCOUNT NO. :		SAMPLE DATE :	DECEMBER 04, 2014 15:10
PRODUCER :	CARRIZO OIL & GAS, INC.	CYLINDER NO. :	1L GLASS JAR
LEASE NO. :		SAMPLED BY :	JOHN MOSER
NAME/DESCRIP :	PRODUCTION TANK BRINGELSON 16-20-9-58		EMPACT
FIELD DATA		SAMPLE TEMP. :	119
SAMPLE PRES. :		AMBIENT TEMP.:	
VAPOR PRES. :		GRAVITY :	
COMMENTS :	SPOT		

SPECIFICATION		TEST METHOD	UNITS	RESULTS
API GRAVITY			API 60/60	34.6
RVP @100 DEG F		D323	PSIG	5.0
TOTAL SULFUR		D2622	WT %	.381
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				BLACK, TRACE WATER PRESENT
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
VISCOSITY:	@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