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

303-637-0150

EXTENDED NATURAL GAS ANALYSIS (*DHA)

MAIN PAGE

PROJECT NO. :	201411103	ANALYSIS NO. :	01
COMPANY NAME :	CASCADE PETROLEUM	ANALYSIS DATE:	NOVEMBER 22, 2014
ACCOUNT NO. :		SAMPLE DATE :	NOVEMBER 19, 2014
PRODUCER :		CYLINDER NO. :	1059
LEASE NO. :		SAMPLED BY :	JOHN MOSER - EMPACT
NAME/DESCRIP :	SALES GAS 13:55 GAEDE A9S-55W-05-43		
FIELD DATA		SAMPLE TEMP. :	78
SAMPLE PRES. :	41	AMBIENT TEMP.:	
VAPOR PRES. :		GRAVITY :	
COMMENTS :	SPOT; PROBE; LENGTH OF H2S STAIN @ 2.0 PPM (1-7PPM) 14:05		

COMPONENT	MOLE %	MASS %	GPM @ 14.650	GPM @ 14.730
ALCOHOLS	0.0009	0.0018		
HELIUM	0.25	0.03	---	---
HYDROGEN	0.00	0.00	---	---
OXYGEN/ARGON	0.03	0.03	---	---
NITROGEN	12.75	12.14	---	---
CARBON DIOXIDE	0.30	0.45	---	---
METHANE	43.97750	23.97740	---	---
ETHANE	17.2494	17.6277	4.6132	4.6384
PROPANE	15.1535	22.7097	4.1751	4.1979
I-BUTANE	1.9160	3.7848	0.6267	0.6301
N-BUTANE	4.6453	9.1761	1.4649	1.4729
I-PENTANE	1.2162	2.9759	0.4382	0.4405
N-PENTANE	1.1030	2.7046	0.4001	0.4022
HEXANES PLUS	1.4082	4.3920	0.5662	0.5688
TOTALS	100.00000	100.00000	12.2844	12.3508

BTEX COMPONENTS	**MOLE%**	**WT%**
BENZENE	0.1000	0.2655
TOLUENE	0.0463	0.1450
ETHYLBENZENE	0.0050	0.0181
XYLENES	0.0061	0.0220
TOTAL BTEX	0.1574	0.4506

	BTU @	14.650	14.730
LOW	NET DRY REAL :	1380.9 **/scf**	1388.4 **/scf**
	NET WET REAL :	1356.8 **/scf**	1364.3 **/scf**
HIGH	GROSS DRY REAL :	1510.2 **/scf**	1518.5 **/scf**
	GROSS WET REAL :	1483.8 **/scf**	1492.1 **/scf**
	NET DRY REAL :	17828.8 **/lb**	17926.2 **/lb**
	GROSS DRY REAL :	19498.9 **/lb**	19605.4 **/lb**
	RELATIVE DENSITY (AIR=1):		1.0148
	COMPRESSIBILITY FACTOR :		0.99423

(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.
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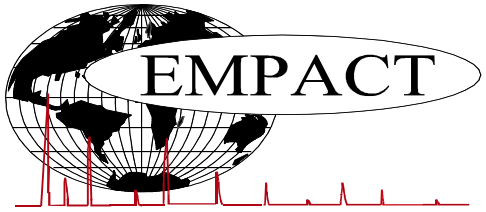
EXTENDED NATURAL GAS ANALYSIS (*DHA)

GLYCALC INFORMATION

PROJECT NO. :	201411103	ANALYSIS NO. :	01
COMPANY NAME :	CASCADE PETROLEUM	ANALYSIS DATE:	NOVEMBER 22, 2014
ACCOUNT NO. :		SAMPLE DATE :	NOVEMBER 19, 2014
PRODUCER :		CYLINDER NO. :	1059
LEASE NO. :		SAMPLED BY :	JOHN MOSER - EMPACT
NAME/DESCRIP :	SALES GAS 13:55 GAEDE A9S-55W-05-43		
FIELD DATA		SAMPLE TEMP. :	78
SAMPLE PRES. :	41	AMBIENT TEMP.:	
VAPOR PRES. :		GRAVITY :	
COMMENTS :	SPOT; PROBE; LENGTH OF H2S STAIN @ 2.0 PPM (1-7PPM) 14:05		

Componet	Mole %	Wt %
Helium	0.25	0.03
Hydrogen	0.00	0.00
Carbon Dioxide	0.30	0.45
Nitrogen	12.75	12.14
Methane	43.97750	23.97740
Ethane	17.2494	17.6277
Propane	15.1535	22.7097
Isobutane	1.9160	3.7848
n-Butane	4.6453	9.1761
Isopentane	1.1239	2.7559
n-Pentane	1.1030	2.7046
Cyclopentane	0.0923	0.2200
n-Hexane	0.2133	0.6247
Cyclohexane	0.0583	0.1668
Other Hexanes	0.5587	1.6272
Heptanes	0.2382	0.8058
Methycyclohexane	0.0365	0.1218
2,2,4 Trimethylpentane	0.0012	0.0047
Benzene	0.1000	0.2655
Toluene	0.0463	0.1450
Ethylbenzene	0.0050	0.0181
Xylenes	0.0061	0.0220
C8+ Heavies	0.1446	0.5904
Subtotal	99.96910	99.96820
Oxygen/Argon	0.03	0.03
Alcohols	0.0009	0.0018
Total	100.00000	100.00000



EXTENDED NATURAL GAS ANALYSIS (*DHA)

DHA COMPONENT LIST

PROJECT NO. :	201411103	ANALYSIS NO. :	01
COMPANY NAME :	CASCADE PETROLEUM	ANALYSIS DATE:	NOVEMBER 22, 2014
ACCOUNT NO. :		SAMPLE DATE :	NOVEMBER 19, 2014
PRODUCER :		CYLINDER NO. :	1059
LEASE NO. :		SAMPLED BY :	JOHN MOSER - EMPACT
NAME/DESCRIP :	SALES GAS 13:55 GAEDE A9S-55W-05-43		
FIELD DATA		SAMPLE TEMP. :	78
SAMPLE PRES. :	41	AMBIENT TEMP.:	
VAPOR PRES. :		GRAVITY :	
COMMENTS :	SPOT; PROBE; LENGTH OF H2S STAIN @ 2.0 PPM (1-7PPM) 14:05		

COMPONENT	PIANO #	MOLE %	MASS %	GPM @ 14.650	GPM @ 14.730
Helium	---	0.25	0.03	---	---
Hydrogen	---	0.00	0.00	---	---
Oxygen/Argon	---	0.03	0.03	---	---
Nitrogen	---	12.75	12.14	---	---
Carbon Dioxide	---	0.30	0.45	---	---
Methane	P1	43.97750	23.97740	---	---
Ethane	P2	17.2494	17.6277	4.613	4.638
Propane	P3	15.1535	22.7097	4.175	4.198
i-Butane	I4	1.9160	3.7848	0.627	0.630
n-Butane	P4	4.6453	9.1761	1.465	1.473
2,2-Dimethylpropane	I5	0.0070	0.0172	0.003	0.003
i-Pentane	I5	1.1169	2.7387	0.408	0.410
Acetone	X3	0.0008	0.0016	0.000	0.000
i-Propanol	X3	0.0001	0.0002	0.000	0.000
n-Pentane	P5	1.1029	2.7044	0.400	0.402
2,2-Dimethylbutane	I6	0.0035	0.0103	0.001	0.001
Cyclopentane	N5	0.0923	0.2200	0.027	0.027
2,3-Dimethylbutane	I6	0.0123	0.0360	0.005	0.005
2-Methylpentane	I6	0.2522	0.7387	0.104	0.105
3-Methylpentane	I6	0.1466	0.4294	0.060	0.061
UnknownC5s	U5	0.0001	0.0002	0.000	0.000
n-Hexane	P6	0.2133	0.6247	0.087	0.088
2,2-Dimethylpentane	I7	0.0005	0.0017	0.000	0.000
Methylcyclopentane	N6	0.1364	0.3902	0.048	0.048
2,4-Dimethylpentane	I7	0.0046	0.0157	0.002	0.002
2,2,3-Trimethylbutane	I7	0.0002	0.0007	0.000	0.000
Benzene	A6	0.1000	0.2655	0.028	0.028
Cyclohexane	N6	0.0583	0.1668	0.020	0.020
2-Methylhexane	I7	0.0230	0.0783	0.011	0.011
2,3-Dimethylpentane	I7	0.0175	0.0596	0.008	0.008
1,1-Dimethylcyclopentane	N7	0.0058	0.0193	0.002	0.002
3-Methylhexane	I7	0.0445	0.1515	0.020	0.020
1c,3-Dimethylcyclopentane	N7	0.0136	0.0454	0.006	0.006
1t,3-Dimethylcyclopentane	N7	0.0082	0.0274	0.004	0.004
3-Ethylpentane	I7	0.0063	0.0214	0.003	0.003
1t,2-Dimethylcyclopentane	N7	0.0389	0.1298	0.018	0.018
2,2,4-Trimethylpentane	I8	0.0012	0.0047	0.001	0.001
UnknownC6s	U6	0.0077	0.0226	0.003	0.003
n-Heptane	P7	0.0560	0.1907	0.026	0.026
1c,2-Dimethylcyclopentane	N7	0.0030	0.0100	0.001	0.001
Methylcyclohexane	N7	0.0365	0.1218	0.015	0.015

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2,2-Dimethylhexane	I8	0.0017	0.0066	0.001	0.001
1,1,3-Trimethylcyclopentane	N7	0.0003	0.0012	0.000	0.000
Ethylcyclopentane	N7	0.0106	0.0354	0.004	0.004
2,5-Dimethylhexane	I8	0.0018	0.0070	0.001	0.001
2,2,3-Trimethylpentane	I8	0.0010	0.0039	0.001	0.001
2,4-Dimethylhexane	I8	0.0013	0.0051	0.001	0.001
1c,2t,4-Trimethylcyclopentane	N8	0.0038	0.0145	0.002	0.002
3,3-Dimethylhexane	I8	0.0003	0.0012	0.000	0.000
1t,2c,4-Trimethylcyclopentane	N8	0.0066	0.0252	0.003	0.003
2,3,4-Trimethylpentane	I8	0.0002	0.0008	0.000	0.000
2,3,3-Trimethylpentane	I8	0.0001	0.0004	0.000	0.000
Toluene	A7	0.0463	0.1450	0.015	0.015
2,3-Dimethylhexane	I8	0.0020	0.0078	0.001	0.001
2-Methyl-3-ethylpentane	I8	0.0010	0.0039	0.000	0.000
1,1,2-Trimethylcyclopentane	N8	0.0001	0.0004	0.000	0.000
2-Methylheptane	I8	0.0156	0.0606	0.008	0.008
4-Methylheptane	I8	0.0027	0.0105	0.001	0.001
3-Methyl-3-ethylpentane	I8	0.0021	0.0082	0.001	0.001
3,4-Dimethylhexane	I8	0.0007	0.0027	0.000	0.000
1c,2c,4-Trimethylcyclopentane	N8	0.0003	0.0012	0.000	0.000
1c,3-Dimethylcyclohexane	N8	0.0001	0.0004	0.000	0.000
3-Methylheptane	I8	0.0027	0.0105	0.001	0.001
1c,2t,3-Trimethylcyclopentane	N8	0.0075	0.0286	0.004	0.004
3-Ethylhexane	I8	0.0023	0.0089	0.001	0.001
1t,4-Dimethylcyclohexane	N8	0.0019	0.0072	0.001	0.001
1,1-Dimethylcyclohexane	N8	0.0011	0.0042	0.000	0.000
3t-Ethylmethylcyclopentane	N8	0.0020	0.0076	0.001	0.001
2t-Ethylmethylcyclopentane	N8	0.0017	0.0065	0.001	0.001
1,1-Methylethylcyclopentane	N8	0.0054	0.0206	0.003	0.003
2,2,4-Trimethylhexane	I9	0.0002	0.0009	0.000	0.000
1t,2-Dimethylcyclohexane	N8	0.0027	0.0103	0.001	0.001
UnknownC7s	U7	0.0052	0.0177	0.002	0.002
n-Octane	P8	0.0070	0.0272	0.004	0.004
1c,4-Dimethylcyclohexane	N8	0.0073	0.0278	0.004	0.004
i-Propylcyclopentane	I8	0.0005	0.0019	0.000	0.000
2,3,5-Trimethylhexane	I9	0.0002	0.0009	0.000	0.000
2,2,3,4-Tetramethylpentane	I9	0.0004	0.0017	0.000	0.000
1c,2-Dimethylcyclohexane	N8	0.0006	0.0023	0.000	0.000
2,2-Dimethylheptane	I9	0.0005	0.0022	0.000	0.000
2,2,3-Trimethylhexane	I9	0.0031	0.0135	0.002	0.002
2,4-Dimethylheptane	I9	0.0039	0.0170	0.002	0.002
4,4-Dimethylheptane	I9	0.0006	0.0026	0.000	0.000
Ethylcyclohexane	N8	0.0044	0.0168	0.002	0.002
n-Propylcyclopentane	N8	0.0012	0.0046	0.001	0.001
1c,3c,5-Trimethylcyclohexane	N9	0.0006	0.0026	0.000	0.000
2,5-Dimethylheptane	I9	0.0001	0.0004	0.000	0.000
3,3-Dimethylheptane	I9	0.0004	0.0017	0.000	0.000
3,5-Dimethylheptane	I9	0.0003	0.0013	0.000	0.000
1,1,3-Trimethylcyclohexane	N9	0.0002	0.0009	0.000	0.000
Ethylbenzene	I8	0.0050	0.0181	0.002	0.002
1c,2t,4t-Trimethylcyclohexane	N9	0.0039	0.0167	0.002	0.002
2,3-Dimethylheptane	I9	0.0007	0.0031	0.000	0.000
1,3-Dimethylbenzene (m-Xylene)	A8	0.0026	0.0094	0.001	0.001
1,4-Dimethylbenzene (p-Xylene)	A8	0.0007	0.0025	0.000	0.000
3,4-Dimethylheptane	I9	0.0003	0.0013	0.000	0.000
3,4-Dimethylheptane (2)	I9	0.0006	0.0026	0.000	0.000
4-Ethylheptane	I9	0.0001	0.0004	0.000	0.000
4-Methyloctane	I9	0.0009	0.0039	0.001	0.001
2-Methyloctane	I9	0.0009	0.0039	0.001	0.001
1c,2t,3-Trimethylcyclohexane	N9	0.0007	0.0030	0.000	0.000
3-Ethylheptane	I9	0.0004	0.0017	0.000	0.000
3-Methyloctane	I9	0.0025	0.0109	0.001	0.001
1c,2t,4c-Trimethylcyclohexane	I9	0.0001	0.0004	0.000	0.000
1,1,2-Trimethylcyclohexane	N9	0.0001	0.0004	0.000	0.000

3,3-Diethylpentane	I9	0.0001	0.0004	0.000	0.000
1,2-Dimethylbenzene (o-Xylene)	A8	0.0028	0.0101	0.001	0.001
i-Butylcyclopentane	N9	0.0008	0.0034	0.000	0.000
UnknownC8s	U8	0.0008	0.0031	0.000	0.000
n-Nonane	P9	0.0028	0.0122	0.002	0.002
1,1-Methylethylcyclohexane	N9	0.0011	0.0047	0.001	0.001
i-Propylbenzene	A9	0.0015	0.0061	0.001	0.001
i-Propylcyclohexane	N9	0.0002	0.0009	0.000	0.000
2,2-Dimethyloctane	I10	0.0003	0.0015	0.000	0.000
2,4-Dimethyloctane	I10	0.0001	0.0005	0.000	0.000
2,6-Dimethyloctane	I10	0.0001	0.0005	0.000	0.000
2,5-Dimethyloctane	I10	0.0001	0.0005	0.000	0.000
n-Butylcyclopentane	N9	0.0006	0.0026	0.000	0.000
3,3-Dimethyloctane	I10	0.0002	0.0010	0.000	0.000
n-Propylbenzene	A9	0.0012	0.0049	0.001	0.001
3,6-Dimethyloctane	I10	0.0010	0.0048	0.001	0.001
3-Methyl-5-ethylheptane	I10	0.0003	0.0015	0.000	0.000
1,3-Methylethylbenzene	A9	0.0008	0.0033	0.000	0.000
1,4-Methylethylbenzene	A9	0.0004	0.0016	0.000	0.000
1,3,5-Trimethylbenzene	A9	0.0002	0.0008	0.000	0.000
2,3-Dimethyloctane	I10	0.0001	0.0005	0.000	0.000
5-Methylnonane	I10	0.0003	0.0015	0.000	0.000
1,2-Methylethylbenzene	A9	0.0006	0.0025	0.000	0.000
2-Methylnonane	I10	0.0003	0.0015	0.000	0.000
3-Ethyloctane	I10	0.0001	0.0005	0.000	0.000
3-Methylnonane	I10	0.0003	0.0015	0.000	0.000
1,2,4-Trimethylbenzene	A9	0.0001	0.0004	0.000	0.000
t-Butylbenzene	A10	0.0009	0.0041	0.000	0.000
i-Butylcyclohexane	N10	0.0002	0.0010	0.000	0.000
1t-Methyl-2-n-propylcyclohexane	I10	0.0001	0.0005	0.000	0.000
i-Butylbenzene	A10	0.0001	0.0004	0.000	0.000
sec-Butylbenzene	A10	0.0001	0.0004	0.000	0.000
UnknownC9s	U9	0.0060	0.0262	0.003	0.003
n-Decane	P10	0.0009	0.0044	0.001	0.001
1,2,3-Trimethylbenzene	A9	0.0004	0.0016	0.000	0.000
1,3-Methyl-i-propylbenzene	A10	0.0001	0.0004	0.000	0.000
1,4-Methyl-i-propylbenzene	A10	0.0001	0.0004	0.000	0.000
Sec-Butylcyclohexane	A10	0.0003	0.0014	0.000	0.000
1,2-Methyl-i-propylbenzene	A10	0.0001	0.0004	0.000	0.000
1,3-Diethylbenzene	A10	0.0001	0.0004	0.000	0.000
1,3-Methyl-n-propylbenzene	A10	0.0001	0.0004	0.000	0.000
1,4-Diethylbenzene	A10	0.0002	0.0009	0.000	0.000
1,4-Methyl-n-propylbenzene	A10	0.0002	0.0009	0.000	0.000
n-Butylbenzene	A10	0.0001	0.0004	0.000	0.000
1,3-Dimethyl-5-ethylbenzene	A10	0.0001	0.0004	0.000	0.000
1,2-Diethylbenzene	A10	0.0001	0.0004	0.000	0.000
t-Decahydronaphthalene	A9	0.0001	0.0005	0.000	0.000
1,2-Methyl-n-propylbenzene	A10	0.0001	0.0004	0.000	0.000
1,4-Dimethyl-2-ethylbenzene	A10	0.0001	0.0004	0.000	0.000
1,2-Dimethyl-4-ethylbenzene	A10	0.0001	0.0004	0.000	0.000
1,3-Dimethyl-2-ethylbenzene	A10	0.0001	0.0004	0.000	0.000
1,2-Dimethyl-3-ethylbenzene	A10	0.0001	0.0004	0.000	0.000
1,4-Methyl-t-butylbenzene	A11	0.0001	0.0005	0.000	0.000
UnknownC10s	U10	0.0045	0.0218	0.003	0.003
n-Undecane	P11	0.0003	0.0016	0.000	0.000
1,2,4,5-Tetramethylbenzene	A11	0.0001	0.0004	0.000	0.000
1,2,3,5-Tetramethylbenzene	A11	0.0001	0.0004	0.000	0.000
1,2-Methyl-t-butylbenzene	A11	0.0001	0.0005	0.000	0.000
2-Methylindan	A11	0.0001	0.0004	0.000	0.000
1,3-Di-i-propylbenzene	A11	0.0001	0.0005	0.000	0.000
Naphthalene	A10	0.0001	0.0004	0.000	0.000
UnknownC11s	U11	0.0011	0.0059	0.001	0.001
n-Dodecane	P12	0.0001	0.0006	0.000	0.000
1,2,4-Triethylbenzene	A12	0.0001	0.0005	0.000	0.000

2-Methylnaphthalene	A11	0.0001	0.0005	0.000	0.000
UnknownC12s	U12	0.0005	0.0027	0.000	0.000
n-Tridecane	P13	0.0001	0.0006	0.000	0.000
UnknownC13s	U13	0.0002	0.0013	0.000	0.000
UnknownC14s	U14	0.0001	0.0007	0.000	0.000
UnknownC15s	U15	0.0001	0.0007	0.000	0.000
UnknownC16s	U16	0.0001	0.0008	0.000	0.000
TOTAL		100.00000	100.00000	12.2844	12.3508

BTEX COMPONENTS	**MOLE%**	**WT%**
BENZENE	0.1000	0.2655
TOLUENE	0.0463	0.1450
ETHYLBENZENE	0.0050	0.0181
XYLENES	0.0061	0.0220
TOTAL BTEX	0.1574	0.4506

	BTU @	14.650		14.730
LOW	NET DRY REAL :	1380.9	**/scf**	1388.4 **/scf**
	NET WET REAL :	1356.8	**/scf**	1364.3 **/scf**
HIGH	GROSS DRY REAL :	1510.2	**/scf**	1518.5 **/scf**
	GROSS WET REAL :	1483.8	**/scf**	1492.1 **/scf**
	NET DRY REAL :	17828.8	**/lb**	17926.2 **/lb**
	GROSS DRY REAL :	19498.9	**/lb**	19605.4 **/lb**
	RELATIVE DENSITY (AIR=1):			1.0148
	COMPRESSIBILITY FACTOR :			0.99423

(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 ST.
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303-637-0150

EXTENDED NATURAL GAS LIQUID ANALYSIS (*DHA)

MAIN PAGE

PROJECT NO. :	201411103	ANALYSIS NO. :	02
COMPANY NAME :	CASCADE PETROLEUM	ANALYSIS DATE:	NOVEMBER 21, 2014
ACCOUNT NO. :		SAMPLE DATE :	NOVEMBER 19, 2014
PRODUCER :		CYLINDER NO. :	5896
LEASE NO. :		SAMPLED BY :	JOHN MOSER
NAME/DESCRIP :	OIL TREATER 13:50		EMPACT
	GAEDE A9S-55W-05-43		
FIELD DATA		SAMPLE TEMP. :	153
SAMPLE PRES. :	31	AMBIENT TEMP.:	
VAPOR PRES. :		GRAVITY :	
COMMENTS :	SPOT; NO PROBE		

COMPONENT	MOLE %	MASS %	VOL %
NITROGEN (AIR)	0.0110	0.0028	0.0026
CARBON DIOXIDE	0.0000	0.0000	0.0000
METHANE	0.1070	0.0155	0.0388
ETHANE	0.4830	0.1315	0.2771
PROPANE	1.6700	0.6666	0.9868
I-BUTANE	0.5170	0.2720	0.3627
N-BUTANE	1.9120	1.0059	1.2927
I-PENTANE	1.1250	0.7347	0.8832
N-PENTANE	1.4000	0.9143	1.0873
HEXANES PLUS	92.7750	96.2567	95.0688
TOTALS	100.0000	100.0000	100.0000

BTEX COMPONENTS	MOLE%	MASS%
BENZENE	2.7226	1.9249
TOLUENE	4.0449	3.3735
ETHYLBENZENE	1.5976	1.5353
XYLENE	1.9595	1.8831
TOTAL BTEX	10.3246	8.7168

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

	TOTAL SAMPLE	C6+ FRACTION	
Specific Gravity (H2O=1) =	0.751	0.7598	60/60
API Gravity =	56.92	54.73	60/60
Molecular Weight =	110.48	115.143	
Absolute Density =	6.26	6.34	LBS/GAL
Heating Value Liq. Idl Gas=	126497	128124	BTU/GAL
Vapor/Liquid =	21.59	21.03	CUFT/GAL
Vapor Pressure =	15.78	1.68	PSIA @100 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 LIQUID ANALYSIS (*DHA)

E & P TANK / GLYCALC INFORMATION

PROJECT NO. :	201411103	ANALYSIS NO. :	02
COMPANY NAME :	CASCADE PETROLEUM	ANALYSIS DATE:	NOVEMBER 21, 2014
ACCOUNT NO. :		SAMPLE DATE :	NOVEMBER 19, 2014
PRODUCER :		CYLINDER NO. :	5896
LEASE NO. :		SAMPLED BY :	JOHN MOSER
NAME/DESCRIP :	OIL TREATER 13:50		EMPACT
	GAEDE A9S-55W-05-43		
FIELD DATA		SAMPLE TEMP. :	153
SAMPLE PRES. :	31	AMBIENT TEMP.:	
VAPOR PRES. :		GRAVITY :	
COMMENTS :	SPOT; NO PROBE		

COMPONENT	Mole %		Wt %		LV %	
CARBON DIOXIDE	0.0000		0.0000		0.0000	
NITROGEN (AIR)	0.0110		0.0028		0.0026	
METHANE	0.1070		0.0155		0.0388	
ETHANE	0.4830		0.1315		0.2771	
PROPANE	1.6700		0.6666		0.9868	
I-BUTANE	0.5170		0.2720		0.3627	
N-BUTANE	1.9120		1.0059		1.2927	
I-PENTANE	1.1250		0.7347		0.8832	
N-PENTANE	1.4000		0.9143		1.0873	
CYCLOPENTANE (N-C5)	1.0901		0.6920		0.6832	
N-HEXANE	5.0080		3.9069		4.4178	
CYCLOHEXANE (OTHER C6)	2.3344		1.7783		1.7036	
OTHER HEXANES	10.8620		8.4048		9.1327	
OTHER HEPTANES	13.1104		11.8049		12.4351	
METHYLCYCLOHEXANE (OTHER C7)	3.1766		2.8233		2.7352	
2,2,4 TRIMETHYLPENTANE	0.8219		0.7305		0.7276	
BENZENE	2.7226		1.9249		1.6363	
TOLUENE	4.0449		3.3735		2.8961	
ETHYLBENZENE	1.5976		1.5353		1.3178	
XYLENES	1.9595		1.8831		1.6162	
OTHER OCTANES	11.1683		11.5691		11.7807	
OCTANES PLUS	----	50.4260	----	61.5481	----	59.4288
NONANES	10.8387		12.3801		12.1257	
DECANES PLUS	24.0400		33.4500		31.8608	
SUB TOTAL	100.0000		100.0000		100.0000	
TOTAL	100.0000		100.0000		100.0000	

API Gravity =	**56.92**	60/60
Vapor Pressure =	**15.78**	PSIA & 100 F
Average Molecular Weight of Decanes plus =	**153.72**	
Average Specific Gravity of Decanes plus =	**0.7920**	

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. :	201411103	ANALYSIS NO. :	02
COMPANY NAME :	CASCADE PETROLEUM	ANALYSIS DATE:	NOVEMBER 21, 2014
ACCOUNT NO. :		SAMPLE DATE :	NOVEMBER 19, 2014
PRODUCER :		CYLINDER NO. :	5896
LEASE NO. :		SAMPLED BY :	JOHN MOSER
NAME/DESCRIP :	OIL TREATER 13:50		EMPACT
	GAEDE A9S-55W-05-43		
FIELD DATA		SAMPLE TEMP. :	153
SAMPLE PRES. :	31	AMBIENT TEMP.:	
VAPOR PRES. :		GRAVITY :	
COMMENTS :	SPOT; NO PROBE		

COMPONENT / CARBON NUMBER	MOLE%	MASS %	VOLUME %
NITROGEN	0.0110	0.0028	0.0026
CARBON DIOXIDE	0.0000	0.0000	0.0000
C1	0.1070	0.0155	0.0388
C2	0.4830	0.1315	0.2771
C3	1.6700	0.6666	0.9868
C4	2.4290	1.2779	1.6554
C5	3.6151	2.3410	2.6537
C6	20.9270	16.0149	16.8904
C7	20.3319	18.0017	18.0664
C8	15.5473	15.7180	15.4423
C9	10.8387	12.3801	12.1257
C10	9.5326	11.8577	11.3414
C11	6.4444	8.4895	7.8698
C12	2.9195	4.0839	3.8575
C13	2.2816	3.6681	3.5644
C14	1.5115	2.7143	2.6688
C15	1.0987	2.1125	2.0532
C16	0.1998	0.4096	0.3955
C17	0.0403	0.0877	0.0845
C18	0.0116	0.0267	0.0257
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.
365 S. MAIN ST.
BRIGHTON, CO
80601

303-637-0150

EXTENDED NATURAL GAS LIQUID ANALYSIS (*DHA)

DHA COMPONENT LIST

PROJECT NO. :	201411103	ANALYSIS NO. :	02
COMPANY NAME :	CASCADE PETROLEUM	ANALYSIS DATE:	NOVEMBER 21, 2014
ACCOUNT NO. :		SAMPLE DATE :	NOVEMBER 19, 2014
PRODUCER :		CYLINDER NO. :	5896
LEASE NO. :		SAMPLED BY :	JOHN MOSER
NAME/DESCRIP :	OIL TREATER 13:50		EMPACT
	GAEDE A9S-55W-05-43		
FIELD DATA		SAMPLE TEMP. :	153
SAMPLE PRES. :	31	AMBIENT TEMP.:	
VAPOR PRES. :		GRAVITY :	
COMMENTS :	SPOT; NO PROBE		

COMPONENT	PIANO #	MOLE %	MASS %	VOL %
Nitrogen	NHC	0.0110	0.0028	0.0026
Carbon Dioxide	NHC	0.0000	0.0000	0.0000
Methane	P1	0.1070	0.0155	0.0388
Ethane	P2	0.4830	0.1315	0.2771
Propane	P3	1.6700	0.6666	0.9868
i-Butane	I4	0.5170	0.2720	0.3627
n-Butane	P4	1.9120	1.0059	1.2927
2,2-Dimethylpropane	I5	0.0140	0.0091	0.0114
i-Pentane	I5	1.1110	0.7256	0.8718
n-Pentane	P5	1.4000	0.9143	1.0873
2,2-Dimethylbutane	I6	0.0574	0.0448	0.0514
Cyclopentane	N5	1.0901	0.6920	0.6832
2,3-Dimethylbutane	I6	0.3679	0.2870	0.3229
2-Methylpentane	I6	4.0418	3.1528	3.5975
3-Methylpentane	I6	2.6634	2.0776	2.3311
n-Hexane	P6	5.0080	3.9069	4.4178
2,2-Dimethylpentane	I7	0.0452	0.0410	0.0451
Methylcyclopentane	N6	3.7305	2.8418	2.8289
2,4-Dimethylpentane	I7	0.1719	0.1559	0.1730
2,2,3-Trimethylbutane	I7	0.0101	0.0092	0.0099
Benzene	A6	2.7226	1.9249	1.6363
3,3-Dimethylpentane	I7	0.0329	0.0298	0.0321
Cyclohexane	N6	2.3344	1.7783	1.7036
2-Methylhexane	I7	1.2531	1.1365	1.2501
2,3-Dimethylpentane	I7	0.6951	0.6304	0.6736
1,1-Dimethylcyclopentane	N7	0.2443	0.2171	0.2146
3-Methylhexane	I7	2.2454	2.0365	2.2063
1c,3-Dimethylcyclopentane	N7	0.9013	0.8011	0.8022
1t,3-Dimethylcyclopentane	N7	0.8219	0.7305	0.7276
3-Ethylpentane	I7	0.2397	0.2174	0.2317
1t,2-Dimethylcyclopentane	N7	1.8566	1.6501	1.6379
2,2,4-Trimethylpentane	I8	0.0461	0.0477	0.0512
UnknownC6s	U6	0.0010	0.0008	0.0009
n-Heptane	P7	3.6945	3.3508	3.6541
1c,2-Dimethylcyclopentane	N7	0.1747	0.1553	0.1500
Methylcyclohexane	N7	3.1766	2.8233	2.7352
2,2-Dimethylhexane	I8	0.2751	0.2844	0.3049
Ethylcyclopentane	N7	0.7161	0.6364	0.6194
2,5-Dimethylhexane	I8	0.1736	0.1795	0.1929
2,2,3-Trimethylpentane	I8	0.0100	0.0103	0.0107
2,4-Dimethylhexane	I8	0.2048	0.2118	0.2266
1c,2t,4-Trimethylcyclopentane	N8	0.6809	0.6916	0.6759

3,3-Dimethylhexane	I8	0.0485	0.0501	0.0527
2,3,4-Trimethylpentane	I8	0.0244	0.0252	0.0261
2,3,3-Trimethylpentane	I8	0.0038	0.0039	0.0040
Toluene	A7	4.0449	3.3735	2.8961
2,3-Dimethylhexane	I8	0.0829	0.0857	0.0898
2-Methyl-3-ethylpentane	I8	0.1545	0.1598	0.1657
1,1,2-Trimethylcyclopentane	N8	0.0081	0.0082	0.0079
2-Methylheptane	I8	1.7872	1.8479	1.9712
4-Methylheptane	I8	0.4722	0.4882	0.5082
3-Methyl-3-ethylpentane	I8	0.0711	0.0735	0.0754
3,4-Dimethylhexane	I8	0.1116	0.1154	0.1196
1c,2c,4-Trimethylcyclopentane	N8	0.0292	0.0297	0.0287
1c,3-Dimethylcyclohexane	N8	0.0275	0.0279	0.0272
3-Methylheptane	I8	0.7085	0.7326	0.7748
1c,2t,3-Trimethylcyclopentane	N8	0.8580	0.8714	0.8439
3-Ethylhexane	I8	0.1478	0.1528	0.1599
1t,4-Dimethylcyclohexane	N8	0.2894	0.2939	0.2876
1,1-Dimethylcyclohexane	N8	0.1498	0.1521	0.1453
3c-Ethylmethylcyclopentane	N8	0.0069	0.0070	0.0068
3t-Ethylmethylcyclopentane	N8	0.2492	0.2531	0.2463
2t-Ethylmethylcyclopentane	N8	0.2186	0.2220	0.2154
1,1-Methylethylcyclopentane	N8	0.6757	0.6863	0.6559
2,2,4-Trimethylhexane	I9	0.0356	0.0413	0.0431
1t,2-Dimethylcyclohexane	N8	0.4458	0.4528	0.4356
1t,3-Dimethylcyclohexane	N8	0.0035	0.0036	0.0034
UnknownC7s	U7	0.0076	0.0069	0.0075
n-Octane	P8	2.1770	2.2509	2.3897
1c,4-Dimethylcyclohexane	N8	0.2227	0.2262	0.2156
i-Propylcyclopentane	I8	0.0937	0.0952	0.0915
2,4,4-Trimethylhexane	I9	0.0258	0.0300	0.0310
2,2,3,4-Tetramethylpentane	I9	0.0258	0.0300	0.0311
2,3,4-Trimethylhexane	I9	0.0241	0.0280	0.0289
1c,2-Dimethylcyclohexane	N8	0.1614	0.1639	0.1536
2,3,5-Trimethylhexane	I9	0.0426	0.0495	0.0512
2,2-Dimethylheptane	I9	0.0164	0.0190	0.0200
1,1,4-Trimethylcyclohexane	N9	0.7182	0.8207	0.7935
2,2,3-Trimethylhexane	I9	0.7886	0.9155	0.9367
2,4-Dimethylheptane	I9	0.1123	0.1304	0.1360
4,4-Dimethylheptane	I9	0.0432	0.0502	0.0524
Ethylcyclohexane	N8	0.9256	0.9401	0.8908
n-Propylcyclopentane	N8	0.2880	0.2925	0.2811
1c,3c,5-Trimethylcyclohexane	N9	0.0454	0.0519	0.0502
2,5-Dimethylheptane	I9	0.0773	0.0897	0.0934
3,3-Dimethylheptane	I9	0.0911	0.1058	0.1101
3,5-Dimethylheptane	I9	0.0666	0.0773	0.0805
2,6-Dimethylheptane	I9	0.1028	0.1193	0.1255
1,1,3-Trimethylcyclohexane	N9	0.1358	0.1552	0.1501
Ethylbenzene	A8	1.5976	1.5353	1.3178
1c,2t,4t-Trimethylcyclohexane	N9	0.2347	0.2682	0.2544
2,3-Dimethylheptane	I9	0.1181	0.1371	0.1409
1,3-Dimethylbenzene (m-Xylene)	A8	0.8401	0.8073	0.6970
1,4-Dimethylbenzene (p-Xylene)	A8	0.3877	0.3726	0.3227
3,4-Dimethylheptane	I9	0.0439	0.0510	0.0520
3,4-Dimethylheptane (2)	I9	0.0469	0.0544	0.0555
4-Ethylheptane	I9	0.0730	0.0847	0.0883
4-Methyloctane	I9	0.2481	0.2880	0.2982
2-Methyloctane	I9	0.3680	0.4272	0.4467
1c,2t,4c-Trimethylcyclohexane	I9	0.0471	0.0547	0.0562
3-Ethylheptane	I9	0.1463	0.1698	0.1744
3-Methyloctane	I9	0.7084	0.8224	0.8514
3,3-Diethylpentane	I9	0.0755	0.0877	0.0867
1c,2t,3-Trimethylcyclohexane	N9	0.0851	0.0972	0.0922
1,1,2-Trimethylcyclohexane	N9	0.0175	0.0200	0.0190
1,2-Dimethylbenzene (o-Xylene)	A8	0.7317	0.7032	0.5965
i-Butylcyclopentane	N9	0.2306	0.2635	0.2518
UnknownC8s	U8	0.1571	0.1624	0.1724
n-Nonane	P9	1.3668	1.5868	1.6499
1,1-Methylethylcyclohexane	N9	0.2324	0.2698	0.2814
i-Propylbenzene	A9	0.2557	0.2782	0.2404
i-Propylcyclohexane	N9	0.1136	0.1298	0.1208
2,2-Dimethyloctane	I10	0.0735	0.0947	0.0956
2,4-Dimethyloctane	I10	0.0641	0.0826	0.0834
2,6-Dimethyloctane	I10	0.0132	0.0170	0.0177
2,5-Dimethyloctane	I10	0.0295	0.0380	0.0384

n-Butylcyclopentane	N9	0.2250	0.2857	0.2669
3,3-Dimethyloctane	I10	0.1577	0.2031	0.2051
n-Propylbenzene	A9	0.7687	0.8363	0.7229
3,6-Dimethyloctane	I10	0.4853	0.6250	0.6308
3-Methyl-5-ethylheptane	I10	0.1528	0.1774	0.1824
1,3-Methylethylbenzene	A9	0.4412	0.4800	0.4114
1,4-Methylethylbenzene	A9	0.1731	0.1883	0.1614
1,3,5-Trimethylbenzene	A9	0.1225	0.1333	0.1151
2,3-Dimethyloctane	I10	0.0515	0.0663	0.0669
5-Methylnonane	I10	0.3395	0.4372	0.4454
1,2-Methylethylbenzene	A9	0.5137	0.5589	0.4766
2-Methylnonane	I10	0.0696	0.0896	0.0920
3-Ethyloctane	I10	0.0609	0.0784	0.0791
3-Methylnonane	I10	0.2219	0.2858	0.2908
1,2,4-Trimethylbenzene	A9	0.0069	0.0075	0.0064
t-Butylbenzene	A10	0.8080	0.9816	0.8462
i-Butylcyclohexane	N10	0.2211	0.2807	0.2582
1t-Methyl-2-n-propylcyclohexane	I10	0.0558	0.0648	0.0666
i-Butylbenzene	A10	0.0565	0.0686	0.0600
sec-Butylbenzene	A10	0.0439	0.0533	0.0462
UnknownC9s	U9	1.3849	1.6078	1.6718
n-Decane	P10	0.9243	1.1904	1.2169
1,2,3-Trimethylbenzene	A9	0.4394	0.4780	0.3993
1,3-Methyl-i-propylbenzene	A10	0.1543	0.1679	0.1432
1,4-Methyl-i-propylbenzene	A10	0.0623	0.0678	0.0578
Sec-Butylcyclohexane	N10	0.5046	0.6407	0.5885
1,2-Methyl-i-propylbenzene	A10	0.1519	0.1845	0.1572
3-Ethylnonane	I10	0.0501	0.0645	0.0663
1,3-Diethylbenzene	A10	0.1211	0.1471	0.1272
1,3-Methyl-n-propylbenzene	A10	0.0699	0.0849	0.0736
1,4-Diethylbenzene	A10	0.1244	0.1511	0.1309
1,4-Methyl-n-propylbenzene	A10	0.2077	0.2523	0.2195
n-Butylbenzene	A10	0.0919	0.1117	0.0968
1,3-Dimethyl-5-ethylbenzene	A10	0.0949	0.1153	0.0996
1,2-Diethylbenzene	A10	0.1153	0.1401	0.1190
1,2-Methyl-n-propylbenzene	A10	0.1156	0.1404	0.1200
1,4-Dimethyl-2-ethylbenzene	A10	0.1190	0.1446	0.1231
1,3-Dimethyl-4-ethylbenzene	A10	0.0516	0.0627	0.0534
1,2-Dimethyl-4-ethylbenzene	A10	0.2121	0.2577	0.2201
1,3-Dimethyl-2-ethylbenzene	A10	0.1926	0.2340	0.1963
1t,2c,4-Trimethylcyclopentane	A10	0.3888	0.3949	0.3942
1,2-Dimethyl-3-ethylbenzene	A10	0.1716	0.2085	0.1745
1,2-Ethyl-i-propylbenzene	A10	0.0329	0.0400	0.0341
1,4-Methyl-t-butylbenzene	A11	0.1165	0.1415	0.1205
UnknownC10s	U10	2.3572	3.0357	3.1034
n-Undecane	P11	0.7478	1.0580	1.0666
1,4-Ethyl-i-propylbenzene	A11	0.0760	0.0923	0.0786
1,2,4,5-Tetramethylbenzene	A11	0.1889	0.2295	0.1935
1,2-Methyl-n-butylbenzene	A11	0.1480	0.1798	0.1532
1,2,3,5-Tetramethylbenzene	A11	0.1510	0.1834	0.1539
1,2-Methyl-t-butylbenzene	A11	0.2862	0.3477	0.2962
5-Methylindan	A11	0.0201	0.0310	0.0309
4-Methylindan	A11	0.0050	0.0077	0.0077
1,2-Ethyl-n-propylbenzene	A11	0.1269	0.1542	0.1314
2-Methylindan	A11	0.0986	0.1520	0.1516
1,3-Methyl-n-butylbenzene	A11	1.0187	1.2376	1.0543
1,3-Di-i-propylbenzene	A11	0.3454	0.4196	0.3575
sec-Pentylbenzene	A11	0.0983	0.1194	0.1017
n-Pentylbenzene	A11	0.1424	0.1911	0.1662
1t-M-2-(4MP)cyclopentane	P12	0.0807	0.1244	0.1240
1,2-Di-n-propylbenzene	A11	0.1008	0.1225	0.1044
1,4-Di-i-propylbenzene	A11	0.1033	0.1255	0.1069
Tetrahydronaphthalene	A10	0.0799	0.0971	0.0827
t-Decahydronaphthalene	A10	0.1546	0.1878	0.1600
Naphthalene	A10	0.0792	0.0919	0.0783
1-t-Butyl-3,5-dimethylbenzene	A12	0.0622	0.0756	0.0644
1,4-Ethyl-t-butylbenzene	A11	0.1062	0.1290	0.1099
UnknownC11s	U11	2.0916	2.9593	2.9834
n-Dodecane	P12	0.5766	0.8890	0.8864
1,3-Di-n-propylbenzene	A12	0.1203	0.1462	0.1245
1,3,5-Triethylbenzene	A12	0.0380	0.0413	0.0356
1,2,4-Triethylbenzene	A12	0.5444	0.5923	0.5048
1,4-Methyl-n-pentylbenzene	A12	0.2244	0.2726	0.2322
n-Hexylbenzene	A12	0.2760	0.4054	0.3530

1,2,3,4,5-Pentamethylbenzene	A13	0.3067	0.3726	0.3174
2-Methylnaphthalene	A11	0.3634	0.4677	0.3984
1-Methylnaphthalene	A11	0.1093	0.1407	0.1030
UnknownC12s	U12	0.9969	1.5371	1.5326
n-Tridecane	P13	0.4246	0.7085	0.6981
UnknownC13s	U13	1.5503	2.5870	2.5489
n-Tetradecane	P14	0.1817	0.3263	0.3208
UnknownC14s	U14	1.3298	2.3880	2.3480
n-Pentadecane	P15	0.1256	0.2415	0.2347
UnknownC15s	U15	0.9731	1.8710	1.8185
n-Hexadecane	P16	0.0334	0.0685	0.0661
UnknownC16s	U16	0.1664	0.3411	0.3294
n-Heptadecane	P17	0.0042	0.0091	0.0088
UnknownC17s	U17	0.0361	0.0786	0.0757
n-Octadecane	P18	0.0004	0.0009	0.0009
UnknownC18s	U18	0.0112	0.0258	0.0248
TOTAL		100.0000	100.0000	100.0000

CRUDE OIL ASSAY

PROJECT NO. :	201411103	ANALYSIS NO. :	03
COMPANY NAME :	CASCADE PETROLEUM	ANALYSIS DATE:	NOVEMBER 21, 2014
ACCOUNT NO. :		SAMPLE DATE :	NOVEMBER 19, 2014
PRODUCER :		CYLINDER NO. :	1L GLASS JAR
LEASE NO. :		SAMPLED BY :	JOHN MOSER
NAME/DESCRIP :	PRODUCTION TANK 14:15 GAEDE A9S-55W-05-43		EMPACT
FIELD DATA		SAMPLE TEMP. :	55
SAMPLE PRES. :		AMBIENT TEMP.:	
VAPOR PRES. :		GRAVITY :	
COMMENTS :	SPOT		

SPECIFICATION		TEST METHOD	UNITS	RESULTS
API GRAVITY			API 60/60	34.7
RVP @100 DEG F		D323	PSIG	10
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				BLACK
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