



303-637-0150

EXTENDED NATURAL GAS LIQUID ANALYSIS ("DHA")

E & P TANK / GLYCALC INFORMATION

PROJECT NO. :	201511044	ANALYSIS NO. :	01
COMPANY NAME :	MULL DRILLING COMPANY INC	ANALYSIS DATE:	NOVEMBER 06, 2015 17:07
ACCOUNT NO. :		SAMPLE DATE :	NOVEMBER 02, 2015 11:45
PRODUCER :		CYLINDER NO.:	5041
LEASE NO. :		SAMPLED BY :	JOHN MOSER
NAME/DESCRIP :	MUSF #2 TB		EMPACT

*****FIELD DATA*****

SAMPLE PRES. :	22.0	SAMPLE TEMP. :	128.0
VAPOR PRES. :		AMBIENT TEMP.:	
COMMENTS :	SPOT; NO PROBE; REQUIRED BY CARL SMALLEY FOR POSSIBLE ANALYSIS CORRECTION		

COMPONENT	Mole %	Wt %	LV %
CARBON DIOXIDE	0.0270	0.0097	0.0089
NITROGEN (AIR)	0.0790	0.0180	0.0166
METHANE	0.0240	0.0031	0.0077
ETHANE	0.0770	0.0188	0.0394
PROPANE	0.5690	0.2042	0.3009
I-BUTANE	0.2680	0.1267	0.1682
N-BUTANE	1.4730	0.6966	0.8913
I-PENTANE	0.9377	0.5505	0.6590
N-PENTANE	1.6430	0.9646	1.1420
CYCLOPENTANE (N-C5)	0.7259	0.4142	0.4071
N-HEXANE	6.0733	4.2594	4.7959
CYCLOHEXANE (OTHER C6)	3.6890	2.5262	2.4093
OTHER HEXANES	8.7748	6.1003	6.5641
OTHER HEPTANES	12.1736	9.8734	10.4197
METHYLCYCLOHEXANE (OTHER C7)	5.8069	4.6395	4.4748
2,2,4 TRIMETHYLPENTANE	0.3088	0.2870	0.3067
BENZENE	0.6705	0.4262	0.3607
TOLUENE	1.5573	1.1676	0.9979
ETHYLBENZENE	0.1328	0.1147	0.0980
XYLENES	1.4042	1.2131	1.0375
OTHER OCTANES	12.1039	11.1575	11.2686
OCTANES PLUS	----	55.2953	----
NONANES	9.7996	10.1631	10.1912
DECANES PLUS	31.5460	45.0293	43.4004
SUB TOTAL	99.8643	99.9637	99.9659
ALCOHOLS	0.1357	0.0363	0.0341
TOTAL	100.0000	100.0000	100.0000

API Gravity	=	57.77 60/60
Vapor Pressure	=	5.76 PSIA & 100 F
Average Molecular Weight of Decanes plus	=	175.43
Average Specific Gravity of Decanes plus	=	0.7750

THE DATA PRESENTED HEREIN HAS BEEN ACQUIRED THROUGH JUDICIOUS APPLICATION OF CURRENT STATE-OF-THE ART ANALYTICAL TECHNIQUES. THE APPLICATIONS OF THIS INFORMATION IS THE RESPONSIBILITY OF THE USER. EMPACT ANALYTICAL SYSTEMS, INC. ASSUMES NO RESPONSIBILITY FOR ACCURACY OF THE REPORTED INFORMATION NOR ANY CONSEQUENCES OF ITS APPLICATION.



CRUDE OIL ASSAY

PROJECT NO. :	201511044	ANALYSIS NO. :	02
COMPANY NAME :	MULL DRILLING COMPANY INC	ANALYSIS DATE:	NOV. 12, 2015
ACCOUNT NO. :		SAMPLE DATE :	NOV. 02, 2015 12:50
PRODUCER :		CYLINDER NO. :	1L GLASS
LEASE NO. :		SAMPLED BY :	JOHN MOSER
NAME/DESCRIP :	MUSF #2 TB		EMPACT

FIELD DATA

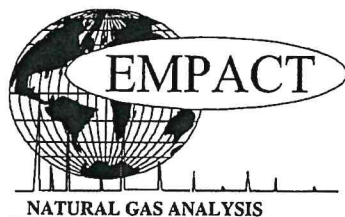
SAMPLE PRES. :		SAMPLE TEMP. :	112.0
VAPOR PRES. :		AMBIENT TEMP.:	
COMMENTS :	REQUIRED BY CARL SMALLEY FOR POSSIBLE ANALYSIS CORRECTION		

<u>SPECIFICATION</u>	<u>TEST METHOD</u>	<u>UNITS</u>	<u>RESULTS</u>
API GRAVITY		API 60/60	40.1
RVP @100 DEG F	D323	PSIG	5.6
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
<u>BS&W</u>	D96		
Crude Oil		VOL %	N/A
Water		VOL %	N/A
Emulsion		VOL %	N/A
Sediment		VOL %	N/A
<u>DISTILLATION:</u>	D86		
INITIAL POINT		DEG F	N/A
50%		DEG F	N/A
90%		DEG F	N/A
END POINT		DEG F	N/A
<u>DISTILLATION:</u>	@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

NA: NO TEST PERFORMED FOR THIS PARAMETER

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PRIMARY DB KEY: NAME/DESCRIP: MUSF 9
 LEASE #: CASING GAS
 FIELD/ AREA: MUSF
 PROJECT NO. : 201903031 ANALYSIS NO. : 01
 COMPANY NAME : MULL DRILLING COMPANY INC ANALYSIS DATE: MARCH 06, 2019 13:55
 OFFICE / BRANCH: CHEYENNE WELLS, CO SAMPLE DATE : FEBRUARY 26, 2019
 CUSTOMER REF: TO:
 PRODUCER : EFFECTIVE DATE:

FIELD DATA

SAMPLE CYCLE: SAMPLE TYPE: SPOT
 SAMPLE PRES. : 14 psig PROBE : NO
 FLOW PRES. : psig CYLINDER NO. : 1810
 LAB PRES: psig SAMPLED BY : BILL STUTZ
 SAMPLE TEMP. : 50 °f SAMPLING COMPANY: MULL
 AMBIENT TEMP.: °f H2S BY STAIN TUBE: - ppm
 H2O BY STAIN TUBE - #/mmcf CO2 BY STAIN TUBE: - Mol %
 FIELD COMMENTS:
 LAB COMMENTS:

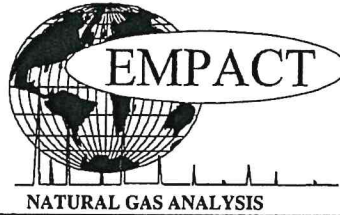
COMPONENTS	NORM. MOLE%	GPM @ 14.65	GPM @ 14.73
HELIUM	0.04	-	-
HYDROGEN	0.03	-	-
OXYGEN/ARGON	0.67	-	-
NITROGEN	89.70	-	-
CO2	1.39	-	-
METHANE	1.90	-	-
ETHANE	0.83	0.2205	0.2217
PROPANE	1.17	0.3212	0.3230
ISOBUTANE	0.25	0.0818	0.0822
N-BUTANE	1.05	0.3292	0.3310
ISOPENTANE	0.42	0.1526	0.1535
N-PENTANE	0.93	0.3352	0.3370
HEXANES+	1.62	0.6993	0.7031
TOTAL	100.00	2.1398	2.1515
BTU @ 60 DEG F		14.65	14.73
GROSS DRY REAL =		242.5 /scf	243.8 /scf
GROSS SATURATED REAL =		238.3 /scf	239.6 /scf
RELATIVE DENSITY (AIR=1 @ 14.696 PSIA 60F)		1.0451	
GRAVITY (LB/SCF)		0.07976	
COMPRESSIBILITY FACTOR :		0.99928	

NOTE: REFERENCE GPA 2261 (ASTM D1945 & ASME-PTC), 2145, & 2172 CURRENT PUBLICATIONS

Reference: Per GPA 2172-14 sec 9

The C6+ is derived from the following ratios of C6, C7 & C8+ respectively: 60% 30% 10%

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PRIMARY DB KEY: NAME/DESCRIP : MUSF 10
LEASE #: CASING GAS
FIELD/ AREA: MUSF
PROJECT NO. : 201903031 ANALYSIS NO. : 02
COMPANY NAME : MULL DRILLING COMPANY INC ANALYSIS DATE: MARCH 06, 2019 14:20
OFFICE / BRANCH: CHEYENNE WELLS, CO SAMPLE DATE : FEBRUARY 26, 2019
CUSTOMER REF: TO:
PRODUCER : EFFECTIVE DATE:

FIELD DATA

SAMPLE CYCLE: SAMPLE TYPE: SPOT
SAMPLE PRES. : psig PROBE : NO
FLOW PRES. : psig CYLINDER NO. : 1097
LAB PRES: psig SAMPLED BY : BILL STUTZ
SAMPLE TEMP. : 50 °f SAMPLING COMPANY: MULL
AMBIENT TEMP.: °f H2S BY STAIN TUBE: - ppm
H2O BY STAIN TUBE - #/mmcf CO2 BY STAIN TUBE: - Mol %
FIELD COMMENTS:
LAB COMMENTS:

COMPONENTS	NORM. MOLE%	GPM @ 14.65	GPM @ 14.73
HELIUM	0.15	-	-
HYDROGEN	0.01	-	-
OXYGEN/ARGON	0.49	-	-
NITROGEN	62.41	-	-
CO2	1.58	-	-
METHANE	7.83	-	-
ETHANE	4.87	1.2990	1.3061
PROPANE	8.48	2.3300	2.3427
ISOBUTANE	1.47	0.4800	0.4826
N-BUTANE	5.48	1.7230	1.7324
ISOPENTANE	1.59	0.5800	0.5832
N-PENTANE	2.23	0.8060	0.8104
HEXANES+	3.41	1.4760	1.4840
TOTAL	100.00	8.6940	8.7414
BTU @ 60 DEG F		14.65	14.73
GROSS DRY REAL =		933.3 /scf	938.4 /scf
GROSS SATURATED REAL =		917.0 /scf	922.1 /scf
RELATIVE DENSITY (AIR=1 @14.696 PSIA 60F)		1.2007	
GRAVITY (LB/SCF)		0.09164	
COMPRESSIBILITY FACTOR :		0.99689	

NOTE: REFERENCE GPA 2261(ASTM D1945 & ASME-PTC), 2145, & 2172 CURRENT PUBLICATIONS

Reference: Per GPA 2172-14 sec 9

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NATURAL GAS ANALYSIS

PRIMARY DB KEY: NAME/DESCRIP : MUSF 11
LEASE #: CASING GAS
FIELD/ AREA: MUSF
PROJECT NO. : 201903031 ANALYSIS NO. : 04
COMPANY NAME : MULL DRILLING COMPANY INC ANALYSIS DATE: MARCH 06, 2019 15:08
OFFICE / BRANCH: CHEYENNE WELLS, CO SAMPLE DATE : FEBRUARY 26, 2019
CUSTOMER REF: TO:
PRODUCER : EFFECTIVE DATE:

FIELD DATA

SAMPLE CYCLE: SAMPLE TYPE: SPOT
SAMPLE PRES. : 20 psig PROBE : NO
FLOW PRES. : psig CYLINDER NO. : 1082
LAB PRES: psig SAMPLED BY : BILL STUTZ
SAMPLE TEMP. : 50 °f SAMPLING COMPANY: MULL
AMBIENT TEMP.: °f H2S BY STAIN TUBE: - ppm
H2O BY STAIN TUBE: - #/mmcf CO2 BY STAIN TUBE: - Mol %
FIELD COMMENTS:
LAB COMMENTS:

COMPONENTS	NORM. MOLE%	GPM @ 14.65	GPM @ 14.73
HELIUM	0.03	-	-
HYDROGEN	0.02	-	-
OXYGEN/ARGON	0.67	-	-
NITROGEN	90.85	-	-
CO2	1.40	-	-
METHANE	1.56	-	-
ETHANE	0.77	0.2045	0.2056
PROPANE	0.91	0.2494	0.2507
ISOBUTANE	0.11	0.0359	0.0361
N-BUTANE	0.37	0.1157	0.1163
ISOPENTANE	0.14	0.0509	0.0511
N-PENTANE	0.25	0.0898	0.0903
HEXANES+	2.92	1.2608	1.2676
TOTAL	100.00	2.0070	2.0177
BTU @ 60 DEG F		14.65	14.73
GROSS DRY REAL =		232.9 /scf	234.2 /scf
GROSS SATURATED REAL =		228.8 /scf	230.1 /scf
RELATIVE DENSITY (AIR=1 @14.696 PSIA 60F)			1.0512
GRAVITY (LB/SCF)			0.08023
COMPRESSIBILITY FACTOR :			0.99943

NOTE: REFERENCE GPA 2261(ASTM D1945 & ASME-PTC), 2145, & 2172 CURRENT PUBLICATIONS

Reference: Per GPA 2172-14 sec 9

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NATURAL GAS ANALYSIS

PRIMARY DB KEY:	NAME/DESCRIP :	MUSF 12
LEASE #:		CASING GAS
FIELD/ AREA:	MUSF	
PROJECT NO. :	201903031	ANALYSIS NO. :
COMPANY NAME :	MULL DRILLING COMPANY INC	ANALYSIS DATE:
OFFICE / BRANCH:	CHEYENNE WELLS, CO	SAMPLE DATE :
CUSTOMER REF:		TO:
PRODUCER :		EFFECTIVE DATE:

FIELD DATA

SAMPLE CYCLE:		SAMPLE TYPE:	SPOT
SAMPLE PRES. :	30	PROBE :	NO
FLOW PRES. :		CYLINDER NO. :	1795
LAB PRES:		SAMPLED BY :	BILL STUTZ
SAMPLE TEMP. :	50	SAMPLING COMPANY:	MULL
AMBIENT TEMP.:		H2S BY STAIN TUBE:	- ppm
H2O BY STAIN TUBE:		CO2 BY STAIN TUBE:	- Mol %
FIELD COMMENTS:			
LAB COMMENTS:			

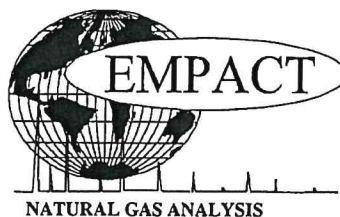
COMPONENTS	NORM. MOLE%	GPM @ 14.65	GPM @ 14.73
HELIUM	0.11	-	-
HYDROGEN	0.00	-	-
OXYGEN/ARGON	0.61	-	-
NITROGEN	79.64	-	-
CO2	1.69	-	-
METHANE	6.18	-	-
ETHANE	3.07	0.8173	0.8218
PROPANE	3.78	1.0369	1.0425
ISOBUTANE	0.47	0.1527	0.1535
N-BUTANE	1.49	0.4680	0.4706
ISOPENTANE	0.29	0.1058	0.1064
N-PENTANE	0.36	0.1297	0.1304
HEXANES+	2.31	0.9979	1.0034
TOTAL	100.00	3.7083	3.7286
BTU @ 60 DEG F		14.65	14.73
GROSS DRY REAL =		419.2 /scf	421.5 /scf
GROSS SATURATED REAL =		411.9 /scf	414.2 /scf
RELATIVE DENSITY (AIR=1 @ 14.696 PSIA 60F)			1.0564
GRAVITY (LB/SCF)			0.08062
COMPRESSIBILITY FACTOR :			0.99893

NOTE: REFERENCE GPA 2261(ASTM D1945 & ASME-PTC), 2145, & 2172 CURRENT PUBLICATIONS

Reference: Per GPA 2172-14 sec 9

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PRIMARY DB KEY: NAME/DESCRIP : MUSF 13
 LEASE #: CASING GAS
 FIELD/ AREA: MUSF
 PROJECT NO. : 201903031 ANALYSIS NO. : 12
 COMPANY NAME : MULL DRILLING COMPANY INC ANALYSIS DATE: MARCH 06, 2019 13:55
 OFFICE / BRANCH: CHEYENNE WELLS, CO SAMPLE DATE : FEBRUARY 26, 2019
 CUSTOMER REF: TO:
 PRODUCER : EFFECTIVE DATE:
 FIELD DATA
 SAMPLE CYCLE: SAMPLE TYPE: SPOT
 SAMPLE PRES. : 28 psig PROBE : NO
 FLOW PRES. : psig CYLINDER NO. : 0897
 LAB PRES: psig SAMPLED BY : BILL STUTZ
 SAMPLE TEMP. : 50 °f SAMPLING COMPANY: MULL
 AMBIENT TEMP.: °f H2S BY STAIN TUBE: - ppm
 H2O BY STAIN TUBE: - #/mmcf CO2 BY STAIN TUBE: - Mol %
 FIELD COMMENTS: Well has not pumped for 10 days.
 LAB COMMENTS:

COMPONENTS	NORM. MOLE%	GPM @ 14.65	GPM @ 14.73
HELIUM	0.12	-	-
HYDROGEN	0.21	-	-
OXYGEN/ARGON	0.60	-	-
NITROGEN	77.54	-	-
CO2	1.69	-	-
METHANE	6.14	-	-
ETHANE	3.18	0.8465	0.8511
PROPANE	4.39	1.2038	1.2104
ISOBUTANE	0.65	0.2116	0.2128
N-BUTANE	2.26	0.7097	0.7136
ISOPENTANE	0.62	0.2256	0.2268
N-PENTANE	0.91	0.3284	0.3302
HEXANES+	1.69	0.7297	0.7337
TOTAL	100.00	4.2553	4.2786
BTU @ 60 DEG F			
		14.65	14.73
GROSS DRY REAL =		471.3 /scf	473.9 /scf
GROSS SATURATED REAL =		463.1 /scf	465.7 /scf
RELATIVE DENSITY (AIR=1 @ 14.696 PSIA 60F)		1.0673	
GRAVITY (LB/SCF)		0.08146	
COMPRESSIBILITY FACTOR :		0.99867	

NOTE: REFERENCE GPA 2261 (ASTM D1945 & ASME-PTC), 2145, & 2172 CURRENT PUBLICATIONS

Reference: Per GPA 2172-14 sec 9

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