



Mull Drilling Company, Inc.
1700 N. Waterfront Parkway, Bld. 1200
Wichita, Kansas 67206
Tel: +1 316.264.6366
Fax: +1 316.264.6440
www.mulldrilg.com

January 8, 2022

Colorado Oil & Gas Conservation Commission
Permitting Division
1120 Lincoln Street, Suite 801
Denver, Colorado

RE:

Form 4 Sundry Submittal
MUSF #1 Tank Battery Gas Capture Plan
API #05-017-06239, API #05-017-06244, API #05-017-06287, API #05-017-06279
API # 05-017-06254, API #05-017-06260, API #05-017-06271
COGCC Location not available for MUSF Tank Battery 1
COGCC Doc#402921008

To whom it may concern:

In this ***Form 4 Sundry*** Submittal you will find the Gas Capture Plan from Mull Drilling Company, Inc. (Mull) for the MUSF #1 Crude Oil Tank Battery, associated equipment, and wellheads (*API Various as displayed above*). Mull is also including all required paperwork and recent Colorado Department of Health & Environment APEN Submittals, modeling, and analytical.

Should there be any questions or concerns do not hesitate to contact us,

James Beilman, PG, CPG
Environmental / Safety Manager
Tel: +1 316.264.6366 (128)
Cell: +1 316.364.9203
JBeilman@Mulldrilling.com





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MUSF # 1 Crude Oil Tank Battery

API #05-017-06239

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API #05-017-06260

API #05-017-06271

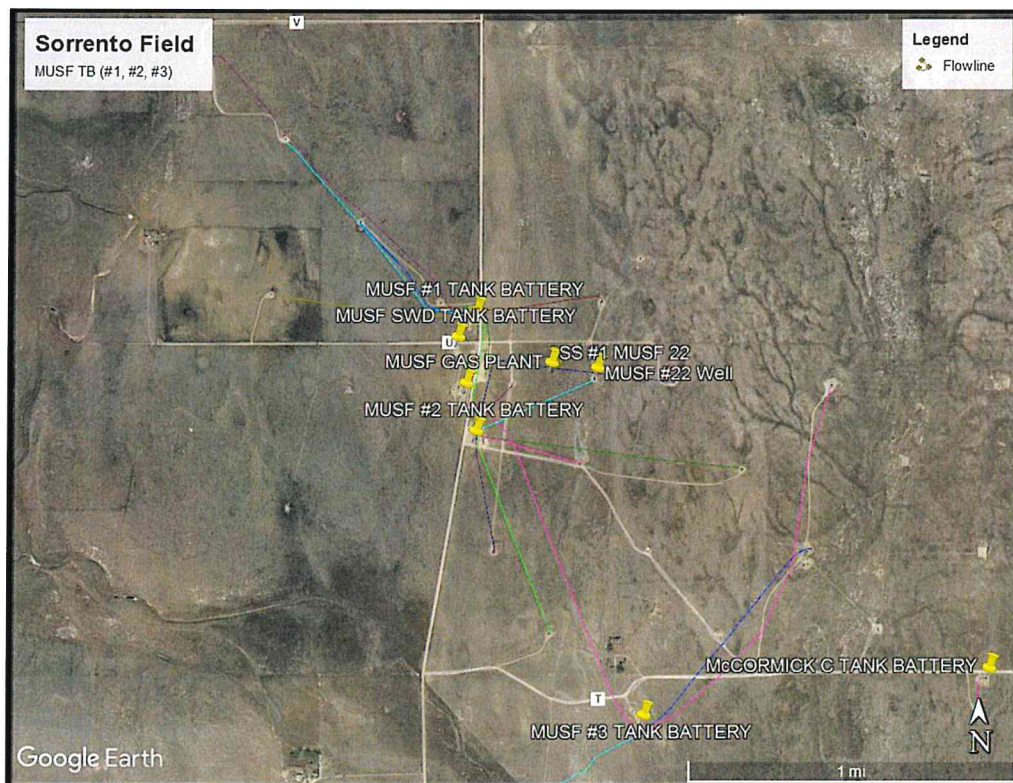
CDPHE Permit Number 09CY1358.XP AIRS ID 017-0250-002

Sec 32, T13S, R49W

Cheyenne County, Colorado

GAS CAPTURE PLAN

Site Map



Mull Drilling Company., Inc. (Mull) has drafted this plan to comply with Rules 903.d and 903.e.(1).B. The MUSF #1 Tank Battery and associated wells were constructed in 1985.

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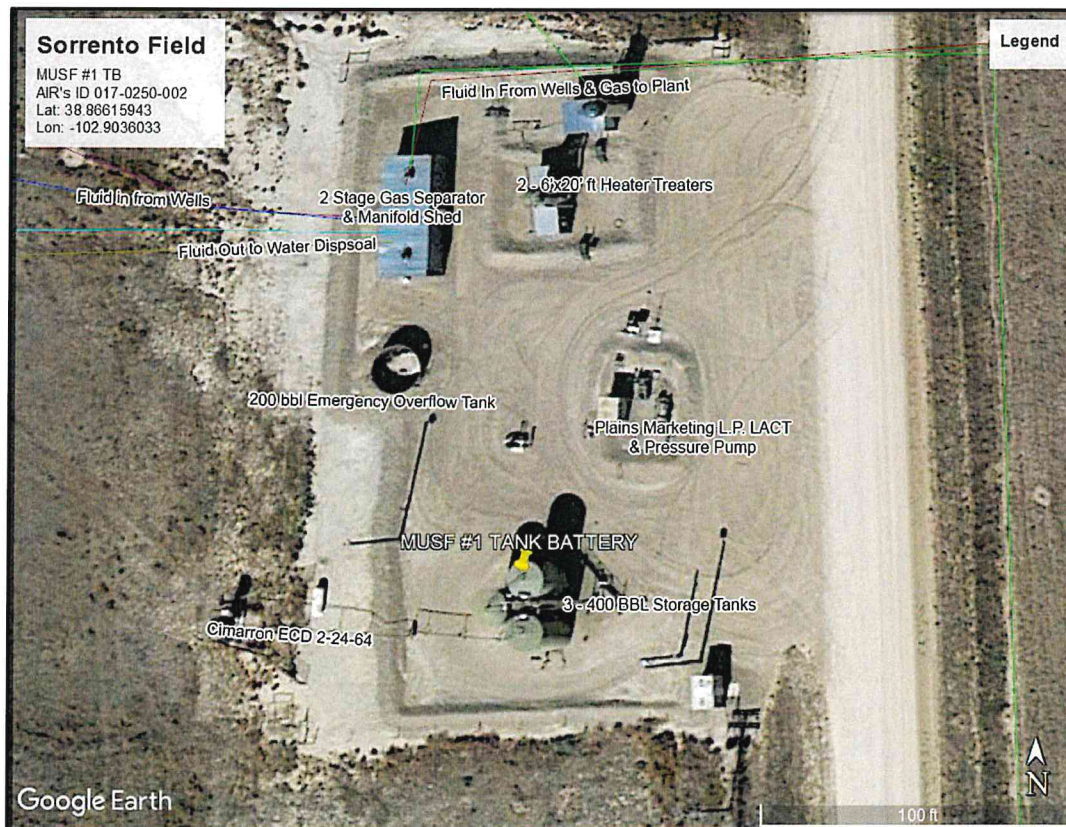
They consist of the consolidated production facilities for 7 operated wells: the location contains 3 oil storage tanks (400 bbl – Total 1200 bbl total), 1 200 bbl emergency overflow tank, 2 - 6'x20' ft Heater Treaters, and 1 Cimarron ECD 2-24-64 ECD. Produced water is disposed to the local Sorrento Plant SWD. The wells are powered via an electrical motors and electricity.

Gas at this tank battery is separated and sent to the Sorrento Compressor Station for Re-injection into the reservoir. The Gas is of poor quality due to significant (and increasing) nitrogen concentrations. The station operates under CDPHE permit numbers 85CY204-1 for Engine source emissions and 95CY049 for VOC Fugitive emissions.

Liquids are loaded directly into Plain Marketing Lease Automatic Custody Transfer (LACT) and pressured up as required for transport through a high pressure line.

This is not a request to Vent or Flare.

Flow Diagram



903.d: Emissions During Production	Gas at this facility is continuing to drop in quality as the local nitrogen plant continues to inject nitrogen into the reservoir. Currently, any available gas is piped from heater treaters, burned for beneficial reuse in the treaters themselves or sent to the compressor station for reinjection, which is not the case at this time. Otherwise all otherwise available gas (Flash) is currently routed to the ECD for final combustion.
903.e.(1).B.i: Description of the Closest Gas Gathering System	All available gas not used for beneficial reuse is sent to the compressor station for reinjection into the reservoir.
903. e.(1).B.ii: Company operating the closest Gas Gathering System	NA
903. e.(1).B.iv: Production Test Plans	The Original Production Test and analyticals are supplied (As available). This includes original gas analysis and liquids analysis/modeling updated for rolling 12 emissions calculations through 2021. A copy of the Latest APEN Update is also being supplied.
903. e.(1).B.v: Safety Risks	Mull does not currently anticipate any safety risks that will require us to allow gas to escape rather than being captured or combusted during normal operating procedures.
903. e.(1).B.vi: Operational BMPs	<p>Mull intends to use the following list of operational best practices to minimize Venting during active and planned maintenance allowed pursuant to Rule 903.d.(1).B:</p> <p>During maintenance activities, Mull will have appropriate gas control equipment on location to minimize all Venting.</p> <p>Flow for liquids is all into the LACT and to Plains Marketing L.P. for final sale. Should Liquid Loading/Unloading occur, flowback controls have been installed to prevent any venting or release of emissions.</p> <p>All facilities maintain a rigorous LDAR Program. In this case MUSF #2 TB is checked semi-annually for leaks and verified (when necessary) with a PID/FID approved by the CDPHE and the COGCC.</p> <p>All Tanks in this system maintain a real-time monitoring system to determine fluid totals.</p>

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	<p>All tanks have sight glasses for visual inspection of fluids during daily gauging events.</p> <p>All Wells have pressure/trip Murphy switches that will shutdown the well in the event of a leak.</p>
903. e.(1).B.vii: Procedures to reduce well liquids unloading events	Mull anticipates Well Liquid Unloading events as required for operation. Flowback controls have been installed at this location to send emitted gases to the tanks and then the combustor.
903. e.(1).B.viii: Anticipated volumes of liquids and gas production	As displayed by Mulls latest APEN, liquids production is anticipated to not exceed approximately 29000 bbl per year. The 12 month rolling total from October 2021 produces approximately 6.28 tpy Flash VOC's. As stated, flow back controls are installed on this tank battery.



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April 6, 2020

Colorado Department of Public Health and Environment
Air Pollution Control Division
APCD-SS-B1
4300 Cherry Creek Drive South
Denver, Co 80246 - 1530



RE: MUSF #1 Tank Battery
AIRS ID 017-0250-002
Revised APEN Update – Crude Oil Storage Tank Form APCD-210

To whom it may concern:

Enclosed you will find the revised APEN update for Mull Drilling Company's (Mull) MUSF #1 Tank Battery and associated equipment. The APEN update utilized Site Specific Emissions factors that were generated utilizing the original site specific sampling that occurred on November 6, 2014. We also utilized the APCD Spreadsheet and E&P Tanks V.3.0 to calculate the parameters (as was generally done with the original submission).

Should there be any questions or concerns feel free to contact us,



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Crude Oil Storage Tank(s) APEN Form APCD-210

Air Pollutant Emission Notice (APEN) and
Application for Construction Permit

COPY

All sections of this APEN and application must be completed for both new and existing facilities, including APEN updates. Incomplete APENs will be rejected and will require re-submittal. *Your APEN will be rejected if it is filled out incorrectly, is missing information, or lacks payment for the filing fee. The re-submittal will require payment for a new filing fee.*

This APEN is to be used for tanks that store crude oil associated with oil and gas industry operations. If your emission source does not fall into this category, there may be a more specific APEN available for your source (e.g. condensate storage tanks, produced water storage tanks, hydrocarbon liquid loading, etc.). In addition, the General APEN (Form APCD-200) is available if the specialty APEN options will not satisfy your reporting needs. A list of all available APEN forms and associated addendum forms can be found on the Air Pollution Control Division (APCD) website.

This emission notice is valid for five (5) years. Submission of a revised APEN is required 30 days prior to expiration of the five-year term, or when a reportable change is made (significant emissions increase, increase production, new equipment, change in fuel type, etc.). See Regulation No. 3, Part A, II.C. for revised APEN requirements.

Permit Number: **09CY1358.XP**

AIRS ID Number: **017 / 0250 / 002**

[Leave blank unless APCD has already assigned a permit # and AIRS ID]

Section 1 - Administrative Information

Company Name¹: **Mull Drilling Company**

Site Name: **MUSF 1 Tank Battery**

Site Location: **Sec 32, T13S, R49W**

Site Location
County: **Cheyenne**

NAICS or SIC Code: **1311**

Mailing Address:
(Include Zip Code) **1700 N. Waterfront Parkway Building 1200**

Wichita, Kansas 67206

Contact Person: **James Beilman**

Phone Number: **316-807-8880**

E-Mail Address²: **jbeilman@Mulldrilling.com**

¹ Use the full, legal company name registered with the Colorado Secretary of State. This is the company name that will appear on all documents issued by the APCD. Any changes will require additional paperwork.

² Permits, exemption letters, and any processing invoices will be issued by the APCD via e-mail to the address provided.

Permit Number: **09CY1358.XP**AIRS ID Number: **017 / 0250 / 002**

[Leave blank unless APCD has already assigned a permit # and AIRS ID]

Section 2 - Requested Action

- ☐ **NEW permit OR newly-reported emission source**
- ☐ Request coverage under traditional construction permit
- ☐ Request coverage under General Permit GP08

If General Permit coverage is requested, the General Permit registration fee of \$312.50 must be submitted along with the APEN filing fee.

- OR -

- ☐ **MODIFICATION to existing permit** (check each box below that applies)
- ☐ Change in equipment ☐ Change company name³
- ☐ Change permit limit ☐ Transfer of ownership⁴ ☐ Other (describe below)

- OR -

- ☒ **APEN submittal for update only** (Note blank APENs will not be accepted)

- ADDITIONAL PERMIT ACTIONS -

- ☐ APEN submittal for permit exempt/grandfathered source
- ☐ Limit Hazardous Air Pollutants (HAPs) with a federally-enforceable limit on Potential To Emit (PTE)

Additional Info & Notes: **Permit Update for MUSF 1 Tank Battery Installation**

³ For company name change, a completed Company Name Change Certification Form (Form APCD-106) must be submitted.

⁴ For transfer of ownership, a completed Transfer of Ownership Certification Form (Form APCD-104) must be submitted.

Section 3 - General Information

General description of equipment and purpose: **Combustor Installation at TB**

Company equipment Identification No. (optional): **MUSF #1 Combustor**

For existing sources, operation began on: **1985**

For new or reconstructed sources, the projected start-up date is:

Normal Hours of Source Operation: **24** hours/day **7** days/week **52** weeks/year

Storage tank(s) located at: ☒ Exploration & Production (E&P) site ☐ Midstream or Downstream (non E&P) site

Will this equipment be operated in any NAAQS nonattainment area?	<input type="checkbox"/>	Yes	<input checked="" type="checkbox"/>	No
Are Flash Emissions anticipated from these storage tanks?	<input checked="" type="checkbox"/>	Yes	<input type="checkbox"/>	No
Are these storage tanks subject to Colorado Oil and Gas Conservation Commission (COGCC) 805 series rules? If so, submit Form APCD-105.	<input type="checkbox"/>	Yes	<input checked="" type="checkbox"/>	No
Are you requesting ≥ 6 ton/yr VOC emissions (per storage tank), or are uncontrolled actual emissions ≥ 6 ton/yr (per storage tank)?	<input checked="" type="checkbox"/>	Yes	<input type="checkbox"/>	No

Permit Number: 09CY1358.XP

AIRS ID Number: 017 / 0250 / 002

[Leave blank unless APCD has already assigned a permit # and AIRS ID]

Section 4 - Storage Tank(s) Information

	Actual Annual Amount (bbl/year)	Requested Annual Permit Limit ⁵ (bbl/year)
Crude Oil Throughput:	28322	29000

From what year is the *actual annual amount*? 2019

Average API gravity of sales oil: 38.95 degrees RVP of sales oil: 9.20

Tank design: ☐ Fixed roof ☐ Internal floating roof ☐ External floating roof

Storage Tank ID	# of Liquid Manifold Storage Vessels in Storage Tank	Total Volume of Storage Tank (bbl)	Installation Date of Most Recent Storage Vessel in Storage Tank (month/year)	Date of First Production (month/year)
001	3	400	1985	01/1985

Wells Served by this Storage Tank or Tank Battery⁶ (E&P Sites Only)

API Number	Name of Well	Newly Reported Well
- -	See APEN Addendum (Form APCD-212)	<input type="checkbox"/>
- -		<input type="checkbox"/>
- -		<input type="checkbox"/>
- -		<input type="checkbox"/>
- -		<input type="checkbox"/>

⁵ Requested values will become permit limitations or will be evaluated for exempt status, as applicable, and should consider future process growth. Requested values are required on all APENs, including APEN updates.

⁶ The E&P Storage Tank APEN Addendum (Form APCD-212) should be completed and attached when additional space is needed to report all wells that are serviced by the equipment reported on this APEN form.

Section 5 - Geographical/Stack Information

Geographical Coordinates (Latitude/Longitude or UTM)
38.86615943; -102.9036033

☐ Check box if the following information is not applicable to the source because emissions will not be emitted from a stack. If this is the case, the rest of this section may remain blank.

Operator Stack ID No.	Discharge Height Above Ground Level (Feet)	Temp. (°F)	Flow Rate (ACFM)	Velocity (ft/sec)
001	15'			

Indicate the direction of the stack outlet: (check one)

☒ Upward☐ Downward☐ Upward with obstructing raincap☐ Horizontal☐ Other (describe): _____

Indicate the stack opening and size: (check one)

☒ Circular

Interior stack diameter (inches): 48'

☐ Square/rectangle

Interior stack width (inches): _____

Interior stack depth (inches): _____

☐ Other (describe): _____

Permit Number: 09CY1358.XPAIRS ID Number: 017 / 0250 / 002

[Leave blank unless APCD has already assigned a permit # and AIRS ID]

Section 6 - Control Device Information☐ Check this box if no emission control equipment or practices are used to reduce emissions, and skip to the next section.

Pollutants Controlled: _____		
<input type="checkbox"/> Vapor Recovery Unit (VRU):	Size: _____	Make/Model: _____
	Requested Control Efficiency: _____	%
	VRU Downtime or Bypassed (emissions vented): _____	%

Pollutants Controlled: <u>VOC's, HAP's</u>		
Rating: <u>6.1</u> MMBtu/hr		
<input type="checkbox"/> Combustion Device:	Type: <u>Combustor</u>	Make/Model: <u>Cimarron 48 E 00</u>
	Requested Control Efficiency: <u>95</u>	%
	Manufacturer Guaranteed Control Efficiency: <u>99</u>	%
	Minimum Temperature: <u>NA</u>	Waste Gas Heat Content: <u>2770</u> Btu/scf
	Constant Pilot Light: <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Pilot Burner Rating: <u>0.04</u> MMBtu/hr

Description of the closed loop system: _____	
<input type="checkbox"/> Closed Loop System	_____

Pollutants Controlled: _____	
<input type="checkbox"/> Other:	Description: _____
	Control Efficiency Requested: _____ %

Section 7 - Gas/Liquids Separation Technology Information (E&P Sites Only)What is the pressure of the final separator vessel prior to discharge to the storage tank(s)? 28 psig

Describe the separation process between the well and the storage tanks: _____

Heater Treater

Permit Number: 09CY1358.XP

AIRS ID Number: 017 / 0250 / 002

[Leave blank unless APCD has already assigned a permit # and AIRS ID]

Section 8 - Criteria Pollutant Emissions InformationAttach all emissions calculations and emission factor documentation to this APEN form⁷.Is any emission control equipment or practice used to reduce emissions? ☐ Yes ☐ No

If yes, describe the control equipment AND state the collection and control efficiencies (report the overall, or combined, values if multiple emission control methods were identified in Section 6):

Pollutant	Control Equipment Description	Collection Efficiency (% of total emissions captured by control equipment)	Control Efficiency (% reduction of captured emissions)
VOC	ECD	98%	95%
NO _x			
CO			
HAPs	ECD	98%	95%
Other:			

From what year is the following reported *actual annual emissions data*? 2019

Use the following table to report the criteria pollutant emissions from source:

Pollutant	Emission Factor ⁷			Actual Annual Emissions		Requested Annual Permit Emission Limit(s) ⁵	
	Uncontrolled Basis	Units	Source (AP-42, Mfg., etc.)	Uncontrolled Emissions (tons/year)	Controlled Emissions ⁸ (tons/year)	Uncontrolled Emissions (tons/year)	Controlled Emissions (tons/year)
VOC	0.3790	#/bbl	Site Specific	5.4	0.3	5.5	0.3
NO _x	0.0037	lb/MMBtu	AP-42	0.0	0.0	0.0	0.0
CO	0.0094	lb/MMBtu	Ap-42	0.0	0.0	0.0	0.0

⁵ Requested values will become permit limitations or will be evaluated for exempt status, as applicable, and should consider future process growth. Requested values are required on all APENs, including APEN updates.⁷ Attach crude oil laboratory analysis, stack test results, and associated emissions calculations if you are requesting site specific emissions factors according to the guidance in PS Memo 14-03.⁸ Annual emission fees will be based on actual controlled emissions reported. If source has not yet started operating, provide projected emissions.**Section 9 - Non-Criteria Pollutant Emissions Information**Does the emissions source have any uncontrolled actual emissions of non-criteria pollutants (e.g. HAP - hazardous air pollutant) equal to or greater than 250 lbs/year? ☒ Yes ☐ No

If yes, use the following table to report the non-criteria pollutant (HAP) emissions from source:

Chemical Name	Chemical Abstract Service (CAS) Number	Emission Factor ⁷			Actual Annual Emissions	
		Uncontrolled Basis	Units	Source (AP-42, Mfg., etc.)	Uncontrolled Emissions (lbs/year)	Controlled Emissions ⁸ (lbs/year)
Benzene	71432	0.0032	lbs/bbl	Site Specific	90.6	4.5
Toluene	108883	0.0028	bs/bbl	Site Specific	79.8	4.0
Ethylbenzene	100414	0.0002	bs/bbl	Site Specific	6.0	0.3
Xylene	1330207	0.0006	bs/bbl	Site Specific	17.0	0.8
n-Hexane	110543	0.0300	bs/bbl	Site Specific	849.7	42.5
2,2,4-Trimethylpentane	540841	0.0340	bs/bbl	Site Specific	962.9	48.1

⁷ Attach crude oil laboratory analysis, stack test results, and associated emissions calculations if you are requesting site specific emissions factors according to the guidance in PS Memo 14-03.⁸ Annual emission fees will be based on actual controlled emissions reported. If source has not yet started operating, provide projected emissions.

Permit Number: **09CY1358.XP**

AIRS ID Number: **017 / 0250 / 002**

[Leave blank unless APCD has already assigned a permit # and AIRS ID]

Section 10 - Applicant Certification

I hereby certify that all information contained herein and information submitted with this application is complete, true, and correct. If this is a registration for coverage under General Permit GP08, I further certify that this source is and will be operated in full compliance with each condition of General Permit GP08.

Signature of Legally Authorized Person (not a vendor or consultant)

Date

Name (print)

Title

Check the appropriate box to request a copy of the:

- ☐ Draft permit prior to issuance
☐ Draft permit prior to public notice

(Checking any of these boxes may result in an increased fee and/or processing time)

This emission notice is valid for five (5) years. Submission of a revised APEN is required 30 days prior to expiration of the five-year term, or when a reportable change is made (significant emissions increase, increase production, new equipment, change in fuel type, etc.). See Regulation No. 3, Part A, II.C. for revised APEN requirements.

Send this form along with \$191.13 and the General Permit registration fee of \$312.50, if applicable, to:

Colorado Department of Public Health and Environment
Air Pollution Control Division
APCD-SS-B1
4300 Cherry Creek Drive South
Denver, CO 80246-1530

Make check payable to:

Colorado Department of Public Health and Environment

For more information or assistance call:

Small Business Assistance Program
(303) 692-3175
OR
(303) 692-3148

APCD Main Phone Number
(303) 692-3150

E&P Storage Tank Air Pollutant Emissions Notice (APEN) Addendum Form¹

Company Name:	Mull Drilling Company
Source Name:	MUSF 1 Tank Battery
Emissions Source AIRS ID²:	017/0250/002

Wells Services by this Storage Tank or Tank Battery (E&P Sites Only)		
API Number	Name of Well	Newly Reported Well
05-017-06239-00	MUSF #1	<input type="checkbox"/>
05-017-06244-00	MUSF #2	<input type="checkbox"/>
05-017-06287-00	MUSF #4	<input type="checkbox"/>
05-017-06279-00	MUSF #5	<input type="checkbox"/>
05-017-06254-00	MUSF #6	<input type="checkbox"/>
05-017-06260-00	MUSF #7	<input type="checkbox"/>
05-017-06271-00	MUSF #8	<input type="checkbox"/>
- -		<input type="checkbox"/>
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- -		<input type="checkbox"/>
- -		<input type="checkbox"/>
- -		<input type="checkbox"/>
- -		<input type="checkbox"/>

Footnotes:

- ¹ Attach this addendum to associated APEN form when needed to report additional wells.
- ² If this is a newly report source that has not been assigned an AIRS ID by the APCD, enter N/A

Crude Oil Storage Tank(s) Emissions Inventory



Section 01 - Administrative Information

Facility AIRS ID:	09CY1358.XP	017-0250-002	
	Cheyenne	Plant	Point

Section 02 - Equipment Description Details

Detailed Emissions Unit

Description: Crude Oil Storage

Emission Control Device

Description: Cimarron ECD

Requested Overall VOC & HAP Control

Efficiency %: 95.0

Section 03 - Processing Rate Information for Emissions Estimates

Primary Emissions - Storage Tank(s)

Actual Throughput = 28322.0 Barrels (bbl) per year

Requested Permit Limit Throughput = 29000.0 Barrels (bbl) per year Requested Monthly Throughput = 2463.0 Barrels (bbl) per month

Potential to Emit (PTE) Throughput = 32000.0 Barrels (bbl) per year

Secondary Emissions - Combustion Device(s)

Heat content of waste gas = Btu/scf

Volume of waste gas emitted per BBL of liquids produced = scf/bbl

Actual heat content of waste gas routed to combustion device = 0.0 MMBTU per year

Requested heat content of waste gas routed to combustion device = 0.0 MMBTU per year

Potential to Emit (PTE) heat content of waste gas routed to combustion device = 0.0 MMBTU per year

Control Device

Pilot Fuel Use Rate: scfh 0.0 MMscf/yr

Pilot Fuel Gas Heating Value: Btu/scf 0.0 MMBTU/yr

Section 04 - Emissions Factors & Methodologies

Will this storage tank emit flash emissions?

Yes

Emission Factors	Crude Oil Tank		Emission Factor Source
	Uncontrolled	Controlled	
	(lb/bbl)	(lb/bbl)	
	(Crude Oil Throughput)	(Crude Oil Throughput)	
VOC	0.3790	0.0190	Site Specific E.F. (includes flash)
Benzene	0.0032	0.0002	Site Specific E.F. (includes flash)
Toluene	0.0028	0.0001	Site Specific E.F. (includes flash)
Ethylbenzene	0.0002	0.0000	Site Specific E.F. (includes flash)
Xylene	0.0006	0.0000	Site Specific E.F. (includes flash)
n-Hexane	0.0300	0.0015	Site Specific E.F. (includes flash)
224 TMP	0.0340	0.0017	Site Specific E.F. (includes flash)
Pollutant	Control Device		Emission Factor Source
	Uncontrolled	Uncontrolled	
	(lb/MMBtu)	(lb/bbl)	
	(Waste Heat Combusted)	(Crude Oil Throughput)	
PM10	0.0075	0.0000	AP-42 Table 1.4-2 (PM10/PM2.5)
PM2.5	0.0075	0.0000	AP-42 Table 1.4-2 (PM10/PM2.5)
NOx	0.0680	0.0000	AP-42 Chapter 13.5 Industrial Flares (NOx)
CO	0.3100	0.0000	AP-42 Chapter 13.5 Industrial Flares (CO)
Pollutant	Pilot Light Emissions		Emission Factor Source
	Uncontrolled	Uncontrolled	
	(lb/MMBtu)	(lb/MMscf)	
	(Waste Heat Combusted)	(Pilot Gas Throughput)	
PM10	0.0075	0.0000	AP-42 Table 1.4-2 (PM10/PM2.5)
PM2.5	0.0075	0.0000	AP-42 Table 1.4-2 (PM10/PM2.5)
NOx	0.0680	0.0000	AP-42 Chapter 13.5 Industrial Flares (NOx)
CO	0.3100	0.0000	AP-42 Chapter 13.5 Industrial Flares (CO)

Crude Oil Storage Tank(s) Emissions Inventory

Section 05 - Emissions Inventory

Criteria Pollutants	Potential to Emit Uncontrolled (tons/year)	Actual Emissions		Requested Permit Limits		Requested Monthly Limits Controlled (lbs/month)
		Uncontrolled (tons/year)	Controlled (tons/year)	Uncontrolled (tons/year)	Controlled (tons/year)	
VOC	6.1	5.4	0.3	5.5	0.3	46.7
PM10	0.0	0.0	0.0	0.0	0.0	0.0
PM2.5	0.0	0.0	0.0	0.0	0.0	0.0
NOx	0.0	0.0	0.0	0.0	0.0	0.0
CO	0.0	0.0	0.0	0.0	0.0	0.0
Hazardous Air Pollutants						
	Potential to Emit Uncontrolled (lbs/year)	Actual Emissions		Requested Permit Limits		
		Uncontrolled (lbs/year)	Controlled (lbs/year)	Uncontrolled (lbs/year)	Controlled (lbs/year)	
Benzene	102.4	90.6	4.5	92.8	4.6	
Toluene	90.1	79.8	4.0	81.7	4.1	
Ethylbenzene	6.8	6.0	0.3	6.1	0.3	
Xylene	19.2	17.0	0.8	17.4	0.9	
n-Hexane	960.0	849.7	42.5	870.0	43.5	
224 TMP	1088.0	962.9	48.1	986.0	49.3	

Section 06 - Regulatory Summary Analysis

Regulation 3, Parts A,B	Not enough information
Regulation 7, Section XVII.B, C.1, C.3	Storage Tank is not subject to Regulation 7, Section XVII
Regulation 7, Section XVII.C.2	Storage Tank is not subject to Regulation 7, Section XVII.C.2
Regulation 6, Part A, NSPS Subpart Kb	Not enough information
Regulation 6, Part A, NSPS Subpart OOOO	Not enough information
NSPS Subpart OOOOa	Not enough information
Regulation 8, Part E, MACT Subpart HH	Not enough information
(See regulatory applicability worksheet for detailed analysis)	

Section 07 - Initial and Periodic Sampling and Testing Requirements

Does the company use the state default emissions factors to estimate emissions?

No

If yes, are the uncontrolled actual or requested emissions estimated to be greater than or equal to 20 tons VOC per year?

No

If yes, the permit will contain an "Initial Compliance" testing requirement to develop a site specific emissions factor based on guidelines in PS Memo 14-03

Does the company use a site specific emissions factor to estimate emissions?

Yes

If yes and if there are flash emissions, are the emissions factors based on a pressurized liquid sample of crude oil drawn at the facility being permitted?

Yes

If no, the permit will contain an "Initial Compliance" testing requirement to develop a site specific emissions factor based on guidelines in PS Memo 14-03.

Does the company request a control device efficiency greater than 95% for a flare or combustion device?

No

If yes, the permit will contain an initial compliance test condition to demonstrate the destruction efficiency of the combustion device based on inlet and outlet concentration sampling

Section 08 - Technical Analysis Notes

Section 09 - Inventory SCC Coding and Emissions Factors

AIRS Point #	Process #	SCC Code	Pollutant	Uncontrolled Emissions	Control %	Units
				Factor		
0	01		PM10	0.00	0	lb/1,000 gallons crude oil throughput
			PM2.5	0.00	0	lb/1,000 gallons crude oil throughput
			NOx	0.00	0	lb/1,000 gallons crude oil throughput
			VOC	9.0	95	lb/1,000 gallons crude oil throughput
			CO	0.00	0	lb/1,000 gallons crude oil throughput
			Benzene	0.08	95	lb/1,000 gallons crude oil throughput
			Toluene	0.07	95	lb/1,000 gallons crude oil throughput
			Ethylbenzene	0.01	95	lb/1,000 gallons crude oil throughput
			Xylene	0.01	95	lb/1,000 gallons crude oil throughput
			n-Hexane	0.71	95	lb/1,000 gallons crude oil throughput
			224 TMP	0.81	95	lb/1,000 gallons crude oil throughput

```

*****
*      Project Setup Information      *
*****
Project File       : E:\APEN -- Emissions Tracking - CO\ef Modeling.Analyticals\Model files\2022 Files\MUSF
Flowsheet Selection : Oil Tank with Separator
Calculation Method  : AP42
Control Efficiency  : 95.00%
Known Separator Stream : Low Pressure Oil
Entering Air Composition : No
Component Group     : C10+

Filed Name         : Mull Drilling Company
Well Name          : MUSF 1-1
Date               : 2020.04.06

```

```

*****
*      Data Input      *
*****

Separator Pressure (psia)      : 36.00
Separator Temperature (F)      : 120.0
C10+ SG                        : 0.78
C10+ MW(lb/lbmol)             : 153.43

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-- Low Pressure Oil -----
No.  Component      Mole%  Wt%
1    H2S             0.0000  0.0000
2    O2              0.0000  0.0000
3    CO2             0.0340  0.0136
4    N2              0.0810  0.0206
5    C1              0.1150  0.0167
6    C2              0.3510  0.0957
7    C3              0.9731  0.3889
8    i-C4            0.2280  0.1201
9    n-C4            1.0041  0.5289
10   i-C5            0.5519  0.3609
11   n-C5            1.7914  1.1714
12   C6              14.2298  11.1114
13   C7              23.6988  21.5208
14   C8              14.6758  15.1931
15   C9              11.6253  13.5154
16   C10+            18.6826  25.9784
17   Benzene         0.8199  0.5804
18   Toluene         1.9173  1.6009
19   E-Benzene       0.2998  0.2885
20   Xylenes         1.1303  1.0876
21   n-C6            6.5258  5.0969
22   224Trimethylp   1.2653  1.3100

```

```

-- Sales Oil -----
Production Rate (bbl/day)      : 78.30
Days of Annual Operation      : 365
API Gravity                    : 38.95
Reid Vapor Pressure (psia)     : 9.20
Bulk Temperature               : 66.0

```

```

-- Tank and Shell Data -----
Diameter (ft)                  : 12.00
Shell Height (ft)              : 20.00
Cone Roof Slope                : 0.06
Average Liquid Height (ft)     : 10.00
Vent Pressure Range (psia)     : 0.06
Solar Absorbance               : 0.68

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-- Meteorological Data -----

```


City : Denver, CO
 Min Ambient Temperature (F) : 37.2
 Max Ambient Temperature (F) : 64.5
 Total Solar Insolation (F) : 1501.00
 Ambient Pressure (psia) : 12.63
 Ambient Temperature (F) : 120.0

 * Calculation Results *

-- Emission Summary -----

	Uncontrolled ton	Controlled ton
Total HAPs	0.6290	0.0314
Total HC	5.8570	0.2928
VOCs, C2+	5.4120	0.2706
VOCs, C3+	4.6500	0.2325
CO2	0.2140	
CH4	0.4440	

Uncontrolled Recovery Information:

Vapor (mscfd) : 0.3286
 HC Vapor (mscfd) : 0.2531
 CO2 (mscfd) : 0.0100
 CH4 (mscfd) : 0.0600
 GOR (SCF/STB) : 4.1971

-- Emission Composition -----

NoComponent	Uncontrolled ton	Controlled ton
1 H2S	0.0000	0.0000
2 O2	0.0000	0.0000
3 CO2	0.2140	0.2140
4 N2	0.8830	0.8830
5 C1	0.4440	0.0222
6 C2	0.7630	0.0382
7 C3	1.0580	0.0529
8 i-C4	0.1470	0.0074
9 n-C4	0.4580	0.0229
10 i-C5	0.1300	0.0065
11 n-C5	0.3260	0.0163
12 C6	1.0370	0.0518
13 Benzene	0.0460	0.0023
14 Toluene	0.0410	0.0021
15 E-Benzene	0.0030	0.0002
16 Xylenes	0.0090	0.0004
17 n-C6	0.4830	0.0242
18 224Trimethylp	0.0470	0.0023
19 Pseudo Comp1	0.5820	0.0291
20 Pseudo Comp2	0.1870	0.0093
21 Pseudo Comp3	0.0670	0.0033
22 Pseudo Comp4	0.0280	0.0014
23 Pseudo Comp5	0.0010	0.0000
24 Total	6.9540	0.3477

-- Stream Data -----

NoComponent	MW lb/lbmol	LP Oil mole %	Flash Oil mole %	Sales Oil mole %	Flash Gas mole %	W&S Gas mole %	Total Emission mole %
1 H2S	34.80	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
2 O2	32.00	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
3 CO2	44.01	0.0340	0.0247	0.0215	2.9419	3.5283	3.0712
4 N2	28.01	0.0810	0.0221	0.0000	18.5423	24.8238	19.9271
5 C1	16.04	0.1150	0.0637	0.0437	16.1775	22.1979	17.5048
6 C2	30.07	0.3510	0.3022	0.2867	15.6382	17.4038	16.0274
7 C3	44.10	0.9731	0.9270	0.9149	15.4015	14.2945	15.1574

8 i-C4	58.12	0.2280	0.2234	0.2224	1.6604	1.3656	1.5954
9 n-C4	58.12	1.0041	0.9906	0.9878	5.2453	4.0258	4.9764
10 i-C5	72.15	0.5519	0.5497	0.5495	1.2305	0.8242	1.1409
11 n-C5	72.15	1.7914	1.7872	1.7870	3.1066	1.9712	2.8563
12 C6	84.00	14.2298	14.2474	14.2561	8.6993	4.6239	7.8009
13 Benzene	78.11	0.8199	0.8212	0.8217	0.4171	0.2175	0.3731
14 Toluene	92.14	1.9173	1.9224	1.9240	0.3186	0.1372	0.2786
15 E-Benzene	106.17	0.2998	0.3007	0.3010	0.0188	0.0069	0.0162
16 Xylenes	106.17	1.1303	1.1337	1.1347	0.0627	0.0223	0.0538
17 n-C6	86.18	6.5258	6.5340	6.5380	3.9500	2.0906	3.5401
18 224Trimethylp	114.23	1.2653	1.2684	1.2694	0.2967	0.1402	0.2622
19 Pseudo Comp1	96.00	23.6988	23.7603	23.7802	4.4262	1.7255	3.8308
20 Pseudo Comp2	107.00	14.6758	14.7185	14.7314	1.2948	0.4424	1.1068
21 Pseudo Comp3	121.00	11.6253	11.6611	11.6715	0.4148	0.1209	0.3500
22 Pseudo Comp4	138.77	12.4182	12.4573	12.4686	0.1509	0.0365	0.1256
23 Pseudo Comp5	181.21	6.2644	6.2844	6.2900	0.0060	0.0009	0.0049
		LP Oil	Flash Oil	Sales Oil	Flash Gas	W&S Gas	Total Emission
MW (lb/lbmol):		107.05	107.25	107.25	45.83	37.26	43.94
Stream Mole Ratio:		1.0000	0.9968	0.9959	0.0032	0.0009	0.0041
Stream Weight Ratio:		107.05	106.90	106.81	0.15	0.03	0.18
Total Emission (ton):					5.654	1.300	6.954
Heating Value (BTU/scf):					2204.26	1636.73	2079.15
Gas Gravity (Gas/Air):					1.58	1.29	1.52
Bubble Pt. @100F (psia):	19.09	10.60	7.43				
RVP @100F (psia):	42.47	36.57	34.59				
Spec. Gravity @100F:	0.71	0.71	0.71				



303-637-0150

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EXTENDED NATURAL GAS LIQUID ANALYSIS (*DHA)

E & P TANK / GLYCALC INFORMATION

PROJECT NO. :	201411042	ANALYSIS NO. :	03
COMPANY NAME :	MULL DRILLING COMPANY	ANALYSIS DATE:	NOVEMBER 10, 2014
ACCOUNT NO. :		SAMPLE DATE :	NOVEMBER 6, 2014
PRODUCER :		CYLINDER NO. :	5053
LEASE NO. :		SAMPLED BY :	JOHN MOSER
NAME/DESCRIP :	OIL TREATOR 08:40 MUSF BATTERY 1		EMPACT
FIELD DATA		SAMPLE TEMP. :	120
SAMPLE PRES. :	36	AMBIENT TEMP.:	
VAPOR PRES. :		GRAVITY :	
COMMENTS :	SPOT; NO PROBE; RE-SAMPLE		

COMPONENT	Mole %	Wt %	LV %	
CARBON DIOXIDE	0.0340	0.0137	0.0124	
NITROGEN (AIR)	0.0810	0.0207	0.0189	
METHANE	0.1150	0.0168	0.0415	
ETHANE	0.3510	0.0963	0.2002	
PROPANE	0.9730	0.3916	0.5719	
I-BUTANE	0.2280	0.1209	0.1590	
N-BUTANE	1.0040	0.5325	0.6752	
I-PENTANE	0.5519	0.3633	0.4311	
N-PENTANE	0.9560	0.6294	0.7384	
CYCLOPENTANE (N-C5)	0.8353	0.5346	0.5207	
N-HEXANE	6.5254	5.1316	5.7248	
CYCLOHEXANE (OTHER C6)	4.1277	3.1700	2.9961	
OTHER HEXANES	10.1013	7.8693	8.3768	
OTHER HEPTANES	16.7262	15.1846	15.8123	
METHYLCYCLOHEXANE (OTHER C7)	6.9712	6.2467	5.9716	
2,2,4 TRIMETHYLPENTANE	1.2652	1.1336	1.1141	
BENZENE	0.8198	0.5843	0.4901	
TOLUENE	1.9172	1.6120	1.3653	
ETHYLBENZENE	0.2998	0.2905	0.2460	
XYLENES	1.1302	1.0950	0.9279	
OTHER OCTANES	14.6749	15.3522	15.4487	
OCTANES PLUS	----	47.6762	57.4785	55.8907
NONANES	11.6246	13.4521	13.2048	
DECANES PLUS	18.6815	26.1551	24.9492	
SUB TOTAL	99.9942	99.9968	99.9970	
ALCOHOLS	0.0058	0.0032	0.0030	
TOTAL	100.0000	100.0000	100.0000	

API Gravity	=	59.48	60/60
Vapor Pressure	=	13.09	PSIA & 100 F
Average Molecular Weight of Decanes plus	=	153.43	
Average Specific Gravity of Decanes plus	=	0.7780	

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.

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303-637-0150

EXTENDED NATURAL GAS LIQUID ANALYSIS (*DHA)

BY CARBON NUMBER

PROJECT NO. :	201411042	ANALYSIS NO. :	03
COMPANY NAME :	MULL DRILLING COMPANY	ANALYSIS DATE:	NOVEMBER 10, 2014
ACCOUNT NO. :		SAMPLE DATE :	NOVEMBER 6, 2014
PRODUCER :		CYLINDER NO. :	5053
LEASE NO. :		SAMPLED BY :	JOHN MOSER
NAME/DESCRIP :	OIL TREATOR 08:40		EMPACT
	MUSF BATTERY 1		
FIELD DATA		SAMPLE TEMP. :	120
SAMPLE PRES. :	36	AMBIENT TEMP.:	
VAPOR PRES. :		GRAVITY :	
COMMENTS :	SPOT; NO PROBE; RE-SAMPLE		

COMPONENT / CARBON NUMBER	MOLE%	MASS %	VOLUME %
ALCOHOLS	0.0058	0.0032	0.0030
NITROGEN	0.0810	0.0207	0.0189
CARBON DIOXIDE	0.0340	0.0137	0.0124
C1	0.1150	0.0168	0.0415
C2	0.3510	0.0963	0.2002
C3	0.9730	0.3916	0.5719
C4	1.2320	0.6534	0.8342
C5	2.3432	1.5273	1.6902
C6	21.5742	16.7552	17.5878
C7	25.6146	23.0433	23.1492
C8	17.3701	17.8713	17.7367
C9	11.6246	13.4521	13.2048
C10	8.7380	10.8738	10.4154
C11	4.0411	5.5068	5.1596
C12	2.3683	3.4284	3.2684
C13	1.4029	2.2886	2.1994
C14	0.9902	1.7926	1.7390
C15	0.8910	1.7271	1.6562
C16	0.1433	0.2961	0.2821
C17	0.0577	0.1266	0.1202
C18	0.0384	0.0891	0.0844
C19	0.0106	0.0260	0.0245
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

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.



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EXTENDED NATURAL GAS LIQUID ANALYSIS (*DHA)

DHA COMPONENT LIST

PROJECT NO. :	201411042	ANALYSIS NO. :	03
COMPANY NAME :	MULL DRILLING COMPANY	ANALYSIS DATE:	NOVEMBER 10, 2014
ACCOUNT NO. :		SAMPLE DATE :	NOVEMBER 6, 2014
PRODUCER :		CYLINDER NO. :	5053
LEASE NO. :		SAMPLED BY :	JOHN MOSER
NAME/DESCRIP :	OIL TREATOR 08:40		EMPACT
	MUSF BATTERY 1		
FIELD DATA			
SAMPLE PRES. :	36	SAMPLE TEMP. :	120
VAPOR PRES. :		AMBIENT TEMP.:	
COMMENTS :	SPOT; NO PROBE; RE-SAMPLE	GRAVITY :	

COMPONENT	PIANO #	MOLE %	MASS %	VOL %
Nitrogen	NHC	0.0810	0.0207	0.0189
Carbon Dioxide	NHC	0.0340	0.0137	0.0124
Methane	P1	0.1150	0.0168	0.0415
Ethane	P2	0.3510	0.0963	0.2002
Propane	P3	0.9730	0.3916	0.5719
i-Butane	I4	0.2280	0.1209	0.1590
n-Butane	P4	1.0040	0.5325	0.6752
2,2-Dimethylpropane	I5	0.0099	0.0065	0.0081
i-Pentane	I5	0.5420	0.3568	0.4230
i-Propanol	X3	0.0058	0.0032	0.0030
n-Pentane	P5	0.9560	0.6294	0.7384
2,2-Dimethylbutane	I6	0.0518	0.0407	0.0461
Cyclopentane	N5	0.8353	0.5346	0.5207
2,3-Dimethylbutane	I6	0.3530	0.2776	0.3082
2-Methylpentane	I6	3.4275	2.6954	3.0344
3-Methylpentane	I6	2.2320	1.7553	1.9431
n-Hexane	P6	6.5254	5.1316	5.7248
2,2-Dimethylpentane	I7	0.0436	0.0399	0.0433
Methylcyclopentane	N6	4.0357	3.0993	3.0439
2,4-Dimethylpentane	I7	0.2324	0.2125	0.2326
2,2,3-Trimethylbutane	I7	0.0371	0.0339	0.0361
Benzene	A6	0.8198	0.5843	0.4901
3,3-Dimethylpentane	I7	0.0245	0.0224	0.0238
Cyclohexane	N6	4.1277	3.1700	2.9961
2-Methylhexane	I7	1.3465	1.2312	1.3361
2,3-Dimethylpentane	I7	0.5228	0.4780	0.5039
1,1-Dimethylcyclopentane	N7	0.7136	0.6394	0.6236
3-Methylhexane	I7	2.0755	1.8977	2.0284
1c,3-Dimethylcyclopentane	N7	1.2990	1.1639	1.1499
1t,3-Dimethylcyclopentane	N7	1.2652	1.1336	1.1141
3-Ethylpentane	I7	0.1838	0.1681	0.1768
1t,2-Dimethylcyclopentane	N7	2.1599	1.9353	1.8953
2,2,4-Trimethylpentane	I8	0.1386	0.1445	0.1530
UnknownC6s	U6	0.0013	0.0010	0.0011
n-Heptane	P7	5.9874	5.4745	5.8902
1c,2-Dimethylcyclopentane	N7	0.1849	0.1657	0.1579
Methylcyclohexane	N7	6.9712	6.2467	5.9716
2,2-Dimethylhexane	I8	1.2664	1.3201	1.3962
Ethylcyclopentane	N7	0.3166	0.2837	0.2724
2,5-Dimethylhexane	I8	0.1175	0.1225	0.1299
2,2,3-Trimethylpentane	I8	0.0480	0.0500	0.0514
2,4-Dimethylhexane	I8	0.2143	0.2234	0.2358

1c,2t,4-Trimethylcyclopentane	N8	0.7161	0.7332	0.7069
3,3-Dimethylhexane	I8	0.1272	0.1326	0.1375
2,3,4-Trimethylpentane	I8	0.0460	0.0480	0.0491
2,3,3-Trimethylpentane	I8	0.0012	0.0013	0.0013
Toluene	A7	1.9172	1.6120	1.3653
2,3-Dimethylhexane	I8	0.3880	0.4044	0.4181
2-Methyl-3-ethylpentane	I8	0.0735	0.0766	0.0784
1,1,2-Trimethylcyclopentane	N8	0.0640	0.0655	0.0624
2-Methylheptane	I8	1.6660	1.7366	1.8277
4-Methylheptane	I8	0.4091	0.4264	0.4379
3-Methyl-3-ethylpentane	I8	0.2015	0.2100	0.2126
3,4-Dimethylhexane	I8	0.1301	0.1356	0.1386
1c,2c,4-Trimethylcyclopentane	N8	0.0592	0.0606	0.0578
1c,3-Dimethylcyclohexane	N8	0.0521	0.0533	0.0512
3-Methylheptane	I8	0.7473	0.7790	0.8128
1c,2t,3-Trimethylcyclopentane	N8	1.5594	1.5967	1.5257
3-Ethylhexane	I8	0.3095	0.3226	0.3330
1t,4-Dimethylcyclohexane	N8	0.8700	0.8908	0.8600
1,1-Dimethylcyclohexane	N8	0.2031	0.2080	0.1961
3c-Ethylmethylcyclopentane	N8	0.0132	0.0135	0.0130
3t-Ethylmethylcyclopentane	N8	0.1233	0.1262	0.1212
2t-Ethylmethylcyclopentane	N8	0.0984	0.1008	0.0965
1,1-Methylethylcyclopentane	N8	0.2878	0.2947	0.2779
2,2,4-Trimethylhexane	I9	0.0526	0.0616	0.0634
1t,2-Dimethylcyclohexane	N8	0.8036	0.8228	0.7809
1c,2c,3-Trimethylcyclopentane	N8	0.0067	0.0069	0.0065
1t,3-Dimethylcyclohexane	N8	0.0472	0.0483	0.0453
UnknownC7s	U7	0.3334	0.3048	0.3279
n-Octane	P8	2.9674	3.0931	3.2399
1c,4-Dimethylcyclohexane	N8	1.0847	1.1107	1.0447
i-Propylcyclopentane	I8	0.0827	0.0847	0.0803
2,4,4-Trimethylhexane	I9	0.0411	0.0481	0.0490
2,2,3,4-Tetramethylpentane	I9	0.0210	0.0246	0.0252
2,3,4-Trimethylhexane	I9	0.0345	0.0404	0.0412
1c,2-Dimethylcyclohexane	N8	0.1725	0.1766	0.1633
2,3,5-Trimethylhexane	I9	0.1295	0.1516	0.1546
2,2-Dimethylheptane	I9	0.0304	0.0356	0.0369
1,1,4-Trimethylcyclohexane	N9	0.9649	1.1115	1.0603
2,2,3-Trimethylhexane	I9	0.5588	0.6540	0.6602
2,4-Dimethylheptane	I9	0.0234	0.0274	0.0282
4,4-Dimethylheptane	I9	0.0690	0.0808	0.0831
Ethylcyclohexane	N8	0.5195	0.5319	0.4972
n-Propylcyclopentane	N8	0.2656	0.2720	0.2579
1c,3c,5-Trimethylcyclohexane	N9	0.0488	0.0562	0.0536
2,5-Dimethylheptane	I9	0.0627	0.0734	0.0754
3,3-Dimethylheptane	I9	0.0638	0.0747	0.0767
3,5-Dimethylheptane	I9	0.0478	0.0559	0.0574
2,6-Dimethylheptane	I9	0.0420	0.0492	0.0511
1,1,3-Trimethylcyclohexane	N9	0.0990	0.1140	0.1087
Ethylbenzene	A8	0.2998	0.2905	0.2460
1c,2t,4t-Trimethylcyclohexane	N9	0.3907	0.4501	0.4212
2,3-Dimethylheptane	I9	0.7596	0.8890	0.9016
1,3-Dimethylbenzene (m-Xylene)	A8	0.3121	0.3024	0.2576
1,4-Dimethylbenzene (p-Xylene)	A8	0.4140	0.4011	0.3427
3,4-Dimethylheptane	I9	0.0929	0.1087	0.1094
3,4-Dimethylheptane (2)	I9	0.1833	0.2145	0.2159
4-Ethylheptane	I9	0.0642	0.0751	0.0773
4-Methyloctane	I9	0.2308	0.2701	0.2759
2-Methyloctane	I9	0.3859	0.4517	0.4660
1c,2t,4c-Trimethylcyclohexane	I9	0.1145	0.1340	0.1360
3-Ethylheptane	I9	0.0794	0.0929	0.0941
3-Methyloctane	I9	0.4648	0.5440	0.5557
3,3-Diethylpentane	I9	0.0593	0.0694	0.0677
1c,2t,3-Trimethylcyclohexane	N9	0.0602	0.0694	0.0649
1,1,2-Trimethylcyclohexane	N9	0.0528	0.0608	0.0569
1,2-Dimethylbenzene (o-Xylene)	A8	0.4041	0.3915	0.3276
i-Butylcyclopentane	N9	0.2279	0.2625	0.2475
UnknownC8s	U8	0.0594	0.0619	0.0648
n-Nonane	P9	1.8007	2.1075	2.1620
1,1-Methylethylcyclohexane	N9	0.5363	0.6277	0.6459
i-Propylbenzene	A9	0.3271	0.3587	0.3059
i-Propylcyclohexane	N9	0.1143	0.1317	0.1209
2,2-Dimethyloctane	I10	0.0418	0.0543	0.0541
2,4-Dimethyloctane	I10	0.0589	0.0765	0.0762

2,6-Dimethyloctane	I10	0.0129	0.0167	0.0172
2,5-Dimethyloctane	I10	0.0315	0.0409	0.0407
n-Butylcyclopentane	N9	0.1579	0.2021	0.1863
3,3-Dimethyloctane	I10	0.0848	0.1101	0.1097
n-Propylbenzene	A9	0.3803	0.4171	0.3557
3,6-Dimethyloctane	I10	0.1380	0.1792	0.1784
3-Methyl-5-ethylheptane	I10	0.2035	0.2382	0.2417
1,3-Methylethylbenzene	A9	0.2564	0.2812	0.2378
1,4-Methylethylbenzene	A9	0.2137	0.2344	0.1982
1,3,5-Trimethylbenzene	A9	0.1086	0.1191	0.1014
2,3-Dimethyloctane	I10	0.0660	0.0857	0.0853
5-Methylnonane	I10	0.1679	0.2180	0.2191
1,2-Methylethylbenzene	A9	0.2648	0.2904	0.2443
2-Methylnonane	I10	0.0720	0.0935	0.0948
3-Ethyl-octane	I10	0.1036	0.1345	0.1339
3-Methylnonane	I10	0.1958	0.2542	0.2552
1,2,4-Trimethylbenzene	A9	0.0340	0.0373	0.0314
t-Butylbenzene	A10	0.5180	0.6344	0.5395
i-Butylcyclohexane	N10	0.1972	0.2524	0.2290
1t-Methyl-2-n-propylcyclohexane	I10	0.0684	0.0801	0.0813
i-Butylbenzene	A10	0.0319	0.0391	0.0338
sec-Butylbenzene	A10	0.0145	0.0178	0.0152
UnknownC9s	U9	1.7350	2.0306	2.0831
n-Decane	P10	1.4025	1.8209	1.8366
1,2,3-Trimethylbenzene	A9	0.2399	0.2631	0.2168
1,3-Methyl-i-propylbenzene	A10	0.0715	0.0784	0.0660
1,4-Methyl-i-propylbenzene	A10	0.0991	0.1087	0.0914
Sec-Butylcyclohexane	N10	0.3304	0.4229	0.3832
1,2-Methyl-i-propylbenzene	A10	0.1816	0.2224	0.1869
3-Ethyl-nonane	I10	0.0559	0.0726	0.0736
1,3-Diethylbenzene	A10	0.0904	0.1107	0.0944
1,3-Methyl-n-propylbenzene	A10	0.0480	0.0588	0.0503
1,4-Diethylbenzene	A10	0.0542	0.0664	0.0568
1,4-Methyl-n-propylbenzene	A10	0.1623	0.1988	0.1706
n-Butylbenzene	A10	0.0490	0.0600	0.0513
1,3-Dimethyl-5-ethylbenzene	A10	0.0369	0.0452	0.0385
1,2-Diethylbenzene	A10	0.1269	0.1554	0.1302
1,2-Methyl-n-propylbenzene	A10	0.0865	0.1059	0.0893
1,4-Dimethyl-2-ethylbenzene	A10	0.0998	0.1222	0.1026
1,3-Dimethyl-4-ethylbenzene	A10	0.0280	0.0343	0.0288
1,2-Dimethyl-4-ethylbenzene	A10	0.1511	0.1851	0.1560
1,3-Dimethyl-2-ethylbenzene	A10	0.0808	0.0990	0.0819
1t,2c,4-Trimethylcyclopentane	A10	0.8445	0.8647	0.8517
1,2-Dimethyl-3-ethylbenzene	A10	0.0892	0.1092	0.0902
1,2-Ethyl-i-propylbenzene	A10	0.0519	0.0636	0.0535
1,4-Methyl-t-butylbenzene	A11	0.1226	0.1502	0.1262
UnknownC10s	U10	2.3673	3.0735	3.1000
n-Undecane	P11	1.1412	1.6278	1.6191
1,4-Ethyl-i-propylbenzene	A11	0.0569	0.0697	0.0586
1,2,4,5-Tetramethylbenzene	A11	0.0781	0.0957	0.0796
1,2-Methyl-n-butylbenzene	A11	0.0646	0.0791	0.0665
1,2,3,5-Tetramethylbenzene	A11	0.0422	0.0517	0.0428
1,2-Methyl-t-butylbenzene	A11	0.0987	0.1209	0.1016
5-Methylindan	A11	0.0121	0.0188	0.0185
4-Methylindan	A11	0.0091	0.0141	0.0139
1,2-Ethyl-n-propylbenzene	A11	0.1296	0.1587	0.1334
2-Methylindan	A11	0.0416	0.0647	0.0637
1,3-Methyl-n-butylbenzene	A11	0.0537	0.0658	0.0553
1,3-Di-i-propylbenzene	A11	0.0387	0.0474	0.0398
sec-Pentylbenzene	A11	0.1015	0.1243	0.1045
n-Pentylbenzene	A11	0.0383	0.0518	0.0445
1t-M-2-(4MP)cyclopentane	P12	0.0381	0.0592	0.0582
1,2-Di-n-propylbenzene	A11	0.0597	0.0731	0.0614
1,4-Di-i-propylbenzene	A11	0.1545	0.1892	0.1590
Tetrahydronaphthalene	A10	0.0868	0.1063	0.0893
t-Decahydronaphthalene	A10	0.0604	0.0740	0.0622
Naphthalene	A10	0.0763	0.0892	0.0750
1-t-Butyl-3,5-dimethylbenzene	A12	0.0375	0.0459	0.0386
1,4-Ethyl-t-butylbenzene	A11	0.0734	0.0899	0.0756
UnknownC11s	U11	1.3673	1.9503	1.9398
n-Dodecane	P12	0.8297	1.2897	1.2687
1,3-Di-n-propylbenzene	A12	0.0662	0.0811	0.0682
1,3,5-Triethylbenzene	A12	0.0748	0.0820	0.0698
1,2,4-Triethylbenzene	A12	0.3539	0.3881	0.3263

1,4-Methyl-n-pentylbenzene	A12	0.0561	0.0687	0.0577
n-Hexylbenzene	A12	0.0525	0.0777	0.0667
1,2,3,4,5-Pentamethylbenzene	A13	0.1564	0.1916	0.1610
2-Methylnaphthalene	A11	0.1362	0.1767	0.1485
1-Methylnaphthalene	A11	0.2211	0.2869	0.2073
UnknownC12s	U12	0.8595	1.3360	1.3142
n-Tridecane	P13	0.3809	0.6408	0.6229
UnknownC13s	U13	0.8656	1.4562	1.4155
n-Tetradecane	P14	0.2415	0.4372	0.4241
UnknownC14s	U14	0.7487	1.3554	1.3149
n-Pentadecane	P15	0.1684	0.3264	0.3130
UnknownC15s	U15	0.7226	1.4007	1.3432
n-Hexadecane	P16	0.0239	0.0494	0.0471
UnknownC16s	U16	0.1194	0.2467	0.2350
n-Heptadecane	P17	0.0414	0.0908	0.0862
UnknownC17s	U17	0.0163	0.0358	0.0340
n-Octadecane	P18	0.0063	0.0146	0.0138
UnknownC18s	U18	0.0321	0.0745	0.0706
UnknownC19s	U19	0.0106	0.0260	0.0245
<u>TOTAL</u>		<u>100.0000</u>	<u>100.0000</u>	<u>100.0000</u>

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.



EMPACT

ANALYSIS NO. : 04
ANALYSIS DATE: NOVEMBER 13, 2014
SAMPLE DATE : NOVEMBER 6, 2014
CYLINDER NO. : 1L GLASS JAR
SAMPLED BY : JOHN MOSER
IMPACT

SAMPLE TEMP.: 66

AMBIENT TEMP.:

GRAVITY :

COMMENTS : SPOT: RE-SAMPLE

TEST			
<u>SPECIFICATION</u>	<u>METHOD</u>	<u>UNITS</u>	<u>RESULTS</u>
API GRAVITY		API 60/60	39.5
RVP @100 DEG F	D323	PSIG	9.2
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>	<u>@TEMP</u>	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

N/A: NO TEST PERFORMED FOR THIS PARAMETER



NATURAL GAS ANALYSIS

COPY

PROJECT NO. : 201406040 ANALYSIS NO. : 02
COMPANY NAME : MULL DRILLING ANALYSIS DATE: JUNE 6, 2014
ACCOUNT NO. : SAMPLE DATE : MAY 23, 2014
PRODUCER : MUSF NITROGEN TO:
LEASE NO. : CYLINDER NO. : 0681
NAME/DESCRIP : MUSF 8
CSG GAS-CK NITROGEN

FIELD DATA

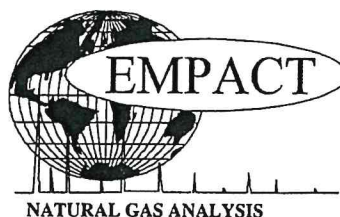
SAMPLED BY : BILL SAMPLE TEMP. : 50
SAMPLE PRES. : 4 AMBIENT TEMP. :
COMMENTS : SPOT; NO PROBE

COMPONENTS	NORM. MOLE%	GPM @ 14.65	GPM @ 14.73
HELIUM	0.07	-	-
HYDROGEN	0.03	-	-
OXYGEN/ARGON	0.02	-	-
NITROGEN	1.41	-	-
CO2	1.66	-	-
METHANE	5.47	-	-
ETHANE	13.76	3.659	3.679
PROPANE	34.94	9.571	9.623
ISOBUTANE	5.52	1.796	1.806
N-BUTANE	18.10	5.674	5.705
ISOPENTANE	3.91	1.422	1.430
N-PENTANE	5.16	1.860	1.870
HEXANES+	9.95	4.293	4.317
TOTAL	100.00	28.275	28.430

BTU @ 60 DEG F	14.65	14.73
GROSS DRY REAL =	2885.2	2901.0
GROSS SATURATED REAL =	2834.7	2850.6

RELATIVE DENSITY (AIR=1 @14.696 PSIA 60F) : 1.8091
COMPRESSIBILITY FACTOR : 0.97489

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



COPY

PRIMARY DB KEY: NAME/DESCRIP : MUSF 6
LEASE #: CASING GAS
FIELD/ AREA: MUSF
PROJECT NO. : 201903031 ANALYSIS NO. : 05
COMPANY NAME: MULL DRILLING COMPANY INC ANALYSIS DATE: MARCH 06, 2019 15:31
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. : 17 psig PROBE : NO
FLOW PRES. : psig CYLINDER NO. : 1867
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	0.02	-	-
HYDROGEN	0.01	-	-
OXYGEN/ARGON	0.50	-	-
NITROGEN	65.27	-	-
CO2	1.17	-	-
METHANE	1.22	-	-
ETHANE	2.88	0.7686	0.7728
PROPANE	9.69	2.6650	2.6796
ISOBUTANE	2.12	0.6925	0.6963
N-BUTANE	8.11	2.5519	2.5659
ISOPENTANE	2.20	0.8036	0.8080
N-PENTANE	2.92	1.0568	1.0626
HEXANES+	3.89	1.6853	1.6945
TOTAL	100.00	10.2237	10.2797
BTU @ 60 DEG F		14.65	14.73
GROSS DRY REAL =		1046.0 /scf	1051.7 /scf
GROSS SATURATED REAL =		1027.7 /scf	1033.4 /scf
RELATIVE DENSITY (AIR=1 @ 14.696 PSIA 60F)		1.2968	
GRAVITY (LB/SCF)		0.09898	
COMPRESSIBILITY FACTOR :		0.99612	

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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