

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	Uncontrolled Emissions		
			Factor	Control %	Units
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

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*****
*      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

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*****
*      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 -----

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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

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-- 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

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-- 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 -----

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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				