

# Crude Oil Storage Tank(s) Emissions Inventory

## Section 01 - Administrative Information

Facility AIRs ID:	02CY0280	Plant	017-0005-009
	Cheyenne		Point

## Section 02 - Equipment Description Details

Detailed Emissions Unit Description:	Emissions From Tank Battery at MUSF#2
Emission Control Device Description:	ECD, VRU
Requested Overall VOC & HAP Control Efficiency %:	95.0

## Section 03 - Processing Rate Information for Emissions Estimates

### Primary Emissions - Storage Tank(s)

Actual Throughput =	60240.7 Barrels (bbl) per year	Requested Monthly Throughput =	5945.2 Barrels (bbl) per month
Requested Permit Limit Throughput =	70000.0 Barrels (bbl) per year		
Potential to Emit (PTE) Throughput =	75000.0 Barrels (bbl) per year		

### Secondary Emissions - Combustion Device(s)

Heat content of waste gas =	1755.0 Btu/scf
Volume of waste gas emitted per BBL of liquids produced =	23.0 scf/bbl
Actual heat content of waste gas routed to combustion device =	2,431.6 MMBTU per year
Requested heat content of waste gas routed to combustion device =	2,825.6 MMBTU per year
Potential to Emit (PTE) heat content of waste gas routed to combustion device =	3,027.4 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	0.0500	0.0025	Site Specific E.F. (includes flash)
Benzene	0.0004	0.0000	Site Specific E.F. (includes flash)
Toluene	0.0003	0.0000	Site Specific E.F. (includes flash)
Ethylbenzene	0.0000	0.0000	Site Specific E.F. (includes flash)
Xylene	0.0001	0.0000	Site Specific E.F. (includes flash)
n-Hexane	0.0041	0.0002	Site Specific E.F. (includes flash)
224 TMP	0.0001	0.0000	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	0.0003	AP-42 Table 1.4-2 (PM10/PM2.5)
PM2.5	0.0075	0.0003	AP-42 Table 1.4-2 (PM10/PM2.5)
NOx	0.0980	0.0040	AP-42 Table 1.4-1 (NOx)
CO	0.0824	0.0033	AP-42 Table 1.4-1 (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	0.0980	0.0000	AP-42 Table 1.4-1 (NOx)
CO	0.0824	0.0000	AP-42 Table 1.4-1 (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	1.9	1.5	0.1	1.8	0.1	14.9
PM10	0.0	0.0	0.0	0.0	0.0	1.8
PM2.5	0.0	0.0	0.0	0.0	0.0	1.8
NOx	0.1	0.1	0.1	0.1	0.1	23.5
CO	0.1	0.1	0.1	0.1	0.1	19.8
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	30.0	24.1	1.2	28.0	1.4	
Toluene	22.5	18.1	0.9	21.0	1.1	
Ethylbenzene	1.5	1.2	0.1	1.4	0.1	
Xylene	7.5	6.0	0.3	7.0	0.4	
n-Hexane	307.5	247.0	12.3	287.0	14.4	
224 TMP	7.5	6.0	0.3	7.0	0.4	

### Section 06 - Regulatory Summary Analysis

Regulation 3, Parts A, B	Facility attainment-area status has not been established yet
Regulation 7, Section XVII.B, C.1, C.3	Not enough information
Regulation 7, Section XVII.C.2	Not enough information
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?

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

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?

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?

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?

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		Units
				Factor	Control %	
#REF!	01		PM10	0.01	0	lb/1,000 gallons crude oil throughput
			PM2.5	0.01	0	lb/1,000 gallons crude oil throughput
			NOx	0.09	0	lb/1,000 gallons crude oil throughput
			VOC	1.2	95	lb/1,000 gallons crude oil throughput
			CO	0.08	0	lb/1,000 gallons crude oil throughput
			Benzene	0.01	95	lb/1,000 gallons crude oil throughput
			Toluene	0.01	95	lb/1,000 gallons crude oil throughput
			Ethylbenzene	0.00	95	lb/1,000 gallons crude oil throughput
			Xylene	0.00	95	lb/1,000 gallons crude oil throughput
			n-Hexane	0.10	95	lb/1,000 gallons crude oil throughput
			224 TMP	0.00	95	lb/1,000 gallons crude oil throughput

```

*****
*      Project Setup Information      *
*****
Project File       : L:\Jay\Backup\Documents\MDC\MUSF T5 permit & Emission Data\EP Tanks for MUSF 2\09301
Flowsheet Selection : Oil Tank with Separator
Calculation Method  : AP42
Control Efficiency  : 95.0%
Known Separator Stream : Low Pressure Oil
Entering Air Composition : No

```

```

Well Name      : MUSF #2 Tank Battery
Date           : 2015.10.13

```

```

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

```

```

Separator Pressure : 22.00[psig]
Separator Temperature : 128.00[F]
Ambient Pressure : 12.63[psia]
Ambient Temperature : 72.10[F]
C10+ SG : 0.7750
C10+ MW : 175.43

```

```

-- Low Pressure Oil -----
No.   Component      mol %
1     H2S             0.0000
2     O2              0.0000
3     CO2             0.0270
4     N2              0.0791
5     C1              0.0240
6     C2              0.0771
7     C3              0.5698
8     i-C4            0.2684
9     n-C4            1.4750
10    i-C5            0.9390
11    n-C5            2.3721
12    C6              12.4807
13    C7              18.0049
14    C8              12.1203
15    C9              9.8129
16    C10+           31.5889
17    Benzene         0.6714
18    Toluene         1.5594
19    E-Benzene       0.1330
20    Xylenes         1.4061
21    n-C6            6.0816
22    224Trimethylp   0.3092

```

```

-- Sales Oil -----
Production Rate      : 251.1[bbl/day]
Days of Annual Operation : 365 [days/year]
API Gravity          : 40.1
Reid Vapor Pressure  : 5.60[psia]
Bulk Temperature     : 112.00[F]

```

```

-- Tank and Shell Data -----
Diameter             : 12.00[ft]
Shell Height         : 20.00[ft]
Cone Roof Slope      : 0.03
Average Liquid Height : 3.00[ft]
Vent Pressure Range  : 0.00[psi]
Solar Absorbance     : 0.54

```

```

-- Meteorological Data -----

```

City : Denver, CO  
 Ambient Pressure : 12.63[psia]  
 Ambient Temperature : 72.10[F]  
 Min Ambient Temperature : 37.20[F]  
 Max Ambient Temperature : 64.50[F]  
 Total Solar Insolation : 1501.00[Btu/ft^2\*day]

\*\*\*\*\*  
 \* Calculation Results \*  
 \*\*\*\*\*

-- Emission Summary -----

Item	Uncontrolled [ton/yr]	Uncontrolled [lb/hr]	Controlled [ton/yr]	Controlled [lb/hr]
Total HAPs	0.230	0.053	0.011	0.003
Total HC	2.241	0.512	0.112	0.026
VOCs, C2+	2.180	0.498	0.109	0.025
VOCs, C3+	2.097	0.479	0.105	0.024

Uncontrolled Recovery Info.

Vapor 147.4500 x1E-3 [MSCFD]  
 HC Vapor 75.8500 x1E-3 [MSCFD]  
 GOR 0.59 [SCF/bbl]

-- Emission Composition -----

No	Component	Uncontrolled [ton/yr]	Uncontrolled [lb/hr]	Controlled [ton/yr]	Controlled [lb/hr]
1	H2S	0.000	0.000	0.000	0.000
2	O2	0.000	0.000	0.000	0.000
3	CO2	0.080	0.018	0.080	0.018
4	N2	0.915	0.209	0.915	0.209
5	C1	0.061	0.014	0.003	0.001
6	C2	0.083	0.019	0.004	0.001
7	C3	0.298	0.068	0.015	0.003
8	i-C4	0.079	0.018	0.004	0.001
9	n-C4	0.319	0.073	0.016	0.004
10	i-C5	0.106	0.024	0.005	0.001
11	n-C5	0.206	0.047	0.010	0.002
12	C6	0.459	0.105	0.023	0.005
13	C7	0.288	0.066	0.014	0.003
14	C8	0.080	0.018	0.004	0.001
15	C9	0.028	0.006	0.001	0.000
16	C10+	0.006	0.001	0.000	0.000
17	Benzene	0.017	0.004	0.001	0.000
18	Toluene	0.015	0.003	0.001	0.000
19	E-Benzene	0.001	0.000	0.000	0.000
20	Xylenes	0.005	0.001	0.000	0.000
21	n-C6	0.186	0.042	0.009	0.002
22	224Trimethylp	0.005	0.001	0.000	0.000
	Total	3.237	0.739	0.162	0.037

-- Stream Data -----

No.	Component	MW	LP Oil mol %	Flash Oil mol %	Sale Oil mol %	Flash Gas mol %	W&S Gas mol %	Total Emissions mol %
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	0.0270	0.0270	0.0253	0.0000	2.5508	2.5508
4	N2	28.01	0.0791	0.0791	0.0481	0.0000	46.0100	46.0100
5	C1	16.04	0.0240	0.0240	0.0204	0.0000	5.3308	5.3308
6	C2	30.07	0.0771	0.0771	0.0745	0.0000	3.9025	3.9025
7	C3	44.10	0.5698	0.5698	0.5638	0.0000	9.5024	9.5024
8	i-C4	58.12	0.2684	0.2684	0.2673	0.0000	1.9249	1.9249
9	n-C4	58.12	1.4750	1.4750	1.4708	0.0000	7.7229	7.7229
10	i-C5	72.15	0.9390	0.9390	0.9382	0.0000	2.0657	2.0657
11	n-C5	72.15	2.3721	2.3721	2.3710	0.0000	4.0286	4.0286
12	C6	86.16	12.4807	12.4807	12.4839	0.0000	7.6982	7.6982
13	C7	100.20	18.0049	18.0049	18.0142	0.0000	4.1795	4.1795



14	C8	114.23	12.1203	12.1203	12.1278	0.0000	1.0107	1.0107
15	C9	128.28	9.8129	9.8129	9.8193	0.0000	0.3199	0.3199
16	C10+	175.43	31.5889	31.5889	31.6102	0.0000	0.0498	0.0498
17	Benzene	78.11	0.6714	0.6714	0.6716	0.0000	0.3054	0.3054
18	Toluene	92.13	1.5594	1.5594	1.5603	0.0000	0.2283	0.2283
19	E-Benzene	106.17	0.1330	0.1330	0.1331	0.0000	0.0072	0.0072
20	Xylenes	106.17	1.4061	1.4061	1.4070	0.0000	0.0677	0.0677
21	n-C6	86.18	6.0816	6.0816	6.0837	0.0000	3.0376	3.0376
22	224Trimethylp	114.24	0.3092	0.3092	0.3094	0.0000	0.0573	0.0573
	MW		121.66	121.66	121.66	0.00	45.57	45.57
	Stream Mole Ratio		1.0000	1.0000	0.9993	0.0000	0.0007	0.0007
	Heating Value	[BTU/SCF]				0.00	1755.05	1755.05
	Gas Gravity	[Gas/Air]				0.00	1.57	1.57
	Bubble Pt. @ 100F	[psia]	13.20	13.20	10.18			
	RVP @ 100F	[psia]	34.49	34.49	33.65			
	Spec. Gravity @ 100F		0.694	0.694	0.694			