

City : Denver, CO
 Min Ambient Temperature (F) : 36.2
 Max Ambient Temperature (F) : 64.3
 Total Solar Insolation (F) : 1568.00
 Ambient Pressure (psia) : 12.63
 Ambient Temperature (F) : 105.0

 * Calculation Results *

--- Emission Summary ---

	Uncontrolled ton	Controlled ton	
Total HAPs	0.2870	0.0143	
Total HC	3.1350	0.1567	- 0.245768 (VOCs) (0.35)
VOCs, C2+	2.8140	0.1407	
VOCs, C3+	2.3140	0.1157	
CO2	0.2170		
CH4	0.3200		

Uncontrolled Recovery Information:

Vapor (mscfd) : 0.1866
 HC Vapor (mscfd) : 0.1502
 CO2 (mscfd) : 0.0100
 CH4 (mscfd) : 0.0400
 GOR (SCF/STB) : 2.6692

--- Emission Composition ---

NoComponent	Uncontrolled ton	Controlled ton	
1 H2S	0.0000	0.0000	
2 O2	0.0000	0.0000	
3 CO2	0.2170	0.2170	
4 N2	0.3530	0.3530	
5 C1	0.3200	0.0160	
6 C2	0.5000	0.0250	
7 C3	0.6260	0.0313	
8 i-C4	0.0830	0.0041	
9 n-C4	0.2530	0.0126	
10 i-C5	0.0670	0.0033	
11 n-C5	0.1680	0.0084	
12 C6	0.4820	0.0241	
13 Benzene	0.0210	0.0010	0.0016462 16/661 (0.0016) benzene
14 Toluene	0.0170	0.0009	0.001332 16/661 (0.0013) Toluene
15 E-Benzene	0.0020	0.0001	0.000156 16/661 (0.0002) E-Benzene
16 Xylenes	0.0040	0.0002	0.000313 16/661 (0.0003) Xylene
17 n-C6	0.2210	0.0110	0.01732525 16/661 (0.0173) n-C6
18 224Trimethylp	0.0210	0.0010	0.00164629 16/661 (0.0016) 224-TMP
19 Pseudo Comp1	0.2380	0.0119	
20 Pseudo Comp2	0.0740	0.0037	
21 Pseudo Comp3	0.0240	0.0012	
22 Pseudo Comp4	0.0100	0.0005	
23 Pseudo Comp5	0.0000	0.0000	
24 Total	3.7010	0.1850	

--- 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	0.0510	0.0431	0.0313	4.7275	6.8897	5.4978
4 N2	28.01	0.0620	0.0255	0.0000	21.7595	0.0009	14.0085
5 C1	16.04	0.1230	0.0872	0.0383	21.3821	23.7674	22.2318
6 C2	30.07	0.3540	0.3289	0.2900	15.2876	24.3542	18.5174
7 C3	44.10	0.9671	0.9461	0.9164	13.4430	20.0592	15.7998

8 i-C4	58.12	0.2300	0.2280	0.2254	1.4047	1.9448	1.5971
9 n-C4	58.12	1.0151	1.0095	1.0025	4.3527	5.7421	4.8476
10 i-C5	72.15	0.5533	0.5526	0.5519	0.9726	1.1639	1.0407
11 n-C5	72.15	1.8261	1.8250	1.8242	2.4602	2.8289	2.5915
12 C6	84.00	14.0676	14.0805	14.0982	6.3738	6.4276	6.3930
13 Benzene	78.11	0.8112	0.8121	0.8132	0.3035	0.3021	0.3030
14 Toluene	92.14	1.8911	1.8939	1.8973	0.2199	0.1898	0.2092
15 E-Benzene	106.17	0.5089	0.5097	0.5107	0.0215	0.0164	0.0197
16 Xylenes	106.17	1.3651	1.3673	1.3699	0.0505	0.0377	0.0460
17 n-C6	86.18	6.3696	6.3755	6.3836	2.8541	2.8690	2.8594
18 224Trimethylp	114.23	1.2606	1.2624	1.2645	0.2126	0.1964	0.2068
19 Pseudo Comp1	96.00	23.2325	23.2666	23.3086	2.9694	2.3744	2.7575
20 Pseudo Comp2	107.00	14.5761	14.5992	14.6269	0.8509	0.6165	0.7674
21 Pseudo Comp3	121.00	11.2699	11.2884	11.3104	0.2556	0.1645	0.2232
22 Pseudo Comp4	138.77	12.9388	12.9604	12.9858	0.0950	0.0531	0.0801
23 Pseudo Comp5	181.21	6.5270	6.5380	6.5508	0.0033	0.0013	0.0026
		LP Oil	Flash Oil	Sales Oil	Flash Gas	W&S Gas	Total Emission
MW (lb/lbmol):		107.46	107.58	107.65	40.73	42.14	41.24
Stream Mole Ratio:		1.0000	0.9983	0.9974	0.0017	0.0009	0.0026
Stream Weight Ratio:		107.46	107.40	107.37	0.07	0.04	0.11
Total Emission (ton):					2.356	1.349	3.705
Heating Value (BTU/scf):					1839.18	2219.62	1974.70
Gas Gravity (Gas/Air):					1.41	1.45	1.42
Bubble Pt. @100F (psia):		17.52	12.14	7.42			
RVP @100F (psia):		43.84	39.32	34.63			
Spec. Gravity @100F:		0.71	0.71	0.71			

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*****
*   Project Setup Information   *
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Project File       : M:\MDC_Jay\TB AQ\CO\Storage Tank APENS-Permits-Exemptions\E&P TANKS Modeling\2014 ef 1
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
Well Name         : MUSF 3
Date              : 2014.12.08

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*   Data Input                 *
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Separator Pressure (psia)      : 26.00
Separator Temperature (F)     : 105.0
C10+ SG                        : 0.78
C10+ MW(lb/lbmol)            : 153.39

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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            0.0510  0.0203
4    N2             0.0620  0.0157
5    C1             0.1230  0.0178
6    C2             0.3540  0.0962
7    C3             0.9671  0.3853
8    i-C4           0.2300  0.1208
9    n-C4           1.0151  0.5330
10   i-C5           0.5533  0.3606
11   n-C5           1.8261  1.1903
12   C6             14.0676 10.9498
13   C7             23.2325 21.0301
14   C8             14.5761 15.0418
15   C9             11.2699 13.0604
16   C10+          19.4658 26.9742
17   Benzene        0.8112  0.5724
18   Toluene        1.8911  1.5740
19   E-Benzene      0.5089  0.4881
20   Xylenes        1.3651  1.3093
21   n-C6           6.3696  4.9590
22   224Trimethylp 1.2606  1.3010

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-- Sales Oil -----
Production Rate (bbl/day)      : 69.90
Days of Annual Operation      : 365
API Gravity                    : 38.90
Reid Vapor Pressure (psia)    : 7.00
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                : 0.54

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-- Meteorological Data -----

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Crude Oil Storage Tank(s) Emissions Inventory

Section 01 - Administrative Information

Facility AIRs ID:	017-0251-001	MUSF#3 TB	
	Cheyenne	Point	

Section 02 - Equipment Description Details

Detailed Emissions Unit Description: Oil Tank Storage along with ECD/Separator

Emission Control Device Description: ECD

Requested Overall VOC & HAP Control Efficiency %: 95.0

Section 03 - Processing Rate Information for Emissions Estimates

Primary Emissions - Storage Tank(s)

Actual Throughput =	25511.9 Barrels (bb) per year		
Requested Permit Limit Throughput =	30000.0 Barrels (bb) per year	Requested Monthly Throughput =	2547.9 Barrels (bb) per month

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

Secondary Emissions - Combustion Device(s)

Heat content of waste gas = 3535.0 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 = 2,074.2 MMBTU per year
 Requested heat content of waste gas routed to combustion device = 2,439.2 MMBTU per year
 Potential to Emit (PTE) heat content of waste gas routed to combustion device = 2,601.6 MMBTU per year

Control Device

Pilot Fuel Use Rate:	30 scfh	0.3 MMscf/yr
Pilot Fuel Gas Heating Value:	800 Btu/scf	210.2 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) (Crude Oil Throughput)	(lb/bbl) (Crude Oil Throughput)	
VOC	0.3500	0.0175	Site Specific E.F. (Includes flash)
Benzene	0.0016	0.0001	Site Specific E.F. (Includes flash)
Toluene	0.0013	0.0001	Site Specific E.F. (Includes flash)
Ethylbenzene	0.0002	0.0000	Site Specific E.F. (Includes flash)
Xylene	0.0003	0.0000	Site Specific E.F. (Includes flash)
n-Hexane	0.0173	0.0009	Site Specific E.F. (Includes flash)
2,2,4 TMP	0.0016	0.0001	Site Specific E.F. (Includes flash)
Emission Factors	Control Device		Emission Factor Source
	Uncontrolled	Uncontrolled	
	(lb/MMBtu) (Waste Heat Combusted)	(lb/bbl) (Crude Oil Throughput)	
PM10	0.0075	0.0005	AP-42 Table 1.4-2 (PM10/PM 2.5)
PM2.5	0.0075	0.0005	AP-42 Table 1.4-2 (PM10/PM 2.5)
NOx	0.0980	0.0080	AP-42 Table 1.4-1 (NOx)
CO	0.0824	0.0067	AP-42 Table 1.4-1 (CO)
Emission Factors	Pilot Light Emissions		Emission Factor Source
	Uncontrolled	Uncontrolled	
	(lb/MMBtu) (Waste Heat Combusted)	(lb/MMscf) (Pilot Gas Throughput)	
PM10	0.0075	5.3608	AP-42 Table 1.4-2 (PM10/PM 2.5)
PM2.5	0.0075	5.9608	AP-42 Table 1.4-2 (PM10/PM 2.5)
NOx	0.0980	78.4314	AP-42 Table 1.4-1 (NOx)
CO	0.0824	65.3824	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 (tons/year)		Requested Permit Limits (tons/year)		Requested Monthly Limits Controlled (lbs/month)
		Uncontrolled	Controlled	Uncontrolled	Controlled	
VOC	5.6	4.5	0.2	5.3	0.3	44.6
PM10	0.0	0.0	0.0	0.0	0.0	1.7
PM2.5	0.0	0.0	0.0	0.0	0.0	1.7
NOx	0.1	0.1	0.1	0.1	0.1	22.1
CO	0.1	0.1	0.1	0.1	0.1	18.5
Hazardous Air Pollutants	Potential to Emit Uncontrolled (lbs/year)	Actual Emissions (lbs/year)		Requested Permit Limits (lbs/year)		
		Uncontrolled	Controlled	Uncontrolled	Controlled	
Benzene	52.7	42.0	2.1	49.4	2.5	
Toluene	42.6	34.0	1.7	40.0	2.0	
Ethylbenzene	5.0	4.0	0.2	4.7	0.2	
Xylene	10.0	8.0	0.4	9.4	0.5	
n-Hexane	554.4	442.0	22.1	519.8	26.0	
224 TMP	52.7	42.0	2.1	49.4	2.5	

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? **Yes**
 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		
			Pollutant	Factor	Control % Units
0	01		PM10	0.02	0 lb/1,000 gallons crude oil throughput
			PM2.5	0.02	0 lb/1,000 gallons crude oil throughput
			NOx	0.21	0 lb/1,000 gallons crude oil throughput
			VOC	3.3	95 lb/1,000 gallons crude oil throughput
			CO	0.17	0 lb/1,000 gallons crude oil throughput
			Benzene	0.04	95 lb/1,000 gallons crude oil throughput
			Toluene	0.03	95 lb/1,000 gallons crude oil throughput
			Ethylbenzene	0.09	95 lb/1,000 gallons crude oil throughput
			Xylene	0.01	95 lb/1,000 gallons crude oil throughput
			n-Hexane	0.11	95 lb/1,000 gallons crude oil throughput
			224 TMP	0.04	95 lb/1,000 gallons crude oil throughput