Maryland
Department of
the Environment

Larry Hogan, Governor
Boyd K. Rutherford, Lt. Governor

Ben Grumbles, Secretary
Horacio Tablada, Deputy Secretary

Maryland Negative Declaration for Control Techniques Guidelines (CTG) for the Oil and Natural Gas Industry (EPA-453/B-16-001 – October 2016)

June 11, 2020
SIP # 20-07

Prepared for:
U.S. Environmental Protection Agency

Prepared by:
Maryland Department of the Environment

Maryland Department of the Environment

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SECTION 1 - SIP Revision – Negative Declaration for Oil and Gas CTG

Maryland Negative Declaration for Control Techniques Guidelines (CTG) for the Oil and Natural Gas Industry (EPA-453/B-16-001) dated October 2016

March 20, 2020

The Maryland Department of the Environment (MDE) has conducted a review of potential sources subject to the requirements of the Oil and Natural Gas Industry CTG, EPA-453/B-16-001. MDE searched Maryland's oil and gas well records and air permit records. MDE also searched EPA greenhouse gas reporting files, and internet SIC code classification.

Possible Maryland Sources

Maryland NG facilities in the Transmission Sector			
Permit No.	**County**	**Company**	**Year built**
24-009-0021	Calvert	Dominion Cove Point LNG	1972/2014
24-021-0707	Frederick	Dominion Myersville Compressor Station	2014
24-023-0881	Garrett	Enbridge Eastern Accident Compressor Station	1965
24-023-0881	Garrett	Enbridge Accident Underground Storage	1965
24-027-0223	Howard	Williams Transco Ellicott City Compressor Station (190)	1951
NA	Baltimore	TransCanada Rutledge Compessor Station	1988

Maryland Wells					
Permit No.	**County**	**Well Type**	**Common Name**	**Company**	**Production**
50-GO-0001	GA	Production	Welch #1	Ruthanne Welch	<15 barrels equivelent
51-GO-0132	GA	Production	Dawson #1	Phyllis J. Arnold	<15 barrels equivelent
52-GO-0134	GA	Production	Welch #2	Ruthanne Welch	<15 barrels equivelent
53-GO-0136	GA	Production	Swartzentruber #1	Mike Ross Inc.	<15 barrels equivelent
54-GO-0005	GA	Production	Hamstead #1	Jerome K and Jeffrey A. Moyer	<15 barrels equivelent
54-GO-0006	GA	Production	Arnold #1	Closed	
55-GO-0011	GA	Production	Hamilton #1	Premma Oil & Gas LLC	<15 barrels equivelent
55-GO-0017	GA	Production	Stahl #1	Premma Oil & Gas LLC	<15 barrels equivelent
94-GO-0132	AL	Production	Curry Well #1	Oil & Gas Management, Inc.	<15 barrels equivelent

MDE research found that each of the five Maryland facilities in the natural gas transmission and storage segment do not have a storage tank that meets the definition and applicability with a PTE greater than or equal to 6 tons per year VOC. There are no natural gas or oil production facilities in Maryland. MDE research concludes that each of the eight Maryland individual well facilities in the production and processing segment do not produce greater than 15 barrel equivalent per well per day of natural gas. MDE research also concludes that these older gas wells in Maryland do not utilize pneumatic pumps or devices subject to the CTG.

CTG Emission Source	**Maryland Source Research**
Storage Vessels Individual storage vessel with a potential to emit (PTE) greater than or equal to 6 tpy VOC.	No Maryland Sources >/= 6 tpy VOC
Pneumatic Controllers - NG processing plant	No Maryland Sources
Pneumatic Controllers - NG wellhead to pipeline	No Maryland Sources Identified
Pneumatic Pumps - NG processing plant	No Maryland Sources
Pneumatic Pumps - NG wellhead to pipeline	No Maryland Sources Identified
Compressors - NG wellhead to pipeline	No Maryland Sources
Compressors at wellhead	RACT Not Applicable
Equipment Leaks at NG processing plant	No Maryland Sources
Fugitive Emissions - NG processing	No Maryland Sources
Fugitive Emissions - NG wells with GOR > 300	No Maryland Sources
Fugitive Emissions - NG wells with GOR < 300	RACT Not Applicable

Conclusion

Maryland does have sources that operate in the production and processing and transmission and storage segments of the oil and natural gas industry, however, no facility was determined to meet the CTG applicability criteria.

Attachments

A. Letter/email from Dominion
B. Letter/email from Enbridge
C. Letter/email from TransCanada
D. Letter/email from Williams

Dominion Energy Services, Inc.
5000 Dominion Boulevard, Glen Allen, VA 23060

www.dominionenergy.com

October 30, 2018

BY U.S. MAIL, RETURN RECEIPT REQUESTED
7016 2070 0001 1101 8232

Brian Hug
Program Manager
Air Quality Planning Program
Air and Radiation Administration
Maryland Department of the Environment
1800 Washington Boulevard
Baltimore, Maryland 21230

RE: Dominion Energy, Inc. Information Request Response
October 5, 2018 MDE Information Request

Dear Mr. Hug:

In response to your October 5, 2018 letter, Dominion Energy, Inc. is providing the following information in regards to tank inventories at the Dominion Energy Cove Point LNG Terminal and the Dominion Energy Myersville Compressor Station:

1) A complete tank inventory, including tank contents and size;
2) Applicability of each tank to the October 2016 Environmental Protection Agency's (EPA's) finalized Control Techniques Guidelines (CTG) for the Oil and Natural Gas Industry (EPA-453/B-16-001), Section 4.1 APPLICABILITY;
3) Estimated maximum annual emissions of Volatile Organic Carbons (VOCs) over the past five (5) years for CTG applicable tanks;
4) E&P TANKS program, version 2.0 calculation reports, where applicable; and
5) Control devices and vapor recovery units (VRU) associated with each tank applicable to the CTG.

If you have any questions, please contact Joseph Pietro at (804) 273-4175 or via email at Joseph.J.Pietro@dominionenergy.com.

Sincerely,

for
Richard B. Gangle
Director, Environmental Services

Enclosures (4)

cc: John Artes, MDE (john.artes@maryland.gov)
Duane King, MDE (duane.king@maryland.gov)
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Joshua Shodeinde, MDE (joshua.shodeinde@maryland.gov)
Christopher Cripps, EPA Region 3 (cripps.christopher@epa.gov)

Dominion Energy Cove Point LNG Terminal and Myersville Compressor Station Tank List and Control Technical Guidelines Applicability (EPA-453/B-16-001)

Location	Tank Size (Gallons)	Tank Contents	Control Device	VRU[1]	VOC[2] (tons/year)	Applicable to CTG[3]
Dominion Energy Cove Point LNG Terminal	600	Diesel Fuel				No, Fuel Tank
Dominion Energy Cove Point LNG Terminal	1,000	Diesel Fuel				No, Fuel Tank
Dominion Energy Cove Point LNG Terminal	460	Diesel Fuel				No, Fuel Tank
Dominion Energy Cove Point LNG Terminal	550	Diesel Fuel				No, Fuel Tank
Dominion Energy Cove Point LNG Terminal	500	Diesel Fuel				No, Fuel Tank
Dominion Energy Cove Point LNG Terminal	500	Diesel Fuel				No, Fuel Tank
Dominion Energy Cove Point LNG Terminal	2,000	Lube Oil				No, Engine Lube Oil
Dominion Energy Cove Point LNG Terminal	4,000	Lube Oil				No, Engine Lube Oil
Dominion Energy Cove Point LNG Terminal	1,000	Diesel Fuel				No, Fuel Tank
Dominion Energy Cove Point LNG Terminal	1,000	Gasoline				No, Fuel Tank
Dominion Energy Cove Point LNG Terminal	500	Used Lube Oil				No, Engine Lube Oil
Dominion Energy Cove Point LNG Terminal	550	Used Lube Oil				No, Engine Lube Oil
Dominion Energy Cove Point LNG Terminal	500	NGL[4] Tank	No, vents to atmosphere	No	0[4]	Yes, Produced NGL
Dominion Energy Cove Point LNG Terminal	550	Used Oil				No, Fuel Tank
Dominion Energy Cove Point LNG Terminal	9,463	Oily Wastewater				No, Stormwater, A/C Water
Dominion Energy Cove Point LNG Terminal	500	Oily Wastewater				No, A/C water
Dominion Energy Cove Point LNG Terminal	2,100	Diesel Fuel				No, Fuel Tank
Dominion Energy Cove Point LNG Terminal	460	Diesel Fuel				No, Fuel Tank
Dominion Energy Cove Point LNG Terminal	460	Diesel Fuel				No, Fuel Tank
Dominion Energy Cove Point LNG Terminal	460	Diesel Fuel				No, Fuel Tank
Dominion Energy Cove Point LNG Terminal	460	Diesel Fuel				No, Fuel Tank
Dominion Energy Cove Point LNG Terminal	460	Diesel Fuel				No, Fuel Tank
Dominion Energy Cove Point LNG Terminal	740	Oily Wastewater	Yes, Flare	No	0.000[5]	Yes, Produced Water
Dominion Energy Cove Point LNG Terminal	330	Oily Wastewater				No, A/C water
Dominion Energy Cove Point LNG Terminal	115	Diesel Fuel				No, Fuel Tank
Dominion Energy Cove Point LNG Terminal	115	Diesel Fuel				No, Fuel Tank
Dominion Energy Cove Point LNG Terminal	115	Diesel Fuel				No, Fuel Tank
Dominion Energy Cove Point LNG Terminal	115	Diesel Fuel				No, Fuel Tank
Dominion Energy Cove Point LNG Terminal	115	Diesel Fuel				No, Fuel Tank
Dominion Energy Cove Point LNG Terminal	115	Diesel Fuel				No, Fuel Tank
Dominion Energy Cove Point LNG Terminal	106	Diesel Fuel				No, Fuel Tank
Dominion Energy Cove Point LNG Terminal	39,654	Contaminated DGA[6]	No, vents to atmosphere	No	0[6]	Yes, Condensate Present
Dominion Energy Cove Point LNG Terminal	38,152	Hydrocarbons	Yes, Closed Loop to Flare	No	0.020[5]	Yes, Condensate
Dominion Energy Cove Point LNG Terminal	38,152	Hydrocarbons	Yes, Closed Loop to Flare	No	0[7]	Yes, Condensate[7]
Dominion Energy Cove Point LNG Terminal	102,448	Propane				No, Operates > 29.7 psi
Dominion Energy Cove Point LNG Terminal	102,448	Propane				No, Operates > 29.7 psi
Dominion Energy Cove Point LNG Terminal	102,448	Propane				No, Operates > 29.7 psi
Dominion Energy Cove Point LNG Terminal	102,448	Propane				No, Operates > 29.7 psi
Dominion Energy Cove Point LNG Terminal	5,538	Propane				No, Consumable Product
Dominion Energy Cove Point LNG Terminal	34,040	Ethane				No, Non-VOC
Dominion Energy Cove Point LNG Terminal	34,040	Ethane				No, Non-VOC
Dominion Energy Cove Point LNG Terminal	1,850	Propane				No, Fuel Tank

Dominion Energy Cove Point LNG Terminal	1,000	Propane				No, Fuel Tank
Dominion Energy Cove Point LNG Terminal	220	NI-712				No, Consumable Product
Dominion Energy Cove Point LNG Terminal	12,000	Aqueous Ammonia				No, Non-VOC
Dominion Energy Cove Point LNG Terminal	18,000	Aqueous Ammonia				No, Non-VOC
Dominion Energy Cove Point LNG Terminal	40,000	Aqueous Ammonia				No, Non-VOC
Dominion Energy Cove Point LNG Terminal	800	Aqueous Ammonia				No, Non-VOC
Dominion Energy Cove Point LNG Terminal	15,750,000	LNG				No, Final Product
Dominion Energy Cove Point LNG Terminal	15,750,000	LNG				No, Final Product
Dominion Energy Cove Point LNG Terminal	15,750,000	LNG				No, Final Product
Dominion Energy Cove Point LNG Terminal	35,700,000	LNG				No, Final Product
Dominion Energy Cove Point LNG Terminal	42,000,000	LNG				No, Final Product
Dominion Energy Cove Point LNG Terminal	42,000,000	LNG				No, Final Product
Dominion Energy Cove Point LNG Terminal	1,000	Isopentane				No, Used for Heat Transfer
Dominion Energy Cove Point LNG Terminal	1,000	Isopentane				No, Used for Heat Transfer
Dominion Energy Cove Point LNG Terminal	1,000	Isopentane				No, Used for Heat Transfer
Dominion Energy Cove Point LNG Terminal	8,800	50/50 Glycol/Water				No, Used for Heat Transfer
Dominion Energy Cove Point LNG Terminal	2,000	50/50 Glycol/Water				No, Used for Heat Transfer
Dominion Energy Cove Point LNG Terminal	10,000	50/50 Glycol/Water				No, Used for Heat Transfer
Dominion Energy Cove Point LNG Terminal	1,000	Isobutane				No, Used for Heat Transfer
Dominion Energy Cove Point LNG Terminal	10,000	Sodium Hydroxide				No, Consumable Product
Dominion Energy Cove Point LNG Terminal	264	50/50 Glycol/Water				No, Used for Heat Transfer
Dominion Energy Cove Point LNG Terminal	49	50/50 Glycol/Water				No, Used for Heat Transfer
Dominion Energy Cove Point LNG Terminal	49	50/50 Glycol/Water				No, Used for Heat Transfer
Dominion Energy Cove Point LNG Terminal	49	50/50 Glycol/Water				No, Used for Heat Transfer
Dominion Energy Cove Point LNG Terminal	56,395	DGA				No, Consumable Product
Dominion Energy Cove Point LNG Terminal	49	50/50 Glycol/Water				No, Used for Heat Transfer
Dominion Energy Cove Point LNG Terminal	49	50/50 Glycol/Water				No, Used for Heat Transfer
Dominion Energy Cove Point LNG Terminal	49	50/50 Glycol/Water				No, Used for Heat Transfer
Dominion Energy Myserville Station	1,000	Pipeline Fluids	No, vents to atmosphere	No	0.000[8]	Yes, Condensate
Dominion Energy Myserville Station	2,500	Wastewater				No, Floor Drains
Dominion Energy Myserville Station	13,000	Aqueous Ammonia				No, Non-VOC

[1]Vapor Recovery Unit

[2]Volatile Organic Carbon Fugitive Emissions, calculated using the American Petroleum Institute's (API's) E&P TANKS program, version 2.0 , unless otherwise noted. Maximum annual emissions from the past 5 years of operation.

[3]Applicable to EPA-453/B-16-001 per Section 4.1 Applicability, may have additional justifications for non-applicablility than those listed.

[4]This tank is designed for Natural Gas Liquids (NGL) and has not received any fluids since it was installed, Pre-2014.

[5]These tanks were first operated in 2018. YTD 2018 (October 15, 2018) throughput was used for this calcualtion. See attached E&P Tank reports.

[6]This tank contains contaminated diglycolamine (DGA) and was first operated in 2018. Only trace amounts of condensate has been observed in this tank YTD 2018 (October 15, 2018).

[7]This tank was first operated in 2018, and is currently filled with a consumable product.

[8]This tank has not required the removal of fluids since its installation in 2015. Annual emissions are calculated esitmating 50 gallons of throughput per year. See attached E&P Tank report.

Cove Point 740 gallon produced water tank 10-2018

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* Project Setup Information *
****

Project File : Cove Point 740 gallon produced water tank 10-2018
Flowsheet Selection : Oil Tank with Separator
Calculation Method : RVP Distillation
Control Efficiency : 99.0%
Known Separator Stream : Low Pressure Oil
Entering Air Composition : No

Filed Name : Cove Point 740 gallon produced water tank 10-2018
Date : 2015.10.22

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

Separator Pressure : 21.00[psig]
Separator Temperature : 88.00[F]
Ambient Pressure : 14.70[psia]
Ambient Temperature : 70.00[F]
C10+ SG : 0.8496
C10+ MW : 294.70

-- Low Pressure Oil

No.	Component	mol %
1	H2S	0.0000
2	O2	0.0000
3	CO2	0.0050
4	N2	0.0150
5	C1	0.9500
6	C2	0.7810
7	C3	0.9740
8	i-C4	0.3100
9	n-C4	0.8550
10	i-C5	0.6900
11	n-C5	0.9510
12	C6	2.0730
13	C7	8.2611
14	C8	11.3561
15	C9	7.4811
16	C10+	60.3797
17	Benzene	0.1830
18	Toluene	0.4570
19	E-Benzene	0.4570
20	Xylenes	1.4610
21	n-C6	2.3600
22	224Trimethylp	0.0000

-- Sales Oil

Production Rate : 0[bbl/day]
Days of Annual Operation : 365 [days/year]
API Gravity : 40.88

Cove Point 740 gallon produced water tank 10-2018
Reid Vapor Pressure : 1.84[psia]

****
* Calculation Results *
****

-- Emission Summary

Item	Uncontrolled [ton/yr]	Uncontrolled [lb/hr]	Controlled [ton/yr]	Controlled [lb/hr]
Total HAPs	0.000	0.000	0.000	0.000
Total HC	0.000	0.000	0.000	0.000

VOCs, C2+	0.000	0.000	0.000	0.000
VOCs, C3+	0.000	0.000	0.000	0.000

Uncontrolled Recovery Info.

Vapor	0.0000 x1E-3	[MSCFD]
HC Vapor	0.0000 x1E-3	[MSCFD]
GOR	0.00	[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	0.000	0.000	0.000	0.000
4	N2	0.000	0.000	0.000	0.000
5	C1	0.000	0.000	0.000	0.000
6	C2	0.000	0.000	0.000	0.000
7	C3	0.000	0.000	0.000	0.000
8	i-C4	0.000	0.000	0.000	0.000
9	n-C4	0.000	0.000	0.000	0.000
10	i-C5	0.000	0.000	0.000	0.000
11	n-C5	0.000	0.000	0.000	0.000
12	C6	0.000	0.000	0.000	0.000
13	C7	0.000	0.000	0.000	0.000
14	C8	0.000	0.000	0.000	0.000
15	C9	0.000	0.000	0.000	0.000
16	C10+	0.000	0.000	0.000	0.000
17	Benzene	0.000	0.000	0.000	0.000
18	Toluene	0.000	0.000	0.000	0.000
19	E-Benzene	0.000	0.000	0.000	0.000
20	Xylenes	0.000	0.000	0.000	0.000
21	n-C6	0.000	0.000	0.000	0.000
22	224Trimethylp	0.000	0.000	0.000	0.000
	Total	0.000	0.000	0.000	0.000

-- 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	0.0050	0.0030	0.0000	0.1939	0.1698	0.1787
4	N2	28.01	0.0150	0.0021	0.0000	1.2551	0.1176	0.5362
5	C1	16.04	0.9500	0.3212	0.0000	61.4002	17.9794	33.9561
6	C2	30.07	0.7810	0.5743	0.0027	20.6571	31.9946	27.8230
7	C3	44.10	0.9740	0.8860	0.1968	9.4309	38.7706	27.9750
8	i-C4	58.12	0.3100	0.3004	0.2511	1.2331	3.0109	2.3568
9	n-C4	58.12	0.8550	0.8386	0.7757	2.4320	4.2956	3.6099
10	i-C5	72.15	0.6900	0.6895	0.6867	0.7423	0.8389	0.8034
11	n-C5	72.15	0.9510	0.9530	0.9551	0.7634	0.8322	0.8069
12	C6	86.16	2.0730	2.0897	2.1189	0.4652	0.4866	0.4787
13	C7	100.20	8.2611	8.3407	8.4807	0.6123	0.6423	0.6312
14	C8	114.23	11.3561	11.4715	11.6751	0.2632	0.2788	0.2731
15	C9	128.28	7.4811	7.5583	7.6946	0.0594	0.0674	0.0644
16	C10+	294.70	60.3797	61.0077	62.1176	0.0000	0.0000	0.0000
17	Benzene	78.11	0.1830	0.1846	0.1874	0.0309	0.0323	0.0318
18	Toluene	92.13	0.4570	0.4615	0.4695	0.0215	0.0226	0.0222
19	E-Benzene	106.17	0.4570	0.4617	0.4699	0.0070	0.0075	0.0073
20	Xylenes	106.17	1.4610	1.4760	1.5025	0.0194	0.0207	0.0202
21	n-C6	86.18	2.3600	2.3802	2.4157	0.4132	0.4323	0.4253
22	224Trimethylp	114.24	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

MW		217.00	218.99	222.30	25.65	37.03	32.85
Stream Mole Ratio		1.0000	0.9897	0.9720	0.0103	0.0177	0.0280
Heating Value	[BTU/SCF]				1500.55	2132.37	1899.89
Gas Gravity	[Gas/Air]				0.89	1.28	1.13
Bubble Pt. @ 100F	[psia]	40.47	17.83	2.13			
RVP @ 100F	[psia]	7.41	5.03	1.84			
Spec. Gravity @ 100F		0.709	0.710	0.711			

Cove Point 38152 gallon condensate tank 10-2018

****
*   Project Setup Information
     *
****

Project File : Cove Point 38152 gallon condensate tank 10-2018
Flowsheet Selection : Oil Tank with Separator
Calculation Method : RVP Distillation
Control Efficiency : 99.0%
Known Separator Stream : Low Pressure Oil
Entering Air Composition : No

Filed Name : Cove Point 38152 gallon condensate tank 10-2018
Date : 2015.10.22

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

Separator Pressure : 21.00[psig]
Separator Temperature : 88.00[F]
Ambient Pressure : 14.70[psia]
Ambient Temperature : 70.00[F]
C10+ SG : 0.8496
C10+ MW : 294.70

-- Low Pressure Oil

No.	Component	mol %
1	H2S	0.0000
2	O2	0.0000
3	CO2	0.0050
4	N2	0.0150
5	C1	0.9500
6	C2	0.7810
7	C3	0.9740
8	i-C4	0.3100
9	n-C4	0.8550
10	i-C5	0.6900
11	n-C5	0.9510
12	C6	2.0730
13	C7	8.2611
14	C8	11.3561
15	C9	7.4811
16	C10+	60.3797
17	Benzene	0.1830
18	Toluene	0.4570
19	E-Benzene	0.4570
20	Xylenes	1.4610
21	n-C6	2.3600
22	224Trimethylp	0.0000

-- Sales Oil

Production Rate : 17.5[bbl/day]
Days of Annual Operation : 365 [days/year]
API Gravity : 40.88

Cove Point 38152 gallon condensate tank 10-2018
Reid Vapor Pressure : 1.84[psia]

****
* Calculation Results *
****

-- Emission Summary

Item	Uncontrolled [ton/yr]	Uncontrolled [lb/hr]	Controlled [ton/yr]	Controlled [lb/hr]
Total HAPs	0.050	0.011	0.001	0.000
Total HC	3.543	0.809	0.035	0.008

Page 1-- E&P TANK

VOCs, C2+	2.951	0.674	0.030	0.007
VOCs, C3+	2.042	0.466	0.020	0.005

Uncontrolled Recovery Info.

Vapor	225.5600 x1E-3	[MSCFD]
HC Vapor	223.9500 x1E-3	[MSCFD]
GOR	12.91	[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	0.009	0.002	0.009	0.002
4	N2	0.016	0.004	0.016	0.004
5	C1	0.592	0.135	0.006	0.001
6	C2	0.909	0.208	0.009	0.002
7	C3	1.340	0.306	0.013	0.003
8	i-C4	0.149	0.034	0.001	0.000
9	n-C4	0.228	0.052	0.002	0.001
10	i-C5	0.063	0.014	0.001	0.000
11	n-C5	0.063	0.014	0.001	0.000
12	C6	0.044	0.010	0.000	0.000
13	C7	0.067	0.015	0.001	0.000
14	C8	0.033	0.008	0.000	0.000
15	C9	0.009	0.002	0.000	0.000
16	C10+	0.000	0.000	0.000	0.000
17	Benzene	0.003	0.001	0.000	0.000
18	Toluene	0.002	0.000	0.000	0.000
19	E-Benzene	0.001	0.000	0.000	0.000
20	Xylenes	0.002	0.000	0.000	0.000
21	n-C6	0.040	0.009	0.000	0.000
22	224Trimethylp	0.000	0.000	0.000	0.000
	Total	3.570	0.815	0.036	0.008

-- 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	0.0050	0.0030	0.0000	0.1939	0.1698	0.1787
4 N2	28.01	0.0150	0.0021	0.0000	1.2551	0.1176	0.5362
5 C1	16.04	0.9500	0.3212	0.0000	61.4002	17.9794	33.9561
6 C2	30.07	0.7810	0.5743	0.0027	20.6571	31.9946	27.8230
7 C3	44.10	0.9740	0.8860	0.1968	9.4309	38.7706	27.9750
8 i-C4	58.12	0.3100	0.3004	0.2511	1.2331	3.0109	2.3568
9 n-C4	58.12	0.8550	0.8386	0.7757	2.4320	4.2956	3.6099
10 i-C5	72.15	0.6900	0.6895	0.6867	0.7423	0.8389	0.8034
11 n-C5	72.15	0.9510	0.9530	0.9551	0.7634	0.8322	0.8069
12 C6	86.16	2.0730	2.0897	2.1189	0.4652	0.4866	0.4787
13 C7	100.20	8.2611	8.3407	8.4807	0.6123	0.6423	0.6312
14 C8	114.23	11.3561	11.4715	11.6751	0.2632	0.2788	0.2731
15 C9	128.28	7.4811	7.5583	7.6946	0.0594	0.0674	0.0644
16 C10+	294.70	60.3797	61.0077	62.1176	0.0000	0.0000	0.0000
17 Benzene	78.11	0.1830	0.1846	0.1874	0.0309	0.0323	0.0318
18 Toluene	92.13	0.4570	0.4615	0.4695	0.0215	0.0226	0.0222
19 E-Benzene	106.17	0.4570	0.4617	0.4699	0.0070	0.0075	0.0073
20 Xylenes	106.17	1.4610	1.4760	1.5025	0.0194	0.0207	0.0202
21 n-C6	86.18	2.3600	2.3802	2.4157	0.4132	0.4323	0.4253
22 224Trimethylp	114.24	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
MW		217.00	218.99	222.30	25.65	37.03	32.85
Stream Mole Ratio		1.0000	0.9897	0.9720	0.0103	0.0177	0.0280
Heating Value	[BTU/SCF]				1500.55	2132.37	1899.89
Gas Gravity	[Gas/Air]				0.89	1.28	1.13
Bubble Pt. @ 100F	[psia]	40.47	17.83	2.13			
RVP @ 100F	[psia]	7.41	5.03	1.84			
Spec. Gravity @ 100F		0.709	0.710	0.711			

Myersville 1000 gallon produced fluids tank 10-2018

****
******
*   Project Setup Information
    *
****
******

Project File	:	Myersville 1000 gallon produced fluids tank 10-2018
Flowsheet Selection	:	Oil Tank with Separator
Calculation Method	:	RVP Distillation
Control Efficiency	:	100.0%
Known Separator Stream	:	Low Pressure Oil
Entering Air Composition	:	No
Filed Name	:	Myersville 1000 gallon produced fluids tank 10-2018
Date	:	2015.10.22

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

Separator Pressure	:	21.00[psig]
Separator Temperature	:	88.00[F]
Ambient Pressure	:	14.70[psia]
Ambient Temperature	:	70.00[F]
C10+ SG	:	0.8496
C10+ MW	:	294.70

-- Low Pressure Oil

No.	Component	mol %
1	H2S	0.0000
2	O2	0.0000
3	CO2	0.0050
4	N2	0.0150
5	C1	0.9500
6	C2	0.7810
7	C3	0.9740
8	i-C4	0.3100
9	n-C4	0.8550
10	i-C5	0.6900
11	n-C5	0.9510
12	C6	2.0730
13	C7	8.2611
14	C8	11.3561
15	C9	7.4811
16	C10+	60.3797
17	Benzene	0.1830
18	Toluene	0.4570
19	E-Benzene	0.4570
20	Xylenes	1.4610
21	n-C6	2.3600
22	224Trimethylp	0.0000

-- Sales Oil

Production Rate	:	0[bbl/day]
Days of Annual Operation	:	365 [days/year]
API Gravity	:	40.88

Myersville 1000 gallon produced fluids tank 10-2018
Reid Vapor Pressure : 1.84[psia]

****
* Calculation Results *
****

-- Emission Summary

Item	Uncontrolled [ton/yr]	Uncontrolled [lb/hr]
Total HAPs	0.000	0.000
Total HC	0.001	0.000

VOCs, C2+	0.001	0.000
VOCs, C3+	0.000	0.000

Uncontrolled Recovery Info.

Vapor	0.0500 x1E-3	[MSCFD]
HC Vapor	0.0500 x1E-3	[MSCFD]
GOR	12.50	[SCF/bbl]

-- Emission Composition

No	Component	Uncontrolled [ton/yr]	Uncontrolled [lb/hr]
1	H2S	0.000	0.000
2	O2	0.000	0.000
3	CO2	0.000	0.000
4	N2	0.000	0.000
5	C1	0.000	0.000
6	C2	0.000	0.000
7	C3	0.000	0.000
8	i-C4	0.000	0.000
9	n-C4	0.000	0.000
10	i-C5	0.000	0.000
11	n-C5	0.000	0.000
12	C6	0.000	0.000
13	C7	0.000	0.000
14	C8	0.000	0.000
15	C9	0.000	0.000
16	C10+	0.000	0.000
17	Benzene	0.000	0.000
18	Toluene	0.000	0.000
19	E-Benzene	0.000	0.000
20	Xylenes	0.000	0.000
21	n-C6	0.000	0.000
22	224Trimethylp	0.000	0.000
	Total	0.000	0.000

-- 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	0.0050	0.0030	0.0000	0.1939	0.1698	0.1787
4	N2	28.01	0.0150	0.0021	0.0000	1.2551	0.1176	0.5362
5	C1	16.04	0.9500	0.3212	0.0000	61.4002	17.9794	33.9561
6	C2	30.07	0.7810	0.5743	0.0027	20.6571	31.9946	27.8230
7	C3	44.10	0.9740	0.8860	0.1968	9.4309	38.7706	27.9750
8	i-C4	58.12	0.3100	0.3004	0.2511	1.2331	3.0109	2.3568
9	n-C4	58.12	0.8550	0.8386	0.7757	2.4320	4.2956	3.6099
10	i-C5	72.15	0.6900	0.6895	0.6867	0.7423	0.8389	0.8034
11	n-C5	72.15	0.9510	0.9530	0.9551	0.7634	0.8322	0.8069
12	C6	86.16	2.0730	2.0897	2.1189	0.4652	0.4866	0.4787
13	C7	100.20	8.2611	8.3407	8.4807	0.6123	0.6423	0.6312
14	C8	114.23	11.3561	11.4715	11.6751	0.2632	0.2788	0.2731
15	C9	128.28	7.4811	7.5583	7.6946	0.0594	0.0674	0.0644
16	C10+	294.70	60.3797	61.0077	62.1176	0.0000	0.0000	0.0000
17	Benzene	78.11	0.1830	0.1846	0.1874	0.0309	0.0323	0.0318
18	Toluene	92.13	0.4570	0.4615	0.4695	0.0215	0.0226	0.0222
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20	Xylenes	106.17	1.4610	1.4760	1.5025	0.0194	0.0207	0.0202
21	n-C6	86.18	2.3600	2.3802	2.4157	0.4132	0.4323	0.4253
22	224Trimethylp	114.24	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

MW		217.00	218.99	222.30	25.65	37.03	32.85
Stream Mole Ratio		1.0000	0.9897	0.9720	0.0103	0.0177	0.0280
Heating Value	[BTU/SCF]				1500.55	2132.37	1899.89
Gas Gravity	[Gas/Air]				0.89	1.28	1.13
Bubble Pt. @ 100F	[psia]	40.47	17.83	2.13			
RVP @ 100F	[psia]	7.41	5.03	1.84			
Spec. Gravity @ 100F		0.709	0.710	0.711			

ENBRIDGE

Received ARA
11/26/2018
JH

Enbridge
5400 Westheimer Court
Houston, Texas 77056

November 15, 2018

Mr. Brian Hug
Program Manager, Air Quality Planning Program
Air and Radiation Administration
Maryland Department of the Environment
1800 Washington Boulevard
Baltimore, MD, 21230

RE: Response to Accident Storage Reservoir and Compressor Station Storage Tank Information Request

Dear Mr. Hug:

Texas Eastern Transmission, LP (Texas Eastern) is providing facility information in response to your recent request in order to support your efforts to revise the State Implementation Plan (SIP) to include for nonattainment area's current EPA required "reasonably available control measures" (RACM) , including "reasonably available control technology" (RACT), for sources of emissions contributing to ozone formation.

Specifically your request was to" *provide a list of all tanks at the Accident Maryland storage and compression site including the tank contents and size, a calculation that shows the VOC fugitive emissions per year, and whether or not the tank has a control device or vapor recovery unit (VRU)."*

Texas Eastern transports natural gas via underground pipelines from the Gulf Coast region of the United States to the Northeast and mid-Atlantic United States. The gas must be compressed at several compressor stations along the pipeline to ensure efficient transportation and delivery to customers at serviceable pressures. Texas Eastern owns and operates a natural gas compressor station (Accident Compressor Station) and Storage Reservoir located in Accident, Garrett County, Maryland. Texas Eastern operates the existing compressor station under Title V Operating Permit Number 24-023-00081 (effective November 1, 2017), issued by the Maryland Department of the Environment (MDE).

As part of the 2015 Title V renewal application a review was made of the applicability of federal and state air quality regulations to the emission units at the Accident Compressor Station. A review was specifically made of 40 CFR Part 60, Subpart OOOO – Standards of Performance for Crude Oil and Natural Gas Production, Transmission and Distribution. There are no tanks at the facility that are applicable for EPA's RACT recommendations since all tanks storing applicable contents do not have a potential to emit greater than or equal to 6 tons per year VOCs. As noted in the renewal application;

"NSPS Subpart OOOO applies to owners and operators of several types of facilities related to the production, transmission, or storage of crude oil or natural gas that commenced construction, modification or reconstruction after August 23, 2011. The only unit at the Accident Compressor Station that was constructed, modified or reconstructed after this compliance date is the 24,300 gallon wastewater/methanol AST that was installed in 2013. However, this tank does not meet the definition of

any of the affected facilities subject to the rule. Therefore, no units at the site are subject to NSPS Subpart OOOO."

Below is a table summarizing the requested information for the Accident Facility Storage Tanks. As noted in your request letter the EPA's Techniques Guidelines (CTG, October 2016) for the Oil and Natural Gas Industry Control apply only to tanks whose contents include *an accumulation of crude oil, condensate, intermediate hydrocarbon liquids, or produced water...*". Tanks that are exempt because they do not store those materials are noted in the table below.

Summary of Accident, Maryland Facility Storage Tanks Potentially Subject to EPA Oil and Gas Industry CTG

Tank Emissions Unit	Storage Content Description	Size (gallons)	Control Device	Comment
TK-02A and TK-02B	Pipeline Liquids	12,600 each	*N*	Attachment 1
Tanks ACC3A-3F	Waste methanol/water	8,450 each	N	Attachment 2
Wastewater/Methanol Tank	Wastewater/methanol	24,340	N	Attachment 3

Summary of Accident, Maryland Facility Storage Tanks Exempt from EPA Oil and Gas Industry CTG

Tank Emissions Unit	Storage Content Description	Size (gallons)	Control Device	Comment
Tank ACC1	Used Oil	2,940	N	Contents exempt by CTG applicability definitions
Tanks ACC4A & 4B	Pipeline liquids	1,500 each	Y- Carbon Canisters	Attachment 4 – No longer in service piping disconnected
Tank ACC5	Scrubber Oil	345	N	Contents exempt by CTG applicability definitions
Tank ACC6	Cylinder Oil	700	N	Contents exempt by CTG applicability definitions
Tanks ACC7A & 7B	Lube Oil	3,000 each	N	Contents exempt by CTG applicability definitions
Tank ACC9	Ambitrol	4,200 - UST	N	CTG exempt because an underground storage tank and content does not meet applicability

				definition
Tanks ACCI-MeOH01 - MeOH01	Methanol	10,000 each	N	Makeup methanol storage, contents exempt by CTG applicability definitions
Undesignated Tank (2007)	Methanol	10,000	N	Contents exempt by CTG applicability definitions
Undesignated Tank (2007) (6)	Methanol	900	N	Attachment 5 Contents exempt by CTG applicability definitions
Tank DEF-1	Defoamer tank (process tank)	500	N	Contents exempt by CTG applicability definitions
Tank AC-1	Condensate from air compressor (process tank)	500	N	Contents exempt by CTG applicability definitions
Tank Jenkins #1	Field Methanol Pump Tank	900	N	Contents exempt by CTG applicability definitions
Tank McCullough#4	Field Methanol Pump Tank	900	N	Contents exempt by CTG applicability definitions
Tank Black & Frazee#1	Field MNethanol Pump Tank	1,000	N	Contents exempt by CTG applicability definitions
Tank Black & Frazee#2	Field Methanol Pump Tank	900	N	Contents exempt by CTG applicability definitions
Tank Rexrode #3	Field Methanol Pump Tank	900	N	Contents exempt by CTG applicability definitions
Tank Knox #1	Field Methanol Pump Tank	1,000	N	Contents exempt by CTG applicability definitions
Tank Fratz #1	Field Methanol Pump Tank	900	N	Contents exempt by CTG applicability definitions
Tank B-B1	Field Methanol Pump Tank	900	N	Contents exempt by CTG applicability definitions
Tank End of C-Line	Field Methanol Pump Tank	900	N	Contents exempt by CTG applicability definitions
Tank Kelso #1	Field Methanol Pump Tank	1,000	N	Contents exempt by CTG applicability definitions
Tank George #3	Field Methanol Pump Tank	1,000	N	Contents exempt by CTG applicability definitions
Tank End of B1-Line	Field Methanol Pump Tank	1,000	N	Contents exempt by CTG applicability definitions

If there are any questions concerning this information, please do not hesitate to contact me at (713) 627-4063 or Barry Goodrich at (713) 627-4484.

Sincerely,
TEXAS EASTERN TRANSMISSION, LP

John Bins, P.E.
Senior Engineer, Air Compliance

Attachments
cc:
Barry Goodrich – Enbridge
Rohan Bakane - Enbridge

Attachment 1

TK-02A and TK-02B PTE Emission Calculations from 2015 Title V Renewal Application

Summary of Potential to Emit
Accident
Significant Emission Units

Source	Compressor Station													Storage Field		Combined Total
	92101	92102	92135	921SBH05	921SBH06	921WBH01	921WBH02	921WBH03	921WBH04	TK-02A/02B	PL-TL	Facility Gas Releases	Facility Pipeline Component Fugitives	Storage Field Gas Releases	Storage Field Pipeline Component	
NO_X	70.42 tpy	70.42 tpy	2.64 tpy	1.29 tpy	1.29 tpy	6.44 tpy	5.15 tpy	5.15 tpy	6.44 tpy							**169.24 tpy**
CO	26.71 tpy	26.71 tpy	4.32 tpy	1.08 tpy	1.08 tpy	5.41 tpy	4.33 tpy	4.33 tpy	5.41 tpy							**79.381 tpy**
SO_2	0.09 tpy	0.09 tpy	6.83E-04 tpy	0.01 tpy	0.01 tpy	0.04 tpy	0.03 tpy	0.03 tpy	0.04 tpy							**0.3364 tpy**
PM_{10}	7.44 tpy	7.44 tpy	0.02 tpy	0.10 tpy	0.10 tpy	0.49 tpy	0.39 tpy	0.39 tpy	0.49 tpy							**16.860 tpy**
TOC (Total)	358.51 tpy	358.51 tpy	0.42 tpy	0.14 tpy	0.14 tpy	0.71 tpy	0.57 tpy	0.57 tpy	0.71 tpy			3,689.3 tpy	131.85 tpy	8,425 tpy	124.45 tpy	**13,090 tpy**
Methane	322.69 tpy	322.69 tpy	0.27 tpy	0.03 tpy	0.03 tpy	0.15 tpy	0.12 tpy	0.12 tpy	0.15 tpy			3,330.1 tpy	110.68 tpy	7,604 tpy	106.97 tpy	**11,799 tpy**
Ethane	15.46 tpy	15.46 tpy	0.08 tpy	0.04 tpy	0.04 tpy	0.20 tpy	0.16 tpy	0.16 tpy	0.20 tpy			324.50 tpy	10.785 tpy	741.0 tpy	10.424 tpy	**1,118.5 tpy**
VOC (Total)	20.56 tpy	20.56 tpy	0.03 tpy	0.07 tpy	0.07 tpy	0.35 tpy	0.28 tpy	0.28 tpy	0.35 tpy	4.83 tpy	1.38 tpy	74.98 tpy	11.150 tpy	132.10 tpy	7.7951 tpy	**274.82 tpy**
CO_2	17,976.73 tpy	17,976.73 tpy	135.54 tpy	1,533.86 tpy	1,533.86 tpy	7,669.29 tpy	6,135.43 tpy	6,135.43 tpy	7,669.29 tpy			52.86 tpy	1.7568 tpy	120.70 tpy	1.6980 tpy	**66,943 tpy**
N_2O	0.03 tpy	0.03 tpy	2.55E-04 tpy	2.89E-03 tpy	2.89E-03 tpy	0.01 tpy	0.01 tpy	0.01 tpy	0.01 tpy							**0.1258 tpy**
CO_2e	26,053.96 tpy	26,053.96 tpy	142.29 tpy	1,535.46 tpy	1,535.46 tpy	7,677.30 tpy	6,141.84 tpy	6,141.84 tpy	7,677.30 tpy			83,306 tpy	2,768.8 tpy	190,233 tpy	2,676.0 tpy	**361,943 tpy**
HAP (Total)	9.92 tpy	9.92 tpy	0.04 tpy	0.02 tpy	0.02 tpy	0.12 tpy	0.10 tpy	0.10 tpy	0.12 tpy	0.07 tpy	0.02 tpy	4.6356 tpy	1.3428 tpy	3.7319 tpy	0.9500 tpy	**31.109 tpy**
Acetaldehyde	1.04 tpy	1.04 tpy	3.24E-03 tpy													**2.0755 tpy**
Acrolein	1.30 tpy	1.30 tpy	3.05E-03 tpy													**2.6001 tpy**
Benzene	0.30 tpy	0.30 tpy	1.83E-03 tpy	2.71E-05 tpy	2.71E-05 tpy	1.35E-04 tpy	1.08E-04 tpy	1.08E-04 tpy	1.35E-04 tpy	0.02 tpy	0.01 tpy	0.5668 tpy	0.1256 tpy	0.4177 tpy	0.0948 tpy	**1.8389 tpy**
Butadiene (1,3-)	0.14 tpy	0.14 tpy	7.70E-04 tpy													**0.2818 tpy**
Carbon Tetrachloride	0.01 tpy	0.01 tpy	2.06E-05 tpy													**0.0270 tpy**
Chlorobenzene	0.01 tpy	0.01 tpy	1.50E-05 tpy													**0.0198 tpy**
Chloroethane																**0.0000 tpy**
Chloroform	0.01 tpy	0.01 tpy	1.59E-05 tpy													**0.0210 tpy**
Dichloroethane (1,2-)	0.01 tpy	0.01 tpy	1.31E-05 tpy													**0.0188 tpy**
Dichloropropane (1,2-)	0.01 tpy	0.01 tpy	1.51E-05 tpy													**0.0199 tpy**
Dichloropropene (1,3-)	0.01 tpy	0.01 tpy	1.47E-05 tpy													**0.0195 tpy**
Ethylbenzene	0.02 tpy	0.02 tpy	2.88E-05 tpy									0.1230 tpy	0.0436 tpy	0.2809 tpy	0.0333 tpy	**0.5179 tpy**
Ethylene Dibromide	0.01 tpy	0.01 tpy	2.47E-05 tpy													**0.0252 tpy**
Formaldehyde	6.14 tpy	6.14 tpy	0.02 tpy	9.66E-04 tpy	9.66E-04 tpy	4.83E-03 tpy	3.86E-03 tpy	3.86E-03 tpy	4.83E-03 tpy							**12.327 tpy**
Hexane (n-)	0.08 tpy	0.08 tpy		0.02 tpy	0.02 tpy	0.12 tpy	0.09 tpy	0.09 tpy	0.12 tpy	0.04 tpy	0.01 tpy	3.7795 tpy	0.1647 tpy	2.1400 tpy	0.1280 tpy	**6.886 tpy**
Methanol	0.39 tpy	0.39 tpy	3.55E-03 tpy													**0.7762 tpy**
Methylene Chloride	0.03 tpy	0.03 tpy	4.78E-05 tpy													**0.0655 tpy**
Methylnaphthalene (2-)	0.00 tpy	0.00 tpy														**0.0073 tpy**
Naphthalene	0.02 tpy	0.02 tpy	1.13E-04 tpy	7.86E-06 tpy	7.86E-06 tpy	3.93E-05 tpy	3.14E-05 tpy	3.14E-05 tpy	3.93E-05 tpy							**0.0354 tpy**
PAH	0.02 tpy	0.02 tpy	1.64E-04 tpy													**0.0461 tpy**
Phenol	0.01 tpy	0.01 tpy														**0.0144 tpy**
Propylene Oxide																**0.0000 tpy**
Styrene	0.01 tpy	0.01 tpy	1.38E-05 tpy													**0.0244 tpy**
Tetrachloroethane (1,1,2,2-)	0.01 tpy	0.01 tpy	2.94E-05 tpy													**0.0295 tpy**
Toluene	0.13 tpy	0.13 tpy	6.48E-04 tpy	4.38E-05 tpy	4.38E-05 tpy	2.19E-04 tpy	1.75E-04 tpy	1.75E-04 tpy	2.19E-04 tpy	0.01 tpy	2.35E-03 tpy	0.5568 tpy	0.3794 tpy	0.4708 tpy	0.2838 tpy	**1.9600 tpy**
Trichloroethane (1,1,2-)	0.01 tpy	0.01 tpy	1.78E-05 tpy													**0.0235 tpy**
Trimethylpentane (2,2,4-)	0.14 tpy	0.14 tpy										0.0548 tpy	0.0024 tpy	0.0310 tpy	0.0018 tpy	**0.3799 tpy**
Vinyl Chloride	0.01 tpy	0.01 tpy	8.34E-06 tpy													**0.0110 tpy**
Xylenes	0.05 tpy	0.05 tpy	2.26E-04 tpy							0.00 tpy	5.67E-04 tpy	0.8400 tpy	0.5458 tpy	0.9295 tpy	0.4090 tpy	**2.8170 tpy**

TABLE A-1
Potential to Emit
Basis
After Permitting Activity

Emission Source				Rated Capacity	Operational Limits								Data Sources
ID	FIN	EPN	Description		Short-Term -- Material Flow		Short-Term -- Capacity		Annual Material Flow		Annual Utilization		
ACCI GR	ACCI GR CS	ACCI GR CS	Gas Release Events	Compressor Station - Natural Gas	Natural Gas	32,816,000 scfh			Natural Gas	160,234,000 scf/yr	Runtime	N/A	TABLE C-1
	ACCI GR SF	ACCI GR SF	Gas Release Events	Storage Field - Natural Gas	Natural Gas	18,581,000 scfh			Natural Gas	365,900,000 scf/yr	Runtime	N/A	TABLE C-2
ACCI PC CS	ACCI PC NG	ACCI PC NG	Piping Components	Compressor Station - Natural Gas	Valves: 1,621; Connectors: 25,496; Flanges: 1,358; Open-Ended Lines: 0; Pump Seals: 3; Other (blowdown valves, relief valves, and compressor seals): 0								TABLE B-1a
	ACCI PC PL	ACCI PC PL	Piping Components	Compressor Station - Pipeline Li	Valves: 72; Connectors: 431; Flanges: 132; Open-Ended Lines: 0; Pump Seals: 2; Other (blowdown valves, relief valves, and compressor seals): 0								TABLE B-1b
	ACCI PC ME	ACCI PC ME	Piping Components	Compressor Station - Methanol	Valves: 135; Connectors: 748; Flanges: 250; Open-Ended Lines: 0; Pump Seals: 2; Other (blowdown valves, relief valves, and compressor seals): 0								TABLE B-1c
	ACCI PC OIL	ACCI PC OIL	Piping Components	Compressor Station - Oil	Valves: 666; Connectors: 7,290; Flanges: 242; Open-Ended Lines: 0; Pump Seals: 7; Other (blowdown valves, relief valves, and compressor seals): 0								TABLE B-1d
	ACCI PC EC	ACCI PC EC	Piping Components	Compressor Station - Coolant	Valves: 50; Connectors: 83; Flanges: 49; Open-Ended Lines: 0; Pump Seals: 0; Other (blowdown valves, relief valves, and compressor seals): 0								TABLE B-1e
ACCI PC SF	ACCI PC NG	ACCI PC NG	Piping Components	Storage Facility - Natural Gas	Valves: 2,202; Connectors: 10,252; Flanges: 1,379; Open-Ended Lines: 0; Pump Seals: 0; Other (blowdown valves, relief valves, and compressor seals): 0								TABLE B-2a
	ACCI PC PL	ACCI PC PL	Piping Components	Storage Facility - Methanol	Valves: 77; Connectors: 1,502; Flanges: 11; Open-Ended Lines: 0; Pump Seals: 10; Other (blowdown valves, relief valves, and compressor seals): 0								TABLE B-2b

TABLE A-1
Potential to Emit
Emissions
After Permitting Activity

Emission Source				Rated Capacity	Potential to Emit (tpy)									Data
ID	FIN	EPN	Description		CO_{2e}	VOC (Total)	HAP (Total)	Benzene	Ethylbenzene	Hexane (n-)	Toluene	Trimethylpentane (2,2,4-	Xylenes	Sources
ACCI GR	ACCI GR CS	ACCI GR CS	Gas Release Events	Compressor Station - Natural Gas	83,306	74.98	4.6356	0.5668	0.1230	3.7795	0.5568	0.0548	0.8400	TABLE C-1
	ACCI GR SF	ACCI GR SF	Gas Release Events	Storage Field - Natural Gas	190,233	132.10	3.7319	0.4177	0.2809	2.1400	0.4708	0.0310	0.9295	TABLE C-2
ACCI PC CS	ACCI PC NG	ACCI PC NG	Piping Components	Compressor Station - Natural Gas	2,768.8	1.9227	0.0543	0.0061	0.0041	0.0243	0.0069	0.0002	0.0135	TABLE B-1a
	ACCI PC PL	ACCI PC PL	Piping Components	Compressor Station - Pipeline Liquids		2.8891	0.4368	0.0433	0.0143	0.0509	0.1349	0.0008	0.1927	TABLE B-1b
	ACCI PC ME	ACCI PC ME	Piping Components	Compressor Station - Methanol		5.0910	0.7696	0.0762	0.0252	0.0896	0.2377	0.0014	0.3396	TABLE B-1c
	ACCI PC OIL	ACCI PC OIL	Piping Components	Compressor Station - Oil		1.1654								TABLE B-1d
	ACCI PC EC	ACCI PC EC	Piping Components	Compressor Station - Coolant		0.0821	0.0821							TABLE B-1e
ACCI PC SF	ACCI PC NG	ACCI PC NG	Piping Components	Storage Facility - Natural Gas	2,676.0	1.8583	0.0525	0.0059	0.0040	0.0234	0.0066	0.0002	0.0131	TABLE B-2a
	ACCI PC PL	ACCI PC PL	Piping Components	Storage Facility - Methanol		5.9368	0.8975	0.0889	0.0294	0.1045	0.2771	0.0016	0.3960	TABLE B-2b
TOTAL					**278,984**	226.03	10.660	1.2049	0.4809	**6.2122**	**1.6907**	**0.0900**	2.724	Minor/Major

TABLE B-1a
Piping Components
Hourly and Annual Emission Estimates

Source			ACCI-PC-NG			
Service			Gas			
			Compressor Station - Natural Gas			
Minimum hours when component purged with inert gas			0 hrs/yr			
Component	Valves	Count	1,621 components			
		Emission Factor	4.50E-03 kg/hr/component			
	Connectors	Count	25,496 components			
		Emission Factor	2.00E-04 kg/hr/component			
	Flanges	Count	1,358 components			
		Emission Factor	3.90E-04 kg/hr/component			
	Open-Ended Lines	Count	0 components			
		Emission Factor	2.00E-03 kg/hr/component			
	Pump Seals	Count	3 components			
		Emission Factor	2.40E-03 kg/hr/component			
	Other	Count	0 components	**Emissions**		
		Emission Factor	8.80E-03 kg/hr/component	**Avg. Hourly**	**Max. Annual**	**Max. Hourly**
Speciation	CO_{2-e}		2217.57% by weight	632.1501 lb/hr	2,768.8176 tpy	688.4756 lb/hr
	CO_2		1.41% by weight	0.4011 lb/hr	1.7568 tpy	1.8131 lb/hr
	TOC (Total)		98.21% by weight	27.9951 lb/hr	122.6187 tpy	28.4045 lb/hr
	Methane		88.647% by weight	25.2700 lb/hr	110.6824 tpy	27.4665 lb/hr
	Ethane		8.638% by weight	2.4624 lb/hr	10.7854 tpy	7.1273 lb/hr
	VOC (Total)		1.540% by weight	0.4390 lb/hr	1.9227 tpy	2.6533 lb/hr
	VOC (non-HAP)					
	HAP (Total)		0.044% by weight	0.0124 lb/hr	0.0543 tpy	0.1640 lb/hr
	Benzene		0.005% by weight	1.39E-03 lb/hr	6.08E-03 tpy	2.01E-02 lb/hr
	Ethylbenzene		0.003% by weight	9.34E-04 lb/hr	4.09E-03 tpy	3.50E-03 lb/hr
	Hexane (n-)		0.019% by weight	5.54E-03 lb/hr	2.43E-02 tpy	1.34E-01 lb/hr
	Methanol					
	Naphthalene					
	Toluene		0.005% by weight	1.56E-03 lb/hr	6.85E-03 tpy	1.97E-02 lb/hr
	Trimethylpentane (2,2,4-)		0.000% by weight	5.09E-05 lb/hr	2.23E-04 tpy	1.94E-03 lb/hr
	Xylenes		0.011% by weight	3.09E-03 lb/hr	1.35E-02 tpy	2.97E-02 lb/hr

NOTES

1. Emission factors obtained from Table 2-4 (Oil & Gas Production Operations) of Protocol for Equipment Leak Emission Estimates (EPA 453/R-95-017). The average SOCMI w/o ethylene emission factor is used for pumps in heavy oil service (Table 2-1) since an emission factor isn't provided in Table 2-4.
2. Piping component counts at Accident compressor station.
3. The component type "Other" includes blowdown valves, relief valves, and compressor seals.
4. Weight percents based on gas analysis used to estimate gas release annual emissions (TABLE C-1). Maximum hourly emissions are based on the worst-case short-term weight percents even though the values are NOT presente

TABLE B-1b
Piping Components
Hourly and Annual Emission Estimates

Source			ACCI-PC-PL			
Service			Light Oil			
			Compressor Station - Pipeline Liquids			
Minimum hours when component purged with inert gas			0 hrs/yr			
Component	Valves	Count	72 components			
		Emission Factor	2.50E-03 kg/hr/component			
	Connectors	Count	431 components			
		Emission Factor	2.10E-04 kg/hr/component			
	Flanges	Count	132 components			
		Emission Factor	1.10E-04 kg/hr/component			
	Open-Ended Lines	Count	0 components			
		Emission Factor	1.40E-03 kg/hr/component			
	Pump Seals	Count	2 components			
		Emission Factor	1.30E-02 kg/hr/component			
	Other	Count	0 components	Emissions		
		Emission Factor	7.50E-03 kg/hr/component	Avg. Hourly	Max. Annual	Max. Hourly
Speciation	CO_{2-e}					
	CO_2					
	TOC (Total)		96.20% by weight	0.6596 lb/hr	2.8891 tpy	0.7915 lb/hr
	Methane					
	Ethane					
	VOC (Total)		96.20% by weight	0.6596 lb/hr	2.8891 tpy	0.7915 lb/hr
	VOC (non-HAP)					
	HAP (Total)		14.54% by weight	0.0997 lb/hr	0.4368 tpy	0.1197 lb/hr
	Benzene		1.44% by weight	9.88E-03 lb/hr	4.33E-02 tpy	1.19E-02 lb/hr
	Ethylbenzene		0.48% by weight	3.26E-03 lb/hr	1.43E-02 tpy	3.92E-03 lb/hr
	Hexane (n-)		1.69% by weight	1.16E-02 lb/hr	5.09E-02 tpy	1.39E-02 lb/hr
	Methanol					
	Naphthalene					
	Toluene		4.49% by weight	3.08E-02 lb/hr	1.35E-01 tpy	3.69E-02 lb/hr
	Trimethylpentane (2,2,4-)		0.03% by weight	1.77E-04 lb/hr	7.75E-04 tpy	2.12E-04 lb/hr
	Xylenes		6.42% by weight	4.40E-02 lb/hr	1.93E-01 tpy	5.28E-02 lb/hr

NOTES

1. Emission factors obtained from Table 2-4 (Oil & Gas Production Operations) of Protocol for Equipment Leak Emission Estimates (EPA 453/R-95-017). The average SOCMI w/o ethylene emission factor is used for pumps in heavy oil service (Table 2-1) since an emission factor isn't provided in Table 2-4.
2. Piping component counts at Accident compressor station.
3. The component type "Other" includes blowdown valves, relief valves, and compressor seals.
4. Weight percents based on composition estimate (TABLE D-0).
5. Maximum hourly emissions are based on 120% of the hourly emissions estimated in an effort to be conservativ

TABLE B-1c
Piping Components
Hourly and Annual Emission Estimates

Source			ACCI-PC-PL			
Service			Light Oil			
			Compressor Station - Methanol			
Minimum hours when component purged with inert ga:			0 hrs/yr			
Component	Valves	Count	135 components			
		Emission Factor	2.50E-03 kg/hr/component			
	Connectors	Count	748 components			
		Emission Factor	2.10E-04 kg/hr/component			
	Flanges	Count	250 components			
		Emission Factor	1.10E-04 kg/hr/component			
	Open-Ended Lines	Count	0 components			
		Emission Factor	1.40E-03 kg/hr/component			
	Pump Seals	Count	2 components			
		Emission Factor	1.30E-02 kg/hr/component			
	Other	Count	0 components	**Emissions**		
		Emission Factor	7.50E-03 kg/hr/component	**Avg. Hourly**	**Max. Annual**	**Max. Hourly**
Speciation	CO_{2-e}					
	CO_2					
	TOC (Total)		96.20% by weight	1.1623 lb/hr	5.0910 tpy	1.3948 lb/hr
	Methane					
	Ethane					
	VOC (Total)		96.20% by weight	1.1623 lb/hr	5.0910 tpy	1.3948 lb/hr
	VOC (non-HAP)					
	HAP (Total)		14.54% by weight	0.1757 lb/hr	0.7696 tpy	0.2109 lb/hr
	Benzene		1.44% by weight	1.74E-02 lb/hr	7.62E-02 tpy	2.09E-02 lb/hr
	Ethylbenzene		0.48% by weight	5.75E-03 lb/hr	2.52E-02 tpy	6.90E-03 lb/hr
	Hexane (n-)		1.69% by weight	2.05E-02 lb/hr	8.96E-02 tpy	2.46E-02 lb/hr
	Methanol					
	Naphthalene					
	Toluene		4.49% by weight	5.43E-02 lb/hr	2.38E-01 tpy	6.51E-02 lb/hr
	Trimethylpentane (2,2,4-)		0.03% by weight	3.12E-04 lb/hr	1.37E-03 tpy	3.74E-04 lb/hr
	Xylenes		6.42% by weight	7.75E-02 lb/hr	3.40E-01 tpy	9.30E-02 lb/hr

NOTES

1. Emission factors obtained from Table 2-4 (Oil & Gas Production Operations) of Protocol for Equipment Leak Emission Estimates (EPA 453/R-95-017). The average SOCMI w/o ethylene emission factor is used for pumps in heavy oil service (Table 2-1) since an emission factor isn't provided in Table 2-4.
2. Piping component counts at Accident compressor station.
3. The component type "Other" includes blowdown valves, relief valves, and compressor seals.
4. Weight percents based on composition estimate (TABLE D-0).
5. Maximum hourly emissions are based on 120% of the hourly emissions estimated in an effort to be conservative

TABLE B-1d
Piping Components
Hourly and Annual Emission Estimates

Source			ACCI-PC-OIL			
Service			Heavy Oil			
			Compressor Station - Oil			
Minimum hours when component purged with inert gas			0 hrs/yr			
Component	Valves	Count	666 components			
		Emission Factor	8.40E-06 kg/hr/component			
	Connectors	Count	7,290 components			
		Emission Factor	7.50E-06 kg/hr/component			
	Flanges	Count	242 components			
		Emission Factor	3.90E-07 kg/hr/component			
	Open-Ended Lines	Count	0 components			
		Emission Factor	1.40E-04 kg/hr/component			
	Pump Seals	Count	7 components			
		Emission Factor	8.62E-03 kg/hr/component			
	Other	Count	0 components	Emissions		
		Emission Factor	3.20E-05 kg/hr/component	Avg. Hourly	Max. Annual	Max. Hourly
Speciation	CO_{2-e}					
	CO_2					
	TOC (Total)		100.00% by weight	0.2661 lb/hr	1.1654 tpy	0.3193 lb/hr
	Methane					
	Ethane					
	VOC (Total)		100.00% by weight	0.2661 lb/hr	1.1654 tpy	0.3193 lb/hr
	VOC (non-HAP)					
	HAP (Total)					
	Benzene					
	Ethylbenzene					
	Hexane (n-)					
	Methanol					
	Naphthalene					
	Toluene					
	Trimethylpentane (2,2,4-)					
	Xylenes					

NOTES

1. Emission factors obtained from Table 2-4 (Oil & Gas Production Operations) of Protocol for Equipment Leak Emission Estimates (EPA 453/R-95-017).
The emission factor for pumps in heavy oil service is obtained from Table 2-1.
2. Piping component counts at Accident compressor station.
3. The component type "Other" includes blowdown valves, relief valves, and compressor seals.
4. Weight percents based listed on MSDS.
5. Maximum hourly emissions are based on 120% of the hourly emissions estimated in an effort to be conservative

TABLE B-1e
Piping Components
Hourly and Annual Emission Estimates

Source			ACCI-PC-EC			
Service			Water/Oil			
			Compressor Station - Coolant			
Minimum hours when component purged with inert gas			0 hrs/yr			
Component	Valves	Count	50 components			
		Emission Factor	9.80E-05 kg/hr/component			
	Connectors	Count	83 components			
		Emission Factor	1.10E-04 kg/hr/component			
	Flanges	Count	49 components			
		Emission Factor	2.90E-06 kg/hr/component			
	Open-Ended Lines	Count	0 components			
		Emission Factor	2.50E-04 kg/hr/component			
	Pump Seals	Count	0 components			
		Emission Factor	2.40E-05 kg/hr/component			
	Other	Count	0 components	Emissions		
		Emission Factor	1.40E-02 kg/hr/component	Avg. Hourly	Max. Annual	Max. Hourly
Speciation	CO_{2-e}					
	CO_2					
	TOC (Total)		60.00% by weight	0.0187 lb/hr	0.0821 tpy	0.0225 lb/hr
	Methane					
	Ethane					
	VOC (Total)		60.00% by weight	0.0187 lb/hr	0.0821 tpy	0.0225 lb/hr
	VOC (non-HAP)					
	HAP (Total)		60.00% by weight	0.0187 lb/hr	0.0821 tpy	0.0225 lb/hr
	Benzene					
	Ethylbenzene					
	Hexane (n-)					
	Methanol					
	Naphthalene					
	Toluene					
	Trimethylpentane (2,2,4-)					
	Xylenes					

NOTES

1. Emission factors obtained from Table 2-4 (Oil & Gas Production Operations) of Protocol for Equipment Leak Emission Estimates (EPA 453/R-95-017). The average SOCMI w/o ethylene emission factor is used for pumps in heavy oil service (Table 2-1) since an emission factor isn't provided in Table 2-4.
2. Piping component counts at Accident compressor station.
3. The component type "Other" includes blowdown valves, relief valves, and compressor seals.
4. Weight percents based listed on MSDS.
5. Maximum hourly emissions are based on 120% of the hourly emissions estimated in an effort to be conservative

TABLE B-2a
Piping Components
Hourly and Annual Emission Estimates

Source			ACCI-PC-NG			
Service			Gas			
			Storage Facility - Natural Gas			
Minimum hours when component purged with inert gas			0 hrs/yr			
Component	Valves	Count	2,202 components			
		Emission Factor	4.50E-03 kg/hr/component			
	Connectors	Count	10,252 components			
		Emission Factor	2.00E-04 kg/hr/component			
	Flanges	Count	1,379 components			
		Emission Factor	3.90E-04 kg/hr/component			
	Open-Ended Lines	Count	0 components			
		Emission Factor	2.00E-03 kg/hr/component			
	Pump Seals	Count	0 components			
		Emission Factor	2.40E-03 kg/hr/component			
	Other	Count	0 components	**Emissions**		
		Emission Factor	8.80E-03 kg/hr/component	**Avg. Hourly**	**Max. Annual**	**Max. Hourly**
Speciation	CO_{2-e}		2217.57% by weight	610.9664 lb/hr	2,676.0328 tpy	665.4044 lb/hr
	CO_2		1.41% by weight	0.3877 lb/hr	1.6980 tpy	1.7523 lb/hr
	TOC (Total)		98.21% by weight	27.0570 lb/hr	118.5096 tpy	27.4527 lb/hr
	Methane		88.647% by weight	24.4231 lb/hr	106.9734 tpy	26.5461 lb/hr
	Ethane		8.638% by weight	2.3799 lb/hr	10.4240 tpy	6.8884 lb/hr
	VOC (Total)		1.540% by weight	0.4243 lb/hr	1.8583 tpy	2.5644 lb/hr
	VOC (non-HAP)					
	HAP (Total)		0.044% by weight	0.0120 lb/hr	0.0525 tpy	0.1585 lb/hr
	Benzene		0.005% by weight	1.34E-03 lb/hr	5.88E-03 tpy	1.94E-02 lb/hr
	Ethylbenzene		0.003% by weight	9.02E-04 lb/hr	3.95E-03 tpy	3.38E-03 lb/hr
	Hexane (n-)		0.019% by weight	5.35E-03 lb/hr	2.34E-02 tpy	1.29E-01 lb/hr
	Methanol					
	Naphthalene					
	Toluene		0.005% by weight	1.51E-03 lb/hr	6.62E-03 tpy	1.90E-02 lb/hr
	Trimethylpentane (2,2,4-)		0.000% by weight	4.92E-05 lb/hr	2.16E-04 tpy	1.87E-03 lb/hr
	Xylenes		0.011% by weight	2.99E-03 lb/hr	1.31E-02 tpy	2.87E-02 lb/hr

NOTES

1. Emission factors obtained from Table 2-4 (Oil & Gas Production Operations) of Protocol for Equipment Leak Emission Estimates (EPA 453/R-95-017).
The average SOCMI w/o ethylene emission factor is used for pumps in heavy oil service (Table 2-1) since an emission factor isn't provided in Table 2-4.
2. Piping component counts at Accident Storage Field.
3. The component type "Other" includes blowdown valves, relief valves, and compressor seals.
4. Weight percents based on gas analysis used to estimate gas release annual emissions (TABLE C-2).
Maximum hourly emissions are based on the worst-case short-term weight percents even though the values are NOT presente

TABLE B-2b
Piping Components
Hourly and Annual Emission Estimates

Source			ACCI-PC-PL			
Service			Light Oil			
			Storage Facility - Methanol			
Minimum hours when component purged with inert gas			0 hrs/yr			
Component	Valves	Count	77 components			
		Emission Factor	2.50E-03 kg/hr/component			
	Connectors	Count	1,502 components			
		Emission Factor	2.10E-04 kg/hr/component			
	Flanges	Count	11 components			
		Emission Factor	1.10E-04 kg/hr/component			
	Open-Ended Lines	Count	0 components			
		Emission Factor	1.40E-03 kg/hr/component			
	Pump Seals	Count	10 components			
		Emission Factor	1.30E-02 kg/hr/component			
	Other	Count	0 components	Emissions		
		Emission Factor	7.50E-03 kg/hr/component	Avg. Hourly	Max. Annual	Max. Hourly
Speciation	CO_{2-e}					
	CO_2					
	TOC (Total)		96.20% by weight	1.3554 lb/hr	5.9368 tpy	1.6265 lb/hr
	Methane					
	Ethane					
	VOC (Total)		96.20% by weight	1.3554 lb/hr	5.9368 tpy	1.6265 lb/hr
	VOC (non-HAP)					
	HAP (Total)		14.54% by weight	0.2049 lb/hr	0.8975 tpy	0.2459 lb/hr
	Benzene		1.44% by weight	2.03E-02 lb/hr	8.89E-02 tpy	2.44E-02 lb/hr
	Ethylbenzene		0.48% by weight	6.71E-03 lb/hr	2.94E-02 tpy	8.05E-03 lb/hr
	Hexane (n-)		1.69% by weight	2.39E-02 lb/hr	1.05E-01 tpy	2.86E-02 lb/hr
	Methanol					
	Naphthalene					
	Toluene		4.49% by weight	6.33E-02 lb/hr	2.77E-01 tpy	7.59E-02 lb/hr
	Trimethylpentane (2,2,4-)		0.03% by weight	3.64E-04 lb/hr	1.59E-03 tpy	4.37E-04 lb/hr
	Xylenes		6.42% by weight	9.04E-02 lb/hr	3.96E-01 tpy	1.08E-01 lb/hr

NOTES

1. Emission factors obtained from Table 2-4 (Oil & Gas Production Operations) of Protocol for Equipment Leak Emission Estimates (EPA 453/R-95-017).
The average SOCMI w/o ethylene emission factor is used for pumps in heavy oil service (Table 2-1) since an emission factor isn't provided in Table 2-4.
2. Piping component counts at Accident Storage Field.
3. The component type "Other" includes blowdown valves, relief valves, and compressor seals.
4. Weight percents based on composition estimate (TABLE D-0).
5. Maximum hourly emissions are based on 120% of the hourly emissions estimated in an effort to be conservativ

TABLE C-1
Gas Releases
Hourly and Annual Emission Estimates
(Gas Releases from Miscellaneous Vents w/ Minor Contributions from MSS

Category	Compressor Station Operations					
Source	ACCI-GR-ST					
	Avg. Hourly	Max. Annual	Max. Hourly			
Gas Release	18,292 scfh	160,234,000 scf/yr	32,816,000 scfh			
	858 lb/hr	7,513,296 lb/yr	1,611,134 lb/hr			
NO_X						
CO						
SO_2						
$PM_{10/2.5}$						
CO_{2-e}	19,020 lb/hr	83,306 tpy	38,911,442 lb/hr			
CO_2	12.068 lb/hr	52.86 tpy	102,474 lb/hr			
N_2O						
TOC (Total)	842.3 lb/hr	3,689.3 tpy	1,605,375 lb/hr			
Methane	760.3 lb/hr	3,330.1 tpy	1,552,359 lb/hr			
Ethane	74.09 lb/hr	324.50 tpy	402,820 lb/hr			
VOC (Total)	17.119 lb/hr	74.98 tpy	149,962 lb/hr			
VOC (non-HAP)	16.061 lb/hr	70.35 tpy	140,690.5835 lb/hr			
HAP (Total)	1.0583 lb/hr	4.6356 tpy	9,271.1328 lb/hr			
Acetaldehyde						
Acrolein						
Benzene	0.1294 lb/hr	0.5668 tpy	1,133.7 lb/hr			
Biphenyl						
Butadiene (1,3-)						
Carbon Tetrachloride						
Chlorobenzene						
Chloroform						
Dichloropropene (1,3-)						
Ethylbenzene	0.0281 lb/hr	0.1230 tpy	197.65 lb/hr			
Ethylene Dibromide						
Formaldehyde						
Hexane (n-)	0.8629 lb/hr	3.7795 tpy	7,559 lb/hr			
Methanol						
Methylene Chloride						
Methylnaphthalene (2-)						
Naphthalene						
PAH						
Phenol						
Propylene Oxide						
Styrene						
Tetrachloroethane (1,1,2,2-)						
Toluene	0.1271 lb/hr	0.5568 tpy	1,113.5 lb/hr			
Trichloroethane (1,1,2-)						
Trimethylpentane (2,2,4-)	0.0125 lb/hr	0.0548 tpy	109.55 lb/hr			
Vinyl Chloride						
Xylenes	0.1918 lb/hr	0.8400 tpy	1,680.0 lb/hr			

NOTES

1. Historical gas release data extracted from gas loss database (01/1998 through 07/2004).
2. Gas chromatograph data (GC) are used to estimate overall mass emissions: 32 GC data sites collected between 2008 and 2015 at sites in MD and PA evaluated to be most representative.

	Average	Average Plus	Maximum	Maximum/Average+	Average+/Average
Density (GC):	0.0469 lb/scf	0.0469 lb/scf	0.0491 lb/scf	105%	100%
Density (Lab):	0.0444 lb/scf	0.0445 lb/scf	0.0521 lb/scf	117%	100%
Density (Use):		0.0469 lb/scf	0.0491 lb/scf		

3. Extended analyses (Lab) are used to estimate pollutant emissions: 364 samples collected in CT, IN, KY, LA, MD, ME, MO, MS, NJ, NY, OH, PA, RI, TN, TX and VA between 2011 and 2016.
   Maximum (i.e., short-term) = Max(ALL)
   Average Plus (i.e., long-term) = Average(ALL) + CONFIDENCE.NORM(100% - 99%, STDEV.S(ALL), COUNT(ALL)).

	Average	Average Plus	Maximum	Maximum/Average+	Average+/Average
VOC (GC):	1.87% wt%	2.00% wt%	7.19% wt%	360%	107%
VOC (Lab):	1.44% wt%	1.54% wt%	9.31% wt%	604%	107%
VOC (Use):		1.54% wt%	9.31% wt%		

TABLE C-2
Gas Releases
Hourly and Annual Emission Estimates

Category	Storage Field Operations					
Source	[redacted]			ACCI-GR-PL		
	[redacted]	[redacted]	[redacted]	Avg. Hourly	Max. Annual	Max. Hourly
Gas Release	[redacted]	[redacted]	[redacted]	41,769 scfh	365,900,000 scf/yr	18,581,000 scfh
	[redacted]	[redacted]	[redacted]	1,959 lb/hr	17,156,876 lb/yr	912,253 lb/hr
NO_X	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
CO	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
SO_2	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
$PM_{10/2.5}$	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
CO_{2e}	[redacted]	[redacted]	[redacted]	43,432 lb/hr	190,233 tpy	22,032,347 lb/hr
CO_2	[redacted]	[redacted]	[redacted]	27.5579 lb/hr	120.7036 tpy	58,022.4258 lb/hr
N_2O	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
TOC (Total)	[redacted]	[redacted]	[redacted]	1,923 lb/hr	8,425 tpy	908,992 lb/hr
Methane	[redacted]	[redacted]	[redacted]	1,736 lb/hr	7,604 tpy	878,973 lb/hr
Ethane	[redacted]	[redacted]	[redacted]	169 lb/hr	741 tpy	228,084 lb/hr
VOC (Total)	[redacted]	[redacted]	[redacted]	30.1601 lb/hr	132.1013 tpy	84,910.9779 lb/hr
VOC (non-HAP)	[redacted]	[redacted]	[redacted]	29.3081 lb/hr	128.3694 tpy	79,661.4984 lb/hr
HAP (Total)	[redacted]	[redacted]	[redacted]	0.8520 lb/hr	3.7319 tpy	5,249.4795 lb/hr
Acetaldehyde	[redacted]	[redacted]	[redacted]			
Acrolein	[redacted]	[redacted]	[redacted]			
Benzene	[redacted]	[redacted]	[redacted]	0.0954 lb/hr	0.4177 tpy	641.9046 lb/hr
Biphenyl	[redacted]	[redacted]	[redacted]			
Butadiene (1,3-)	[redacted]	[redacted]	[redacted]			
Carbon Tetrachloride	[redacted]	[redacted]	[redacted]			
Chlorobenzene	[redacted]	[redacted]	[redacted]			
Chloroform	[redacted]	[redacted]	[redacted]			
Dichloropropene (1,3-)	[redacted]	[redacted]	[redacted]			
Ethylbenzene	[redacted]	[redacted]	[redacted]	0.0641 lb/hr	0.2809 tpy	111.9127 lb/hr
Ethylene Dibromide	[redacted]	[redacted]	[redacted]			
Formaldehyde	[redacted]	[redacted]	[redacted]			
Hexane (n-)	[redacted]	[redacted]	[redacted]	0.4886 lb/hr	2.1400 tpy	4,280.0209 lb/hr
Methanol	[redacted]	[redacted]	[redacted]			
Methylene Chloride	[redacted]	[redacted]	[redacted]			
Methylnaphthalene (2-)	[redacted]	[redacted]	[redacted]			
Naphthalene	[redacted]	[redacted]	[redacted]			
PAH	[redacted]	[redacted]	[redacted]			
Phenol	[redacted]	[redacted]	[redacted]			
Propylene Oxide	[redacted]	[redacted]	[redacted]			
Styrene	[redacted]	[redacted]	[redacted]			
Tetrachloroethane (1,1,2,2-)	[redacted]	[redacted]	[redacted]			
Toluene	[redacted]	[redacted]	[redacted]	0.1075 lb/hr	0.4708 tpy	630.5088 lb/hr
Trichloroethane (1,1,2-)	[redacted]	[redacted]	[redacted]			
Trimethylpentane (2,2,4-)	[redacted]	[redacted]	[redacted]	0.0071 lb/hr	0.0310 tpy	62.0289 lb/hr
Vinyl Chloride	[redacted]	[redacted]	[redacted]			
Xylenes	[redacted]	[redacted]	[redacted]	0.2122 lb/hr	0.9295 tpy	951.2578 lb/hr

NOTES

1. Historical gas release data extracted from gas loss database (01/1998 through 07/2004).
2. Gas chromatograph data (GC) are used to estimate overall mass emissions. 32 GC data sites collected between 2008 and 2015 at sites in MD and PA evaluated to be most representative.

	Average	Average Plus	Maximum	Maximum/Average+	Average+/Average
Density (GC):	0.0469 lb/scf	0.0469 lb/scf	0.0491 lb/scf	105%	100%
Density (Lab):	0.0444 lb/scf	0.0445 lb/scf	0.0521 lb/scf	117%	100%
Density (Use):		0.0469 lb/scf	0.0491 lb/scf		

3. Extended analyses (Lab) are used to estimate pollutant emissions. 364 samples collected in CT, IN, KY, LA, MD, ME, MO, MS, NJ, NY, OH, PA, RI, TN, TX and VA between 2011 and 2016.
Maximum (i.e., short-term) = Max(ALL)
Average Plus (i.e., long-term) = Average(ALL) + CONFIDENCE.NORM(100% - 99%, STDEV.S(ALL), COUNT(ALL)).

	Average	Average Plus	Maximum	Maximum/Average+	Average+/Average
VOC (GC):	1.87% wt%	2.00% wt%	7.19% wt%	360%	107%
VOC (Lab):	1.44% wt%	1.54% wt%	9.31% wt%	604%	107%
VOC (Use):		1.54% wt%	9.31% wt%		

TABLE D-0
Volatile Organic Liquid Storage Tanks
Vapor Physical Property and Composition Estimates
Raoult's Law

Component Data													Liquid Data		Vapor Data	
Component			MW	Yaws Vapor Pressure Coefficients							VP Datum		mol%	wt%	y_i	wt%$_i$
Name (i)	Type	HAP	(lb/mol)$_i$ M_i	A	B	C	D	E	T_{Min} (°F)	T_{Max} (°F)	T (°F)	P_i (psia)	(mol_i/mol_L) f_{v-i}	(lb_i/lb_L) f_{m-i}	(mol_i/mol_V)	(lb_i/lb_V)
Nitrogen			28.013	3.7362	2.6465E+02	-6.7880E+00	0.0000E+00	0.0000E+00	-345.75	-232.60	68.00		0.000%	0.000%	0.000%	0.000%
Carbon Dioxide	GHG		44.010	35.0169	-1.5119E+03	-1.1334E+01	9.3368E-03	1.7136E-09	-68.80	87.80	68.00	833.1743	0.000%	0.000%	0.000%	0.000%
Methane	GHG		16.042	14.6667	-5.7097E+02	-3.3373E+00	-2.1999E-09	1.3096E-05	-295.60	-115.60	68.00	7,889.8148	0.000%	0.000%	0.000%	0.000%
Ethane			30.069	20.6973	-1.1341E+03	-5.2514E+00	-9.8774E-11	6.7329E-06	-297.40	89.60	68.00	546.5426	0.000%	0.000%	0.000%	0.000%
Propane	VOC		44.096	21.4469	-1.4627E+03	-5.2610E+00	3.2820E-11	3.7349E-06	-306.40	206.60	68.00	121.5870	0.000%	0.000%	0.000%	0.000%
Butane (i-)	VOC		58.122	31.2541	-1.9532E+03	-8.8060E+00	8.9246E-11	5.7501E-06	-254.20	275.00	68.00	44.2751	0.000%	0.000%	0.000%	0.000%
Butane (n-)	VOC		58.122	27.0441	-1.9049E+03	-7.1805E+00	-6.6845E-11	4.2190E-06	-216.40	305.60	68.00	30.1688	0.000%	0.000%	0.000%	0.000%
Pentane (i-)	VOC		72.149	29.2963	-2.1762E+03	-7.8830E+00	-4.6512E-11	3.8997E-06	-256.00	368.60	68.00	11.1082	2.544%	1.430%	27.049%	22.613%
Pentane (n-)	VOC		72.149	33.3239	-2.4227E+03	-9.2354E+00	9.0199E-11	4.1050E-06	-202.00	386.60	68.00	8.1938	1.859%	1.045%	14.586%	12.194%
Dimethylbutane (2,2-)	VOC		86.175	33.1285	-2.4527E+03	-9.2016E+00	-4.7077E-10	4.1755E-06	-146.20	420.80	68.00	5.0720	0.227%	0.152%	1.100%	1.099%
Dimethylbutane (2,3-)	VOC		86.175	33.6319	-2.5524E+03	-9.3142E+00	1.4759E-10	3.9140E-06	-223.60	500.00	68.00	3.6998	0.000%	0.000%	0.000%	0.000%
Cyclopentane	VOC		70.133	29.1547	-2.3512E+03	-7.6965E+00	-1.6212E-10	3.1250E-06	-137.20	462.20	68.00	5.0181	0.000%	0.000%	0.000%	0.000%
Methylpentane (2-)	VOC		86.175	30.7477	-2.4888E+03	-8.2295E+00	-2.3723E-11	3.2402E-06	-243.40	437.00	68.00	3.3041	1.586%	1.065%	5.017%	5.010%
Methylpentane (3-)	VOC		86.175	35.2848	-2.6773E+03	-9.8546E+00	2.2352E-11	4.0277E-06	-261.40	447.80	68.00	2.9617	1.188%	0.797%	3.367%	3.362%
Hexane (n-)	VOC	X	86.175	69.7378	-3.6278E+03	-2.3927E+01	1.2810E-02	-1.6844E-16	-139.00	453.20	68.00	2.3626	2.522%	1.693%	5.705%	5.697%
Dimethylpentane (2,2-)	VOC		100.202	6.2875	-2.1682E+03	2.6936E+00	-1.5525E-02	1.0917E-05	-191.20	478.40	68.00	1.6191	0.430%	0.335%	0.666%	0.773%
Methylcyclopentane	VOC		84.159	32.4766	-2.6434E+03	-8.7933E+00	2.0749E-11	3.2158E-06	-223.60	500.00	68.00	2.1257	1.567%	1.027%	3.189%	3.109%
Dimethylpentane (2,4-)	VOC		100.202	35.9436	-2.8460E+03	-9.9938E+00	8.0693E-11	3.6419E-06	-182.20	476.60	68.00	1.5074	0.177%	0.138%	0.255%	0.296%
Trimethylbutane (2,2,3-)	VOC		100.202	32.3633	-2.6614E+03	-8.7743E+00	-7.6870E-10	3.2006E-06	-11.20	496.40	68.00	1.5789	0.000%	0.000%	0.000%	0.000%
Benzene	VOC	X	78.112	31.7718	-2.7254E+03	-8.4443E+00	-5.3534E-09	2.7187E-06	42.80	552.20	68.00	1.4495	2.367%	1.440%	3.284%	2.973%
Dimethylpentane (3,3-)	VOC		100.202	30.2570	-2.6313E+03	-7.9839E+00	4.6848E-13	2.7170E-06	-209.20	505.40	68.00	1.2681	0.305%	0.238%	0.371%	0.430%
Cyclohexane	VOC		84.159	48.5529	-3.0874E+03	-1.5521E+01	7.3830E-03	6.3563E-12	44.60	537.80	68.00	1.5112	1.528%	1.002%	2.211%	2.156%
Methylhexane (2-)	VOC		100.202	54.1075	-3.3785E+03	-1.7547E+01	8.2594E-03	-3.4967E-14	-180.40	494.60	68.00	0.9987	3.167%	2.472%	3.028%	3.516%
Dimethylpentane (2,3-)	VOC		100.202	39.7737	-2.9050E+03	-1.2012E+01	5.1334E-03	-2.3807E-14	-171.40	507.20	68.00	1.0467	0.000%	0.000%	0.000%	0.000%
Dimethylcyclopentane (1,1-)	VOC		98.186	58.1943	-3.4151E+03	-1.9294E+01	9.6704E-03	-2.4361E-15	-94.00	525.20	68.00	1.1616	0.833%	0.637%	0.927%	1.054%
Methylhexane (3-)	VOC		100.202	35.2535	-2.9310E+03	-9.6667E+00	-5.2026E-11	3.2107E-06	-182.20	503.60	68.00	0.9291	3.287%	2.566%	2.924%	3.394%
Dimethylcyclopentane (1,t-3-)	VOC		98.186	53.1912	-3.3121E+03	-1.7277E+01	8.3107E-03	5.0896E-14	-209.20	536.00	68.00	0.9791	0.225%	0.172%	0.211%	0.240%
Dimethylcyclopentane (1,c-3-)	VOC		98.186	35.4255	-2.7286E+03	-1.0444E+01	4.6608E-03	1.7565E-14	-209.20	532.40	68.00	1.0075	0.368%	0.281%	0.354%	0.403%
Ethylpentane (3-)	VOC		100.202	8.5463	-2.2979E+03	1.5503E+00	-1.2233E-02	8.2670E-06	-180.40	514.40	68.00	0.8755	0.040%	0.031%	0.034%	0.039%
Dimethylcyclopentane (1,t-2-)	VOC		98.186	36.8109	-2.9536E+03	-1.0275E+01	-4.6212E-12	3.6730E-06	-178.60	536.00	68.00	0.9713	0.307%	0.235%	0.285%	0.325%
Trimethylpentane (2,2,4-)	VOC	X	114.229	50.3422	-3.2789E+03	-1.6111E+01	7.4260E-03	-9.1804E-14	-160.60	519.80	68.00	0.7453	0.029%	0.026%	0.021%	0.027%
Heptane (n-)	VOC		100.202	65.0257	-3.8188E+03	-2.1684E+01	1.0387E-02	1.0206E-14	-130.00	512.60	68.00	0.6808	5.170%	4.036%	3.370%	3.912%
Methylcyclohexane	VOC		98.186	38.0955	-3.0738E+03	-1.0684E+01	-5.1766E-11	3.5282E-06	-194.80	570.20	68.00	0.6925	4.647%	3.555%	3.081%	3.505%
Trimethylcyclopentane (1,1,3-)	VOC		112.213	11.0144	-2.9801E+03	2.7007E-01	-6.7946E-03	3.5409E-06	-63.40	734.00	68.00	0.0130	0.317%	0.277%	0.004%	0.005%
Dimethylhexane (2,2-)	VOC		114.229	38.7670	-3.1841E+03	-1.0857E+01	1.9275E-12	3.4797E-06	-185.80	530.60	68.00	0.5066	0.134%	0.119%	0.065%	0.086%
Dimethylcyclopentane (1,c-2-)	VOC		98.186	36.3623	-3.0025E+03	-1.0070E+01	-1.0435E-09	3.3726E-06	-65.20	557.60	68.00	0.7110	1.194%	0.913%	0.813%	0.924%
Dimethylhexane (2,5-)	VOC		114.229	40.0260	-3.2647E+03	-1.1282E+01	-6.5408E-10	3.6200E-06	-131.80	530.60	68.00	0.4490	0.000%	0.000%	0.000%	0.000%
Dimethylhexane (2,4-)	VOC		114.229	56.2877	-3.6225E+03	-1.8225E+01	8.1864E-03	8.7232E-12	30.20	537.80	68.00	0.4499	0.201%	0.179%	0.087%	0.115%
Ethylcyclopentane	VOC		98.186	36.3631	-3.0448E+03	-1.0038E+01	3.5007E-11	3.2347E-06	-216.40	566.60	68.00	0.5963	0.653%	0.500%	0.373%	0.424%
Trimethylpentane (2,2,3-)	VOC		114.229	35.9540	-3.0569E+03	-9.8896E+00	-7.2916E-11	3.1060E-06	-169.60	555.80	68.00	0.4788	0.039%	0.035%	0.018%	0.024%
Trimethylcyclopentane (1,t-2,c-4-)	VOC		112.213	11.0144	-2.9801E+03	2.7007E-01	-6.7946E-03	3.5409E-06	-63.40	734.00	68.00	0.0130	0.000%	0.000%	0.000%	0.000%
Dimethylhexane (3,3-)	VOC		114.229	38.0712	-3.1736E+03	-1.0617E+01	6.3090E-11	3.3817E-06	-194.80	552.20	68.00	0.4250	0.000%	0.000%	0.000%	0.000%
Trimethylcyclopentane (1,t-2,c-3-)	VOC		112.213	11.0144	-2.9801E+03	2.7007E-01	-6.7946E-03	3.5409E-06	-63.40	734.00	68.00	0.0130	0.000%	0.000%	0.000%	0.000%
Trimethylpentane (2,3,4-)	VOC		114.229	34.1565	-3.0232E+03	-9.2267E+00	2.7691E-11	2.7828E-06	-164.20	559.40	68.00	0.4029	0.000%	0.000%	0.000%	0.000%
Dimethylhexane (2,3-)	VOC		114.229	57.3778	-3.7143E+03	-1.8599E+01	8.2907E-03	-2.8441E-12	30.20	554.00	68.00	0.3451	0.000%	0.000%	0.000%	0.000%
Toluene	VOC	X	92.138	34.0775	-3.0379E+03	-9.1635E+00	1.0289E-11	2.7035E-06	-139.00	606.20	68.00	0.4219	6.256%	4.491%	2.527%	2.697%
Trimethylcyclopentane (1,1,2-)	VOC		112.213	11.0144	-2.9801E+03	2.7007E-01	-6.7946E-03	3.5409E-06	-63.40	734.00	68.00	0.0130	0.522%	0.457%	0.006%	0.008%
Dimethylhexane (3,4-)	VOC		114.229	38.6119	-3.2685E+03	-1.0752E+01	3.6386E-09	3.2771E-06	30.20	564.80	68.00	0.3186	4.934%	4.391%	1.505%	1.992%
Methylheptane (2-)	VOC		114.229	37.6930	-3.2611E+03	-1.0391E+01	-1.0524E-12	3.0560E-06	-164.20	548.60	68.00	0.3028	0.000%	0.000%	0.000%	0.000%
Methylheptane (4-)	VOC		114.229	40.2080	-3.3661E+03	-1.1279E+01	-8.7855E-11	3.4055E-06	-185.80	552.20	68.00	0.3001	4.077%	3.628%	1.171%	1.550%
Dimethylhexane (3,4-)	VOC		114.229	38.6119	-3.2685E+03	-1.0752E+01	3.6386E-09	3.2771E-06	30.20	564.80	68.00	0.3186	0.000%	0.000%	0.000%	0.000%
Methylheptane (3-)	VOC		114.229	52.8828	-3.6231E+03	-1.6804E+01	7.1828E-03	7.4077E-14	-184.00	555.80	68.00	0.2869	0.586%	0.521%	0.161%	0.213%
Ethylhexane (3-)	VOC		114.229	40.2079	-3.3651E+03	-1.1285E+01	-5.4180E-09	3.4199E-06	30.20	557.60	68.00	0.2931	0.156%	0.139%	0.044%	0.058%
Trimethylcyclopentane (1,c-2,t-4-)	VOC		112.213	11.0144	-2.9801E+03	2.7007E-01	-6.7946E-03	3.5409E-06	-63.40	734.00	68.00	0.0130	0.039%	0.034%	0.000%	0.001%
Dimethylcyclohexane (1,c-3-)	VOC		112.213	32.4775	-3.0067E+03	-8.5896E+00	7.0258E-11	2.1739E-06	-103.00	604.40	68.00	0.3176	0.239%	0.209%	0.073%	0.095%
Trimethylcyclopentane (1,c-2,t-3-)	VOC		112.213	11.0144	-2.9801E+03	2.7007E-01	-6.7946E-03	3.5409E-06	-63.40	734.00	68.00	0.0130	0.239%	0.209%	0.003%	0.004%
Dimethylcyclohexane (1,t-4-)	VOC		112.213	32.5731	-2.9872E+03	-8.6494E+00	-2.1355E-09	2.2946E-06	-34.60	602.60	68.00	0.3364	0.000%	0.000%	0.000%	0.000%
Trimethylhexane (2,2,5-)	VOC		128.255	7.8816	-2.6422E+03	2.3902E+00	-1.5376E-02	9.7931E-06	-158.80	563.00	68.00	0.2426	0.000%	0.000%	0.000%	0.000%
Dimethylcyclohexane (1,1-)	VOC		112.213	33.1329	-3.0084E+03	-8.8498E+00	-4.3621E-10	2.3704E-06	-27.40	604.40	68.00	0.3361	0.000%	0.000%	0.000%	0.000%
Ethylcyclopentane (1-methyl-t-3-)	VOC		112.213	11.0144	-2.9801E+03	2.7007E-01	-6.7946E-03	3.5409E-06	-63.40	734.00	68.00	0.0130	0.000%	0.000%	0.000%	0.000%
Ethylcyclopentane (1-methyl-c-3-)	VOC		112.213	11.0144	-2.9801E+03	2.7007E-01	-6.7946E-03	3.5409E-06	-63.40	734.00	68.00	0.0130	0.000%	0.000%	0.000%	0.000%
Ethylcyclopentane (1-methyl-t-2-)	VOC		112.213	11.0144	-2.9801E+03	2.7007E-01	-6.7946E-03	3.5409E-06	-63.40	734.00	68.00	0.0130	0.000%	0.000%	0.000%	0.000%
Trimethylhexane (2,2,4-)	VOC		128.255	33.1285	-2.4527E+03	-9.2016E+00	-4.7077E-10	4.1755E-06	-146.20	420.80	68.00	5.0720	0.000%	0.000%	0.000%	0.000%
Ethylcyclopentane (1-methyl-t-1-)	VOC		112.213	11.0144	-2.9801E+03	2.7007E-01	-6.7946E-03	3.5409E-06	-63.40	734.00	68.00	0.0130	0.000%	0.000%	0.000%	0.000%
Cycloheptane	VOC		98.186	54.0858	-3.6109E+03	-1.7331E+01	7.5272E-03	1.7553E-12	17.60	627.80	68.00	0.3185	0.000%	0.000%	0.000%	0.000%
Octane (n-)	VOC		114.229	29.0948	-3.0114E+03	-7.2653E+00	-2.2696E-11	1.4680E-06	-70.60	564.80	68.00	0.2040	6.155%	5.477%	1.202%	1.591%
Trimethylhexane (2,4,4-)	VOC		128.255	33.1285	-2.4527E+03	-9.2016E+00	-4.7077E-10	4.1755E-06	-146.20	420.80	68.00	5.0720	0.269%	0.269%	1.308%	1.944%
Tetramethylpentane (2,2,4,4-)	VOC		128.255	-3.8184	-2.2442E+03	7.0671E+00	-1.9644E-02	1.1435E-05	-86.80	568.40	68.00	0.2957	0.000%	0.000%	0.000%	0.000%
Dimethylcyclohexane (1,t-3-)	VOC		112.213	32.4384	-3.0550E+03	-8.5372E+00	2.2892E-10	2.0099E-06	-130.00	617.00	68.00	0.2590	0.075%	0.066%	0.019%	0.024%
Dimethylcyclohexane (1,c-4-)	VOC		112.213	31.9151	-3.0253E+03	-8.3613E+00	5.7055E-12	1.9673E-06	-124.60	617.00	68.00	0.2640	0.075%	0.066%	0.019%	0.025%
Trimethylcyclopentane (1,c-2,c-3-)	VOC		112.213	11.0144	-2.9801E+03	2.7007E-01	-6.7946E-03	3.5409E-06	-63.40	734.00	68.00	0.0130	0.075%	0.066%	0.001%	0.001%
Propylcyclopentane (i-)	VOC		112.213	11.0144	-2.9801E+03	2.7007E-01	-6.7946E-03	3.5409E-06	-63.40	734.00	68.00	0.0130	0.493%	0.431%	0.006%	0.008%
Trimethylhexane (2,3,5-)	VOC		128.255	33.1285	-2.4527E+03	-9.2016E+00	-4.7077E-10	4.1755E-06	-146.20	420.80	68.00	5.0720	0.009%	0.009%	0.041%	0.061%
Dimethylheptane (2,2-)	VOC		128.255	33.1285	-2.4527E+03	-9.2016E+00	-4.7077E-10	4.1755E-06	-146.20	420.80	68.00	5.0720	0.000%	0.000%	0.000%	0.000%
Dimethylheptane (2,4-)	VOC		128.255	33.1285	-2.4527E+03	-9.2016E+00	-4.7077E-10	4.1755E-06	-146.20	420.80	68.00	5.0720	0.224%	0.224%	1.088%	1.617%
Methylcyclopentane (1-ethyl-c-2-)	VOC		112.213	11.0144	-2.9801E+03	2.7007E-01	-6.7946E-03	3.5409E-06	-63.40	734.00	68.00	0.0130	0.257%	0.224%	0.003%	0.004%
Trimethylhexane (2,2,3-)	VOC		128.255	33.1285	-2.4527E+03	-9.2016E+00	-4.7077E-10	4.1755E-06	-146.20	420.80	68.00	5.0720	0.000%	0.000%	0.000%	0.000%
Dimethylcyclohexane (1,c-2-)	VOC		112.213	32.1635	-3.0728E+03	-8.4344E+00	6.8943E-10	1.9558E-06	-58.00	631.40	68.00	0.2121	0.723%	0.632%	0.147%	0.191%
Dimethylheptane (2,6-)	VOC		128.255	33.1285	-2.4527E+03	-9.2016E+00	-4.7077E-10	4.1755E-06	-146.20	420.80	68.00	5.0720	0.159%	0.159%	0.771%	1.146%
Propylcyclopentane (n-)	VOC		112.213	33.9220	-3.2097E+03	-8.9914E+00	-3.2992E-11	2.0684E-06	-178.60	626.00	68.00	0.1793	0.000%	0.000%	0.000%	0.000%
Trimethylcyclohexane (1,c-3,c-5-)	VOC		126.239	11.0144	-2.9801E+03	2.7007E-01	-6.7946E-03	3.5409E-06	-63.40	734.00	68.00	0.0130	0.000%	0.000%	0.000%	0.000%
Ethylcyclohexane	VOC		112.213	32.7090	-3.1283E+03	-8.6023E+00	-3.9268E-11	1.9935E-06	-167.80	636.80	68.00	0.1870	1.935%	1.692%	0.346%	0.450%

TABLE D-0
Volatile Organic Liquid Storage Tanks
Vapor Physical Property and Composition Estimates
Raoult's Law

Component Data													Liquid Data		Vapor Data	
Component			MW	Yaws Vapor Pressure Coefficients							VP Datum		mol%	wt%	y_i	wt%$_i$
Name (i)	Type	HAP	(lb/mol)$_i$ M_i	A	B	C	D	E	T_{Min} (°F)	T_{Max} (°F)	T (°F)	P_i (psia)	(mol$_i$/mol$_L$) $f_{v\text{-}i}$	(lb$_i$/lb$_L$) $f_{m\text{-}i}$	(mol$_i$/mol$_V$)	(lb$_i$/lb$_V$)
Dimethylheptane (2,5-)	VOC		128.255	33.1285	-2.4527E+03	-9.2016E+00	-4.7077E-10	4.1755E-06	-146.20	420.80	68.00	5.0720	0.095%	0.095%	0.461%	0.686%
Dimethylheptane (3,5-)	VOC		128.255	33.1285	-2.4527E+03	-9.2016E+00	-4.7077E-10	4.1755E-06	-146.20	420.80	68.00	5.0720	0.095%	0.095%	0.461%	0.686%
Trimethylcyclohexane (1,1,3-)	VOC		126.239	11.0144	-2.9801E+03	2.7007E-01	-6.7946E-03	3.5409E-06	-63.40	734.00	68.00	0.0130	0.109%	0.107%	0.001%	0.002%
Trimethylhexane (2,3,3-)	VOC		128.255	33.1285	-2.4527E+03	-9.2016E+00	-4.7077E-10	4.1755E-06	-146.20	420.80	68.00	5.0720	0.054%	0.054%	0.262%	0.389%
Dimethylheptane (3,3-)	VOC		128.255	33.1285	-2.4527E+03	-9.2016E+00	-4.7077E-10	4.1755E-06	-146.20	420.80	68.00	5.0720	0.054%	0.054%	0.262%	0.389%
Trimethylcyclohexane (1,1,4-)	VOC		126.239	11.0144	-2.9801E+03	2.7007E-01	-6.7946E-03	3.5409E-06	-63.40	734.00	68.00	0.0130	0.000%	0.000%	0.000%	0.000%
Tetramethylpentane (2,2,3,3-)	VOC		128.255	35.4216	-3.2760E+03	-9.5678E+00	9.0298E-10	2.4355E-06	14.00	640.40	68.00	0.1369	0.370%	0.370%	0.049%	0.072%
Ethylbenzene	VOC	X	106.165	36.1998	-3.3402E+03	-9.7970E+00	-1.1467E-11	2.5758E-06	-139.00	651.20	68.00	0.1388	0.576%	0.476%	0.076%	0.094%
Trimethylhexane (2,3,4-)	VOC		128.255	33.1285	-2.4527E+03	-9.2016E+00	-4.7077E-10	4.1755E-06	-146.20	420.80	68.00	5.0720	0.010%	0.010%	0.048%	0.072%
Trimethylcyclohexane (1,t-2,t-4-)	VOC		126.239	11.0144	-2.9801E+03	2.7007E-01	-6.7946E-03	3.5409E-06	-63.40	734.00	68.00	0.0130	0.000%	0.000%	0.000%	0.000%
Dimethylheptane (2,3-)	VOC		128.255	33.1285	-2.4527E+03	-9.2016E+00	-4.7077E-10	4.1755E-06	-146.20	420.80	68.00	5.0720	0.000%	0.000%	0.000%	0.000%
Trimethylcyclohexane (1,c-3,t-5-)	VOC		126.239	11.0144	-2.9801E+03	2.7007E-01	-6.7946E-03	3.5409E-06	-63.40	734.00	68.00	0.0130	0.000%	0.000%	0.000%	0.000%
Xylene (m-)	VOC	X	106.165	34.6803	-3.2981E+03	-9.2570E+00	-4.3563E-10	-2.4103E-06	-54.40	649.40	68.00	0.0468	3.491%	2.887%	0.156%	0.192%
Xylene (p-)	VOC	X	106.165	60.0531	-4.0159E+03	-1.9441E+01	8.2881E-03	-2.3647E-12	55.40	649.40	68.00	0.1277	3.491%	2.887%	0.427%	0.525%
Dimethylheptane (3,4-)	VOC		128.255	33.1285	-2.4527E+03	-9.2016E+00	-4.7077E-10	4.1755E-06	-146.20	420.80	68.00	5.0720	0.130%	0.130%	0.633%	0.941%
Methyloctane (2-)	VOC		128.255	6.0191	-2.8579E+03	3.4068E+00	-1.6572E-02	9.8047E-06	-112.00	597.20	68.00	0.0881	1.109%	1.108%	0.093%	0.139%
Methyloctane (4-)	VOC		128.255	11.2012	-2.9467E+03	1.2133E+00	-1.4423E-02	9.1770E-06	-171.40	599.00	68.00	0.0974	1.109%	1.108%	0.103%	0.154%
Dimethylheptane (3,4-)	VOC		128.255	33.1285	-2.4527E+03	-9.2016E+00	-4.7077E-10	4.1755E-06	-146.20	420.80	68.00	5.0720	0.000%	0.000%	0.000%	0.000%
Methyloctane (3-)	VOC		128.255	9.8147	-2.9609E+03	1.9061E+00	-1.5675E-02	9.7961E-06	-160.60	602.60	68.00	0.0889	0.000%	0.000%	0.000%	0.000%
Butylcyclopentane (i-)	VOC		126.239	11.0144	-2.9801E+03	2.7007E-01	-6.7946E-03	3.5409E-06	-63.40	734.00	68.00	0.0130	0.000%	0.000%	0.000%	0.000%
Trimethylcyclohexane (1,t-2,c-3-)	VOC		126.239	11.0144	-2.9801E+03	2.7007E-01	-6.7946E-03	3.5409E-06	-63.40	734.00	68.00	0.0130	0.328%	0.322%	0.004%	0.006%
Trimethylcyclohexane (1,t-2,c-4-)	VOC		126.239	11.0144	-2.9801E+03	2.7007E-01	-6.7946E-03	3.5409E-06	-63.40	734.00	68.00	0.0130	0.328%	0.322%	0.004%	0.006%
Xylene (o-)	VOC	X	106.165	37.2413	-3.4573E+03	-1.0126E+01	9.0676E-11	2.6123E-06	-13.00	674.60	68.00	0.0946	0.776%	0.641%	0.070%	0.086%
Trimethylcyclohexane (1,1,2-)	VOC		126.239	11.0144	-2.9801E+03	2.7007E-01	-6.7946E-03	3.5409E-06	-63.40	734.00	68.00	0.0130	0.000%	0.000%	0.000%	0.000%
Trimethylcyclohexane (1,c-2,t-4-)	VOC		126.239	11.0144	-2.9801E+03	2.7007E-01	-6.7946E-03	3.5409E-06	-63.40	734.00	68.00	0.0130	0.284%	0.279%	0.004%	0.005%
Trimethylcyclohexane (1,c-2,c-4-)	VOC		126.239	11.0144	-2.9801E+03	2.7007E-01	-6.7946E-03	3.5409E-06	-63.40	734.00	68.00	0.0130	0.000%	0.000%	0.000%	0.000%
Nonane (n-)	VOC		128.255	8.8817	-2.8042E+03	1.5262E+00	-1.0464E-02	5.7972E-06	-63.40	613.40	68.00	0.0627	4.089%	4.086%	0.245%	0.365%
Unknowns	VOC		263.361	116.5157	-8.0140E+03	-3.8799E+01	1.3398E-02	-4.4444E-13	50.00	813.20	68.00	0.0000	15.292%	31.375%	0.001%	0.002%
Residual Liquid	Liquid	128.362 lb/lb-mol		Vapor	68.00 °F		1.0446 psia		86.303 lb/lb-mol				96.197%	96.197%	96.197%	96.197%
TOC (Total)	Liquid	128.362 lb/lb-mol		Vapor	68.00 °F		1.0446 psia		86.303 lb/lb-mol				96.197%	96.197%	96.197%	96.197%
VOC (Total)	Liquid	128.362 lb/lb-mol		Vapor	68.00 °F		1.0446 psia		86.303 lb/lb-mol				96.197%	96.197%	96.197%	96.197%
HAP (Total)	Liquid	95.690 lb/lb-mol		Vapor	68.00 °F		0.6569 psia		86.481 lb/lb-mol				19.507%	14.542%	12.267%	12.292%
Xylenes	Liquid	106.165 lb/lb-mol		Vapor	68.00 °F		0.0880 psia		106.165 lb/lb-mol				7.757%	6.416%	0.653%	0.804%

NOTES

1. Liquid composition of residual liquid based on SPL flash analysis (see TABLE E-0b(iii)).
2. Vapor pressure data for unknowns based on: Pentadecane (n-)

TABLE E-0a(i)
Flash Analysis
Summary of Laboratory Analysis

	FEED Pressurized Liquid	VAPOR Flash Gas	LIQUID Residual Liquid
Pressure	575.000 psig	0.034 psig	0.034 psig
	589.696 psia	14.730 psia	14.730 psia
Temperature	72 °F	60 °F	60 °F
API Gravity at 60°F	73.960 n.d.	788.526 n.d.	61.227 n.d.
Specific Gravity at 60°F	0.6887 n.d. (water)	0.1538 n.d. (water)	0.7342 n.d. (water)
	3.3880 n.d. (air)	0.9301 n.d. (air)	4.4320 n.d. (air)
Molecular Weight	98.125 lb/lb-mol	26.938 lb/lb-mol	128.362 lb/lb-mol
Density at 60°F and 14.730 psia	5.747 lb/gal	1.283 lb/gal	6.126 lb/gal
	0.2593 lb/ft^3	0.0712 lb/ft^3	0.3392 lb/ft^3
	22.1622 ft^3/gal	18.0282 ft^3/gal	18.0610 ft^3/gal
	930.8120 ft^3/bbl	757.1853 ft^3/bbl	758.5600 ft^3/bbl
	378.4123 ft^3/lb-mol	378.4123 ft^3/lb-mol	378.4123 ft^3/lb-mol
	17.0747 gal/lb-mol	20.9900 gal/lb-mol	20.9520 gal/lb-mol
	2.4598 lb-mol/bbl	2.0010 lb-mol/bbl	2.0046 lb-mol/bbl
Density at 68°F and 14.696 psia	947.3299 scf/bbl	770.6220 scf/bbl	772.0211 scf/bbl
	385.1275 scf/lb-mol	385.1275 scf/lb-mol	385.1275 scf/lb-mol
	2.4598 lb-mol/bbl	2.0010 lb-mol/bbl	2.0046 lb-mol/bbl
Vapor to Liquid Mole Ratio (V/L)	0.4249 n.d. (lb-mol$_{VAPOR}$/lb-mol$_{LIQUID}$)		
Mole Balance	1.0000 bbl	0.3666 bbl	0.8612 bbl
	2.4598 lb-mol	0.7335 lb-mol	1.7263 lb-mol
	947.3299 scf	282.4903 scf	664.8396 scf
Flash Factor (FF)	328.0318 scf$_{VAPOR}$/bbl$_{LIQUID}$		

NOTES

1. Sample Data:	Location:	Atlanta, TX	
	Date:	04/15/09	
	Time:	Not Recorded	
2. Reference Conditions:		SPL	Standard
	T =	60 °F	68 °F
	P =	14.730 psia	14.696 psia
	Water	8.344 lb/gal	8.338 lb/gal
	Air	0.0765 lb/ft^3	0.0752 lb/ft^3

3. V + L = F => F = (1 + V/L)L {Overall Mole Balance}.

TABLE E-0a(ii)
Flash Analysis
Extrapolation of Specie Mole Percentages

Component						Liquid Dump Flash Data				
						Input			Output	
						Liquid	Scaled	*Calculated*	Vapor	Liquid
Name (i)	GC Position	SPL Class	Formula	Type	HAP	z_i ($mol_{i,F}/mol_F$)		z_i ($mol_{i,F}/mol_F$)	y_i ($mol_{i,V}/mol_V$)	x_i ($mol_{i,L}/mol_L$)
Nitrogen	1		N2			0.034%	0.034%	0.030%	0.101%	0.000%
Carbon Dioxide	3		CO2	GHG		0.968%	0.968%	0.970%	3.163%	0.038%
Methane	2		C01H04	GHG		20.922%	20.922%	20.921%	69.445%	0.303%
Ethane	4		C02H06			3.391%	3.391%	3.390%	10.467%	0.383%
Propane	5		C03H08	VOC		2.183%	2.183%	2.180%	5.339%	0.838%
Butane (i-)	6		C04H10	VOC		1.232%	1.232%	1.230%	2.126%	0.849%
Butane (n-)	7		C04H10	VOC		1.721%	1.721%	1.720%	2.495%	1.391%
Pentane (i-)	8		C05H12	VOC		2.354%	2.354%	2.350%	1.895%	2.543%
Pentane (n-)	9		C05H12	VOC		1.622%	1.622%	1.620%	1.056%	1.859%
Dimethylbutane (2,2-)	10	Hexanes	C06H14	VOC		0.174%	0.174%	0.174%	0.050%	0.227%
Dimethylbutane (2,3-)	11	Hexanes	C06H14	VOC		0.000%	0.000%	0.000%	0.000%	0.000%
Cyclopentane	12	Hexanes	C05H10	VOC		0.000%	0.000%	0.000%	0.000%	0.000%
Methylpentane (2-)	13	Hexanes	C06H14	VOC		1.218%	1.218%	1.218%	0.352%	1.586%
Methylpentane (3-)	14	Hexanes	C06H14	VOC		0.912%	0.912%	0.912%	0.264%	1.187%
Hexane (n-)	15	Hexanes	C06H14	VOC	X	1.937%	1.937%	1.937%	0.561%	2.522%
Dimethylpentane (2,2-)	16	Heptanes	C07H16	VOC		0.311%	0.311%	0.311%	0.032%	0.430%
Methylcyclopentane	17	Heptanes	C06H12	VOC		1.134%	1.134%	1.134%	0.116%	1.566%
Dimethylpentane (2,4-)	18	Heptanes	C07H16	VOC		0.128%	0.128%	0.128%	0.013%	0.177%
Trimethylbutane (2,2,3-)	19	Heptanes	C07H16	VOC		0.000%	0.000%	0.000%	0.000%	0.000%
Benzene	20	Heptanes	C06H06	VOC	X	1.713%	1.713%	1.713%	0.175%	2.366%
Dimethylpentane (3,3-)	21	Heptanes	C07H16	VOC		0.221%	0.221%	0.221%	0.023%	0.305%
Cyclohexane	22	Heptanes	C06H12	VOC		1.106%	1.106%	1.106%	0.113%	1.528%
Methylhexane (2-)	23	Heptanes	C07H16	VOC		2.292%	2.292%	2.292%	0.235%	3.166%
Dimethylpentane (2,3-)	24	Heptanes	C07H16	VOC		0.000%	0.000%	0.000%	0.000%	0.000%
Dimethylcyclopentane (1,1-)	25	Heptanes	C07H14	VOC		0.603%	0.603%	0.603%	0.062%	0.833%
Methylhexane (3-)	26	Heptanes	C07H16	VOC		2.379%	2.379%	2.379%	0.244%	3.286%
Dimethylcyclopentane (1,t-3-)	27	Heptanes	C07H14	VOC		0.163%	0.163%	0.163%	0.017%	0.225%
Dimethylcyclopentane (1,c-3-)	28	Heptanes	C07H14	VOC		0.266%	0.266%	0.266%	0.027%	0.367%
Ethylpentane (3-)	29	Heptanes	C07H16	VOC		0.029%	0.029%	0.029%	0.003%	0.040%
Dimethylcyclopentane (1,t-2-)	30	Heptanes	C07H14	VOC		0.222%	0.222%	0.222%	0.023%	0.307%
Trimethylpentane (2,2,4-)	31	Heptanes	C08H18	VOC	X	0.021%	0.021%	0.021%	0.002%	0.029%
Heptane (n-)	32	Heptanes	C07H16	VOC		3.742%	3.742%	3.742%	0.383%	5.169%
Methylcyclohexane	33	Octanes	C07H14	VOC		3.301%	3.301%	3.301%	0.136%	4.646%
Trimethylcyclopentane (1,1,3-)	34	Octanes	C08H16	VOC		0.225%	0.225%	0.225%	0.009%	0.317%
Dimethylhexane (2,2-)	35	Octanes	C08H18	VOC		0.095%	0.095%	0.095%	0.004%	0.134%
Dimethylcyclopentane (1,c-2-)	36	Octanes	C07H14	VOC		0.848%	0.848%	0.848%	0.035%	1.193%
Dimethylhexane (2,5-)	37	Octanes	C08H18	VOC		0.000%	0.000%	0.000%	0.000%	0.000%
Dimethylhexane (2,4-)	38	Octanes	C08H18	VOC		0.143%	0.143%	0.143%	0.006%	0.201%
Ethylcyclopentane	39	Octanes	C07H14	VOC		0.464%	0.464%	0.464%	0.019%	0.653%
Trimethylpentane (2,2,3-)	40	Octanes	C08H18	VOC		0.028%	0.028%	0.028%	0.001%	0.039%
Trimethylcyclopentane (1,t-2,c-4-)	41	Octanes	C08H16	VOC		0.000%	0.000%	0.000%	0.000%	0.000%
Dimethylhexane (3,3-)	42	Octanes	C08H18	VOC		0.000%	0.000%	0.000%	0.000%	0.000%
Trimethylcyclopentane (1,t-2,c-3-)	43	Octanes	C08H16	VOC		0.000%	0.000%	0.000%	0.000%	0.000%
Trimethylpentane (2,3,4-)	44	Octanes	C08H18	VOC		0.000%	0.000%	0.000%	0.000%	0.000%
Dimethylhexane (2,3-)	45	Octanes	C08H18	VOC		0.000%	0.000%	0.000%	0.000%	0.000%
Toluene	46	Octanes	C07H08	VOC	X	4.444%	4.444%	4.444%	0.183%	6.255%
Trimethylcyclopentane (1,1,2-)	47	Octanes	C08H16	VOC		0.371%	0.371%	0.371%	0.015%	0.522%
Dimethylhexane (3,4-)	48	Octanes	C08H18	VOC		3.505%	3.505%	3.505%	0.144%	4.933%
Methylheptane (2-)	49	Octanes	C08H18	VOC		0.000%	0.000%	0.000%	0.000%	0.000%
Methylheptane (4-)	50	Octanes	C08H18	VOC		2.896%	2.896%	2.896%	0.119%	4.076%
Dimethylhexane (3,4-)	51	Octanes	C08H18	VOC		0.000%	0.000%	0.000%	0.000%	0.000%
Methylheptane (3-)	52	Octanes	C08H18	VOC		0.416%	0.416%	0.416%	0.017%	0.585%
Ethylhexane (3-)	53	Octanes	C08H18	VOC		0.111%	0.111%	0.111%	0.005%	0.156%
Trimethylcyclopentane (1,c-2,t-4-)	54	Octanes	C08H16	VOC		0.028%	0.028%	0.028%	0.001%	0.039%
Dimethylcyclohexane (1,c-3-)	55	Octanes	C08H16	VOC		0.170%	0.170%	0.170%	0.007%	0.239%
Trimethylcyclopentane (1,c-2,t-3-)	56	Octanes	C08H16	VOC		0.170%	0.170%	0.170%	0.007%	0.239%
Dimethylcyclohexane (1,t-4-)	57	Octanes	C08H16	VOC		0.000%	0.000%	0.000%	0.000%	0.000%
Trimethylhexane (2,2,5-)	58	Octanes	C09H20	VOC		0.000%	0.000%	0.000%	0.000%	0.000%
Dimethylcyclohexane (1,1-)	59	Octanes	C08H16	VOC		0.000%	0.000%	0.000%	0.000%	0.000%
Ethylcyclopentane (1-methyl-t-3-)	60	Octanes	C08H16	VOC		0.000%	0.000%	0.000%	0.000%	0.000%
Ethylcyclopentane (1-methyl-c-3-)	61	Octanes	C08H16	VOC		0.000%	0.000%	0.000%	0.000%	0.000%
Ethylcyclopentane (1-methyl-t-2-)	62	Octanes	C08H16	VOC		0.000%	0.000%	0.000%	0.000%	0.000%
Trimethylhexane (2,2,4-)	63	Octanes	C09H20	VOC		0.000%	0.000%	0.000%	0.000%	0.000%
Ethylcyclopentane (1-methyl-t-1-)	64	Octanes	C08H16	VOC		0.000%	0.000%	0.000%	0.000%	0.000%
Cycloheptane	65	Octanes	C07H14	VOC		0.000%	0.000%	0.000%	0.000%	0.000%
Octane (n-)	66	Octanes	C08H18	VOC		4.372%	4.372%	4.372%	0.180%	6.153%
Trimethylhexane (2,4,4-)	67	Nonanes	C09H20	VOC		0.190%	0.190%	0.190%	0.003%	0.269%
Tetramethylpentane (2,2,4,4-)	68	Nonanes	C09H20	VOC		0.000%	0.000%	0.000%	0.000%	0.000%
Dimethylcyclohexane (1,t-3-)	69	Nonanes	C08H16	VOC		0.053%	0.053%	0.053%	0.001%	0.075%
Dimethylcyclohexane (1,c-4-)	70	Nonanes	C08H16	VOC		0.053%	0.053%	0.053%	0.001%	0.075%
Trimethylcyclopentane (1,c-2,c-3-)	71	Nonanes	C08H16	VOC		0.053%	0.053%	0.053%	0.001%	0.075%
Propylcyclopentane (i-)	72	Nonanes	C08H16	VOC		0.348%	0.348%	0.348%	0.006%	0.493%
Trimethylhexane (2,3,5-)	73	Nonanes	C09H20	VOC		0.006%	0.006%	0.006%	0.000%	0.009%
Dimethylheptane (2,2-)	74	Nonanes	C09H20	VOC		0.000%	0.000%	0.000%	0.000%	0.000%
Dimethylheptane (2,4-)	75	Nonanes	C09H20	VOC		0.158%	0.158%	0.158%	0.003%	0.224%
Methylcyclopentane (1-ethyl-c-2-)	76	Nonanes	C08H16	VOC		0.181%	0.181%	0.181%	0.003%	0.257%
Trimethylhexane (2,2,3-)	77	Nonanes	C09H20	VOC		0.000%	0.000%	0.000%	0.000%	0.000%

TABLE E-0a(ii)
Flash Analysis
Extrapolation of Specie Mole Percentages

Component						Liquid Dump Flash Data				
						Input			Output	
						Liquid	Scaled	*Calculated*	Vapor	Liquid
						z_i		z_i	y_i	x_i
Name (i)	GC Postition	SPL Class	Formula	Type	HAP	($mol_{i,F}/mol_F$)		($mol_{i,F}/mol_F$)	($mol_{i,V}/mol_V$)	($mol_{i,L}/mol_L$)
Dimethylcyclohexane (1,c-2-)	78	Nonanes	C08H16	VOC		0.510%	0.510%	0.510%	0.009%	0.723%
Dimethylheptane (2,6-)	79	Nonanes	C09H20	VOC		0.112%	0.112%	0.112%	0.002%	0.159%
Propylcyclopentane (n-)	80	Nonanes	C08H16	VOC		0.000%	0.000%	0.000%	0.000%	0.000%
Trimethylcyclohexane (1,c-3,c-5-)	81	Nonanes	C09H18	VOC		0.000%	0.000%	0.000%	0.000%	0.000%
Ethylcyclohexane	82	Nonanes	C08H16	VOC		1.365%	1.365%	1.365%	0.023%	1.935%
Dimethylheptane (2,5-)	83	Nonanes	C09H20	VOC		0.067%	0.067%	0.067%	0.001%	0.095%
Dimethylheptane (3,5-)	84	Nonanes	C09H20	VOC		0.067%	0.067%	0.067%	0.001%	0.095%
Trimethylcyclohexane (1,1,3-)	85	Nonanes	C09H18	VOC		0.077%	0.077%	0.077%	0.001%	0.109%
Trimethylhexane (2,3,3-)	86	Nonanes	C09H20	VOC		0.038%	0.038%	0.038%	0.001%	0.054%
Dimethylheptane (3,3-)	87	Nonanes	C09H20	VOC		0.038%	0.038%	0.038%	0.001%	0.054%
Trimethylcyclohexane (1,1,4-)	88	Nonanes	C09H18	VOC		0.000%	0.000%	0.000%	0.000%	0.000%
Tetramethylpentane (2,2,3,3-)	89	Nonanes	C09H20	VOC		0.261%	0.261%	0.261%	0.004%	0.370%
Ethylbenzene	90	Nonanes	C08H10	VOC	X	0.406%	0.406%	0.406%	0.007%	0.576%
Trimethylhexane (2,3,4-)	91	Nonanes	C09H20	VOC		0.007%	0.007%	0.007%	0.000%	0.010%
Trimethylcyclohexane (1,t-2,t-4-)	92	Nonanes	C09H18	VOC		0.000%	0.000%	0.000%	0.000%	0.000%
Dimethylheptane (2,3-)	93	Nonanes	C09H20	VOC		0.000%	0.000%	0.000%	0.000%	0.000%
Trimethylcyclohexane (1,c-3,t-5-)	94	Nonanes	C09H18	VOC		0.000%	0.000%	0.000%	0.000%	0.000%
Xylene (m-)	95	Nonanes	C08H10	VOC	X	2.462%	2.462%	2.462%	0.042%	3.490%
Xylene (p-)	96	Nonanes	C08H10	VOC	X	2.462%	2.462%	2.462%	0.042%	3.490%
Dimethylheptane (3,4-)	97	Nonanes	C09H20	VOC		0.092%	0.092%	0.092%	0.002%	0.130%
Methyloctane (2-)	98	Nonanes	C09H20	VOC		0.782%	0.782%	0.782%	0.013%	1.109%
Methyloctane (4-)	99	Nonanes	C09H20	VOC		0.782%	0.782%	0.782%	0.013%	1.109%
Dimethylheptane (3,4-)	100	Nonanes	C09H20	VOC		0.000%	0.000%	0.000%	0.000%	0.000%
Methyloctane (3-)	101	Nonanes	C09H20	VOC		0.000%	0.000%	0.000%	0.000%	0.000%
Butylcyclopentane (i-)	102	Nonanes	C09H18	VOC		0.000%	0.000%	0.000%	0.000%	0.000%
Trimethylcyclohexane (1,t-2,c-3-)	103	Nonanes	C09H18	VOC		0.231%	0.231%	0.231%	0.004%	0.327%
Trimethylcyclohexane (1,t-2,c-4-)	104	Nonanes	C09H18	VOC		0.231%	0.231%	0.231%	0.004%	0.327%
Xylene (o-)	105	Nonanes	C08H10	VOC	X	0.547%	0.547%	0.547%	0.009%	0.775%
Trimethylcyclohexane (1,1,2-)	106	Nonanes	C09H18	VOC		0.000%	0.000%	0.000%	0.000%	0.000%
Trimethylcyclohexane (1,c-2,t-4-)	107	Nonanes	C09H18	VOC		0.200%	0.200%	0.200%	0.003%	0.284%
Trimethylcyclohexane (1,c-2,c-4-)	108	Nonanes	C09H18	VOC		0.000%	0.000%	0.000%	0.000%	0.000%
Nonane (n-)	109	Nonanes	C09H20	VOC		2.884%	2.884%	2.884%	0.050%	4.088%
Unknowns	110	Decanes+	C10+	VOC		10.753%	10.753%	10.753%	0.079%	15.288%
TOTAL						100.001%	100.000%	99.984%	100.001%	99.976%
TOC (Total)						98.999%	98.998%	98.984%	96.737%	99.938%
VOC (Total)						74.686%	74.685%	74.673%	16.825%	99.252%
Hexanes						4.241%	4.240%	4.241%	1.227%	5.521%
Heptanes						14.330%	14.310%	14.330%	1.468%	19.795%
Octanes						21.587%	21.610%	21.587%	0.888%	30.382%
Nonanes						14.663%	14.660%	14.663%	0.252%	20.786%
Decanes+						10.753%	10.770%	10.753%	0.079%	15.288%
HAP (Total)						13.992%	13.992%	13.992%	1.022%	19.503%
Xylenes						1.209%	1.209%	1.209%	0.021%	1.714%

NOTES

1. Sample Data: Location: Atlanta, TX; Date: 04/15/09; Time: Not Recorded
2. $v_i + l_i = f_i$; $y_i = v_i/V$; $x_i = l_i/L$; $z_i = f_i/F$ => $y_iV + x_iL = z_iF$ => $y_i(V/L)L + x_iL = z_i(1 + V/L)L$ => $z_i = [y_i(V/L) + x_i]/[1 + (V/L)]$ {Mole Balance}
3. V/L = 0.4249 1 + V/L = 1.4249
4. z_i is refined to the same number if significant digits as yand x_i using the component mole balance and laboratory results for V/L
5. z_i is scale using the hydrocarbon (e.g., hexanes+) z percentage in the flash analysis results, with the exception of HAP species
6. $[y_i ; x_i]$ mole percent for species of hydrocarbons is estimated using scaled lab mole percent results for zand $[y ; x]_{HC}$ for the hydrocarbon

(assumes v_i/l_i is same for all hydrocarbon species)

$(v/l)_{hexanes}$ = 0.2219
$y_{hexanes}$ = 1.227% $x_{hexanes}$ = 5.520% $z_{hexanes}$ = 4.240%
$y_i = z_i(y/z)_{hexanes}$ = 0.2894 z_i
$x_i = z_i(x/z)_{hexanes}$ = 1.3019 z_i

$(v/l)_{heptanes}$ = 0.0740
$y_{heptanes}$ = 1.466% $x_{heptanes}$ = 19.767% $z_{heptanes}$ = 14.310%
$y_i = z_i(y/z)_{heptanes}$ = 0.1024 z_i
$x_i = z_i(x/z)_{heptanes}$ = 1.3814 z_i

$(v/l)_{octanes}$ = 0.0292
$y_{octanes}$ = 0.889% $x_{octanes}$ = 30.414% $z_{octanes}$ = 21.610%
$y_i = z_i(y/z)_{octanes}$ = 0.0411 z_i
$x_i = z_i(x/z)_{octanes}$ = 1.4074 z_i

$(v/l)_{nonanes}$ = 0.0121
$y_{nonanes}$ = 0.252% $x_{nonanes}$ = 20.782% $z_{nonanes}$ = 14.660%
$y_i = z_i(y/z)_{nonanes}$ = 0.0172 z_i
$x_i = z_i(x/z)_{nonanes}$ = 1.4176 z_i

$(v/l)_{decanes+}$ = 0.0051
$y_{decanes+}$ = 0.079% $x_{decanes+}$ = 15.313% $z_{decanes+}$ = 10.770%
$y_i = z_i(y/z)_{decanes+}$ = 0.0073 z_i
$x_i = z_i(x/z)_{decanes+}$ = 1.4218 z_i

TABLE E-0b(i)
Flash Analysis
Estimation of Specie Weight Percentages
Pressurized Liquid

Component			Molecular	Density	Mole	Weight
Name (i)	Type	HAP	Weight $(lb/mol)_i$	$(lb/scf)_i$	Percent (mol_i/mol_T)	Percent (lb_i/lb_T)
Nitrogen			28.013	0.0727	0.030%	0.009%
Carbon Dioxide	GHG		44.010	0.1143	0.970%	0.435%
Methane	GHG		16.042	0.0417	20.924%	3.421%
Ethane			30.069	0.0781	3.391%	1.039%
Propane	VOC		44.096	0.1145	2.181%	0.980%
Butane (i-)	VOC		58.122	0.1509	1.230%	0.729%
Butane (n-)	VOC		58.122	0.1509	1.720%	1.019%
Pentane (i-)	VOC		72.149	0.1873	2.350%	1.728%
Pentane (n-)	VOC		72.149	0.1873	1.620%	1.191%
Dimethylbutane (2,2-)	VOC		86.175	0.2238	0.174%	0.153%
Dimethylbutane (2,3-)	VOC		86.175	0.2238	0.000%	0.000%
Cyclopentane	VOC		70.133	0.1821	0.000%	0.000%
Methylpentane (2-)	VOC		86.175	0.2238	1.218%	1.070%
Methylpentane (3-)	VOC		86.175	0.2238	0.912%	0.801%
Hexane (n-)	VOC	X	86.175	0.2238	1.937%	1.701%
Dimethylpentane (2,2-)	VOC		100.202	0.2602	0.311%	0.318%
Methylcyclopentane	VOC		84.159	0.2185	1.134%	0.973%
Dimethylpentane (2,4-)	VOC		100.202	0.2602	0.128%	0.131%
Trimethylbutane (2,2,3-)	VOC		100.202	0.2602	0.000%	0.000%
Benzene	VOC	X	78.112	0.2028	1.713%	1.364%
Dimethylpentane (3,3-)	VOC		100.202	0.2602	0.221%	0.226%
Cyclohexane	VOC		84.159	0.2185	1.106%	0.949%
Methylhexane (2-)	VOC		100.202	0.2602	2.292%	2.341%
Dimethylpentane (2,3-)	VOC		100.202	0.2602	0.000%	0.000%
Dimethylcyclopentane (1,1-)	VOC		98.186	0.2549	0.603%	0.603%
Methylhexane (3-)	VOC		100.202	0.2602	2.379%	2.430%
Dimethylcyclopentane (1,t-3-)	VOC		98.186	0.2549	0.163%	0.163%
Dimethylcyclopentane (1,c-3-)	VOC		98.186	0.2549	0.266%	0.266%
Ethylpentane (3-)	VOC		100.202	0.2602	0.029%	0.030%
Dimethylcyclopentane (1,t-2-)	VOC		98.186	0.2549	0.222%	0.222%
Trimethylpentane (2,2,4-)	VOC	X	114.229	0.2966	0.021%	0.024%
Heptane (n-)	VOC		100.202	0.2602	3.743%	3.822%
Methylcyclohexane	VOC		98.186	0.2549	3.302%	3.304%
Trimethylcyclopentane (1,1,3-)	VOC		112.213	0.2914	0.225%	0.257%
Dimethylhexane (2,2-)	VOC		114.229	0.2966	0.095%	0.111%
Dimethylcyclopentane (1,c-2-)	VOC		98.186	0.2549	0.848%	0.849%
Dimethylhexane (2,5-)	VOC		114.229	0.2966	0.000%	0.000%
Dimethylhexane (2,4-)	VOC		114.229	0.2966	0.143%	0.166%
Ethylcyclopentane	VOC		98.186	0.2549	0.464%	0.464%
Trimethylpentane (2,2,3-)	VOC		114.229	0.2966	0.028%	0.033%
Trimethylcyclopentane (1,t-2,c-4-)	VOC		112.213	0.2914	0.000%	0.000%
Dimethylhexane (3,3-)	VOC		114.229	0.2966	0.000%	0.000%
Trimethylcyclopentane (1,t-2,c-3-)	VOC		112.213	0.2914	0.000%	0.000%
Trimethylpentane (2,3,4-)	VOC		114.229	0.2966	0.000%	0.000%

TABLE E-0b(i)
Flash Analysis
Estimation of Specie Weight Percentages
Pressurized Liquid

Component			Molecular	Density	Mole	Weight
Name (i)	Type	HAP	Weight $(lb/mol)_i$	$(lb/scf)_i$	Percent (mol_i/mol_T)	Percent (lb_i/lb_T)
Dimethylhexane (2,3-)	VOC		114.229	0.2966	0.000%	0.000%
Toluene	VOC	X	92.138	0.2392	4.445%	4.174%
Trimethylcyclopentane (1,1,2-)	VOC		112.213	0.2914	0.371%	0.424%
Dimethylhexane (3,4-)	VOC		114.229	0.2966	3.506%	4.081%
Methylheptane (2-)	VOC		114.229	0.2966	0.000%	0.000%
Methylheptane (4-)	VOC		114.229	0.2966	2.896%	3.372%
Dimethylhexane (3,4-)	VOC		114.229	0.2966	0.000%	0.000%
Methylheptane (3-)	VOC		114.229	0.2966	0.416%	0.484%
Ethylhexane (3-)	VOC		114.229	0.2966	0.111%	0.129%
Trimethylcyclopentane (1,c-2,t-4-)	VOC		112.213	0.2914	0.028%	0.032%
Dimethylcyclohexane (1,c-3-)	VOC		112.213	0.2914	0.170%	0.194%
Trimethylcyclopentane (1,c-2,t-3-)	VOC		112.213	0.2914	0.170%	0.194%
Dimethylcyclohexane (1,t-4-)	VOC		112.213	0.2914	0.000%	0.000%
Trimethylhexane (2,2,5-)	VOC		128.255	0.3330	0.000%	0.000%
Dimethylcyclohexane (1,1-)	VOC		112.213	0.2914	0.000%	0.000%
Ethylcyclopentane (1-methyl-t-3-)	VOC		112.213	0.2914	0.000%	0.000%
Ethylcyclopentane (1-methyl-c-3-)	VOC		112.213	0.2914	0.000%	0.000%
Ethylcyclopentane (1-methyl-t-2-)	VOC		112.213	0.2914	0.000%	0.000%
Trimethylhexane (2,2,4-)	VOC		128.255	0.3330	0.000%	0.000%
Ethylcyclopentane (1-methyl-t-1-)	VOC		112.213	0.2914	0.000%	0.000%
Cycloheptane	VOC		98.186	0.2549	0.000%	0.000%
Octane (n-)	VOC		114.229	0.2966	4.373%	5.090%
Trimethylhexane (2,4,4-)	VOC		128.255	0.3330	0.190%	0.248%
Tetramethylpentane (2,2,4,4-)	VOC		128.255	0.3330	0.000%	0.000%
Dimethylcyclohexane (1,t-3-)	VOC		112.213	0.2914	0.053%	0.061%
Dimethylcyclohexane (1,c-4-)	VOC		112.213	0.2914	0.053%	0.061%
Trimethylcyclopentane (1,c-2,c-3-)	VOC		112.213	0.2914	0.053%	0.061%
Propylcyclopentane (i-)	VOC		112.213	0.2914	0.348%	0.398%
Trimethylhexane (2,3,5-)	VOC		128.255	0.3330	0.006%	0.008%
Dimethylheptane (2,2-)	VOC		128.255	0.3330	0.000%	0.000%
Dimethylheptane (2,4-)	VOC		128.255	0.3330	0.158%	0.207%
Methylcyclopentane (1-ethyl-c-2-)	VOC		112.213	0.2914	0.181%	0.207%
Trimethylhexane (2,2,3-)	VOC		128.255	0.3330	0.000%	0.000%
Dimethylcyclohexane (1,c-2-)	VOC		112.213	0.2914	0.510%	0.583%
Dimethylheptane (2,6-)	VOC		128.255	0.3330	0.112%	0.146%
Propylcyclopentane (n-)	VOC		112.213	0.2914	0.000%	0.000%
Trimethylcyclohexane (1,c-3,c-5-)	VOC		126.239	0.3278	0.000%	0.000%
Ethylcyclohexane	VOC		112.213	0.2914	1.365%	1.561%
Dimethylheptane (2,5-)	VOC		128.255	0.3330	0.067%	0.088%
Dimethylheptane (3,5-)	VOC		128.255	0.3330	0.067%	0.088%
Trimethylcyclohexane (1,1,3-)	VOC		126.239	0.3278	0.077%	0.099%
Trimethylhexane (2,3,3-)	VOC		128.255	0.3330	0.038%	0.050%
Dimethylheptane (3,3-)	VOC		128.255	0.3330	0.038%	0.050%
Trimethylcyclohexane (1,1,4-)	VOC		126.239	0.3278	0.000%	0.000%

TABLE E-0b(i)
Flash Analysis
Estimation of Specie Weight Percentages
Pressurized Liquid

Component Name (i)	Type	HAP	Molecular Weight $(lb/mol)_i$	Density $(lb/scf)_i$	Mole Percent (mol_i/mol_T)	Weight Percent (lb_i/lb_T)
Tetramethylpentane (2,2,3,3-)	VOC		128.255	0.3330	0.261%	0.341%
Ethylbenzene	VOC	X	106.165	0.2757	0.406%	0.439%
Trimethylhexane (2,3,4-)	VOC		128.255	0.3330	0.007%	0.009%
Trimethylcyclohexane (1,t-2,t-4-)	VOC		126.239	0.3278	0.000%	0.000%
Dimethylheptane (2,3-)	VOC		128.255	0.3330	0.000%	0.000%
Trimethylcyclohexane (1,c-3,t-5-)	VOC		126.239	0.3278	0.000%	0.000%
Xylene (m-)	VOC	X	106.165	0.2757	2.462%	2.664%
Xylene (p-)	VOC	X	106.165	0.2757	2.462%	2.664%
Dimethylheptane (3,4-)	VOC		128.255	0.3330	0.092%	0.120%
Methyloctane (2-)	VOC		128.255	0.3330	0.782%	1.022%
Methyloctane (4-)	VOC		128.255	0.3330	0.782%	1.022%
Dimethylheptane (3,4-)	VOC		128.255	0.3330	0.000%	0.000%
Methyloctane (3-)	VOC		128.255	0.3330	0.000%	0.000%
Butylcyclopentane (i-)	VOC		126.239	0.3278	0.000%	0.000%
Trimethylcyclohexane (1,t-2,c-3-)	VOC		126.239	0.3278	0.231%	0.297%
Trimethylcyclohexane (1,t-2,c-4-)	VOC		126.239	0.3278	0.231%	0.297%
Xylene (o-)	VOC	X	106.165	0.2757	0.547%	0.592%
Trimethylcyclohexane (1,1,2-)	VOC		126.239	0.3278	0.000%	0.000%
Trimethylcyclohexane (1,c-2,t-4-)	VOC		126.239	0.3278	0.200%	0.257%
Trimethylcyclohexane (1,c-2,c-4-)	VOC		126.239	0.3278	0.000%	0.000%
Nonane (n-)	VOC		128.255	0.3330	2.884%	3.770%
Unknowns	VOC		**283.704**	0.7366	10.755%	31.094%
Pressurized Liquid			98.125	0.2548	100.000%	100.000%
TOC (Total)			98.677	0.2562	99.000%	99.556%
VOC (Total)			124.943	0.3244	74.685%	95.096%
HAP (Total)			92.449	0.2400	7.356%	6.931%
Xylenes			106.165	0.2757	5.472%	5.920%

NOTES

1. Normalized mole percentages from TABLE E-0a(ii) to make total 100.000%.
2. Determined molecular weight of unknowns via iteration to match TABLE E-0a(i).

MW = 98.125 lb/lb-mol

TABLE E-0b(ii)
Flash Analysis
Estimation of Specie Weight Percentages
Flash Gas

Component			Molecular Weight (lb/mol)$_i$	Density (lb/scf)$_i$	Mole Percent (mol$_i$/mol$_T$)	Weight Percent (lb$_i$/lb$_T$)
Name (i)	Type	HAP				
Nitrogen			28.013	0.0727	0.101%	0.103%
Carbon Dioxide	GHG		44.010	0.1143	3.201%	5.146%
Methane	GHG		16.042	0.0417	69.747%	40.873%
Ethane			30.069	0.0781	10.850%	11.917%
Propane	VOC		44.096	0.1145	6.177%	9.950%
Butane (i-)	VOC		58.122	0.1509	2.975%	6.317%
Butane (n-)	VOC		58.122	0.1509	3.886%	8.251%
Pentane (i-)	VOC		72.149	0.1873	1.895%	4.994%
Pentane (n-)	VOC		72.149	0.1873	1.056%	2.783%
Dimethylbutane (2,2-)	VOC		86.175	0.2238	0.050%	0.159%
Dimethylbutane (2,3-)	VOC		86.175	0.2238	0.000%	0.000%
Cyclopentane	VOC		70.133	0.1821	0.000%	0.000%
Methylpentane (2-)	VOC		86.175	0.2238	0.352%	1.110%
Methylpentane (3-)	VOC		86.175	0.2238	0.264%	0.831%
Hexane (n-)	VOC	X	86.175	0.2238	0.561%	1.765%
Dimethylpentane (2,2-)	VOC		100.202	0.2602	0.032%	0.117%
Methylcyclopentane	VOC		84.159	0.2185	0.116%	0.357%
Dimethylpentane (2,4-)	VOC		100.202	0.2602	0.013%	0.048%
Trimethylbutane (2,2,3-)	VOC		100.202	0.2602	0.000%	0.000%
Benzene	VOC	X	78.112	0.2028	0.175%	0.501%
Dimethylpentane (3,3-)	VOC		100.202	0.2602	0.023%	0.083%
Cyclohexane	VOC		84.159	0.2185	0.113%	0.348%
Methylhexane (2-)	VOC		100.202	0.2602	0.235%	0.859%
Dimethylpentane (2,3-)	VOC		100.202	0.2602	0.000%	0.000%
Dimethylcyclopentane (1,1-)	VOC		98.186	0.2549	0.062%	0.222%
Methylhexane (3-)	VOC		100.202	0.2602	0.244%	0.892%
Dimethylcyclopentane (1,t-3-)	VOC		98.186	0.2549	0.017%	0.060%
Dimethylcyclopentane (1,c-3-)	VOC		98.186	0.2549	0.027%	0.098%
Ethylpentane (3-)	VOC		100.202	0.2602	0.003%	0.011%
Dimethylcyclopentane (1,t-2-)	VOC		98.186	0.2549	0.023%	0.082%
Trimethylpentane (2,2,4-)	VOC	X	114.229	0.2966	0.002%	0.009%
Heptane (n-)	VOC		100.202	0.2602	0.383%	1.403%
Methylcyclohexane	VOC		98.186	0.2549	0.136%	0.487%
Trimethylcyclopentane (1,1,3-)	VOC		112.213	0.2914	0.009%	0.038%
Dimethylhexane (2,2-)	VOC		114.229	0.2966	0.004%	0.016%
Dimethylcyclopentane (1,c-2-)	VOC		98.186	0.2549	0.035%	0.125%
Dimethylhexane (2,5-)	VOC		114.229	0.2966	0.000%	0.000%
Dimethylhexane (2,4-)	VOC		114.229	0.2966	0.006%	0.025%
Ethylcyclopentane	VOC		98.186	0.2549	0.019%	0.068%
Trimethylpentane (2,2,3-)	VOC		114.229	0.2966	0.001%	0.005%
Trimethylcyclopentane (1,t-2,c-4-)	VOC		112.213	0.2914	0.000%	0.000%
Dimethylhexane (3,3-)	VOC		114.229	0.2966	0.000%	0.000%
Trimethylcyclopentane (1,t-2,c-3-)	VOC		112.213	0.2914	0.000%	0.000%
Trimethylpentane (2,3,4-)	VOC		114.229	0.2966	0.000%	0.000%

TABLE E-0b(ii)
Flash Analysis
Estimation of Specie Weight Percentages
Flash Gas

Component			Molecular Weight $(lb/mol)_i$	Density $(lb/scf)_i$	Mole Percent (mol_i/mol_T)	Weight Percent (lb_i/lb_T)
Name (i)	Type	HAP				
Dimethylhexane (2,3-)	VOC		114.229	0.2966	0.000%	0.000%
Toluene	VOC	X	92.138	0.2392	0.183%	0.615%
Trimethylcyclopentane (1,1,2-)	VOC		112.213	0.2914	0.015%	0.063%
Dimethylhexane (3,4-)	VOC		114.229	0.2966	0.144%	0.602%
Methylheptane (2-)	VOC		114.229	0.2966	0.000%	0.000%
Methylheptane (4-)	VOC		114.229	0.2966	0.119%	0.497%
Dimethylhexane (3,4-)	VOC		114.229	0.2966	0.000%	0.000%
Methylheptane (3-)	VOC		114.229	0.2966	0.017%	0.071%
Ethylhexane (3-)	VOC		114.229	0.2966	0.005%	0.019%
Trimethylcyclopentane (1,c-2,t-4-)	VOC		112.213	0.2914	0.001%	0.005%
Dimethylcyclohexane (1,c-3-)	VOC		112.213	0.2914	0.007%	0.029%
Trimethylcyclopentane (1,c-2,t-3-)	VOC		112.213	0.2914	0.007%	0.029%
Dimethylcyclohexane (1,t-4-)	VOC		112.213	0.2914	0.000%	0.000%
Trimethylhexane (2,2,5-)	VOC		128.255	0.3330	0.000%	0.000%
Dimethylcyclohexane (1,1-)	VOC		112.213	0.2914	0.000%	0.000%
Ethylcyclopentane (1-methyl-t-3-)	VOC		112.213	0.2914	0.000%	0.000%
Ethylcyclopentane (1-methyl-c-3-)	VOC		112.213	0.2914	0.000%	0.000%
Ethylcyclopentane (1-methyl-t-2-)	VOC		112.213	0.2914	0.000%	0.000%
Trimethylhexane (2,2,4-)	VOC		128.255	0.3330	0.000%	0.000%
Ethylcyclopentane (1-methyl-t-1-)	VOC		112.213	0.2914	0.000%	0.000%
Cycloheptane	VOC		98.186	0.2549	0.000%	0.000%
Octane (n-)	VOC		114.229	0.2966	0.180%	0.750%
Trimethylhexane (2,4,4-)	VOC		128.255	0.3330	0.003%	0.015%
Tetramethylpentane (2,2,4,4-)	VOC		128.255	0.3330	0.000%	0.000%
Dimethylcyclohexane (1,t-3-)	VOC		112.213	0.2914	0.001%	0.004%
Dimethylcyclohexane (1,c-4-)	VOC		112.213	0.2914	0.001%	0.004%
Trimethylcyclopentane (1,c-2,c-3-)	VOC		112.213	0.2914	0.001%	0.004%
Propylcyclopentane (i-)	VOC		112.213	0.2914	0.006%	0.025%
Trimethylhexane (2,3,5-)	VOC		128.255	0.3330	0.000%	0.000%
Dimethylheptane (2,2-)	VOC		128.255	0.3330	0.000%	0.000%
Dimethylheptane (2,4-)	VOC		128.255	0.3330	0.003%	0.013%
Methylcyclopentane (1-ethyl-c-2-)	VOC		112.213	0.2914	0.003%	0.013%
Trimethylhexane (2,2,3-)	VOC		128.255	0.3330	0.000%	0.000%
Dimethylcyclohexane (1,c-2-)	VOC		112.213	0.2914	0.009%	0.036%
Dimethylheptane (2,6-)	VOC		128.255	0.3330	0.002%	0.009%
Propylcyclopentane (n-)	VOC		112.213	0.2914	0.000%	0.000%
Trimethylcyclohexane (1,c-3,c-5-)	VOC		126.239	0.3278	0.000%	0.000%
Ethylcyclohexane	VOC		112.213	0.2914	0.023%	0.096%
Dimethylheptane (2,5-)	VOC		128.255	0.3330	0.001%	0.005%
Dimethylheptane (3,5-)	VOC		128.255	0.3330	0.001%	0.005%
Trimethylcyclohexane (1,1,3-)	VOC		126.239	0.3278	0.001%	0.006%
Trimethylhexane (2,3,3-)	VOC		128.255	0.3330	0.001%	0.003%
Dimethylheptane (3,3-)	VOC		128.255	0.3330	0.001%	0.003%
Trimethylcyclohexane (1,1,4-)	VOC		126.239	0.3278	0.000%	0.000%

TABLE E-0b(ii)
Flash Analysis
Estimation of Specie Weight Percentages
Flash Gas

Component			Molecular Weight (lb/mol)$_i$	Density (lb/scf)$_i$	Mole Percent (mol$_i$/mol$_T$)	Weight Percent (lb$_i$/lb$_T$)
Name (i)	Type	HAP				
Tetramethylpentane (2,2,3,3-)	VOC		128.255	0.3330	0.004%	0.021%
Ethylbenzene	VOC	X	106.165	0.2757	0.007%	0.027%
Trimethylhexane (2,3,4-)	VOC		128.255	0.3330	0.000%	0.001%
Trimethylcyclohexane (1,t-2,t-4-)	VOC		126.239	0.3278	0.000%	0.000%
Dimethylheptane (2,3-)	VOC		128.255	0.3330	0.000%	0.000%
Trimethylcyclohexane (1,c-3,t-5-)	VOC		126.239	0.3278	0.000%	0.000%
Xylene (m-)	VOC	X	106.165	0.2757	0.042%	0.164%
Xylene (p-)	VOC	X	106.165	0.2757	0.042%	0.164%
Dimethylheptane (3,4-)	VOC		128.255	0.3330	0.002%	0.007%
Methyloctane (2-)	VOC		128.255	0.3330	0.013%	0.063%
Methyloctane (4-)	VOC		128.255	0.3330	0.013%	0.063%
Dimethylheptane (3,4-)	VOC		128.255	0.3330	0.000%	0.000%
Methyloctane (3-)	VOC		128.255	0.3330	0.000%	0.000%
Butylcyclopentane (i-)	VOC		126.239	0.3278	0.000%	0.000%
Trimethylcyclohexane (1,t-2,c-3-)	VOC		126.239	0.3278	0.004%	0.018%
Trimethylcyclohexane (1,t-2,c-4-)	VOC		126.239	0.3278	0.004%	0.018%
Xylene (o-)	VOC	X	106.165	0.2757	0.009%	0.036%
Trimethylcyclohexane (1,1,2-)	VOC		126.239	0.3278	0.000%	0.000%
Trimethylcyclohexane (1,c-2,t-4-)	VOC		126.239	0.3278	0.003%	0.016%
Trimethylcyclohexane (1,c-2,c-4-)	VOC		126.239	0.3278	0.000%	0.000%
Nonane (n-)	VOC		128.255	0.3330	0.050%	0.232%
Unknowns	VOC		**0.000**	0.0000	0.079%	0.000%
Flash Gas			27.376	0.0711	103.803%	103.803%
TOC (Total)			26.845	0.0697	100.501%	98.554%
VOC (Total)			62.943	0.1634	19.904%	45.764%
HAP (Total)			88.115	0.2288	0.762%	2.452%
Xylenes			106.165	0.2757	0.094%	0.365%

NOTES

1. Normalized mole percentages from TABLE E-0a(ii) to make total 100.000%.
2. Determined molecular weight of unknowns via iteration to match TABLE E-0a(i), unless value negative.

MW = 26.938 lb/lb-mol

TABLE E-0b(iii)
Flash Analysis
Estimation of Specie Weight Percentages
Residual Liquid

Component			Molecular	Density	Mole	Weight
Name (i)	Type	HAP	Weight $(lb/mol)_i$	$(lb/scf)_i$	Percent (mol_i/mol_T)	Percent (lb_i/lb_T)
Nitrogen			28.013	0.0727	0.000%	0.000%
Carbon Dioxide	GHG		44.010	0.1143	0.000%	0.000%
Methane	GHG		16.042	0.0417	0.000%	0.000%
Ethane			30.069	0.0781	0.000%	0.000%
Propane	VOC		44.096	0.1145	0.000%	0.000%
Butane (i-)	VOC		58.122	0.1509	0.000%	0.000%
Butane (n-)	VOC		58.122	0.1509	0.000%	0.000%
Pentane (i-)	VOC		72.149	0.1873	2.544%	1.430%
Pentane (n-)	VOC		72.149	0.1873	1.859%	1.045%
Dimethylbutane (2,2-)	VOC		86.175	0.2238	0.227%	0.152%
Dimethylbutane (2,3-)	VOC		86.175	0.2238	0.000%	0.000%
Cyclopentane	VOC		70.133	0.1821	0.000%	0.000%
Methylpentane (2-)	VOC		86.175	0.2238	1.586%	1.065%
Methylpentane (3-)	VOC		86.175	0.2238	1.188%	0.797%
Hexane (n-)	VOC	X	86.175	0.2238	2.522%	1.693%
Dimethylpentane (2,2-)	VOC		100.202	0.2602	0.430%	0.335%
Methylcyclopentane	VOC		84.159	0.2185	1.567%	1.027%
Dimethylpentane (2,4-)	VOC		100.202	0.2602	0.177%	0.138%
Trimethylbutane (2,2,3-)	VOC		100.202	0.2602	0.000%	0.000%
Benzene	VOC	X	78.112	0.2028	2.367%	1.440%
Dimethylpentane (3,3-)	VOC		100.202	0.2602	0.305%	0.238%
Cyclohexane	VOC		84.159	0.2185	1.528%	1.002%
Methylhexane (2-)	VOC		100.202	0.2602	3.167%	2.472%
Dimethylpentane (2,3-)	VOC		100.202	0.2602	0.000%	0.000%
Dimethylcyclopentane (1,1-)	VOC		98.186	0.2549	0.833%	0.637%
Methylhexane (3-)	VOC		100.202	0.2602	3.287%	2.566%
Dimethylcyclopentane (1,t-3-)	VOC		98.186	0.2549	0.225%	0.172%
Dimethylcyclopentane (1,c-3-)	VOC		98.186	0.2549	0.368%	0.281%
Ethylpentane (3-)	VOC		100.202	0.2602	0.040%	0.031%
Dimethylcyclopentane (1,t-2-)	VOC		98.186	0.2549	0.307%	0.235%
Trimethylpentane (2,2,4-)	VOC	X	114.229	0.2966	0.029%	0.026%
Heptane (n-)	VOC		100.202	0.2602	5.170%	4.036%
Methylcyclohexane	VOC		98.186	0.2549	4.647%	3.555%
Trimethylcyclopentane (1,1,3-)	VOC		112.213	0.2914	0.317%	0.277%
Dimethylhexane (2,2-)	VOC		114.229	0.2966	0.134%	0.119%
Dimethylcyclopentane (1,c-2-)	VOC		98.186	0.2549	1.194%	0.913%
Dimethylhexane (2,5-)	VOC		114.229	0.2966	0.000%	0.000%
Dimethylhexane (2,4-)	VOC		114.229	0.2966	0.201%	0.179%
Ethylcyclopentane	VOC		98.186	0.2549	0.653%	0.500%
Trimethylpentane (2,2,3-)	VOC		114.229	0.2966	0.039%	0.035%
Trimethylcyclopentane (1,t-2,c-4-)	VOC		112.213	0.2914	0.000%	0.000%
Dimethylhexane (3,3-)	VOC		114.229	0.2966	0.000%	0.000%
Trimethylcyclopentane (1,t-2,c-3-)	VOC		112.213	0.2914	0.000%	0.000%
Trimethylpentane (2,3,4-)	VOC		114.229	0.2966	0.000%	0.000%

TABLE E-0b(iii)
Flash Analysis
Estimation of Specie Weight Percentages
Residual Liquid

Component Name (i)	Type	HAP	Molecular Weight $(lb/mol)_i$	Density $(lb/scf)_i$	Mole Percent (mol_i/mol_T)	Weight Percent (lb_i/lb_T)
Dimethylhexane (2,3-)	VOC		114.229	0.2966	0.000%	0.000%
Toluene	VOC	X	92.138	0.2392	6.256%	4.491%
Trimethylcyclopentane (1,1,2-)	VOC		112.213	0.2914	0.522%	0.457%
Dimethylhexane (3,4-)	VOC		114.229	0.2966	4.934%	4.391%
Methylheptane (2-)	VOC		114.229	0.2966	0.000%	0.000%
Methylheptane (4-)	VOC		114.229	0.2966	4.077%	3.628%
Dimethylhexane (3,4-)	VOC		114.229	0.2966	0.000%	0.000%
Methylheptane (3-)	VOC		114.229	0.2966	0.586%	0.521%
Ethylhexane (3-)	VOC		114.229	0.2966	0.156%	0.139%
Trimethylcyclopentane (1,c-2,t-4-)	VOC		112.213	0.2914	0.039%	0.034%
Dimethylcyclohexane (1,c-3-)	VOC		112.213	0.2914	0.239%	0.209%
Trimethylcyclopentane (1,c-2,t-3-)	VOC		112.213	0.2914	0.239%	0.209%
Dimethylcyclohexane (1,t-4-)	VOC		112.213	0.2914	0.000%	0.000%
Trimethylhexane (2,2,5-)	VOC		128.255	0.3330	0.000%	0.000%
Dimethylcyclohexane (1,1-)	VOC		112.213	0.2914	0.000%	0.000%
Ethylcyclopentane (1-methyl-t-3-)	VOC		112.213	0.2914	0.000%	0.000%
Ethylcyclopentane (1-methyl-c-3-)	VOC		112.213	0.2914	0.000%	0.000%
Ethylcyclopentane (1-methyl-t-2-)	VOC		112.213	0.2914	0.000%	0.000%
Trimethylhexane (2,2,4-)	VOC		128.255	0.3330	0.000%	0.000%
Ethylcyclopentane (1-methyl-t-1-)	VOC		112.213	0.2914	0.000%	0.000%
Cycloheptane	VOC		98.186	0.2549	0.000%	0.000%
Octane (n-)	VOC		114.229	0.2966	6.155%	5.477%
Trimethylhexane (2,4,4-)	VOC		128.255	0.3330	0.269%	0.269%
Tetramethylpentane (2,2,4,4-)	VOC		128.255	0.3330	0.000%	0.000%
Dimethylcyclohexane (1,t-3-)	VOC		112.213	0.2914	0.075%	0.066%
Dimethylcyclohexane (1,c-4-)	VOC		112.213	0.2914	0.075%	0.066%
Trimethylcyclopentane (1,c-2,c-3-)	VOC		112.213	0.2914	0.075%	0.066%
Propylcyclopentane (i-)	VOC		112.213	0.2914	0.493%	0.431%
Trimethylhexane (2,3,5-)	VOC		128.255	0.3330	0.009%	0.009%
Dimethylheptane (2,2-)	VOC		128.255	0.3330	0.000%	0.000%
Dimethylheptane (2,4-)	VOC		128.255	0.3330	0.224%	0.224%
Methylcyclopentane (1-ethyl-c-2-)	VOC		112.213	0.2914	0.257%	0.224%
Trimethylhexane (2,2,3-)	VOC		128.255	0.3330	0.000%	0.000%
Dimethylcyclohexane (1,c-2-)	VOC		112.213	0.2914	0.723%	0.632%
Dimethylheptane (2,6-)	VOC		128.255	0.3330	0.159%	0.159%
Propylcyclopentane (n-)	VOC		112.213	0.2914	0.000%	0.000%
Trimethylcyclohexane (1,c-3,c-5-)	VOC		126.239	0.3278	0.000%	0.000%
Ethylcyclohexane	VOC		112.213	0.2914	1.935%	1.692%
Dimethylheptane (2,5-)	VOC		128.255	0.3330	0.095%	0.095%
Dimethylheptane (3,5-)	VOC		128.255	0.3330	0.095%	0.095%
Trimethylcyclohexane (1,1,3-)	VOC		126.239	0.3278	0.109%	0.107%
Trimethylhexane (2,3,3-)	VOC		128.255	0.3330	0.054%	0.054%
Dimethylheptane (3,3-)	VOC		128.255	0.3330	0.054%	0.054%
Trimethylcyclohexane (1,1,4-)	VOC		126.239	0.3278	0.000%	0.000%

TABLE E-0b(iii)
Flash Analysis
Estimation of Specie Weight Percentages
Residual Liquid

Component			Molecular	Density	Mole	Weight
Name (i)	Type	HAP	Weight (lb/mol)$_i$	(lb/scf)$_i$	Percent (mol$_i$/mol$_T$)	Percent (lb$_i$/lb$_T$)
Tetramethylpentane (2,2,3,3-)	VOC		128.255	0.3330	0.370%	0.370%
Ethylbenzene	VOC	X	106.165	0.2757	0.576%	0.476%
Trimethylhexane (2,3,4-)	VOC		128.255	0.3330	0.010%	0.010%
Trimethylcyclohexane (1,t-2,t-4-)	VOC		126.239	0.3278	0.000%	0.000%
Dimethylheptane (2,3-)	VOC		128.255	0.3330	0.000%	0.000%
Trimethylcyclohexane (1,c-3,t-5-)	VOC		126.239	0.3278	0.000%	0.000%
Xylene (m-)	VOC	X	106.165	0.2757	3.491%	2.887%
Xylene (p-)	VOC	X	106.165	0.2757	3.491%	2.887%
Dimethylheptane (3,4-)	VOC		128.255	0.3330	0.130%	0.130%
Methyloctane (2-)	VOC		128.255	0.3330	1.109%	1.108%
Methyloctane (4-)	VOC		128.255	0.3330	1.109%	1.108%
Dimethylheptane (3,4-)	VOC		128.255	0.3330	0.000%	0.000%
Methyloctane (3-)	VOC		128.255	0.3330	0.000%	0.000%
Butylcyclopentane (i-)	VOC		126.239	0.3278	0.000%	0.000%
Trimethylcyclohexane (1,t-2,c-3-)	VOC		126.239	0.3278	0.328%	0.322%
Trimethylcyclohexane (1,t-2,c-4-)	VOC		126.239	0.3278	0.328%	0.322%
Xylene (o-)	VOC	X	106.165	0.2757	0.776%	0.641%
Trimethylcyclohexane (1,1,2-)	VOC		126.239	0.3278	0.000%	0.000%
Trimethylcyclohexane (1,c-2,t-4-)	VOC		126.239	0.3278	0.284%	0.279%
Trimethylcyclohexane (1,c-2,c-4-)	VOC		126.239	0.3278	0.000%	0.000%
Nonane (n-)	VOC		128.255	0.3330	4.089%	4.086%
Unknowns	VOC		**263.361**	0.6838	15.292%	31.375%
Residual Liquid			128.362	0.3333	96.197%	96.197%
TOC (Total)			128.362	0.3333	96.197%	96.197%
VOC (Total)			128.362	0.3333	96.197%	96.197%
HAP (Total)			92.587	0.2404	10.159%	7.327%
Xylenes			106.165	0.2757	7.757%	6.416%

NOTES

1. Normalized mole percentages from TABLE E-0a(ii) to make total 100.000%.
2. Determined molecular weight of unknowns via iteration to match TABLE E-0a(i).

MW = 128.362 lb/lb-mol

TABLE B-2
Volatile Organic Liquids Storage Tanks
Maximum Hourly and Annual Emission Estimates

Source			TK04A or TK04B			
Service			Pipeline Liquids			
Molecular Weight	Liquid	M_L	**92.00** lb/lb-mol			
	Vapor	M_V	**62.00** lb/lb-mol			
Vapor Pressure	Monthly (Max.)	P_{max}	**10.7470** psia			
	Annual (Avg.)	P_{avg}	**6.8405** psia			
Capacity		V	1,500 gal			
Maximum Pumping Rate		Q_{pump}	150 gal/min			
		$Q_{m-h} = \min(V, Q_{pump})$	1,500 gal/hr			
Annual Throughput		N	16.00 turnover/yr			
		$Q_{m-a} = Q_a/(12\ months/year)$	2,000 gal/month			
		$Q_a = V(N)$	24,000 gal/yr			
Standing Losses	Monthly (Max.)		**July**			
		HRS_{m-m}	744 hrs/month			
		SL_{m-m}	**185.91** lbs/month			
		$SL_{m-h} = SL_{m-m}/HRS_{m-m}$	0.2499 lb/hr			
	Annual (Avg.)	SL_a	**1,103.98** lb/yr			
		$SL_{a-a} = SL_a/(8760\ hours/year)$	0.1260 lb/hr			
Working Losses	Monthly (Max)	WL_{m-m}	**25.41** lbs/month			
		$WL_{m-h} = WL_{m-m}/Q_{m-a}$	0.0127 lb/gal	Emissions		
	Annual (Avg.)	WL_a	**242.35** lb/yr	lb/hr		tpy
		$WL_{a-a} = WL_a/Q_a$	0.0101 lb/gal	(Max)	(Avg)	(Annual)
Total Losses	VOC (Total)		100.00% by weight	19.3069 lb/hr	0.1537 lb/hr	0.6732 tpy
	Benzene		0.44% by weight	0.0850 lb/hr	0.0007 lb/hr	0.0030 tpy
	Hexane (n-)		0.93% by weight	0.1789 lb/hr	0.0014 lb/hr	0.0062 tpy
	Methanol					
	Toluene		0.17% by weight	0.0331 lb/hr	0.0003 lb/hr	0.0012 tpy
	Xylenes		0.04% by weight	0.0080 lb/hr	0.0001 lb/hr	0.0003 tpy

NOTES

1. USEPA TANKS 4.09b (data from output file is listed in **bold**).
2. Emissions are estimated as follows:
   a. Hourly = $wt\%(SL_{m-h} + Q_{m-h}WL_{m-h})$
   b. Annual = $wt\%(SL_a + WL_a)/(2000\ lb/ton)$
3. In an effort to be conservative, the physical properties of gasoline (RVP 13) are used to estimate emissions.

Attachment 2

Tanks ACC3A-3F Example Tank PTE Emission

TANKS 4.0.9d
Emissions Report - Detail Format
Tank Indentification and Physical Characteristics

Identification	
User Identification:	ACCI-TK-WWME01
City:	Accident
State:	Maryland
Company:	Texas Eastern Transmission, L.P.
Type of Tank:	Vertical Fixed Roof Tank
Description:	Wastewater w/ Methanol
Tank Dimensions	
Shell Height (ft):	15.00
Diameter (ft):	10.00
Liquid Height (ft) :	15.00
Avg. Liquid Height (ft):	7.50
Volume (gallons):	8,800.00
Turnovers:	12.00
Net Throughput(gal/yr):	105,600.00
Is Tank Heated (y/n):	N
Paint Characteristics	
Shell Color/Shade:	Gray/Light
Shell Condition	Good
Roof Color/Shade:	Gray/Light
Roof Condition:	Good
Roof Characteristics	
Type:	Dome
Height (ft)	1.34
Radius (ft) (Dome Roof)	10.00
Breather Vent Settings	
Vacuum Settings (psig):	-0.03
Pressure Settings (psig)	0.03

Meterological Data used in Emissions Calculations: Pittsburgh, Pennsylvania (Avg Atmospheric Pressure = 14.11 psia)

TANKS 4.0.9d
Emissions Report - Detail Format
Liquid Contents of Storage Tank

ACCI-TK-WWME01 - Vertical Fixed Roof Tank
Accident, Maryland

Mixture/Component	Month	Daily Liquid Surf. Temperature (deg F) Avg	Min	Max	Liquid Bulk Temp (deg F)	Vapor Pressure (psia) Avg	Min	Max	Vapor Mol. Weight	Liquid Mass Fract.	Vapor Mass Fract.	Mol. Weight	Basis for Vapor Pressure Calculations
Methyl alcohol	Jan	43.26	38.44	48.09	52.55	0.8338	0.7063	0.9806	32.0400			32.04	Option 2: A=7.897, B=1474.08, C=229.13
Methyl alcohol	Feb	45.40	39.41	51.39	52.55	0.8963	0.7304	1.0937	32.0400			32.04	Option 2: A=7.897, B=1474.08, C=229.13
Methyl alcohol	Mar	51.53	43.85	59.21	52.55	1.0987	0.8505	1.4066	32.0400			32.04	Option 2: A=7.897, B=1474.08, C=229.13
Methyl alcohol	Apr	57.42	48.06	66.78	52.55	1.3290	0.9799	1.7797	32.0400			32.04	Option 2: A=7.897, B=1474.08, C=229.13
Methyl alcohol	May	63.01	52.45	73.57	52.55	1.5846	1.1324	2.1830	32.0400			32.04	Option 2: A=7.897, B=1474.08, C=229.13
Methyl alcohol	Jun	67.50	56.28	78.73	52.55	1.8192	1.2813	2.5391	32.0400			32.04	Option 2: A=7.897, B=1474.08, C=229.13
Methyl alcohol	Jul	69.18	58.29	80.07	52.55	1.9140	1.3660	2.6395	32.0400			32.04	Option 2: A=7.897, B=1474.08, C=229.13
Methyl alcohol	Aug	67.54	57.55	77.53	52.55	1.8214	1.3343	2.4528	32.0400			32.04	Option 2: A=7.897, B=1474.08, C=229.13
Methyl alcohol	Sep	63.23	54.45	72.01	52.55	1.5952	1.2080	2.0840	32.0400			32.04	Option 2: A=7.897, B=1474.08, C=229.13
Methyl alcohol	Oct	56.57	49.31	63.84	52.55	1.2935	1.0214	1.6256	32.0400			32.04	Option 2: A=7.897, B=1474.08, C=229.13
Methyl alcohol	Nov	50.49	45.37	55.62	52.55	1.0620	0.8952	1.2547	32.0400			32.04	Option 2: A=7.897, B=1474.08, C=229.13
Methyl alcohol	Dec	45.19	40.95	49.43	52.55	0.8900	0.7702	1.0255	32.0400			32.04	Option 2: A=7.897, B=1474.08, C=229.13

TANKS 4.0.9d
Emissions Report - Detail Format
Detail Calculations (AP-42)

ACCI-TK-WWME01 - Vertical Fixed Roof Tank
Accident, Maryland

Month:	January	February	March	April	May	June	July	August	September	October	November	December
Standing Losses (lb):	3.9481	4.8353	8.5073	12.2303	17.0940	20.2849	21.4008	18.5997	13.7451	9.4297	5.1834	3.6625
Vapor Space Volume (cu ft):	642.9301	642.9301	642.9301	642.9301	642.9301	642.9301	642.9301	642.9301	642.9301	642.9301	642.9301	642.9301
Vapor Density (lb/cu ft):	0.0049	0.0053	0.0064	0.0077	0.0091	0.0103	0.0108	0.0103	0.0091	0.0075	0.0062	0.0053
Vapor Space Expansion Factor:	0.0545	0.0704	0.0982	0.1303	0.1599	0.1826	0.1819	0.1620	0.1324	0.0987	0.0632	0.0484
Vented Vapor Saturation Factor:	0.7344	0.7200	0.6772	0.6343	0.5926	0.5589	0.5463	0.5586	0.5910	0.6405	0.6846	0.7214
Tank Vapor Space Volume:												
Vapor Space Volume (cu ft):	642.9301	642.9301	642.9301	642.9301	642.9301	642.9301	642.9301	642.9301	642.9301	642.9301	642.9301	642.9301
Tank Diameter (ft):	10.0000	10.0000	10.0000	10.0000	10.0000	10.0000	10.0000	10.0000	10.0000	10.0000	10.0000	10.0000
Vapor Space Outage (ft):	8.1860	8.1860	8.1860	8.1860	8.1860	8.1860	8.1860	8.1860	8.1860	8.1860	8.1860	8.1860
Tank Shell Height (ft):	15.0000	15.0000	15.0000	15.0000	15.0000	15.0000	15.0000	15.0000	15.0000	15.0000	15.0000	15.0000
Average Liquid Height (ft):	7.5000	7.5000	7.5000	7.5000	7.5000	7.5000	7.5000	7.5000	7.5000	7.5000	7.5000	7.5000
Roof Outage (ft):	0.6860	0.6860	0.6860	0.6860	0.6860	0.6860	0.6860	0.6860	0.6860	0.6860	0.6860	0.6860
Roof Outage (Dome Roof)												
Roof Outage (ft):	0.6860	0.6860	0.6860	0.6860	0.6860	0.6860	0.6860	0.6860	0.6860	0.6860	0.6860	0.6860
Dome Radius (ft):	10.0000	10.0000	10.0000	10.0000	10.0000	10.0000	10.0000	10.0000	10.0000	10.0000	10.0000	10.0000
Shell Radius (ft):	5.0000	5.0000	5.0000	5.0000	5.0000	5.0000	5.0000	5.0000	5.0000	5.0000	5.0000	5.0000
Vapor Density												
Vapor Density (lb/cu ft):	0.0049	0.0053	0.0064	0.0077	0.0091	0.0103	0.0108	0.0103	0.0091	0.0075	0.0062	0.0053
Vapor Molecular Weight (lb/lb-mole):	32.0400	32.0400	32.0400	32.0400	32.0400	32.0400	32.0400	32.0400	32.0400	32.0400	32.0400	32.0400
Vapor Pressure at Daily Average Liquid Surface Temperature (psia):	0.8338	0.8963	1.0987	1.3290	1.5846	1.8192	1.9140	1.8214	1.5952	1.2935	1.0620	0.8900
Daily Avg. Liquid Surface Temp. (deg. R):	502.9348	505.0702	511.2000	517.0926	522.6819	527.1711	528.8458	527.2106	522.8977	516.2446	510.1639	504.8614
Daily Average Ambient Temp. (deg. F):	26.1000	28.6000	39.4000	49.5500	59.5000	67.9000	72.1000	70.5000	63.9000	52.4000	42.2500	31.5000
Ideal Gas Constant R (psia cuft / (lb-mol-deg R)):	10.731	10.731	10.731	10.731	10.731	10.731	10.731	10.731	10.731	10.731	10.731	10.731
Liquid Bulk Temperature (deg. R):	512.2183	512.2183	512.2183	512.2183	512.2183	512.2183	512.2183	512.2183	512.2183	512.2183	512.2183	512.2183
Tank Paint Solar Absorptance (Shell):	0.5400	0.5400	0.5400	0.5400	0.5400	0.5400	0.5400	0.5400	0.5400	0.5400	0.5400	0.5400
Tank Paint Solar Absorptance (Roof):	0.5400	0.5400	0.5400	0.5400	0.5400	0.5400	0.5400	0.5400	0.5400	0.5400	0.5400	0.5400
Daily Total Solar Insulation Factor (Btu/sqft day):	551.7325	794.4441	1,117.4249	1,451.8275	1,735.7842	1,921.7044	1,881.0938	1,662.8121	1,332.5340	959.1072	580.6041	446.3989
Vapor Space Expansion Factor												
Vapor Space Expansion Factor:	0.0545	0.0704	0.0982	0.1303	0.1599	0.1826	0.1819	0.1620	0.1324	0.0987	0.0632	0.0484
Daily Vapor Temperature Range (deg. R):	19.2862	23.9640	30.7195	37.4316	42.2291	44.8962	43.5621	39.9737	35.1239	29.0457	20.5147	16.9736
Daily Vapor Pressure Range (psia):	0.2744	0.3633	0.5561	0.7997	1.0506	1.2578	1.2734	1.1184	0.8760	0.6042	0.3594	0.2553
Breather Vent Press. Setting Range(psia):	0.0600	0.0600	0.0600	0.0600	0.0600	0.0600	0.0600	0.0600	0.0600	0.0600	0.0600	0.0600
Vapor Pressure at Daily Average Liquid Surface Temperature (psia):	0.8338	0.8963	1.0987	1.3290	1.5846	1.8192	1.9140	1.8214	1.5952	1.2935	1.0620	0.8900
Vapor Pressure at Daily Minimum Liquid Surface Temperature (psia):	0.7063	0.7304	0.8505	0.9799	1.1324	1.2813	1.3660	1.3343	1.2080	1.0214	0.8952	0.7702
Vapor Pressure at Daily Maximum Liquid Surface Temperature (psia):	0.9806	1.0937	1.4066	1.7797	2.1830	2.5391	2.6395	2.4528	2.0840	1.6256	1.2547	1.0255
Daily Avg. Liquid Surface Temp. (deg R):	502.9348	505.0702	511.2000	517.0926	522.6819	527.1711	528.8458	527.2106	522.8977	516.2446	510.1639	504.8614
Daily Min. Liquid Surface Temp. (deg R):	498.1132	499.0792	503.5201	507.7347	512.1247	515.9470	517.9553	517.2172	514.1167	508.9832	505.0352	500.6180
Daily Max. Liquid Surface Temp. (deg R):	507.7563	511.0612	518.8799	526.4505	533.2392	538.3951	539.7363	537.2041	531.6786	523.5060	515.2926	509.1048
Daily Ambient Temp. Range (deg. R):	15.2000	16.6000	19.2000	21.5000	22.2000	22.0000	21.0000	20.6000	20.8000	20.2000	16.3000	14.2000
Vented Vapor Saturation Factor												
Vented Vapor Saturation Factor:	0.7344	0.7200	0.6772	0.6343	0.5926	0.5589	0.5463	0.5586	0.5910	0.6405	0.6846	0.7214
Vapor Pressure at Daily Average Liquid Surface Temperature (psia):	0.8338	0.8963	1.0987	1.3290	1.5846	1.8192	1.9140	1.8214	1.5952	1.2935	1.0620	0.8900
Vapor Space Outage (ft):	8.1860	8.1860	8.1860	8.1860	8.1860	8.1860	8.1860	8.1860	8.1860	8.1860	8.1860	8.1860
Working Losses (lb):	5.5973	6.0170	7.3756	8.9220	10.6376	12.2126	12.8492	12.2274	10.7091	8.6837	7.1290	5.9748

Vapor Molecular Weight (lb/lb-mole):	32.0400	32.0400	32.0400	32.0400	32.0400	32.0400	32.0400	32.0400	32.0400	32.0400	32.0400	32.0400
Vapor Pressure at Daily Average Liquid Surface Temperature (psia):	0.8338	0.8963	1.0987	1.3290	1.5846	1.8192	1.9140	1.8214	1.5952	1.2935	1.0620	0.8900
Net Throughput (gal/mo.):	8,800.0000	8,800.0000	8,800.0000	8,800.0000	8,800.0000	8,800.0000	8,800.0000	8,800.0000	8,800.0000	8,800.0000	8,800.0000	8,800.0000
Annual Turnovers:	12.0000	12.0000	12.0000	12.0000	12.0000	12.0000	12.0000	12.0000	12.0000	12.0000	12.0000	12.0000
Turnover Factor:	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Maximum Liquid Volume (gal):	8,800.0000	8,800.0000	8,800.0000	8,800.0000	8,800.0000	8,800.0000	8,800.0000	8,800.0000	8,800.0000	8,800.0000	8,800.0000	8,800.0000
Maximum Liquid Height (ft):	15.0000	15.0000	15.0000	15.0000	15.0000	15.0000	15.0000	15.0000	15.0000	15.0000	15.0000	15.0000
Tank Diameter (ft):	10.0000	10.0000	10.0000	10.0000	10.0000	10.0000	10.0000	10.0000	10.0000	10.0000	10.0000	10.0000
Working Loss Product Factor:	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total Losses (lb)	9.5454	10.8523	15.8830	21.1523	27.7316	32.4976	34.2499	30.8270	24.4542	18.1134	12.3124	9.6373

TANKS 4.0.9d
Emissions Report - Detail Format
Individual Tank Emission Totals

Emissions Report for: January, February, March, April, May, June, July, August, September, October, November, December

ACCI-TK-WWME01 - Vertical Fixed Roof Tank
Accident, Maryland

	Losses(lbs)		
Components	Working Loss	Breathing Loss	Total Emissions
Methyl alcohol	108.34	138.92	247.26

TABLE F-0
Volatile Organic Liquid Storage Tanks
Vapor Physical Property and Composition Estimates
Raoult's Law

Component Data													Liquid Data		Vapor Data	
Component			MW	Yaws Vapor Pressure Coefficients							VP Datum		mol%	wt%	y_i	wt%$_i$
Name (i)	Type	HAP	(lb/mol)$_i$ M_i	A	B	C	D	E	T_{Min} (°F)	T_{Max} (°F)	T (°F)	P_i (psia)	(mol_i/mol_L) f_{v-i}	(lb_i/lb_L) f_{m-i}	(mol_i/mol_V)	(lb_i/lb_V)
Water			18.015	4.6543	1.4353E+03	-6.4848E+01			1.04	212.00	56.69	0.2238	99.947%	99.789%	99.775%	99.183%
Methanol	VOC	X	32.042	45.6171	-3.2447E+03	-1.3988E+01	6.6365E-03	-1.0507E-13	-144.40	464.00	56.69	1.3103	0.011%	0.019%	0.064%	0.113%
Benzene	VOC	X	78.112	31.7718	-2.7254E+03	-8.4443E+00	-5.3534E-09	2.7187E-06	42.80	552.20	56.69	1.0642	0.031%	0.135%	0.148%	0.638%
Toluene	VOC	X	92.138	34.0775	-3.0379E+03	-9.1635E+00	1.0289E-11	2.7035E-06	-139.00	606.20	56.69	0.2982	0.009%	0.047%	0.012%	0.062%
Ethylbenzene	VOC	X	106.165	36.1998	-3.3402E+03	-9.7970E+00	-1.1467E-11	2.5758E-06	-139.00	651.20	56.69	0.0945	0.000%	0.001%	0.000%	0.000%
Xylene (m-)	VOC	X	106.165	34.6803	-3.2981E+03	-9.2570E+00	-4.3563E-10	-2.4103E-06	-54.40	649.40	56.69	0.0331	0.000%	0.000%	0.000%	0.000%
Xylene (p-)	VOC	X	106.165	60.0531	-4.0159E+03	-1.9441E+01	8.2881E-03	-2.3647E-12	55.40	649.40	56.69	0.0865	0.001%	0.007%	0.000%	0.003%
Xylene (o-)	VOC	X	106.165	37.2413	-3.4573E+03	-1.0126E+01	9.0676E-11	2.6123E-06	-13.00	674.60	56.69	0.0635	0.000%	0.000%	0.000%	0.000%
Trimethylbenzene (1,2,4-)	VOC		120.192	2.1667	-2.6318E+03	4.0350E+00	-1.1776E-02	6.0956E-06	-47.20	708.80	56.69	0.0208	0.000%	0.001%	0.000%	0.000%
Wastewater	Liquid	18.044 lb/lb-mol		Vapor	56.69 °F		0.2242 psia		18.123 lb/lb-mol				100.000%	100.000%	100.000%	100.000%
TOC (Total)	Liquid	71.955 lb/lb-mol		Vapor	56.69 °F		0.9517 psia		65.887 lb/lb-mol				0.053%	0.211%	0.225%	0.817%
VOC (Total)	Liquid	71.955 lb/lb-mol		Vapor	56.69 °F		0.9517 psia		65.887 lb/lb-mol				0.053%	0.211%	0.225%	0.817%
HAP (Total)	Liquid	71.809 lb/lb-mol		Vapor	56.69 °F		0.9546 psia		65.883 lb/lb-mol				0.053%	0.210%	0.225%	0.817%
Xylenes	Liquid	106.165 lb/lb-mol		Vapor	56.69 °F		0.0865 psia		106.165 lb/lb-mol				0.001%	0.007%	0.000%	0.003%

NOTES

1. Liquid composition of wastewater based on Accutest Laboratories analysis of sample collected on 08/29/2011.

TABLE F-0
Volatile Organic Liquid Storage Tanks
Vapor Physical Property and Composition Estimates
Raoult's Law

Component Data													Liquid Data		Vapor Data	
Component			MW	Yaws Vapor Pressure Coefficients							VP Datum		mol%	wt%	y_i	wt%$_i$
Name (i)	Type	HAP	(lb/mol)$_i$ M_i	A	B	C	D	E	T_{Min} (°F)	T_{Max} (°F)	T (°F)	P_i (psia)	(mol$_i$/mol$_L$) $f_{v\text{-}i}$	(lb$_i$/lb$_L$) $f_{m\text{-}i}$	(mol$_i$/mol$_V$)	(lb$_i$/lb$_V$)
Water			18.015	4.6543	1.4353E+03	-6.4848E+01			1.04	212.00	80.07	0.5099	99.947%	99.789%	99.811%	99.319%
Methanol	VOC	X	32.042	45.6171	-3.2447E+03	-1.3988E+01	6.6365E-03	-1.0507E-13	-144.40	464.00	80.07	2.6592	0.011%	0.019%	0.057%	0.100%
Benzene	VOC	X	78.112	31.7718	-2.7254E+03	-8.4443E+00	-5.3534E-09	2.7187E-06	42.80	552.20	80.07	1.9820	0.031%	0.135%	0.121%	0.523%
Toluene	VOC	X	92.138	34.0775	-3.0379E+03	-9.1635E+00	1.0289E-11	2.7035E-06	-139.00	606.20	80.07	0.5995	0.009%	0.047%	0.011%	0.055%
Ethylbenzene	VOC	X	106.165	36.1998	-3.3402E+03	-9.7970E+00	-1.1467E-11	2.5758E-06	-139.00	651.20	80.07	0.2048	0.000%	0.001%	0.000%	0.000%
Xylene (m-)	VOC	X	106.165	34.6803	-3.2981E+03	-9.2570E+00	-4.3563E-10	-2.4103E-06	-54.40	649.40	80.07	0.0663	0.000%	0.000%	0.000%	0.000%
Xylene (p-)	VOC	X	106.165	60.0531	-4.0159E+03	-1.9441E+01	8.2881E-03	-2.3647E-12	55.40	649.40	80.07	0.1894	0.001%	0.007%	0.000%	0.003%
Xylene (o-)	VOC	X	106.165	37.2413	-3.4573E+03	-1.0126E+01	9.0676E-11	2.6123E-06	-13.00	674.60	80.07	0.1414	0.000%	0.000%	0.000%	0.000%
Trimethylbenzene (1,2,4-)	VOC		120.192	2.1667	-2.6318E+03	4.0350E+00	-1.1776E-02	6.0956E-06	-47.20	708.80	80.07	0.0486	0.000%	0.001%	0.000%	0.000%
Wastewater	Liquid	18.044 lb/lb-mol		Vapor	80.07 °F		0.5106 psia		18.105 lb/lb-mol				100.000%	100.000%	100.000%	100.000%
TOC (Total)	Liquid	71.955 lb/lb-mol		Vapor	80.07 °F		1.8261 psia		65.180 lb/lb-mol				0.053%	0.211%	0.189%	0.681%
VOC (Total)	Liquid	71.955 lb/lb-mol		Vapor	80.07 °F		1.8261 psia		65.180 lb/lb-mol				0.053%	0.211%	0.189%	0.681%
HAP (Total)	Liquid	71.809 lb/lb-mol		Vapor	80.07 °F		1.8315 psia		65.175 lb/lb-mol				0.053%	0.210%	0.189%	0.681%
Xylenes	Liquid	106.165 lb/lb-mol		Vapor	80.07 °F		0.1894 psia		106.165 lb/lb-mol				0.001%	0.007%	0.000%	0.003%

NOTES

1. Liquid composition of wastewater based on Accutest Laboratories analysis of sample collected on 08/29/2011.

TABLE F-1A
Volatile Organic Liquids Storage Tanks
Hourly and Annual Emission Estimates
Standing & Working Losses

Source		ACCI-TK-WWME01				
Service		Wastewater w/ Methanol				
Capacity		8,800 gal			8,800 gal	
Temperature of Stored Liquid		56.69 °F			80.07 °F	
Vapor Pressure		1.3448 psia			2.6395 psia	
Pumping Rate		135 gal/min			135 gal/min	
Throughput		8.00 turnover/yr				
		70,400 gal/yr			1,760 gal/hr	
Standing Losses					**July**	
					744 hrs/month	
					21.4008 lbs/month	
		138.9211 lb/yr			0.0288 lb/hr	
Working Losses		**1.03E-03** lb/gal			**1.46E-03** lb/gal	
		72.2236 lb/yr	Average	Maximum	2.5698 lb/hr	Maximum
Wastewater	Stand	12243.39% by weight	1.9416 lb/hr	8.5043 tpy	14675.07% by weight	4.2212 lb/hr
	Work		1.0094 lb/hr	4.4213 tpy		377.1243 lb/hr
	Total		2.9511 lb/hr	12.9256 tpy		381.3455 lb/hr
CO_{2-e}						
CO_2						
TOC (Total)		100.00% by weight	0.0241 lb/hr	0.1056 tpy	100.00% by weight	2.5986 lb/hr
Methane						
Ethane						
VOC (Total)		100.00% by weight	0.0241 lb/hr	0.1056 tpy	100.00% by weight	2.5986 lb/hr
HAP (Total)		99.99% by weight	0.0241 lb/hr	0.1056 tpy	99.99% by weight	2.5982 lb/hr
Benzene		78.1563% by weight	0.0188 lb/hr	0.0825 tpy	76.6854% by weight	1.9927 lb/hr
Ethylbenzene		0.0490% by weight	0.0000 lb/hr	0.0001 tpy	0.0559% by weight	0.0015 lb/hr
Hexane (n-)						
Methanol		13.7904% by weight	0.0033 lb/hr	0.0146 tpy	14.7446% by weight	0.3832 lb/hr
Naphthalene						
Toluene		7.6409% by weight	0.0018 lb/hr	0.0081 tpy	8.0940% by weight	0.2103 lb/hr
Trimethylpentane (2,2,4-)						
Xylenes		0.3514% by weight	0.0001 lb/hr	0.0004 tpy	0.4054% by weight	0.0105 lb/hr

NOTES

1. Tank Characteristics: TANKS 4.09d

Orientation	Vertical Fixed Roof Tank	Above Ground?	Yes
Height/Length	15.00 ft	Shell/Roof Color	Gray/Light or less solar absorptance
Diameter	10.00 ft	Shell Condition	Good
Capacity (estimated)	8,813 gal	Vacuum Setting	-0.03 psig
Capacity (nominal)	8,800 gal	Pressure Setting	0.03 psig

2. Stored Liquid Characteristics:

Basis	USEPA TANKS 4.09d	MET Station:	Pittsburgh, Pennsylvania
Material	Methyl alcohol	Selection based on VOC vapor pressure (see TABLE F-0).	
Liquid Molecular Weight	32.04 lb/lb-mol	Vapor Molecular Weight	32.04 lb/lb-mol

Monthly Data

	Days	Vapor Pressure		Liquid Surface Temperature		TANKS Output		TANKS
		avg	max	avg	max	standing	working	Flow
January	31	0.8338	0.9806	43.26	48.09	3.9481	5.5973	8,800
February	28	0.8963	1.0937	45.40	51.39	4.8353	6.0170	8,800
March	31	1.0987	1.4066	51.53	59.21	8.5073	7.3756	8,800
April	30	1.3290	1.7797	57.42	66.78	12.2303	8.9220	8,800
May	31	1.5846	2.1830	63.01	73.57	17.0940	10.6376	8,800
June	30	1.8192	2.5391	67.50	78.73	20.2849	12.2126	8,800
July	31	1.9140	2.6395	69.18	80.07	21.4008	12.8492	8,800
August	31	1.8214	2.4528	67.54	77.53	18.5997	12.2274	8,800
September	30	1.5952	2.0840	63.23	72.01	13.7451	10.7091	8,800
October	31	1.2935	1.6256	56.57	63.84	9.4297	8.6837	8,800
November	30	1.0620	1.2547	50.49	55.62	5.1834	7.1290	8,800
December	31	0.8900	1.0255	45.19	49.43	3.6625	5.9748	8,800
ALL	365	1.3448	2.6395	56.69	80.07	138.9211	108.3354	105,600

3. Emission Estimate Basis: USEPA TANKS 4.09d & TCEQ RG-166/01
4. Speciation of emissions is based on vapor weight percentages in TABLE F-0 normalized on VOC to assure methodology is conservative.

TABLE F-1B
Volatile Organic Liquids Loading (Tanker Trucks)
Hourly and Annual Emission Estimates

Source	ACCI-TL-WWME				
Supply Vessel	ACCI-TK-WWME01 thru ACCI-TK-WWME06				
	Wastewater w/ Methanol				
	52,800 gal			52,800 gal	
Tanker Truck Service	Vapor Balance			Vapor Balance	
Loading Method	Submerged			Submerged	
Saturation Factor	1.00 n.d.			1.00 n.d.	
Vapor Molecular Weight	32.04 lb/lb-mol			32.04 lb/lb-mol	
Bulk Liquid Temperature	56.69 °F			80.07 °F	
	516.69 R			540.07 R	
Vapor Pressure	1.3448 psia			2.6395 psia	
Loading Loss Factor	1.0391 lb/kgal			1.9511 lb/kgal	
Pumping Rate				150 gpm	
Throughput	8.00 turnover/yr				
	422,400 gal/yr			9,000 gal/hr	
Loading Losses	438.8982 lb/yr	Average	Maximum	17.5598 lb/hr	Maximum
Wastewater	12243.39% by weight	6.1342 lb/hr	26.8680 tpy	14675.07% by weight	2576.9130 lb/hr
$CO_{2\text{-}e}$					
CO_2					
TOC (Total)	100.00% by weight	0.0501 lb/hr	0.2194 tpy	100.00% by weight	17.5598 lb/hr
Methane					
Ethane					
VOC (Total)	100.00% by weight	0.0501 lb/hr	0.2194 tpy	100.00% by weight	17.5598 lb/hr
HAP (Total)	99.99% by weight	0.0501 lb/hr	0.2194 tpy	99.99% by weight	17.5572 lb/hr
Benzene	78.1563% by weight	3.92E-02 lb/hr	1.72E-01 tpy	76.6854% by weight	1.35E+01 lb/hr
Ethylbenzene	0.0490% by weight	2.45E-05 lb/hr	1.07E-04 tpy	0.0559% by weight	9.82E-03 lb/hr
Hexane (n-)					
Methanol	13.7904% by weight	6.91E-03 lb/hr	3.03E-02 tpy	14.7446% by weight	2.59E+00 lb/hr
Naphthalene					
Toluene	7.6409% by weight	3.83E-03 lb/hr	1.68E-02 tpy	8.0940% by weight	1.42E+00 lb/hr
Trimethylpentane (2,2,4-)					
Xylenes	0.3514% by weight	1.76E-04 lb/hr	7.71E-04 tpy	0.4054% by weight	7.12E-02 lb/hr

NOTES

1. Emissions calculated using methods provided in USEPA, AP-42 Section 5.2 dated 1/95. $L_L = 12.46[(S)M_VP/T]$
2. Physical property, throughput and speciation data based data from supply vessel emission calculation spreadsheet.

Attachment 3

24,340 gallon Wastewater/Methanol Storage Tank PTE Emission
November 16, 2011Request for Determination – NSPS Kb Applicability

title: 10/MD/Accident/Air/Permit/App/

5320 Spectrum Drive | Suite A | Frederick, MD 21703 | P (240) 379-7490 | F (240) 379-7491
trinityconsultants.com

Trinity Consultants

November 16, 2011

Mr. William Paul
Chief, Combustion & Metallurgical Division
Air Quality Permits Program
Maryland Department of the Environment
1800 Washington Boulevard
Baltimore, Maryland 21230

RE: Request for Determination – NSPS Kb Applicability

Dear Mr. Paul:

Texas Eastern Transmission L.P. (Texas Eastern) is submitting this letter and its attachments following the discussion with the Maryland Department of the Environment (MDE) at the meeting on November 8, 2011. As described during the meeting, in September 2010 Texas Eastern installed a storage tank with a capacity of 60,000 gallons at the Accident Compressor Station, located in Accident, Maryland, to store the wastewater produced during withdrawal activities from the natural gas storage field wellheads, prior to shipping the wastewater offsite via trucks.

BACKGROUND

Texas Eastern evaluated the new storage tank process during preparation of the Title V renewal application. During this review, it was identified that as a result of the Accident Compressor Station's injection of methanol into the wellheads, which is used as necessary to prevent hydrate formation, the wastewater stored in this tank can include methanol at up to 15 percent by volume. As such, the tank has the potential to emit volatile organic compounds (VOC) such as methanol, but did not receive a Permit to Construct (PTC) or determination that it was exempt from the requirement to obtain a PTC. At this point, the tank was immediately disconnected from service and Texas Eastern revised the semi-annual Title V deviation report to inform the Compliance Department at the MDE about the installation of the tank.

REGULATORY ANALYSIS OF THE WASTEWATER STORAGE TANK

In accordance with Code of Maryland Regulations (COMAR) 26.11.02.09.A(6), a PTC is required for all sources, unless exempted under COMAR 26.11.02.10, of which the wastewater storage tank could potentially qualify for the following two exemptions: Q or X. The following assesses each exemption in more detail.

<u>COMAR 26.11.02.10.Q</u> *for containers, reservoirs, or tanks used exclusively for:*

(1) Dipping operations for coating objects with oils, waxes, or greases, where no VOC is used;
(2) Dipping operations for applying coatings of natural or synthetic resins which contain no VOC;
(3) Storage of butane, propane or liquefied petroleum, or natural gas;
(4) Storage of lubricating oils;
(5) Unheated storage of VOC with an initial boiling point of 300°F (149°C) or greater;
(6) Storage of Numbers 1, 2, 4, 5, and 6 fuel oil and aviation jet engine fuel;
(7) Storage of motor vehicle gasoline, having an individual tank capacity of 2,000 gallons or less;

(8) The storage of VOC normally used as solvents, diluents, thinners, inks, colorants, paints, lacquers, enamels, varnishes, liquid resins, or other surface coatings and having a capacity of 2,000 gallons (7.6 cubic meters) or less;

This categorical exemption does not specifically exempt wastewater storage under (1) through (4), or (6) through (8), and because methanol has an approximate boiling point of 65°F, the tank may not meet (5) either. Although the tank does not appear to meet the categorical exemption under Q, it will still be exempt from the requirement to obtain a PTC if it meets the general exemption under X, as follows:

<u>COMAR 26.11.02.10.X</u> *for other installations if:*

(1) The proposed installation is not subject to any source-specific State or federal limitation or emissions standard, including any mass emissions rate limitation, pollutant concentration limitation, material formulation standard, equipment performance standard, or work practice standard;
(2) The emissions contain not more than 1 pound per day of a Class I toxic air pollutant, as defined in COMAR 26.11.15.01B(4); and
(3) The pre-control potential-to-emit from the proposed installation, combined with any potential increase in emissions from other installations that could be caused by the proposed installation, is less than 1 ton per calendar year for:
(a) Volatile organic compounds;
(b) Each pollutant for which there is a federal ambient air quality standard; and
(c) Each Class II toxic air pollutant, as defined in COMAR 26.11.15.01B(5).

In order to address the requirements of (1) above, there are no source-specific emission standards within the Maryland State Implementation Plan (SIP) that are applicable to the wastewater storage tank. Federal New Source Performance Standards (NSPS), incorporated into Maryland's SIP by reference, includes source-specific requirements for volatile organic liquid storage vessels for which construction, reconstruction or modification commences after July 23, 1984 (NSPS Subpart Kb).[1] NSPS Subpart Kb is applicable to tanks with a design capacity greater than or equal to 151 m^3 (~39,890 gallons) storing liquid with a maximum true vapor pressure of 3.5 kilopascals (kPa) or greater, or tanks with a design capacity greater than or equal to 75 m^3 (~19,813 gallons) but less than 151 m^3 storing liquid with a maximum true vapor pressure of 15.0 kPa or greater.

As originally installed, the wastewater storage tank has a capacity of 60,000 gallons. Based on the analysis of a wastewater sample, the partial pressure of VOC in the wastewater is approximately 4.9 kPa (See Attachment 1 for the results of the analysis). This analysis suggests the 60,000 gallon wastewater tank is subject to the monitoring requirements of NSPS Subpart Kb, 40 CFR §60.116b, but is not subject to the control requirements of 40 CFR §60.112b, which are only triggered for tanks with a design capacity greater than or equal to 151 m^3 storing liquids with a maximum true vapor pressure equal to or greater than 5.2 kPa.

It is acknowledged that this assessment is based on a single sample and analysis of the wastewater, and that fluctuations in the methanol content (or other VOC constituents) of the wastewater could result in an increase in the maximum true vapor pressure of the stored liquid. In order to avoid triggering the control requirements of NSPS Subpart Kb in the future, Texas Eastern is proposing to re-design the tank to include a partition and to render only half of the existing tank as functional liquid storage. Texas Eastern has attached the engineering drawing for the proposed redesigning of the tank in Attachment 2. This new tank design was provided to Texas Eastern by Highland Tank which was the designer of the original wastewater storage tank. The attached drawing clearly shows that half the tank will be completely abandoned and there will be no interconnection between the two parts. Since the two parts of the tank will be totally independent, Texas Eastern believes that after re-designing the tank, the operational part will be exempt from the requirements of NSPS Subpart Kb. This determination is supported by the EPA's Applicability Determination Index (ADI) memorandum number 9700064, which is attached to this letter. Please also

[1] COMAR 26.11.13.02

note that the EPA defines the design capacity of a tank for NSPS Kb purposes in two ADI memorandums, numbers 9800006 and 9800034, as the volume determined by the internal dimensions of a tank, rather than by the nominal capacity of the tank or the height of the stored liquid. The EPA clearly states that the owner/operator must rely on the "design capacity" and not the nominal capacity and requires the volume to be calculated as "top of the shell multiplied by the internal dimensions" which "should give a more accurate design capacity". According to the EPA, "This is reinforced by Webster's definition of nominal which is 'in name only, not in fact'". Please find these referenced memorandums in Attachment 3 to this letter.

As such, the proposed re-design of the wastewater storage tank to a 30,000 gallon tank storing a liquid with a maximum true vapor pressure less than 15.0 kPa will exempt the tank from NSPS Subpart Kb. As well, the re-designed wastewater storage tank will also meet the exemption from a PTC under COMAR 26.11.02.10.X if the emissions from the tank remain below the respective thresholds in subsections (2) through (3), as discussed in the following section.

WASTEWATER STORAGE TANK EMISSIONS

Texas Eastern has calculated potential emissions from the proposed re-designed 30,000 gallon tank and these emissions are well below the 1 ton per year threshold for Class II pollutants and volatile organic compounds (VOC), and 1 pound per day threshold for Class I pollutants. Please note that the majority of the VOC emissions are attributed to the addition of methanol to the tank and other VOC components are minuscule. Due to the nature of the wastewater stored in the wastewater tank, emissions of other pollutants with a federal ambient air quality standard are not expected from the wastewater tank. These calculations are conducted based on a maximum throughput assumption of 200,000 gallons of wastewater per year. Since the highest throughput ever experienced by the Accident Compressor Station was 175,000 gallons in 2009, Texas Eastern believes that basing the potential to emit from the re-designed tank on a maximum throughput of 200,000 gallons per year is an appropriate and conservative approach. As a result of the minor potential emissions and because it will not be subject to any source-specific State or Federal limitation or emissions standard, the re-designed 30,000 gallon wastewater storage tank will be exempt from the requirement to obtain a construction permit per the exemption delineated in COMAR 26.11.02.10.X.

Two separate supporting calculations are attached to this letter (see Attachments 4 and 5 to this letter). The first set of calculations is performed based on the actual properties of the wastewater as determined by a sample and analysis, and the second set is performed under a hypothetical assumption that the tank stores pure methanol, solely to demonstrate the insignificance of the tank. Both sets of calculations are performed using EPA Tanks 4.09d. EPA Tanks 4.0.9d database was used to determine the physical and chemical properties of the volatile components in wastewater. However, a few additional chemicals were added to this database based on the wastewater sample analysis.

CONCLUSION

Based on the discussion above, Texas Eastern believes that a permanent reduction in the size of the tank exempts the tank from NSPS Subpart Kb per 40 CFR 60.110b(b). Additionally, since emissions from the tank are below the thresholds of 1 tons per year of Class II pollutants and 1 pound per day of Class I pollutant, and the tank is not subject to any federal or state regulations, the re-designed tank at the Accident Compressor Station will not be subject to construction permitting in accordance with COMAR 26.11.02.10.X. Texas Eastern seeks the MDE's written concurrence with this determination and will appreciate an expeditious review of this letter. Should you have any questions on this letter, please do not hesitate to contact me at 407-514-2632.

Sincerely,

Michael Ballenger, P.E.
Manager of Consulting Services

Attachments
- Analysis Results of the Wastewater Sample
- Tank Size Reduction Sketch
- Applicability Determination Index Number 9700046, 9800006, and 9800034
- Emission Calculations Using the Wastewater Sample Analysis
- Emission Calculations Assuming Pure Methanol Stored

cc: Mr. Sabino Gomez, Spectra Energy
Mr. Sean Cramer, Spectra Energy (Harrisburg)
Ms. Fariba Mehdizadeh, Spectra Energy
Mr. Jonathan Crooks, Maryland Department of the Environment

ATTACHMENT 5

Emission Calculations Assuming Pure Methanol Stored

TANKS 4.0.9d
Emissions Report - Detail Format
Tank Indentification and Physical Characteristics

Identification

User Identification:	30,000 gal - Pure Methanol
City:	Accident
State:	Maryland
Company:	Spectra Energy
Type of Tank:	Horizontal Tank
Description:	30,000 gallon waste water and methanol tank

Tank Dimensions

Shell Length (ft):		30.30
Diameter (ft):		13.00
Volume (gallons):		30,000.00
Turnovers:		6.67
Net Throughput(gal/yr):		200,000.00
Is Tank Heated (y/n):	N	
Is Tank Underground (y/n):	N	

Paint Characteristics

Shell Color/Shade:	Gray/Medium
Shell Condition	Good

Breather Vent Settings

Vacuum Settings (psig):	-0.03
Pressure Settings (psig)	0.03

Meterological Data used in Emissions Calculations: Pittsburgh, Pennsylvania (Avg Atmospheric Pressure = 14.11 psia)

TANKS 4.0.9d
Emissions Report - Detail Format
Liquid Contents of Storage Tank

30,000 gal - Pure Methanol - Horizontal Tank
Accident, Maryland

Mixture/Component	Month	Daily Liquid Surf Temperature (deg F) Avg	Min	Max	Liquid Bulk Temp (deg F)	Vapor Pressure (psia) Avg	Min	Max	Vapor Mol Weight	Liquid Mass Fract	Vapor Mass Fract	Mol Weight	Basis for Vapor Pressure Calculations
Methyl alcohol	All	58.50	49.32	67.67	53.39	1.3751	1.0217	1.8285	32.0400			32.04	Option 2: A=7.897, B=1474.08, C=229.13

TANKS 4.0.9d
Emissions Report - Detail Format
Detail Calculations (AP-42)

30,000 gal - Pure Methanol - Horizontal Tank
Accident, Maryland

Annual Emission Calcaulations	
Standing Losses (lb):	650 8328
Vapor Space Volume (cu ft)	2,561 6486
Vapor Density (lb/cu ft):	0 0079
Vapor Space Expansion Factor	0 1295
Vented Vapor Saturation Factor	0 6785
Tank Vapor Space Volume	
Vapor Space Volume (cu ft)	2,561 6486
Tank Diameter (ft):	13 0000
Effective Diameter (ft)	22 4005
Vapor Space Outage (ft)	6 5000
Tank Shell Length (ft):	30 3000
Vapor Density	
Vapor Density (lb/cu ft)	0 0079
Vapor Molecular Weight (lb/lb-mole)	32 0400
Vapor Pressure at Daily Average Liquid Surface Temperature (psia)	1 3751
Daily Avg Liquid Surface Temp. (deg R)	518.1654
Daily Average Ambient Temp (deg F)	50 3083
Ideal Gas Constant R (psia cuft / (lb-mol-deg R)):	10.731
Liquid Bulk Temperature (deg R):	513.0583
Tank Paint Solar Absorptance (Shell):	0 6800
Daily Total Solar Insulation Factor (Btu/sqft day)	1,202 9556
Vapor Space Expansion Factor	
Vapor Space Expansion Factor	0 1295
Daily Vapor Temperature Range (deg R)	36.6923
Daily Vapor Pressure Range (psia)	0 8068
Breather Vent Press Setting Range(psia)	0.0600
Vapor Pressure at Daily Average Liquid Surface Temperature (psia)	1.3751
Vapor Pressure at Daily Minimum Liquid Surface Temperature (psia)	1.0217
Vapor Pressure at Daily Maximum Liquid Surface Temperature (psia)	1.8285
Daily Avg Liquid Surface Temp (deg R)	518 1654
Daily Min Liquid Surface Temp (deg R)	508 9923
Daily Max Liquid Surface Temp (deg R)	527 3385
Daily Ambient Temp Range (deg R)	19 1500
Vented Vapor Saturation Factor	
Vented Vapor Saturation Factor	0.6785
Vapor Pressure at Daily Average Liquid Surface Temperature (psia)	1.3751
Vapor Space Outage (ft)	6.5000
Working Losses (lb):	209.8084
Vapor Molecular Weight (lb/lb-mole)	32.0400
Vapor Pressure at Daily Average Liquid Surface Temperature (psia)	1.3751
Annual Net Throughput (gal/yr.)	200,000.0000
Annual Turnovers	6.6667
Turnover Factor	1.0000
Tank Diameter (ft):	13.0000
Working Loss Product Factor	1.0000
Total Losses (lb):	860.6412

TANKS 4.0.9d
Emissions Report - Detail Format
Individual Tank Emission Totals

Emissions Report for: Annual

30,000 gal - Pure Methanol - Horizontal Tank
Accident, Maryland

	Losses(lbs)		
Components	Working Loss	Breathing Loss	Total Emissions
Methyl alcohol	209.81	650.83	860.64

Attachment 4

Tanks ACC4A & 4B Pipeline Liquids PTE Emission Calculations from April 18, 2000 Initial Registration Application

Duke Energy

Texas Eastern Transmission Corporation
Algonquin Gas Transmission Company
Duke Energy Companies
5400 Westheimer Court
P.O. Box 1642
Houston, TX 77251-1642

April 18, 2000

Mr. Frank Courtwright
Program Manager
Air Quality Compliance Program
Air & Radiation Management Administration
Maryland Department of the Environment (MDE)
2500 Broening Highway
Baltimore, MD 21224

RE: INITIAL REGISTRATION APPLICATION
TWO (2) PIPELINE LIQUIDS STORAGE TANKS
ACCIDENT COMPRESSOR STATION

Dear Mr. Courtwright,

Texas Eastern Transmission Corporation (Texas Eastern) is submitting applications for initial registration of two (2) pipeline liquids storage tanks located at the Accident Compressor Station in Accident, Maryland. These tanks were installed between 1965 and 1971. Since the tanks were installed, there have been no modifications to the tanks or modifications that affect operation of the tanks, which may have resulted in an increase in air emissions.

Texas Eastern cannot locate any records that initial registration applications for these tanks have been previously submitted. As such, initial registration applications are being submitted at this time. Attached you will find completed and signed Form AMA-5's (Application for Processing/Manufacturing Equipment) for each of the two tanks submitted in triplicate. The USEPA TANKS 4.0 printouts and emission calculation spreadsheets are also attached.

Should you have any questions regarding the initial registration applications, please contact me at (713) 627-5210.

Sincerely,

David A. Felcman
Manager,
Environmental Compliance

DAF/opm
Attachments

OPM12744.00

STATE OF MARYLAND
DEPARTMENT OF THE ENVIRONMENT
Air and Radiation Management Administration
2500 Broening Highway
Baltimore, Maryland 21224

Permit to Construct ☐
Registration Update ☐
Initial Registration ☒

APPLICATION FOR PROCESSING/MANUFACTURING EQUIPMENT

1A OWNER OF EQUIPMENT /COMPANY NAME
Texas Eastern Transmission Corporation

MAILING ADDRESS/STREET
P. O. Box 1642

CITY STATE ZIP
Houston, TX 77251-1642

TELEPHONE NUMBER ( )
(713) 627-5210

[redacted]

SIGNATURE [signature]
PRINT NAME AND TITLE
David A. Felcman; Mgr. Env. Compliance
DATE

1B EQUIPMENT LOCATION AND TELEPHONE NUMBER (IF DIFFERENT FROM ABOVE)
Accident-Friendsville Road
STREET #, STREET NAME
Accident, MD 21520 (301) 746-8137
CITY, TOWN STATE ZIP TELEPHONE

PREMISES NAME (IF DIFFERENT FROM ABOVE)

3 STATUS
A. NEW EQUIPMENT
B. MODIFICATION TO EXISTING EQUIPMENT
C. EXISTING EQUIPMENT

STATUS	New Construction Begun MONTH/YEAR	New Construction Completed MONTH/YEAR	Existing Initial Operation MONTH/YEAR
C			6 5
15	16-19	20-23	20-23

4 DESCRIBE THIS EQUIPMENT: MAKE, MODEL, FEATURES, MANUFACTURER; INCLUDE MAXIMUM HOURLY INPUT RATE, ETC.
12,600-Gallon Pipeline Liquids Storage Tank (TK-02A)

5 WORKMEN'S COMPENSATION COVERAGE EXPIRATION DATE 7/1/00
- COMPANY Hartford Casualty Company BINDER/POLICY NUMBER Policy #37 WN D52066

6 A. NUMBER OF PIECES OF IDENTICAL EQUIPMENT UNITS TO BE REGISTERED/PERMITTED AT THIS TIME 1
B. NUMBER OF STACKS/EMISSION POINTS ASSOCIATED WITH THIS EQUIPMENT 1

7 PERSON INSTALLING THIS EQUIPMENT (IF DIFFERENT FROM (1) ABOVE)
NAME ____________ TITLE ____________
COMPANY ____________
MAILING ADDRESS/STREET ____________
CITY, TOWN ____________ STATE ____________ TELEPHONE ( ) ____________

WHITE-ARMA * GREEN-Premises * CANARY-Local Dept. * PINK-Applicant's copy

8 MAJOR ACTIVITY, PRODUCT OR SERVICE OF COMPANY AT THIS LOCATION

Natural gas transmission (SIC Code: 4922)

9 CONTROL DEVICES ASSOCIATED WITH THIS EQUIPMENT

NONE [X] 24-0

SIMPLE/MULTIPLE CYCLONE	SPRAY/ADSORB TOWER	VENTURI SCRUBBER	CARBON ADSORBER	ELECTROSTATIC PRECIPITATOR	BAGHOUSE	THERMAL/CATALYTIC AFTERBURNER	DRY SCRUBBER
[ ] 24-1	[ ] 24-2	[ ] 24-3	[ ] 24-4	[ ] 24-5	[ ] 24-6	[ ] 24-7	[ ] 24-8

OTHER [ ] 24-9 DESCRIBE ______

10 ANNUAL FUEL CONSUMPTION FOR THIS EQUIPMENT

OIL - 1000 GALLONS	SULFUR %	GRADE	NATURAL GAS - 1000 FT^3	LP GAS - 100 GALLONS	GRADE (A B C D E F)
26-31	32-33	34	35-41	42-45	

COAL - TONS	SULFUR %	ASH %	WOOD - TONS	MOISTURE %
46-52	53-55	56-58	59-63	64-65

Other Fuels ______ (Specify Type) [ ] 66-1 Annual Amount Consumed ______ (Specify Type)

Other Fuel ______ (Specify Type) [ ] 66-2 Annual Amount Consumed ______ (Specify Units)

1 = Coke 2 = COG 3 = BFG 4 = Other

11 OPERATING SCHEDULE [for this equipment]

CONTINUOUS OPERATION	BATCH PROCESS	HOURS PER BATCH	BATCH PER WEEK	HOURS PER DAY	DAYS PER WEEK	DAYS PER YEAR
X				2 4	7	3 6 5
67-1	67-2	68-69		70-71	72	73-75

SEASONAL VARIATION IN OPERATION:

NO VARIATION	WINTER PERCENT	SPRING PERCENT	SUMMER PERCENT	FALL PERCENT	(TOTAL SEASONS = 100%)
X					
76	77-78	79-80	81-82	83-84	

12 EQUIVALENT STACK INFORMATION - IS EXHAUST THROUGH DOORS, WINDOWS, ETC., ONLY? [N] Y OR N 85

IF NOT, THEN →	HEIGHT ABOVE GROUND (FT)	INSIDE DIAMETER AT TOP (INCHES)	EXIT TEMPERATURE (°F)	EXIT VELOCITY (FT/SEC)
	5			
	86-88	89-91	92-95	96-98

AMA-5 Revised

NOTE: Storage tanks are typically assigned the following exit values: D=0.001 m, T=ambient temperature, and V=0.001 m/sec.

NOTE: ATTACH A BLOCK DIAGRAM OF PROCESS/PROCESS LINE, INDICATING NEW EQUIPMENT AS REPORTED ON THIS FORM AND ALL EXISTING EQUIPMENT, INCLUDING CONTROL DEVICES AND EMISSION POINTS.

13 INPUT MATERIALS [for this equipment only]
IS ANY OF THIS DATA TO BE CONSIDERED CONFIDENTIAL? N Y OR N

NAME	CAS NUMBER (if applicable)	INPUT RATE PER HOUR *	UNITS	PER YEAR	UNITS
1. Pipeline Liquids		23	Gals.	200,000	Gals.
2.					
3.					
4.					
5.					
6.					
7.					
8.					
9.					
TOTAL					

14 OUTPUT MATERIALS [for this equipment]
PROCESS/PRODUCT STREAM

NAME	CAS NUMBER (if applicable)	OUTPUT RATE PER HOUR *	UNITS	PER YEAR	UNITS
1. Pipeline Liquids		23	Gals.	200,000	Gals.
2.					
3.					
4.					
5.					
6.					
7.					
8.					
9.					
TOTAL					

15 WASTE STREAMS - SOLID AND LIQUID

NAME	CAS NUMBER (if applicable)	OUTPUT RATE PER HOUR	UNITS	PER YEAR	UNITS
1.					
2.					
3.					
4.					
5.					
6.					
7.					
8.					
9.					
TOTAL					

AMA-5 Revised

* Hourly fill/withdrawal rates are average hourly rates. See attached spreadsheet for maximum hourly rates.

16 TOTAL STACK EMISSIONS (FOR THIS EQUIPMENT ONLY) IN POUNDS PER OPERATING DAY

PARTICULATE MATTER	OXIDES OF SULFUR	OXIDES OF NITROGEN
99-104	105-110	111-116

CARBON MONOXIDE	VOLATILE ORGANIC COMPOUNDS	PM-10
	7.0210*	
117-122	123-128	129-134

17 TOTAL FUGITIVE EMISSIONS (FOR THIS EQUIPMENT ONLY) IN POUNDS PER OPERATING DAY

PARTICULATE MATTER	OXIDES OF SULFUR	OXIDES OF NITROGEN
135-139	140-144	145-149

CARBON MONOXIDE	VOLATILE ORGANIC COMPOUNDS	PM-10
150-154	155-159	160-164

METHOD USED TO DETERMINE EMISSIONS (1 = ESTIMATE 2 = EMISSION FACTOR 3 = STACK TEST 4 = OTHER)

TSP	SOX	NOX	CO	VOC	PM10
				4	
165	166	167	168	169	170

AIR MANAGEMENT USE ONLY

18 DATE REC'D. LOCAL ____________ DATE REC'D. STATE ____________ RETURN TO LOCAL JURISDICTION DATE ____________ BY ____________

REVIEWED BY LOCAL JURISDICTION DATE ____________ BY ____________ REVIEWED BY STATE DATE ____________ BY ____________

19 INVENTORY DATE MONTH YEAR [ ] 171-174 EQUIPMENT CODE [ ] 175-177 SCC CODE [ ] 178-185

20 ANNUAL OPERATING RATE [ ] 186-192 MAXIMUM DESIGN HOURLY RATE [ ] 193-199 PERMIT TO OPERATE MONTH [ ] 200-201 TRANSACTION DATE (MM/DD/YR) [ ] 202-207

STAFF CODE [ ] 208-210 VOC CODE [ ] 211 212 SIP CODE [ ] 213 214 REGULATION CODE [ ] 215-218 CONFIDENTIALITY [ ] 219

POINT DESCRIPTION [ ] 220-238

ACTION [ ] 239 A: ADD C: CHANGE

* Daily VOC emissions are average daily emissions, not maximum daily emissions.

STATE OF MARYLAND
DEPARTMENT OF THE ENVIRONMENT
Air and Radiation Management Administration
2500 Broening Highway
Baltimore, Maryland 21224

Permit to Construct ☐
Registration Update ☐
Initial Registration ☒

APPLICATION FOR PROCESSING/MANUFACTURING EQUIPMENT

1A OWNER OF EQUIPMENT /COMPANY NAME Texas Eastern Transmission Corporation	DO NOT WRITE IN THIS BLOCK REGISTRATION NUMBER [illegible] APPLICATION DATE
MAILING ADDRESS/STREET P. O. Box 1642	
CITY / STATE / ZIP Houston, TX 77251-1642	
TELEPHONE NUMBER ( ) (713 627-5210	

SIGNATURE: [signature] | PRINT NAME AND TITLE: David A. Felcman; Mgr. Env. Compliance | DATE:

1B EQUIPMENT LOCATION AND TELEPHONE NUMBER (IF DIFFERENT FROM ABOVE)

Accident-Friendsville Road
STREET #, STREET NAME

Accident, MD 21520 — (301)746-8137
CITY, TOWN — STATE — ZIP — TELEPHONE

PREMISES NAME (IF DIFFERENT FROM ABOVE)

3 STATUS

A. NEW EQUIPMENT
B. MODIFICATION TO EXISTING EQUIPMENT
C. EXISTING EQUIPMENT

STATUS	New Construction Begun MONTH/YEAR	New Construction Completed MONTH/YEAR	Existing Initial Operation MONTH/YEAR
C			7 1
15	16-19	20-23	20-23

4 DESCRIBE THIS EQUIPMENT: MAKE, MODEL, FEATURES, MANUFACTURER; INCLUDE MAXIMUM HOURLY INPUT RATE, ETC.

12,600-Gallon Pipeline Liquids Storage Tank (TK-02B)

5 WORKMEN'S COMPENSATION COVERAGE — EXPIRATION DATE 7/1/00

- COMPANY Hartford Casualty Company — BINDER/POLICY NUMBER Policy #37 WN D52066

6 A. NUMBER OF PIECES OF IDENTICAL EQUIPMENT UNITS TO BE REGISTERED/PERMITTED AT THIS TIME 1

B. NUMBER OF STACKS/EMISSION POINTS ASSOCIATED WITH THIS EQUIPMENT 1

7 PERSON INSTALLING THIS EQUIPMENT (IF DIFFERENT FROM (1) ABOVE)

NAME______ TITLE______

COMPANY______

MAILING ADDRESS/STREET______

CITY, TOWN______ STATE______ TELEPHONE ( )______

WHITE-ARMA * GREEN-Premises * CANARY-Local Dept. * PINK-Applicant's copy

AMA-5 Revised

8 MAJOR ACTIVITY, PRODUCT OR SERVICE OF COMPANY AT THIS LOCATION

Natural gas transmission (SIC Code: 4922)

9 CONTROL DEVICES ASSOCIATED WITH THIS EQUIPMENT

NONE [X] 24-0

SIMPLE/MULTIPLE CYCLONE	SPRAY/ADSORB TOWER	VENTURI SCRUBBER	CARBON ADSORBER	ELECTROSTATIC PRECIPITATOR	BAGHOUSE	THERMAL/CATALYTIC AFTERBURNER	DRY SCRUBBER
[ ] 24-1	[ ] 24-2	[ ] 24-3	[ ] 24-4	[ ] 24-5	[ ] 24-6	[ ] 24-7	[ ] 24-8

OTHER [ ] 24-9 DESCRIBE ____________

10 ANNUAL FUEL CONSUMPTION FOR THIS EQUIPMENT

OIL - 1000 GALLONS	SULFUR %	GRADE	NATURAL GAS - 1000 FT^3	LP GAS - 100 GALLONS	GRADE
26-31	32-33	34	35-41	42-45	A B C D E F

COAL - TONS	SULFUR %	ASH %	WOOD - TONS	MOISTURE %
46-52	53-55	56-58	59-63	64-65

Other Fuels ____ (Specify Type) [ ] 66-1 Annual Amount Consumed ____ (Specify Type)

Other Fuel ____ (Specify Type) [ ] 66-2 Annual Amount Consumed ____ (Specify Units)

1 = Coke 2 = COG 3 = BFG 4 = Other

11 OPERATING SCHEDULE (for this equipment)

CONTINUOUS OPERATION	BATCH PROCESS	HOURS PER BATCH	BATCH PER WEEK	HOURS PER DAY	DAYS PER WEEK	DAYS PER YEAR
X				24	7	365
67-1	67-2	68-69		70-71	72	73-75

SEASONAL VARIATION IN OPERATION:

NO VARIATION	WINTER PERCENT	SPRING PERCENT	SUMMER PERCENT	FALL PERCENT	(TOTAL SEASONS = 100%)
X					
76	77-78	79-80	81-82	83-84	

12 EQUIVALENT STACK INFORMATION - IS EXHAUST THROUGH DOORS, WINDOWS, ETC., ONLY? [N] Y OR N 85

IF NOT, THEN →

HEIGHT ABOVE GROUND (FT)	INSIDE DIAMETER AT TOP (INCHES)	EXIT TEMPERATURE (°F)	EXIT VELOCITY (FT/SEC)
5			
86-88	89-91	92-95	96-98

AMA-5 Revised

NOTE: Storage tanks are typically assigned the following exit values: D=0.001 m, T=ambient temperature, and V=0.001 m/sec.

NOTE: ATTACH A BLOCK DIAGRAM OF PROCESS/PROCESS LINE, INDICATING NEW EQUIPMENT AS REPORTED ON THIS FORM AND ALL EXISTING EQUIPMENT, INCLUDING CONTROL DEVICES AND EMISSION POINTS.

13 INPUT MATERIALS (for this equipment only)
IS ANY OF THIS DATA TO BE CONSIDERED CONFIDENTIAL? N Y OR N

NAME	CAS NUMBER (if applicable)	INPUT RATE PER HOUR *	UNITS	PER YEAR	UNITS
1. Pipeline Liquids		23	Gals.	200,000	Gals.
2.					
3.					
4.					
5.					
6.					
7.					
8.					
9.					
TOTAL					

14 OUTPUT MATERIALS (for this equipment)
PROCESS/PRODUCT STREAM

NAME	CAS NUMBER (if applicable)	OUTPUT RATE PER HOUR *	UNITS	PER YEAR	UNITS
1. Pipeline Liquids		23	Gals.	200,000	Gals.
2.					
3.					
4.					
5.					
6.					
7.					
8.					
9.					
TOTAL					

15 WASTE STREAMS - SOLID AND LIQUID

NAME	CAS NUMBER (if applicable)	OUTPUT RATE PER HOUR	UNITS	PER YEAR	UNITS
1.					
2.					
3.					
4.					
5.					
6.					
7.					
8.					
9.					
TOTAL					

AMA-5 Revised

* Hourly fill/withdrawal rates are average hourly rates. See attached spreadsheet for maximum hourly rates.

16 TOTAL STACK EMISSIONS (FOR THIS EQUIPMENT ONLY) IN POUNDS PER OPERATING DAY

PARTICULATE MATTER	OXIDES OF SULFUR	OXIDES OF NITROGEN
99-104	105-110	111-116

CARBON MONOXIDE	VOLATILE ORGANIC COMPOUNDS	PM-10
	7.0210*	
117-122	123-128	129-134

17 TOTAL FUGITIVE EMISSIONS (FOR THIS EQUIPMENT ONLY) IN POUNDS PER OPERATING DAY

PARTICULATE MATTER	OXIDES OF SULFUR	OXIDES OF NITROGEN
135-139	140-144	145-149

CARBON MONOXIDE	VOLATILE ORGANIC COMPOUNDS	PM-10
150-154	155-159	160-164

METHOD USED TO DETERMINE EMISSIONS (1 = ESTIMATE 2 = EMISSION FACTOR 3 = STACK TEST 4 = OTHER)

TSP	SOX	NOX	CO	VOC	PM10
				4	
165	166	167	168	169	170

AIR MANAGEMENT USE ONLY

18 DATE REC'D. LOCAL ____________ DATE REC'D. STATE ____________

RETURN TO LOCAL JURISDICTION DATE ____________ BY ____________

REVIEWED BY LOCAL JURISDICTION DATE ____________ BY ____________

REVIEWED BY STATE DATE ____________ BY ____________

19

INVENTORY DATE MONTH YEAR	EQUIPMENT CODE	SCC CODE
171-174	175-177	178-185

20

ANNUAL OPERATING RATE	MAXIMUM DESIGN HOURLY RATE	PERMIT TO OPERATE MONTH	TRANSACTION DATE (MM/DD/YR)
186-192	193-199	200-201	202-207

STAFF CODE	VOC CODE	SIP CODE	REGULATION CODE	CONFIDENTIALITY
208-210	211 212	213 214	215-218	219

POINT DESCRIPTION

220-238

ACTION A: ADD C: CHANGE

239

* Daily VOC emissions are average daily emissions, not maximum daily emissions.

AMA-5 Revised

Texas Eastern Transmission Corporation
Accident Compressor Station
Condensate Storage Tank Losses
Maximum Hourly and Annual Emissions

Equipment ID		TK-02A	TK-02B
Installation Date		1965	1971
Material		Condensate	Condensate
Tank Capacity	gal	12,600	12,600
Maximum Fill/Withdrawal Rate	gal/hr	5,500	5,500
Average Fill/Withdrawal Rate	gal/hr	23	23
Annual Throughput	gal/yr	200,000	200,000
Breathing Loss Emission Factor	lbs/hr	0.14362	0.14362
Working Loss Emission Factor	lbs/gal	0.00652	0.00652
VOC (including speciated VOC)	lb/hr (max.)	36.0178	36.0178
	lb/day (avg.)	7.0210	7.0210
	tpy	1.2813	1.2813
Benzene	vapor wt%	1.82%	1.82%
HAP, Class I TAP	lb/hr (max.)	0.6547	0.6547
	lb/day (avg.)	0.1276	0.1276
	tpy	0.0233	0.0233
Ethylbenzene	vapor wt%	0.01%	0.01%
HAP, Class II TAP	lb/hr (max.)	0.0031	0.0031
	lb/day (avg.)	0.0006	0.0006
	tpy	0.0001	0.0001
Hexane, n-	vapor wt%	5.01%	5.01%
HAP, Class II TAP	lb/hr (max.)	1.8030	1.8030
	lb/day (avg.)	0.3515	0.3515
	tpy	0.0641	0.0641
Toluene	vapor wt%	0.25%	0.25%
HAP, Class II TAP	lb/hr (max.)	0.0902	0.0902
	lb/day (avg.)	0.0176	0.0176
	tpy	0.0032	0.0032
Xylene	vapor wt%	0.03%	0.03%
HAP, Class II TAP	lb/hr (max.)	0.0092	0.0092
	lb/day (avg.)	0.0018	0.0018
	tpy	0.0003	0.0003

Basis of Emission Estimates

1. Physical properties of condensate based on worst-case physical properties determined from gas chromatography of two samples in 1988.
2. Emissions estimated using TANKS 4.0.
3. Vapor weight percent of VOC species from TANKS 4.0 run.
4. Maximum hourly emissions based on maximum truck capacity.
5. Average daily emissions are the daily average of the annual emissions (365 days/yr).

TANKS 4.0
Emissions Report - Detail Format
Tank Identification and Physical Characteristics

Identification	
User Identification:	TK-02A (Accident)
City:	Accident
State:	Maryland
Company:	Texas Eastern Transmission Co.
Type of Tank:	Vertical Fixed Roof Tank
Description:	12,500-gal Pipeline Liquids Tanks
Tank Dimensions	
Shell Height (ft):	15.00
Diameter (ft):	12.00
Liquid Height (ft):	15.00
Avg. Liquid Height (ft):	7.00
Volume (gallons):	12,690.44
Turnovers:	16.00
Net Throughput (gal/yr):	203,047.11
Is Tank Heated (y/n):	N
Paint Characteristics	
Shell Color/Shade:	Aluminum/Diffuse
Shell Condition:	Good
Roof Color/Shade:	Aluminum/Diffuse
Roof Condition:	Good
Roof Characteristics	
Type:	Dome
Height (ft):	1.61
Radius (ft) (Dome Roof):	12.00
Breather Vent Settings	
Vacuum Settings (psig):	-0.03
Pressure Settings (psig):	0.03

Meteorological Data used in Emissions Calculations: Pittsburgh, Pennsylvania (Avg Atmospheric Pressure = 14.11 psia)

TANKS 4.0
Emissions Report - Detail Format
Liquid Contents of Storage Tank

Mixture/Component	Month	Daily Liquid Surf. Temperatures (deg F) Avg.	Min.	Max.	Liquid Bulk Temp. (deg F)	Vapor Pressures (psia) Avg.	Min.	Max	Vapor Mol. Weight	Liquid Mass Fract.	Vapor Mass Fract.	Mol. Weight	Basis for Vapor Pressure Calculations
Pipeline Liquids (Accident)	All	57.47	48.97	65.97	52.91	4.4746	3.7701	5.2814	61.2230			90.99	Option 4: RVP=9.1623, ASTM Slope=3
Benzene						1.0882	0.8530	1.3748	78.1100	0.0503	0.0182	78.11	Option 2: A=6.905, B=1211.033, C=220.79
Cyclohexane						1.1306	0.8914	1.4207	84.1600	0.0442	0.0166	84.16	Option 2: A=6.841, B=1201.53, C=222.65
Ethylbenzene						0.0993	0.0731	0.1332	106.1700	0.0025	0.0001	106.17	Option 2: A=6.975, B=1424.255, C=213.21
Hexane (-n)						1.7907	1.4252	2.2300	86.1700	0.0842	0.0501	86.17	Option 2: A=6.876, B=1171.17, C=224.41
Toluene						0.3049	0.2320	0.3965	92.1300	0.0247	0.0025	92.13	Option 2: A=6.954, B=1344.8, C=219.48
Unidentified Components						5.4431	5.3490	5.3492	59.6580	0.7842	0.9123	92.70	
Xylene (-m)						0.0826	0.0607	0.1111	106.1700	0.0075	0.0002	106.17	Option 2: A=7.009, B=1462.266, C=215.11
Xylene (-o)						0.0648	0.0473	0.0878	106.1700	0.0024	0.0001	106.17	Option 2: A=6.998, B=1474.679, C=213.69

TANKS 4.0
Emissions Report - Detail Format
Detail Calculations (AP-42)

Annual Emission Calculations	
Standing Losses (lb):	1,258.1405
Vapor Space Volume (cu ft):	997.8859
Vapor Density (lb/cu ft):	0.0494
Vapor Space Expansion Factor:	0.2164
Vented Vapor Saturation Factor:	0.3234
Tank Vapor Space Volume	
Vapor Space Volume (cu ft):	997.8859
Tank Diameter (ft):	12.0000
Vapor Space Outage (ft):	8.8232
Tank Shell Height (ft):	15.0000
Average Liquid Height (ft):	7.0000
Roof Outage (ft):	0.8232
Roof Outage (Dome Roof)	
Roof Outage (ft):	0.8232
Dome Radius (ft):	12.0000
Shell Radius (ft):	6.0000
Vapor Density	
Vapor Density (lb/cu ft):	0.0494
Vapor Molecular Weight (lb/lb-mole):	61.2230
Vapor Pressure at Daily Average Liquid Surface Temperature (psia):	4.4746
Daily Avg. Liquid Surface Temp. (deg. R):	517.1363
Daily Average Ambient Temp. (deg. F):	50.3083
Ideal Gas Constant R (psia cuft / (lb-mol-deg R)):	10.731
Liquid Bulk Temperature (deg. R):	512.5783
Tank Paint Solar Absorptance (Shell):	0.6000
Tank Paint Solar Absorptance (Roof):	0.6000
Daily Total Solar Insulation Factor (Btu/sqft day):	1,202.9556
Vapor Space Expansion Factor	
Vapor Space Expansion Factor:	0.2164
Daily Vapor Temperature Range (deg. R):	33.9977
Daily Vapor Pressure Range (psia):	1.5113
Breather Vent Press. Setting Range(psia):	0.0600
Vapor Pressure at Daily Average Liquid Surface Temperature (psia):	4.4746
Vapor Pressure at Daily Minimum Liquid Surface Temperature (psia):	3.7701
Vapor Pressure at Daily Maximum Liquid Surface Temperature (psia):	5.2814
Daily Avg. Liquid Surface Temp. (deg R):	517.1363
Daily Min. Liquid Surface Temp. (deg R):	508.6369
Daily Max. Liquid Surface Temp. (deg R):	525.6358
Daily Ambient Temp. Range (deg. R):	19.1500
Vented Vapor Saturation Factor	
Vented Vapor Saturation Factor:	0.3234
Vapor Pressure at Daily Average Liquid Surface Temperature (psia):	4.4746
Vapor Space Outage (ft):	8.8232

TANKS 4.0
Emissions Report - Detail Format
Detail Calculations (AP-42)- (Continued)

Working Losses (lb):	1,324.3876
Vapor Molecular Weight (lb/lb-mole):	61.2230
Vapor Pressure at Daily Average Liquid Surface Temperature (psia):	4.4746
Annual Net Throughput (gal/yr.):	203,047.1095
Number of Turnovers:	16.0000
Turnover Factor:	1.0000
Maximum Liquid Volume (cuft):	12,690.4443
Maximum Liquid Height (ft):	15.0000
Tank Diameter (ft):	12.0000
Working Loss Product Factor:	1.0000
Total Losses (lb):	2,582.5281

TANKS 4.0
Emissions Report - Detail Format
Individual Tank Emission Totals

Annual Emissions Report

	Losses(lbs)		
Components	Working Loss	Breathing Loss	Total Emissions
Pipeline Liquids (Accident)	1,324.39	1,258.14	2,582.53
Benzene	24.07	22.87	46.94
Hexane (-n)	66.30	62.98	129.28
Toluene	3.32	3.15	6.47
Xylene (-m)	0.27	0.26	0.53
Xylene (-o)	0.07	0.06	0.13
Cyclohexane	21.99	20.89	42.88
Ethylbenzene	0.11	0.10	0.22
Unidentified Components	1,208.26	1,147.82	2,356.08

Attachment 5

Example PTE Emission Calculations from Applications for Exempt 10,000 gallon and 900 gallon Field Methanol Storage Tanks from August 15, 2007 *"Installation of Methanol Storage Tanks at Texas Eastern Transmisssion , LP's Accident Compression Station and Storage Field"*

Trinity Consultants

Offices nationwide ■ trinityconsultants.com

5320 Spectrum Drive, Suite C, Frederick, MD 21703 U.S.A. ■ (240) 379-7490 ■ Fax (240) 379-7491

August 15, 2007

Ms. Karen Irons
Air Quality Permits Program
Maryland Department of the Environment
1800 Washington Boulevard
Baltimore, MD 21230

RE: Installation of Methanol Storage Tanks at Texas Eastern Transmission, LP's Accident Compression Station and Storage Field

Dear Ms. Irons:

Texas Eastern Transmission, LP (TET) operates a natural gas transmission station and adjacent storage field in Accident, Garrett County, Maryland under Title V Operating Permit No. 24-023-00081. TET is planning on installing methanol storage tanks to facilitate operations at the Accident station. It is not expected for this project to be subject to a Permit to Construct, nor will it trigger any new regulatory requirements that are not already included in the existing Title V operating permit.

Currently, the facility uses pressurized bottles of methanol at each of the various well-head sites located at the station. The usage rate of methanol at the well-head sites is such that each bottle is refilled approximately every 20 – 30 days. During winter months, excessive snowfall at the station often makes well-head sites difficult to access, making the task of refilling these bottles labor and equipment intensive for the facility. As such, the facility is proposing to reduce the operating burden of frequently refilling these bottles (particularly during winter months) by storing larger quantities of methanol at the facility, some well sites, and strategic gathering pipeline locations in the storage field. Having the injection skids and atmospheric tanks in lieu of the bottles will also eliminate the methanol gas loss due to bottle blowdowns that occur every time the bottles are refilled.

The facility is proposing to construct one (1) 10,000 gallon and six (6) 900 gallon methanol storage tanks, along with relocating an existing injection pump skid and installing additional skids for the 900 gallon storage tanks. This project will reduce the frequency with which facility personnel will need to access well-head sites to refill methanol necessary for the natural gas transmission process. The project will not result in any increases to facility throughput or production rates.

Emissions from these proposed tanks were calculated to assess the applicability of a Permit to Construct. Emissions calculations were based on output from EPA's TANKS 4.09D software. As can be seen from the attached spreadsheets and the TANKS output, the total potential emissions of methanol from these new tanks is less than one (1) ton per year.

According to COMAR 26.11.02.10, exemptions to Permits to Construct include those modifications that are not subject to any source-specific State or Federal emission standards and the expected uncontrolled emissions are less than (one) 1 ton per calendar year of each pollutant for which there is a federal ambient air quality standard or which is a Class II toxic air pollutant as defined in COMAR 26.11.15.01B(5).

There are no source-specific emission standards within the Maryland State Implementation Plan (SIP) that are applicable to the proposed methanol storage tanks. Federal New Source Performance Standards (NSPS), incorporated into Maryland's SIP by reference, includes source-specific requirements for volatile organic liquid storage vessels for which construction, reconstruction or modification commences after July 23, 1984 (NSPS Subpart Kb).[1] While the methanol tanks are included by this source-category, each tank is less than the regulatory threshold of 75 cubic meters, or approximately 19,800 gallons. As well, the total potential emissions from all tanks is less than one (1) ton per year of methanol, the only pollutant directly emitted from this installation.

As such, the installation of the methanol storage tanks at the Accident station is exempt from a Permit to Construct. This letter serves as notification of these tanks as additional insignificant sources at the facility.

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Should you have any questions regarding the enclosed information, please contact us at (240) 379-7490.

Sincerely,

TRINITY CONSULTANTS

Michael Ballenger
Senior Consultant

Enclosure
cc: Mr. Owen McManus, Spectra Energy Gas Transmission

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[1] COMAR 26.11.13.02
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Attachment A – Emissions Calculation Spreadsheets and TANKS Output

TABLE A-1
Volatile Organic Liquids Storage Tanks
Hourly and Annual Emission Estimates
Standing & Working Losses
Summary of Emissions

Methodology	AP-42								
Source	921-FT01:06			921-FT07			TOTAL		
	Average	Maximum	Maximum	Average	Maximum	Maximum	Average	Maximum	Maximum
TOC (Total)	0.0047 lb/hr	1.6670 lb/hr	0.0206 tpy	0.0307 lb/hr	16.4846 lb/hr	0.1345 tpy	0.0590 lb/hr	26.4867 lb/hr	0.2584 tpy
Methane									
Ethane									
VOC (Total)	0.0047 lb/hr	1.6670 lb/hr	0.0206 tpy	0.0307 lb/hr	16.4846 lb/hr	0.1345 tpy	0.0590 lb/hr	26.4867 lb/hr	0.2584 tpy
HAP (Total)	0.0047 lb/hr	1.6670 lb/hr	0.0206 tpy	0.0307 lb/hr	16.4846 lb/hr	0.1345 tpy	0.0590 lb/hr	26.4867 lb/hr	0.2584 tpy
Benzene									
Ethylbenzene									
Hexane (n-)									
Methanol	4.71E-03 lb/hr	1.67E+00 lb/hr	2.06E-02 tpy	3.07E-02 lb/hr	1.65E+01 lb/hr	1.35E-01 tpy	5.90E-02 lb/hr	2.65E+01 lb/hr	2.58E-01 tpy
Naphthalene									
Toluene									
Trimethylpentane (2,2,4-)									
Xylenes									

TABLE A-2
Volatile Organic Liquids Storage Tanks
Hourly and Annual Emission Estimates
Standing & Working Losses

Source		921-FT01:06				
Service		Methanol Storage Tank				
Capacity		950 gal			950 gal	
Temperature of Stored Liquid		62.62 °F			86.92 °F	
Vapor Pressure		1.6176 psia			3.2067 psia	
Pumping Rate		150 gal/min			150 gal/min	
Throughput		14.00 turnover/yr				
		13,300 gal/yr			950 gal/hr	
Standing Losses					**July**	
					744 hrs/month	
					3.8984 lbs/month	
		24.8741 lb/yr			0.0052 lb/hr	
Working Losses		**1.23E-03** lb/gal			**1.75E-03** lb/gal	
		16.4121 lb/yr	Average	Maximum	1.6618 lb/hr	Maximum
Liquid	Stand	100.00% by weight	0.0028 lb/hr	0.0124 tpy	100.00% by weight	0.0052 lb/hr
	Work		0.0019 lb/hr	0.0082 tpy		1.6618 lb/hr
	Total		0.0047 lb/hr	0.0206 tpy		1.6670 lb/hr
TOC (Total)		100.00% by weight	0.0047 lb/hr	0.0206 tpy	100.00% by weight	1.6670 lb/hr
Methane						
Ethane						
VOC (Total)		100.00% by weight	0.0047 lb/hr	0.0206 tpy	100.00% by weight	1.6670 lb/hr
HAP (Total)		100.00% by weight	0.0047 lb/hr	0.0206 tpy	100.00% by weight	1.6670 lb/hr
Benzene						
Ethylbenzene						
Hexane (n-)						
Methanol		100.0000% by weight	4.71E-03 lb/hr	2.06E-02 tpy	100.0000% by weight	1.67E+00 lb/hr
Naphthalene						
Toluene						
Trimethylpentane (2,2,4-)						
Xylenes						

NOTES

1. Tank Characteristics: TANKS 4.09d

Orientation	Vertical Fixed Roof Tank	Above Ground?	Yes
Height/Length	6.25 ft	Shell/Roof Color	Aluminum/Diffuse or less solar absorptance
Diameter	5.08 ft	Shell Condition	Good
Capacity (estimated)	947 gal	Vacuum Setting	-0.03 psig
Capacity (nominal)	950 gal	Pressure Setting	0.03 psig

2. Stored Liquid Characteristics:

Basis	USEPA TANKS 4.09d		
Material	Methyl alcohol	Product stored	
Liquid Molecular Weight	32.04 lb/lb-mol	Vapor Molecular Weight	32.04 lb/lb-mol

Monthly Data

	Days	Vapor Pressure		Liquid Surface Temperature		TANKS Output		TANKS
		avg	max	avg	max	standing	working	Flow
January	31	1.0248	1.2378	49.41	55.20	0.7155	0.7427	950
February	28	1.1129	1.3947	51.92	58.94	0.8711	0.8065	950
March	31	1.3334	1.7528	57.53	66.28	1.4988	0.9664	950
April	30	1.5925	2.1867	63.17	73.63	2.1512	1.1541	950
May	31	1.8830	2.6343	68.64	80.00	2.9663	1.3647	950
June	30	2.1772	3.0854	73.48	85.55	3.6551	1.5779	950
July	31	2.2930	3.2067	75.23	86.92	3.8984	1.6618	950
August	31	2.1816	2.9687	73.55	84.18	3.3207	1.5810	950
September	30	1.9043	2.5196	69.01	78.46	2.4037	1.3801	950
October	31	1.5441	1.9881	62.18	70.44	1.6752	1.1190	950
November	30	1.2804	1.5704	56.26	62.72	1.0064	0.9279	950
December	31	1.0840	1.2922	51.12	56.54	0.7117	0.7856	950
ALL	365	1.6176	3.2067	62.62	86.92	24.8741	14.0676	11,400

3. Emission Estimate Basis: USEPA TANKS 4.09d & TCEQ RG-166/01
4. Speciation of emissions is based on 100% methanol.

TABLE A-3
Volatile Organic Liquids Storage Tanks
Hourly and Annual Emission Estimates
Standing & Working Losses

Source		921-FT07				
Service		Methanol Storage Tank				
Capacity		11,400 gal			11,400 gal	
Temperature of Stored Liquid		63.70 °F			89.47 °F	
Vapor Pressure		1.6756 psia			3.4419 psia	
Pumping Rate		150 gal/min			150 gal/min	
Throughput		3.00 turnover/yr				
		34,200 gal/yr			9,000 gal/hr	
Standing Losses					**July**	
					744 hrs/month	
					33.7142 lbs/month	
		225.3793 lb/yr			0.0453 lb/hr	
Working Losses		**1.28E-03** lb/gal			**1.83E-03** lb/gal	
		43.7164 lb/yr	Average	Maximum	16.4393 lb/hr	Maximum
Liquid	Stand	100.00% by weight	0.0257 lb/hr	0.1127 tpy	100.00% by weight	0.0453 lb/hr
	Work		0.0050 lb/hr	0.0219 tpy		16.4393 lb/hr
	Total		0.0307 lb/hr	0.1345 tpy		16.4846 lb/hr
TOC (Total)		100.00% by weight	0.0307 lb/hr	0.1345 tpy	100.00% by weight	16.4846 lb/hr
Methane						
Ethane						
VOC (Total)		100.00% by weight	0.0307 lb/hr	0.1345 tpy	100.00% by weight	16.4846 lb/hr
HAP (Total)		100.00% by weight	0.0307 lb/hr	0.1345 tpy	100.00% by weight	16.4846 lb/hr
Benzene						
Ethylbenzene						
Hexane (n-)						
Methanol		100.0000% by weight	3.07E-02 lb/hr	1.35E-01 tpy	100.0000% by weight	1.65E+01 lb/hr
Naphthalene						
Toluene						
Trimethylpentane (2,2,4-)						
Xylenes						

NOTES

1. Tank Characteristics: TANKS 4.09d

Orientation	Vertical Fixed Roof Tank	Above Ground?	Yes	
Height/Length	19.42 ft	Shell/Roof Color	Gray/Medium	or less solar
Diameter	10.00 ft	Shell Condition	Good	absorptance
Capacity (estimated)	11,408 gal	Vacuum Setting	-0.03 psig	
Capacity (nominal)	11,400 gal	Pressure Setting	0.03 psig	

2. Stored Liquid Characteristics:

Basis: USEPA TANKS 4.09d

Material: Methyl alcohol — Product stored

Liquid Molecular Weight: 32.04 lb/lb-mol — Vapor Molecular Weight: 32.04 lb/lb-mol

Monthly Data

	Days	Vapor Pressure		Liquid Surface Temperature		TANKS Output		TANKS
		avg	max	avg	max	standing	working	Flow
January	31	1.0482	1.2803	50.10	56.25	7.1425	9.1160	11,400
February	28	1.1439	1.4555	52.77	60.29	8.6594	9.9481	11,400
March	31	1.3786	1.8482	58.57	68.02	14.4846	11.9889	11,400
April	30	1.6554	2.3280	64.42	75.75	20.1344	14.3961	11,400
May	31	1.9640	2.8211	70.03	82.39	26.8465	17.0798	11,400
June	30	2.2763	3.3183	74.98	88.15	32.0537	19.7956	11,400
July	31	2.3944	3.4419	76.71	89.47	33.7142	20.8231	11,400
August	31	2.2695	3.1656	74.88	86.46	28.9094	19.7365	11,400
September	30	1.9713	2.6636	70.15	80.38	21.4275	17.1436	11,400
October	31	1.5895	2.0806	63.11	71.95	15.4721	13.8229	11,400
November	30	1.3101	1.6256	56.97	63.84	9.5623	11.3930	11,400
December	31	1.1064	1.3315	51.74	57.48	6.9725	9.6218	11,400
ALL	365	1.6756	3.4419	63.70	89.47	225.3793	174.8655	136,800

3. Emission Estimate Basis: USEPA TANKS 4.09d & TCEQ RG-166/01
4. Speciation of emissions is based on 100% methanol.

TANKS 4.0.9d
Emissions Report - Detail Format
Tank Indentification and Physical Characteristics

Identification	
User Identification:	921-FT01:06
City:	Accident
State:	Maryland
Company:	Texas Eastern Transmission, L.P.
Type of Tank:	Vertical Fixed Roof Tank
Description:	Methanol Storage Tank
Tank Dimensions	
Shell Height (ft):	6.25
Diameter (ft):	5.08
Liquid Height (ft) :	6.25
Avg. Liquid Height (ft):	3.13
Volume (gallons):	950.00
Turnovers:	12.00
Net Throughput(gal/yr):	11,400.00
Is Tank Heated (y/n):	N
Paint Characteristics	
Shell Color/Shade:	Aluminum/Diffuse
Shell Condition	Good
Roof Color/Shade:	Aluminum/Diffuse
Roof Condition:	Good
Roof Characteristics	
Type:	Cone
Height (ft)	0.16
Slope (ft/ft) (Cone Roof)	0.06
Breather Vent Settings	
Vacuum Settings (psig):	-0.03
Pressure Settings (psig)	0.03

Meterological Data used in Emissions Calculations: Baltimore, Maryland (Avg Atmospheric Pressure = 14.67 psia)

TANKS 4.0.9d
Emissions Report - Detail Format
Liquid Contents of Storage Tank

921-FT01:06 - Vertical Fixed Roof Tank
Accident, Maryland

Mixture/Component	Month	Daily Liquid Surf. Temperature (deg F) Avg.	Min.	Max.	Liquid Bulk Temp (deg F)	Vapor Pressure (psia) Avg.	Min.	Max.	Vapor Mol. Weight.	Liquid Mass Fract.	Vapor Mass Fract.	Mol. Weight	Basis for Vapor Pressure Calculations
Methyl alcohol	Jan	49.41	43.63	55.20	57.69	1.0248	0.8441	1.2378	32.0400			32.04	Option 2: A=7.897, B=1474.08, C=229.13
Methyl alcohol	Feb	51.92	44.90	58.94	57.69	1.1129	0.8814	1.3947	32.0400			32.04	Option 2: A=7.897, B=1474.08, C=229.13
Methyl alcohol	Mar	57.53	48.77	66.28	57.69	1.3334	1.0032	1.7528	32.0400			32.04	Option 2: A=7.897, B=1474.08, C=229.13
Methyl alcohol	Apr	63.17	52.72	73.63	57.69	1.5925	1.1421	2.1867	32.0400			32.04	Option 2: A=7.897, B=1474.08, C=229.13
Methyl alcohol	May	68.64	57.27	80.00	57.69	1.8830	1.3228	2.6343	32.0400			32.04	Option 2: A=7.897, B=1474.08, C=229.13
Methyl alcohol	Jun	73.48	61.41	85.55	57.69	2.1772	1.5074	3.0854	32.0400			32.04	Option 2: A=7.897, B=1474.08, C=229.13
Methyl alcohol	Jul	75.23	63.54	86.92	57.69	2.2930	1.6110	3.2067	32.0400			32.04	Option 2: A=7.897, B=1474.08, C=229.13
Methyl alcohol	Aug	73.55	62.91	84.18	57.69	2.1816	1.5797	2.9687	32.0400			32.04	Option 2: A=7.897, B=1474.08, C=229.13
Methyl alcohol	Sep	69.01	59.56	78.46	57.69	1.9043	1.4220	2.5196	32.0400			32.04	Option 2: A=7.897, B=1474.08, C=229.13
Methyl alcohol	Oct	62.18	53.92	70.44	57.69	1.5441	1.1877	1.9881	32.0400			32.04	Option 2: A=7.897, B=1474.08, C=229.13
Methyl alcohol	Nov	56.26	49.79	62.72	57.69	1.2804	1.0375	1.5704	32.0400			32.04	Option 2: A=7.897, B=1474.08, C=229.13
Methyl alcohol	Dec	51.12	45.70	56.54	57.69	1.0840	0.9053	1.2922	32.0400			32.04	Option 2: A=7.897, B=1474.08, C=229.13

TANKS 4.0.9d
Emissions Report - Detail Format
Detail Calculations (AP-42)

921-FT01:06 - Vertical Fixed Roof Tank
Accident, Maryland

Month	January	February	March	April	May	June	July	August	September	October	November	December
Standing Losses (lb):	0.7155	0.8711	1.4988	2.1512	2.9663	3.6551	3.8984	3.3207	2.4037	1.6752	1.0064	0.7117
Vapor Space Volume (cu ft):	64.4106	64.4106	64.4106	64.4106	64.4106	64.4106	64.4106	64.4106	64.4106	64.4106	64.4106	64.4106
Vapor Density (lb/cu ft):	0.0060	0.0065	0.0077	0.0091	0.0106	0.0122	0.0128	0.0122	0.0108	0.0088	0.0074	0.0063
Vapor Space Expansion Factor	0.0699	0.0883	0.1194	0.1553	0.1839	0.2120	0.2115	0.1862	0.1528	0.1197	0.0855	0.0665
Vented Vapor Saturation Factor	0.8528	0.8421	0.8166	0.7885	0.7592	0.7317	0.7214	0.7313	0.7572	0.7936	0.8226	0.8456
Tank Vapor Space Volume												
Vapor Space Volume (cu ft):	64.4106	64.4106	64.4106	64.4106	64.4106	64.4106	64.4106	64.4106	64.4106	64.4106	64.4106	64.4106
Tank Diameter (ft):	5.0800	5.0800	5.0800	5.0800	5.0800	5.0800	5.0800	5.0800	5.0800	5.0800	5.0800	5.0800
Vapor Space Outage (ft):	3.1779	3.1779	3.1779	3.1779	3.1779	3.1779	3.1779	3.1779	3.1779	3.1779	3.1779	3.1779
Tank Shell Height (ft):	6.2500	6.2500	6.2500	6.2500	6.2500	6.2500	6.2500	6.2500	6.2500	6.2500	6.2500	6.2500
Average Liquid Height (ft)	3.1250	3.1250	3.1250	3.1250	3.1250	3.1250	3.1250	3.1250	3.1250	3.1250	3.1250	3.1250
Roof Outage (ft):	0.0529	0.0529	0.0529	0.0529	0.0529	0.0529	0.0529	0.0529	0.0529	0.0529	0.0529	0.0529
Roof Outage (Cone Roof)												
Roof Outage (ft):	0.0529	0.0529	0.0529	0.0529	0.0529	0.0529	0.0529	0.0529	0.0529	0.0529	0.0529	0.0529
Roof Height (ft):	0.1587	0.1587	0.1587	0.1587	0.1587	0.1587	0.1587	0.1587	0.1587	0.1587	0.1587	0.1587
Roof Slope (ft/ft):	0.0625	0.0625	0.0625	0.0625	0.0625	0.0625	0.0625	0.0625	0.0625	0.0625	0.0625	0.0625
Shell Radius (ft):	2.5400	2.5400	2.5400	2.5400	2.5400	2.5400	2.5400	2.5400	2.5400	2.5400	2.5400	2.5400
Vapor Density												
Vapor Density (lb/cu ft):	0.0060	0.0065	0.0077	0.0091	0.0106	0.0122	0.0128	0.0122	0.0108	0.0088	0.0074	0.0063
Vapor Molecular Weight (lb/lb-mole)	32.0400	32.0400	32.0400	32.0400	32.0400	32.0400	32.0400	32.0400	32.0400	32.0400	32.0400	32.0400
Vapor Pressure at Daily Average Liquid Surface Temperature (psia):	1.0248	1.1129	1.3334	1.5925	1.8830	2.1772	2.2930	2.1816	1.9043	1.5441	1.2804	1.0840
Daily Avg. Liquid Surface Temp. (deg. R)	509.0845	511.5926	517.1965	522.8414	528.3061	533.1493	534.9037	533.2175	528.6769	521.8493	515.9251	510.7893
Daily Average Ambient Temp. (deg. F)	31.8000	34.8000	44.0500	53.4000	63.4000	72.5000	77.0000	75.5500	68.4500	56.6000	46.8000	36.7000
Ideal Gas Constant R (psia cuft / (lb-mol-deg R))	10.731	10.731	10.731	10.731	10.731	10.731	10.731	10.731	10.731	10.731	10.731	10.731
Liquid Bulk Temperature (deg. R)	517.3575	517.3575	517.3575	517.3575	517.3575	517.3575	517.3575	517.3575	517.3575	517.3575	517.3575	517.3575
Tank Paint Solar Absorptance (Shell)	0.6000	0.6000	0.6000	0.6000	0.6000	0.6000	0.6000	0.6000	0.6000	0.6000	0.6000	0.6000
Tank Paint Solar Absorptance (Roof)	0.6000	0.6000	0.6000	0.6000	0.6000	0.6000	0.6000	0.6000	0.6000	0.6000	0.6000	0.6000
Daily Total Solar Insulation Factor (Btu/sqft day):	657.7007	908.3440	1,231.9594	1,554.9403	1,779.5674	1,956.6041	1,909.0136	1,687.8764	1,389.0081	1,048.5774	708.4639	562.5197
Vapor Space Expansion Factor												
Vapor Space Expansion Factor	0.0699	0.0883	0.1194	0.1553	0.1839	0.2120	0.2115	0.1862	0.1528	0.1197	0.0855	0.0665
Daily Vapor Temperature Range (deg. R):	23.1454	28.0762	35.0249	41.8190	45.4487	48.2789	46.7594	42.5403	37.8073	33.0241	25.8702	21.6903
Daily Vapor Pressure Range (psia):	0.3936	0.5133	0.7496	1.0446	1.3115	1.5780	1.5957	1.3890	1.0976	0.8003	0.5329	0.3869
Breather Vent Press. Setting Range(psia):	0.0600	0.0600	0.0600	0.0600	0.0600	0.0600	0.0600	0.0600	0.0600	0.0600	0.0600	0.0600
Vapor Pressure at Daily Average Liquid Surface Temperature (psia):	1.0248	1.1129	1.3334	1.5925	1.8830	2.1772	2.2930	2.1816	1.9043	1.5441	1.2804	1.0840
Vapor Pressure at Daily Minimum Liquid Surface Temperature (psia):	0.8441	0.8814	1.0032	1.1421	1.3228	1.5074	1.6110	1.5797	1.4220	1.1877	1.0375	0.9053
Vapor Pressure at Daily Maximum Liquid Surface Temperature (psia):	1.2378	1.3947	1.7528	2.1867	2.6343	3.0854	3.2067	2.9687	2.5196	1.9881	1.5704	1.2922
Daily Avg. Liquid Surface Temp. (deg R):	509.0845	511.5926	517.1965	522.8414	528.3061	533.1493	534.9037	533.2175	528.6769	521.8493	515.9251	510.7893
Daily Min. Liquid Surface Temp. (deg R):	503.2982	504.5735	508.4403	512.3867	516.9440	521.0796	523.2139	522.5825	519.2251	513.5932	509.4576	505.3668
Daily Max. Liquid Surface Temp. (deg R):	514.8708	518.6116	525.9527	533.2962	539.6683	545.2190	546.5936	543.8526	538.1287	530.1053	522.3927	516.2119
Daily Ambient Temp. Range (deg. R):	16.8000	17.8000	19.9000	21.8000	21.6000	21.4000	20.4000	19.7000	20.1000	21.4000	19.4000	17.0000
Vented Vapor Saturation Factor												
Vented Vapor Saturation Factor	0.8528	0.8421	0.8166	0.7885	0.7592	0.7317	0.7214	0.7313	0.7572	0.7936	0.8226	0.8456
Vapor Pressure at Daily Average Liquid Surface Temperature (psia):	1.0248	1.1129	1.3334	1.5925	1.8830	2.1772	2.2930	2.1816	1.9043	1.5441	1.2804	1.0840
Vapor Space Outage (ft):	3.1779	3.1779	3.1779	3.1779	3.1779	3.1779	3.1779	3.1779	3.1779	3.1779	3.1779	3.1779
Working Losses (lb):	0.7427	0.8065	0.9664	1.1541	1.3647	1.5779	1.6618	1.5810	1.3801	1.1190	0.9279	0.7856
Vapor Molecular Weight (lb/lb-mole):	32.0400	32.0400	32.0400	32.0400	32.0400	32.0400	32.0400	32.0400	32.0400	32.0400	32.0400	32.0400
Vapor Pressure at Daily Average Liquid												

Surface Temperature (psia)	1.0248	1.1129	1.3334	1.5925	1.8830	2.1772	2.2930	2.1816	1.9043	1.5441	1.2804	1.0840
Net Throughput (gal/mo.)	950.0000	950.0000	950.0000	950.0000	950.0000	950.0000	950.0000	950.0000	950.0000	950.0000	950.0000	950.0000
Annual Turnovers	12.0000	12.0000	12.0000	12.0000	12.0000	12.0000	12.0000	12.0000	12.0000	12.0000	12.0000	12.0000
Turnover Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Maximum Liquid Volume (gal)	950.0000	950.0000	950.0000	950.0000	950.0000	950.0000	950.0000	950.0000	950.0000	950.0000	950.0000	950.0000
Maximum Liquid Height (ft)	6.2500	6.2500	6.2500	6.2500	6.2500	6.2500	6.2500	6.2500	6.2500	6.2500	6.2500	6.2500
Tank Diameter (ft)	5.0800	5.0800	5.0800	5.0800	5.0800	5.0800	5.0800	5.0800	5.0800	5.0800	5.0800	5.0800
Working Loss Product Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total Losses (lb)	1.4582	1.6776	2.4652	3.3052	4.3310	5.2329	5.5602	4.9017	3.7837	2.7942	1.9343	1.4972

TANKS 4.0.9d
Emissions Report - Detail Format
Individual Tank Emission Totals

Emissions Report for: January, February, March, April, May, June, July, August, September, October, November, December

921-FT01:06 - Vertical Fixed Roof Tank
Accident, Maryland

	Losses(lbs)		
Components	Working Loss	Breathing Loss	Total Emissions
Methyl alcohol	14.07	24.87	38.94

TANKS 4.0.9d
Emissions Report - Detail Format
Tank Indentification and Physical Characteristics

Identification	
User Identification:	921-FT07
City:	Accident
State:	Maryland
Company:	Texas Eastern Transmission, L.P.
Type of Tank:	Vertical Fixed Roof Tank
Description:	Methanol Storage Tank
Tank Dimensions	
Shell Height (ft):	19.42
Diameter (ft):	10.00
Liquid Height (ft) :	19.42
Avg. Liquid Height (ft):	9.71
Volume (gallons):	11,400.00
Turnovers:	12.00
Net Throughput(gal/yr):	136,800.00
Is Tank Heated (y/n):	N
Paint Characteristics	
Shell Color/Shade:	Gray/Medium
Shell Condition	Good
Roof Color/Shade:	Gray/Medium
Roof Condition:	Good
Roof Characteristics	
Type:	Cone
Height (ft)	0.31
Slope (ft/ft) (Cone Roof)	0.06
Breather Vent Settings	
Vacuum Settings (psig):	-0.03
Pressure Settings (psig)	0.03

Meterological Data used in Emissions Calculations: Baltimore, Maryland (Avg Atmospheric Pressure = 14.67 psia)

TANKS 4.0.9d
Emissions Report - Detail Format
Liquid Contents of Storage Tank

921-FT07 - Vertical Fixed Roof Tank
Accident, Maryland

Mixture/Component	Month	Daily Liquid Surf Temperature (deg F) Avg	Min.	Max.	Liquid Bulk Temp (deg F)	Vapor Pressure (psia) Avg	Min.	Max.	Vapor Mol Weight	Liquid Mass Fract	Vapor Mass Fract.	Mol. Weight	Basis for Vapor Pressure Calculations
Methyl alcohol	Jan	50 10	43 94	56 25	58 17	1.0482	0.8533	1 2803	32 0400			32.04	Option 2 A=7 897, B=1474 08, C=229 13
Methyl alcohol	Feb	52 77	45 24	60 29	58 17	1.1439	0.8914	1 4555	32 0400			32 04	Option 2 A=7 897, B=1474 08, C=229 13
Methyl alcohol	Mar	58 57	49 13	68 02	58 17	1.3786	1.0151	1.8482	32 0400			32 04	Option 2 A=7 897, B=1474 08, C=229 13
Methyl alcohol	Apr	64 42	53 10	75 75	58 17	1.6554	1.1563	2 3280	32 0400			32.04	Option 2 A=7 897, B=1474 08, C=229 13
Methyl alcohol	May	70 03	57 67	82 39	58 17	1.9640	1.3396	2 8211	32 0400			32 04	Option 2 A=7 897, B=1474 08, C=229 13
Methyl alcohol	Jun	74 98	61 82	88 15	58 17	2 2763	1.5268	3.3183	32 0400			32 04	Option 2 A=7 897, B=1474 08, C=229 13
Methyl alcohol	Jul	76 71	63 95	89 47	58 17	2 3944	1.6314	3.4419	32 0400			32 04	Option 2 A=7 897, B=1474 08, C=229 13
Methyl alcohol	Aug	74 88	63 30	86 46	58 17	2.2695	1.5990	3.1656	32 0400			32 04	Option 2 A=7 897, B=1474 08, C=229 13
Methyl alcohol	Sep	70 15	59 92	80 38	58 17	1.9713	1.4387	2 6636	32 0400			32 04	Option 2 A=7 897, B=1474 08, C=229 13
Methyl alcohol	Oct	63 11	54 27	71 95	58 17	1.5895	1.2010	2 0806	32 0400			32 04	Option 2 A=7 897, B=1474 08, C=229 13
Methyl alcohol	Nov	56 97	50 11	63 84	58 17	1.3101	1.0485	1.6256	32 0400			32 04	Option 2 A=7 897, B=1474 08, C=229 13
Methyl alcohol	Dec	51 74	46 01	57 48	58 17	1.1064	0.9148	1.3315	32 0400			32 04	Option 2 A=7 897, B=1474 08, C=229 13

TANKS 4.0.9d
Emissions Report - Detail Format
Detail Calculations (AP-42)

921-FT07 - Vertical Fixed Roof Tank
Accident, Maryland

Month	January	February	March	April	May	June	July	August	September	October	November	December
Standing Losses (lb)	7.1425	8.6594	14.4846	20.1344	26.8465	32.0537	33.7142	28.9094	21.4275	15.4721	9.5623	6.9725
Vapor Space Volume (cu ft)	770.8028	770.8028	770.8028	770.8028	770.8028	770.8028	770.8028	770.8028	770.8028	770.8028	770.8028	770.8028
Vapor Density (lb/cu ft)	0.0061	0.0067	0.0079	0.0094	0.0111	0.0127	0.0133	0.0127	0.0111	0.0091	0.0076	0.0065
Vapor Space Expansion Factor	0.0752	0.0960	0.1311	0.1718	0.2052	0.2382	0.2377	0.2081	0.1689	0.1303	0.0918	0.0712
Vented Vapor Saturation Factor	0.6471	0.6270	0.5824	0.5373	0.4947	0.4579	0.4453	0.4586	0.4937	0.5474	0.5947	0.6347
Tank Vapor Space Volume												
Vapor Space Volume (cu ft)	770.8028	770.8028	770.8028	770.8028	770.8028	770.8028	770.8028	770.8028	770.8028	770.8028	770.8028	770.8028
Tank Diameter (ft)	10.0000	10.0000	10.0000	10.0000	10.0000	10.0000	10.0000	10.0000	10.0000	10.0000	10.0000	10.0000
Vapor Space Outage (ft)	9.8142	9.8142	9.8142	9.8142	9.8142	9.8142	9.8142	9.8142	9.8142	9.8142	9.8142	9.8142
Tank Shell Height (ft)	19.4200	19.4200	19.4200	19.4200	19.4200	19.4200	19.4200	19.4200	19.4200	19.4200	19.4200	19.4200
Average Liquid Height (ft)	9.7100	9.7100	9.7100	9.7100	9.7100	9.7100	9.7100	9.7100	9.7100	9.7100	9.7100	9.7100
Roof Outage (ft)	0.1042	0.1042	0.1042	0.1042	0.1042	0.1042	0.1042	0.1042	0.1042	0.1042	0.1042	0.1042
Roof Outage (Cone Roof)												
Roof Outage (ft)	0.1042	0.1042	0.1042	0.1042	0.1042	0.1042	0.1042	0.1042	0.1042	0.1042	0.1042	0.1042
Roof Height (ft)	0.3125	0.3125	0.3125	0.3125	0.3125	0.3125	0.3125	0.3125	0.3125	0.3125	0.3125	0.3125
Roof Slope (ft/ft)	0.0625	0.0625	0.0625	0.0625	0.0625	0.0625	0.0625	0.0625	0.0625	0.0625	0.0625	0.0625
Shell Radius (ft)	5.0000	5.0000	5.0000	5.0000	5.0000	5.0000	5.0000	5.0000	5.0000	5.0000	5.0000	5.0000
Vapor Density												
Vapor Density (lb/cu ft)	0.0061	0.0067	0.0079	0.0094	0.0111	0.0127	0.0133	0.0127	0.0111	0.0091	0.0076	0.0065
Vapor Molecular Weight (lb/lb-mole)	32.0400	32.0400	32.0400	32.0400	32.0400	32.0400	32.0400	32.0400	32.0400	32.0400	32.0400	32.0400
Vapor Pressure at Daily Average Liquid Surface Temperature (psia)	1.0482	1.1439	1.3786	1.6554	1.9640	2.2763	2.3944	2.2695	1.9713	1.5895	1.3101	1.1064
Daily Avg. Liquid Surface Temp. (deg. R)	509.7690	512.4354	518.2439	524.0929	529.6996	534.6547	536.3790	534.5531	529.8236	522.7808	516.6417	511.4137
Daily Average Ambient Temp. (deg. F)	31.8000	34.8000	44.0500	53.4000	63.4000	72.5000	77.0000	75.5500	68.4500	56.6000	46.8000	36.7000
Ideal Gas Constant R (psia cuft / (lb-mol-deg R))	10.731	10.731	10.731	10.731	10.731	10.731	10.731	10.731	10.731	10.731	10.731	10.731
Liquid Bulk Temperature (deg. R)	517.8375	517.8375	517.8375	517.8375	517.8375	517.8375	517.8375	517.8375	517.8375	517.8375	517.8375	517.8375
Tank Paint Solar Absorptance (Shell)	0.6800	0.6800	0.6800	0.6800	0.6800	0.6800	0.6800	0.6800	0.6800	0.6800	0.6800	0.6800
Tank Paint Solar Absorptance (Roof)	0.6800	0.6800	0.6800	0.6800	0.6800	0.6800	0.6800	0.6800	0.6800	0.6800	0.6800	0.6800
Daily Total Solar Insulation Factor (Btu/sqft day)	657.7007	908.3440	1,231.9594	1,554.9403	1,779.5674	1,956.6041	1,909.0136	1,687.8764	1,389.0081	1,048.5774	708.4639	562.5197
Vapor Space Expansion Factor												
Vapor Space Expansion Factor	0.0752	0.0960	0.1311	0.1718	0.2052	0.2382	0.2377	0.2081	0.1689	0.1303	0.0918	0.0712
Daily Vapor Temperature Range (deg. R)	24.6186	30.1109	37.7845	45.3021	49.4350	52.6617	51.0356	46.3212	40.9187	35.3729	27.4572	22.9504
Daily Vapor Pressure Range (psia)	0.4271	0.5641	0.8330	1.1716	1.4815	1.7915	1.8105	1.5666	1.2250	0.8796	0.5771	0.4168
Breather Vent Press. Setting Range(psia)	0.0600	0.0600	0.0600	0.0600	0.0600	0.0600	0.0600	0.0600	0.0600	0.0600	0.0600	0.0600
Vapor Pressure at Daily Average Liquid Surface Temperature (psia)	1.0482	1.1439	1.3786	1.6554	1.9640	2.2763	2.3944	2.2695	1.9713	1.5895	1.3101	1.1064
Vapor Pressure at Daily Minimum Liquid Surface Temperature (psia)	0.8533	0.8914	1.0151	1.1563	1.3396	1.5268	1.6314	1.5990	1.4387	1.2010	1.0485	0.9148
Vapor Pressure at Daily Maximum Liquid Surface Temperature (psia)	1.2803	1.4555	1.8482	2.3280	2.8211	3.3183	3.4419	3.1656	2.6636	2.0806	1.6256	1.3315
Daily Avg. Liquid Surface Temp. (deg R)	509.7690	512.4354	518.2439	524.0929	529.6996	534.6547	536.3790	534.5531	529.8236	522.7808	516.6417	511.4137
Daily Min. Liquid Surface Temp. (deg R)	503.6143	504.9077	508.7978	512.7674	517.3409	521.4892	523.6201	522.9728	519.5939	513.9375	509.7774	505.6761
Daily Max. Liquid Surface Temp. (deg R)	515.9236	519.9631	527.6900	535.4185	542.0584	547.8201	549.1379	546.1334	540.0532	531.6240	523.5060	517.1512
Daily Ambient Temp. Range (deg. R)	16.8000	17.8000	19.9000	21.8000	21.6000	21.4000	20.4000	19.7000	20.1000	21.4000	19.4000	17.0000
Vented Vapor Saturation Factor												
Vented Vapor Saturation Factor	0.6471	0.6270	0.5824	0.5373	0.4947	0.4579	0.4453	0.4586	0.4937	0.5474	0.5947	0.6347
Vapor Pressure at Daily Average Liquid Surface Temperature (psia)	1.0482	1.1439	1.3786	1.6554	1.9640	2.2763	2.3944	2.2695	1.9713	1.5895	1.3101	1.1064
Vapor Space Outage (ft)	9.8142	9.8142	9.8142	9.8142	9.8142	9.8142	9.8142	9.8142	9.8142	9.8142	9.8142	9.8142
Working Losses (lb)	9.1160	9.9481	11.9889	14.3961	17.0798	19.7956	20.8231	19.7365	17.1436	13.8229	11.3930	9.6218
Vapor Molecular Weight (lb/lb-mole)	32.0400	32.0400	32.0400	32.0400	32.0400	32.0400	32.0400	32.0400	32.0400	32.0400	32.0400	32.0400
Vapor Pressure at Daily Average Liquid												

Surface Temperature (psia):	1.0482	1.1439	1.3786	1.6554	1.9640	2.2763	2.3944	2.2695	1.9713	1.5895	1.3101	1.1064
Net Throughput (gal/mo.):	11,400.0000	11,400.0000	11,400.0000	11,400.0000	11,400.0000	11,400.0000	11,400.0000	11,400.0000	11,400.0000	11,400.0000	11,400.0000	11,400.0000
Annual Turnovers:	12.0000	12.0000	12.0000	12.0000	12.0000	12.0000	12.0000	12.0000	12.0000	12.0000	12.0000	12.0000
Turnover Factor:	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Maximum Liquid Volume (gal):	11,400.0000	11,400.0000	11,400.0000	11,400.0000	11,400.0000	11,400.0000	11,400.0000	11,400.0000	11,400.0000	11,400.0000	11,400.0000	11,400.0000
Maximum Liquid Height (ft):	19.4200	19.4200	19.4200	19.4200	19.4200	19.4200	19.4200	19.4200	19.4200	19.4200	19.4200	19.4200
Tank Diameter (ft):	10.0000	10.0000	10.0000	10.0000	10.0000	10.0000	10.0000	10.0000	10.0000	10.0000	10.0000	10.0000
Working Loss Product Factor:	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total Losses (lb):	16.2585	18.6075	26.4735	34.5306	43.9263	51.8494	54.5373	48.6458	38.5711	29.2951	20.9554	16.5943

TANKS 4.0.9d
Emissions Report - Detail Format
Individual Tank Emission Totals

Emissions Report for: January, February, March, April, May, June, July, August, September, October, November, December

921-FT07 - Vertical Fixed Roof Tank
Accident, Maryland

	Losses(lbs)		
Components	Working Loss	Breathing Loss	Total Emissions
Methyl alcohol	174.87	225.38	400.24

TANKS 4.0.9d
Emissions Report - Detail Format
Total Emissions Summaries - All Tanks in Report

Emissions Report for: January, February, March, April, May, June, July, August, September, October, November, December

Tank Identification				Losses (lbs)
921-FT01 06	Texas Eastern Transmission, L.P.	Vertical Fixed Roof Tank	Accident, Maryland	38.94
921-FT07	Texas Eastern Transmission, L.P.	Vertical Fixed Roof Tank	Accident, Maryland	400.24
Total Emissions for all Tanks:				439.19

Columbia Pipeline Group
700 Louisiana Street, 700, Houston, Texas, USA 77002
Tel: 832.320.5895 Cell: 832.954.4875
mili_patel@transcanada.com

Via Email brian.hug@maryland.gov

October 29, 2018

Brian Hug
Program Manager, Air Quality Planning Program, Air and Radiation
1800 Washington Boulevard
Baltimore, MD 21230

Re: EPA Oil & Natural Gas Control Techniques Guidelines (CTG)
Rutledge Compressor Station
Tank Emissions

Dear Mr. Mosier:

TransCanada's Columbia Pipeline Group operates the Rutledge Compressor Station in Fallston, Maryland. The site has two (2) 1,000-gallon Pipeline Liquids Tanks. Attached are VOC fugitive emissions calculations for the tanks. Both tanks are below 6 tons per year VOC and therefore, not subject to the EPA Oil & Natural Gas Industry CTG. The tanks are not equipped with a control device or vapor recovery unit.

Should you have any questions or require additional information, you may contact me at (832) 320-5895 or mili_patel@transcanada.com.

Sincerely,

Mili R. Patel
Senior Environmental Engineer

cc: via email with attachments

Randy Mosier, Division Chief, Air Regulations Division
Frank Courtright, Program Manager, Air Quality Compliance Program
John Artes, Regulatory & Compliance Engineer, Air Quality Compliance Program
Joshua Shodeinde, Regulatory & Compliance Engineer, Regulations Division
Christopher Cripps, EPA Region 3

Columbia Gas Transmission, LLC
Rutledge Compressor Station

1,000 gal Horizontal Fixed Roof Pipeline Liquids Tank

Source ID: ***A01, A02***

Month	Pollutant	Emissions (Per Tank)	
		lb/yr	tons
January	VOC	0.76	3.82E-04
February	VOC	0.75	3.75E-04
March	VOC	0.90	4.51E-04
April	VOC	0.95	4.77E-04
May	VOC	1.00	5.00E-04
June	VOC	0.98	4.91E-04
July	VOC	0.99	4.94E-04
August	VOC	0.94	4.72E-04
September	VOC	0.89	4.43E-04
October	VOC	0.90	4.51E-04
November	VOC	0.80	3.98E-04
December	VOC	0.75	3.74E-04
Total	VOC	10.61	5.31E-03

Material Information (Per Tank):

Material		Pipeline Liquids
Throughput	Number of Turnovers:	1.5
	Annual Throughput (gal/yr):	1,500
	January Throughput (gal/month):	125
	February Throughput (gal/month):	125
	March Throughput (gal/month):	125
	April Throughput (gal/month):	125
	May Throughput (gal/month):	125
	June Throughput (gal/month):	125
	July Throughput (gal/month):	125
	August Throughput (gal/month):	125
	September Throughput (gal/month):	125
	October Throughput (gal/month):	125
	November Throughput (gal/month):	125
	December Throughput (gal/month):	125

Compound	Molecular Weight (lb/lb-mol)
Benzene	78.11
Ethylbenzene	106.17
Heptane	100.2
Nonane	128.26
Toluene	92.13
Xylene	106.17

Tank Information:

Tank Length (feet)		11.0
Tank Diameter (feet)		4.0
Number of Turnovers per year per tank		1.5
Type of Tank:		Horizontal Fixed Roof
Deck Characteristics	Tank Construction:	Welded
Location	Nearest City:	Baltimore, MD
Tank Solar absorptance (α):	Table 7.1-6	0.17

Other Information:

Constants	˚F to ˚R conversion:	459.67
mmHg to psia conversion (psia/mmHg):		0.019337
AP-42 Defined Material (from Table 7.1-3, 7.1-5):		
VP Calculation Method:		Linear Interpolation
Vapor Molecular Weight (lb/lb-mole):		94.59
Daily Total Solar Insolation Factor (I), (Btu/(ft² day)):		1284
Ideal Gas Constant, (psia ft³/lb-mole °R):		10.73

Columbia Gas Transmission, LLC
Rutledge Compressor Station

1,000 gal Horizontal Fixed Roof Pipeline Liquids Tank

Source ID: ***A01, A02***

Meteorological Data

The daily maximum ambient temperature (TAX), daily minimum ambient temperature (TAN), and daily total solar insolation factor (I) for each month for the specified city were taken from the proposed revisions to AP-42 Chapter 7, Table 7.1-7

City:	Baltimore, MD
Annual Average Atmospheric Pressure (psia):	14.68
Annual Average Wind Speed (mph):	8.7

Month	Daily Maximum Ambient Temperature T_{AX} (°F)	Daily Minimum Ambient Temperature T_{AN} (°F)	Daily Total Solar Insolation Factor I (Btu/ft^{2}d)
Jan.	40.3	23.4	666
Feb.	43.7	25.9	919
Mar.	54.0	34.2	1236
Apr.	64.2	42.4	1554
May	74.1	52.5	1775
June	83.1	61.9	1966
July	87.3	66.7	1902
Aug.	85.5	65.7	1680
Sept.	78.4	58.5	1395
Oct.	67.3	45.9	1046
Nov.	56.5	37.0	698
Dec.	45.1	28.2	571

Calculated Tank Temperature Data

The daily average ambient temperature (T_{AA}) and bulk liquid temperature (T_B) were calculated for each month using equations from AP-42, Chapter 7, dated 11/06. If product is not at ambient temperature, then the bulk temperature is set equal to the user entered temperature information above.

$$T_{AA} = \left(\frac{T_{AX} + T_{AN}}{2}\right)$$

Equation 1-27

$$T_B = T_{AA} + 6\alpha - 1$$

Equation 1-28

where:

T_{AA} =	daily average ambient temperature, °R
T_B =	liquid bulk temperature, °R
T_{AX} =	daily maximum ambient temperature, °R
T_{AN} =	daily minimum ambient temperature, °R
α =	tank paint solar absorptance, dimensionless

Month	Days	Daily Maximum Ambient Temperature T_{AX} °R	Daily Minimum Ambient Temperature T_{AN} °R	Daily Average Ambient Temperature T_{AA} °R	Daily Average Ambient Temperature T_{AA} °F	Liquid Bulk Temperature T_B °R	Liquid Bulk Temperature T_B °F
Jan.	31	499.97	483.07	491.52	31.85	491.54	31.87
Feb.	28	503.37	485.57	494.47	34.80	494.49	34.82
Mar.	31	513.67	493.87	503.77	44.10	503.79	44.12
Apr.	30	523.87	502.07	512.97	53.30	512.99	53.32
May	31	533.77	512.17	522.97	63.30	522.99	63.32
June	30	542.77	521.57	532.17	72.50	532.19	72.52
July	31	546.97	526.37	536.67	77.00	536.69	77.02
Aug.	31	545.17	525.37	535.27	75.60	535.29	75.62
Sept.	30	538.07	518.17	528.12	68.45	528.14	68.47
Oct.	31	526.97	505.57	516.27	56.60	516.29	56.62
Nov.	30	516.17	496.67	506.42	46.75	506.44	46.77
Dec.	31	504.77	487.87	496.32	36.65	496.34	36.67

Total Losses from Fixed Roof Tanks

$$L_T = L_S + L_W$$

Equation 1-1

where:

L_T = total loss, lb
L_S = standing storage losses, lb
L_W = working losses, lb

Total Losses, L_T		
January	0.76	lb/month
February	0.75	lb/month
March	0.90	lb/month
April	0.95	lb/month
May	1.00	lb/month
June	0.98	lb/month
July	0.99	lb/month
August	0.94	lb/month
September	0.89	lb/month
October	0.90	lb/month
November	0.80	lb/month
December	0.75	lb/month
Annual Total	10.61	lb/yr

Columbia Gas Transmission, LLC
Rutledge Compressor Station

1,000 gal Horizontal Fixed Roof Pipeline Liquids Tank

Source ID: ***A01, A02***

Standing Storage Loss

$$L_S = E_M V_V W_V K_E K_S$$

Equation 1-2

where:

L_S = standing storage loss, lb/month
V_V = vapor space volume, ft³
W_V = stock vapor density, lb/ft³
K_E = vapor space expansion factor, dimensionless
K_S = vented vapor saturation factor, dimensionless
E_M = the number of daily events in month, $(\text{month})^{-1}$

Standing Storage Loss, L_S		
January	0.65	lb/month
February	0.64	lb/month
March	0.79	lb/month
April	0.84	lb/month
May	0.88	lb/month
June	0.86	lb/month
July	0.86	lb/month
August	0.82	lb/month
September	0.77	lb/month
October	0.78	lb/month
November	0.68	lb/month
December	0.64	lb/month

Tank Vapor Space Volume

$$V_V = \left(\frac{\pi}{4} D_E{}^2\right) H_{VO}$$

Equation 1-3*

where:

V_V = vapor space volume, ft³
D_E = effective tank diameter, ft
H_{VO} = vapor space outage, ft

*D_E used instead of D for horizontal fixed roof tanks (7.1-14)

V_V =	69.12	ft³
D_E =	7.48	ft
H_{VO} =	1.57	ft

Vapor Space Outage

$$H_{VO} = \frac{H_E}{2}$$

Equation 1-15*
* For horizontal tanks (7.1-11; 7.1-14)

where:

H_E = effective height, ft
H_{VO} = vapor space outage, ft

Effective Height

$$H_E = \frac{\pi}{4} D$$

Equation 1-14

where:

D = tank diameter, ft

H_{VO} =	1.57	ft
H_E =	3.14	ft
D =	4	ft

Effective Tank Diameter

Equation 1-13

$$D_E = \sqrt{\frac{LD}{\frac{\pi}{4}}}$$

where:

D_E = tank diameter, ft
L = length of the horizontal tank, ft
D = diameter of a vertical cross-section of the horizontal tank, ft

D_E =	7.48	ft
L=	11.00	ft
D=	4	ft

Vapor Space Expansion Factor

$$K_E = \frac{\Delta T_V}{T_{LA}} + \frac{\Delta P_V - \Delta P_B}{P_A - P_{VA}} > 0$$

Equation 1-7*
*ΔP_B=0 when roof tank is bolted or riveted

where:

K_E = vapor space expansion factor, dimensionless
ΔT_V = daily vapor temperature range, °R
ΔP_V = daily vapor pressure range, psi
ΔP_B = breather vent pressure setting range, psi
T_{LA} = daily average liquid surface temperature, °R
P_A = atmospheric pressure, psia
P_{VA} = vapor pressure at daily average liquid surface temperature, psia

Vapor Space Expansion Factor, K_E	
January	0.04
February	0.05
March	0.05
April	0.06
May	0.06
June	0.06
July	0.06
August	0.06
September	0.05
October	0.05
November	0.05
December	0.04

Columbia Gas Transmission, LLC
Rutledge Compressor Station

1,000 gal Horizontal Fixed Roof Pipeline Liquids Tank

Source ID: ***A01, A02***

Daily Vapor Temperature Range

$\Delta T_V = 0.72\ \Delta T_A + 0.028\ \alpha\ I$ **Equation 1-8**

where:

ΔT_V = daily vapor temperature range, °R
ΔT_A = daily ambient temperature range, °R
α = tank paint solar absorptance, dimensionless
I = daily total solar insolation factor, Btu/ft² d

	Daily Vapor Temperature Range, ΔT_V (°R)
January	15.34
February	17.19
March	20.14
April	23.09
May	24.00
June	24.62
July	23.89
August	22.25
September	20.97
October	20.39
November	17.36
December	14.89

Daily Ambient Temperature Range

$\Delta T_A = T_{AX} - T_{AN}$ **Equation 1-12**

where:

ΔT_A = daily ambient temperature range, °R
T_{AX} = daily maximum ambient temperature, °R
T_{AN} = daily minimum ambient temperature, °R

	Daily Ambient Temperature Range, ΔT_A (°R)
January	16.90
February	17.80
March	19.80
April	21.80
May	21.60
June	21.20
July	20.60
August	19.80
September	19.90
October	21.40
November	19.50
December	16.90

Daily Vapor Pressure Range

$\Delta P_V = P_{VX} - P_{VN}$ **Equation 1-9**

where:

ΔP_V = daily vapor pressure range, psi
P_{VX} = vapor pressure at daily maximum liquid surface temperature, psia
P_{VN} = vapor pressure at daily minimum liquid surface temperature, psia

$T_{LX} = T_{LA} + 0.25\ \Delta T_V$ **Figure 7.1-17**

$T_{LN} = T_{LA} - 0.25\ \Delta T_V$

where:

T_{LX} = daily maximum liquid surface temperature, °R
T_{LA} = daily average liquid surface temperature, °R
ΔT_V = daily vapor temperature range, °R
T_{LN} = daily minimum liquid surface temperature, °R

	ΔP_V (psi)	P_{VX} (psia)	P_{VN} (psia)
January	0.1854	0.4996	0.3142
February	0.1873	0.5034	0.3161
March	0.1921	0.5139	0.3218
April	0.1968	0.5243	0.3275
May	0.2009	0.5349	0.3340
June	0.2046	0.5446	0.3400
July	0.2059	0.5489	0.3430
August	0.2046	0.5467	0.3421
September	0.2013	0.5388	0.3375
October	0.1966	0.5263	0.3297
November	0.1916	0.5151	0.3235
December	0.1869	0.5042	0.3173

True Vapor Pressure of Organic Liquids

$\log P_{VA} = A - \left(\frac{B}{T_{LA}+C}\right)$ **Equation 1-25***

where:

A = constant in vapor pressure equation (Table 7.1-5)
B = constant in vapor pressure equation (Table 7.1-5), °C
C = constant in vapor pressure equation (Table 7.1-5), °C
T_{LA} = daily average liquid surface temperature, °C*
P_{VA} = vapor pressure at average liquid surface temperature, mm Hg

*Note that temperature is in °C instead of °R, and that vapor pressure is in mm Hg instead of psia

	P_{VA} (psia)
January	0.3977
February	0.4004
March	0.4082
April	0.4160
May	0.4243
June	0.4320
July	0.4355
August	0.4342
September	0.4281
October	0.4181
November	0.4098
December	0.4015

Columbia Gas Transmission, LLC
Rutledge Compressor Station

1,000 gal Horizontal Fixed Roof Pipeline Liquids Tank

Source ID: ***A01, A02***

Vented Vapor Saturation Factor

$$K_S = \frac{1}{1+0.053 P_{VA} H_{VO}}$$

Equation 1-20

where:

K_S = vented vapor saturation factor, dimensionless
P_{VA} = vapor pressure at daily average liquid surface temperature, psia
H_{VO} = vapor space outage, ft
0.053 = constant, $(psia\text{-}ft)^{-1}$

Vented Vapor Saturation Factor, K_S	
January	0.97
February	0.97
March	0.97
April	0.97
May	0.97
June	0.97
July	0.97
August	0.97
September	0.97
October	0.97
November	0.97
December	0.97

Stock Vapor Density

$$W_V = \frac{M_V P_{VA}}{R T_{LA}}$$

Equation 1-21

where:

W_V = vapor density, lb/ft³
M_V = vapor molecular weight, lb/lb-mole
R = the ideal gas constant, 10.731 psia ft³/lb-mole °R
P_{VA} = vapor pressure at daily average liquid surface temperature, psia
T_{LA} = daily average liquid surface temperature, °R

Stock Vapor Density, W_V (lb/ft^3)	
January	0.007119
February	0.007120
March	0.007119
April	0.007119
May	0.007119
June	0.007120
July	0.007119
August	0.007120
September	0.007120
October	0.007119
November	0.007120
December	0.007120

Daily Average Liquid Surface Temperature

$$T_{LA} = 0.44T_{AA} + 0.56T_B + 0.0079\,\alpha\,I$$

Equation 1-26

where:

T_{LA} = daily average liquid surface temperature, °R
T_{AA} = daily average ambient temperature, °R
T_B = liquid bulk temperature, °R
α = tank paint solar absorptance, dimensionless
I = daily total solar insolation factor, Btu/ft² d

Daily Average Liquid Surface Temperature, T_{LA} (°R)	
January	492.43
February	495.72
March	505.44
April	515.07
May	525.37
June	534.82
July	539.24
August	537.54
September	530.00
October	517.69
November	507.37
December	497.10

Columbia Gas Transmission, LLC
Rutledge Compressor Station

1,000 gal Horizontal Fixed Roof Pipeline Liquids Tank

Source ID: ***A01, A02***

Daily Average Ambient Temperature

$$T_{AA} = \left(\frac{T_{AX} + T_{AN}}{2}\right)$$ **Equation 1-27**

where:

T_{AA} = daily average ambient temperature, °R
T_{AX} = daily maximum ambient temperature, °R
T_{AN} = daily minimum ambient temperature, °R

Daily Average Ambient Temperature, T_{AA} (°R)	
January	491.52
February	494.47
March	503.77
April	512.97
May	522.97
June	532.17
July	536.67
August	535.27
September	528.12
October	516.27
November	506.42
December	496.32

Liquid Bulk Temperature

$$T_B = T_{AA} + 6\alpha - 1$$ **Equation 1-28**

where:

T_B = liquid bulk temperature, °R
T_{AA} = daily average ambient temperature, °R
α = tank paint solar absorptance, dimensionless

Liquid Bulk Temperature, T_B (°R)	
January	491.54
February	494.49
March	503.79
April	512.99
May	522.99
June	532.19
July	536.69
August	535.29
September	528.14
October	516.29
November	506.44
December	496.34

Working Loss

$$L_W = 0.0010\, M_V\, P_{VA}\, Q\, K_N\, K_P$$ **Equation 1-29**

where:

L_W = working loss, lb
M_V = vapor molecular weight, lb/lb-mole
P_{VA} = vapor pressure at daily average liquid surface temperature, psia
Q = annual net throughput (tank capacity [bbl] times annual turnover rate), bbl
K_N = working loss turnover (saturation) factor, dimensionless*
*turnovers >36 = (180 + N)/6N where N = # of turnovers/yr, dimensionless (7.1-18)
*turnovers ≤36 = 1 (7.1-18)
K_P = working loss product factor for fixed roof tanks, dimensionless**
**1 for volatile organic liquids, 0.75 for crude oils (7.1-19)
N = number of turnovers per year, dimensionless

Working Loss, L_W (lb)	
January	0.11
February	0.11
March	0.11
April	0.12
May	0.12
June	0.12
July	0.12
August	0.12
September	0.12
October	0.12
November	0.12
December	0.11

$$N = \frac{5.614Q}{V_{LX}}$$ **Equation 1-30**

$$V_{LX} = \frac{\pi}{4} D^2 H_{LX}$$ **Equation 1-31**

where:

V_{LX} = tank maximum liquid volume, ft³
D = diameter, ft
H_{LX} = maximum liquid height, ft*
*Length for horizontal tank

Q =	35.72	bbl/yr
N =	1	
V_{LX} =	138	ft³
D =	4.0	ft
H_{LX} =	11	ft

October 5, 2018

Mili Patel
USGO Environmental – Air Permitting & Compliance
700 Louisiana Street, Suite 14104E
Houston, TX 77002-2700
Telephone 832.320.5895
Mili_Patel@transcanada.com

Dear Ms. Mili Patel:

The Environmental Protection Agency (EPA) finalized Control Techniques Guidelines (CTG) for the Oil and Natural Gas Industry (EPA-453/B-16-001) in October 2016. The Federal Clean Air Act (CAA) specifies that State Implementation Plans (SIPs) for nonattainment areas must include “reasonably available control measures” (RACM), including “reasonably available control technology” (RACT), for sources of emissions contributing to ozone formation. The EPA Oil and Natural Gas Industry CTG provides the State guidelines to address volatile organic compounds (VOC) emissions reductions.

The Maryland Department of the Environment (MDE) is conducting a review of potential sources subject to the requirements of the Oil and Natural Gas Industry CTG noted. MDE is reaching out to facilities with-in the oil and gas industry of the State. MDE is requesting a review of each Maryland facility to determine if the facility has a storage vessel that meets the definition and applicability of the CTG. For reference, the CTG Section 4.1 APPLICABILITY states “For purposes of this CTG, the emissions and emission controls discussed herein would apply to a tank or other vessel in the oil and natural gas industry that contains an accumulation of crude oil, condensate, intermediate hydrocarbon liquids, or produced water, and that is constructed primarily of non-earthen materials (such as wood, concrete, steel, fiberglass, or plastic) that provide structural support.” EPA's applicability for RACT recommendations are for individual storage vessels with a potential to emit greater than or equal to 6 tons per year VOC.

Please provide a list of all tanks at the Transcanada Rutledge Maryland compression station site including the tank contents and size, a calculation that shows the VOC fugitive emissions in tons per year, and whether or not the tank has a control device or vapor recovery unit (VRU). The calculations provided should follow the CTG guidance under Section 4.0 STORAGE VESSELS or an equivalent emissions evaluation process such as the "*Upstream Oil and Gas Storage Tanks Project Flash Emissions Models Evaluation*" by Texas Commission on Environmental Quality, 2009. The information provided will assist MDE in the determination of applicability with-in the State. MDE would like to receive this information by November 1, 2018.

Your assistance with this survey is appreciated. Please contact myself or Mr. John Artes at 410-537-4232 if you have need for any further information.

Sincerely,

Brian Hug, Program Manager, Air Quality Planning Program, Air and Radiation Administration

Attachment

cc: Randy Mosier, Division Chief, Air Regulations Division
Frank Courtright, Program Manager, Air Quality Compliance Program
John Artes, Regulatory & Compliance Engineer, Air Quality Compliance Program
Joshua Shodeinde, Regulatory & Compliance Engineer, Regulations Division
Christopher Cripps, EPA Region 3

Carolyn A Jones -MDE- <carolyna.jones@maryland.gov>

Re: Oil and Gas CTG

1 message

Randy Mosier -MDE- <randy.mosier@maryland.gov> Tue, Jan 21, 2020 at 8:29 AM
To: Carolyn A Jones -MDE- <carolyna.jones@maryland.gov>
Cc: John Artes -MDE- <john.artes@maryland.gov>, Joshua Shodeinde -MDE- <joshua.shodeinde@maryland.gov>

Williams response was just an email...

---------- Forwarded message ---------
From: **Lutz, Richard** <Richard.C.Lutz@williams.com>
Date: Tue, May 7, 2019 at 7:24 AM
Subject: RE: [EXTERNAL] Re: Oil and Natural Gas CTG Letter
To: Joshua Shodeinde -MDE- <joshua.shodeinde@maryland.gov>
Cc: Rich, Tim O <Tim.O.Rich@williams.com>, Chenaux, Nathan <Nathan.Chenaux@williams.com>, Chapa, Cecilia <Cecilia.Chapa@williams.com>

Joshua,

Thank you for forwarding the Oil and Natural Gas CTG Letter. I apologize for the delay in our response as Cecilia Chapa is on extended medical leave. There are four storage tanks at the facility that contain natural gas condensate. Transco typically utilizes TANKS 4.0.9d to evaluate tank emissions. The results of the TANKS runs are summarized in the table below:

Tank Contents	Volume (gallons)	VOC (tons/year)
Natural Gas Condensate	10,022	0.35
Natural Gas Condensate	8,820	0.24
Natural Gas Condensate	800 (portable tank)	0.03
Natural Gas Condensate	85	0.04

None of the tanks are equipped with a control device or vapor recovery unit. None of the tanks have a potential to emit greater than or equal to 6 tons per year VOC.

I can send you a more formal written response but wanted to provide you with this information as quickly as possible.

Please let me know if you require additional information.

Respectfully,

Rich Lutz

Environmental Specialist

Williams

Atlantic – Gulf Operating Area

345 Greenbrier Drive

Charlottesville, VA 22901

CHANGING Maryland FOR THE BETTER

Randy E. Mosier
Chief
Air Quality Regulations Division
Maryland Department of the Environment
1800 Washington Boulevard
Baltimore, Maryland 21230
randy.mosier@maryland.gov
(410) 537-4488 (O)
Website | Facebook | Twitter

SECTION 2a - Public Hearing Notices

General Notices

Notice of ADA Compliance

The State of Maryland is committed to ensuring that individuals with disabilities are able to fully participate in public meetings. Anyone planning to attend a meeting announced below who wishes to receive auxiliary aids, services, or accommodations is invited to contact the agency representative at least 48 hours in advance, at the telephone number listed in the notice or through Maryland Relay.

COMPTROLLER OF THE TREASURY/ADMINISTRATION AND FINANCE

Subject: Announcement
Add'l. Info: Pursuant to State Finance and Procurement Article, §8-128, Annotated Code of Maryland, which provides that, if within 2 years after the date of an authorization of State debt no part of the project or program for which the enabling act authorized the State debt is under contract and the Board of Public Works has not committed money for any part of the project or program, the authorization terminates unless:

(1) The enabling act provides otherwise; or

(2) In an emergency, the Board unanimously grants a temporary exception for a period of 1 year.

Therefore, with Board of Public Works approval of items, #11B MDE Secretary's Agenda Item, dated June 19, 2019, we submit for publication the following cancellation of bond authorization in accordance with the above-referenced articles:

Chesapeake Bay Water Quality Biological Nutrient Removal Program:

Ch. 424, Acts of 2013; $59,798; authorized the funds to provide no more than $29,200,000 in grants and projects to remove nutrients at publicly owned sewage treatment works.
Contact: Re Rentuma (410) 260-7909

[20-11-15]

STATE COLLECTION AGENCY LICENSING BOARD

Subject: Public Meeting
Date and Time: June 8, 2020, 2 — 3 p.m.
Place: Via videoconference; see details below
Add'l. Info: In response to Governor Hogan's Executive Order Number 20-03-30-01 (Stay-at-Home Order) and other applicable emergency orders, this meeting will be held via videoconference. Directions for access will be provided on the State Collection Agency Licensing Board website, http://www.labor.maryland.gov/finance/collagboard.shtml, prior to the meeting.
Contact: Devki Dave (410) 230-6019

[20-11-20]

MARYLAND CORRECTIONAL ENTERPRISES CUSTOMER COUNCIL MEETING

Subject: Public Meeting
Dates and Times: May 27, 2020, 11:30 a.m. — 12 p.m.; July 28, 2020: 9:30 — 10:30 a.m.; October 27, 2020: 9:30 — 10:30 a.m.
Place: Via conference call; see details below
Add'l. Info: MCE Customer Council Meetings will be held via conference call during the COVID-19 crisis. Further meeting announcements will be made available on our website: www.mce.md.gov.
Contact: Ashley Lohr (410) 540-5405

[20-11-11]

MARYLAND CORRECTIONAL ENTERPRISES MANAGEMENT COUNCIL MEETING

Subject: Public Meeting
Dates and Times: June 9, 2020, 9 a.m. — 11 a.m.; September 8, 2020: 9:00 — 11:00 a.m.; December 8, 2020: 9:00 — 11:00 a.m.
Place: Via conference call; see details below
Add'l. Info: MCE Management Council Meetings will be held via conference call during the COVID-19 crisis. Further meeting announcements will be made available on our website: www.mce.md.gov.
Contact: Ashley Lohr (410) 540-5405

[20-11-12]

EMERGENCY MEDICAL SERVICES ADVISORY COUNCIL

Subject: Public Meeting
Date and Time: June 4, 2020, 1 — 3 p.m.
Place: 653 W. Pratt St., Ste. 212, Baltimore, MD
Add'l. Info: The State Emergency Medical Services Advisory Council (SEMSAC) meets regularly the 1st Thursday of each month.
Contact: E. Fremont Magee (410) 706-8531

[20-11-04]

EMERGENCY MEDICAL SERVICES BOARD

Subject: Public Meeting
Date and Time: June 9, 2020, 9 a.m. — 11 p.m.
Place: 653 W. Pratt St., Ste. 212, Baltimore, MD
Add'l. Info: The State Emergency Medical Services Board (EMS Board) meets regularly on the 2nd Tuesday of each month. Part of the meeting may include a closed session.
Contact: E. Fremont Magee (410) 706-8531

[20-11-03]

DEPARTMENT OF THE ENVIRONMENT/AIR AND RADIATION ADMINISTRATION

Subject: Public Hearing on Air Quality Plans
Date and Time: June 4, 2020, 10 — 10:30 a.m.
Place: Join the virtual hearing at: https://global.gotomeeting.com/join/374590157 Or, dial in using your phone: 1 877 309 2073 (Toll Free). Access Code: 374-590-157, MD
Add'l. Info: The Maryland Department of the Environment (MDE) gives notice of a virtual public hearing concerning the Oil and Gas CTG Negative Declaration.

A virtual public hearing will be held on:

Thursday, June 4, 2020 — Virtual Hearing — 10 a.m.

Due to the ongoing COVID-19 pandemic, all public hearings are being held virtually in accordance with Maryland Executive Orders 20-03-19-01 and 20-03-30-01, which restrict public gatherings and enact a stay-at-home-order, respectively.

The State of Maryland is adopting a negative declaration documenting that the State has no facilities subject to the requirements of the Oil and Natural Gas Industry CTG, EPA-453/B-16001 to address volatile organic compounds (VOC) emissions reductions.

The public hearing will be held on Thursday, June 4, 2020, at 10 a.m. Information regarding the virtual hearing can be found below and on the MDE Air Quality Planning page at:

https://mde.maryland.gov/programs/Air/AirQualityPlanning/Pages/index.aspx

Join the hearing at:

https://global.gotomeeting.com/join/374590157. Or, dial in using your phone: 1-877-309-2073 (Toll Free). Access Code: 374-590-157

Comments may be sent to Lisa Nissley, Maryland Department of the Environment, Air and Radiation Administration, 1800 Washington Boulevard, Suite 730, Baltimore, MD 21230, or emailed to lisa.nissley@maryland.gov. Comments must be received by 5 p.m. on Thursday, June 11, 2020, or be submitted verbally during the hearing.

The proposed plan document is available on the MDE website at:

http://mde.maryland.gov/programs/Air/AirQualityPlanning/Pages/index.aspx

The public hearing will be held as required by federal law (Clean Air Act at 42 U.S.C. 7410 (a) and 40 CFR 51.102).

After consideration of comments received, the plan will be finalized and submitted to the United States Environmental Protection Agency (EPA) for approval.

TTY users should contact the Department through the Maryland Relay Service at 1-800-735-2258.

For more information, contact Lisa Nissley via email at lisa.nissley@maryland.gov.

Contact: Lisa Nissley (410) 537-3812

[20-11-13]

MARYLAND DEPARTMENT OF HEALTH/OFFICE OF HEALTH SERVICES

Subject: 1915(b)(4) Waiver Renewal Fee for Services Selective Contracting for Mental Health Targeted Case Management: Care Coordination for Adults and Mental Health Targeted Case Management: Care Coordination for Children and Youth — Request for Public Comment

Add'l. Info: The Maryland Department of Health (MDH) is renewing it's 1915(b)(4) waiver for fee for service (FSS) selective contracting for two mental health targeted case management (TCM) programs titled: Mental Health TCM: Care Coordination for Adults and Mental Health TCM: Care Coordination for Children and Youth. Under the 1915(b)(4) of the Social Security Act, Maryland has waived the freedom of choice of providers for TCM services. Selective contracting for TCM providers is completed Statewide by the Local Behavioral Health Authorities (LBHAs) acting as designees for MDH. The LBHAs select TCM providers for their jurisdictions through a competitive procurement process which results in contracts with one or more service providers based on the individual characteristics and needs of each jurisdiction.

The waiver renewal is requested for a period of 5 years beginning October 1, 2019, and ending September 30, 2024. Approval of this waiver renewal will have an impact on the Intensive Services for Children and Youth, 1915(i) state plan amendment by expanding eligibility to individuals who would be eligible for home and community-based services under one of the State's existing 1915(c) waivers and whose income does not exceed 300% of the supplemental security income (SSI) benefit rate.

The full draft waiver renewal and independent assessment can be found on the MDH website using the following link:

https://mmcp.health.maryland.gov/Pages/1915(i)-Intensive-Behavioral-Health-Services-for-Children,-Youth-and-Families.aspx.

Written comments may be sent to Rebecca Raggio, Medicaid Behavioral Health, MDH, 201 W. Preston St.,2nd floor, Baltimore, MD 21201, or fax to (410) 333-5425, or call (410) 767-1687, or email Rebecca.Raggio@maryland.gov or mdh.mabehavioralhealth@maryland.gov from May 22, 2020 to June 22, 2020.

Contact: Katia Fortune (410) 767-4267

[20-11-19]

MARYLAND STATE LOTTERY AND GAMING CONTROL COMMISSION

Subject: Public Meeting

Date and Time: May 28, 2020, 10 a.m. — 12 p.m.

Place: t/b/d — See Additional Information, Baltimore, MD

Add'l. Info: Due to COVID-19, please check the Lottery Agency website closer to meeting date for information about whether the meeting will be held by audio conference or in person.

Contact: Kathy Lingo (410) 230-3135

[20-11-07]

MARYLAND HEALTH CARE COMMISSION

Subject: Public Meeting

Date and Time: June 18, 2020, 1 — 4 p.m.

Place: 4160 Patterson Ave., Rm. 100, Baltimore, MD

Contact: Valerie Wooding (410) 764-3570

[20-11-01]

MARYLAND HEALTH CARE COMMISSION

Subject: Receipt of Application

Add'l. Info: On May 6, 2020, the Maryland Health Care Commission (MHCC) received a Certificate of Need application submitted by:

CMDS Residential, Inc. — Matter No. 20-24-2441

CMDS Residential is a private, for-profit, 104-bed long-term care residential facility that provides inpatient substance abuse treatment for patients who meet the 3.1, 3.3, and 3.5. Proposes to establish a new Track Two Intermediate Care Facility in Baltimore City, by converting 59 existing beds from level 3.1 to levels 3.7 and 3.7WM (30 beds for level 3.7 and 29 beds for level 3.7WM).

The MHCC shall review the applications under, Health-General Article, §19-101 et. seq., Annotated Code of Maryland, and COMAR 10.24.01.

Any affected person may make a written request to the Commission to receive copies of relevant notices concerning the application. All further notices of proceedings on the application will be sent only to affected persons who have registered as interested parties.

Please refer to the Matter No. listed above in any correspondence on the application. A copy of the application is available, for review, in the office of the MHCC, during regular business hours by appointment, or on the Commission's website at www.mhcc.maryland.gov.

All correspondence should be addressed to Paul Parker, Deputy Director, Center for Health Care Facilities Planning and Development, MHCC, 4160 Patterson Ave., Baltimore, MD 21215.

Contact: Ruby Potter (410) 764-3276

[20-11-16]

STATE ADVISORY COUNCIL ON QUALITY CARE AT THE END OF LIFE

Subject: Public Meeting

Date and Time: June 11, 2020, 10 a.m. — 12 p.m.

Place: Via videoconference; see details below

Add'l. Info: Videoconference Information: meet.google.com/ehd-mizv-wuo — Join by Phone +1 651-571-1596; PIN: 107 050 422 The public is welcome.

Contact: Paul Ballard (410) 382-1536

[20-11-18]

Maryland

Lisa Nissley -MDE- <lisa.nissley@maryland.gov>

MDE- Virtual Hearing Notice - Oil and Gas CTG Negative Declaration

12 messages

Lisa Nissley -MDE- <lisa.nissley@maryland.gov> Mon, May 4, 2020 at 3:55 PM
To: Lisa Nissley -MDE- <lisa.nissley@maryland.gov>
Bcc: kramamurth@pa.gov, Angelo Bianca -MDE- <angelo.bianca@maryland.gov>, Brian Hug -MDE- <brian.hug@maryland.gov>, DLAllCountyEnvironmentalHealthDirectors_MDE@maryland.gov, DLAllCountyHealthOfficers_MDE@maryland.gov, mgdowd@deq.virginia.gov, Randy Mosier -MDE- <Randy.Mosier@maryland.gov>, spielberger.susan@epa.gov, Tad Aburn <george.aburn@maryland.gov>, Cristina Fernandez <Fernandez.Cristina@epa.gov>, david.fees@state.de.us, Roger Thunell -MDE- <roger.thunell@maryland.gov>, Carolyn A Jones -MDE- <carolyna.jones@maryland.gov>, talley.david@epa.gov, laura.m.crowder@wv.gov, rama.tangirala@dc.gov

Attached for your information and shown in the message below is the notice of an upcoming virtual hearing on Thursday, June 4th, 2020 at 10:00 am, regarding a Maryland Department of the Environment State Implementation Plan (SIP) for air quality.

Thank you,

Lisa Nissley

Notice of Virtual Public Hearing on Air Quality Plan

The Maryland Department of the Environment (MDE) gives notice of a virtual public hearing concerning the Oil and Gas CTG Negative Declaration.

A virtual public hearing will be held on:

Thursday, June 4, 2020 – Virtual Hearing – 10:00 a.m.

Due to the ongoing COVID-19 pandemic, all public hearings are being held virtually in accordance with Maryland Executive Orders 20-03-19-01 and 20-03-30-01 , which restrict public gatherings and enact a stay-at-home-order, respectively.

The public hearing will be held on Thursday, June 4, 2020 at 10:00 a.m. Information regarding the virtual hearing can be found below and on the MDE Air Quality Planning page at: https://mde.maryland.gov/programs/Air/AirQualityPlanning/Pages/index.aspx

Join the hearing at:https://global.gotomeeting.com/join/374590157
Or, dial in using your phone: 1 877 309 2073 (Toll Free)
Access Code: 374-590-157

Comments may be sent to Lisa Nissley, Maryland Department of the Environment, Air and Radiation Administration, 1800 Washington Boulevard, Suite 730, Baltimore, MD, 21230 or emailed to lisa.nissley@maryland.gov. Comments must be received by 5:00 p.m. on Thursday, June 11, 2020 or be submitted verbally during the hearing.

The proposed plan document is available on the MDE website at: http://mde.maryland.gov/programs/Air/AirQualityPlanning/Pages/index.aspx

The public hearing will be held as required by federal law (Clean Air Act at 42 U.S.C. 7410 (a) and 40 CFR 51.102).

After consideration of comments received, the plan will be finalized and submitted to the United States Environmental Protection Agency (EPA) for approval.

TTY users should contact the Department through the Maryland Relay Service at 1-(800) 735-2258.
For more information, contact Lisa Nissley via email at lisa.nissley@maryland.gov.

Hearing Date June 4, 2020 10:00 a.m.

Hearing Location Virtual Hearing

Connection Information https://global.gotomeeting.com/join/374590157
Or, dial in using your phone: 1 877 309 2073 (Toll Free)
Access Code: 374-590-15

Deadline for Comments June 11, 2020, 5:00 p.m.
Comments may be mailed or emailed to the addresses listed below or submitted verbally during the hearing.

Proposed Documents SIP Document (insert link)

Objective of SIP Revision The State of Maryland is adopting a negative declaration documenting that the state has no facilities subject to the requirements of the Oil and Natural Gas Industry CTG, EPA-453/B-16001 to address volatile organic compounds (VOC) emissions reductions.

Contact Lisa Nissley
Mail Maryland Department of the Environment
1800 Washington Boulevard, Suite 730
Baltimore, MD 21230-1720
Email lisa.nissley@maryland.gov

TTY Through Maryland Relay Service 7-1-1 or 1-(800) 735-2258

This SIP Revision will be submitted to the U.S. Environmental Protection Agency for approval after consideration of comments.

--

Lisa Nissley
Maryland Department of the Environment
1800 Washington Blvd
Baltimore, MD 21230
Baltimore: (410) 537-3812

Carolyn A Jones -MDE- <carolyna.jones@maryland.gov> Mon, May 4, 2020 at 3:58 PM
To: Lisa Nissley -MDE- <lisa.nissley@maryland.gov>

received, looks good

Carolyn A. Jones, P.E.
Regulatory and Compliance Senior Engineer

Maryland

Carolyn A Jones -MDE- <carolyna.jones@maryland.gov>

Fwd: MDE- Virtual Hearing Notice - Oil and Gas CTG Negative Declaration

1 message

Carolyn A Jones -MDE- <carolyna.jones@maryland.gov> Fri, May 22, 2020 at 10:00 AM
To: Joe Pietro <Joseph.J.Pietro@dominionenergy.com>, Mili Patel <mili_patel@transcanada.com>, Michael.Hahn@williams.com, "Goodrich, Barry" <Barry.Goodrich@enbridge.com>
Cc: Brian Hug -MDE- <brian.hug@maryland.gov>, Randy Mosier <Randy.Mosier@maryland.gov>, Joshua Shodeinde -MDE- <joshua.shodeinde@maryland.gov>, Lisa Nissley -MDE- <lisa.nissley@maryland.gov>

Hello - We at MDE would like to inform you about an upcoming virtual public hearing on June 4th. The subject is Maryland's proposal for a negative declaration pertaining to the EPA's Oil and Gas Control Technique Guidelines. Your company provided information that was used to assess possible affected sources in Maryland, and no facility was determined to meet the CTG applicability criteria.

The State Implementation Plan (SIP) document is attached for your review. This is the final step as Maryland prepares to send EPA the required SIP. No action is required on your part. If you have any questions or concerns please contact me.

Thank you. Carolyn Jones, CarolynA.Jones@maryland.gov

On Mon, May 4, 2020 at 3:56 PM Lisa Nissley -MDE- <lisa.nissley@maryland.gov> wrote:

> Attached for your information and shown in the message below is the notice of an upcoming virtual hearing on Thursday, June 4th, 2020 at 10:00 am, regarding a Maryland Department of the Environment State Implementation Plan (SIP) for air quality.
>
> Thank you,
>
> Lisa Nissley
>
> **Notice of Virtual Public Hearing on Air Quality Plan**
>
> **The Maryland Department of the Environment (MDE) gives notice of a virtual public hearing concerning the Oil and Gas CTG Negative Declaration.**
>
> A virtual public hearing will be held on:
>
> Thursday, June 4, 2020 – Virtual Hearing – 10:00 a.m.
>
> Due to the ongoing COVID-19 pandemic, all public hearings are being held virtually in accordance with Maryland Executive Orders 20-03-19-01 and 20-03-30-01 , which restrict public gatherings and enact a stay-at-home-order, respectively.
>
> The public hearing will be held on Thursday, June 4, 2020 at 10:00 a.m. Information regarding the virtual hearing can be found below and on the MDE Air Quality Planning page at: https://mde.maryland.gov/programs/Air/AirQualityPlanning/Pages/index.aspx
>
> Join the hearing at:https://global.gotomeeting.com/join/374590157
> Or, dial in using your phone: 1 877 309 2073 (Toll Free)
> Access Code: 374-590-157
>
> Comments may be sent to Lisa Nissley, Maryland Department of the Environment, Air and Radiation Administration, 1800 Washington Boulevard, Suite 730, Baltimore, MD, 21230 or emailed to

lisa.nissley@maryland.gov. Comments must be received by 5:00 p.m. on Thursday, June 11, 2020 or be submitted verbally during the hearing.

The proposed plan document is available on the MDE website at: http://mde.maryland.gov/programs/Air/AirQualityPlanning/Pages/index.aspx

The public hearing will be held as required by federal law (Clean Air Act at 42 U.S.C. 7410 (a) and 40 CFR 51.102).

After consideration of comments received, the plan will be finalized and submitted to the United States Environmental Protection Agency (EPA) for approval.

TTY users should contact the Department through the Maryland Relay Service at 1-(800) 735-2258.
For more information, contact Lisa Nissley via email at lisa.nissley@maryland.gov.

Hearing Date June 4, 2020 10:00 a.m.

Hearing Location Virtual Hearing

Connection Information https://global.gotomeeting.com/join/374590157
Or, dial in using your phone: 1 877 309 2073 (Toll Free)
Access Code: 374-590-15

Deadline for Comments June 11, 2020, 5:00 p.m.
Comments may be mailed or emailed to the addresses listed below or submitted verbally during the hearing.

Proposed Documents SIP Document (insert link)

Objective of SIP Revision The State of Maryland is adopting a negative declaration documenting that the state has no facilities subject to the requirements of the Oil and Natural Gas Industry CTG, EPA-453/B-16001 to address volatile organic compounds (VOC) emissions reductions.

Contact Lisa Nissley
Mail Maryland Department of the Environment
1800 Washington Boulevard, Suite 730
Baltimore, MD 21230-1720
Email lisa.nissley@maryland.gov

TTY Through Maryland Relay Service 7-1-1 or 1-(800) 735-2258

This SIP Revision will be submitted to the U.S. Environmental Protection Agency for approval after consideration of comments.

--
Lisa Nissley
Maryland Department of the Environment
1800 Washington Blvd
Baltimore, MD 21230
Baltimore: (410) 537-3812

---

2 attachments

MD Reg Hearing Notice Oil and Gas CTG 05222020.pdf
261K

MDE_Oil_GasCTGNegDec_SIP20-07_DRAFT.pdf
13197K

Maryland
Department of
the Environment

Larry Hogan
Governor

Boyd Rutherford
Lieutenant Governor

Ben Grumbles
Secretary

June 12, 2020

CERTIFICATION OF PUBLICATION

This is to certify that the "Oil and Gas CTG Negative Declaration." hearing was published on MDE's web site May 4, 2020 and will be kept online through June 11, 2020.

The notice in full with links to supporting documents may be found in the following web address:

https://mde.maryland.gov/programs/Air/AirQualityPlanning/Pages/index.aspx

Web publication of the notice was at the request of Carolyn Jones, Regulatory and Compliance Senior Engineer of the Air and Radiation Administration (ARA) of MDE.

By:

Joseph E. Herb Jr.

JOE HERB
MDE Webmaster

Attachment:
Copy of web page as published.

Maryland.gov Phone Directory State Agencies Online Services Translate

Maryland | MARYLAND Department of the Environment

Enter search term

HOME | ABOUT MDE | AIR | LAND | WATER | MARYLANDER | PERMITS | NEWSROOM

Air Quality Planning

- Regulation Development
- Climate Change
- Air Quality Planning Home

Air Quality Planning Program

Maryland's Air Quality Planning Program (AQPP) writes state implementation plans and regulations to reduce emissions and achieve the National Ambient Air Quality Standards (NAAQS) for six "criteria" air pollutants: ground-level ozone, particulate matter, lead, carbon monoxide, nitrogen dioxide, and sulfur dioxide. The AQPP also implements federal, regional, local, and state greenhouse gas emissions reduction programs, including implementing the requirements of the Maryland Greenhouse Gas Emissions Reduction Act of 2009 and managing Maryland's involvement in the Regional Greenhouse Gas Initiative (RGGI).

The AQPP consists of three divisions covering its different program areas:

(1) Planning and Policy
(2) Regulation Development
(3) Climate Change

Planning and Policy: State Implementation Plans (SIPs)

The Planning and Policy Division develops State Implementation Plans (SIPs), inventories, and related reports which document how the state will attain and maintain the National Ambient Air Quality Standards, and prevent significant deterioration of air quality in areas cleaner than the standards.

Public Comment Periods

(For details, click »» the topics below.)

»» 2019 Annual Sulfur Dioxide Data Requirements Report for Gen-On Chalk Point LLC Generating Station & Gen-On Mid-Atlantic Morgantown Generating Station

Scheduled Hearings

Due to the ongoing COVID-19 pandemic, all public hearings are being held via Internet-based conferences until further notice, in accordance with Governor Hogan's limitation on group gatherings of more than ten people and the safer-at-home advisory enacted on May 15, 2020.

(For details, click »» hearing topics below.)

»» 2017 Base Year Emissions Inventory for the Washington DC-MD-VA 2015 Ozone NAAQS Nonattainment Area

»» Oil and Gas CTG Negative Declaration

Hearing Date	June 4, 2020 at 10:00 a.m.
Hearing Location	Virtual Hearing
Virtual Hearing Connection Information	Join Online: https://global.gotomeeting.com/join/374590157 Dial-in Number: 1-877-309-2073 (Toll Free) Access Code: 374-590-157
Deadline for Comments	**5:00 p.m. on Thursday, June 11, 2020 Comments may be mailed or emailed to the addresses listed below or submitted verbally during the hearing.**
Proposed Documents	SIP Document
Objective of SIP Revision	The State of Maryland is adopting a negative declaration documenting that the state has no facilities subject to the requirements of the Oil and Natural Gas Industry CTG, EPA-453/B-16001 to address volatile organic compounds (VOC) emissions reductions.
Contact	Lisa Nissley
Mail	Maryland Department of the Environment 1800 Washington Boulevard, Suite 730 Baltimore, MD 21230-1720
Email	Lisa.Nissley@maryland.gov
Phone	(410) 537-3252
Toll-Free	1-(800) 633-6101 ext. 3812
TTY Through Maryland Relay Service	7-1-1 or 1-(800) 735-2258

This SIP Revision will be submitted to the U.S. Environmental Protection Agency for approval after consideration of comments.

SECTION 2b - MDE Hearing Statement

Hearing Statement

Statement of the Air and Radiation Administration

Maryland Department of the Environment

Oil and Gas CTG Negative Declaration June 4, 2020

Good morning. My name is Carolyn Jones. I am a Regulatory and Compliance Engineer in the Regulations Division, Planning Program of the Air & Radiation Administration, Maryland Department of the Environment.

This virtual public hearing is related to the state implementation plan (SIP) entitled **Negative Declaration for Control Techniques Guidelines (CTG) for the Oil and Natural Gas Industry, EPA document 453/B-16-001 dated October 2016.**

Due to the ongoing COVID-19 pandemic, all public hearings are being held virtually in accordance with Maryland Executive Orders 20-03-19-01[1] and 20-03-30-01[2], which restrict public gatherings and enact a stay-at-home-order, respectively.

This public hearing is being held pursuant to federal law found at 42 U. S. C. Section 7410(a) and 40 CFR Part 51.102. It is also being held in conformance with the State Administrative Procedure Act, under the State Government Article, beginning at Section 10-101.

Notice of a public hearing for this plan was posted on the Maryland Department of the Environment's website

1 https://governor.maryland.gov/wp-content/uploads/2020/03/Proclamation-COVID-19.pdf
2 https://governor.maryland.gov/wp-content/uploads/2020/03/Gatherings-FOURTH-AMENDED-3.30.20.pdf

on May 4, 2020. The notice also appeared in the *Maryland Register*, Volume 47, Issue 11, dated May 22, 2020. The comment period for this proposed document began on May 4, 2020 and will remain open until 5 p.m. on June 11, 2020.

Copies of the proposed SIP and supporting documents are submitted at this time into the hearing record. Access to the proposed negative declaration SIP document was made available by request or via the website of the Maryland Department of the Environment. The purpose of this hearing is to provide the public with an opportunity to formally comment on the proposed document.

Summary

The State of Maryland is submitting a negative declaration documenting that the state has no facilities subject to the requirements of the Oil and Natural Gas Industry CTG and EPA document 453/B-16001 to address volatile organic compounds (VOC) emissions reductions. The Federal Clean Air Act (CAA) specifies that State Implementation Plans (SIPs) for nonattainment areas must include "reasonably available control measures" (RACM), including "reasonably available control technology" (RACT), for sources of emissions contributing to ozone formation. As an alternative to adopting a RACT rule, a state may adopt a negative declaration documenting that it has no facilities to which the CTG is applicable. This action will be submitted to the U.S. Environmental Protection Agency (EPA) for approval as part of Maryland's SIP.

CONSIDERATION OF COMMENTS

The Department will consider all pertinent comments, and revise the proposed plan if necessary, before making a final decision to adopt the plan and submit it to the EPA for approval as part of Maryland's SIP.

SECTION 2c - Public Hearing Transcript

MARYLAND DEPARTMENT OF THE ENVIRONMENT

AIR AND RADIATION ADMINISTRATION

PUBLIC HEARING

THE STATE IMPLEMENTATION PLAN FOR THE NEGATIVE DECLARATION FOR CONTROL TECHIQUES GUIDELINES (CTG) FOR THE OIL AND NATURAL GAS INDUSTRY EPA DOCUMENT 453/B-16-001 DATED OCTOBER 2016

The virtual hearing in the above matter commenced on Thursday, June 4, 2020, at the MDE Headquarters, Montgomery Park, 1800 Washington Boulevard, Baltimore, Maryland.

BEFORE: Lisa Nissley, Hearing Officer

Reported by: Karen Willoughby, CER

A P P E A R A N C E S

ON BEHALF OF THE MARYLAND DEPARTMENT OF THE ENVIRONMENT:

LISA NISSLEY
Communications Specialist
Air and Radiation Administration
Maryland Department of the Environment
1800 Washington Boulevard
Baltimore, Maryland 21230

CAROLYN JONES
Senior Regulatory and Compliance Engineer
Air Quality Regulations Division
Air and Radiation Administration
Maryland Department of the Environment
1800 Washington Boulevard
Baltimore, Maryland 21230

A T T E N D E E S

Mili Patel, TC Energy

Randy Mosier, MDE

Agenda Item:
Opening Remarks, Lisa Nissley, MDE
Hearing Statement, Carolyn Jones, MDE

P R O C E E D I N G S

\- - - - -

(10:00 a.m.)

LISA NISSLEY: If the court reporter would turn on the equipment, we will begin. On behalf of the Department of the Environment and the Air and Radiation Administration, I would like to welcome you to this public hearing. My name is Lisa Nissley, and I am a Communications Specialist in the Air and Radiation Administration. I will serve as hearing officer for today's hearing. This hearing is being recorded as well as transcribed.

This hearing concerns the State Implementation Plan for the Negative Declaration for Control Techniques Guidelines (CTG) for the Oil and Natural Gas Industry, EPA document 453/B-16-001 dated October 2016.

Please note that MDE is not using the webinar chat feature during this hearing. We will read the hearing statement at 10:10 a.m. I will now check to see if we have any participants for this hearing. I will unmute the line. Please state and spell your name and indicate if you would like to make a statement.

(Unmuted.) (No response.)

LISA NISSLEY: Hello again. Could I ask the court reporter to confirm that the equipment is unmuted?

THE REPORTER: Hi, Lisa. This is Karen. Yes, we are still on the record.

LISA NISSLEY: Okay, great.

(Unmuted.)

LISA NISSLEY: This is Lisa Nissley with MDE. Are there any members of the public on the line who have not previously announced themselves?

(Unmuted.)

LISA NISSLEY: I do see someone labeled Mili, M-I-L-I, if you could introduce yourself for the record.

MILI PATEL: My apologies. I was

having audio issues. This is Mili Patel with TC Energy. No statement.

LISA NISSLEY: Thank you.

Okay. I am going to read the hearing statement in about two more minutes. We will wait to see if anyone else joins before then. Thank you.

(Muted.)

LISA NISSLEY: Let the record show that the time is 10:10 a.m. on June 4th, 2020. This hearing was scheduled for a 10:00 a.m. start time. We will now proceed with the public hearing concerning the State Implementation Plan for the Negative Declaration for Control Techniques Guidelines (CTG) for the Oil and Natural Gas Industry.

My name is Lisa Nissley and I am a Communications Specialist in the Air and Radiation Administration. I will serve as hearing officer for today's hearing.

The purpose of this hearing is to give

the public the opportunity to comment on this state implementation plan. The State of Maryland is adopting a negative declaration documenting that the state has no facilities subject to the requirements of the Oil and Natural Gas Industry CTG, EPA-453/B-16001 to address volatile organic compounds (VOC) emissions reductions. Notice of a public hearing for this plan appeared as follows:

(1) on the Maryland Department of the Environment's website, "Air Quality Planning Program" page on May 4, 2020.

(2) in the Maryland Register, Volume 47, Issue 1, Friday, May 22, 2020.

The public comment period began on May 4, 2020 for receipt of all comments to the plan. Written comments for this proposal must be received by 5:00 p.m. on Thursday, June 11, 2020. Comments may be sent to Lisa Nissley, Maryland Department of the Environment, Air and Radiation Administration, 1800 Washington

Boulevard, Suite 730, Baltimore, Maryland, 21230 or emailed to lisa.nissley@maryland.gov.

The hearing will proceed in the following order. First, I will introduce Ms. Carolyn Jones, the representative of the Air and Radiation Administration, who will make a statement. After Ms. Jones reads the hearing statement, I will call upon members of the public who have indicated that they would like to make a statement.

A summary of all comments received will be answered in writing and published with the final SIP document.

I will now call on Ms. Carolyn Jones.

CAROLYN JONES: Good morning. My name is Carolyn Jones. I am a Regulatory and Compliance Engineer in the Regulations Division, Planning Program, of the Air and Radiation Administration, Maryland Department of the Environment. This virtual public hearing is related to the state implementation plan (SIP) entitled "Negative Declaration for Control Techniques Guideline (CTG) for the Oil and Natural Gas Industry, EPA Document 453/B-16-001, dated October 2016."

Due to the ongoing COVID-19 pandemic, all public hearings are being held virtually in accordance with Maryland Executive Orders 20-30-19-01 and 20-03-30-01, which restrict public gatherings and enact a stay-at-home-order, respectively.

This public hearing is being held pursuant to federal law found at 42 U.S.C. Section 7410(a) and 40 CFR Part 51.102. It is also being held in conformance with the State Administrative Procedure Act, under the State Government Article, beginning at Section 10-101.

Notice of a public hearing for this plan was posted on the Maryland Department of the Environment's website on May 4, 2020. The notice also appeared in the Maryland Register, Volume 47, Issue 11, dated May 22, 2020. The comment period for this proposed document began on May 4, 2020 and will remain open until 5 p.m. on June 11, 2020.

Copies of the proposed SIP and supporting documents are submitted at this time into the hearing record. Access to the proposed negative declaration SIP document was made available by request or via the website of the Maryland Department of the Environment. The purpose of this hearing is to provide the public with an opportunity to formally comment on the proposed document.

Summary:

The State of Maryland is submitting a negative declaration documenting that the state has no facilities subject to the requirements of the Oil and Natural Gas Industry CTG and EPA document 453/B-16001 to address VOC emissions reductions. The Federal Clean Air Act (CAA) specifies that State Implementation Plans (SIPs) for nonattainment areas must include "reasonably available control measures" (RACM), including "reasonably available control technology" (RACT), for sources of emissions contributing to ozone formation. As an alternative to adopting a RACT rule, a state may adopt a negative declaration documenting that it has no facilities to which the CTG is applicable. This action will be submitted to the U.S. Environmental Protection Agency (EPA) for approval as part of Maryland's SIP.

The Department will consider all pertinent comments and revise the proposed plan if necessary, before making a final decision to adopt the plan and submit it to the EPA for approval as part of Maryland's SIP.

That's the end of my statement. Thank you.

LISA NISSLEY: There are no persons in the audience wishing to make any statements on the record, so we request that the court reporter please enter the hearing statement into the record at this time.

It is now 10:17 a.m., and this will conclude the public hearing for State Implementation Plan for the Negative Declaration for Control Technique Guidelines (CTG) for the Oil and Natural Gas Industry.

Thank you.

(Whereupon, at 10:17 a.m., the hearing was adjourned.)

CERTIFICATE OF REPORTER

I, Karen Willoughby, do hereby certify that the foregoing proceedings were recorded by me and reduced to typewriting under my supervision; that I am neither counsel for, related to, nor employed by any of the parties to the action in which these proceedings were transcribed; and further, that I am not a relative or employee of any attorney or counsel employed by the parties hereto, nor financially or otherwise interested in the outcome of the action.

____s/Karen Willoughby________

KAREN WILLOUGHBY, CER

SECTION 2d - Comments / Response to Comments

DEPARTMENT OF THE ENVIRONMENT
AIR AND RADIATION ADMINISTRATION

RESPONSE TO COMMENTS

for the

PUBLIC HEARING held on June 4, 2020
in BALTIMORE, MD
related to
Maryland's negative declaration for the Environmental Protection Agency's (EPA)
Oil and Natural Gas Industry CTG, EPA-453/B-16001

Purpose of Hearing: The purpose of the public hearing was to allow for public comment on the Maryland Department of the Environment's (the Department or MDE) adopting a negative declaration documenting that the State has no facilities subject to the requirements of the Oil and Natural Gas Industry CTG, EPA-453/B-16001 to address volatile organic compounds (VOC) emissions reductions.

Date and Location: The virtual public hearing was held on June 4, 2020 at 10 a.m. utilizing GoToMeeting. The comment period was extended to June 11, 2020.

Attendance: 1 attendee. Ms. Mili Patel.

Statement: The Department's statement was read by Carolyn Jones, Senior Regulatory and Compliance Engineer of the Regulations Development Division of the Air and Radiation Administration, Department of the Environment.

Comments and Responses: There were no comments received.